Full Cost Accounting: An Agenda for Action

by

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1. An introduction to the issues

1.1 INTRODUCTION

This research monograph is intended to provide guidance on how the accountancy profession may begin to address the issue of how, if at all, it could be part of the development of some form of full cost accounting (FCA). The policy impetus for FCA comes from the call, buried within the detail of the European Commission's (EC)[1] *Fifth Action Programme*, for the profession to develop FCA so that 'the consumption and use of environmental resources are accounted for as part of the full cost of production and reflected in market prices' (EC, 1992, Vol. II, p. 67)[2]. As can be seen from the preceding quote, FCA is not an end in itself. Rather, the EC makes it clear that FCA is a means by which market prices can be 'corrected' in order to create an economic system that is more likely to deliver 'sustainable development'. The assumptions that:

(i) the current economic system is deficient

and

(ii) that the goal of sustainable development is desirable,

constitute the starting point of this monograph. A reasonably lengthy introduction to these issue is, we believe, necessary in order to demonstrate why FCA is, potentially, a radical tool that could transform the current economic context within which business and society operates (with attendant changes in the environmental and social impacts of that economic activity).

It is now well established that neither conventional accounting numbers nor conventional economic measurement capture all the consequences of economic actions, (see, for example, Pearce et al., 1989; Gray, 1990; Costanza, 1991; Vase 1998 and Ekins 2000a). More particularly, the form of accounting used at the micro-level (to manage and direct organisational behaviour and to assess the success or failure of organisations) and at the macro level (to guide national and international policy making and to assess the effectiveness of those policies) virtually ignores anything that does not have a price attached to it. As prices only arise through the transfer of private property rights of a 'thing', those 'things' over which private property rights do not exist (for example, clean air) and those aspects of transactions that tend not to be impounded in the price (for example, aesthetic considerations) are largely ignored by society's principal driving and assessment mechanisms. The consequences of this are obvious – important economic and business decisions are made with little or no explicit concern for the *externalities*[3] (see also section 1.3) that arise from those decisions. It becomes inevitable that decisions will be made, and activities undertaken, that may well maximise private

economic and financial *benefits* but that may also maximise social and environmental *costs*. The fact that this appears to have happened with alarming environmental, economic and social consequences (see section 1.2 below and box 1.1) provides a considerable impetus for developing tools for sustainability orientated decision making, with FCA being one such alternative. FCA is, however, by no means the only option – chapter 3 will consider a variety of alternatives to FCA.

For much of modern history, the failure of economics to operate as it claims it does has been recognised as a problem, but a problem of relatively personal (or at least marginal) concern. That is, although matters such as poverty, injustice, degradation of the natural environment and the exploitation of non-Western nations were recognised as issues, the causes of those issues and the appropriate ethical response were less clear at a visible, consensual level. Or, at least, we must make such an assumption because otherwise the

Box 1.1 Economic growth and the developing world

There is an underlying assumption that economic growth in the developed countries will stimulate growth and prosperity in the developing world. Pirages (1990), while noting that the developing world is 'often uncharitably referred to as "the never to be developed world"' (p. 2), suggests that it is not at all clear that:

> *'a slowly rising tide [of economic growth] will lift all ships. In fact, there is well-founded fear that the tide may be ebbing and leaving them [developing countries] behind as litter on the beach'* (pp. 2/3).

Likewise, Bartelmus (1994) identifies the 1980s as the 'lost decade of development' (p. 1, see also Esteva, 1992, p16; Sachs, 1995, p. 7) and notes that '[w]ith a few exceptions of developing countries in South-east Asia, the rich countries got richer and the poor ones poorer' (p. 1). In a similar manner Tolba and El-Kholy (1992) note that:

> *'[w]hile the world economy has grown considerably ... much of the growth has been in countries that were already consuming an inordinate share of the world's resources. Many of the least developed countries had little economic growth and a substantial fall in per capital production during the 1980s'* (p. 816).

willingness of the wealthy in humanity to ignore the desecration and degradation of nature and other human beings could be viewed only as either an act of criminal negligence or the natural consequence of a fatally flawed system of economic organisation and rewards.[4]

In 1987, the United Nations Commission on Environment and Development (UNCED), which published *The Brundtland Report*, achieved a measure of global consensus that the indicators of planetary health were showing increasingly alarming trends of 'bad news' (as were many of the social and economic indicators for the developing world). In addition, UNCED placed the term 'sustainable development' at the heart of international policy making and the world entered a new phase (see boxes 1.2 and 1.3). No longer were the problems identified in the *Brundtland Report* considered to be localised ones over which we might make personal choices. Rather, they were global, systemic and threatened the existence of us all, rich and poor (see, for example, Holdgate et al., 1982 and Grubb et al., 1993). Equally, the ethical dilemma was (apparently) removed from the equation in that a global consensus was (apparently) reached that neither global environmental desecration nor social injustice was any longer acceptable to humanity (see priorities in box 1.2).

It is at this point that the full range of political, economic, social, ethical, legal and other assumptions, value judgements and beliefs enter the picture. But can they be allowed to enter the picture? We have known for a very long time that while capitalism, as we currently understand it, brings many apparent benefits, it also brings many apparent problems. Yet, collectively, we have chosen to do little or nothing about it. To question such matters has been, in the past, to invoke cries of 'Marxism' or, even worse, 'communism', as if these were the worst crimes of which humanity is capable. Therefore, the current consensus, at least among the wealthier and more influential individuals and nations, is that while subscription to sustainable development remains and the worst excesses of our currently unsustainable system *are* unacceptable, the basic structure and frameworks in which we work are simply not up for grabs. No matter what the evidence, no debate can be entertained in polite and wealthy (that is, influential) circles if either the principles of international capitalism and the globalisation of financial markets are questioned or the wealthy are considered to be held guilty for the condition of the planet and the poor.

This is where ***full cost accounting*** comes into the equation. If the system is based on prices and costs and if we *must* accept that the system is OK (but see box 1.3, which suggests that not everyone sees this as being appropriate) and that the competence and decency of those running the system is not open to question – then it can only be that the prices and costs on which these decisions are made are wrong. FCA is, at its

Box 1.2 The *Brundtland Report* and the definition of sustainable development

Sustainable development is defined as 'development which meets the need of the present without compromising the ability of future generations to meet their own needs' (p. 8). The critical objectives for environment and development policies that follow from this concept include:

- reviving growth
- changing the quality of growth
- meeting essential needs for jobs, food, energy, water and sanitation
- conserving and enhancing the resource base
- reorienting technology and managing risk

  and

- merging environment and economics in decision-making.

Source: UNCED, 1987, p. 49, see also Bartelmus, 1994, p. 8.

simplest, a system which allows current accounting and economic numbers to incorporate all potential/actual costs and benefits into the equation including environmental (and, perhaps, social) externalities to *'get the prices right'.*
This chapter is designed to provide a broad overview to FCA, explore its various meanings and analogues and examine its limitations and potentials. In doing so, the chapter provides a basis for the rest of the monograph, where we will explore the concept of FCA in more depth and, in particular, look at ways in which such a notion can be fed into practice at organisational, national and international levels.

This chapter is organised as follows. First, a brief introduction to the concerns of sustainable development is given because it is from the sustainable development agenda that the call for FCA emerges. Second, the various ways in which externalities could be internalised are introduced and discussed. Third, FCA is outlined in more detail (a task

Box 1.3 Reflections on the *Brundtland Report*

Anupam Mishra, an Indian environmentalist, claims that the *Brundtland Report* follows:

> *'all governments and UN documents in highlighting poverty and the population explosion as the biggest obstacles to environmental conservation ... the real cause of environment destruction, increasing poverty and a growing world population lies in their own prescriptions of a Western standard of living for everybody, not vice versa'* (De la Court, 1990, p. 14/15).

Redclift (1992) suggests that the kind of social and environmental problems one sees and the kind of solutions that appear to be feasible are rooted in implicitly held cultural assumptions:

> *'Where one chooses to set the parameters of this process [pursuit of sustainability] depends on the range of social concerns that are identified ... [t]he essential point is that environmental problems ... are the outcome of a series of choices ... [t]he epicentre of these choices is the developed world, and most of these choices are so culturally grounded that few people in the North recognize them as choices at all: they are routinely depicted as "needs" rather than "wants". In exploring the human dimensions of global environmental change we might usefully explore these social commitments'* (p. 40).

that is continued in chapter 4). Fourth, two examples are developed in order to demonstrate the issues that arise in undertaking FCA. The penultimate section of this chapter briefly considers the critique of FCA emanating from the 'deep greens'. Finally, some concluding comments are made.

The monograph is structured broadly along the lines of this chapter in order to explore the issues introduced here in greater depth and permitting the possible policy implications and limitations to emerge from the discussion and evidence. The monograph is, therefore, structured as follows.

Chapter 2 sketches the policy back ground to the EC's call for FCA. The history of FCA as a possible policy initiative is traced to the Earth Summit and a 'watered down' version of the need for FCA can be found in *Agenda 21*. In addition, FCA has from time to time

found its way into various publications of the accounting profession worldwide. These publications are reviewed and we provide a summary of the accounting professions engagement with FCA.

In chapter 3 the focus is expanded to consider the array of state and market instruments that are already creating some kind of FCA (and that could be extended to bring more costs within an organisation). This chapter draws from the disciplines of law and economics, and we seek to fit the accountant's pursuit of FCA within that framework.

Chapter 4 is more technically orientated and introduces a variety of tools and ways of thinking that would need to be developed in order for some sort of FCA to be attempted. Techniques such as life cycle analysis, eco-balances and ecological footprints are pre-requisites to the development of an FCA. In addition, we outline the variety of possible costs that could be calculated on the basis of information gathered from these techniques. Finally, an attempt to define the steps in any FCA approach is made.

Chapters 4 and 5 are closely interlinked, with chapter 5 explicitly developing the suggested FCA approach outlined in chapter 4, by examining the FCA experiments of the last decade. These experiments are relevant for an accounting orientated consideration of FCA because they are focused on seeking to determine fuller costs for specific corporate entities. Thus they could be seen as examples of what the accountancy profession would be involved in, if it chose to develop FCA. In addition, chapter 5 leads into the evaluation (undertaken in chapter 6) as to why one would undertake FCA.

Chapter 6 reports on the research undertaken specifically for this monograph to gauge both the profession's and corporate response to the EC's FCA proposals. In particular, we have undertaken a number of interviews (both in person and via e-mail) with those undertaking FCA and others who are key players in the policy arena surrounding FCA. Further, in order to gauge the likelihood of the profession responding to the EC's call for FCA, we surveyed Féderation des Experts Comptables Européens (FEE) member bodies as a way to gain some idea of the European accounting profession's intentions in this area (details of the research methods undertaken for this monograph are contained in the appendix).

In chapter 7 we bring together the evidence presented in the preceding chapters and draw out a number of the recommendations along with an indication of who should be responsible for implementing the recommendations.

1.2 REHEARSING THE ISSUES

Taking stock of humankind's stewardship of the planet reveals an unflattering picture. The ozone layer, climate change, species extinction, habitat loss, starvation, malnutrition, water shortages, desertification, inequality (and the list could go on) all illustrate a lack of stewardship. More particularly, the global community at the *Earth Summit* in 1992[5] finally recognised the extent of the growing problem and largely agreed an agenda whereby national and international governments and agencies would undertake to seek to reverse these life-threatening trends (see box 1.4). One of the significant documents to emerge from the Earth Summit, *Agenda 21,*[6] outlined a number of ways in which sustainable development could be implemented – including a suggestion for FCA (see chapter 2). In 1997, the global community met again (at what was described as *Rio+5*) and, to its dismay, found that all the indicators were still going in the wrong direction despite five or more years of significant efforts. In the current policy language, the global community was not living sustainably and our ways of financial, economic, legal and business organisation were looking less and less sustainable year by year, albeit that the rate at which our unsustainability progressed may (for some elements) have slowed (see in a European context, the European Environment Agency, 1999, 2000a).[7]

At least one part of the difficulty facing attempts to reverse negative environmental trends was a lack of detailed agreement among the parties as to the extent and cause of our current unsustainability. While all apparently subscribed to the necessity of seeking a state of sustainability, not all could agree on the extent of the unsustainability, the causes of this state, or the solutions necessary. In order to overcome this problem, and the related problem that we cannot expect to know when we have achieved sustainable development, commentators often provide a spectrum of understanding of sustainable development. The spectrum is phrased in terms of 'strong' and 'weak' sustainability and box 1.5 explores eight key questions that frame the sustainable development debate – responses to these questions provide a contrast between 'strong' and 'weak' sustainability (see also Neumayer, 1999, who explores these opposing paradigms in greater depth).

It comes a little surprise to discover that most Western organisations, and especially governments and business, lean towards a 'weak' sustainability point of view (see, for example, Bebbington and Thomson, 1996 and Bebbington, 1999). That is, within the political and business agendas dominated by Western governments and business, no consideration was permitted of solutions that might be predicated on any questioning of the underlying structure of Western capitalism, business structures and objectives or attachments to conventional measures of economic growth, well-being and profitability (see Mayhew, 1997 and Hildyard, 1995, who document how this focus has been maintained). This position may very well prove to be incorrect in the medium to longer

Box 1.4 The Earth Summit: comments and criticisms

Hildyard (1995) characterises the Earth Summit as 'finish[ing] where it began' (p. 22) and asserts it failed to examine key structural features of unsustainability. He states the net outcome was to:

> *'minimise change to the status quo ... Unwilling to question the desirability of economic growth, the market economy or the development process itself, UNCED never had a chance of addressing the real problems of "environment and development". Its Secretariat provided delegates with materials for a convention on biodiversity, but not on free trade; on forests but not on agribusiness; on climate but not on automobiles. Agenda 21 ... featured clauses on "enabling the poor to achieve sustainable livelihoods" but none on enabling the rich to do so;*[8] *a section on women but none on men. By such deliberate evasion of the central issues which economic expansion poses for human societies, UNCED condemned itself to irrelevance even before the first preparatory meeting got under way'* (pp. 22/23, see also Jordan 1993).

Grubb et al., (1993) identified a tension within the UNCED conference proceedings and they note: *'there was a fundamental paradox in the fact that UNCED participants almost universally interpreted the "D" (development) to mean the process of poor countries getting richer, along an economic path similar to that followed by the industrialised countries, while the whole point of the "E" (environment) was to encourage such countries to "leapfrog" that path of development to a wealthy but sustainable state.'* (p. 32).

term as it is, after all, based on belief, hope and assumption. It is, however, not based on reasoning or evidence (*a priori* evidence would suggest that the problem is largely systemic and lies in the roots of how we organise our means of economic production – see the above discussion).

We will briefly review the principal critiques of this weak sustainability position in section 1.6 below. At this stage, however, it is sufficient to note that the global agenda (which requires urgent action to ameliorate the environmental and social crisis) remains dominated by 'weak' sustainability views. The choice facing any individual or

organisation concerned about the states of (un)sustainability is a harsh one – to work with Western business and economics on the assumption that it must be part of the solution or step outside Western capitalist hegemony and seek more radical change. In particular, the types of protests that have surrounded World Trade Organisation meetings (most notably in Seattle and The Hague) are but one, highly visible, way in which concerns about the functioning of Western capitalism have been expressed in the public domain.

FCA is one of a range of concepts that seek to work through the mechanisms of current business and economic organisation to pursue more environmentally-sensitive and socially-just futures. Such approaches may well be misguided but such immanent, reformist mechanisms are the only ones with which business, governments – and, indeed accounting bodies – seem currently able to engage. It is, therefore essential to state that with brief exceptions this monograph takes the reformist agenda as given and seeks to explore what possibilities exists within it. The question then becomes (if we must leave unchallenged the essential tenets of conventional business and economics): how can that system be persuaded to continue to do what it does, but in a manner that is more sensitive to issues of environmental degradation and social justice? Possible answers to this central question are outlined in the following section.

1.3 INTERNALISING THE EXTERNALITIES?

Implicit within the EC's call for FCA are two assumptions. First is the belief that current prices do not tell the, so-called, 'ecological truth'. That is, by and large, that prices underestimate, for example, the environmental damage caused by products, processes and services and that this is one factor that sustains the present environmental problems we face. Second, there is a belief that if the market price of a product, for example, were to reflect accurately the relative environmental cost of that product, then consumers would be encouraged to switch their consumption from more to less damaging products because there would be a financial incentive for them to do so.[9] It is envisaged that such a consumer reaction would lead to consumption patterns that would be less environmentally damaging. An effect associated with this likely change in consumer choices would be that producers would strive for reductions in the environmental impact of their products because to do so would enhance their competitive advantage.

If one accepts that current prices fail to incorporate the majority of environmental (and social)[10] issues then, in the language of economics, one is talking about externalities. Externalities arise where private decisions (taken for largely personal reasons) do not reflect either the public costs of those decisions (costs borne in society as a whole)[11] or

Box 1.5: 'Strong' and 'Weak' sustainability

Aspect	'Strong' Sustainability	'Weak' Sustainability
Focus of the pursuit of sustainability and the impetus for change	Fundamental examination of the relationship between humans and their environment and with each other.	Concerned to prevent an environmental catastrophe that would threaten human society.
View of nature-human interaction	Humans and nature are not separate from each other and harmony between the two is sought.	The natural environment is a resource, humans need to better master the environment to solve present problems.
What do we wish to sustain?	Other species, not just the human species, are to be maintained.	The human species is what we are seeking to sustain.
The gap between the present and a sustainable future	The present situation is a long way from a sustainable one, it is so far away it is almost impossible to imagine what sustainability looks like. The time span of change may take 150–200 years.	Present situation is near to a sustainable one, over next 30–50 years it should be reached.
Extent of change required	Fundamental, structural change is likely to be required.	Sustainability is achievable with incremental adjustment of the current system.
Nature of the process of getting to a sustainable path.	Likely to require a participatory, transparent and democratic process. Technical fixes may generate more side effects than they solve.	Authoritative and coercive structures can be utilised (for example, market forces). Greater technological development will allow problems to be solved.
Relevance of eco-justice concerns – who is to be sustained?	Intragenerational equity is an integral and essential part of sustainability. Focus on third world conditions and aspirations cannot be avoided.	Intragenerational equity is a separate issue, sustainability focus is primarily on ecological issues, equity issues will follow from them. Primary focus is on sustaining Western populations.

Sustainable in what way?	The nature of economic growth may need to be redefined or abandoned as a dominant goal. This raises questions about how we currently measure and view development.	Sustainability of the Western civilisation at, at least, the current level of economic development. There is a belief that economic development is actually essential for the pursuit of sustainability.

Extracted from: Bebbington and Thomson (1996) and adapted from Redclift (1987), Gray et al., (1993) and Turner (1993).

private costs which are borne elsewhere in the system (by someone other than the individual causing the costs). These two sorts of costs are called *externalities* because they are costs borne by someone external to the system making the decision or taking the action.

For our current system of economic organisation to operate in an environmentally-sensitive and socially-just manner, these externalities must, it is argued, be *internalised* in some way. That is, the internal costing and pricing systems that led to (say) a company producing sulphur dioxide pollution must be amended. In such a way the implications of the pollution will be 'impounded' into the private costs incurred by the polluter such that, typically, the private decision to pollute, which is not in the public's interest, is not in the interests of the company either.

There are, broadly, four ways in which this can be brought about. None of these ways is likely, on its own, to be sufficient to achieve major shifts towards sustainable development. Rather, they are complementary to each other and, used in concert, may well enable the substantial changes to our financial and economic organisation that, we have asserted, are essential. We should also stress at the outset that the four options are certainly not discrete and that all require some degree of state/government intervention. In addition, box 1.6 lists UNCTAD's conceptualisation of how costs could be internalised. This list is similar to the four approaches developed in the text.

The four approaches, which are explored in more detail below, are as follows: the democratic/accountability approach; the full privatisation approach; the law, market instruments and structural change approach; and the shadow price approach.

Box 1.6: UNCTAD's approach to cost internalisation

'In theory, there are a number of ways in which market mechanisms can internalize costs. For example:

- *an effective, enforced regulatory system that sets costs for previously free goods (land damage by waste disposal is given a clean-up cost)*
- *a civil liability system that "punishes" firms/executives for not taking care of health and safety, and the environment (for example, health damages are paid by the polluter)*
- *a corporate accounting system that reflects "real" environmental costs during the internal decision-making process (for example, recycling costs are included in budget forecasts)*
- *an eco-labelling system that encourages consumers to make purchases on the basis of the product's environmental impact (so that consumer purchasing choices could penalize unacceptable environmental business decisions)*
- *a national tax system based on the use of natural resources rather than on income flows (taxes could be charged on the consumption of non-renewable resources rather than on income flows)*
- *a mandated requirement that manufacturers have a responsibility for their products' full life-cycle uses (costs for a public recycling plan are paid for by the manufacturer) and*
- *an end to Government programmes that under price natural resources and therefore encourage their over-use or misuse (costs for soil depletion are not subsidized by agricultural programmes).'*

Source: UNCTAD (1996) pp. 76–77.

The democratic/accountability approach

The first move towards sustainability would be to permit – and, indeed, encourage – members of society to make more sustainable choices and take fewer unsustainable decisions. The prerequisite for this would be the *sine qua non* of democracy – information for accountability. At the organisational level, such accountability would be achieved through the development and mandatory application of social and environmental reporting by all organisations and would be predicated upon a more informed society acting in a more informed – and hopefully more ethical – fashion. Eco-labelling schemes of various types are another (this time product-based) way in which transparency may be achieved.

Although a *necessary condition* for democracy, accountability is clearly not a *sufficient condition* for less unsustainable activities. On the positive side, it is apparent that individuals and groups can and do exercise social, political, ethical and environmental choice. Boycotts, 'green consumerism', ethical investment and pressure placed on companies are all examples of how the demos can act if informed. Although less widely discussed, information can also evoke more subtle effects in both the organisation about which the information is produced and in the society receiving such information.
On the one hand, it is clear that organisations and their members are affected by the act of collating and reporting information. This can be the result of information inductance but it can also be either as simple as embarrassment or as subtle as exposing organisational myths for what they are (see, for example Gray et al., 1995 and 1997).
On the other hand, changed corporate environments, altered social construction of the enterprise and its goals and different emphases in marketing and advertising (to name a few mechanisms) must have some effect in changing societal perceptions of products, consumption and waste. Such changed perceptions would begin to drive to the heart of current economic well-being. Although such changes are ambitious, we believe that it is at this level that the debate needs to be held.

In these ways, some degree of 'getting the prices right' would be achieved. Thus, for example: certain economic options that are cheaper but less ethical would be eschewed; volumes of some goods and services would decline, so losing, among other things, current economies of scale; additional, less unsustainable aspects of goods, services and their delivery to market would be undertaken from choice. In these ways some products and services would be driven from the market, others would become more expensive as costs would become internalised at different points in the life cycle of the product. In such ways do economies shift emphasis and direction.

That we currently live in a political climate largely opposed to mandatory disclosure of a substantive kind and that we may well suffer from information overload (which could be

inferred from the lack of responsiveness to much of the information that already exists in the public domain) leads us to question the immediate efficacy of this option. If democracy is important to us, however, then accountability – and effective social and environmental accountability in particular – is essential.

The full privatisation approach

This phrase is usually attributed to David Pearce, the influential environmental economist (see, for example, Pearce et al., 1989), and involves an extension of conventional economic analysis. That is, as prices are generated by the exchange of private property rights and many of the environmental (and social) aspects of the economic activity are not included in the price, then, it is argued, one needs to extend the private ownership function to include all social and environmental aspects. Whether this suggestion was ever intended as a serious option or, rather, simply as a modelling heuristic is unclear. It is, however, an option that, at least in its *reductio ad absurdum*,[12] helps clarify some issues and illustrates many others. It is also, however whimsically intended, present (at least implicitly) in much standard neo-classical economic reasoning. A full privatisation approach to 'getting the prices right' may take many forms. Essentially, it requires an alteration to the current economic rules to bring more of nature within those rules. In whatever form it takes, this approach requires some form of government activity and/or intervention (as indeed, does the democracy/accountability approach) if it is to be effective and not just a marginal activity.

The essence of this approach is that all environmental elements must be embedded in price. The use, by a company for example, of air for pollution, water for cooling, silence for making noise into, land for waste disposal and habitat for mining must be charged to the company. These matters are then paid for, and one of two things results. The simplest option is that the organisation seeks out cheaper (that is, less environmentally damaging) options. The more complex option is that the price of the good or service rises. This, in turn, causes either a reduced demand (and thereby less environmental pressure) or substitution of other goods and services up to the point where society signals that it believes itself to be compensated for the use/destruction of the environmental (previously free, collective) good. The economic effect of changing prices to reflect the environmental dimension is quite unpredictable – there are fewer purchasing dollars available to the West (although more are now available to the prior owner of the asset) and the removal of a source of economic raw materials should, in principle, push up the price of that raw material.

The most visible examples of privatising environmental rights in the West – such as the privatisation of water, the granting of land and mining rights and the attachment of conditions to the management of, for example, forests – appear to have had varying

degrees of success in internalising the environmental dimensions of the economic use of natural resources. Likewise, emissions trading schemes are examples of the development of the privatisation approach and are an option that the UK government is experimenting with.

More pertinent to FCA have been the attempts by economists to determine values for environmental resources through such mechanisms as establishing society's *willingness to pay* for the continuance of habitats and sites of natural beauty, (see chapters 3 and 4 for an introduction to the controversy in this area). By placing a market value on a rare habitat or by trading off, through cost-benefit analysis, jobs created against (say) visual beauty destroyed, the economist would argue that the environmental dimension of the resource is brought into the equation. It is made visible and, thereby, considered in an explicit manner that has the effect of imposing increased costs on the organisation interested in exploiting (however indirectly) the natural resource at issue.

The final example of how one aspect of this approach might work is illustrated by two relatively new phenomena that were especially visible in the 1990s: the 'debt-for-nature' swaps and the private purchase of natural resources for custodianship. Although the motives for each of these phenomena may be different, the effect is broadly the same. That is, the wealthy (typically) Western individuals or nations agree to take natural resources – typically land, forest and/or habitat – into their own private ownership with the express intention of holding them as custodians in perpetuity. These resources are acquired in debt-for-nature swaps in return for cancelling a nation's sovereign debt or are bought outright by coalitions of individuals and environmental organisations.

The law, market instruments and structural change approach

This approach is by far the most diverse and, despite market rhetoric, it is the exploitation of this diversity that is likely to be the means by which moves towards more sustainable prices and costs are to be achieved. At the outset we should note that, despite the historical and widely proselytised belief that market instruments are more efficient and effective than law as a means of achieving environmental responsibility (see, for example, Cmnd 1200, 1990), such instruments cannot occur without government action and changes in law and its enforcement. Thus, while it may be popular to see such matters as fundamentally different, for our purposes they are broadly similar categories of approach.

The essence of the approach lies in the recognition that markets are rarely (if ever) entirely anarchic institutions. They are governed by constraints and rules. The structures within which markets operate (for example, the rules of limited liability, audit, taxation, natural justice or stock market listing) are set, of course, by governments – surprisingly, often much to the chagrin of the very organisations who benefit most from the rules, who

in fact expend most to have them minimised. The most obvious way in which less unsustainable behaviour can be encouraged is by changing the structure of the economic environment within which business operates. In Milton Friedman's terms, changing the 'rules of the game' within which private enterprise plays.

There is a very wide range of mechanisms that can be, and are, employed to 'change the rules'. Among the more obvious are:

- environmental taxes – on such things as fuel, carbon content, disposable containers, landfill resources
- environmental grants – to encourage more benign options and reduce the costs thereof and give market advantage to those using/consuming the preferred option
- environmental regulations – requiring specific standards of behaviour and accountability from those operating in certain areas; the costs of adopting an environmental management system or complying with consent levels, for example, either increase eco-efficiency or push up the costs of operation and thus change the terms of the market
- environmental quotas – by restricting the volume of a resource that can be extracted or the hours that can be worked in an area; the costs of operations are thereby raised, encouraging either greater efficiency or sending signals to consumers; the most obvious examples of this device are fishing quotas and tradable pollution permits
- removal of assets from economic activity through, for example, forbidding certain activities or establishing heritage assets or Sites of Special Scientific Interest (and other such 'protected' kinds of land status); the supply of the resource represented by those assets will be reduced and thus the prices of the remaining available resources will rise – again introducing an economic rationing device
- environmental fines and penalties – all systems must be closely policed (costs that will passed on to those being policed) and there may be prohibitive penalties for those failing to work within the new structural rules.

This whole set of approaches is very complex and is covered in much more detail in chapter 3. Each mechanism, however, has a similar impact on the operation of the economy – certain environmental (and social) 'bads' are discouraged and/or environmental and social 'goods' are encouraged.

Certainly, conditions such as remediating land used for pipelines or mines, insistence upon more careful means of extracting raw materials from the sea or the ground, or levels of charge and/or consent on the use of disposal media have all, to a degree at least, forced some internalisation of environmental costs (we return to this below).

The shadow price approach

Each of the options considered so far has introduced some real economic effect at some point in a product or services life cycle (see chapter 4 for more explanation of the notion of life cycle).These effects have been achieved either through demand shifts, reductions in supply, cost increases or direct manipulation of the economics. The result is that some level of cost increases enter the system and play through suppliers, manufacturers, transport, sellers, and, eventually retailers to the final customer. The final customer bears either the increased price or turns away to the more desirable (or perhaps more eco-efficient) option. In this way, it is assumed, the market will begin to reflect society's environmental preferences through prices that increasingly reflect the 'true' environmental cost of the good or service. The final of our four broad approaches deals less with real cash effects (at least directly) than with *potential* cost and price changes. In essence, we are concerned here with what *would have* been incurred if the organisation (or whatever) had been sustainable.

At the corporate level, the shadow price approach can take, broadly, one of three forms. These are:

- rearrangement, re-definition and reporting of *actual* costs, (the approach attributed to the United States Environmental Protection Agency and/or the Tellus Institute)

- use of economic valuation systems to produce a social cost benefit statement (the approach undertaken by BSO/Origin, Ontario Hydro and, historically, Linowes and Abt[13])

- use of existing market prices to calculate the cost that an organisation *would* have had to bear if it had acted in a sustainable manner during the accounting period. This is the *sustainable cost approach* (used by the Centre for Social and Environmental Accounting Research (CSEAR), Rubenstein, 1994 and by Forum for the Future's costing experiments with, among others, Interface Europe – see Howes, 2000). In addition, Paul Ekins (once again in conjunction with Forum for the Future) has attempted to measure what it would cost a nation to meet sustainable economic policy objectives (Ekins 2000a, b). This work has the same roots as the sustainable cost approach and goes by the name of a *sustainability gap analysis*.

Each of these corporate-level approaches is very different in terms of background thinking, with corresponding differences in the 'answers' produced. It should be apparent that these attempts to produce and report on the 'shadow' prices of environmental (and social) interactions are intended to change perceptions and attitudes (and thus could be considered to be a part of the first approach we discussed above) or are designed to inform governments (and to be used as a basis for taxation or some other charging mechanism). We shall return in considerable depth to experiments using these approaches in chapter 5 as these are *probably* most closely related to the kind of FCA that the EC appeared to be championing in the *Fifth Action Programme*.

1.4 FULL COST ACCOUNTING

In the foregoing section we have briefly reviewed the mechanisms through which the current structures of an economy might come to reflect – to a significantly greater degree than at present – the social and environmental aspects of economic activity. It is our view that any system for 'getting the prices right' must incorporate (at least some aspects of) all four approaches to internalising externalities. Any system designed to achieve FCA would be some meld of these four, non-discrete approaches. (We return to examine the possible policy directions in chapter 7).

What is confusing, however, is that the term FCA is used in quite specific, but diverse ways by different commentators. It is typically employed to refer to only one part of one of the above approaches – whereas we believe it must be seen as a combination of all four. Hence, great care must be taken with terminology. Let us stress that, as far as we can assess, *no one* knows what a 'full cost' price would actually look like – the issue is far too complicated and research is not yet fully enough developed. It is our belief that economies will need to move towards *increasingly full cost* and that we should hope that we can recognise when we get to 'the' full cost.

This is not a cause for despair – there is a great deal that can be done (and, indeed, which must be done) that can take us in the right direction. The direction must be away from unsustainability. But the size of the problem must not be under-estimated. Only the most profound, fundamental and visionary change has any chance of bringing us to a reasonably sustainable position. The profundity of, for example, Weizsäcker et al.'s (1997) analysis begins to hint at a world so very different from our present world – a world that involves less material consumption, longer-lived (and quite possibly leased) assets, and in which products and services are designed for environmental and social impact as opposed to short-lived use followed by disposal without recycling. As those authors note, the levels of structural and cultural change necessary to bring us to that point are mind-boggling.

We make this statement to emphasise that what, for example, the USEPA/Tellus Institute call FCA (from tier 0 to 3 in box 1.7) is certainly *not* full cost. It is a *fuller* cost and only if a fourth tier were to be added (as we have in box 1.7) would externalities be considered. By working through the tiers, any organisation would be in a much better position to identify, and thereby manage, its own private costs associated with social and environmental interaction. The social/public costs and the externalities borne by other parts of the product/service life cycle are, however, not included until tier 4. At this time, the costs *that would have to be borne* if the organisation were:

(i) to start reducing its ecological footprint (see chapter 4) and, thus, to consider reductions in absolute levels of material use as opposed to per unit material use[14]

and

(ii) to internalise the impacts that it has on social and environmental systems could be factored in. As indicated in box 1.7, however, such costs would not become real in the absence of a change in the regulatory and operating environment.

The additional factors contained in tier 4 in box 1.7 can, we believe, only be identified by the addition of:

- either a valuation of impacts – as undertaken by Ontario Hydro, for example (chapter 5), or a sustainable cost calculation as undertaken by Landcare Research (see, again chapter 5)
- a fully transparent picture of and accountability for social and environmental impacts arising from activities, which should be communicated to a fully informed market and demos
- active government policy to embed the social and environmental dimensions into private costs (see chapter 3)

and probably informed by

- the estimates of economic values associated with the environmental and social impacts and alternatives (while bearing in mind the limitations, both practical and conceptual, in such an approach).

Box 1.7: FCA (the USEPA/Tellus Institute approach with additions)

Tier 0: Usual costs
Includes direct and indirect costs usually associated with the project of both a capital and revenue nature.

Tier 1: Hidden costs
These are additional costs that are usually found in overheads/general accounts. They would include regulatory and environmental management systems, monitoring and safety costs – both capital and revenue in nature.

Tier 2: Liability costs
These are 'contingent liability costs' that are not presently incurred in a conventional accounting sense. They may emerge depending on circumstances (for example, if the law changes) and their likelihood can be estimated. Such costs include fines, future clean up costs and regulatory costs associated with a project.

Tier 3: Less tangible costs
Costs and benefits that may be assessable in financial terms are likely to arise from improved environmental management. These costs and benefits could include the loss/gain of goodwill arising from a project; changing attitudes of suppliers, customers, and employees; and advertising/image issues arising from environmental performance of projects.

Tier 4: Environment focused costs
Costs that would be incurred if an environmentally focused approach was taken to a project can be estimated. Costs to ensure that a project had zero environmental effect could be estimated. It is unlikely that such costs would become real costs in the absence of a radical change in the regulatory and operating environment.

Source: Bebbington and Thomson, 1996, p. 53.

The Tellus Institute 'full costs' will help an organisation adopt a more responsible and eco-efficient approach to its activities, but it will not necessarily move the organisation towards sustainability. That takes a far more profound shift in the numbers.

It seems appropriate at this point to try and review how the four approaches to internalising externalities might work together. We do this, not least, to raise the central issue that – even if 'true environmental and social costs' *can* be and *should* be calculated – nobody can imagine what shape the European economy would take if all prices were 'full cost' prices.[15]

1.5 ILLUSTRATING THE ISSUES

The purpose of this section is (i) to illustrate briefly how the different approaches to 'getting the prices right' might work together and (ii) to attempt to show just how dramatic a change such prices might bring about in any economy.

For example: Virgin timber
To illustrate how a complete FCA system might work for even one raw material would probably require a book in itself but a simple outline will indicate the range of issues involved.

A European timber grower, selling uncut timber to a saw or pulp mill for onward sale to (say) a paper manufacturer or a builders' merchant, bears a number of relatively obvious costs. These include labour, machinery running, repair and depreciation costs and transport costs (as well as, obviously, overheads of varying sorts). Given that a European timber grower is not simply felling virgin forest (a matter returned to below), the company must also bear the costs of pesticides, fertilisers and, usually, some charge for the use of the land on which the timber is grown. Further, the grower will have costs involved in both maintaining the capital of the soil (for future growth), replanting for new growth and procedures for compliance with a variety of legislation and consent agreements. These latter might cover, for example, soil stability, demonstration of compliance with forestry standards, maintenance of public access, health and safety compliance and so on.

Increasingly, the grower will also be facing additional costs in the form of requirements for habitat protection plus, increasingly, demanding standards on felling rates and practices as well as the growing influence of voluntary codes established by bodies such as the Forestry Stewardship Council. This series of costs all become impounded in the price of the timber, which is in turn embedded in the cost of the builders' products or the paper to the eventual final purchaser.

As can be seen, a not-insignificant volume of (hidden) social and environmental costs is already impounded in the price of timber or paper in this example. Two separate issues now present themselves: (i) overseas competition and (ii) moving our European grower towards sustainability.

An overseas competitor might very well be felling virgin forest, using cheaper labour, operating under a less rigorous safety and environmental regime and, despite having greater transport costs, is able to compete in European markets on price. This is an obvious case of the 'bad' (less socially and environmentally sensitive production) driving out the 'good' (or more conscientious producer). Thus, without labouring the point, any environmental and social 'burden' placed on (say) a European manufacturer always runs the risk of price-based competition. Hence, no consideration on sustainable costs can be considered without taking explicit cognisance of world trade issues and by implication of the rules of international trade, which are overseen by the World Trade Organisation.

Our European grower, however, is also far from sustainable at the moment. Even if we can accept that forests can be grown as monocultures and not demand the enriched habitat and eco-system qualities of complex and mixed forests (and that is questionable) our grower has some way to go to move closer to sustainability. The grower needs to produce complete social and environmental accounts of its activities to make transparent its activities in the areas of felling, maintaining soil, habitat, maintenance of biodiversity, access, health and safety, employment practices and liaison with local communities – to name but a few areas. The company needs to maintain the very highest standards of environmental management systems and undertake cycles of social audits. It needs to find alternative sources of not only transportation of the felled timber, but also means for felling the timber that are not based (as currently) on high intensity manufacturing (for the machines, saws, grapples etc.) and fossil fuel technology (with all the impacts that has). Government policy will need to impose punitive fines for the breaking of rules and increase the funding of the environmental protection agencies' monitoring of soil and habitat maintenance to ensure that the existing legal regime is operating effectively. Furthermore, the grower needs to develop a system of shadow pricing and produce sustainable cost estimations (see chapter 5) to demonstrate the extent to which the grower is maintaining natural environmental and social capital through its operations.

If these cost elements were impounded, the costs of timber will rise even further. The market will be faced with increasing prices for timber and paper products and will (i) switch into alternative sources; and/or (ii) use less such timber and/or (iii) purchase from less stringently managed sources. The outcome is very likely to be that an indigenous sustainable forestry company could no longer exist in Europe unless there was absolute protectionism against foreign imports. The disruption to those industries dependent upon

timber would be immense – and this is without thinking through the social consequences of timber and timber products becoming luxury goods only available to the wealthy in society (assuming, of course, that the same rules are not applied to alternatives to timber and timber products). The manifestations are clearly profound – even at this very simple level of analysis.

For example: The case of energy

Energy issues are much more widely discussed and the complexities that energy brings to sustainability much better understood (see EC, 1995). Some issues, such as differential taxing of petrol and of motor cars according to engine size, have been successful in switching marginal behaviours. The social outcry over the carbon tax proposals (see chapter 3) is a much better illustration of the social complexity that can arise in attempts to move towards solutions for environmental pressure.

At a very simple level of analysis, energy is widely argued to be one of the key components in any attempt to use price to encourage moves away from unsustainability. One simple, but not unreasonable, suggestion is that all energy needs to be at least three to five times more expensive if it is to be realistically priced for sustainability. Energy is not only considered to be a good indicator of wider resource use but, in its emphasis on limited fossil fuels, the pollution (including greenhouse gas) and extraction implications and the way in which its relative cheapness encourages profligacy in general consumption, it is considered to lie at the heart of our unsustainable means of economic organisation. How might a reduction of 60% to 80% in energy use be brought about and what are the potential implications?

At its simplest, a tripling in the price of energy will lead to something in the order of a doubling (assuming significant efficiency developments) in the energy component of all prices. In direct fuel use – for heating, energy, transport, for example – that will mean pretty much a doubling of costs. For all other products and services the increase will be less but is unlikely to be insignificant. If the economy is able to absorb such an increased range of costs any positive environmental implications will have to stem entirely from the use to which governments put the increased revenue (presumably derived through tax and duty). The social costs will be enormous, as the poor will suffer further from fuel and transport poverty. This can only be overcome through a major re-think about housing and fuel subsidies and about the travel activities of society (including a major re-invention of public transportation systems). Put more basically, it is highly unlikely that *any* air travel, for example, can *ever* be fully sustainable. Thus, in a sustainable society air travel would be most unlikely and the impact of this on current, taken-for-granted ways of conducting business and enjoying leisure would clearly be astounding.

If massive energy taxes could be imposed (and this is unlikely from a political perspective) to bring the price more in line with sustainable requirements and this resulted in the expected reduction in energy usage – what then? There would, most likely, be a complete re-design of living and working accommodation, completely different travel arrangements and, almost certainly, significant reductions in the consumption of material resources (including food, of course, which in many instances is highly energy intensive). What would have to emerge would be an energy-efficient industrial base, reduced travel by most people, minimal air travel, reduced consumption, etc. All this sounds very unlike our present economy and society.

To achieve anything like the changes outlined above requires, again, two major things. First, the governments of the West must find some means of dissuading industry from relocating away from countries with FCA regimes and thereby exporting social and environmental problems to developing nations and letting them bear the environmental costs (as we have been doing for decades). After all, this only moves the sustainability problem to another location and delays the point at which 'something' has to be done. The second requirement is the adoption of a meld of the four approaches discussed above. *All* organisations need to be held accountable for their energy use and, in particular, for their contributions to environmental and social programmes. There is probably a need for careful economic valuation to set the levels and terms for tradable emissions and other pollution permits. The suite of grants, fines, taxes and other regulatory instruments needs to be significantly developed. Finally, the real costs that organisations would have incurred had they used entirely sustainable energy sources in their activities needs to be calculated. Once again, it does not take long before the mind starts to boggle at the extent of the profound structural change the above thought experiment suggests. It is *quite* obvious that even for the most basic elements, environmental sustainability requires staggering change in our current societal structures.

1.6 THE DEEP GREEN CRITIQUE

We will not dwell long on this critique but it would be short-sighted, and unforgivably partial, to ignore the increasingly sophisticated and persuasive deep green critique of the types of market-based, reformist strategies we have talked about above (and which will comprise the bulk of this monograph).

The essence of the deep green critique is that the problem we face is structural, spiritual and fundamental. That is, the problem lies with the very tenets of our civilisation: exploitation, over-consumption, growth, alienation, competition, masculinity, patriarchy and so on. Our current crises will not be solved and sustainability will not be achieved by

either tinkering with a fundamentally flawed system and/or adding more of the very thing (economic calculative rationalism) that caused the problem in the first place. Equally, as many of the things that the deep green (and feminist) critique see as the crucial problems are simultaneously the most dearly held characteristics of our economic system, then we should sensibly expect there to be profound resistance to any suggestions of a deep green radical agenda. Those who are benefiting most from the current system – the wealthy, business and government leaders in the West – cannot realistically be expected to want to see change and, indeed, will resist it with all the considerable resources at their disposal. There is a case for saying that such a thing is already happening, (see, for example, Hildyard, 1995, Beder, 1997, Mayhew, 1997, Welford, 1997 and Greer and Bruno, 1997).

We personally believe that the deep green critique is, at its most cogent, profound, telling and largely irresistible. We also know that for most of our audience, deep green alternatives are largely unthinkable. We would suggest, though, that any time spent with the appropriate literature[16] would leave one with a very different point of view.

Be that as it may, a report that concludes that FCA cannot work as it is immoral is hardly going to help matters at this stage. We therefore tend to lean (at times uncomfortably) towards the pragmatism of the reformist agenda (see, for example, Bebbington, 1997, Owen et al., 1997, Gray, 1992 and Gray and Bebbington, 2000 for the rationale behind this move) and this report is predicated upon the assumption that:

(i) the reformist agenda is the only one currently with *any* realistic hope of change

(ii) that the reformist agenda will, we hope, do more good than harm

and

(iii) that reformist analysis of the kind we undertake throughout this monograph will illustrate the very limits of that agenda and, thereby, illustrate why at least some of the more radical agendas for change are more desirable and practicable.

1.7 CONCLUDING COMMENTS

As noted at the outset of this chapter, we have sought to provide a high level analysis of the issues that will dominate the rest of this research monograph. The remainder of the monograph develops aspects of this chapter in order to support and lead to our recommendations in chapter 7. The key themes that have emerged here are that:

(i) we should be concerned about the state of our natural and social environment

(ii) the prices that govern exchange within our economies are not necessarily 'right' and do not necessarily provide good signals to markets

and

(iii) the above-mentioned crisis and the problems with pricing mechanism are interlinked.

Given these concerns, we identified four ways in which economic, social and environmental behaviour may be better aligned with each other and with the goals of sustainable development. Briefly these approaches were:

(i) the democratic/accountability approach

(ii) the full privatisation approach

(iii) the law, market instruments and structural change approach

and

(iv) the shadow price approach.

FCA is an approach that sits within the democratic/accountability approach but that is specifically introduced under the shadow price approach, and it is to FCA that we now turn.

2. Policy background and context

2.1 INTRODUCTION

As can be seen from chapter 1, the sustainable development agenda is diverse and FCA can only ever form a part of that agenda. There is, however, an explicit mention of FCA within *Agenda 21* and this will form the starting point of this chapter. Thereafter, the background to the EU's adoption of sustainable development as a guiding principle will be sketched as a precursor to understanding the *Fifth Action Programme* itself. *The Fifth Action Programme*, and the place of FCA within it, will then be discussed. In addition, the UK Government policy on FCA will be inferred from pronouncements on topics related to FCA. Section 2.3 will introduce accounting-sponsored FCA initiatives and we will attempt to define FCA and its purpose. By the end of this chapter the reader should have a broad idea of where the policy impetus for FCA has originated from and what FCA seeks to achieve. This sets the scene for chapter 3 and 4, which develop the conceptual and practical tools required to develop a full cost account for an individual entity.

2.2 THE INTERNATIONAL, EU AND UK POLICY CONTEXT

As can be seen from chapter 1, this monograph takes as given three starting premises. First, the report assumes that there is an environmental crisis that is severe in nature and that associated with the environmental aspects of the crisis there are also social dimensions to the problems faced.[17] Second, the research is premised on a belief that the concept of sustainable development is the appropriate guiding concept with which to tackle the environmental/social problematique.[18] Third, it is assumed that FCA would do more 'good' than 'harm' if implemented to resolve the social/environmental problems we face. These three givens are by no means uncontentious. They do, however, form the context for this monograph and they also lie behind the EC's call for FCA. First, however, a largely failed attempt to place FCA on international sustainable development agenda will be reviewed.

International attempts to develop FCA

In the lead-up to the Earth Summit in Rio de Janeiro, the Swedish government campaigned to put FCA on the international development agenda. In particular, they sought to include within *Agenda 21* a clause calling for transnational corporation's 'to internalise environmental costs in their accounting and reporting procedures' (Mayhew, 1997, p. 71). The full Swedish proposal, however, did not survive the lobbying that took place before the conference. Indeed, Mayhew (1997) notes that 'members of the ICC [the International Chamber of Commerce] … travelled to Stockholm specifically to persuade the Swedish government to withdraw their suggested *Agenda 21* clause' (p. 71). Thus one, potentially powerful, source of support for developing FCA was eliminated

from the sustainable development debate. Further, the fact that 'business', or at least corporate elites, had FCA removed from the agenda suggests that there may be tensions between business interests and FCA (see chapter 6). It suggests that the contention in chapter 1 that FCA will challenge current perceptions of a successful business is an observation shared by business itself. This is an important point to keep in mind in what follows and also affects the policy recommendations that can be made in this area.

Although the original Swedish proposal was removed from *Agenda 21*, there remains a 'watered down' indication within that document that FCA should be considered by transnational corporations. Box 2.1 reproduces the *Agenda 21* recommendations.

While the United Nations document (UNCTAD, 1996) itself suggests that FCA 'concepts in *Agenda 21* are far-reaching' (p. 71) it also makes clear that *Agenda 21* does no more

Box 2.1: *Agenda 21* and FCA

Transnational corporations should …

- be invited to participate at the international level in assessing the practical implementation of moving towards greater reliance on pricing systems that internalise environmental costs
- co-operate in developing methodologies for the valuation of non-marketed natural resources and the standardisation of data collection
- work towards the development and implementation of concepts and methodologies for the internalisation of environmental costs into accounting and pricing mechanisms

  and

- work with governments to identify and implement an appropriate mix of economic instruments and normative measure such as laws, legislation and standards.

Source: Clauses 27–30 of United Nations Conference on Trade and Development, Division on Transnational Corporations and Investment (1996).

'than "invite" firms to "participate", "cooperate" and "work towards" internalising environmental costs' (p. 71) and thus the possibilities for effecting change via these clauses are considered to be limited. Indeed, we are not aware of any FCA experimentation taking place under the auspices of these clauses. Nor did any of our interviewees for this project suggest that they knew these clauses existed. Further, in the same report, the United Nations acknowledge that the issue of FCA has not been developed extensively since 1992 (see UNCTAD, 1996, pp. 71–78).

FCA and the European Union

Although *Agenda 21* offers support, albeit weak, for FCA, the EC's *Fifth Action Programme* arguably creates a stronger impetus for its development. In order to understand the importance of the *Fifth Action Programme*, however, a brief outline of how the EU has, historically, approached sustainable development is appropriate.

Key points in the EU's handling of environmental aspects of development have mirrored those taking place in the international arena. At the time of the Stockholm conference in 1972 the heads of state of the European Community also expressed their concern about the state of the European environment and their intention to address these problems (Baker, 1983). Likewise, in 1988 (after the publication *The Brundtland Report*) the European Community heads of government stated that 'sustainable development must be one of the over-riding objectives of all Community policies' (Council of the Economic Community, 1992 – see Baker, 1997, p. 92). What this commitment means, however, is not clear. For example, the EU's use of the term 'sustainable development' has been, at best, confusing. The *Maastricht Treaty*, for example, speaks about 'sustainable growth', 'sustainable development' and 'promoting economic and social progress which is also sustainable' (Baker, 1997, p. 92) without distinguishing these terms from each other. While there is no clear indication of how the EU views sustainable development this term is still used to point to the future. Indeed, the *Fifth Action Programme* (sub-titled *Towards Sustainability*) provides an explicit commitment to sustainable development – albeit that the conception of sustainable development contained in it is not a radical one. Rather, the EU's conception of sustainable development builds, incrementally, on the previous action programmes (Baker, 1997, pp. 93/94).

Within the framework of the *Fifth Action Programme*, Baker et al. (1997) suggest that 'the use of policy instruments is particularly important… For example, legal, economic and fiscal instruments are advocated in order to influence or force changes in behaviour' (p. 15). In particular, the EU, under the EC's *Fifth Environmental Action Programme*, is 'committed to expanding the range of policy instruments that it uses to bring about changes in the patterns of consumption, and in particular making increased use of market-based policy instruments' (Baker et al., 1997, p. 15). Possible market based

instruments include 'financial incentives and economic instruments such as green taxes and pollution charges, tradable resource and pollution permits' (Baker et al., 1997, p. 15).

The above priorities are reflected in the detail of the *Fifth Action Programme* as it pertains to FCA. The call for FCA was placed within a section titled, 'Getting the prices right', where it was noted that 'valuations, pricing and accounting mechanisms have a pivotal role to play in the achievement of sustainable development' (EC, 1992, p. 72). While the accountancy profession was suggested as the appropriate body to guide this process, who within the profession and how the profession collectively would do this, was not articulated. The time scale, however, was clear. Initially, it was indicated that by 1992/1993 there should have been consultation with professional organisations and guidelines for FCA should have been developed. By the year 2000 the EC expected that companies would be producing parallel accounts using the FCA methodology (see EC, 1992, p. 72). Like some other aspects of the EC's *Fifth Action Programme*, however, progress on this target has not been as envisaged.[19]

Interviews conducted for this project shed light on the background to the FCA call and on how implementation of this provision of the *Fifth Action Programme* was envisaged. In order to understand the context within which the FCA target in the Fifth Action Programme came about, two Directorate Generals (DGs) are of importance: DG XI (which had responsibility for Environment, Nuclear Safety and Civil Protection) and DG XV[20] (which had responsibility for Internal Market and Financial Services).[21] The FCA proposals in the *Fifth Action Programme* originated in DG XI, and were championed by economists there, but individuals in DG XV were also consulted, at a very senior level, in the process of developing the FCA target. Responsibility for the target, however, remained in DG XI.

One could infer from the discussions we had that FCA was acknowledged as being a potentially radical, and hence politically sensitive, tool because it had the power to generate accounting numbers or indicators that would suggest that current business activities are unsustainable. Indeed, one interviewee suggested that if FCA were implemented then there would be 'a completely new discussion' about how to organise our economic affairs. The reason for the inclusion of FCA in the *Fifth Action Programme* appeared to be the wish to have in place a broad range of instruments that could be used to achieve environmental aims within the EU, and for the *Fifth Action Programme* to provide some leadership regarding these instruments. FCA was suggested as part of that range, but not considered to be a primary mechanism for achieving sustainable development. Rather, FCA was seen to be very much a 'backstop measure' (interviewee), albeit a technique that the authors of the FCA part of the Programme felt it would be useful to have in a public document, in order to stimulate debate in this area. Further, it was felt that rather than 'threaten business with legislation' (interviewee) on FCA, the

idea of developing parallel accounts would challenge business to innovate in this area. Accountants were 'targeted' (albeit totally inadequately) as the developers of FCA because it was felt that the profession could encourage industry in the area (see, however, our observations in chapter 6 which suggest that the accounting profession is largely driven by industry to innovate as opposed to encouraging industry to innovate).

FCA and UK Government policy

While there has been no direct link, of which we are aware,[22] between the EC's vision of FCA and policy makers in the UK Government there are hints of FCA thinking evident within UK Government policy. Three policy bodies, potentially, could contribute to the debate in this area (namely, the Advisory Committee on Business and the Environment (ACBE),[23] the Government Panel on Sustainable Development[24] and the UK Round Table on Sustainable Development.[25] Of these groups, only ACBE and the Government Panel appear to have touched on issues related to FCA (in the 'shadow sustainability' sense).[26] ACBE, for example, had a financial sector working group, which was to examine (*inter alia*) internalisation of environmental costs. Indeed, ACBE's sixth report (published in 1996) noted that:

> *'many aspects of the way we use and affect the natural environment have effectively no price attached to them. They have a 'zero' price, because no market exists in which those kind of goods are brought or sold. This is the result of their being a lack of well-defined property rights over them. Although the environment undoubtedly has a positive value, no charge is made for utilising or polluting it. Many environmental impacts are included by economists in the category of 'externalities' because they are external to markets in this way'* (p. 45).

The ACBE report went on the note that 'existing environmental regulation already has the effect of internalising' (p. 46) externalities but conceded that such 'internalisation as goes on at the moment is only partial' (p. 46). The ACBE report also recognised that internalisation may be achieved via economic instruments (see chapter 3) and they were supportive of this approach compared with what they termed 'prescriptive regulation'. The section of the report on cost internalisation, however, ended with the 'usual' caveat – that regard should be given to 'effects on business competitiveness' (ACBE, 1996, p. 47). Beyond the sixth report there is no evidence of ACBE itself pursuing this topic. Indeed, given that ACBE functions as a 'think tank' (interviewee) this may be expected. What is clear, however, is that ACBE is aware of the potential of FCA but cannot see business adopting it voluntarily (ACBE, 1996, p. 47). Rather, it would appear from ACBE publications that it is monitoring (but not developing) the agenda in this area.

The Government Panel on Sustainable Development's initiatives in the FCA arena are

similar to that of ACBE in that there appears to be an awareness of the issues presented, but nothing of great relevance is being developed. In 1994 the Panel indicated that one topic it was planning to investigate was 'environmental cost accounting and pricing' (ENDS, 1994, p. 38). While it was not clear what the Panel meant by this term, there has not been any sign that FCA (as envisioned in this monograph) has been considered by the Panel. Rather, pronouncements from the Panel have endorsed the idea of using economic instruments (for example, in its fifth report in February 1999) and have also suggested that the development of environmental accounting at the level of national accounts would be an appropriate way forward. Once again, one would suppose that FCA is not high on their agenda at present.

In sum, it is apparent that UK sustainable development policy groups have, from time to time, considered FCA-related subjects. There is, however, no sign that any of these groups have developed a programme of work in this area, either in conjunction with the EC or in response to its call for FCA. This may, however, change with the advent of the Sustainable Development Commission, which subsumes the Panel and the Round Table. It would be reasonable to expect these groups to be interested in this area – albeit at a broad policy level.

In summary, it appeared to us that individuals within the EC were happy to launch the idea of FCA but were then keen to see it find a champion elsewhere in the EC or within the accounting profession. It seems unlikely, at this point, that the Internal Market DG would seek to develop FCA, as the policy focus of this DG is on financial accounting and reporting issues rather than cost or management accounting issues.[27] Further, to date, the accounting profession within EU member states has not been proactive in sponsoring the development of FCA. This research monograph therefore signals the first explicit step (of which we are aware), made by an accountancy body within the EU, to consider FCA. There are, however, some attempts by the accounting profession in North America to consider FCA-related issues and these attempts are considered below.

2.3 FCA AND THE ACCOUNTING PROFESSION

The only publication dedicated to FCA is the Canadian Institute of Chartered Accountants' (CICA) 1997 research report titled *Full Cost Accounting from an Environmental Perspective*. This research report considered how to account for both internal and external costs and how the identification of these costs could be 'useful' to a variety of users. CICA used the term FCA to incorporate accounting for both internal and external costs. In addition to canvassing the reasons why corporations may seek to develop FCA, the CICA also reported extensively on the Ontario Hydro attempt to develop

Box 2.2: Environmental costs defined by IFAC (1998)[28]

External environmental costs

Examples:

- Depletion of natural resources
- Noise and aesthetic impacts
- Residual air and water emissions
- Long-term waste disposal
- Uncompensated health effects
- Change in local quality of life

Internal environmental costs

Direct or indirect environmental costs

Examples:

- Waste management
- Remediation costs or obligations
- Compliance costs
- Permit fees
- Environmental training
- Environmentally driven R&D
- Environmentally related maintenance
- Legal costs and fines
- Environmental assurance bonds
- Environmental certification/labelling
- Natural resource inputs
- Record keeping and reporting

Contingent or intangible environmental costs

Examples:

- Uncertain future remediation or compensation costs
- Risk posed by future regulatory changes
- Product quality
- Employee health and safety
- Environmental knowledge assets
- Sustainability of raw material inputs
- Risk of impaired assets
- Public/customer perception

FCA (see chapter 5). While the CICA report was valuable for bringing FCA ideas into the public domain, its conclusions were not supportive of developing FCA in the immediate future. For example, the study group concluded that it 'would be premature at this stage to attempt to develop accounting and reporting standards for full cost accounting, even for management purposes' (CICA, 1997, p. xiv) and further that 'it is questionable whether it will ever be practical for entities of any size or in any sector to implement all aspects of full cost accounting' (CICA, 1997, p. xiv). CICA was, however, supportive of the basic idea of FCA and believed that 'the accounting profession should continue to assist the advancement of full cost accounting principles and practices' (CICA, 1997, p. xiv). While the report was an intervention in the policy arena, it does not appear to have spawned anything by way of increasing experimentation in FCA or in the development of methodologies that would assist others to tackle FCA. Further, the bulk of the report itself focused on reorganising existing costs rather than on the internalisation of externalities and, despite its title, did not really address FCA in the way the EC conceptualised it.

Three other North American publications touch upon FCA in the context of environmentally-orientated management accounting. Each of these publications has considered (albeit in little depth) accounting for externalities. The Financial and Management Accounting Committee of the International Federation of Accountants (IFAC) examined the role of the management accounting profession in environmental management. In defining the 'cost spectrum' (see box 2.2) the IFAC report considered external costs, contained a brief review of the Ontario Hydro experiment (IFAC, 1998, p. 11–12), and also very briefly touched on how externalities could be costed (IFAC, 1998, p. 16). As with the CICA study, concrete suggestions for taking this area forward were not offered within the report and to the best of our knowledge IFAC is not planning to develop FCA in the immediate future.

In addition, both the Society of Management Accountants of Canada and the Institute of Management Accountants have published management accounting guidelines or statements on environmental management accounting. These two guidelines are similar to each other and each draws on the United States Environmental Protection Agency (USEPA, 1992) cost distinctions (see box 1.7). Relevant parts of the Institute of Management Accountants' Statement on Management Accounting (4Z) are reproduced in box 2.3. The statement also briefly outlines the Ontario Hydro FCA experiment (again, see chapter 5). The definition of FCA put forward by the Society of Management Accountants of Canada is reproduced in box 2.4.[29]

In summary, while the North American accounting profession appears to have been proactive in the area of FCA, on closer examination the publications:

Box: 2.3: Extracts from the Institute of Management Accountants' Statement on Management Accounting (4Z)

External costs/externalities are:

'costs for which firms are not accountable or that have no material economic consequences to firms under current and foreseeable regulatory and market conditions. For example, ...

- *environmental damage due to acid rain deposits from combustion of fossil fuels*
- *adverse health effects due to noise pollution from airports or highways and*
- *ozone depletion caused by aerosol cans containing CFCs'* (p. 8).

(i) are primarily focused on the issue of reorganising internal costs

(ii) identify the fact that external costs exist

(iii) discuss the Ontario Hydro experiment (and, less frequently, the BSO/Origin FCA attempt – see chapter 5)

and

(iv) say that FCA is too difficult to do at present.

In short, there is nothing specific in the North American literature to guide us in the FCA debate.

Within the United Kingdom two research reports, both published by the Association of Chartered Certified Accountants, also touch on FCA. The first considers FCA in the context of business's pursuit of sustainable development and concludes that FCA is 'an area of considerable relevance to the accounting profession' (Bebbington and Thomson, 1996, p. 47). Further, the idea of a sustainable cost calculation (that is, some sort of shadow price approach to measuring an organisation's unsustainability) was mooted with some of those interviewed for that research report. Bebbington and Thomson (1996) noted that 'interviewees indicated that full cost accounting is likely to be a valuable step forward in the sustainability debate because it articulates sustainability in the language of business' (p. 47). A number of interviewees, however, did note that FCA would provide uncomfortable information of the current level of business unsustainability. For example,

interviewees for that project noted that the 'answer [to a sustainable cost calculation] is likely to be horrifying' (Environmental Manager, Multinational Company, Extractive Industry); 'my heart stops when I think about the amount of money that would be involved' (Environmental manager, British Company, Energy Industry)' (Bebbington and Thomson, 1996, p. 42). While a consideration of FCA was a minor part of that research report, the present report builds directly on the work conducted by Bebbington and Thomson (see also the appendix, which provides details of the starting point of this study).

The second relevant research report discusses FCA in the context of environmental performance measurement (Bennett and James, 1998). While this report does not directly address FCA it touches on aspects relevant to the development of FCA, some of which are pertinent to this study. In particular, Bennett and James review the extent to which the individuals whom they interviewed (24 environmental managers in a cross-section of industrial sectors – see p. 127) were using life cycle assessment techniques (LCA) or eco-balancing to aid their assessment of environmental performance. These techniques are linked to FCA in that they could be considered to be prerequisites for the development of FCA (see chapter 4). Bennett and James (1998) found that LCA 'had been used by a substantial minority' (p. 74) of their interviewees. Likewise, some firms were using eco-balancing, although the way in which this technique was used varied across firms (p. 79–81). In both cases it was suggested that these approaches were linked to strategic goals of the firms and that the approaches introduced a longer-term perspective to the evaluation of environmental impacts. In addition, the report commented on the use of financial indicators in Baxter's environmental report and noted that there was some attention given to 'the external costs associated with particular environmental actions [with the assumption] … that these costs will be wholly or partially internalised in [the] future' (p. 86). What we take from this report is that there are likely to be individual business corporations experimenting with FCA, or with techniques (such as LCA) that would generate data that would make FCA easier to tackle.

Box 2.4 draws from the above material, and some other relevant publications, to suggest some possible definitions of FCA. In all cases a key aspect of FCA is identified: that FCA entails a consideration of externalities. What is much less developed, however, is the process by which those externalities are identified and measured (this task is tackled in chapters 3 and 4).

In summary, some level of interest in FCA is apparent within some publications sponsored or produced by the accounting profession. This interest has not, however, translated into direct action on behalf of the accounting profession to champion FCA. Two observations can be made regarding the view of FCA that emerges from the above

Box 2.4: Selected definitions of FCA

EC (1992):
'*the consumption and use of environmental resources are accounted for as part of the full cost of production and reflected in market prices*' (Vol. II, p. 67).

CICA (1997):
'*From an environmental perspective, full cost accounting is the integration of an entity's internal costs (including all internal environmental costs) with the external costs relating to the impacts of the entity's activities, operations, products and/or services on the environment*' (p. xiii).

IFAC (1998):
'*Full cost accounting is the commonly accepted term applied to the identification, evaluation and allocation of a combined and potentially complex set of conventional costs, environmental costs and social costs*' (p. 11).

Society of Management Accountants of Canada (1996):
'*Full environmental cost accounting includes the current and likely future company costs, including externalities relating to the environmental impacts of a company's products, services and activities*' (Management Accounting Guideline 37).

Ontario Hydro:
'*Full cost accounting incorporates environmental and other internal costs, with external impacts and costs/benefits of Ontario Hydro's activities on the environment and human health*' (in CICA, 1997, p. 87).

World Resources Institute (see Ditz et al., 1995):
'Within the accounting profession, full cost accounting means that all manufacturing, sales and administrative costs are allocated to products. Recently, a number of environmental and business leaders have also used full cost accounting to describe the practice of introducing environmental costs once considered external into corporate decision making. This broader interpretation encompasses the range of private and social costs imposed throughout a product's life cycle, from raw material extraction to product disposal' (in CICA, 1997, p. 88).

Alberta Department of Energy, Environmental Affairs Branch:
'*Full cost accounting is the explicit recognition of all costs and benefits of a transaction, whether they are incurred by the direct beneficiaries of that transaction or any third parties. Full cost accounting, for the purposes of the Clear Air Strategy, is the*

attempt to identify and place a value on 'external costs and benefits' so they may be incorporated with 'internal costs and benefits' into economic assessment of an energy transaction' (in CICA, 1997, p. 88).

Mathews (1993):
'*The term total impact accounting ... refers to attempts at measuring, in monetary form, the total cost of running an organization in its existing form. The total cost of running an organization may be divided between private and public costs*' (p. 130).

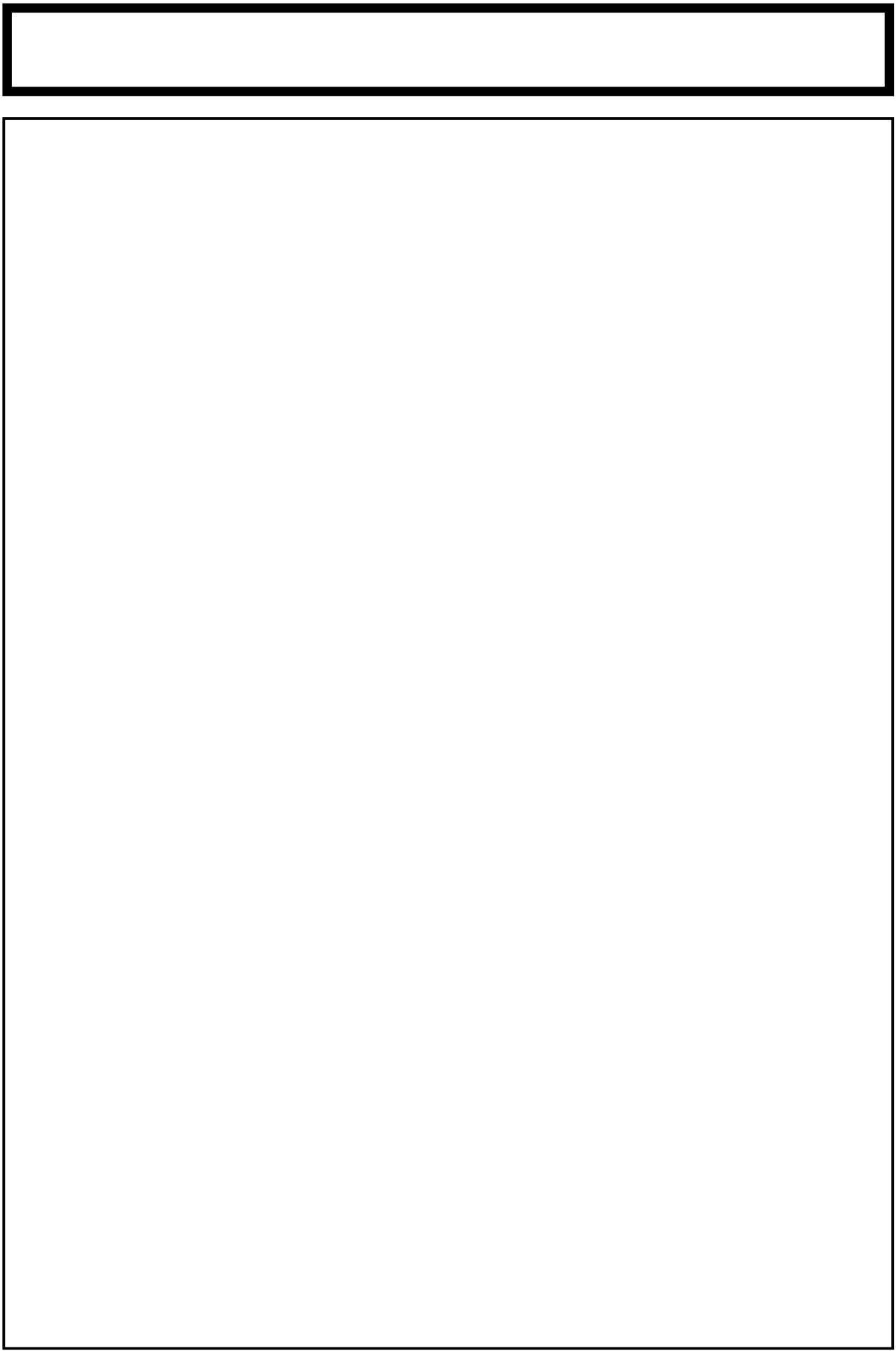
Gray (1992):
'*FCA could be approximated if we derived a parallel accounting system which provided calculations of what additional costs must be borne by the organisation if the organisational activity were not to leave the planet worse off, i.e. what it would cost at the end of the accounting period to return the planet and biosphere to the point it was at the beginning of the accounting period*' (p. 419).

studies. First, FCA is seen as holding out some promise as companies seek to minimise their environmental impacts and, in particular, it may be helpful as organisations seek to introduce a longer term perspective into their decision making – which itself has the aim of helping organisations make a quantum leap towards becoming less unsustainable. This suggests that the EC were prescient in their suggestion, in 1992, that FCA should be investigated and developed. Second, FCA is presently seen as being a difficult concept to implement as well as being a costly technique, given the information requirements associated with it. These two elements, and the tensions between them, will dominate this monograph. On the one hand, FCA is seen as a 'good' idea. There appears, however, to be little progress in terms of developing a systematic, defendable and publicly available method for FCA.

2.4 CONCLUDING COMMENTS

This chapter sought to introduce the institutional context within which the EC's FCA call emerged. In particular, it is clear that the EC's approach to achieving sustainable development incorporates elements from several of the approaches to FCA that were outlined in chapter 1. The EU is using, and plans to expand its use of, economic instruments to create economic incentives for FCA. Further, in anticipating that companies could produce parallel accounts of the fuller costs of their activities, the EC is

signalling that an accountability/democratic approach incorporating shadow pricing/ sustainability gap analysis is *a* way forward in moving business towards sustainable development. In addition, we outlined some material that has either been sponsored by or produced by the accounting profession, which mentions FCA. Drawing from these latter (and related) sources, we provided a number of definitions of FCA. Each of these definitions was focused on the goal of somehow identifying the externalities arising from actions of a particular entity. How one could develop an account of these externalities will be picked up and developed from chapter 3 onwards. At the moment, however, a little more detail must be provided as to FCA's position within a broader legal and economic framework. In this manner we hope to show the specific space that FCA is intended to occupy (within the various policy tools that could be used in the pursuit of sustainable development).



3. Legal and economic perspectives

3.1 INTRODUCTION

As noted in chapter 1, there are many ways in which costs become internalised. In particular, four approaches to internalising externalities were identified: the democratic/accountability approach; the full privatisation approach; the law, market instruments and structural change approach and the shadow price approach. This chapter focuses on the third of these approaches and outlines in more detail how costs may be internalised by legal and other regulatory means. This approach needs special consideration within the research report because, in the absence of full privatisation of all environmental elements, it is the approach most likely to be taken by governments as they seek to 'get the prices right'. Indeed, in our discussions with the EC it became apparent that internalisation of costs by legal and other regulatory means is the favoured approach of policy makers. Likewise, the UK policy environment (see chapter 2) favours, in rhetoric if not yet in practice, such an approach. It appears that only if this approach fails could we expect that entity level FCA (that is, the fourth approach outlined above) would be championed by policy makers. Another reason for briefly and explicitly considering this area arises from the linkages between FCA and economic approaches to cost internalisation. As will become apparent (in chapters 4 and 5) many of the costs/prices or taxes that arise in developing economic instruments are used in FCA experiments.

This chapter examines the approach of two disciplines to internalising environmental externalities. First, we examine legal perspectives on how externalities may be internalised. Second, we shall briefly introduce the issues that arise from economic analyses of externalities. There is a substantial, technically complex and controversy-ridden literature in both areas. We have not attempted detailed coverage of these issues. Nor is such coverage appropriate. What we attempt, however, is to introduce the main elements of the aforementioned work insofar as it impacts upon the likely future direction of shadow FCA. Further, in section 3.4 we seek to demonstrate how the legal and economic approaches to dealing with externalities link to FCA. Finally some concluding comments are made.

3.2 LEGAL PERSPECTIVES ON ENVIRONMENTAL REGULATION

Under the broad area of legal regulation there are four specific ways in which the state may intervene to ensure prices reflect fuller costs (see, generally Ball, 1997 and Ogus, 1994). These are: by way of command and control regimes, by the use of economic instruments, by using criminal law provisions and, finally, through voluntary agreements. Each of these legal mechanisms is used at present within the UK to regulate economic behaviour. If one is seeking to change the 'rules of the game', these various legal devices

may be used to regulate what costs are to be internalised and what costs are to remain externalised.

Command and control regimes

Command and control regimes are the most readily recognisable form of regulatory regime. These regimes simply dictate what activities individuals can or can not carry out, or dictate how activities may be carried out. There are three possible forms of such regimes: outright bans, standard setting and licensing. Each will be considered in turn. In order to deal with the externalities that arise from a particular activity, a Government may ban outright a particular process or a particular impact that could arise from any process. Complete bans on the use of particular processes or on the production of certain impacts are used where the particular activity or outcome is deemed to be completely unacceptable to the community. In the environmental context their use, which is relatively rare, is limited to instances where the harm imposed by an activity or outcome is simply too great for any attendant benefits to be regarded as worthwhile. The objective underlying their use is to remove the unacceptable externalities completely. In some instances, activities may be allowed to continue if it can be shown that they do not give rise to a particular externality that has been deemed unacceptable.

In the UK the ban on the outcome or process might arise as a result of the operation of the common law. That is, it might arise through case law, as a result of a private action for damages, or occasionally as a result of a criminal prosecution. Where a private action for damages leads to a ban on an activity or outcome that ban arises as a result of an interpretation of property rights and the application of those rights. It will therefore probably be a specific ban, which only applies to the same activity or outcome arising in the same circumstances. Moreover, it is simply an implicit ban derived from the outcome of the case and so may not be immediately apparent to other members of the public. The type of thing likely to be covered in this manner includes building smelters or tanning works that cause noxious fumes, and so cause a nuisance to neighbours, in residential areas, although in the UK such activity is covered by planning controls.

A ban on the activity will probably arise through legislation proper. That is, a new law will be passed by Parliament that states plainly that an activity or outcome is not permitted. Anyone carrying out that activity, or an activity that leads to the outcome, will be subject to the possibility of enforcement action. That action may be a criminal prosecution, or may be the imposition of an administrative fine, or removal of a licence or other right. The legislation will be specific in its terms and its operation ought to be transparent to all those affected by it. It may be that those who breach the legislation are deemed strictly liable, which means that where a harm has occurred they are automatically liable for it regardless of whether or not they have been negligent. In such circumstances a fixed fine

will often be imposed, or the costs of clean up will automatically fall to those causing the harm. Alternatively, it may be that proof of the harm caused and the causal link between the activity and the harm will have to be provided.[30] Examples of outright bans are relatively rare, but include the proposed ban on CFCs[31] and the prohibition on dumping sewage at sea.[32]

The second way to implement a command and control regime is to use standards. Standard setting is perhaps the method most commonly used in the environmental regulatory context. Where standard setting is used the legislature, or more likely a relevant regulatory body such as an environmental protection agency, will set ambient or source specific environmental (and social – in the case of, for example, health and safety) standards. The standards used may relate to the quantities of particular pollutants found in the ambient environment or in emissions (see, for example, section 3(5) of the Environmental Protection Act, 1990), or may relate to the particular process to be followed by an industry. The objective of standard setting is to internalise externalities by changing the processes used by industry in order to avoid a particular harm, or by introducing 'end of pipe' technology, such as filters, to prevent pollution. It is common in the UK for process-based standards to be based on the best available technique not entailing excessive cost (see, generally Bell, 1997 and for a specific example EC Directive 84/360).

Ambient standards are used to set limits on the quantities of pollutants emitted into a certain watershed or other area. Where such standards are used they are usually accompanied by some sort of licensing or permit system that places specific limits on the quantities of pollutants that may be emitted from particular plants or, in the case of water, on the amount of water that may be abstracted at a given time. The ambient environmental quality is then tested at set intervals to check whether or not the standards are being met. It is unlikely, however, that enforcement action would be taken against any particular individual or industry if the ambient standards were not met because of the difficulties faced in both identifying those responsible for the pollution and in apportioning responsibility between them. Instead, further source-specific standards would probably be introduced or another mechanism, such as economic instruments, would be used to decrease the emissions of pollutants into the area.

Source specific standards can be set generally, for an industry, or specifically, for individual factories. These standards may relate to the type of process to be used, laying down a minimum technical standard to be met, or they may relate to the quantities of pollutants that may be emitted. Where the former are used the industry will be subject to periodic checks. If it fails to meet the requisite standard a particular factory or industrial unit may be shut down permanently, or until it is able to meet the standard. Alternatively,

a fine may be imposed, or prosecution may ensue. Where emission standards are set, regular monitoring will take place, such as in relation to the control of industrial discharges into watercourses in the UK. On the whole, the industry itself will carry out most of the monitoring activities. It is, however, likely that industry will also be subject to monitoring by the relevant regulatory agency. Where standards are breached, the result might be prosecution of the individuals concerned, the imposition of a fine or an order to cease the activity, either for a set period or permanently.

Standards may also be used to regulate distinct happenings such as the decommissioning of offshore installations. Regulations set out the standard that the process by which decommissioning options are assessed must meet. They demand that certain standards be considered and that certain others be complied with before an option may be deemed acceptable. Despite the fact that these standards apply to particular events, rather than to a continuing industrial activity, the standards follow the same basic form as those described above. In each of the ways described above, the setting of standards ensures that externalities associated with an activity are made internal to the organisation undertaking that activity by imposing costs on organisations so that they may reach standards that are deemed acceptable.

Finally, in the context of command and control regimes, licences are used as a means of controlling activities. Where they are used, individuals are prohibited from undertaking a particular activity unless they have obtained a licence to do so. Thus, licensing may be used to place restrictions either on the number of individuals undertaking a particular activity or on the manner in which they undertake it. For example, a fishing licence may provide that only a certain quantity of fish may be caught, or that fish may be caught using only particular types of nets or nets of a particular size. Where the licence does contain restrictions on the manner in which an activity is carried out, its purpose is to ensure that those carrying out the activity do so in a manner that does not give rise to inappropriate externalities. The terms of licences are enforced through inspections giving rise to the imposition of fines, removal of the licence and/or criminal prosecution. Once again, the terms of the licence regime either internalise costs or prevent externalities from arising.

Economic instruments

Economic instruments (see generally Pigou, 1929 and OECD, 1994) are used in situations where it is deemed best to leave the final decisions as to how and indeed whether to implement new standards to those most closely involved in an activity. It is assumed that those involved in an activity can decide how best to go about internalising externalities, taking into account their particular circumstances. Thus a particular economic instrument might encourage individuals to modify their behaviour to avoid the

direct costs that the instrument imposes, or they might choose to pay those costs to continue with their activity. Either way, the externality itself is either reduced, or its costs are met by those undertaking the activity. There are four basic types of economic instruments: taxes, subsidies, deposit refund schemes, and licences and licence or permit trading schemes.

Taxation may take the form of a straightforward taxation of profits from a particular activity, but is more likely to be a tax on materials used or tied to pollutants emitted. The United Kingdom's landfill tax and climate change levy (which took effect in April 2001) are the most topical examples of economic instruments.[33] Taxes on materials used include raw material extraction and use levies and deposit schemes that increase the cost of raw materials or of waste disposal. They also include relatively simple taxes such as road tolls. Those subject to the taxes generally pay them rather than modifying their activities until the costs of paying the tax outweighs the costs of modifying the activity.

The operation of a tax regime is seldom as simple as suggested above (see, for example, Ogus, 1999). For example, it must be noted that the tax set will seldom exactly match the external costs imposed by the activity (which, in any event, may be difficult to quantify). In many cases no attempt will be made to get an exact match, rather the tax will be set at the level thought (or suggested by economists as) most likely to lead to a modification of activity. This appears to be the basis for the level the landfill tax was set at and for the annual increases that will continue until 2004. As taxation choices take place within the political realm it is possible that a tax may be imposed for revenue-raising purposes rather than for the purpose of internalising externalities.[34] In addition, the use to which tax funds are put will affect the impact a tax has on an externality. The monies raised by taxation may be used as general revenue income or may be used to tackle the issue that prompted their introduction (that is, they may be hypothecated).[35] The choices made regarding hypothecation will clearly have an impact upon the operation of a taxation regime and on the impact of the externality itself. It is rare in practice for a tax to be fully hypothecated, though there are some instances of partial hypothecation in the environmental sphere with the landfill tax credits scheme and the petrol levy.

As well as taxing negative externalities, economic instruments may be used to encourage actions that reduce environmental 'bads'. Subsidies are used where an activity that is deemed to be beneficial to the community as a whole is unlikely to be undertaken as the cost to individuals is too great. For example, subsidies have been used in the UK to encourage the installation of loft insulation in houses under, for example, the Housing (Scotland) Act 1987. Similarly subsidies have been used to encourage the set-aside of agricultural land to assist in the reintroduction or protection of wildlife (see the Countryside Act 1968 and the Wildlife and Countryside Act 1981).[36] The objective

underlying the use of subsidies is to spread the cost of the activity throughout the community in the interests of environmental protection. Subsidies may be applied to industries in general to encourage the investment in and use of, for example, newer and 'cleaner' technologies. They are used then when the activity that gives rise to a need for regulation is not, as a whole, thought inappropriate, but where some modification to the way in which it is carried out is called for.

Deposit refund schemes are perhaps the most elegant of economic instruments in that the cost being imposed is clear, as is the method of avoiding the cost – simply return the particular goods or portion of them on which the deposit has been paid and the deposit will be refunded. Similarly, the system is relatively easy to run, with those party to production and sale largely responsible for the imposition and collection of the deposit. The aim of such schemes is primarily to encourage less consumption of particular goods through increasing recycling and perhaps also reducing initial demand by raising the costs of purchasing the initial, if not successive quantities of the goods in question. The most common and perhaps easily recognisable of such schemes are those applied to soft drinks containers. Indeed, Baumel and Oates (1993, pp. 267-272) note that the new charges imposed by the Bill (the Oregon 'Bottle Bill' of 1971) led to an 88% reduction of soft drinks containers being disposed of in landfill sites and a 72% reduction in roadside litter.

The final possible area where economic instruments may be used concerns licences and licence or permit trading schemes. Licences fall within the category of economic instruments only in so far as individuals have to pay to obtain them. The fee to be paid may or may not be greater than the costs associated with administering the licence scheme. Where the fee is not greater than the costs of administering the scheme, the fee is not a true type of economic instrument though its existence may still deter some potential actors. In all other cases the fee serves as a means of both internalising some of the costs associated with the activity for the individuals concerned and as a means of limiting those who will wish to carry out the activity.

In some circumstances, the numbers entering in to a particular activity will be further curtailed by restrictions placed on the number of licences or permits that may be issued. Where this happens, the licence or permit may be auctioned to the highest bidder or otherwise allocated to those already operating within the relevant market. Permits will then be open to subsequent trade by those already in the market and/or with those who wish to enter the market. This form of economic instrument serves to increase the costs of those wishing to enter a particular industry, or to increase their share of the industry or their share of emissions. In general an ambient standard will be set for the area in which the scheme is to operate and that standard will be used in determining the standards imposed by the permits and the number of permits that may be issued.

Tradable permit schemes operate in a similar manner and have been used extensively to control action to fisheries (see Pearse, 1992), but is less commonly used in relation to rights to pollute (but see Sorrell and Skea, 1999 who document United States and European experiences with emissions trading – this is also an area now being developed by the UK Government). Where permits are used in relation to the control of pollution the idea is that those who can most cost effectively lower their emissions costs will do so and are then able to sell their permit to those who are unable to lower their emissions so cost effectively.[37] In these circumstances the overall effect may not be to prevent or reduce externalities but to place a limit on the volume of them and to share that limited volume equitably among those with an interest in it. An additional benefit of this type of instrument is that the costs of administering the scheme for sharing are borne by those who wish to buy or sell the permits and not by the regulatory agency, thus leading to cost savings for government.

Criminal law

The criminal law is basically another form of command and control regime. The main distinction is that a stigma attaches to criminal offences that does not attach to the administrative or regulatory offences that might be committed under the command and control regimes outlined above. The criminal law is used where an activity or outcome is deemed socially reprehensible, or where it is believed that severe penalties must be imposed to prevent breaches of the law, or where using the criminal law is appropriate simply because of the message sent to the public and the ease of enforcement using existing structures. Such an approach has been seen in relation to the protection of wildlife (see, for example, Reid, 1994). On the whole, however, the use of the criminal law in environmental regulation has been relatively limited. There are, however, instances where laws have been introduced that have led to the possibility of criminal enforcement for breaches. Such laws and powers are most commonly used where there have been repeated breaches, or particularly gross breaches of standards, such as significant oil spills in rivers.[38] The result may be the criminal prosecution of particular individuals where their activities have caused severe damage to the environment or endangered it to an unacceptable degree. It is difficult to link criminal law provisions to the ideas behind FCA. Rather, such provisions are used to support the other legal mechanisms for internalising externalities. For completeness, however, this legal control should be noted.

Voluntary agreements

Voluntary agreements are the least 'legal' of the regulatory instruments considered in this chapter. There are two basic types. The first type is voluntary agreements among members of an industry. That is, an industry agrees to follow a set code of practice, drawn up by industry members (for example the Responsible Care Programme developed by the Chemical Industries Association). The second type is voluntary agreements

between the regulated and the regulator. These cover instances where the regulated agree with the regulator on the practice to be followed in relation to a particular activity. For example, management agreements are sometimes used in relation to the protection of Sites of Special Scientific Interest (see Last, 1999). The objectives of the agreements are to ensure the protection of the sites occupying land that would otherwise be used, say, for agricultural purposes. In these instances the management agreement will lay out such matters as the area around the site that is to remain untouched to protect the site. In both instances the aim of the agreement is to avoid further strict regulation of the activity through legislation. To the extent that there may have been a financial gain forgone because of the voluntary agreement, one could argue that some externalities have been internalised. It is likely, however, that this amount will be relatively small.

In summary, there are a variety of legal mechanisms operating to internalise environmental externalities. When considering FCA, therefore, it is pertinent to note that in many instances conventional accounting systems have already captured some measure of external costs via the costs that have been imposed by regulation. Further, given that over time environmental regulation has increased it could be argued that fuller costs are likely to be incorporated in the future. What is pertinent to note, however, is that it is unlikely that a *completely full* cost is currently internalised by legal regulations. In addition, it is unlikely that a completely full cost will be internalised in the future because of the political constraints under which legal regulations emerge. The following section builds on this one by introducing economic perspectives on externalities.

3.3 ECONOMIC PERSPECTIVES ON INTERNALISING EXTERNALITIES

This section is not intended to be a technical, economics-related introduction to the complexities of internalising externalities (see chapter 4, section 4.3, which introduces more technical detail). Rather, this section introduces the work undertaken by economists to measure the environmental unsustainability of economies as a whole. As previously indicated, if measures of economic success took into account ecological health, and if such a holistic assessment were used to inform macro-economic policy decisions then FCA at the entity level would not be particularly important. Indeed, it is likely that the regulatory regime (as discussed in the preceding section) could be developed to support sustainable development if a macro-economic assessment of it could be developed and politically supported. As a result, it is necessary to consider attempts that have been made to incorporate environmental assessments into traditional macro-economic measures of success.

As noted in chapter 1, it is widely agreed that conventional economic measurement of

success (that is, national accounts of economic activity, in the form of Gross Domestic Product and such like) do not capture the extent to which economic activity has an adverse impact on the national (and global) environment. This section briefly introduces the various attempts that have been made to try and capture environmental externalities. These attempts include accounting for natural capital and/or flows of environmental services and estimating gaps between current and more sustainable operations.[39]

Accounting for natural capital

At the core of traditional macro-economic analysis is the:

> *'internationally accepted system of national accounts (SNA) [which] is a framework for the systematic ordering of quantitative information about a national economy, so that the economy can be managed and its performance measured and compared with that in previous periods and with those of other countries'* (Ekins 2000a, p. 8).

The SNA contains a measure of both stocks and flows through an economy. The principle measures (of relevance to this discussion) that emerge from these accounts are: GDP (which is a measure of the flow of goods and services through an economy) and NNP (which takes GDP as its starting point and deducts an amount for the consumption of manufactured capital). These measures are calculated in monetary terms and basically are measurements of income or wealth generated. The measures, however, are often interpreted within a political and policy context as being measures of utility or welfare – which they are not. Dissatisfaction with the use of these data as a measure of welfare also arises because they do not take account of environmental stocks and flows except insofar as environmental resources are priced and exchanged within the economy (chapter 1 highlighted this problem). Indeed, at times it appears that nonsensical outcomes are generated from these measures. For example, an environmental disaster that creates large ecosystem and human health damage will create the need for substantial clean up costs and health treatment costs and will boost the economic through put of an economy. This would result in the GDP measure showing an increase in success when, overall, we may well view the disaster and the social and environmental outcomes associated with it as 'bad'.

Ekins (2000a) outlines two main ways of attempting to make macro-economic measures 'better' measures of both environmental and economic success. First, some commentators suggest that additional measures should be introduced to the assessment of whether an economy has been successful or not. One such measure is the United Nations Human Development Index, which 'consists of a combination of various measures of income, education and longevity' (Ekins, 2000a, p. 10). Closely related to

this approach is that developed in the Netherlands to account for the interactions between an economy and the environment. This account, NAMEA (National Accounting Matrix including Environmental Accounts), collects environmental data and presents it is the same format as the SNA in order to 'provide a complete account of all linkages between changes in the environment and the transactions recorded in the national accounts' (de Haan et al., 1993, p. 1 quoted in Ekins 2000a, p. 16). NAMEA:

> *'consists of a conventional input-output table, structured according to the Standard Industrial Classification, with extra rows at the bottom giving environmental inputs into the economy, and extra columns giving environmental emissions from the economy. In this way it is very easy to identify the resource-using and emission-producing sectors'* (Ekins, 2000a, p. 16).

The outcomes of this analysis are published in the Netherlands along with their national accounts. Ekins (2000a) suggests that as a result 'the environmental accounting is related to policy concerns in an absolutely direct and unequivocal way' (p. 16). This approach to modifying an exclusive policy focus on economic indicators has won widespread acceptance, with a number of countries developing this practice and extending it beyond the original focus on air emissions to other environmental aspects (see Vase, 1998, for a summary of UK work in this area). Both the Index of Human Development and NAMEA attempt to supplement GDP measures with other relevant information.

The second approach to 'correcting' macro-economic measures is to attempt to make these measures more accurate welfare indicators by adding or subtracting various items. (Daly and Cobb's, 1989, Index of Socio-Economic Welfare is one approach to this.) This approach usually requires environmental impacts to be monetised in order for them to be amenable to addition and subtraction. Ekins (2000a) notes these valuation issues 'are no less controversial than the GNP/NNP welfare relation itself' (pp. 10/11) and these controversies have limited the use of this approach. (Section 4.3 of chapter 4 revisits the issue of monetisation of environmental impacts.)

The details of the above two approaches need not concern us here. Rather, what is of importance are the principles behind these approaches and their relevance for FCA. The first approach could be seen to be akin to the transparency/democracy approach outlined in chapter 1. That is, instead of a narrow focus on the Annual Report and Accounts, net profit, earnings per share and such like, other measures (for example, an organisation's social and environmental performance) are also taken into account when evaluating an organisation's 'success' in any period. Alternatively, and echoing the second approach, one may take profit as the starting point and add or subtract figures to get to a more

accurate measure of organisational success. Deducting external costs (as ascertained by some FCA exercise) may be part of such an approach (see, especially chapter 5, which reviews experiments that have sought to find environmentally sustainable profits for individual organisations). In both cases, one can see that the organisational attempts at FCA are similar to the approaches developed by economists. In addition, forward-looking attempts to model sustainable economies have been undertaken.

Sustainability gap analysis

Both the approaches outlined above focus on a retrospective evaluation of the sustainability of an economy. The sustainability gap approach, (SGAP) has a more forward looking orientation in that it seeks to estimate the size of the gap between current and sustainable activities in terms of the physical requirement for sustainability, the years until such a standard could be reached (using current environmental trends; this time is termed YS) and the cost of implementing technologies to reach sustainability goals. Each element of this approach will be considered in turn.

The first step to an SGAP analysis is to estimate what environmental impact could be considered to be environmentally sustainable in a scientific sense. Ekins (2000b) describes these standards as being set at:

> *'levels of anthropogenic impact which do not threaten ecosystems (e.g. pollution is below critical loads) or biogeochemical systems (e.g. anthropogenic emissions do not destabilise the climate or destroy the ozone layer) and do not have a detrimental effect on human health'* (p. 5).

In addition, such standards would:

> *'seek to ensure that the harvesting of renewable resources does not exceed their regeneration, and that the rate of depletion of non renewable resources does not exceed the rate of development of substitutes for them'* (Ekins, 2000b, p. 5).

Once these standards are determined (and it must be noted that they will change over time as more accurate knowledge is generated) then the SGAP over an array of environmental impacts can be determined. Indeed, Ekins (2000b) has estimated SGAPs in the UK for CO_2, SO_2 and NOx emission, air quality, water quality and management of a variety of wastes.

The SGAP data can be converted into YS figures by estimating (on the basis of linear extrapolation of past trends) the number years before the sustainability goal is met. The YS figure is therefore dependent on the assumption that there will be no positive or

negative stepwise changes that would have a significant impact on the achievement of environmental sustainability (although it would be simple enough in principle to update YS estimates in light of new technology or significant changes in activity levels). Ekins (2000b) reports on an attempt to operationalise these ideas in the Netherlands (see Adriaanse, 1993) with a variety of YS being identified. On the basis of this work it was estimated that it would take 8.5 years for ozone depletion, 54 years for climate change emissions and 102 years for waste disposal to reach an environmentally sustainable state. In one instance, that of environmental disturbance, the YS figure was infinite because the trend for this impact is worsening not improving. Ekins (2000b) performed a similar analysis on the UK and found, for example, that 'on current trends it will take the UK 126 years before it reaches a sustainable level of CO_2 emissions' (p. 30). As Ekins (2000b) notes given 'the climate change that is already apparent, it may well be that climatic conditions will have changed drastically and irreversibly before this is achieved' (p. 30). Information of the YS clearly has important messages for governments as they seek to implement a legal and fiscal regime that would support sustainable development – especially if there is a reliance on making marginal changes to current activities in order to achieve sustainable development.

The final step in the SGAP analysis is to provide an idea of the 'economic implications of a sustainability gap [and] … of attempts to reduce it' (Ekins, 2000b, p. 28). This is achieved by way of micro-economic analysis of the cost of implementing technologies that would reduce the SGAP. Such an analysis creates, at a point in time, a series of marginal cost curves of, for example, emission abatement. Ekins (2000b) is at pains to stress that the monetary estimate:

> *'does not represent the amount of money that would have to be spent to achieve sustainability …. [rather, it is] a static, partial equilibrium calculation, representing at a moment in time the aggregation of expenditures that would need to be made to reduce the various dimensions of the physical sustainable gap to zero'* (p. 29)

and thus could be used as an indicator of 'both the distances from environmental sustainability and the economic possibilities of reducing those distances' (p. 29). This type of approach may also be transferable to an entity-level (and indeed a project-level) assessment of the gap between current and more sustainable operations. Indeed (as will become apparent in chapter 5), this approach mirrors that undertaken by Rubenstein (1994) and Bebbington (1999) when they sketch the financial implications for organisations that seek to pursue more sustainable activities. In addition, the SGAP analysis is valuable from a policy perspective when one is attempting to gauge whether or not a policy response is sufficient to tackle environmental unsustainability. Indeed, Ekins (2000b) makes the distinction between sustainability targets (those targets

focused on the full SGAP) and policy targets (which fall short of environmental sustainability). At an entity level, such a distinction would also be helpful in modelling which actions will completely 'close the gap' and which actions will move organisations towards environmental sustainability.

In summary, we have suggested that a discussion of shadow FCA should take account of work being undertaken within economics to estimate the external costs of unsustainability for particular economies. In particular, if during macro-economic planning and assessment, a government geared its economy towards sustainable development then it is unlikely that FCA would have a role to play. We have introduced some tools of analysis that would enable governments both to identify the extent to which an economy is not sustainable and to enable it to regulate for sustainable development. It should, however, be noted that while these tools are gaining more widespread acceptance they are not actively being used by the UK Government at present. Given this, FCA remains a potent mechanism for making transparent the extent to which current economic activities generate externalities of a type and at a level that would make these activities unsustainable.

3.4 FCA, LEGAL REGIMES AND ECONOMIC ANALYSIS

Several points can be made with respect to the linkages between FCA, legal regimes and economic analysis. First, and most pertinent to a policy debate, FCA only becomes desirable or necessary where the legal regime does not fully regulate externalities. Likewise, FCA only conveys extra information where the economic system fails to capture all relevant data. Thus, the EC's view that FCA is a fallback position becomes both understandable and defendable. Seeing FCA as merely being pertinent if all else fails, however, misses the potentially important contribution of this technique to the sustainable development debate.

First, FCA makes visible, at the level of the entity, the extent to which organisational operations create externalities. The changes in perceptions of the environmental performance of an entity (from the point of view of both internal managers and external parties) potentially created by a full cost account is thus of importance in the policy context. The likely outcome of FCA would be to signal to internal managers that while in eco-efficiency terms they may be 'doing well' there is still some distance to travel before they could say they are ecologically sustainable in any sense. This realisation may drive individual businesses either to be more sustainable or may result in them realising the limits of the greening activities that they can undertake (see also Gray and Bebbington, 1996) and seeking to lobby governments to create a regulatory environment that would enable them to be more sustainable.

The second contribution of FCA would be to highlight, again at the level of the entity, any gap between the policy response to externalities (in the form of taxes that internalise some of an externality) and the full extent of that externality. This is akin to Ekins' (2000b) exposition of a 'sustainability gap' and 'policy gap' in environmental regulation. It may well be that the economists would argue that the appropriate level of analysis for this gap is at the economy-wide level. We would contend, however, that an analysis at the level of the entity will also produce information that will encourage individual entities to change their operations and thus contribute to economy-wide change. Alternatively, and equally importantly from a policy perspective, the identification of a gap between sustainable business activities and business as dictated by current economic rules may help individual firms to recognise that they cannot deliver sustainable development on their own. Rather, the whole legal and economic framework (which is controlled by governments) needs to change in order to address sustainability issues. This is also an important message (if it is in fact the case) to convey to policy makers.

The third point we would like to make is that a shadow FCA approach is likely to use similar approaches to those employed by economists as they seek to understand sustainable development. Further, environmental tax rates have been used in FCA experiments (see chapter 5) as measures for external costs. There are thus linkages between assessments at various levels of externalities arising from economic activities.

3.5 CONCLUDING COMMENTS

This, deliberately brief, chapter sought to place FCA within a broader context. In particular, we have outlined how legal regimes can and have been used to internalise costs. In addition, we briefly considered how externalities could be factored into economic assessments of the success of an economy. Further, we suggest that if the legal and economic 'rules of the game' internalised externalities then a shadow FCA would not be necessary. In the absence of this, however, FCA has a contribution to make to the policy debate and to individual organisations as they seek to get to grips with the gap between present and more sustainable operations. If one accepts that a case for FCA exists then a consideration of how such an account could be produced is necessary. The next chapter tackles this task and outlines various tools of analysis that could be used to facilitate FCA.

4. FCA tools, concepts and an FCA approach

4.1 INTRODUCTION

Chapter 3 provided a rationale for why shadow FCA may still have a place in the policy arena even when environmental regulations are implemented by governments. In particular, it was suggested that until (and indeed if) governments internalise all externalities, shadow FCA will remain a useful tool for identifying externalities. This chapter builds on the last chapter in that it continues to 'set the scene' for organisational level FCA. Further, this chapter is linked to chapter 5 (which reviews FCA experiments) because it outlines various tools, concepts and heuristics which have, can and should be used in any attempt at FCA. In order to demonstrate the implications of the tools outlined here we shall at times refer, at least obliquely, to the experiments reviewed in chapter 5. It is impossible to write about either FCA tools or FCA experiments without referring to both and as a result chapters 4 and 5 should be read together. We have, however, attempted to keep the discussion of FCA tools in this chapter at a fairly general level with greater depth being attained in chapter 5.

The examination of various tools, concepts and heuristics is split into two parts. The first section covers environmental modelling tools that are required to generate physical data about the particular activity that is to be subject to FCA. Specifically the tools of life cycle analysis, eco-balances and ecological footprint estimation are introduced. The second section focuses on how environmental impacts can be monetised, drawing primarily from the economics literature. As will be apparent, this is an area that has excited considerable controversy and is one of the areas that present many challenges for FCA. The penultimate section of this chapter combines the insights of the preceding two sections to outline a four step approach to FCA. Finally, some concluding comments are made.

4.2 RELATED TOOLS AND CONCEPTS

In order to identify the externalities arising from a particular activity, a link between the environmental impact and the activity must be determined. This section introduces three commonly used techniques for doing this, namely, the eco-balance, life cycle analysis and the idea of an ecological footprint. The modelling of environmental impact is the bedrock upon which any FCA attempt rests. Thus, if this foundation is shaky the validity of the entire exercise is also in question. There is no agreed terminology in much of this area and as a result confusion often arises with the use of terms. In what follows, we shall seek to define what we mean by each term at the outset, but it is worth bearing in mind that different terms may be used for the same basic approach.

An **eco-balance**, at its simplest, is a representation for a single entity of all its material, resources, energy and service inputs and the corresponding outputs, emissions and leakages. That is, an eco-balance seeks to track the inputs to and outputs from a particular activity or for a particular entity. This is achieved by defining some kind of boundary around the activity of interest and then tracking flows over that boundary. Usually, the focus is on tracking all energy and materials flows and, in a properly constructed eco-balance, the energy and materials input should equal the energy and material outputs. The eco-balance is a popular technique in Germany and Austria (as well as having been used in other parts of Europe), especially in flow production industries (such as steel, with the Danish Steel Works being a well know example of an eco-balance account, see Gray and Bebbington, 2001). Sometimes an eco-balance is called a 'mass balance': both terms encompass essentially the same tool.

While an eco-balance may be constructed in a detailed manner, it is also possible for the underlying concept of an eco-balance to inform FCA. This is especially pertinent where the activity being modelled is not of the nature of flow production and where complete information about an activity is not available. The principles of an eco-balance can be applied equally well at an organisational level or to the provision of a service, albeit that detailed input and output data may not be available. Indeed, it may be appropriate, when one is attempting to understand a previously poorly understood area, to use a rough eco-balance to commence an FCA analysis. The results of such an analysis are not going to be exact, but they are likely to indicate areas for future investigation. In addition, a rough eco-balance is likely to identify those areas where the largest external environmental impact is likely to arise.

While an eco-balance assists the identification of the inputs and outputs across an entity boundary and therefore aids an appreciation of the direct impacts associated with an activity, what is less likely to emerge is an appreciation of the impacts of goods/services that arise upstream or downstream of the entity. In order to capture this data a life cycle analysis or an ecological footprint type analysis would be required.

Life cycle analysis (LCA) is a:

> *'process used to evaluate the environmental burdens associated with a product, process or activity. This is accomplished by identifying and quantifying energy and materials usage and environmental releases. The data are then used to assess the impact of those energy and material releases on the environment … [over] the entire lifecycle of the product, process or activity, encompassing: extracting and processing of raw materials; manufacturing, transportation and distribution; use/re-use/maintenance; recycling; and final disposal'* (Fava, 1991, quoted in Gray et al., 1993, p. 163).

Clearly, this technique has the same underlying systems vision as an eco-balance: that is, materials and energy flows associated with an item of interest are identified. The two techniques differ in that, usually, an eco-balance exercise focuses on all the activities of an organisation whereas LCA usually focuses on a single product or activity. While the concept of LCA is straightforward, actually conducting such an analysis is significantly more difficult. In particular, various problems arise in, for example: bounding the analysis (to avoid infinite regress), identifying all significant impacts, obtaining data, the cost of data collection, correctly identifying the significance of impacts and combining impacts together.

A particular strength of LCA is that upstream and downstream impacts arising from a product, process or activity are identified. Thus, if an input to a process, for example, generates a significant externality, an LCA should identify that fact where (depending on how it is constructed) an eco-balance may not. Likewise, if a particular product generated a significant externality in the form of a waste stream at the end of the product's life, LCA should identify this. The LCA concept, therefore, is more akin to FCA. Indeed, FCA could be seen as being financially quantified LCA.

The final technique that could shed light on the impact of a particular activity is that of an **ecological footprint**. Ecological footprints are usually constructed on a country-wide basis and are often used to provide an indication of how richer countries use more than their 'fair' share of resources in order to support a particular life style. As Ekins (2000a) notes, an ecological footprint seeks to:

> *'convert a country's use of energy and land for food, forest product and buildings .... To an area of 'consumed and used' land and then identify how much land people in one area are appropriating from another'* (p. 26).

What such an exercise tends to show is, for example, '1000 Germans consume roughly ten times more in various regards than 1000 Filipinos, Egyptians or Argentineans' (Weizsacker et al., 1997, pp. 218/219). Similarly, Rees and Wackernagel (1994):

> *'have calculated that the ecological footprints of average Canadians are so large that we might need three globes the size of the earth to survive 5 or 6 thousand million footprints of that size, i.e. if all of humanity consumed and polluted at the Canadian rate, it would take three globes to accommodate us all'* (quoted in Weizsacker et al., 1997, p. 220, see also Wackernagel and Rees, 1996).

At the core of ecological footprints, therefore, is the idea that individuals/countries should share resources evenly. Thus, the commitment of the *Brundtland Report* to social justice

and equity is captured by the ecological footprint analysis.

While ecological footprints have in the past been attempted for particular countries the same ideas could equally be applied at the level of the firm. The way in which this could be done is to consider the ecological footprints associated with particular activities, for example, a company's travel. It is possible, for example, to convert total air travel to the distance travelled per person and the resources (again per person) required to support that travel. For one organisation with which we are familiar such an exercise highlighted (at the intra-firm level) the disproportional consumption of air travel by a sub-section of employees. In a similar manner, average travel (or energy use or waste produced, for example) could be compared with other organisations' travel impact, average impacts for a Western economy and average impacts for a 'developing' economy. The extent to which some organisations and/or some individuals within organisations are consuming a disproportionately large share of resources would thus be highlighted. The idea of an ecological footprint, therefore, brings to the fore the politically unpalatable but ecologically essential message that if a Western society is to pursue sustainable development it will be necessary to reduce its ecological footprint (see also Chambers and Lewis, 2001, for a recent application of this technique to business).

It is also the case that many market signals are not in accordance with ecological footprinting principles. If one knew, for example, that in order for the UK to have an ecological footprint for electricity of the size of the country it would be necessary to cut electricity consumed (in absolute terms) by one half, then one solution, using the market, would be to alter the way electricity is charged. At present, the electricity tariff is such that small purchasers face a constant per unit cost for electricity, while larger purchases are charged a smaller per unit cost as they consume more electricity. At the margin this means that an increase in consumption could lead to a decrease in electricity bills. An alternative way to charge for electricity would be to price small purchases at a low per unit cost (and one that would ensure that no one faced fuel poverty) and then to progressively charge a higher per unit price as consumption grows. This would have the effect of making energy efficiency more cost effective for larger energy users. The actual shape of such a regime would be difficult to design. The basic premise, however, is to use such a pricing regime to align economic and ecological success factors. The same idea could be used to ration air and car mileage so that the ecological footprint of overall consumption was kept within the actual physical size of the country. While this is not an FCA approach of itself, it would achieve the same result: a reduction in externalities and a reduction in the ecological footprint of a country to its physical size. Ecological footprinting, therefore, focuses on scale of operations/ impacts rather than on efficiency issues (although, of course, the two are linked).

In summary, these three techniques for converting activity data to environmental impact are essentially attempting, at the level of the entity, what the NAMEA (see chapter 3) attempts at an economy-wide level. Indeed, data contained within the national accounts, and more specifically within the input and output tables that lie behind such accounts, are likely to be a useful source of data in any attempt to quantify impacts arising from activities. The act of making linkages between activities and impacts, however, is only half the FCA story. The link between impacts and external costs is also sought.

4.3 COSTING EXTERNALITIES

The preceding section outlined various tools that could be used to link environmental impacts to corporate activity. While these tools vary in terms of the accuracy and types of the data produced, the outcome of each method will generate a set of environmental impacts, expressed in physical terms, which are deemed to arise from a set of activities. The challenge for FCA is to translate these physical quantities into monetary quantities. It may not be possible, or indeed necessary, in every case to make this translation in order to control environmental impacts. FCA, however, assumes that such a translation will be undertaken. Further, given that the financial measures of success play such a large role in managing and motivating organisations, it is assumed that translating externalities into monetary terms will enable some kind of a 'net' financial position to be guessed at. Two categories of impact are likely to arise from the modelling of environmental impacts: resource use/depletion and pollution impacts.

Resource use

Ekins (2000a) suggests that externalities arise from resource use whenever the price of a particular resource is not set high enough to cover all the impacts of its use or where there is no price assigned to its use. Thus, in effect, the externalities from the use of oil and gas (for example) could be estimated to be those pollution impacts that are not internalised in the price of the resource itself. In theory, economists value the environmental change arising from resource use on the basis of the 'economic rent of depleted resources' (p. 12) with this rent being estimated in a variety of ways (net price approach, present value approach or the user cost method – see Ekins, 2000a, p. 12 for a brief introduction). It is, however, worth noting that there is no clear consensus on which method is the most appropriate. It seems safe to conclude that in the first instance, the external costs arising from resource use are the non-internalised costs of the pollution impact of the use of that resource.

The second cost that arises in this area is that associated with the opportunity cost of future use of the resource. Again, while this concept is theoretically straightforward it is

difficult to see how it could be applied with any accuracy. Given that we cannot know to what likely future uses resources may be put, the opportunity cost of those possible future uses cannot be determined with any accuracy.

The difficulties associated with the economic valuation of resource use flow through into FCA experiments. In particular, it will become evident that none of the experiments reviewed in chapter 5 has sought to account for the fuller costs of resource use. It would, however, be possible to estimate the cost of replacing non-renewable resource use with more renewable resources. For example, if one were looking to estimate the sustainable cost of the use of oil and gas (in the form of petrol), it may be possible to estimate what it would cost to produce fuel using plant biomass (which could be argued to be a more sustainable source of mobility and one which avoids introducing new sources of greenhouse gases into the biosphere). In most instances this cost is likely to be greater than the cost of extracting and using fossil fuels (otherwise such energy sources would be used in preference to fossil fuel). The difference could be considered to be the externalised cost of using the non-renewable resource and could be factored into an FCA exercise.

Pollution impacts

FCA will also require the monetisation of pollution externalities, to the extent to which they have not already been 'priced' in the market. There are two main methods for estimating the value of environmental damage, with each method having a number of variations. Box 4.1 summarises the main methods used. These various approaches a best explained by way of an example.

If effluent arising from a particular activity were to kill all the fish in a nearby lake (but leave the lake otherwise undisturbed)[40] a variety of external costs related to that impact could be estimated. The first possible cost could be the costs that would be incurred if the owner of the damaged resource were to sue the polluter for the pollution event. The costs awarded by the courts could take into account, *inter alia*, the lost revenue associated with the pollution event. For example, the owner of the lake could be running a fishing business and the death of the fish may have resulted in lost earnings. In addition, the cost of restocking the fish in the lake may be incorporated into the external cost of the pollution. This could be determined using a cost of damage approach based on an estimation of the cost of the damage.

Alternatively, a maintenance cost approach could be used. If this method were used, the external cost of the pollution event would be the cost that would be incurred to restore the lake to its pre-pollution condition. This cost is likely to be a smaller cost than the first option, with the difference arising from the economic use to which the lake had been

Box 4.1: Pollution valuation methods

Cost of abating, avoiding or remediating the impact (maintenance cost approach). This is a three-step approach.

- Some level of environmental performance is specified (e.g.: level of emissions of particular pollutant).
- The technical solutions that could be employed to achieve the target are determined.
- The costs of – avoiding or abating emissions using these technical solutions or – remedying the impacts using the various technical solutions are estimated.

Cost of the damage arising from the impact. These costs may be estimated in a variety of ways.

- Physical impact associated with an activity is modelled.
- Estimate of economic value of the damage is attempted using:
  - existing prices (e.g. damage to health requiring medical treatment plus opportunity cost of not working).
  - the cost of transport approach investigates how far people would be prepared to travel in order to enjoy an environmental benefit. The costs of travelling are used as a measure of the economic value of the damage.
  - the hedonic pricing method assumes the price of environmental amenities is implicit within the value of goods (for example, house prices). It is therefore possible to estimate the percentage of a house price that relates to an environmental benefit and, correspondingly, how much house prices fall when that amenity is absent.
  - a contingent valuation method seeks to ascertain how individuals value the environment. There are two main ways to estimate this. The first is to determine the amount people would pay to improve the adverse environment impact (willingness to pay method); the second is to determine the amount people would wish to be paid for accepting the adverse environmental impact (willingness to receive).

Source: IFAC (1998), Ekins (2000a) and Anetheaume (1997).

subject. If the lake is not being used in an economic activity there will be less external costs associated with the pollution event.

The third possible option would be to say that the polluted lake should be left as it is but, in order to compensate for the loss of the lake, the entity concerned should be required to purchase and hold in perpetuity an equivalent unaffected lake. This involves the idea of 'shadow sustainability' in that the loss of a resource in one location is compensated by the maintenance of another resource. The cost of an equivalent lake would be subject to the market conditions at the time the lake was purchased.

The above options are closely linked with a physical item, in this case the lake, for which external costs to remedy and/or compensate for the pollution event (the externalities) could be determined. Alternatively, it could be possible to determine from a variety of surveys: how far people would be willing to travel to visit a lake of the type affected (the travel cost approach), how much people would be hypothetically be willing to be paid/ willing to pay for either suffering damage/not damaging the lake (the contingent valuation approach) or how more valuable houses (say) are if they are close to an undisturbed lake (the hedonic pricing method).

The above ways of costing the environmental damage to our hypothetical lake are all conceptually feasible. In some instances, however, there are likely to be significant practical difficulties in determining the actual figures. Further, it would be instructive to see what kind of spread of costs would be generated from the various costing factors. Indeed, it is at this point that the potential complexity of undertaking FCA becomes apparent, as does the difficulty of comparing numbers from any one FCA attempt with any other. While it is conceptually easy to grasp the idea of an externality and theoretically possible to determine some financial measure of that externality the 'reality' of trying to determine those figures is most difficult. Even leaving aside the problem of linking an impact from an individual entity with specific externalities (and of apportioning impacts where, for example, two or more external impacts combine to create an externality), the costing dimensions leave many further options. Moreover, it must be theoretically possible for some cost elements to be infinite. For instance, returning to our lake example, if the pollution resulted in the extinction of some species then it would not be possible, for example, to remedy such an impact or to get a travel cost estimate. Thus one option for monetisation could be said to be an infinite figure. This is not to say that a contingent valuation approach, say, would not yield a financial valuation. Indeed, this demonstrates one of the limitations of such an approach.

In summary, this section has introduced a number of methods that could be used to translate environmental impacts into monetary terms. Each method has its own rationale, but each method will yield its own unique cost figure as well. This is the main potential problem with costing externalities: that there are a huge variety of defendable (but not unique) ways of generating costing figures, that each of these figures may lead to different conclusions with respect to the sustainability of an activity and that different appropriate policy responses may be implied from each approach. The 'best' one can hope for is that an FCA attempt will be transparent with respect to what costing figure has been used.

4.4 AN APPROACH TO FCA

Drawing together the above tools and concepts, this section outlines how FCA could be achieved. Two defining features of FCA have been suggested. First, that externalities are identified as arising, in some way, from a particular set of activities. Second, that the externality can somehow be measured in monetary terms. These two features give rise to a four stage approach to FCA (see box 4.2). In the first instance (stages 1 and 2), the scope of the FCA exercise must be determined. Once this is achieved then the costs that are internal or external to the particular cost objective (see below) can be determined. The second substantive task is to link the activities being reviewed with their external impacts (stage 3 in box 4.2). Finally, once the external impacts are identified, monetisation can be attempted. While in principle this appears to be a straightforward process, in practice each stage requires a significant amount of data. Further, decisions made in each stage will dictate some of the elements that will need to be pursued at the next stage. These aspects will now be expanded in some depth below.

Box 4.2: Steps in FCA

Stage 1.
Define the cost objective (which may be, for example, a product, production process, waste disposal option, part of an economic entity, an entire entity or an industry).

Stage 2.
Specify the scope or limits of analysis (that is, what sub-set of all possible externalities are to be identified).

Stage 3.
Identify and measure external impact (which involves making the link between a cost objective and the externalities arising from the cost objective).

Stage 4.
Cost external impact (monetisation of the externalities, or determination of the fuller cost associated with, but not already captured by, the current accounting for a cost objective).

Define the cost objective[41]

The first requirement of FCA is a clear idea of the purpose of calculating the fuller costs for. There are several possible cost objectives for which fuller costs could be calculated. Fuller costs may be sought for:

(i) a particular product or process (or indeed, two or more products or processes if a comparative analysis is to be undertaken)

(ii) the whole, or a part, of a business (which may be either functionally defined, for example, all production units, or for a geographically defined sub-set of the business)

(iii) an organisation's entire activities

(iv) the activities of an entire industry

or

(v) all, or a sample of, activities within a geographically defined area.

The nature of the cost objective will, obviously, be dictated by the particular purpose of an FCA analysis. For example, one of the stated purposes of Ontario Hydro's FCA experiment (see chapter 5) was to quantify for Canadian regulators the social and environmental impacts that arose from electricity produced in Canada for export to the United States of America. Thus, the objective of their FCA calculations was their fossil fuel power stations, as these stations were the drivers of the environmental impact that the Canadian government was interested in. In contrast, others have used FCA as an input into strategic decisions as to which of two (or more) production processes, waste disposal options or products they should develop. In these cases the cost objective was the processes, options or the products being evaluated. Others still have focused on (a sub-set of) the externalities associated with their entire operations (see, for example, the BSO/Origin and Manaaki Whenua/Landcare Research experiments discussed in chapter 5). Likewise, from time to time entities, usually governments, produce studies of the impacts of a particular activity on the environment.[42]

Define the scope of the analysis

Once the cost objective is chosen the next, and crucial, decision is to define the scope of the analysis around that cost objective. That is, which externalities are to be measured within the FCA exercise? It may be instructive to consider the issues arising from defining the scope of the analysis by using an example.

If one were to attempt to quantify the externalities from electricity use then the following layers of externalities would arise. First, impacts would arise from the entity's use of electricity to the extent to which these impacts are not captured, or not fully captured, by the accounting system. For example, if the electricity is used to run a photocopy machine then there will be a pollution externality from that activity (the simplest example of this being the generation of spent toner cartridges). To the extent to which the pollution impacts of these cartridges are not fully captured by waste disposal costs there may be an externality arising directly from the organisation's activities. Secondly, impacts may arise from the generation and distribution of the electricity that has been used by the organisation. For example, the use of a non-renewable resource such as coal or gas, as well as the emissions that arise from the combustion of fossil fuel in order to generate electricity, constitute an externality. This externality is not created by the organisation itself. Rather, it is created by a supplier to the organisation. Given that the organisation uses electricity, it could be suggested that it creates, via its demand, the externalities generated by the electricity supplier. Hence the externalities could be seen to relate to the organisation's operations. We would call the impact of the electricity generation a second level impact. Peeling the layers of the impact back further still, one could suggest that

the construction of the power station that enables the electricity to be generated also creates externalities. Furthermore, there will be external impacts arising from the construction of the machinery that was used to build the power station, and so on. It quickly becomes apparent that one ends up with an infinite regress when attempting to examine the externalities that arise, in this case, from using electricity.

While it is valuable to realise that everything is connected with everything else, it is not very useful to attempt to include all the above layers of impacts in an FCA exercise as data problems very quickly become insurmountable. For example, the data on external impacts of power station construction (see above) is likely to be sufficiently complex as to be presently unavailable. Further, attributing the percentage of impact from such up-stream external impacts to electricity currently produced would be very difficult. Furthermore, it is likely that the more one goes up stream from the cost objective being analysed the smaller the impact arising from the next layer is likely to be. Certainly, Honey and Buchanan (1992, see also Buchanan and Honey, 1994), in a study using data on the energy requirements of products used in the building industry in New Zealand, suggest that as much as 90% of the energy required to make material inputs arises from the direct and transport energy inputs to the process (which could be phrased as first level impacts in accordance with our previous example) and the energy required to make the material inputs (second level impacts). Thus, it could be suggested that a long regress up the supply chain to uncover externalities may not be necessary in order to estimate the significance of the impacts arising from any one product or process. It seems likely that for many externalities we could expect to see this 'tailing off' of impact.[43] Indeed, we have not been able to imagine a situation where externalities 'concentrate' on being traced up the supply chain in the manner sketched above.[44]

Given the problem of infinite regress noted above, it is necessary that some boundaries are placed on the FCA analysis. These boundaries may either be in terms of the number of layers of impact that one wishes to consider or in terms of the significance threshold (which itself could be measured either in terms of toxicity or in terms of size of impact) that impacts have to exceed in order to be included in the analysis. What one hopes is that any FCA exercise will make explicit where the limits or boundaries of its analysis are. Further, in practice it is likely that the limits on any FCA attempt will be dictated by the purpose of the analysis. Once impacts are deemed to have a negligible impact on the outcomes of an FCA-related decision then it is likely that they will be ignored in the calculations.

There remains, however, a need to be aware of issues that may arise outside the limits that have been specified for any analysis but that are still relevant to that analysis. For example, Gray et al., (1993, p. 174/175) document a life-cycle analysis on disposable

nappies versus conventional cloth nappies, undertaken by Proctor and Gamble, which was challenged by the Women's Environmental Network, *inter alia*, on the basis that the boundaries of the analysis were not wide enough to consider important issues arising from the sourcing of the wood pulp for disposable nappies. In this case there were issues arising from how one of Proctor and Gamble's suppliers (Stora) was dealing with the Sami (Europe's last indigenous people) who live in the forests from which the wood pulp for the nappies was being obtained. The boundaries of the analysis undertaken by Proctor and Gamble were set in such a way that this issue was missed. The issue, however, was of importance in at least some people's minds and adversely impacted on Proctor and Gamble's claims about the 'friendliness' of their product.

Identify and measure external impact

The third step in developing FCA is to generate data appropriate to the cost objective chosen and within the boundaries specified by the analysis, in order to identify the impacts arising from the cost objective. A significant amount of information is required in order to do this and this information may not be readily available. Essentially, data need to be gathered on two aspects. First, data on the cost objective itself are required. Second, data on the externalities associated with the cost objective are required.
Much of the information required to determine the activity aspects of a cost objective will most probably be obtainable from the existing information systems of the organisation undertaking FCA. This is where accounting information systems are potentially very useful for FCA. Accounting information systems capture all transactions across an entity's boundary that result in an exchange of money. Likewise, these boundary transactions also tend to be those where there is a movement of materials or the consumption of resources (either directly by the entity in the case of the consumption of electricity, or indirectly in that resources are consumed by others who in turn provide a service to an organisation).

In some instances, however, there will be resource flows into and out of an organisation which, because they are not priced, will not be reflected in the accounting information system. These flows will need to be identified and captured outside the accounting information systems. For example, if there is an environmental management system, significant flows that are not recognised by the accounting information system should be captured within, for instance, an inventory of environmental impacts.

Given the complexity associated with undertaking an FCA exercise, it is likely that only those organisations with well-developed environmental information systems will attempt it. It is, therefore, likely that much of the activity data required for FCA will be captured in some form within existing information systems. Of course, the accounting related data will be captured primarily in financial terms so there may well be a substantial amount of

work to be done in order to translate the financial data to activity data. If, however, the organisation in question has account codes that enable physical aspects of financial flows to be captured (for example, if an invoice is processed in such a way that the tonnes of raw materials, kilowatt hours of electricity, distances flown or the reams of paper purchased is also recorded), manipulation of the existing information systems may be sufficient to generate activity data. Where FCA focuses on processes, options or products that are not currently undertaken by the organisation, data of expected activity levels will be required.

At this stage only the activity data associated with a cost objective has been captured. The next step for FCA is somehow to translate the activity data into impacts data (see also section 4.2 above). That is, for a given activity (such as the use of land based transport) there will be a range of associated impacts. In this example, impacts include: the use of fossil fuel, the impacts associated with extracting fossil fuel and processing it into a form that can be used in vehicles, emissions from vehicles as they are driven (and health and environmental impacts associated with these emissions), the impacts arising from the manufacture of the vehicle and impacts associated with the operation of road infrastructure to enable the vehicle to travel from one place to another. Clearly, where the boundaries for any particular FCA exercise are drawn will determine which impacts are to be considered.

Data on impacts of activities can be obtained in a variety of ways. As outlined in section 4.2, the most exact way to obtain impacts data is to create an LCA for the product or process for which the fuller cost account is being created. Less exact, but quicker, would be to extract data from government reports that, for example, link vehicle travel to emissions data. This data could be used to impute an average rate of emissions per mile travelled and this average could be applied to the activity data gathered (see, for example, Department of Environment, Trade and the Regions, 1999, p. 16, which contains average CO_2 emissions for various types of fuel). Likewise, data from environmental reports (such as British Airways' publication of average emissions per passenger seat kilometres) may be used to link air travel to emissions and resource use arising from that activity.[45] Similarly, data on the energy and materials requirements for the manufacture of inputs to the organisation may enable the imputation of the impacts associated with a given activity. The use of these data sources, however, will necessarily introduce the potential for error into the figures used. The extent to which using such secondary data sources matters depends on the purpose of the FCA exercise. If an organisation is seeking to make a choice between products or processes then more exact data is likely to be appropriate and a custom made LCA is likely to be more useful. If one were to seek a general idea of all the externalities that arise for the operations of an economic entity, then an approach that uses secondary data sources will probably

suffice. We are not aware of any analysis undertaken that compares data generated from secondary data as opposed to one's own LCA and as a result we are unable to guess how much error will be introduced from using secondary data sources.

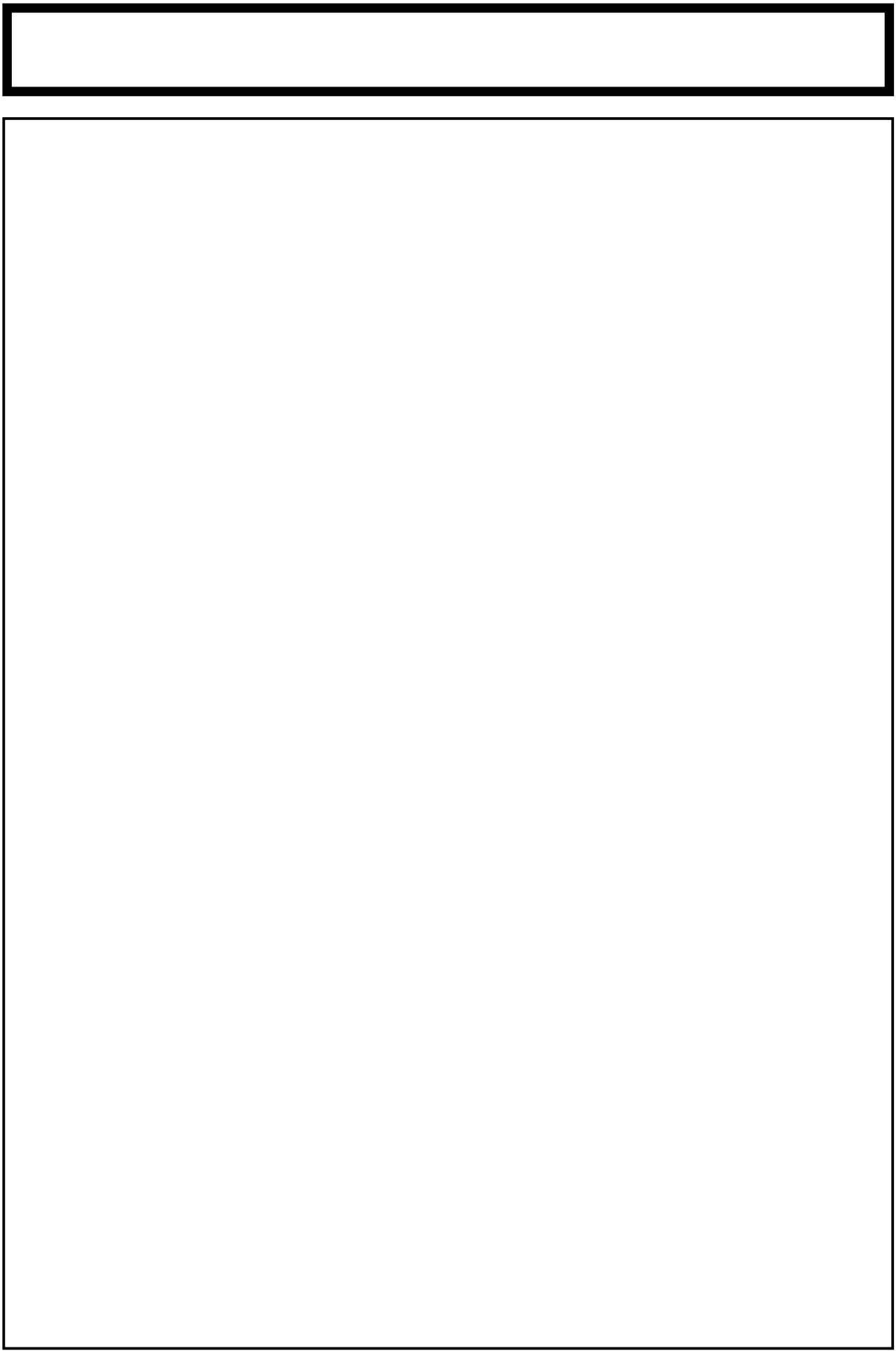
Monetisation

The final step in any attempt to develop an FCA is to attempt to monetise the externalities identified as a result of the foregoing analysis. As has been noted in section 4.3, this is a highly problematic task. It is not a matter of 'merely' applying a costing figure to the impacts identified from the above analysis. Rather, there are more detailed assessments to be made in determining which external costs to use.

In summary, there are four steps that have to be worked through in any FCA exercise, with the choices and decisions arising on the way being, to large extent, dependent on the goal of the exercise. At the outset it was identified that defining the cost objective and defining the boundaries within which externalities would be examined would largely determine the nature of the FCA exercise. Once the bounds of the analysis have been defined the data requirements of a particular FCA exercise may become clearer. Obtaining the relevant data, however, is likely to be less straightforward. Likewise, the most appropriate costing figure to use in the analysis has to be determined and is likely to emerge from an interaction of data availability and the 'story' that the FCA exercise is attempting to tell.

4.5 CONCLUDING COMMENTS

This chapter introduced the tools that would be used to develop FCA and embedded these tools within a four step FCA approach (defining the cost objective, specifying the limits of the analysis, identifying and measuring impacts and costing the external impact). In this way, the externalities associated with a given process, product or activity could be identified and costed. A number of points can be made on the basis of this material. First, eco-balance thinking (at minimum) and LCA are essential tools for FCA. Any reservations held with regard to those particular techniques will also impact upon the practicalities and reliability of FCA. Likewise, from a discussion of the various ways one may cost externalities, it becomes apparent that a key issue in FCA is which costs should be used. It is here that a multitude of options exist. The next chapter examines a number of well-developed FCA experiments where the tools of analysis outlined here have, to greater and lesser extents, been used. In addition, it will become apparent that the costing step has been attempted in a variety of ways in the experiments and that this element has had a significant impact upon the conclusions that could be drawn from the experiments.



5. FCA Experiments

5.1 INTRODUCTION

In the past there have been a number of experiments that could be seen to be related to FCA. These experiments have the potential to tell us much about the nature of and difficulties associated with FCA. Further, one of the findings that emerged from the questionnaire survey sent to selected European accountancy bodies (see the appendix and chapter 6 for details) was that many individuals within the profession have no, or at least very sketchy, knowledge of these FCA experiments. This chapter, therefore, is intended to remedy this lack of knowledge and should be read by those who are unfamiliar with the various FCA experiments. Several of the experiments are also ongoing and it is likely that if any agreed FCA method were to be developed it would be grounded in these experiments. Further, it will become apparent that the concepts, tools and techniques introduced in chapters 3 and 4 have been used in the following experiments. The level of detail contained in these reviews is not such that you never need to refer to the experiments themselves. Nothing can compensate for reading the original, and with this in mind, details of where one may find a fuller explanation of each experiment are provided. In addition, the experiments are reviewed in two parts. Section 5.2 examines major FCA experiments in the public domain undertaken since 1990, while section 5.3 provides a briefer review of other experiments relevant to the FCA debate. Finally, some concluding remarks are made.

5.2 FCA SINCE 1990

Five FCA experiments are reported in detail in this section. The particular examples have been chosen for a variety of reasons. In the first instance, three of the examples have been developed over relatively long timescales. The length of time over which the respective organisations tackled FCA has enabled some of the problems that arise with FCA to be pinpointed. The second reason why this selection of experiments was chosen is that they all are in the public domain in some detail and, as a result, the choices that have been made are reasonably transparent. Finally, these experiments also bring to the fore a number of the tensions and issues that FCA raises and thus a working knowledge of them is useful in formulating ideas about the likely usefulness of FCA (see also chapter 6). The five experiments reviewed here are presented in roughly chronological order starting with BSO/Origin's environmental 'value added' statement and then moving to Dan Rubenstein's modelling of the costs of more sustainable forestry. We stay in Canada to consider Ontario Hydro's work before moving to the southern hemisphere for an examination of an attempted implementation of Gray's (1992) sustainable cost calculation (which is a form of FCA) in New Zealand. Finally, we return to the UK to consider the work of the Forum for the Future as they too attempt to take forward Gray's (1992) ideas.

BSO/Origin and Environmental Value Added[46]

BSO/Origin (now Origin, a merger of BSO/Origin and Phillips C&P, which was enacted in 1996) was, in 1990, the first of a new generation of corporations to experiment with FCA. At that time, BSO/Origin's objectives were:

> *'to provide high-quality services to trade and industry and to the government, with a view to supporting the principal [that is, their clients] in introducing new technologies in the broadest sense of the word. The support is extended in the form of advice, management, development, implementation, education and training'* (BSO/Origin, 1990, p. 2).

The merged Origin maintains the same focus, describing itself as a 'global information technology services company providing customer-driven business solutions for multinational, institutional and national organizations' (Origin, 1996, p. 1).

The first public evidence of BSO/Origin's FCA experiment can be found in their 1990 Annual Report and Accounts. Their description of how they tackled FCA can be found in their Annual Reports up to and including their 1995 report. It is fair to say that BSO/Origin's Annual Reports from 1990 to 1995 were 'quirky' by conventional standards, with each year's report being focused around some theme of interest. For example, in 1990 an essay on the environment ('Pulling our planet out of the red', BSO/Origin, 1990, p. 4) preceded the Annual Report and in 1991 another essay on indigenous peoples ('Reinventing the future', BSO/Origin, 1991, p. 4) was offered. In 1992 some 63 pages were devoted to staff narratives that told the reader about what they had done on Tuesday 27th October. These accounts were accompanied by photos (and occasionally physical objects – such as a tea bag and a sticking plaster) that reflected the diary-type account of the employee's day. The focus of the report for 1992 was 'It's a people business' (BSO/Origin, 1992, p. 3) and the Annual Report in diary form reflected this theme. The reporting style was changed in the 1994 report when a pseudo dossier was produced with, among other things, sections for 'People and projects' (which contained project descriptions in several languages), the financial or more conventional Annual Report information, a fold-out world map with BSO/Origin locations and an Environmental Report, which included the firm's environmental accounting figures. In 1995 – the final report before merger and the last report which contained environmental accounts – the essay format returned, this time on the topic of how people in different countries and cultures greet each other ('To meet is to greet', BSO/Origin, 1995, p. 7). By 1996 the reporting structure had changed to a more 'usual' Annual Report structure.

Against this background of innovation and experimentation, BSO/Origin produced financially quantified accounts that attempted to capture some measure of the external

environmental impacts arising from their operations. The impetus behind the attempt arose from a desire to give some idea of the 'orders of magnitude' (BSO/Origin, 1990, p. 59) of the impact an organisation has on the environment, in order to stimulate debate and policy priorities.[47] There was, however, an expectation that the:

> *'environmental accounts would have a positive effect within BSO/Origin in that many of the staff would embark on their own process of consciousness-raising as a result of being asked once a year how much paper and energy they had used and how many miles they had travelled in their cars'* (BSO/Origin, 1992, p. 101).

The initial approach taken was to determine the 'marginal cost of measures to control emissions, in accordance with current social standard of "optimum" environmental health' (BSO/Origin, 1990, p59). The costs, therefore, are based on those that would have to be incurred in order to meet the reduction targets for various pollutants under the Dutch National Environmental Policy Plan. The figures from the National Plan were adjusted as the company wished to adopt a more precautionary approach than the Dutch National Plan. The impacts identified within the experiment were emissions of BSO/Origin itself and emissions from power stations that supplied power to BSO/Origin (that is, their approach to FCA was to go one level back up the supply chain for one input into their organisation) and pollution arising from wastewater treatment plants and incineration plants that deal with BSO/Origin's leakages (that is, going one level downstream from BSO/Origins operations, but again only for their wastes). The accounts allowed for the above matters by using the costing factors in box 5.1.

The derivation of the costing factors for each pollutant involved matters of scientific knowledge about the impacts of the pollutants and matters of judgement with respect to which alternative cost to capture. For example, with respect to carbon dioxide emissions a number of studies were considered that modelled the type of carbon taxes/levies that would be required in order to achieve the desired decrease in levels of carbon dioxide. In each case the various aspects were considered and a decision was made as to the appropriate cost.[48] While one may not necessarily agree with the cost factors used, the process by which that particular cost was calculated is very clear within the Annual Reports themselves. This, along with the stated aim of this work being to give an estimate of the order of magnitude of costs, means that the accounts could be best understood as an indication of the extent to which current costs underestimate full costs for a small, but potentially significant, array of environmental impacts which arise from this organisation's operations.

Box 5.1: BSO/Origin environmental costing data (1990–1994)

Pollutant	Costing factor in Dutch Guilders per kilogram
Nitrogen oxides	NGL 10/kg
Sulphur dioxide	NGL 14/kg
Carbon dioxide	NGL 100/tonne
Waste water	
Transport costs	NGL 48/inhabitant equivalents
Treatment costs	NGL 12/inhabitant equivalents
Waste production	
Bottom ash	NGL 100/tonne of dry matter
Fly ash	NGL 200/tonne of dry matter
Sewage sludge	NGL 500/tonne of dry matter

In addition to the imputed cost of environmental effects BSO/Origin also separately identified their environmental expenditure. This expenditure consisted of fuel levies paid, purification levies, garbage collection rates, sewerage tax, other environmental taxes and monies paid to private waste processors. The final statement produced by the organisation was an estimate of the net value withdrawn (the imputed cost of environmental effects with environmental expenditure subtracted from it).[49] In turn, this figure was subtracted from the company's value added (which was itself calculated as the sum of personnel costs, depreciation, provisions, financial expenses, taxation and net profit/loss) to obtain a net added value. Box 5.2 provides a five-year summary of the figures thus calculated and some other relevant figures produced during the course of this first phase of the FCA exercise.

Box 5.2: Comparative figures for selected items for environmental accounting
(all figures in millions of Dutch guilders unless stated otherwise)

	1990	1991	1992	1993	1994
Net added value	2.5	3.7	4.1	4.5	5.2
Net value withdrawn	2.3	3.4	3.2	3.2	3.8
Net value withdrawn per employee[50]	986	954	866	650 approx.	680 approx.

1990 – 1991 comparison:

Number of employees rose by 50% and use of private cars for business use factored into the calculation. Impact of transportation makes up about NGL 3.0 million of value withdrawn in 1991.

1991 – 1992 comparison:

Actively investigating how to cut back on vehicle use, especially by introducing working at home. From staff survey ascertain that employee's environmental awareness has increased. 8% decrease in energy consumption related to individual efforts to reduce impact. Fewer miles travelled per employee (12% reduction).

1992 – 1993 comparison:

Staff numbers up 16% while value withdrawn per employee is falling. Road traffic and office heating/cooling and electricity consumption account for 70% of measured impacts. Positive road transport effect achieved via changing working patterns (staff carrying out activities in a single location for a longer period more frequently than before).

1993 – 1994 comparison:
A significant increase in business activity that adversely affected the environmental value withdrawn. Per employee figures approximately the same.

FCA Experiments (continued)

The costing method adopted in 1990 was used up until 1994, after which time both the elements costed and the costing factors used were changed. The rationale for the changes was to make the environmental accounts more complete and also to reduce the level of risk implicitly accepted in the costing estimates. Rather than adopting more stringent conditions than the Dutch National Environment Policy Plan, a criterion of zero environmental risk was assumed. Further, the costs used were determined from 'direct or indirect estimates of actual environmental damage for a first approximation of damage repair, and only uses prevention costs where no appropriate studies can be found'[51] (BSO/Origin, 1995, p. 27). The shadow prices under this new approach were in some instances five to seven times more than those used earlier (see box 5.1) and in one instance the new costing factor was half that used previously.[52] Under the new approach the 'extracted value' was now subtracted from operating income rather than from the value added. The resulting extracted value is 'treated as a cost factor on top of existing costs … [with the resulting figure being] termed sustainable net income' (BSO/Origin, 1995, p. 28). While it is very difficult to compare the 1995 figures with those that were calculated before, the most significant observation would be that in 1995 using the refined method, BSO/Origin had a *negative sustainable operating income* figure. This figure was not discussed in the environmental report and thus it is difficult to ascertain what BSO/Origin made of it. Further, while the 1995 Environmental Report clearly anticipated that the FCA experiment would be continuing, no further accounts of this nature have been produced by BSO/Origin.

A number of observations can be drawn from the BSO/Origin costing experiment. Some of the observations are those made by BSO/Origin themselves about the impact they have on the environment. In addition, a number of more general observations can be made with respect to lessons that could be learned from this experiment for FCA.

First, BSO/Origin consistently identified transportation as being an important element in their environmental accounts. For example, in 1992 they noted 'the transportation factor dominates all other forms of pollution. Unfortunately, transportation impacts (a major source of environmental pollution) can only be tackled to a certain degree by an individual business.' In particular, BSO/Origin noted that they could not stop travelling because 'transportation has an important place in the company's activities and in its working conditions' (BSO/Origin, 1992, p. 101). While improvements could be made to this impact (for example, by working from home and by altering patterns of work to eliminate travel) ultimately the environmental impact of the organisation was outside their control. Of itself, this is a very pertinent conclusion (see also Gray and Bebbington, 1996). This conclusion suggests that there are structural impediments for any individual firm that wishes to find operational alternatives that do not result in current levels of externalities.

Second, BSO/Origin found that changes in the taken-for-granted ways in which they organised their business activities had the potential to affect relative levels of environmental impacts significantly. For example, in box 5.2 it can be seen that from 1992 to 1993 the drop in per employee net value withdrawn was achieved by changing the way in which personnel were organised. This suggests that for other businesses taken-for-granted ways of working could similarly be changed with an associated improvement in eco-efficiency. What eco-efficiency cannot always achieve, however, are falls in absolute impact. This is the third point that can be drawn from the box 5.2. In comparing 1993 with 1994 it is clear that significant changes in the scale of operations always have the potential to offset efficiency gains. In this case, while relative impact remained reasonably static (approximately a 4.6% increase in net value withdrawn per employee was experienced), absolute levels of net value withdrawn increased by 18.8%. These points will be returned to in the conclusions of this chapter.

More generally, it may be observed that over time the BSO/Origin experiment gradually encompassed more externalities. This was especially the case in the alteration of the costing method in 1995 where they included:

> *'not only ... BSO/ Origin's use of energy ... but also the loss incurred by the generation of energy (as well as by the disposal and treatment of wastes). This means that BSO/Origin does not only include its own corporate activities in the valuation, but also those of some of its suppliers'* (BSO/Origin, 1995, p. 26).

At the same time, it was noted that developing the costing methodology in this manner 'would imply the extension of *responsibility* for environmental loss from BSO/Origin's own activities to activities elsewhere in the product chain' (BSO/Origin, 1995, p. 27, emphasis added). Indeed, the account for 1995 appeared to signal a move towards taking a 'strong instead of weak sustainability' view of the changes required to meet the challenge of sustainable development (BSO/Origin, 1995, p. 25). The environmental accounting experiment appeared to have disappeared when BSO/Origin merged with Philips C&P and has not, to the best of our knowledge, been resurrected in a public form. This is a great pity – in BSO/Origin's own words 'if we really wish to lighten the burden on the environment caused by our actions, we shall first have to gain an understanding of this burden' (BSO/Origin, 1991, p. 57). Their accounting experiment certainly went some way towards achieving this goal.

Dan Rubenstein, the United Nations and sustainable forestry[53]

In a project sponsored by the United Nations Conference on Trade and Development Centre for Transnational Corporations, Dan Rubenstein (of the Office of the Auditor General of Canada and a chartered accountant) undertook a wide ranging analysis for a

fictional forest company (albeit that his data was modelled on relationships that were established in a real company) of the financial implications of pursuing more sustainable forestry operations. The project had two parts. The first was concerned with modelling incremental costs and investments required if the company (Blackmore and Price Forest Products Ltd) pursued one of two options that were different from their current approach to forestry operations. Each option could be viewed as moving away from unsustainable forestry practices and under each option more environmental externalities would be internalised. Box 5.3 outlines each one of the more sustainable forestry options evaluated by the project.[54]

Box 5.3: Blackmore and Price Forest Products Ltd: more sustainable forestry options

Option 1: Timber is primary consideration

- Full compliance with all guidelines established by the Ministry of Natural Resources.
- Sustained economic yield with regeneration equal to harvest with acceptance of a risk that guidelines may not be ecologically sustainable in the long run.

Option 2: Enhanced non-wood values

- Full compliance plus selective response to public concerns.
- Commitment to sustained economic yield. Commitment to explore public concerns about the forest's ecological sustainability and accommodation of the long-term needs of all forest users.

Option 3: Environment is equal: Non-wood values are of equal consideration

- The volume of production and the technology employed are to be determined by ecological rather than economic criteria.
- Emulation of natural forest processes of disturbance, regeneration and succession. The sustainable use of the forest means sustainable use of the tree species and ecosystems found there, not simply replacing one felled tree with another.

If these options were pursued then Rubenstein calculated that there would be an adverse impact on the return on investment for the organisation because of the increased investment required to pay for the environmental improvements. Box 5.4 illustrates how much of a reduction in return on investment would arise under each option.

Box 5.4: Rate of return on environmental investments (ROI)

Levels of pulp mill sustainability	Sustainability options (see box 5.3) (Option 1) Timber is primary consideration	(Option 2) Enhanced non-wood values	(Option 3) Environment is equal
Average pulp mill	27%	24.4%	22.2%
Mill meets all air and water regulations by a narrow margin (Blackmore and Price Ltd now)	22.7 %	20.9%	18.9 %
Industry leader, in terms of best environmental practice	18.4%	17.3%	15.6 %

Alternatively, such a decrease in rate of return could be translated into the additional prices that would have to be charged in order to recover the increased level of investment and the higher operation costs. Box 5.5 illustrates the nature of these price increases.

The data reveal the financial downside of adopting more sustainable forestry practices. Rubenstein's experiment, however, took the analysis one further step – a step that moved the experiment from a costing of scenario's type approach to looking at what external costs a 'business-as-usual' approach would generate in the future. That is, the project sought to quantify (in very 'soft' numbers) the extent to which 'intergenerational liabilities' would arise from a business as usual approach. Box 5.6 describes the various sources of intergenerational liabilities recognised by the project.

Box 5.5: Price implications of pursuing more sustainable forestry

	(Option 2) Enhanced non -wood values		**(Option 3)** Non-wood values are of equal consideration	
Incremental price increases required to offset increased production costs	Price increases		Price increases	
	Pulp	**Lumber**	**Pulp**	**Lumber**
Silviculture enhancements	4.5%	3%	11.0%	9%
Zero-impact pulp mill	2.5%	N/A	2.5%	N/A
	7.0%		13.5%	

Box 5.6: Sources of intergenerational liabilities

Natural Capital	Short-term (Next 5–10 years)	Medium-term (Next 20–40 years)	Long-term (Next 40–80 years)
Components of ecosystems			
Micro-climate	Loss of customers		Climate change
Soil			Loss of nutrients
Vegetation		Endangered species	
Microbial life			Reduction in diversity
Wildlife		Endangered species	
Fish and water		Quality and habitat	
Sensitive areas (Wetlands, spawning grounds)		Endangered wetlands	Endangered areas
Ecosystem functions			
Sustained life in biomass			Loss of biomass
Carbon storage and greenhouse effect			
Biodiversity			Loss in diversity
Aesthetics, recreation		Endangered spaces	
Human health and wellbeing		Damage to human health	

The 'risk costs' associated with the above factors were then reintroduced to the three forestry options sketched at the outset of the project and the proposed forestry options were re-evaluated taking into account the externalities that could be associated with each option. Of particular relevance for our purposes here is that Rubenstein (1994) noted that '[when] the project team recomputed these rates of return on investment, using the fuller costs that reflected the higher-risk costs of the business-as-usual option, the gap between Option 1 and Option 2 narrowed to almost 1%' (p. 12). Thus, on the above calculations, once possible future costs are internalised what initially looks like a presently economically unviable option becomes more viable. This last observation and the idea of costing more sustainable operating options are, to our minds, the most useful aspect of this project.

Ontario Hydro[55]

The Ontario Hydro foray into FCA is perhaps the best known example of this type of accounting, by virtue of the USEPA published case study on the company's activities (USEPA, 1996) and the very public way in which Ontario Hydro embarked on the experiment. Maurice Strong, a pivotal figure in the international debate about sustainable development,[56] spearheaded Ontario Hydro's public dissemination of their FCA work when he became their Chair and CEO. Indeed, this experiment is notable for the fact that Ontario Hydro was (and indeed still is, albeit it has been reorganised and renamed) a credible, mainstream business entity whose directors were sufficiently persuaded by the potential benefits that FCA could bring their organisation to spend some time and money on developing practice in this area. While they noted that one important impetus for their use of FCA was the 'requirement to document the environmental and health impacts incurred by Canada from electricity generated in Canada and then exported to the United States' (USEPA, 1996, p. 2) they also believed (subject to certain constraints)[57] that FCA would yield other benefits. These potential benefits and other stated reasons for supporting FCA are shown in box 5.7.

Box 5.7: Expected benefits from introducing FCA at Ontario Hydro and reasons for supporting the development of FCA (USEPA, 1996, p. 16 & p. 20).

Expected benefits from introducing FCA are:

- it provides a powerful incentive to search for the most economic ways of reducing environmental damage
- it leads to choices that include explicit consideration of the present and future environmental impacts of alternative options
- it should lead to a more efficient and effective use of resources
- it should help in 'levelling the playing field' when evaluating demand and supply options (e.g., demand side management, alternative power generation technologies, conventional supply options).

Reasons for supporting the development of FCA are:

- improved environmental cost management – improve identification, allocation, tracking and management of environmental costs in each business unit
- cost avoidance – improved ability of business units to anticipate future environmental liabilities and costs, so that corrective action can be implemented earlier
- revenue enhancement – improve ability of business units to identify revenue enhancement opportunities either through environmental technology innovations spurred by cost cutting initiatives or by strategic alliances with companies that use waste products as material inputs in their own manufacturing
- improved decision-making – to aid business units in better integrating the environment into decision analyses
- environmental quality improvement – to establish an optimal level for reducing emissions/effluents/wastes with consideration for the least cost to society
- contribution to environmental policy – to contribute effectively to the development of environmental regulations/standards and emissions trading markets and
- Sustainable development[58] – to assist in the transition to a more sustainable energy future.

FCA Experiments (continued)

Ontario Hydro's approach to FCA followed a typical path for FCA experiments (see section 4.4, chapter 4) in that it:

(i) considered full life cycle impacts where possible

(ii) estimated expected damage to ecosystems, community and human health arising from activities

(iii) evaluated both positive and negative externalities

and

(iv) quantified and monetised (where possible) the externalities identified (USEPA, 1996, p. 23).

An example of the figures produced by the FCA exercise is given in box 5.8. These figures provide a preliminary estimate, for a sub-set of total externalities, of the external costs arising from Ontario Hydro's fossil fuel stations. The costing figure is obtained using the damage function approach. In brief, this approach focuses on site-specific costs arising from a particular operation. The costs themselves are obtained from a variety of market-based sources. For example, where pollution is assumed to cause crop damage, the market value of the lost crops was calculated. Where pollution is assumed to cause human health problems and early mortality, valuation techniques such as willingness to pay or willingness to accept changes in environmental quality were used (see also chapter 3, which reviews these various monetisation approaches).

It is difficult to place the numbers in box 5.8 into any sort of context and the USEPA study of Ontario Hydro does not help in this respect. What is worth noting, however, for our purposes is that under the guise of FCA both social and environmentally related externalities have been included. It is also the case that Ontario Hydro no longer publicly champions FCA nor appears to be continuing with its project. Further, British Telecom (1996) note that 'Ontario Hydro hopes that its own calculations will influence internal decisions but there has as yet been only limited effect on practice' (p. 44). In addition, in the course of this research it proved impossible to speak with anyone who was involved in the experiment about their experiences of and reflections on FCA (despite making several direct approaches to those involved). Given this, one must assume that this experiment will not be further developed in the public domain. A lack of willingness to talk about the exercise must also raise questions regarding the extent to which Ontario Hydro found FCA to be practically and politically useful.

Box 5.8: Monetised impacts of fossil fuel generation at Ontario (USEPA, 1996, p. 31).

Receptor	Pollutants of concern	Unit values	Monetised impacts (in Canadian dollars)	
			$M 1992	C/kW
Mortality: (statistical deaths)	SO_2, SO_4, O_3, NO_3	$4,725,600	21.4	0.088
Morbidity: (hospital admissions)	SO_2, SO_4, O_3, NO_3 TSP	$44,700	50.83	0.210
Cancer cases	Trace metals	$408,397	9.53	0.039
Crops	O_3	N/A	8.32	0.034
Building materials	SO_2	N/A	5.70	0.024
			95.78	0.395

Manaaki Whenua/Landcare Research, the Centre for Social and Environmental Accounting Research and the sustainable cost calculation[59]

Since 1996 a company by the name of Landcare Research (New Zealand) Ltd (or Manaaki Whenua to give it is Maori name)[60] has been exploring whether the idea of a sustainable cost calculation (SCC) could be used to provide a financial account of the gap between current and more sustainable operations. The SCC is an idea championed by Gray (1992), who suggested that an account of sustainability would be created if one were to:

> *'derive a parallel accounting system which provided calculations of what additional costs must be borne by the organisation if the organisational activity were not to leave the planet worse off, i.e. what it would cost at the end of the accounting period to return the planet and biosphere to the point it was at the beginning of the accounting period'* (p. 419).

The SCC is built around the concepts of capital maintenance and attempts to avoid any attempt to 'value' the environment but seeks to derive remediation costs for

environmental damage. Clearly, the SCC does not measure what a sustainable operation would cost (as Rubenstein, 1994, attempts) but it does allow the 'clock to be stopped' at a point in time and some idea of the financial gap between present and more sustainable operations to be guessed (in this respect it is similar to the sustainable gap analysis). During the SCC experiment, Manaaki Whenua developed a broad-brush eco-balance of its own activities. The firm then used that eco-balance to direct the gathering of data on a selection of key activities (namely electricity use, vehicle use, air travel and paper use), attempted to quantify the environmental impacts that arose from those activities and then used this data as the basis of calculating the cost of remediating this impact. Box 5.9 provides an indication of the activity levels, which have been quantified.

From the table it is apparent that the underlying activity level (as gauged by the number of full time equivalent employees) has remained relatively stable over the four years of the experiment. This would, prima facie, suggest that the environmental impact of the organisation could be expected to be fairly stable over the same time. In order to assess this suggestion some way of translating activity level into environmental impact was required.

Box 5.9: Activity level data for Manaaki Whenua

	Year to 30.6.96	Year to 30.6.97	Year to 30.6.98	Year to 30.6.99
Electricity use (kilowatt hours)	3,229,218	2,510,404	2,381,601	2,357,995
Motor vehicle travel (kilometres)	1,319,913	1,419,461	1,217,926	1,104,910
Domestic air travel (kilometres)	1,467,291	1,776,843	1,697,571	1,782,273
International air travel (kilometres)[61]	3,900,000 (estimated)	3,900,000 (estimated)	3,892,445	3,953,123
Paper use for photocopying (tonnes)	No data	14.79	14.08	11.3
Full time equivalent employee numbers	346	369	358	331

Box 5.10: Estimated, imputed environmental impacts
(numbers in italics include known measurement error)[63]

	30.6.96	30.6.97	30.6.98	30.6.99
Resource use imputed				
Fossil fuel substitution for:				
• electricity (megawatt hours)	452.06	391.56	333.48	330.12
Fossil fuel substitution for:				
• vehicle travel	98.07	105.47	90.49	82.09
• local air travel	51.65	62.54	59.75	62.74
• international air travel	*137.28*	*137.28*	137.01	139.15
Total (tonnes)	*287.00*	*305.29*	287.25	283.98
Emissions imputed				
Carbon emissions for:				
• electricity	87.18	64.22	64.32	63.67
• vehicle travel	81.83	88.04	75.53	68.53
• local air travel	44.41	53.89	51.48	54.05
• international air travel	*118.28*	*118.28*	118.05	119.89
Total (tonnes)	*331.70*	*324.43*	309.38	306.14
Emissions of SO_2 for:				
• electricity (tonnes)	5.02	4.35	3.70	3.67
Emissions of NOx for:				
• electricity	1.38	1.19	1.02	1.01
• vehicle travel	1.85	1.99	1.71	1.55
• local air travel	0.65	0.78	0.75	0.78
• international air travel	*1.72*	*1.72*	1.71	1.74
Total (tonnes)	*5.60*	*5.68*	5.19	5.08
Emissions of CO for:				
• motor vehicles	38.28	41.16	35.32	32.04
• local air travel	0.16	0.20	0.19	0.20
• international air travel	*0.43*	*0.43*	0.43	0.40
Total (tonnes)	*38.87*	*41.79*	35.94	32.64

FCA Experiments (continued)

Box 5.10 lists some of the environmental impacts that were imputed to have arisen from Manaaki Whenua's electricity use, vehicle use and air travel[62]. In addition, to understand these numbers it is necessary to consider briefly where the system boundaries are placed around the SCC. At this stage of the FCA experiment only the impacts arising from Manaaki Whenua's use of electricity, vehicle travel, domestic and international flying are included in the SCC. In addition, only resources used in the generation of electricity and fuel directly used in vehicle travel and air travel have been included. Second, the emissions data relates only to emissions arising from generating fossil fuel electricity and direct emissions from vehicle travel and air travel.

The costing step in the SCC requires the estimate of the costs that would be incurred to remedy the environmental impacts imputed above. Initially the costing step entailed finding an estimate of costs in terms of the schema outlined in box 5.11.

The costing step in this FCA attempt has caused, and continues to cause, the most problems in the experiment, for several reasons. First, the costing schema outlined in box 5.11 proved impossible to operationalise owing to lack of data or, for example, owing to the unavailability of market prices for technically possible more sustainable alternatives (stage 2 in box 5.11). As a result, the costing stage of this project, for the meantime, has moved away from that originally envisioned and towards seeking measures that are more akin to those used by BSO/Origin in the early part of their FCA experiment. Even here, however, difficulties arise because there are numerous ways to estimate different costs. For example, one could estimate the cost that would be incurred in directly cleaning up the environmental impact of the activity (for example, by planting trees), or by installing technology to prevent the impact arising in the first place, or if one attempted to off-set the impact by purchasing, for example, carbon credits from one of the various carbon storage schemes in operation worldwide. As a result, at this stage of the experiment few of the impacts of box 5.10 have been monetised owing to data problems. Having noted this, carbon emissions are used in box 5.12 as an example of what may be estimated on the basis of the data collected.

In box 5.13 the concept of a shadow price[67] is used to demonstrate what costs could be deemed to arise as externalities for NOx emissions.

Box 5.11: Stages in costing environmental sustainability

Stage 1	Stage 2	Stage 3	Stage 4
Present position	Most sustainable option currently available	Zero environmental impact	Past damage remedied
Unsustainable operations	More sustainable operations		Fully sustainable operations?

Box 5.12: Possible financial costs associated with carbon emissions
(in NZ$, note figures in italics contain known measurement errors)

	Option 1: planting trees to soak up carbon emissions[64]	**Option 2:** carbon tax of NZ$100[65]	**Option 3:** carbon tax of NZ$200[66]
30.6.96 = *255.16*	*1,559*	*25,516*	*51,032*
30.6.97 = *237.20*	*1,449*	*23,720*	*47,440*
30.6.98 = 309.38	1,890	30,938	61,876
30.6.99 = 306.14	1,871	30,614	61,228

Box 5.13: Possible financial costs associated with NOx emissions
(in NZ$, note that figures in italics contain known measurement errors)

	NOx shadow price of NZ$12
30.6.96 = *4,490 kilos*	*53,880*
30.6.97 = *4,410 kilos*	*52,920*
30.6.98 = 5,190 kilos	62,280
30.6.99 = 5,080 kilos	60,960

The financial figures in the above tables are notional – it is unlikely that Manaaki Whenua will have to spend these amounts in the near future. What the numbers do illustrate, however, is that even for a very small proportion of Manaaki Whenua's environmental impacts there is, potentially, a significant amount of environmental externalities not identified by the current economic system. Similarly, more general lessons could be learned from this experiment. While Manaaki Whenua is not an especially energy or resource intensive organisation, it becomes apparent that they still generate an environmental impact that is not recognised by the current economic system. This would suggest that the current economic system is far from providing financial signals that would direct organisations and individuals towards sustainable development.

Another, potentially more important, observation which can be made concerning this experiment is the realisation that embedded within the initial specification of the SCC was the assumption that Manaaki Whenua would continue to operate as they had before (phrased as the 'business as usual' assumption). Thus, the fuller costs that could be estimated would reflect the cost of being unsustainable rather than what it would cost to be sustainable (this latter approach is more akin to Rubenstein's work). It was, however, possible to model what more sustainable operations (in an unsustainable economy) would involve and what it would cost to choose these more sustainable options. In particular, Bebbington (1999) reports on an attempt to satisfy a functional requirement (in this case mobility) in a manner that is more sustainable. This was done by estimating the cost of substituting Manaaki Whenua's domestic air travel with less unsustainable forms of transport.

If Manaaki Whenua were not operating on the basis of 'business as usual' then it would be possible to avoid air travel within New Zealand altogether by shifting journeys onto a land and sea basis. The effect of such a move would be to change from a very energy intensive form of transport to one that was less energy intensive. Box 5.14 illustrates the relative energy intensity of various forms of travel and it is clear from this data that moving travel from domestic air to bus transport (along with the inter-island ferry service) would provide an 84 percent reduction in the energy use of the travel undertaken.

Manaaki Whenua's travel agent was able to provide a breakdown of the number of flights undertaken to and from various New Zealand locations and these data provide the basis for the following calculations. Additional data were gathered from bus and ferry companies on the timing and cost of land and sea based travel to and from the locations identified. Box 5.15 summarises the implications of moving away from air travel in terms of the time taken to travel the sample routes via land and sea based alternatives.

Box 5.14: Average energy intensity of different transport modes (MJ/passenger/kilometre)

Private cars	2.30
Bus transport	0.77
Passenger rail	2.17
Domestic air	4.73

Source: Ministry of the Environment (1996), p. 44.

Box 5.15: Relative requirements for travel over selected routes

Journey[68]	Time to fly (in hours)	Land and sea based travel requirements[69]
Christchurch – Auckland	1.25	5 hours on a bus to Picton, wait, 3 hours on a ferry, overnight in Wellington, 11 hours on a bus[70] to Auckland, overnight in Auckland
Christchurch – Wellington	1	5 hours on a bus to Picton, wait, 3 hours on a ferry, overnight in Wellington
Christchurch – Palmerston North	1	5 hours on a bus to Picton, wait, 3 hours on a ferry, 3 hours bus to Palmerston North
Christchurch – Hamilton	1.25	5 hours on a bus to Picton, wait, 3 hours on a ferry, overnight in Wellington, 9 hours on a bus to Hamilton, overnight in Hamilton

A geographical note is relevant here. New Zealand consists of two main islands (the North Island and the South Island). While being a relatively small country (it is 269,000 square kilometres, roughly the same area as England, Wales and Scotland combined) New Zealand is elongated, stretching over 15 degrees of latitude (the United Kingdom by comparison stretches over about 9 degrees of latitude). Further, land based transportation in New Zealand is complicated by Cook Strait, which separates the two islands. While the distance between the two landmasses is relatively small, the shipping routes dictate that a crossing takes three hours and weather can hamper sea travel between the two islands. Hence, along with an underdeveloped public transport system, there is a widespread tendency to drive or fly between locations in New Zealand.

It is possible to estimate how much extra staff cost would be incurred as a result of this slower travel pattern.[71] Further, the accommodation costs arising from the changed travel pattern are estimated. The average salary cost per employee for Manaaki Whenua

Box 5.16: Additional costs of switching travel modes for domestic air travel in 1997

Journey	Number of one way trips	Incremental time and accommodation costs	Incremental cost (NZ$)
Christchurch – Auckland	488	18 hours compared with 1.25 = 16.75 extra hours and two nights' accommodation	301,035
Christchurch – Wellington	528	9 hours compared with 1 = 8 extra hours and one night's accommodation	158,400
Christchurch – Palmerston North	670	12 hours compared with 1 = 11 extra hours and one night's accommodation	246,225
Christchurch – Hamilton	324	18 hours compared with 1.25 = 16.75 extra hours and two nights' accommodation	199,868
TOTAL			**905,528**

is in the vicinity of NZ$45,000 per annum and this figure is used in box 5.16, which estimates the additional costs arising from shifting travel to land and sea based options.

Thus, if 68% of all domestic travel for Manaaki Whenua was shifted to the most sustainable travel options[72] currently available (albeit that this would not enable business to be conducted as at presently) the additional costs incurred would be approximately NZ$ 900,000. In addition, while land based travel costs are 52% of the costs of flying, once the additional costs from box 5.20 are factored into the calculations, land based transport costs approximately NZ$580,000 more than flying. This is not an insignificant number in terms of Manaaki Whenua's surplus after taxation (some NZ$1,178,000 in 1997).

We would draw two conclusions from the latter part of this experiment. First, structural impediments to undertaking activities in a more sustainable manner exist and limit firms' ability to move towards options that have fewer externalities associated with them. In particular, for this organisation, 'delivering' research outcomes under time pressure is a crucial factor in its continued success. The time available to do this, however, is limited and to start travelling by other than air (when no one else is) would further aggravate the time problem. In addition, the proposed, more sustainable form of transport results in individuals being absent from home for longer periods of time – which itself is perhaps not sustainable for any family situation. Second, the quantity of unpriced externalities is likely to be significant. We draw this conclusion by comparing the costs of undertaking travel using land as opposed to air based transport. If air travel were to internalise externalities (and thus put it on an equal cost footing with land based transport) then it needs to be substantially more expensive to tip the economic balance in land transport's favour.

In summary, one important lesson emerged from the Manaaki Whenua FCA experiment: that FCA implicitly assumes that business will continue to be unsustainable. This realisation emerged from two aspects of the experiment. First, this experiment differs from some of the others in that it did explicitly try to address the issue of how one could provide a fuller cost figure for resource use. Conceptually, it was decided that in order to remedy resource use it would be necessary to provide an equivalent renewable source of (in this case) energy, which could serve the same function as the resource depleted. In searching for such a renewable resource it became apparent that there was nothing available in the market (in New Zealand at that time – 1996). This, combined with the modelling of what it would cost to travel more sustainably (see boxes 5.13 – 5.16) led to the realisation that embedded in this experiment (and indeed most of the other experiments reported here) was an assumption that business will carry on as it is at present. What was especially illuminating is that once this assumption is not taken for granted, and more sustainable ways of operating are considered, then the costs involved in these alternatives are potentially significant. Such an assumption was implicit in Rubenstein's work; however, it came to

the fore in the Manaaki Whenua case. This is not to say that much cannot (or indeed is not) being done at present to reduce, for example, travel impacts. Rather, this observation does lead one to suspect that the distance to travel to sustainable operations is considerable and will not necessarily be achieved with incremental improvements in current operations.

The final experiment we shall review arises from an organisation that has sought to develop a 'not-business-as-usual' way of thinking and that has a strategic vision of itself being an environmentally sustainable corporation.

Forum for the Future and environmentally sustainable profits[73]

Forum for the Future (hereafter FFF) describes itself as a:

> *'sustainable development organisation set up in 1996 by Jonathon Porritt, Sara Parkin and Paul Ekins. Through its education programme, policy research, strategic consultancy and advocacy activities the Forum aims to accelerate the building of a sustainable way of life by taking a positive, solutions orientated approach to today's environmental challenges'* (Howes, 1999, p. 32).

In conjunction with Interface Europe Ltd, and with funding from the Chartered Institute of Management Accountants, FFF is attempting to calculate the 'sustainability cost' of Interface Europe. A sustainability cost is described by FFF as 'the notional cost the company would need to spend to *restore or avoid* the environmental damage caused by its activities and hence, to estimate what could be termed the company's environmentally sustainable profits' (Howes, 1999, p. 32, emphasis added). This idea is broadly based upon Gray's (1992) sustainable cost calculation (see also the Manaaki Whenua project above) but the approach has been developed and altered by FFF. In particular, whereas the original conception of the sustainable cost calculation was to seek restoration costs, FFF is also incorporating avoidance cost estimates in its work. Given the difficulties of the purely remediation cost approach presented for Manaaki Whenua, this is, perhaps, a sensible decision.

The first set of accounts from Interface Europe using this approach is reproduced in box 5.17. As with the other experiments reviewed, FFF has modelled a subset of Interface's impacts that have either risen from Interface's own operations or from those associated with the generation of the electricity it has purchased. Further, for this subset of operations only the air emissions arising from the activities have been modelled (resource use, for example, is not included in the account). This approach has resulted in the experiment capturing 'emissions to air from Interface's manufacturing processes and fuel use, together with emissions from freight distribution, company cars and air travel' (ENDS Report, 2000, p. 23).

Box 5.17: Interface Europe's[74] environmental accounts for 1997 (Howes, 2000, p. 25)

Atmospheric emissions	Emissions (tonnes)	Unit cost (£)	Sub-total	Total
Gas consumption 26 million kWh				
CO_2	4,761	6	29,000	
NOx	4	14,000	56,000	
SO_2	4	2,400	9,600	
Total				95,000
Electricity consumption 17 million kWh				
CO_2	7,537	n/a		
NOx	20	n/a		
SO_2	43	n/a		
Total (avoidance)				170,000
Direct production emissions				
NOx	3	n/a		
SO_2	0.3	n/a		
Volatile organic compounds (VOC)[75]	17	n/a		
CO	4	n/a		
Total (avoidance)				350,000
Transport (distribution) 4.645 million kms				
CO_2	3,079	6	19,000	
NO_x	34	14,000	476,000	
VOC	1	7,200	7,000	
CO	9	40	–	
Particulate matter (PM)	2	2,800	6,000	
Total Haulage/distribution				508,000

continued ...

... continued

Transport (company cars) 8.875 million kms				
CO_2	2,026	6	12,000	
NOx	(50%) 2	14,000	28,000	
VOC	low	7,200	–	
PM	low	2,800	–	
LPG net conversion costs		*265,000*		
LPG annual fuel savings		*(283,000)*	*(18,000)*	
Total company cars				22,000
Air Travel 6.397 million kms				
CO_2	1,215	6	8,000	
NOx	4	14,000	56,000	
Total air travel				64,000
Rounding adjustment				*41,000*
Total sustainability cost				**1,250,000**
Operating income per the financial accounts				**17,000,000**
Environmentally sustainable profit				**15,750,000**

A variety of bases have been used to monetise the physical measures of Interface's impacts, because the Interface experiment focuses on how externalities could be avoided or mitigated. Box 5.18 outlines the monetisation factors used and their sources.

FFF notes that in the case of non-carbon dioxide transportation emissions it is difficult to find monetisation factors because 'there is no available technology to eliminate emissions or reduce them to close to zero, and no "restoration" option either' (The ENDS Report, 2000, p. 24). This observation mirrors that made in the Manaaki Whenua experiment and is, potentially, one of the most significant observations that can be drawn from FCA

Box 5.18: Monetisation factors for Interface Europe (ENDS Report, 2000, p. 23)

Impact	Source of costing estimate
1. Gas consumption, distribution, company cars and air travel emissions	
CO_2	Market price for sequestering carbon by way of planting trees (actual cost charged by the Climate Care organisation).
NO_x	This figure is BSO/Origins' costing figure from their 1995 accounts.
SO_2	This is the figure at which SO_2 emissions are taxed in Sweden. The Swedish figure is based on the external costs arising from SO_2 emissions.
VOC	Costs of installing end-of-pipe technology to reduce emissions to the lowest practical level.
CO	It is not clear how this figure has been determined.
PM	This figure is BSO/Origins' costing figure from their 1995 accounts.
2. Electricity consumption	Cost of paying an additional 1p/kWh for electricity. This is what it would cost to buy electricity from renewable energy sources in the UK.
3. Direct production emissions	It is not clear how this figure has been determined, other than the fact it is an avoidance cost.

attempts. That is, for many emissions (which cause environmental and health damage and which thus contribute to unsustainability) we have no known technology that would ensure that they would not arise. This is not to suggest that no technology could be developed or would ever be developed. Rather, this observation suggests to us that, under the present economic rules of the game, the development of the necessary technologies to eliminate externalities is not financially viable. This must be a source of concern for any country seeking sustainable development. The strength of FCA experiments is that they bring such observations to the fore.

The costing factors used by FFF deliberately avoided the use of environmental valuation approaches from economics (see chapter 4). Howes (2000) notes that these approaches are:

> *'steeped in controversy ... [and that] there is ... the immense problem of determining, and subsequently allocating, the proportionate responsibility for those costs between a potentially vast but unknown number of contributors ... [and that] Many of these valuation techniques, such as contingent valuation, hedonic pricing and the 'travel cost' method, are imprecise and extremely subjective'* (p. 10).

As a result, FFF avoids such methods, and their associated shortcomings, by focusing on 'real' or market-based prices that (if Interface sought either to avoid environmental damage or to restore the damage they caused) could be incurred. Howes notes that this approach is more 'straightforward and uncontroversial' (p. 10) in principle but that the identification of the actual cost factors 'can be difficult' (p. 10). In addition, Howes (p. 10) links this work with the United Nations recommendations (see, United Nations Statistical Division, 1993) for environmental adjustments to the national accounts. In this manner, the FFF experiment attempts to model itself on that, already broadly accepted, methodology.

Howes (2000) also discusses the usefulness of the sustainability cost figure. In the first instance it is noted that the sustainability cost comprises some '7.5% of operating income' (p. 17) for Interface Europe and as a result it is suggested that it is:

> *'not beyond the realms of possibility for the company to begin to provide/set up a provision in their accounts to pay for the cost of avoiding the environmental impacts disclosed in the accounts, or where this is not possible, to provide for the cost of restoration of the damage caused as a result of their activities'* (Howes, 2000, p. 17).

We would add our own observation: that the sums suggested in this experiment seem to us to be smaller than one would expect.

Howes (2000) suggests that the actual size of the sustainability cost figure is not that useful and that 'in isolation the figure has limited value to both the company and to external audiences' (p. 17). The value, however, of the FCA exercise:

> *'derives from the process itself and from the subsequent management and control of the environmental cost identified. The insights gained from preparing environmental accounts can help to focus management's attention on the most pressing and potentially costly environmental issues facing the company'* (p. 17).

The Interface Europe experiment is ongoing.

The FFF work is also important because it is the basis for a number of additional FCA experiments in the future. For example, FFF itself uses its FCA method to determine its own sustainability cost figures (see FFF, 2000). In addition, FFF is working with two UK water companies (Anglian Water and Wessex Water) to determine a sustainability cost figure for these organisations. Anglian Water (in its Summary Environment and Community Report 2000, p. 5) has published its 'sustainability cost of operations'. This amount is approximately £19,900,000. The company also indicates that its work in this area is likely to be ongoing. Wessex Water has also published its 'sustainability cost of operations' in its 2000 *Striking the Balance* report. For Wessex Water it amounts to approximately £8 million, which is some 8% of the profit attributed to shareholders. As the outcomes of this work are only just reaching the public domain, it is difficult to predict how FFF's work will evolve. We imagine, however, that these experiments will generate much interest and will be a valuable contribution to the externalities debate.

In conclusion, this section has outlined the five substantive FCA experiments that are in the public domain. Each has had a particular influence on the development of FCA. BSO/Origin, while being an old and discontinued experiment, remains important because its externalities costing factors are still is use in more contemporary experiments. In addition, the trend for experimenters to connect external costs to their own financial performance is continuing in the FFF work. Rubenstein's work remains pertinent in that it introduced the idea that there is something to learn from costing future/alternative operating scenarios, with these more sustainable scenarios encompassing costs that are presently external to a particular entity. Echoes of Rubenstein's ideas are evident in the Manaaki Whenua material, especially when analysis moves to modelling the costs of more sustainable operations. While the Ontario Hydro work is not ongoing there are lessons to be learned about the extent to which FCA experiments can themselves effect organisational change in the absence of regulatory changes. If more were in the public domain about the reasons why Ontario Hydro is not pursuing its FCA work, some pertinent lessons for other FCA experiments could, no doubt, be drawn. Finally, the

Manaaki Whenua and FFF work is of interest because both experiments are ongoing. It is likely that as the methods adopted by each organisation are refined these two experiments may provide more coherent clues as to the likely future of FCA.

5.3 OTHER FCA EXPERIMENTS

This section contains a brief commentary on three additional forays into FCA. Two FCA experiments will be reviewed (Baxter's 'environmental financial statements' and the Scottish Office's reporting on sustainable agriculture project). These experiments are in some ways similar to the FCA experiments in section 5.2. They differ, however, in terms of their problem specification and the extent to which they are ongoing experiments. In addition, the American Institute of Chemical Engineers has recently produced a handbook on total cost assessment methodology (which is a form of FCA), and a brief review of this work is also included.

Baxter and environmental financial statements

Baxter (a 'global medical-products company that is a leader in technologies related to the blood and circulatory system', Baxter, 1997, p. 7) has for a number of years prepared what it calls an 'environmental financial statement'. This statement provides details of the 'cost and value of our environmentally beneficial activities' (Baxter, 1997, p. 27). While not being an FCA experiment along the lines of the work reviewed in the preceding section, some idea of Baxter's externalities can be obtained from its financial statement. In particular, Baxter estimates the costs that it would have incurred in current and previous years had the company not undertaken environmental initiatives in those prior years. In this way, it can demonstrate that being proactive in the area of environmental management has saved money in later years. In addition, and more interestingly from our point of view, their approach introduces the notion that internal costs can be eliminated with proactive environmental management. Also, it is possible to gain some appreciation of the distinction between internal and external costs from Baxter's analysis. What is not clear, however, is whether Baxter's environmental programmes have shifted costs from being internal to the organisation to being external to it, rather than eliminating these costs altogether. It must be possible for Baxter to be able to gauge this and it would be a welcome additional element to their analysis to know whether this situation has arisen.

The Scottish Office and *Reporting for Sustainable Agriculture*

The Macaulay Land Use Research Institute in Aberdeen published a report on *Corporate Reporting for Sustainable Agriculture* in 1999. This project attempted to quantify the impact on the environment of five farms, in four areas: water quality (with regard to diffuse nutrient pollution), greenhouse gas emissions (relating to direct fossil fuel

consumption on the farm and thus not catching upstream fossil fuel use embedded within goods and services purchased by each farm), the maintenance of biodiversity and the management of cultural landscapes.[76] In order to quantify diffuse nutrient pollution the project took a mass balance approach at the farm level and tracked inflows, outflows and leakages of nutrients such as nitrogen, phosphorus and potassium. They noted, however, that it was 'currently impractical to attempt to quantify any external costs that may be associated with diffuse nutrient pollution' (Macaulay Land Use Research Institute, 1999, p. 26). It was possible, however, to provide the marginal social damage cost of greenhouse gas emissions for each farm.

Interestingly, the report used a variety of measures for quantifying the externalities from this source (describing them in terms of 'weak' and 'strong' sustainability measures – see chapter 1 for an explanation of this distinction) and as a result has provided something akin to a sensitivity analysis of possible external costs relating to greenhouse gas emissions. Of relevance to this monograph was the observation that:

> *'[in a weak] sustainability context, these [estimated external costs] are likely to represent significant additional costs in relation to the benefits generated by each farm. Adopting the upper bound figures for the same period … would have the effect of almost doubling the costs per farm'* (Macaulay Land Use Research Institute, 1999, p. 40, emphasis added).

If the upstream externalities were identified and added to the measures already made, it would appear that farm externalities would be very significant indeed. The flow-on effect of the actual internalisation of such costs into food prices could also be substantial. It is difficult to imagine what would happen as a result. It is, however, another example of how the whole economic system could have to be completely re-imagined if all externalities were internalised.

Center for Waste Reduction Technology[77]

The Center for Waste Reduction Technology (CWRT) is part of the American Institute of Chemical Engineers and has, for a number of years, been working with several large companies[78] and Arthur D. Little to develop what they call a 'total cost assessment' (TCA) methodology (see CWRT, 1999). The CWRT defines TCA as seeking to 'provide a process for quantifying all environmental and health costs, both internal and external, associated with a business decision' (p. v). TCA could be viewed as a form of FCA. The CWRT method builds on other North American work in this area, which focuses on refining capital budgeting decisions to take more explicit account of environmental costs. In addition, there has been considerable experience in North America in identifying health and environmental impacts arising from electricity generation (see also Ontario

Hydro above) and as a result there is much in the way of externalities data to draw from.

The CWRT outlines a seven step iterative process for TCA (see box 5.19 – this is similar to the stages of FCA sketched in chapter 4). In addition, within step four (the costing step) the distinctions made between various cost categories is the same as that made in box 1.7 of.

The CWRT approach to TCA does not introduce much that is new to the existing FCA literature. There are, however, three aspects of the approach that merit further attention. First, given that a manual has been produced from this work, the approach may be more easily replicated than the other experiments reviewed in this chapter. In particular, the manual includes a case study of how CWRT's approach to TCA could be implemented. The case is a hypothetical one but is based on 'real' world data and relationships. Indeed, one would expect the case to be useful to work through, given the firms that the TCA tool has been 'beta tested' on. Second, and more importantly, the manual contains an array of 'off the shelf' costing data (see, in particular, section three of the manual). These data include estimates of typical costs of, for example: obtaining consents, levels of fines imposed if prosecuted for legal breaches, toxic tort damages and facility accident costs, and average 'superfund' clean up costs (for a variety of media). It would be expected that these data could be pulled together, given the long experience of North American firms with litigation around the 'superfund' legislation and with the need (in the past) for the electricity industry in North America to identify externalities as part of the regulatory regime it operated under. As a result, the manual may provide a data source for external costs for other FCA experiments. Box 5.20 provides an example of the external costs identified for NOx and SO_2 (costs are also provided for CO, CO_2, mercury (Hg), lead (Pb), particulate matter (PM) and volatile organic compounds (VOCs) in the manual itself). It is also informative to note the wide variation in figures produced from various studies in various locations. Indeed, the variability in damage cost estimates is one of the reasons why the use of such a valuation method is controversial.

Box 5.19: The steps in the CWRT's total cost assessment methodology

Step	Description
Goal definition and scoping	Define project on which TCA is to be performed (for example, the product, process or decision to be made) and specify the purpose of the analysis.
Streamline the analysis	Gather data on the impacts that arise from the focus of analysis. This may entail life cycle analysis.
Identify potential risks	The risks associated with each impact are considered and the feasibility of expressing those risks in financial terms is evaluated.
Conduct financial inventory	Determine internal cost elements from the existing cost accounting system. In addition, identify: future and contingent liability costs, internal intangible costs and external costs.
Conduct impact assessment	Determine where the largest burden of cost falls from the above categorisation. This is of the nature of an assessment of the extent to which each category of cost will be affected by the decision made.
Document results	Document the assumptions and results for each scenario and cost decision.
Feedback into company decision loop	Input the total cost assessment data into the main decision-making process. The data generated from the TCA are only one part of a broader decision-making process.

Source: CWRT (1999, p. viii and pp. 3–2 onwards)

Box 5.20: Externalities associated with air pollution

Contaminant	Cost range at time determined	Cost range (1998$)	Basis for calculation
NOx	$18–$978 (1995$/ton)	$19–$1,025	Damage cost approach based on a willingness to pay to avoid adverse human health effects, agricultural effects and materials damage. Secondary benefits of emissions reductions are included. These figures represent social costs in addition to overall climate changes from burning less fossil fuel. These can include such areas as air quality improvements, reduction in traffic congestion and accidents, and the reduced risk of oil spills and tanker accidents.
NOx (UK)	$136 (1993$/ton)	$149	
NOx (Europe)	$539 (1993$/ton)	$592	
NOx (Norway)	$1,760–$34,540 (1991$/ton)	$2,038–$39,997	
NOx	$2,200 (1989$/ton)	$2,772	
NOx	$11–$110 (1993$/ton)	$12–$121	
SO_2	$10 - $189 (1995$/ton)	$10–$192	
SO_2 (UK)	$404 (1993$/ton)	$444	
SO_2 (Europe)	$701 (1993$/ton)	$770	
SO_2 (Norway)	$550–$8,360 (1991$/ton)	$637–$9,681	
SO_2	$330–$1,980 (1993$/ton)	$362–$2,174	
SO_2	$5,280 (1989$/ton)	$6,652	

Source: CWRT (1999, p. 3–64).

The final aspect of the CWRT manual that warrants attention is its consideration of the valuation of the social benefits arising from the ecological function of, in this case, wetlands (see pp. 3–70 to 3–74). This is, if you like, a reverse FCA in that it estimates the external social benefit arising from *not* undertaking a development that would destroy an existing environmental feature. In some respects this 'benefits costing' exercise is similar to the idea that Rubenstein introduced into his forestry example when he sought to determine the value of the habitat lost when unsustainable forestry operations were undertaken. Such an analysis could augment an FCA exercise.

In summary, the CWRT manual provides a potentially valuable resource to those who are attempting to tackle FCA. It provides, from a North American standpoint, an example of how FCA could be tackled as well as providing a summary of a variety of external cost figures. Further, given the companies that have contributed to the development of this manual, the approach outlined is likely to be robust.

5.4 CONCLUDING COMMENTS

The purpose of this chapter was to provide details of some FCA experiments that are in the public domain. The experiments covered here are not an exhaustive list. Rather, there has been an attempt to cover a range of the more public attempts to develop FCA and to highlight the experiments that are ongoing and that are likely to influence future FCA attempts. The purpose of this review was to ensure that readers of the monograph have a good idea of what FCA entails in practice. In addition, a number of insights emerged from the various experiments.

First, in virtually all cases the externalities arising from transportation were deemed to be significant. In addition, this was an area where firms found it very difficult to make changes in their current operations so as to avoid these externalities. Thus, we would suggest that FCA experiments highlight the extent to which structural change is necessary before individual businesses can make anything more than a marginal impact on reducing the externalities their operations generate. Indeed, in several of these experiments it appeared that there are no more sustainable options available to firms that have already embarked on greening of their activities within the constraints of the current economic system.

Second, in several of the experiments taken-for-granted ways of conducting activities were changed as the result of understanding how these ways of operating generate externalities. In the BSO/Origin, the Manaaki Whenua and the Interface example there were operational changes arising from going through the *process* of developing FCA.

Indeed, it seems that the main benefit of undertaking FCA is not so much the numbers that are generated but the challenges that are presented to taken-for-granted ways of thinking.

Third, while these experiments offer a glimpse at the possible amount of costs that are currently externalised, the figures estimated are not comparable because of the variety of different costing approaches used. What is noteworthy, however, is that in some cases the estimated costs were greater than the traditional profit figure (for example, in the case of BSO/Origin under a strong sustainability scenario). In other cases the costs were more modest (for example, in the case of Interface Europe). Further, where costs have been estimated on a year-by-year basis, the amount of costs is significantly adversely affected by changes in absolute levels of activity and, in come cases, efficiency gains failed to outpace costs arising from scale changes (see BSO/Origin).

Fourth, in these experiments FCA has not solely been used in a retrospective manner. Rather, in several of the experiments (for example, Rubenstein and Manaaki Whenua) the future internal costs associated with more sustainable operations (which themselves have correspondingly lower external costs) were modelled. In these experiments it appeared that sustainable operations were some way off being financially viable. In contrast, the FFF work seems to suggest that some relatively small changes in the regulatory environment could well make more sustainable activities viable. There is more worked needed, however, before a more conclusive argument could be made either way on this point. This chapter links to the next one in that this final and the preceding observations form the basis for a discussion of the business case for FCA. The next chapter also canvasses business' and the profession's views on FCA.

6. The business case for, and business views on, FCA

6.1 INTRODUCTION

As this is a pivotal chapter in the research monograph we shall briefly recap the ground covered in the preceding chapters. Chapters 1 and 2 provided the policy context within which the EC's call for the accounting profession to develop FCA should be placed. In particular, it was noted that FCA has been targeted by policy makers as a possible technique for moving organisations, and hence society, towards sustainable development. Further, the EC's call for FCA is not a voice in the wilderness. Rather, there was support for FCA in *Agenda 21*, although we did note that this support was weakly phrased (as a result of lobbying by corporate elites leading up to the Rio Earth Summit). In chapter 1 we also suggested that the rationale for FCA is to make environmental externalities visible. In particular, we suggested that there are four different, and complementary, approaches that would take us towards being able to identify externalities. To briefly recap, these approaches were: the democratic or accountability approach; the full privatisation approach; the law, market instruments and structural change approach and the shadow price approach. Further, we suggested that a combination of these approaches would provide an opportunity for society to move towards a more sustainable state.

Chapter 3 built on these policy-orientated chapters to introduce the regulatory framework within which any attempt to develop FCA would sit. In particular, chapter 3 outlined the extent to which the legal framework creates conditions whereby external costs are internalised. Further, it was suggested that shadow FCA would only be required in the event and to the extent that a legal regime failed to internalise costs sufficiently. The second part of chapter 3 focused on the discipline of economics and suggested that if measures of the overall success of an economy took into account externalities then, as in the case of a 'properly' constructed legal regime, shadow FCA becomes unnecessary. The conclusion suggested in chapter 3 is that neither the legal regulatory environment nor macro-economic assessments of an economy's success takes sufficient account of environmental externalities. As a result, we suggested that a shadow FCA approach is a legitimate policy aspiration. In short, there is a knowledge gap that a properly constructed full cost account would fill.

Having concluded that FCA is a potentially valuable way of highlighting the extent to which current operations are not sustainable, chapter 4 outlined how one may go about constructing a full cost account. In particular, the tools of analysis required for FCA were introduced and a four-stage FCA approach was outlined. Chapter 5 built explicitly on

chapter 4 by reviewing FCA experiments in the public domain. In each case, the tools and methods suggested in chapter 4 were seen to be applied by various entities as they sought to estimate their external impacts and the cost associated with those impacts. The combined insights from these two chapters suggest that full cost accounts can be prepared at an entity level. What such accounts tell us, however, is open to interpretation. In addition, there are a variety of significant measurement problems that would have to be overcome before FCA could be more widely adopted. An analysis of the various FCA experiments, however, suggests that there is a business case for developing FCA.

The current chapter focuses on this last point and seeks to achieve three interrelated tasks. First, the business case for FCA will be constructed drawing from literature in the area, from the various experiments and from interviews with various individuals (see the appendix for the research methods adopted for this monograph). Having outlined the reasons why business, *prima facie*, should be interested in FCA, business views on FCA are presented. These two elements enable us to gauge how likely it is that shadow FCA will be developed by business voluntarily. The penultimate section of this chapter considers the views of the accounting profession towards FCA, with the aim of gauging the likelihood that the profession could and would innovate with respect to FCA. Finally some concluding remarks are made.

6.2 THE BUSINESS CASE FOR FCA

The case

Tuppen (1996) suggests three reasons as to why organisations may develop FCA. These reasons are:

(i) *to 'inform decision-making by allowing comparisons between the externalities created by different options'*

(ii) *to 'highlight significant externalities in order to provide an impetus for organizational or governmental action to reduce them' and*

(iii) *that 'organizations might wish to calculate the externalities caused by their processes or products [in order to] ... demonstrate that a particular product, process or activity does not create major externalities or creates less externalities than alternatives'* (Tuppen, 1996, p. 44).

Each of these possible reasons will be considered.

Of the reasons suggested above, the first appears to be the dominant reason why corporations were experimenting with FCA. In particular, FCA was often seen to be of use in the context of an organisation's strategic planning. For example, an interviewee from an organisation using FCA noted:

> *'externalities can be identified but it is difficult to use the data on a day-to-day basis ... but we use the data for decisions such as acquisitions and new developments'.*

Indeed, Margaretta (1997) notes that Robert Shapiro of Monsanto[79] believed that 'with better data, it will be possible to make smarter decisions today and *as the underlying economics change in the future*' (p. 86, emphasis added). In a similar vein, another interviewee suggested that the:

> *'pay off from [FCA] ... is primarily strategic – for a particular product portfolio there will be financial and environmental dimensions. An FCA-type analysis will provide more data on the environmental dimensions and thus on the possible future financial performance of that product'.*

Implicit within the above quotes is the assumption that present external costs will become internal costs. Indeed, one interviewee noted that:

> *'as the drivers for external costs are better understood they will be monetised and ultimately will become internal costs. Thus we need to begin to think about the causes and implications of these social or societal costs'.*

Likewise, another interviewee noted that they saw external costs as being 'leading indicators for future business costs'. FCA's strategic importance, therefore, arises because it enables organisation to consider what would happen to costs 'where the cost has the potential for being "real"'.[80]

This rationale also lies behind the Center for Waste Reduction Technology experiment, where the Center notes that the external costs that it identifies are those that are presently borne by society, but that are expected to become internal costs for most companies.

Costs associated with carbon emissions, which were assumed (at the time of the interviews) would be internalised by way of a carbon tax, were the main examples given of external costs it was useful to identify for strategic decision making purposes. One interviewee specifically noted that their organisation was 'currently including a potential cost of carbon in [their] business analysis'.

We are aware of other companies who experimented with FCA in the same manner. Similarly, Popoff and Buzzelli (1993) suggest that 'plants built by the chemical industry today will still be operating 20–25 years from now' (p. 5) and that an FCA exercise causes the organisation involved to ask whether 'the production of this product [is] using excessive resources and could it tolerate the increased full cost of those resources?' (p. 5). An interviewee expressed very similar sentiments, stating:

> *'our view is that, generally speaking environmental restrictions will become increasingly rigorous and expensive over time for power generators using the more polluting technologies … FCA gives you a glimpse of what these costs will be before that event'.*

Where FCA experiments explicitly attempted to model the costs associated with more sustainable operations (such as that attempted by Rubenstein and Manaaki Whenua/ Landcare Research) the benefits of FCA as a strategic planning tool are even more evident. Indeed, the use of FCA by Interface Europe (a company seeking to be the first sustainable corporation in the world) is driven by corporate strategy. The use of FCA in strategic planning may also account for why there is a reluctance in some quarters to talk about FCA experiments. Such a reluctance may arise because of the concern that information relating to competitive advantage will be disclosed in such FCA calculations. Indeed, it is pertinent to note here that there are many more organisations undertaking FCA than may be expected if one were to focus solely on experiments in the public domain. Further, it may well be that organisations are reluctant to highlight their external impacts to an external audience and would rather use FCA data solely to guide internal decision making. Indeed, this suggestion relates to the second element in the business case for FCA.

As suggested by Tuppen (1996), there are examples of organisations that have pursued FCA in order to provide an impetus for organisational (or less frequently governmental) action to reduce externalities. For example, one interviewee noted that FCA:

> *'prompted some questions and issues that we wouldn't normally have thought of. Many of these issues couldn't be monetised but did provide an opportunity for comparison [of] … different manufacturing processes. The outcome is that it is not so much the numbers and dollar values as it is the process of thinking through alternatives and making value judgements on various alternatives'.*

Such a view was echoed by another interviewee who viewed FCA as assisting the 'planning function, especially with product design'. FCA, therefore, can assist with decisions such as 'which products to manufacture, which technologies to employ, which

raw materials to use, [and in] evaluating waste management options.' Similarly, one interviewee suggested that FCA will be used 'when alternative technology/manufacturing processes are being evaluated and when it is economical to complete a life-cycle analysis or inventory'. Finally, one interviewee expressed the view that:

> *'We ... found that the initial commitment to do an FCA has lead to a number of initiatives. For example, we have saved 'heaps' on energy, we are working ... to investigate environmental monitoring/reporting as a business venture, and have triggered research on planting trees to absorb carbon dioxide, not to mention other benefits like enhancement of our public profile and greater staff awareness/ involvement with things environmental ... Benefits are not necessarily all externally generated – they could also come by way of internal resource efficiency, improved ways of doing things ... in short we cannot underestimate the likely positive effects of a change in corporate culture through embarking on doing FCA'.*

The above views echo, in particular, those of BSO/Origin, which sought to use FCA to highlight external impacts rising from its activities, thereby encouraging employees to reduce their impacts and creating an environment in which 'usual' business practices could be questioned. Further, in this case, these changes reduced externalities.

In a similar manner, Dow Europe, in its 1993 environmental report, notes that:

> *'[i]f we are to achieve eco-efficiency, the sustainability imperative must in some way be inserted into the procedures that allocate financial resources ... full-cost accounting ... would place an 'environmental price tag' on the material we use and sell – a price tag that reflects a realistic cost of the product to the environment'* (p. 69).

As a result, one would expect that FCA would lead to changes in corporate activities. Nuclear Electric makes a similar point in its 1993/94 environmental report, saying that sustainability 'of the global environment will carry a cost, the payment of which must be integrated into the economy. This is not a new idea. It simply follows the now widely accepted principle that "the polluter should pay"' (p. 12). Further, in its 1994/95 environmental report, Nuclear Electric notes that the inclusion 'of external costs, such as those associated with environmental damage or improvements, in the prices charged for goods and services, is seen by the Government as an important part of the strategy for sustainable development' (p. 14). While Nuclear Electric's views can be seen as arising within a political environment where it could be seeking to demonstrate the superiority of generating electricity via nuclear means,[81] other organisations (as we have demonstrated) have also seen FCA as being useful for highlighting significant aspects of organisational performance.

While Tuppen (1996) suggests that organisations may use FCA to highlight where governments should be acting to reduce impacts, this did not seem to be an important factor for those interviewed. Indeed, there seemed to be a reluctance to outline one's own externalities for fear of governments imposing regimes that would internalise costs without due regard to what organisations saw as their own difficult situation. We conclude from this that FCA has the potential to connect external costs to a particular organisation. Where the existence of an external cost, and where the link between those costs and an organisation, is not otherwise known, it is possible that FCA may create perception of responsibilities that do not presently exist. This raised visibility may not be desirable for individual organisations and thus may be the reason why FCA is, by and large, not taking place in the public eye. This point is an important one and will be developed further later in this chapter.

With the exception of Nuclear Electric's environmental report disclosures, we failed to find much support for Tuppen's (1996) third suggestion that corporations would use FCA to demonstrate that particular processes or products were superior to others on the basis of externalities produced. Indeed, a number of interviewees were at pains to point out that it is unlikely that FCA will be able to be used in such a precise manner. Indeed, one interviewee noted that they saw FCA as being:

> *'a very quantitative tool to deal with qualitative issues. We have chosen not to do it for this reason ... because the numbers that may be generated are still very 'fuzzy' and as such are difficult to communicate and support in our decision-making processes'.*

Macve (1997) voices similar opinions regarding FCA when he suggests that the numbers produced 'should provide the means to sharpen analysis and questioning but do not in themselves provide the answers and certainly not the complete answers' (p. 194). A related point was suggested by one interviewee who felt that it would be 'important to know about non-internalised costs so you can safeguard your reputation'. This interviewee did not anticipate that externalities data would be made public. Rather, it was envisaged that FCA would be used as part of reputation management processes. This is a more defensive expression of Tuppen's final suggestion as to why organisations might undertake FCA.

In summary, while, *prima facie*, there is a business case for developing FCA, few organisations are publicly experimenting in this area. Thus we may conclude that a number of reservations about FCA exist. These reservations are of both a technical and political nature. The technical reservations about FCA will first be discussed. Second, observations on the outcomes of FCA exercises will be offered. These observations will

provide the context within which the political reservations associated with FCA can be understood. One interviewee distinguished these reservations neatly, noting 'there are two issues: "what is the cost?" (which is a technical issue) and "who pays for it?" (which is a political issue)'. Further, the same interviewee suggested that 'because these two issues get confused, FCA is highly politically charged'.

In what follows we shall attempt to keep these two issues separate, but as will become apparent technical questions necessarily involve political considerations as well.

Technical reservations

The first observation that can be made is that FCA requires a larger array of data than most organisations gather as a matter of course. As a result, there are significant information-gathering costs in developing FCA. These costs include isolating activity-related data from existing records as well as developing the new data sets. In addition, data on the full life-cycle of products and processes are likely to be required as organisations seek to identify externalities. Further, if an FCA exercise were to examine externalities that arise both upstream and downstream from the organisation, an extensive array of data would be required.

Indeed, the need for LCA was identified by a number of our interviewees as being a crucial step towards FCA. One interviewee commented that FCA 'presumes life cycle thinking, at the least, and full life-cycle inventory and analysis for product decisions'. In most instances, such information is not held directly by organisations. Popoff and Buzzelli (1993), also emphasise this point, stating 'a key tool in initiating full-cost accounting will be life-cycle analysis' (p. 2).[82] Creating one's own LCA data around an FCA exercise has advantages. For example, 'custom made' data are likely to be more sensitive to site, time and country specific factors which determine the nature and size of impacts arising from a particular activity. Of course, this is an expensive process to undertake. It may be possible, however, to use data which is already in the public domain to attempt to impute the impacts which are likely to arise from activities and this approach is likely to be cheaper than developing custom made LCAs. The accuracy of the figures FCA produces as a result will, however, suffer.

The need for LCA data creates problems for FCA. For example, one interviewee noted that 'LCA data is not available for [the majority] of processes up and down stream' from the cost objective of the FCA exercise. Potentially, this limits the ability of organisations to do FCA quickly. Indeed, many organisations appear to have to spend at least three years on an FCA exercise before generating usable results. The need for substantial time and money investment may, therefore, limit FCA (at this stage of its development) to larger corporate entities that already have a well established environmental management

system. Further, one may expect that corporations in industries with a greater political risk of cost internalisation would be proactive in this area.[83]

The second technical problem that arises in FCA is deciding which costing figure, from the multitude of possible costing figures, should be used. Further, there is a perception that any one of these figures could be defended as being 'appropriate'. Indeed, a brief review of box 5.20 demonstrates this graphically. An attempt to quantify the external costs associated with, for example, NOx and SO_2 emissions resulted in a range of numbers being calculated. For NOx, the numbers ranged from US$12 to US$39,997 and for SO_2 the range was US$10 to US$9,681. Clearly, depending on which figures are selected, very different conclusions could be drawn from an FCA exercise. At the same time, it could be suggested that the use of different figures implies different ideas about what a full cost is. This was perhaps most graphically illustrated in the reworking of Manaaki Whenua/ Landcare Research's FCA figures in chapter 5. In particular, there was a large difference between what it would cost to clean up existing externalities compared with eliminating a large portion of them by changing the way business is conducted. Further, the ability to compare the results of one FCA exercise with those of another is severely limited by the fact that each exercise tends to use its own costing factors. Thus, it can be suggested that great care needs to be exercised in interpreting figures from FCA exercises. This is especially the case if one were to seek to use these numbers as an input to the policy process.

Given the problems identified, which go to the core of any FCA exercise, it becomes a little more understandable why there has been a dearth of public discussion of experimentation in this area. Not only are many of the choices made in the process matters of judgement, but in addition the final figures produced by an FCA exercise may well be difficult to understand and defend. Further, in order to make an FCA exercise transparent enough to convince external parties of its merits, sensitive and confidential information may well be exposed. For these types of reasons one has sympathy with corporations who choose not to talk about their FCA activities.

Two further technical problems were noted by interviewees. One interviewee suggested that organisational level FCA may not be an appropriate level of analysis if one wishes to determine what actions will best lead to sustainable development. Thus an FCA exercise that focuses on an individual entity may not be as useful as one that examines an entire industry or all activities in a geographical area. Likewise, the boundary drawn around an FCA exercise could lead to an organisation looking more sustainable if it shifted external costs elsewhere in the product chain and thus outside the boundary of a particular FCA exercise. The idea of an entity level FCA, therefore, is not necessarily the only tool one would need for policy development. In particular, wider macro-economic assessments of externalities would necessarily have to supplement an FCA exercise.

The final technical limitation of FCA that was suggested arises from the inability to translate activities into impacts. In particular, the translation exercise is limited by the current state of scientific knowledge (and it should be recognised that this is likely to remain the case in the future). For example, we may know that SO_2 and NOx, once released into the atmosphere, form acid rain, which, *inter alia*, acidifies lakes and hence may damage fish stocks. Further, we may decide that in order to remedy lake acidification it is necessary to counteract lake acidification chemically and restock the lakes with fish. It is very difficult, however, to estimate the connection between an organisation's emission of SO_2 and NOx, lake acidification (especially where there are many disparate sources of pollution giving rise to lake acidification) and the cost of restoring the environment. As a result, the state of knowledge regarding the functioning of the natural world, and the way in which human activities affect this, will limit our ability to model these interactions in financial terms. Thus, any FCA will always be dependent upon the state of scientific knowledge.

The above technical reservations about how to 'do' FCA are substantial. These reservations, however, are only part of the 'story' as to why FCA has not been more widely developed. As noted at the start of this subsection, political issues (such as deciding who pays for externalities) will also affect the uptake of FCA. It is to these reservations that we now turn.

Political reservations

A number of sources were used to develop an idea of the political reservations that individuals have with regard to the development of FCA. First, however, it is necessary to reiterate that corporations undertaking FCA, thinking about doing so, not going ahead after having done some FCA, or not doing so after considering it, are unlikely to be limited to those experiments reviewed in chapter 5. Indeed, as this section will demonstrate, a number of companies have experimented, are experimenting and are thinking about experimenting with FCA. Further, these organisations have a range of views as to the efficacy of FCA. It is interesting to note, however, that the majority of firms whose staff we interviewed or had e-mail conversations with are very reticent about being publicly identified as experimenting with FCA. Indeed, the fact that a corporation is experimenting with FCA was seen by some to be politically sensitive information[84] and the outcomes of such experiments are also seen as being highly sensitive. In many instances those corporations which have experimented with FCA have provided reasons for their experimentation as they have sought to place their actions into some sort of context (see also chapter 5). In addition, firms that are presently not experimenting with FCA but perhaps feel that there may be an expectation that they would do so, have commented on the area in the public domain. Finally, a number of the interviews and e-mail conversations undertaken were with representatives of business, or with people who

felt able to speak on behalf of business, and these provided additional insights into business views of FCA. Drawing from the above sources, two major reservations were identified. In brief, these are: first, the types and amounts of costs that such an activity will identify and, second, how these costs will be used.

In general, interviewees believed that FCA would inevitably generate 'bad news' about those organisations undertaking FCA. For example, a number of interviewees made observations on the size of fuller costs that would be identified from FCA type exercises. These observations suggest that FCA, even though seemingly a sensible notion, contains some uncomfortable messages. A number of writers have commented in general on the kinds of figures that are likely to emerge from an FCA exercise. Bebbington and Thomson (1996), for example, note a variety of reactions. Interviewees on that project observed: 'I think the answer is likely to be horrifying', 'my heart stops when I think about the amount of money that would be involved' and 'a shift to renewable energy for example would have the whole of Scotland covered in wind turbines, it is that kind of scale' (p. 42). In a similar manner, Popoff and Buzzelli (1993) suggest that FCA is a 'new paradigm … For example, if the full cost of water were charged in California tomorrow, much of the agriculture industry in that state would be destroyed' (p. 1). Likewise an interviewee for noted that if a carbon tax (as a proxy for the fuller costs of electricity) were introduced then 'we would be bankrupt'.

These types of sentiment were echoed by a senior policy maker who, when asked, 'what shape would the economy take if we did FCA?' admitted 'I don't have an immediate answer to that … [it] would create a completely new discussion' as to how society could pursue sustainable development. Thus it is possible to suggest that FCA is likely to tell a story that is not comforting; it is likely to suggest that society is a very long way from sustainable development and by implication that corporations are not sustainable.
In addition, the type of 'story' that could emerge from an FCA also created some political reservations. In the first instance, it was recognised that many different stories could be told from FCA data and that the type of stories told would depend upon the cost objective and the objective of the exercise itself. For example, if FCA focused on an LCA driven analysis of products or processes then FCA would provide a highly technical answer to a particular question. Further, the answers provided would probably only be valid in the context of that particular exercise and the findings would be unlikely to be able to be extrapolated to other physical locations or to other products and processes. Where FCA was tackled, say for a whole organisation, it is likely that the answer would not be as technically orientated and it may provide some general policy pointers. What is important to note, however, is that regardless of the focus of the exercise – the news is expected to be bad. Tuppen (1996), for example, suggests that for:

> *'most companies the net effect will be additional cost though, since this will impact equally on all companies, those who can anticipate and minimise it will be able to put themselves at a competitive advantage. For some, the net effect would be a gain'* (p. 51).

Further, one reason why FCA would be unlikely to be developed was suggested by interviewees in the Bebbington and Thomson (1996) project. One interviewee suggested that:

> *'I think it [FCA as suggested by the EC] is going to be ignored ... If as I understand it ... getting the prices right is about internalising externalities then by definition National Power (for example) ... is not a viable company. Now are we really saying that we are going to identify some of Europe's leading companies as unviable using basic accounting techniques?'*

While reasoning such as that outlined above, would provide an explanation as to why so few companies are publicly experimenting with FCA, a basic problem remains with this reasoning. In particular, if corporations subscribe to the concept of the 'polluter pays' then such reasoning is not defendable. For example, Popoff and Buzzelli (1993) suggest, if one is opposed to FCA one is effectively subscribing 'to the theory that product prices should not include environmental costs' (p. 5). Further, the authors suggest that corporations would be unwilling to contradict publicly the polluter pays principal.

In addition to political reservations arising from the size of fuller costs, interviewees also expressed concerns about the extent to which FCA could and would identify social externalities. The view that FCA encompasses social externalities was generally accepted by the majority of interviewees, either implicitly or explicitly. For example, one interviewee stated that the 'identification and costing of social externalities is the next logical step and is required by the sustainable development agenda'. Another interviewee noted that 'social costs should be considered, but I suspect that individual corporations and their stakeholders will have to decide how to value these, not the government and not specific NGOs'. For this interviewee, social externalities were accepted, albeit that this person had clear views as to who should be involved in determining the 'appropriate' social costs. Likewise, another interviewee noted that social aspects should be included in FCA exercises and that there needs to be 'coherence between how one treats environmental FCA and social FCA [but that how one may account for social costs] ... has not been considered yet'.

Having noted that social externalities were almost universally accepted as logically constituting part of an FCA exercise, a number of interviewees were not happy with this.

One interviewee, for example, was at pains to emphasise that social issues should not be included within FCA – not because they did not logically belong there but because social issues introduce more political considerations into the exercise. This interviewee felt that environmental issues could be seen as technical issues in a way that social issues could not. Although social issues should be considered somewhere, the individual felt that if they were within an FCA type exercise '*others*' (unspecified) would use the inclusion of social issues to reject the whole FCA. This seemed to be a minority view and seems a difficult point to sustain as all decisions, be they economic, environmental or social, have political dimensions. If there was anything that could be inferred from this individual's comments it would be that the firm concerned was operating in a UK environment where social issues are less readily discussed (our mainland European interviewees did not seem to think that the inclusion of social issues was a problem). Further, the above-mentioned interviewee was representing the accounting profession, which is itself perhaps more conservative than business in general. Certainly, a rationale for excluding social externalities was not systematically developed by any interviewee. Indeed, one interviewee felt that one of the characteristics of a 'good' FCA exercise[85] was that it would 'throw up several competing impacts' and that these competing impacts usually involved a trade off between 'environmental and safety' issues. Another interviewee believed that while FCA would start with environmental costs it would inevitable open up the way to the consideration of social costs as well.

While concerns about the size of costs identified by FCA were voiced, of more concern was how these costs could and would be used. In particular, a number of interviewees noted that FCA raises questions about what an organisation is responsible for. It seems that the act of identifying and providing an account of impacts external to the organisation introduced the possibility that the organisation should be held to account for those impacts. This concern arises from the possibility that FCA data could be used to extend the application of the polluter pays principal. While interviewees accepted that identifying fuller costs was likely to lead to their internalisation the timing of internalisation was also seen to be important. For example, one interviewee asked 'how active should you be in seeking to incur this cost? Should you be proactive [that is, should you undertake FCA] or wait to be forced to incur that cost?' Clearly, having more time to limit their exposure to financial risk, arising from cost internalisation, will be preferred by companies.

Two additional observations could be made here. First, even if externalities are not about to be internalised, FCA sheds light on the 'subsidy from society to business'. Of itself this may create a more hostile environment for business. It seemed to us that this was an issue that exercised some of our interviewees. The second point arises from the observation by one interviewee that, in some areas, major consequences for their operating environment could arise if a number of related changes occurred. For example,

this interviewee suggested that if consumer tastes changed and if there were more stringent regulations on their emissions, if material input prices changed a little and if fuller costs were internalised by taxes, then the feasibility of their whole operation would have to be considered. Given (for this organisation and industry) that some elements in the above scenario were in place, FCA could be the 'trigger' that would create a major change in operations. While this interviewee acknowledged that the paradigm shift envisaged would be more sustainable (and indeed his organisation was keen to move in that direction), living through the turmoil was not something he or his organisation relished. In the meantime, their own FCA investigations were geared towards identifying areas where change could be undertaken on a timescale suitable to that organisation. If FCA created an informed public, and if the policy arena picked up on the information, then it was feared that an accelerated rate of change could be 'imposed' upon the organisation. While such rapid change would be beneficial from a sustainable development perspective, it was not seen to be beneficial for the individual entity. It seemed that the rationale was that as much profit as could be extracted from unsustainable operations should be achieved before the 'rules of the game' were changed.

The corollary to the above points is that our construction of accounting (and thus what counts and what is accounted for) is questioned by FCA, with FCA potentially being a paradigm changing tool. Under FCA the entity, via the changed definition of the boundaries of that entity, is expanded. This may well explain, at least in part, why the accounting profession has difficulties getting to grips with FCA. Further, the expanded set of responsibilities implicit within the expanded conception of the entity may also explain why FCA has attracted hostility from business elites in the past.

Summary

In summary, while many corporations are not experimenting with FCA it appears that within the leading edge of business (in terms of social and environmental awareness) FCA is viewed positively. The development of FCA is acknowledged to incur substantial costs in terms of 'changes to management information systems ... [and that there are] problems with definitions of environmental costs ... integration of data collected' and such like. The strategic planning related benefits of undertaking FCA, however, are deemed to be potentially significant and this is the area in which the business case for FCA gains ground. This is especially the case for industries where externalities are likely to be imposed on organisations via some form of regulation (for example, by way of a carbon tax, product take back requirements or more stringent environmental and social standards) or where operating plant lifespans are such that consideration of fuller costs will yield benefits. Further, it appeared that, as with environmental reporting, one of the benefits of FCA is the knowledge gained from systematically working through an FCA exercise. Thus it is the process rather than the outcome that is most important.

There are, however, also some uncomfortable questions raised by FCA. In particular, how one defines the boundaries of organisations and organisational responsibilities are brought to the fore by FCA (with FCA potentially expanding both organisational boundaries and responsibilities). Further, FCA makes apparent that the whole economic system must change in response to sustainable development requirements and this is an uncomfortable conclusion for individual businesses and business as a whole. These issues are clearly significant if one wishes corporations to voluntarily develop and use FCA. We would suggest, however, that these are political problems arising from the outcomes of FCA rather than problems arising from the concept itself. None of this, however, fully explains why the accounting profession has been so quiet on the issue of FCA.

6.3 THE VIEWS OF THE ACCOUNTING PROFESSION

While the preceding section evaluated how business perceives FCA, it is relevant to note that (other than in very general terms within *Agenda 21*) business has not been required to tackle this area. Rather, the EC called for the accounting profession to provide some leadership in this area. This section, therefore, concentrates on why the accounting profession has yet to rise to the challenge laid down by the EC. This issue will be explored in several stages. First, it is necessary to be clear about what constitutes the accounting profession in the sense the term was used in the *Fifth Action Programme*. Second, we review the evidence collected from interviews with policy makers in the accounting profession and from a questionnaire survey of European accounting bodies to suggest a number of reasons why the accounting profession has not responded to the EC's FCA call. While it would be easy to characterise the accounting profession as being reactive and unable to innovate in the area of FCA, to do so would ignore the significant impediments that exist for any one accounting body trying to tackle this issue and for the profession (in a larger sense) trying to innovate in this area. These impediments will be considered in this section. Further, in order to develop some prognosis of how FCA could be championed by the accounting profession in the future, a number of interviews concentrated on the nature of the policy-making process within individual accounting bodies. In particular, the reasons why some issues make it from the general policy agenda to an accounting body's agenda were explored and this has proved informative for explaining why FCA has failed, at present, to garner support from the accounting profession. Finally, conditions that would be necessary before the accounting profession would pursue FCA will be suggested.

It is difficult to write about the European accounting profession as a whole as it comprises a diverse collection of professional associations, each of which is seeking to serve the interests of its members (whose interests are also likely to be varied). Some of

these professional bodies have commonalities, for example, a common language, educational regime, client base or accounting system. There are, however, a number of differences between bodies that share seemingly common characteristics and this affects our ability to make generalisations about the profession as a whole (one need only to look at the various UK bodies to see this). Some general points, however, can be made that are relevant to our exploration of the profession's lack of response to the EC's call for FCA.

Within Europe, the United Kingdom is relatively unusual in having a professional body that focuses on management accounting issues and that represents management accountants' interests. In most other European countries the professional accounting bodies are focused on financial accounting issues and thus they predominantly represent financial accountants. As a result, many of the accounting bodies surveyed did not view FCA as falling within the remit of their institutes because FCA was viewed as being primarily concerned with management accounting practices. Indeed, one interviewee identified FCA's management accounting link as a possible impediment to the development of a systematic FCA methodology. This interviewee suggested that 'the problems experienced by FCA comes down to the problems which arise from the status of management accounting versus financial accounting and the problems of the cost of developing information systems'. Thus it is, *prima facie*, difficult to see why any individual accountancy body would seek to develop FCA.[86] Further, it is necessary to consider how the priorities for FCA expressed in the *Fifth Action Programme* could feed through to accounting bodies.

It appears that DG Environment is only willing to approach the accountancy profession through DG Internal Market.[87] This creates an immediate problem for translating the *Fifth Action Programme* call into action by accounting bodies. In particular, to the best of our knowledge, DG Internal Market does not have any plans to champion FCA or to move beyond its focus on environmental issues only insofar as they impact on financial accounting. It was suggested to us that a lack of resources and relevant expertise lie behind this reluctance. One way this problem could be overcome would be to use FEE as a vehicle for developing policy in this area. Again, this route seems unlikely to be a productive one. While the EC could be seen as FEE's 'client', FEE (for reasons of funding if nothing else) tends to be more reactive than proactive with respect to the EC's pronouncements and FEE has not in the past functioned as a policy development body for 'blue sky' accounting developments (such as FCA). At present, the call for FCA has not been phrased in a way that requires an immediate response and as a result it is unlikely that FEE would tackle this issue in the absence of an explicit requirement for them to do so. Further, and more crucially, given that FEE itself is a creature of the European accounting bodies, the priorities and concerns of those bodies will be reflected in FEE itself. Thus FEE would need the support of its member bodies to tackle the issue

(we have suggested that such support is unlikely) in addition to pressure or support from the EC.[88] This begs the question of who the EC saw as being the body most likely to pick up FCA and indeed how they expected the accounting profession to respond to the *Fifth Action Programme*. As indicated in chapter 1, it seems that DG Environment did not have any clear ideas about how FCA could be developed. It is, therefore, perhaps unsurprising that the FCA call has not been translated into action.

The conditions under which FCA could be picked up by the accounting profession, however, were suggested by interviewees and questionnaire respondents. For example, one interviewee suggested that in order for FEE to pick up this issue there 'would need to be a clearly demonstrated benefit to several member bodies'. The same principle held for the likelihood that individual accounting bodies would develop FCA. For example, it was asked by one interviewee: 'is there business demand? If there is then accounting firms will be asked about the issue and thus industry interest will drive the accounting profession's interest … clients needs predominate'.[89]

Further, it was suggested by this and another interviewee that if a policy instrument (such as FCA) were in the public interest but not in the interest of business then it is unlikely that the accounting profession would champion it. Rather, legislative force would be required before anything could change. Indeed, one questionnaire respondent indicated that 'we do not expect that the [accounting standards] will reflect … [FCA] unless stipulated by the relevant Directive of the European Union'. This last point will be further considered later in this section.

Other interviewees had similar views on the problems of developing FCA. One interviewee, for example, suggested that FCA could not be developed by anyone other than the EC, suggesting that:

> *'if the academics develop FCA, practitioners will say that it will not work in practice, if the profession develops it, the critics will say that the profession is merely finding another way to make money and that they are meddling in others' affairs, if you expect that the UK government will do it then there will have to be some pressure on the government, most likely from the EU, and if you expect the companies to develop it, then you will need to show how FCA will enhance shareholder value'.*

While the priorities of particular parties are fairly crudely put by the above interviewee, similar views emerged when we questioned interviewees on how policy goals had, in the past, found their way into accounting practice.

In seeking to generalise about how the accounting profession makes policy choices, several factors were considered to be important. First, the link between the accounting profession and the perceived need for it to serve the needs of the 'big' accountancy firms clients was deemed to be very important. Indeed, according to several interviewees, this is the key to understanding how the policy agenda of the accounting profession operates. Second, it was suggested that the nature of the appointment of presidents (and other senior members) of the accounting profession leads it to be driven by individual preferences. One interviewee suggested that each presidency could be seen having a particular theme, reflecting the concerns of the individual appointed. This, it was suggested, results in two outcomes. In the first instance it makes it unlikely (at this time) that a president would be appointed who would and could champion environmental accounting in general (let alone FCA).[90] If a 'radical' president were appointed, however, it was suggest that a sustained momentum for FCA would be unlikely because each president's tenure is relatively short. Furthermore, one interviewee suggested that the profession's committee structure means that radical initiatives are often vetoed by one or another committee. For FCA to be developed it would, therefore, need to be widely supported by individuals and groups in a professional body. An environmental committee, working party or taskforce would not have sufficient authority to embark on an FCA investigation without the support of, for example, a taxation committee. Finally, it was suggested that in the UK, in particular, a consensus on FCA would be difficult to build because the tensions between the different bodies may result in the issue being used as a 'stalking horse' in inter professional body relations.

These observations from interviewees were borne out in the responses obtained from the questionnaire survey of European accounting bodies. In particular, the questionnaire responses suggested a general lack of knowledge of FCA and of the EC's call for FCA. From the interviews we noted that if individuals were aware of the *Fifth Action Programme*, they had a very sketchy awareness and if they knew of the FCA call that appeared to be the extent of their knowledge (we could infer that this held for questionnaire respondents as well). In addition to a lack of knowledge about FCA, three significant impediments to its development were identified. These were that:

(i) there are other pressing issues that the professional body is dealing with

(ii) individual members (of a particular professional body) did not consider FCA to be an important issue

and

(iii) the benefits of this technique to body members are not clear.

In brief it appears that the professional bodies have plenty of issues to deal with and that FCA has not risen up the policy agenda to the extent that it needs to be addressed. Further, some interviewees suggested that FCA (and the ideas behind it) were 'radical … [and as a result] progress will be slow'.

It was notable that it was only during interviews with accountants that the radical nature of FCA was identified as being a significant problem. In other interviews the logic of the concept was readily accepted – albeit that to achieve FCA in practice would be difficult and that FCA raised questions for business activities. The conservatism of the accounting profession was, therefore, very evident from our interviews. In order for FCA to be acceptable to the profession it was suggested that it would have to be worded in an acceptable manner. To be worded as being part of a broader social or ethical concern was seen by some as being unacceptable. The idea of FCA being part of a 'triple bottom line' or part of the pursuit of sustainable development was viewed as being more acceptable (but it is worth noting that such terms had only recently became acceptable within the profession). Other discussions with accountants, however, suggested that some accounting firms were more comfortable with FCA, and with its connection with social issues (these individuals tended not to be in the UK). It probably remains a fact, however, that FCA is towards the extremes of the issues that the profession is willing to engage with.

It thus becomes important to suggest the way in which FCA could meet the conditions that we have suggested need to be met before an issue makes it onto the accounting profession's agenda. A number of interviewee responses and the responses to question 8 of the questionnaire (see the appendix) point towards the requisite conditions for FCA. The 'triggers' that are required appear to be:

(i) membership pressure on the professional association for guidance on FCA (which itself could come from industry asking questions of individual accountants)

(ii) national government support (at least) for accountants to consider FCA

(iii) support for FCA at the European level (which would be communicated directly by appropriate EU bodies or which would arise from the EU putting pressure on national governments)

(iv) a change of attitude within the profession to make the pursuit of FCA 'acceptable'

and

(v) the creation of a competitive impulse between individual associations in the accounting profession to develop FCA.

At present most of these triggers are absent. It would, however, be possible to start a process of creating an environment within which the development of FCA could be supported.

In particular, we would suggest that the most productive way forward in this area would be to assemble a group of individuals with expertise in FCA with a brief to develop clearer technical guidelines for FCA, perhaps building on the material in this monograph. Interviewees were supportive of this suggestion with one indicating a belief that 'some combination of EU representatives, management accountants and economists could develop something'. Another interviewee made it clear that such an initiative would have to be supported by the EC. This interviewee noted that the EC 'has suggested doing FCA so it should find some way to move that debate forward'.

Urging companies or professional associations to innovate in this area has not worked to date and seems unlikely to work in the future. Indeed, Macve (1997) suggests that 'positive steps, which may require external regulatory stimulus, are needed to overcome organisational inertia. It does not appear likely that this initiative will come from accountants themselves' (p. 190). We would further suggest that regulatory stimulus of itself is unlikely to be sufficient for the development of FCA. There is also a great deal of preparatory work that could and should be done on developing knowledge about how FCA could be implemented and in evaluating organisations' experience with the technique. In this manner, knowledge of and requirements for FCA could evolve together. If FCA can 'improve environmental performance more than any other action, program or regulation in place today' (Popoff and Buzzelli, 1993, p. 7) the initial steps towards developing FCA will have been made at some stage.

6.4 CONCLUDING COMMENTS

A number of conclusions can be suggested at this stage. First, although the EC has signalled that it views the development of FCA to be a 'good idea', there has not been any compulsion for organisations to develop FCA (the *Agenda 21* recommendations on FCA and the EC's call for FCA are both non-binding). Further, there has been no detailed guidance on how to undertake FCA and the benefits of FCA have not been convincingly 'sold' to corporations. Thus, one may suggest that the policy environment has not, as yet, been supportive of FCA. Second, the development of FCA entails a not insignificant effort on behalf of organisations in terms of the data required before an estimation of fuller

costs can be made. Potentially of more importance in our minds, however, was the suggestion that the most likely outcome of undertaking FCA is to bring to light the extensive array of costs that are presently being externalised by corporations. In addition, the scale and nature of these costs are likely to lead to the conclusion that current corporate activity and current economic arrangements are a very long way from being consistent with the goal of sustainable development. It seems, therefore, inevitable that in the absence of regulatory pressure FCA, as a potentially politically explosive technique, will not be voluntarily developed (who could expect turkeys to vote for Christmas?).

There are, however, reasons why corporations could undertake FCA voluntarily (and sometimes are, albeit in many instances not publicly). These reasons are primarily strategic but as fuller costs feed into the economic system these strategic reasons will increasingly become operationally important. If, however, fuller costs are not introduced to the economy (via, for example, taxation or other forms of regulation) or if fuller costs do not evolve within the market itself, then it is difficult to see that voluntarily undertaking FCA will be a beneficial activity. Indeed one interviewee noted that their organisation had problems with factoring increases in energy costs (which would be consistent with internalising externalities from energy production) into their FCA because the price of energy kept on falling rather than rising. Thus, in the absence of interventions by governments, FCA is unlikely to become part of the business mainstream. This does not, however, mean that it should not be. What is clear from this chapter is that in the short term neither individual companies nor the accounting profession are likely to support systematic experimentation with FCA. If one accepts that pressing social and environmental problems exist, that these problems arise from economic activity and that current signals about the costs and benefits of economic activity are incomplete, then FCA is going to be part of any exploration of how to create a more sustainable economy. How FCA may begin to be supported in order to achieve these goals is considered in chapter 7 – the closing chapter of this research report.

7. Conclusions and recommendations

7.1 INTRODUCTION

We identified at the outset of this monograph that the EC's Fifth Action Programme was the impetus for our exploration of FCA. While it would be fair to say that in 1992 the EC's call (and clauses 27–30 of *Agenda 21*) were the only 'pushes' for FCA, some eight years later this is not the case. In particular, we would suggest that there are several reasons for suggesting that FCA could and should be developed.

First, as the sustainable development agenda has become better understood, it has become apparent that the social and environmental problematique that sustainable development is seeking to solve has at least some of its origins in the way economies are ordered. In particular, the pricing mechanisms of an economy will, by and large, dictate the shape of that economy, which in turn will influence the pattern and extent of the environmental (and social – see section 7.3 below) impacts arising from economic activity. If, for example, elements of the environment are not priced in a manner that will ensure that the impacts associated with their extraction, processing, consumption and disposal are captured and communicated to economic actors, then it is inevitable that adverse environmental impacts will be largely ignored in business and policy decisions. As a result, significant negative environmental externalities will exist in a particular economy and, by definition, the economy will not be environmentally sustainable. Further, we would suggest that the absence of information about externalities in the public domain and the failure of this data to be taken into account in decision-making processes will result in more externalities being generated than would otherwise be the case. As a result, there is a sound environmental case for seeking to identify the external costs arising from particular actions or decisions. FCA is a potent way of identifying such externalities.

Second, FCA (at the level of an individual business entity or business decision) would mirror, extend and support other attempts to deal with externalities. In particular, in this monograph we identified (in chapter 3) two routes by which externalities are increasingly becoming recognised and incorporated into decision making. In the first instance, economists and governments are increasingly seeking to evaluate more than the direct economic outcomes (in terms of GDP) of activities. In chapter 1 we noted that a 'full privatisation' approach would be one way to bring externalities within the sphere of the economic. Likewise, in chapter 3 we identified a variety of alternative ways in which economists seek to incorporate non-economic considerations into the policy-making process. In addition, and in response to perceived environmental problems, legal regimes are increasingly seeking to link externalities to corporate actions. A move towards FCA on an entity level would foreshadow the costs that a legal regime may internalise at some stage in the future. Developing FCA at the entity level, therefore, would be consistent with these trends in other disciplines.

Third, and despite the dangers inherent in the further economisation of decision making, FCA appears to be a tool that offers a particular contribution to the externalities debate. While some may argue that FCA is not necessary for change to occur – because the law and/or government policies will ensure that, eventually, all significant externalities are internalised – we would disagree. Shadow FCA is also an appropriate way for the accounting profession to contribute to the debate on externalities. In particular, FCA provides an insight to both the specific business decisions that result in externalities being created as well as highlighting the ways in which individual organisations are driven (by the economic 'system') to make the decisions they do (see especially chapters 5 and 6). In addition, interviewees suggested that the process of developing FCA (as much as the outcomes of such experiments):

(i) yielded information for strategic decision making,

(ii) created different 'pictures' of organisational processes, which developed their understanding of how their organisation operates

and

(iii) prompted ideas about how to redesign processes so that externalities were reduced.

In short, those organisations that have invested resources in developing FCA have found it to be of benefit to their organisations. The message is that there is a business case for some form of FCA (see also, SustainAbility, 2001, especially p. 39) if one is looking for 'win-win' situations.

At a more fundamental level, however, FCA is not as straightforward as it seems. In particular, while it is not generally brought to the fore in FCA experiments in the public domain, the outcomes of an FCA exercise can be used to demonstrate the unsustainability of a particular business and to locate the source of that unsustainability in the current economic arrangements within which business operates (and which business is also, by and large, seeking to perpetuate). If one takes FCA to its logical conclusion then there is NOT a business case for it – because FCA tends to suggest that a radical break with past ways of organising economic activity is required as well as a reconsideration of the ends toward which economic activity is directed. Some of our interviewees recognised this was the case but also noted that such a conclusion cannot be articulated easily within a business context. They also suggested that this is one of the reasons why there has been little public experimentation with FCA in the past.

In summary, we suggest that shadow FCA is important and should be developed for three

reasons. First, accounting for externalities is a necessary activity if, as a society, we are to address our current unsustainability. Second, FCA supports and is compatible with other attempts to identify and remedy the effects of externalities (such as the imposition of environmental taxes). Finally, there are some business reasons for organisations to move towards developing FCA. In particular, FCA results in an enhanced understanding of the organisation's operations and its impacts, and the environmental performance of the organisation can be enhanced as a result of undertaking FCA. If, however, FCA were taken to its logical conclusion (and if fuller costs were translated into prices) then the viability of current economic behaviour would be fundamentally questioned. This could/should result in a radical reconceptualisation of the role of business in society. This is, if you like, the broader societal case for developing FCA.

Having noted the above reasons for FCA it is also the case that there is a lack of evidence that FCA is a widespread business practice (although it may be that organisations are not making public their activities in this area). As a result a number of recommendations can be made.

7.2 RECOMMENDATIONS

In the first instance, we make four specific recommendations with respect to developing FCA. We then identify who should be responsible for pushing ahead with these recommendations. In particular, we address our recommendations to governments, the accounting profession and business.

Our **first recommendation** is that **externalities data should be made more widely available** than they are at present. FCA is one way to achieve this. It is, however, not the only option available. In particular, in chapter 1 we described four approaches to cost internalisation. Of these options, the democratic/accountability approach (which seeks to bring externalities data into the public domain) is a possible step towards making organisations accountable for their externalities. There are various ways in which this externalities data could be made available. For example, some form of eco-labelling is possible – the campaign by Sustain[91] to identify the 'food miles' is a good example of such an approach. In addition, comprehensive environmental and social reporting by corporations could bring externalities data into the public domain. The provision of externalities data in reporting could be done relatively simply and quickly and has the advantage of avoiding some of the technical problems associated with FCA (especially the problems encountered in monetising externalities data). There is still, however, a need to develop FCA and the steps required to do this form the basis for the rest of our recommendations.

Our **second recommendation** relates to the need to **develop a more robust and widely accepted approach to FCA**. As can be seen from the review of experiments (in chapter 5) there is a significant stock of knowledge of and experience with FCA. At the moment, however, such knowledge is not concentrated in one place (with the possible exception of this report). There would be much to be gained from bringing together those involved in FCA experiments to develop an accepted FCA approach. Such an approach would need to be tested and evaluated (see recommendation three below) and the result of such an exercise should be disseminated (see recommendation four below).

Our **third recommendation** flows from the second. That is, once an accepted and more robust FCA approach is developed then **field testing and experimentation must be carried out by applying it to a number of specific situations**. In this way any problems with FCA implementation could be identified (and resolved, if only for the sake of developing an FCA approach – many issues that arise in FCA will not and cannot be 'resolved' by recourse to 'the facts'). This step would also help determine with more certainty if FCA is an appropriate tool to assist business in its pursuit of sustainable development and to enable various stakeholders to understand the externalities of different activities. In addition, the development of an agreed approach may itself encourage more widespread experimentation. We envisage that this same group should consider how social externalities could be accounted for.

Our final, and **fourth recommendation**, is that **an education and practical guidance programme must be developed**. As has been seen (especially from our survey of European accountancy bodies) there is a considerable lack of knowledge about FCA in the broader accounting community. It could also be inferred that there is a lack of awareness of FCA within business circles as well. At the same time, we also noted that FCA is a potentially powerful tool in a transition towards a sustainable economy. As a result, we would recommend that **the idea of FCA and an approach to it be more widely promoted and disseminated among the accountancy and business community**. Such a move, combined with guidance on how to undertake FCA (recommendation two) and further co-ordinated experimentation with such an FCA approach (recommendation three) would help create an environment within which FCA could flourish. In addition, the more radical conclusions that could be drawn from an FCA exercise should also be communicated more clearly. FCA, at its most radical, illustrates that society is not sustainable. While such a conclusion may be profoundly uncomfortable it is one that needs communicating to society – indeed, society needs to be educated about its unsustainability.

The above recommendations require specific mechanisms to ensure that they are achieved. We shall now outline how we see each recommendation being developed and

who we would suggest should be responsible for the implementation of these recommendations. At the outset, we suggest that **four groups should be involved in the implementation of our recommendations**: **governments** (at both the national, European and international level), **the accountancy profession**, **business** (in terms of individual corporations as well as industry groups) and **non-governmental organisations**.

These groups have potentially important roles to play because presently they are implicated in the creation of an impasse with respect to FCA. In particular, governments and government organisations (both national, pan-European and international) are encouraging companies to develop FCA. At the same time, companies are not, as a whole, embarking on FCA and, where FCA is being attempted, many of the results are not in the public domain. Further, although the accounting profession was identified as being a possible champion of FCA, it has been all but inactive in the area. The accounting profession appears to be waiting for either its clients (that is, companies) or governmental pressure before it involves itself in FCA. As a result, each body that could champion FCA (governments, corporations and the accounting profession) is waiting for another body to take the lead, and so nothing substantive is happening. In order to move forward we would suggest the following.

The most obvious body to assist in the further development of FCA within Europe[92] (in the sense outlined in recommendations two and three) would appear to be an **EU institution** of some kind. The European Environment Agency, for example, has been developing assessments of the externalities arising from electricity production and from transportation and therefore may be a suitable organisation to foster the development and experimentation of more coherent FCA. While it was recognised by interviewees that the EC itself may not be in the position to take FCA forward (for funding and political reasons) it did seem necessary for them (or some organ of the European Union) to champion the further development of FCA. Indeed, one interviewee was quite blunt in this respect, saying that given the EC 'has suggested doing FCA … it should find some way to move that debate forward'.

Such a sentiment does not imply that an EU body must develop FCA on its own. We would suggest that, with adequate resources, a group of 'experts' from relevant disciplines and with appropriate experience (as explained in recommendations two and three above) could develop a coherent framework for developing FCA and for evaluating the information generated as a result. The EC is unlikely to be the only body interested in the 'findings' of such a group. International government (especially at the likes of Rio+10), national governments, industry associations, the accountancy profession (both in the UK and more widely), business in general and individual corporations would also benefit from the work of such a group. The funding of any such collaborative and multi-

disciplinary group should probably be split between these interested bodies.

At the same time (and in line with recommendation one), governments should be a great deal more proactive in championing mandatory environmental reporting as a precursor to, and in conjunction with, FCA. For example, if the United Kingdom, the Department for Environment Trade and the Regions' green house gases reporting guidelines were adhered to by all companies then data concerning at least a very small subset of the whole range of externalities would be in the public domain. Comprehensive environmental reporting, the first step towards identifying externalities (see chapter 4 for an outline of a four stage approach to FCA), would be achieved.

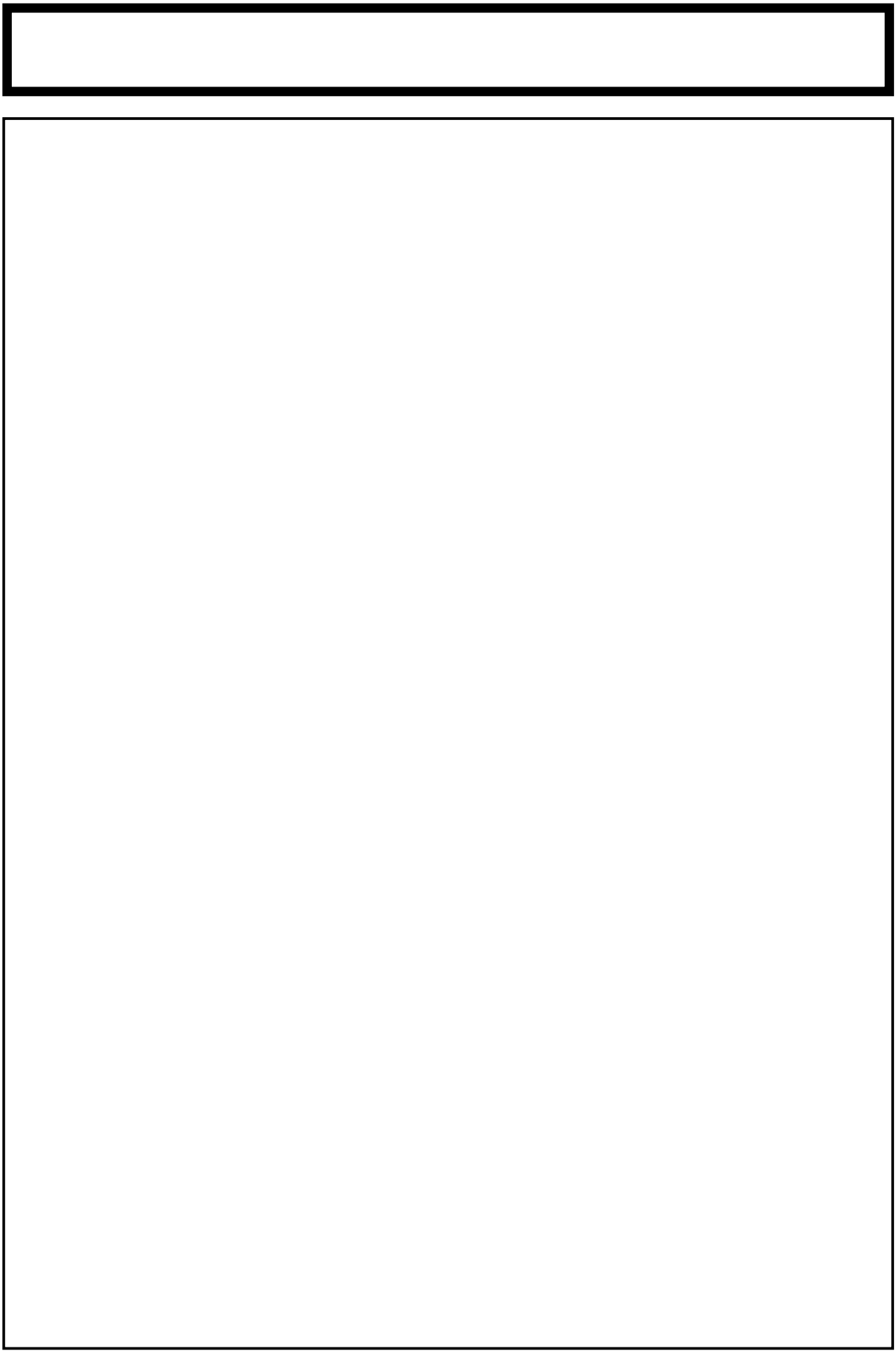
7.3 CONCLUDING COMMENTS

The resolution of the specific details of conducting FCA, of what FCA could yield with respect to insights into corporate activities, and of how FCA should be used within a policy framework, is some way off. It is clear, however, that FCA offers considerable promise as a tool to enable society to better understand the linkages between economic activity and the pursuit of sustainable development. Indeed, Popoff and Buzzelli (1993) suggest that 'when implemented correctly, full-cost accounting will improve environmental performance more than any other action, program or regulation in place today' (p. 7) and further, that FCA 'may well be the most important step down the path to sustainable development' (p. 8). It is, therefore, important that this monograph's consideration of FCA is not seen as some issue of marginal interest to society and the accounting profession. FCA drives to the core of what we currently do and questions the efficacy of those activities. In short, shadow FCA makes visible the current 'subsidy from society to business' (interviewee) and provides a glimpse of the distance we have yet to travel before economic activities could be environmentally (and socially) sustainable.
In addition, the potential importance of FCA to the discipline of accountancy should not be underestimated. FCA fundamentally questions a core aspect of accountancy – that of the accounting entity. FCA stretches the boundaries of the accounting entity to include (economic, environmental and by implication social) events that at present are not recorded, or that are incompletely or inaccurately recorded, within accounting records. The accountancy profession cannot ignore the possibility that events once thought to be external to the organisation will become internalised. In the absence of actual internalisation of externalities, the provision of externalities information in some form of 'satellite accounting' process seems a useful way forward.

Two final closing remarks are pertinent, the first relates to the issue of social externalities, while the second reiterates the key point of FCA. From the outset, we have sought to

maintain this project's focus solely on environmental externalities. Such a focus was dictated by the terms of the EC's FCA call. Given, however, that we are talking about sustainable development, it is intellectually and morally indefensible to ignore social externalities entirely. Interviewees noted that a 'full' full cost account would include social externalities. It was also noted, however, that if environmental FCA is in its infancy then social FCA is a subject area that does not appear to have been considered within the literature in this area or by corporations (with some exceptions). This is an area where future work is much needed and one that could and should be pursued along with recommendations two and three.

Finally, the end point of FCA should not be lost sight of. As Macve (1997) makes clear, the ultimate 'challenge for environmental costing is not just to increase the technical sophistication by which environmental factors are traced through activities, but to construct a new accountability that is linked to real incentives' (p. 196). FCA is not merely a technical exercise. At the end of the day it must be linked to changes in the functioning and primary aims of the economic system, such that the goal of sustainable development may be achieved. FCA is one tool that highlights the current unsustainability of our collective economic activities and provides an indication of the source of that unsustainability. Once that is achieved, the truly hard work of doing something about that unsustainability begins.



Appendix: Research methods

A.1 INTRODUCTION

The evidence used within this research monograph has been gathered from a number of sources, each of which uses a particular research method. This appendix sets out the methods used to generate the information presented in the main body of the monograph. Research methods are covered under two headings. First, prior research that relates to this work is reviewed, as it has provided evidence for this study. Second, the research methods used for this project are outlined and the reason for each approach is given. In addition, a brief description of those interviewed for this project and a description of the questionnaire is given.

A.2 PRIOR AND RELATED RESEARCH PROJECTS

While no research project stands alone, it is very much the case that this study draws from a number of other projects. In particular, a number of prior research projects in the area of accounting for the environment have touched upon the issue of FCA. These projects are introduced here to provide a backdrop to this project and also to provide a starting point for the current investigation.

The earliest work in which we[93] sought for evidence of FCA activity was in *Business Conceptions of Sustainable Development and the Implications for Accountancy* (Bebbington and Thomson, 1996). In the interviews that fed into that report, the role of FCA as an appropriate response to supporting environmental sustainability was mooted. A variety of responses were obtained from this inquiry and while some of these responses have been included in Bebbington and Thomson (1996) a number of additional quotes in this monograph are extracted from the interview transcripts from that study.

In a project closely related to that of Bebbington and Thomson (1996), Gray and Bebbington (1996 and see also Gray and Bebbington, 2000) interviewed a number of organisations about how they were approaching, or planning to approach, sustainable development. In addition to interviews, this project also involved sending a questionnaire to a number of companies spread over 19 countries. The questionnaire part of that research yielded 116 responses. A number of the questions contained within the questionnaire provided an insight into the issues addressed in this research monograph. In particular, question 9 within Gray and Bebbington (1996) asked respondents to indicate how familiar they were with a range of accounting techniques (which could be seen to be related to FCA) and whether their organisation was using these techniques. Specifically, the techniques asked about were:

(i) full cost accounting using the 'Tellus Institute approach' (see box 1.7, chapter 1)

(ii) full cost pricing as envisaged by the EC's *Fifth Action Programme*

(iii) the sustainable cost calculation as proposed by Gray, 1992 (see chapter 5, where the Manaaki Whenua project is reviewed)

and

(iv) net environmental value added calculations such as that done by BSO/Origin (see also chapter 5).

Question 10 also addressed the question of FCA, by asking respondents to indicate how important various accounting-related activities were in their organisation's move towards sustainable development. There was an option to site FCA as being important, as well as an option for the organisation to indicate whether or not they were doing something in this area. Bearing in mind the problems with the interpretation of the term FCA, and given that eight corporations said they were doing the sustainable cost calculation (when we knew none were), the responses to this question need to be treated with caution. For the purposes of this report we sought to investigate instances where respondents responded positively to the parts of both questions 9 and 10 relating to FCA. We consider that these responses would, *prima facie*, indicate that an organisation is familiar with and is undertaking, or is about to undertake, some form of FCA. For the majority of the corporations thus identified we have either interviewed them for this project (either face to face or via e-mail), we have reviewed their environmental reports (to ascertain whether any possible FCA experiment was in the public domain) or we have looked at their FCA experiments that are in the public domain. In this way we believe we have searched as widely as possible to identify the majority of experiments taking place using some sort of FCA method. One important 'discovery' from this part of the investigation was that many organisations equate FCA with the allocation of environmental costs to product costs, essentially a management accounting exercise that allocates actual (internal) costs more 'accurately'. Thus, while it was reasonable to infer that there was a fair amount of FCA activity taking place, much of this activity is not addressing external costs and is thus not FCA as we have conceptualised it here.

The third project that has been of crucial importance in the development of this research monograph was the collaboration with Landcare Research (New Zealand) Ltd/Manaaki Whenua. This work involved one of the researchers working closely with Manaaki Whenua to develop a form of FCA – the sustainable cost calculation. This work has been ongoing since 1996 and has provided practical insights into the problems and pitfalls

that arise with any attempt to determine fuller costs (see Bebbington and Tan, 1996, 1997 and Bebbington and Gray, forthcoming and Bebbington, 1999 and chapter 5). Further, the lessons learned from the practical attempt to develop an FCA method are used throughout this report.

In summary, while the above projects do not directly address the FCA questions that this research report is intended to address, they do touch on this area. They, therefore, provide some additional insights to those generated from this project. In addition, these projects provided a frame of reference for the work undertaken here and assisted the design of the research project. It is to this last point that this appendix now turns.

A.3 RESEARCH METHODS

A number of research methods have been adopted in order to generate the information used to write this monograph. Each method complements the others and each method has been used for a specific reason. These reasons and the methods used will be introduced below.

The main research method used was that of the unstructured interview. This approach was adopted because of the exploratory nature of the work being undertaken and the explicit desire to uncover why FCA was *not* being developed. Interviewees were asked questions from a larger list of potential research questions (the full list is reproduced in box A1.1). The choice of questions to ask each interviewee was dictated by the particular interests and experiences of that interviewee. Two subsets of research questions were developed. The first addressed issues that were viewed as arising from the policy context in which calls for FCA emerged. The second subset of questions was focused on investigating the accounting profession's responses to FCA itself.

Box A1.1: Interview questions

Policy related questions

- Why is FCA on the policy agenda?
- Where has interest in FCA arisen from?
- What can be achieved via the use of FCA?
- Why is FCA linked to the sustainable development agenda?
- Who will benefit from the development and application of FCA?
- Who will lose under the development and application of FCA?
- What other area is FCA related to (with special consideration of environmental taxes and subsidies)?
- Which policy instruments are likely to be favoured in the pursuit of sustainable development?
- What relative weight is likely to be given to FCA as a policy instrument?
- What possible links are there between environmental economics and FCA methodologies?
- Are you familiar with any FCA methodology?
- What is required before FCA can be implemented?
- What FCA experimentation is required?
- What kind of education is needed before FCA could be implemented?
- What is the likely time horizon under which a form of FCA would/could be developed and adopted?
- Are there industry specific issues with respect to FCA?
- What impediments exist to the development and implementation of FCA?

... continued

Accounting profession responses and priorities

- How have accountants become aware of FCA?
- With respect to the *Fifth Action Programme*, how do links between EU and FEE operate?
- Why was FCA linked to the accounting profession in the EU programme?
- Is FCA something on which the accounting profession is likely to have expertise?
- Is FCA a priority for the accounting profession?
- What does FCA entail?
- In what context do accountants identify with FCA? (Is it in the context of environmental accounting or via the sustainable development agenda?)
- What can be done to prepare the accounting profession/accountants for the advent of FCA?
- What timescale are we looking at for the development of FCA?
- What impediments exist to FCA development and implementation by the accounting profession?
- How do issues move from the general policy arena to being a priority for the accounting profession?
- Why do some policy issues get 'picked up' by the accounting profession while others do not?

Research methods (continued)

In total, 35 individuals were interviewed on a face-to-face basis. These interviews were conducted in the UK (with 13 individuals), mainland Europe (with 16 individuals) and in North America (with six individuals). Interviewees can be split into five main groupings: accounting policy makers (seven individuals), accounting practitioners (five individuals), members of business or business representative groups (six individuals), economists and people working in related areas (five individuals) and other policy makers (12 individuals). At one interview all three researchers were present, at five of the interviews two researchers were present and at a further 22 interviews only one interviewer was present. At each interview detailed notes were kept of the proceedings. These were written up and form the basis for the observations made in the monograph.

In addition to those interviewed face to face, 15 other people with an interest in and experience of implementing FCA were also 'interviewed' via e-mail. These interviews usually took the form of extended e-mail conversations about FCA and the individual's experiences of the technique. Being able to conduct these conversations enabled this work to have a far broader geographical spread than it may otherwise have had. Fifteen conversations were held via e-mail (eight individuals were in North America, four in the UK and three in mainland Europe). These individuals were involved in government and other policy arenas (four), the accounting profession (three) and in business (eight).

As a result, we had in-depth contact with some 50 individuals who spanned an array of positions within the FCA debate. Further, given FCA is a relatively rare phenomenon this spread and number of interviewees has enabled us to be relatively confident that we have interviewed the majority of individuals involved in FCA experiments that are, to some extent, in the public domain. Indeed, individuals involved in experiments that are not in the public domain have also been interviewed.

It is relevant to note at this stage that, even though we guaranteed confidentiality to interviewees (both the face to face interviews and the e-mail conversations), many of these people were at pains to emphasise how sensitive their organisations were about details of their experiments with FCA being in the public domain. Indeed, several interviewees were sensitive even to information that their company was experimenting with FCA being in the public domain. This reticence to talk about the technique, and the sensitivities involved, may well contribute to the apparent low level of FCA experiments that can be seen in the public domain. Over the time period of the project, however, it appeared that this level of sensitivity has declined.

As work on this project progressed, it became apparent that some aspects of the investigation were amenable to exploration via the use of a more structured approach. In particular, it became apparent that the answers to one of the research questions of the

monograph (what is the accounting profession doing with respect to FCA?) was yielding the answer: 'nothing much to speak of'. The appropriate research question then became: 'what stops the accounting profession from starting to address FCA?' We used a questionnaire to investigate this issue and also to provide further assurance that we had captured all the FCA activity taking place under the auspices of professional accounting bodies in Europe. The questionnaire was sent to members of FEE. At the time the questionnaire was distributed (March 1999) there were 38 member bodies of FEE. Four member bodies were excluded from the questionnaire part of this work on the basis that we had interviewed them, or a representative of their institute, already. Box A1.2 presents the responses received. In total there was a response rate of 61%, with 45% usable replies.

Given the relatively small number of replies to the questionnaire, detailed statistical analysis has not be attempted. Rather, the patterns of response as well as specific responses have been used within the relevant chapters of the monograph. A brief summary of responses to some of the questions, however, is relevant here in order to place the responses into some sort of context.

Box A1.2: Responses to the FEE member body questionnaire

Completed questionnaires	15
No questionnaire returned but a letter indicating that the accounting body is not doing anything	5
No response	13
One completed questionnaire represented a response from two accounting bodies	1
Total possible responses	34

In the first instance, it was apparent that any picture that can be sketched by the responses to the questionnaire would be the most optimistic picture of what is happening in the field, as it is the larger institutions that have responded to the questionnaire and those that are more active in the environmental accounting field (drawn from responses from question 2). The responses to question 3 (familiarity with publications linked to the sustainable development debate and professional publications that have addressed FCA) indicated that the questionnaire respondents were not at all familiar with most of the background material to FCA. The only two publications where there was widespread familiarity was *Accounting for the Environment* (Gray et al., 1993) and the IFAC publication on *Environmental Management in Organizations: The Role of Management Accounting*, (IFAC, 1998). From these responses we formed the impression that the current research monograph would have to have a strong pedagogic focus if the accounting profession were to move towards FCA (see chapters 3, 4 and 5 in particular).

Question 4 elicited a similar pattern of response to that from question 3. The bulk of the questionnaire respondents had not heard of the FCA experiments that are in the public domain, with the exception of the BSO/Origin experiment, with which just under half the respondents claimed to be relatively familiar. The lack of awareness of FCA experiments prompted us to include the material in chapter 5 and also dictated the level of detail that we provide on the experiments covered. As could be expected, given the apparent lack of awareness of FCA, none of the institutions surveyed were actively undertaking FCA related research.[94] As a result, the reasons why an investigation of FCA is not taking place (the subject of question 7) is pertinent (see box A1.3), as is an appreciation of the factors cited by respondents as being likely to cause their institutions to become involved in FCA (the subject of question 8 – see box A1.4).

Box A1.3: Summary of the number of responses for Question 7 (impediments to the development of FCA)

Factors that prevent exploration of full cost accounting	Relative importance (5 = very important, 1 = not at all important)				
	5	**4**	**3**	**2**	**1**
Benefits of this technique to institution is not clear	3	6	0	2	1
Knowledge and experience in this field is lacking	4	3	2	2	1
Not regarded as an important issue by institution members	5	3	0	3	1
Not something which my institution considers of relevance to accountants at the present time	2	4	3	1	2
Not something which my institution considers of relevance to business at the present time	0	2	7	1	2
Lack of guidance or leadership on this issue from the international accounting profession	0	2	4	4	2
Lack of guidance or leadership on this issue from governments	0	4	5	1	2
Too many other pressing issues to spend time on this area at present	6	4	1	0	1
Lack of clear linkage between full cost accounting and generally accepted accounting practice	3	4	5	0	0
Lack of specific deadlines for developing thinking in this area	0	1	4	6	1

Box A1.4: Summary of the number of responses to Question 8 (factors that would encourage accounting institutes to develop FCA)

Factors that would encourage involvement in full cost accounting debate	Relative importance (5 = very important, 1 = not at all important)				
	5	4	3	2	1
Calls from industry for the accountancy profession to develop full cost accounting	–	–	3	4	5
Specific deadlines for development of full cost accounting in EC regulations	–	1	4	4	3
Better information of what full cost accounting entails	2	3	6	–	1
Clearer demonstration of the benefits of full cost accounting	1	1	4	4	2
Existence of clear methods for full cost accounting	1	–	4	3	4

Issues and observations that emerge from these two tables are developed in chapter 6. The raw data, however, is presented here, as it comprises the most relevant material from the questionnaire.[95]

A.4 CONCLUDING COMMENTS

In summary, the purpose of this appendix is to outline the research methods undertaken in the course of the production of this research monograph and to indicate the extent to which prior studies conducted in related areas have fed into this project. In addition, the research methods undertaken have been outlined. In summary, the monograph draws from 50 interviews and 20 questionnaire responses. Further, a brief summary of the pattern of responses to the questionnaire survey conducted has been presented in order to support the discussion of the body of the research results in chapter 6.

End notes

1 The European Commission is one of the European Community (now the European Union, EU) institutions created under the Treaty of Rome. Among the more important functions of the EC is its role as an initiator of EU legislation and as an enforcer of EU law against those Member States which breach EU law. The Commission is assisted by a staff of civil servants organised in Directorates General (DGs) with DG Environment being responsible for environmental affairs.

2 The EC's *Sixth Action Programme on the Environment* was published in 2001. This Programme notes that the Fifth Action Programme 'orientations remain priorities' (p. 10). In addition, it makes several oblique, but no direct, references to FCA. It is possible to infer from this that FCA remains a priority of the EC. Indeed, the EC note that 'many of the ... measures proposed in the Fifth Programme remain valid, but they are largely a question of implementation on the ground' (p. 67).

3 Briefly, the EC (1995) define externalities as arising: 'when the social or economic activities of one group of persons have an impact on another group and when that impact is not fully accounted for by the first group' (Vol. II, p. 413).

4 This is not to suggest that a non-capitalist based economy would not yield similar results. Indeed, Redclift (1987) suggests that neither 'neo-classical or Marxist economics take a sufficient account of the environment' (p. 199). Likewise, Capra and Spretnak (1984) note that the 'global obsession with growth has resulted in a remarkable similarity between capitalist and communist economies. The two dominant representatives of these so-called opposing value systems, the United States and the [former] Soviet Union, ... [were] in reality not all that different. Both ... [were] dedicated to industrial growth and hard technology, with increasingly centralized and bureaucratic control, whether by the state or by so-called private multinational corporations' (p. 84).

5 Twenty years after the Stockholm conference, Rio provided the focus point for signing two legally binding conventions (the *Framework Convention on Climate Change* and the *Convention on Biological Diversity*), and resulted in the publication of a statement on *Principles of Forest Management,* the *Rio Declaration on Environment and Development* and *Agenda 21*.

6 *Agenda 21* (an action plan for achieving sustainable development in the twenty first century) provides the most guidance on the implications of sustainable development. Indeed, Grubb et al., (1993) suggest that *Agenda 21* is, 'perhaps best seen as a collection of agreed negotiated wisdom as to the nature of the problems, relevant principles, and a sketch of the desirable and feasible paths

towards solutions, taking into account national and other interests ' (p. 17).

7 It is impossible to talk in a sensible manner about the global state of the environment for two reasons. First, the environment encompasses a huge array of individual characteristics, some of which may be in equilibrium and others may be improving/worsening (however that may be measured) over time. Second, any one environmental characteristic may be in a different state in different parts of the globe. What does seem apparent (and on this there is international consensus) is that the state of the environment, for many elements, is incompatible with sustainability. Ekins (2000a), for example, notes that for the Netherlands (where modelling of national environmental quality is much more advanced than elsewhere) the years to sustainability (on the basis of present trends) vary 'from 8.5 years for ozone depletion to 102 years for waste disposal, to infinity for disturbance (which has a worsening trend)' (p. 3).

8 See especially Sachs et al., (1998) who consider this issue.

9 It may also be possible that consumers would avoid certain products and services altogether or would reduce their level of consumption (either in general or of particular products or services) if there were a financial incentive to do so. Alternatively, if consumers were unconcerned about the environmental impact of a product they could continue to consume it, but it would cost them more to do so.

10 While the EC only discusses environmental FCA it is logical (and indeed consistent with sustainable development principles) to expand discussion of externalities to both social and environmental impacts.

11 These costs are not necessarily in monetised form. For example, if the collective activities of an industry cause a species to go extinct then this external impact is unlikely to be reflected in anyone's financial statements. In this case, the externality is not recognised in financial terms by the current economic system. The externality may, for example, be discernible if a nation provided information about the level of species extinction over a particular time period.

12 This option is graphically displayed in Ben Elton's play *Gasping* (Elton, 1997) which can be highly recommended in this context.

13 This experiment will not be explicitly covered in this monograph, but see Johnson (1979) for more details.

14 Which in the context of increasing output may still give rise to increases in material use and environmental impact.

15 One such extensive study, which attempted to quantify the externalities arising from energy production, is the ExternE project (see EC, 1995). While the estimates generated from this study have been subject to debate (see, for example, Maddison, 1999) it is still fair to say that much is known about the energy externalities. The ExternE project is ongoing.

16 See, for example, Puxty (1986 and 1991), Tinker *et al.,* (1991), Cooper (1992) and Everett and Neu (2000).

17 The monograph is not going to rehearse these arguments, but see, for example Gray and Bebbington (2001).

18 See, for example, Gray (1992), Bebbington and Thomson (1996) and Gray and Bebbington (1996).

19 In 1997 the EC published a progress report and action plan on the *Fifth Action Programme*. In reviewing progress on 'getting the prices right' the report noted that prices of resources within the EU are 'not "right" yet, because the costs to the environment are not usually integrated in them' (EC, 1997, p. 106). Further, the report noted that while 'interest in and the use of economic instruments has increased ... they proved to be more difficult to introduce than envisaged' (EC, 1997, p. 109). The lack of progress on the FCA target was not specifically discussed in the review document.

20 Since the formulation of the *Fifth Action Programme*, and since the interviews were conducted for this project, the EC has renamed and reorganised its directorate generals. The work of DG XI has been taken over by the Environment Directorate General while the relevant part of DG XV's work is now found in the company law, accounting and auditing part of the Internal Market Directorate General.

21 These two DGs have different political power within the EC. In particular, DG XI is the politically weaker of the two and has 'historically suffered from staff and budget shortages' (Baker, 1997, p. 102). The DGs also perceive the overall goal of the EC slightly differently. From our interviews it was clear that interviewees in DG XV saw the achievement of a harmonised internal market as being the primary objective of the EC. In contrast, DG XI representatives saw this goal as being a means to an end, and not an end in itself. Further, they saw the maintenance of environmental

integrity as being the bedrock on which the whole of Europe sits. Such contrasting views are to be expected in such a large and diverse institution as the EC.

22 Our understanding of the policy-making processes and agendas of the UK Government is hazy. Although we attempted to interview people from potentially influential policy bodies within the UK Government about FCA, we were consistency blocked by various 'gatekeepers'. As such, there may be FCA-related initiatives under consideration. If, however, such possibilities do not appear in a publicly available forum, we have no way of knowing of their existence. Further, we do not know how policy makers view the EC's FCA proposals.

23 ACBE provides a forum for dialogue between Government and business on environmental issues. Members are jointly appointed by the Deputy Prime Minister and the Secretary of State for Trade and Industry.

24 The Panel's remit is to advise the Government on strategic issues that arise from the sustainable development agenda.

25 The purpose of the Round Table is to bring together various groups who have an interest in the environment and sustainable development issues. As from June 2000 this body has been reconstituted as the Sustainable Development Commission.

26 The Round Table's work included championing economic instruments and the Sustainable Development Commission has indicated that this will be an area for it to further support. The use of economic instruments is related to FCA (see chapter 3).

27 The work of this DG, however, may touch upon issues of FCA. For example, the EC's (2000) *White Paper on Environmental Liability* makes specific reference to the internalisation of environmental costs under the polluter pays principle. Such a reference is, however, tangential to the main thrust of the White Paper.

28 Adapted from Berry and Failing (1996).

29 Similar material has been produced by Global Environmental Management Initiative (1994) and Business Council for Sustainable Development (see Andraca and McCready, 1994). The latter, while being focused on cost internalisation does not provide a specific idea of how this could be achieved. Rather, the paper is by way of an introduction to the Business Council for Sustainable Development's (BCSD – now known as the World Business Council for Sustainable Development) views on economic instruments.

30 See also the EC *White Paper on Environmental Liability* (2000), which applies these concepts to the issue of liability for pollution.

31 Under the 1985 Vienna Convention for the Protection of the Ozone Layer 26 International Legal Materials (1987) 1529 and the 1987 Montreal Protocol (to the Vienna Convention) on Substances that Deplete the Ozone Layer 26 International Legal Materials (1987) 1550 as amended and EC Regulations 3322/88 and 594/91.

32 Under the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 36 International Legal Materials (1997) 1.

33 See, for example, 'Meacher's Failed Bid for Recycling Cash in Landfill Tax Review' 1999 ENDS Reports 290:23, see also 'MPs Press for Landfill Tax Increases and Reform of Tax Credits Scheme' 1999 ENDS Reports 294:34 and 'Concessions on Fuel Duty and Climate Levy Spell Trouble on CO_2' 1999 ENDS Reports 298:22.

34 Interestingly Ogus (1994, p. 252) notes that some taxes, such as the petrol levy, have been converted from purely revenue-raising to having an environmental purpose.

35 See the following speech to the House of Commons by Gordon Brown, Chancellor of the Exchequer on 9 November 1999: 'Since 1997, the [fuel] escalator has been needed to reduce the £28 billion deficit that we inherited, as we put in place our new measures to protect the environment. Those who have opposed the escalator – including some of those who originally imposed it – have to explain how, without it, they would have cut the deficit, made money available for public services and met our environmental commitments in the past two years. Having cut the deficit and introduced our new environmental policies, we are now in a position—instead of the pre-announced 6 per cent. Escalator – to make our decisions Budget by Budget, with the following commitment: if there are any real terms rises in road fuel duties, they will be lower and the revenues will go straight to a ring-fenced fund for the modernisation of roads and public transport.' (Hansard Vol. 337 Cols. 889-890).

36 Under s.50 of the 1981 Act, guidelines have been made laying down standard rates of compensation where management agreements are entered into to protect sites of special scientific interest. See also the following Statutory Instruments: SI 1994/1291, SI 1994/1292, SI 1994/1293 as amended by SI 1995/2871 and SI 1995/2891 on setting agricultural land aside for 20 years.

37 See 'Emissions trading proposals keep climate change policy on the move' 1999 ENDS Reports 297:19. See also 'BP sets the ball rolling on CO_2 emissions trading' 1998 ENDS Report 285:5.

38 See, for example, the prosecution of Shell in 1990 for a major oil spill into the river Mersey.

39 This section draws heavily from the work of Paul Ekins (2000a) from the Forum for the Future.

40 We recognise that this is an artificial assumption but have attempted to keep the example simple. In addition, we note that this is a 'disaster' scenario of sorts. The same principles could be employed for ongoing external impacts – albeit that some of the categories of cost would not be relevant to such an example.

41 Upchurch (1998) provides a typical management accounting definition of a cost objective as being 'the target or purpose at which such attribution [that is, the attribution of costs] is aimed' (p. 35).

42 For example, the New Zealand Ministry of Transport (1996) examined the environmental externalities arising from land transport in the entire country. See also, European Environment Agency, 2000b.

43 It is important to note that this analysis only applies to individual entities, not to the whole system. For example, while the impact of carbon emissions from the activities of one entity will probably tail off, the cumulative impact of carbon emissions of a whole economy may well be significant.

44 The only exception to this general rule may relate to substances produced that are toxic at any level.

45 As noted before, this will lead to less accurate impacts data unless average flight distances and type of aircraft flown by British Airways are typical of the activity being reviewed.

46 The best source of data on this experiment remains the explanations contained in BSO/Origin's Annual Reports over the period reviewed. In addition, this experiment is very similar to Abt's experiment with social accounts in the mid-1970s (see Johnson, 1979, p. 55–65).

47 In this respect the experiment contributes to the accountability/transparency approach to FCA outlined in chapter 1.

48 See chapter 3, which explains in more detail the various approaches to monetisation of externalities. The BSO/Origin experiment uses several approaches to monetisation, but primarily uses an avoidance cost approach.

49 This approach assumes that direct environmental expenditures internalise some of the environmental cost and that the imputed costs embrace both internal and external costs.

50 Until 1993 this figure was mentioned in the Annual Report. After that date it has been estimated from the data contained in the Annual Report.

51 This approach is similar to the idea behind the sustainable cost calculation – see below.

52 That is, costs are only ever fuller costs not full costs. It is important to keep in mind that environmental tax figures do not necessarily capture the full cost of an externality. In addition, the changing of the cost figures illustrates the point that any estimation of full costs in only provisional as our current knowledge about how activities impact upon the environment is also provisional.

53 More information about this experiment can be found in Rubenstein (1994).

54 Box 5.3 to 5.6 are extracted from Rubenstein (1994).

55 The USEPA (1996) case study on Ontario Hydro provides a comprehensive introduction to Ontario Hydro's work as does chapter 4 of CICA (1996).

56 Maurice Strong was the Secretary General of the Stockholm conference in 1972, served on one of the panels that reviewed the *World Conservation Strategy*, was a commission member of the body that produced the *Brundtland Report* and was the Secretary General of the Earth Summit in Rio.

57 Ontario Hydro were at pains to point out that for them FCA is 'not THE decision-making process, not full cost pricing, not an accounting system, and does not require absolute or complete monetization of all internal and external impacts' (USEPA, 1996, p. 8).

58 Ontario Hydro's FCA practices were set within an organisational structure that focused on achieving sustainable development. For example, a sustainable energy development task force was created with the FCA being part of the work of that task force.

59 Further information about this project (which is ongoing) can be obtained from Jan Bebbington directly. There are at present four pieces of work reviewing the experiment: Bebbington and Tan (1996, 1997), Bebbington and Gray (forthcoming) and Bebbington (1999). Further, it is envisaged that more material will be developed as the experiment unfolds. In addition, Manaaki Whenua published its first report on sustainable development in 2000. This can be found at: www.landcare.cri.nz.

60 Manaaki Whenua is a New Zealand research institute which undertakes 'business research, consultancy, technical services and technology development to develop and transfer, to public and private sector clients, ecologically and socially sustainable policies, management strategies and systems for land-based natural resources' Manaaki Whenua, (1996) p. 5.

61 International air travel has only been accurately recorded for 30.6.98 onwards.

62 Briefly, these impacts have been estimated from a variety of data sources. For example, the Electricity Corporation of New Zealand's accounts have been used to estimate the approximate amount of fossil fuel generated electricity used, the UK's National Power accounts have supplemented this analysis by providing emissions data for fossil fuel electricity. Resource use and emissions arising from vehicle travel are derived from the New Zealand Government's Land Transport Price Study and air travel resource use and emissions are derived from data given in British Airways' Environmental Reports. The use of non-New Zealand data will have an impact on the accuracy of the numbers calculated. Where possible, New Zealand data have been used but given the relative dearth of environmental reporting by New Zealand companies this has not been possible in all instances.

63 These numbers are very much estimates in places. The trend of this data is perhaps more important than the absolute amounts.

64 This figure was extracted from a decision of the New Zealand Environment Court, the 'Stratford Decision', where one of the conditions for issuing a consent for the construction of a fossil fuel power plant was that a carbon sink was to be created. The cost of creating such a sink by planting trees was estimated by the Court. As

there are physical limitations on planting (and maintaining) carbon sinks, they can only ever be a partial solution to remedying CO_2 emissions.

65 NZ$100 represents the carbon charge that would be necessary in order to stabilise net carbon emissions at 1990 levels by about 2010. This number has been extracted from the discussion document of the working group on CO_2 policy who reported to the New Zealand Government in June 1996.

66 NZ$200 represents the carbon charge that would be necessary in order to stabilise gross carbon emissions at 1990 levels by about 2010. This figure is extracted from the same source as before.

67 The practice of shadow pricing creates a figure that estimates (on a variety of bases) the externalities arising from pollution. In the example here we have drawn shadow prices from the Centre for Energy Conservation and Environmental Technology in The Netherlands which suggests that a shadow price for NOx emissions would be £4 per kilo of NOx produced. This translates roughly in NZ$12 per kilo.

68 These locations represent Manaaki Whenua's head office site and the four largest activity centres. Travel between these locations accounts for 68 percent of Manaaki Whenua's domestic travel on the basis of distance.

69 No overnight travel options, such as the British sleeper train service, exist in New Zealand. Travel has therefore been divided up into sensible day size chunks of time with overnight stops built in.

70 There is also a train service from Wellington to Auckland which takes the same time as a bus but which has a higher energy intensity. As a result the busing option is included here.

71 It is highly unlikely that if Manaaki Whenua staff travelled by bus and ferry that they would just sit back and relax. Rather, it is likely that they could work while travelling, provided the bus/ferry were modified to make this possible (at present these modes of transport are not conducive to working). This potential to use the time spent travelling has not been built into calculations at present.

72 Options were drawn solely from motorised vehicle options – the use of a bicycle is possible but has not been considered here.

73 There are three main sources of information on this experiment: Howes (1999, 2000) and ENDS Report, 304, (2000).

74 This covers three production sites in Europe: Scherpenzeel, Shelf and Providence Mills and Graigavon.

75 Volatile organic compounds arise from various coating and backing processes which are necessary for making carpet tiles.

76 The final two areas of this project (the maintenance of biodiversity and the management of cultural landscapes) were evaluated in non-financial terms. For example, the maintenance of biodiversity was evaluated by comparing habitat inventories created at the start and end of each year.

77 The American Institute of Chemical Engineers has published a manual outlining its total cost assessment methodology. This can be obtained from the Centre itself or downloaded from its website (www.aiche.org/cwrt). All page references in this section are to their manual.

78 At one stage CWRT's web site listed Eastman Chemical, Monsanto, SmithKline Beecham and Du-Pont as collaborating firms and Bristol Myers Squibb also notes that it is participating in the work in its 1999 *Progress Towards Sustainable Development Report*.

79 In the mid-1990s Monsanto structured its pursuit of sustainable development around seven teams, each of which worked on different aspects of sustainable development. One of these teams, the full cost accounting team, sought to devise a way to account for the environmental and social costs of Monsanto's business activities. In the first instance it appears that this team devoted itself to linking actual expenditures with particular products. There were, however, hints that external costs could be considered as part of this team's mission. Unfortunately there is no detailed work, which we are aware of, in the public domain as to how far this team's work developed. Their work was concluded when Monsanto was restructured in 1997.

80 These costs are already real in the sense that they are incurred or borne somewhere within the economic, social or environmental system. At this stage, however, they are not necessarily real for a particular organisation because there are no cost implications for that organisation. We use the term 'real' because this is how interviewees distinguished these costs.

81 Given the centrality of energy production to the pursuit of sustainable development, it should come as no surprise that the most detailed FCA assessments within the economics literature have been on alternative electricity generation methods. See, especially, the ExternE project (EC, 1995). In addition, the external costs of transportation have attracted attention too (see, for example, European Environment Agency, 2000b).

82 It is likely that this information is readily available for Dow Chemical Company, the organisation studied by Popoff and Buzzelli, given the time elapsed since this statement was made.

83 For example, the electricity, oil and gas, and chemical industries spring to mind.

84 One interviewee stressed that we should not 'mention the specifics … as I do not know the sensitivities of all the corporations involved' and went on to say that 'I would hope that we can publish some of this stuff, but I don't know when or how much'.

85 'Good' in that it reflected, in this individual's mind, the trade-offs that were encountered in day-to-day working life.

86 It could be suggested that within the UK the Association of Chartered Certified Accountants and/or the Chartered Institute of Management Accountants would be the most likely to do so. Their ability, however, to develop FCA without the involvement of other bodies would seem to be limited (see below).

87 Indeed, as noted in chapter 1, the FCA requirement had to be 'cleared' by DG Internal Market before it could be included in the *Fifth Action Programme*.

88 It is worth noting that FEE's consideration of environmental issues began in 1992 (see Collison and Slomp, 2000). As is apparent from the Collison and Slomp paper, FEE's work has often been in response to specific requests for input from the EC.

89 It was suggested to us that this is why the accounting profession has, for example, been active in developing its expertise in the area of assurance services.

90 Interviewees also suggested that the process by which presidents are appointed minimised the possibility that a 'radical' could make their way to such a position. FCA (and social and environmental accounting generally) was seen to be a radical area for the majority of accountants in practice.

91 Sustain is an alliance between the National Food Alliance and the Sustainable Agriculture Food and Environment Alliance, which campaigns for better food and farming. Sustain was formed in June 1999 and information about it can be found at www.sustainaweb.org. Put simply, their food miles campaign is aimed at increasing awareness of how far food has travelled before reaching the point of purchase and the impacts of moving food over large distances.

92 Given the *Fifth Action Programme* focused on the EU our recommendations are phrased within this political context.

93 'We' in this context refers to researchers on this particular project, either alone or in conjunction with other researchers.

94 One respondent suggested that their institute was involved in a number of FCA related initiatives. As far as we can ascertain these initiatives relate to 'greening' national accounts rather than an organisational centred FCA, although it may be that we have totally misunderstood the questionnaire respondents intent.

95 A copy of the questionnaire used may be obtained from the authors.

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