Key Results

Agreement model:	Negotiated energy agreement of 4 year duration as a potential climate change abatement instrument. Identification of actions required to bring participating firms to Best International Practice
Three types of agreement tested:	1. Technology agreement (Thermal energy) 2. Collective agreement (Pharmachem sector) 3. Individual agreement
Approach:	Detailed energy audits by independent auditors Negotiation and agreement of economic and technical criteria
Payback criteria agreed:	Maximum 5 years (all three agreement types) (business as usual typically around 1.5 years)
CO_2 savings within agreements:	17.1% (technology agreement) 16.4% (collective agreement) 5.4% (single-company agreement)
Average agreement transaction costs:	Approximately €1.10/tonne CO_2 abated
Likely future market for Agreements:	Approximately 650 firms
Potential overall abatement from full agreements measure:	640,000 tonnes CO_2 for whole sector

The pilot programme has established the viability and potential efficacy of a negotiated agreements measure as part of climate change policy for Ireland. It can achieve greenhouse gas abatement impacts significantly beyond those likely to arise from a tax alone. It can protect competitiveness by embodying economic tests in the requirements placed on firms, and by offering a tax exemption structure for participating firms. Firms view the approach as desirable, and are willing to commit to abatement investments with much longer payback periods than business as usual.

SEI gratefully acknowledges the contribution made to the project by the 26 participating companies. Without this contribution, the pilot would not have been possible.

SEI is also grateful to IBEC, IPCMF and all other bodies that contributed with advice, feedback and assistance at various points in the pilot project.

Executive Summary

Introduction and background

There is considerable potential for emissions reductions within the industrial sector through improved energy efficiency. A reduction in energy consumption leads directly to a reduction in greenhouse gas emissions (particularly carbon dioxide CO_2), and for this reason Ireland's National Climate Change Strategy (NCCS) includes a suite of measures aimed at achieving a significant reduction in both electrical and thermal energy use in industry. The distribution of energy use within the sector is very uneven – with 18% (814 firms) out of a total of over 4,500 firms accounting for 90% of total industrial consumption. Nonetheless, there is potential for emissions reductions throughout the industrial sector.

The NCCS proposes the introduction of a carbon/energy tax on all fossil fuels. In order to both maximise the emissions abatement benefit of such a tax and to mitigate its negative impact on industrial competitiveness, the NCCS also proposes a series of negotiated agreements with industry, in which participating firms agree to measures to reduce emissions in return for exemption (in whole or in part) from the tax. Such agreements are already in place in a number of EU Member States, with each adopting somewhat different approaches, depending on the structure of industry and the circumstances within which industry has to operate. Development of an agreements framework must take account, not only of the specific needs of industry and the nature and size of the challenge to meet Kyoto emissions targets, but also of the imminent introduction of an EU emissions trading scheme. Emissions trading is liable to exclude many of the larger and more energy-intensive firms from a taxation – and hence probably an agreements – framework.

This report sets out the context, aims, methods and findings of an 18-month programme to develop and evaluate a series of notional negotiated agreements developed specifically for Irish conditions. It is intended as a contribution to policy understanding and debate, and to informing the pursuit of a least-cost path to achieving the goals of the NCCS.

The SEI pilot negotiated agreements project

In late February 2002, SEI commenced a pilot programme to develop and test a framework of negotiated agreements suitable for conditions in Ireland. Three different types of agreement were tested:

i A horizontal agreement that could potentially be applied on an industry-wide basis, addressing a specific energy technology in use across industry, irrespective of sector. The SEI pilot addressed the field of thermal energy systems (hot water and steam production, distribution and recovery). Fifteen companies from a variety of sectors participated in this strand of the pilot.

ii A collective agreement with a grouping of companies from the same industrial sector, addressing common elements of energy end-use technologies within that sector. For the pilot, a group of 10 companies from the chemical/pharmaceuticals sector was assembled.

iii A pilot agreement with one firm whose annual energy consumption is exceptionally high relative to Irish industry generally, addressing key aspects of energy use peculiar to that firm's specific technologies and processes. The company participating in this strand of the programme was Aughinish Alumina Ltd.

In line with recommendations in the report on energy taxation and negotiated agreements prepared in 2002 for Forfás by Indecon International Economic Consultants in association with London Economics, the pilot programme tested action-based agreements, involving a process of identifying the investment and management actions required to bring a firm from current practice to Best International Practice (BIP) on energy efficiency. Identified actions depend on what has already taken place at the site, with more advanced firms required to take fewer additional steps, and with all proposed actions being required to pass technical and economic evaluations.

The aim of the pilot programme was to develop agreements in a collaborative manner with the participating companies; to test these agreements for

acceptability; and to explore their likely impacts, costs, efficiencies and interactions with issues such as competitiveness and their ability to meet the guiding principles set out in the NCCS. Emphasis was placed on simulating and testing the processes involved, information needs, and capacity and resource requirements. The pilot agreements were developed with, and agreed by, the industrial participants. However, the programme did not involve any formal commitment to proceed to implementation of the agreed actions.

Many, though not all, of the participating companies were already members of SEI's Large Industry Energy Network (LIEN). The fact that these companies already knew one another and were familiar with SEI created an initial climate of trust and collaboration.

It was the intention in planning the project to report the results in mid-2003, so that they could help in the formulation of policies concerning taxation and negotiated agreements.

The research process

Overall approach

Prior to commencement of the project itself, SEI engaged in discussions with industry via the LIEN and through briefing sessions and meetings. A collaborative approach was taken throughout. Other key stakeholders, such as the relevant government departments, were consulted and kept informed.

Selection of participants

To ensure wide participation, SEI published a call for expressions of interest in participation, both for potential participating industrial sites and for consultants who might contribute in a variety of ways to the implementation of the programme. A key group among the latter was energy auditing companies, needed to conduct detailed independent reviews of participating sites' current energy technologies and management systems, and to identify all potentially applicable energy technologies needed to advance firms to BIP.

The expression of interest process was followed by a series of one-to-one and group meetings, leading to agreement to participate by 26 sites across the three pilot strands. Arising from the call for consultants and from additional consultation with the industrial sites, 23 consultancies were made available to the sites as possible energy auditors. A further four consultancies were engaged by SEI to provide strategic and technical advice.

Energy auditing within participating sites

A key element in the process was the conduct of high quality, independent energy audits within the participating sites, in order to assess current technologies and practices, and to identify all possible means by which sites could advance towards BIP. In order to ensure a comprehensive audit, and also to ensure consistency in approach and reporting, detailed audit specifications (templates) were developed for each of the three project strands. This was done with the assistance of FES (formerly ETSU, UK), and in close consultation with the sites themselves. FES was also engaged to carry out an independent quality assurance function throughout the auditing process.

Sites selected their own auditors from the agreed panel, with checks by SEI to confirm the quality of the selection process. Audits were carried out in each of the participating sites, and each audit resulted in an audit report. Each audit report included an assessment of the potential for emissions reductions, and a recommended list of actions to be taken, together with a brief assessment of the investment costs and simple payback periods for each of the recommended actions. The costs of the energy audits are summarised in Table 1 (see page v).

The audit results were analysed prior to the negotiation phase of the project and, in the technology and collective strands, all the possible actions identified across the set of audit reports were collated into a full list, to become the subject of further discussion and negotiation.

Agreement type	Typical audit cost (€)	Average cost of audit as a percentage of firms' annual energy expenditure
Technology	7,000	2.3%
Collective	16,000	1.5%
Individual	90,000	0.14%

Table 1: Typical audit costs for each agreement type

Assumed taxation structure for negotiation purposes

In order to conduct a set of negotiations in circumstances where no policy decisions had yet been taken with regard to the levels or structure of a carbon/energy tax, it was necessary to draw up a 'notional' set of assumptions against which to negotiate. These assumptions are fully described in Appendix 1 of the main project report. In summary, the assumptions included a taxation rate of €17.50 per tonne CO_2 on all energy streams, and a rebate or tax exemption of 80% of tax liability for compliance with the terms of the agreement. For simplicity, the rate of €17.50 was to be applied in each year of the agreement (i.e. no phasing-in of tax), and the term of the agreements was four years.

Negotiation process

Within each strand, negotiations were conducted by two to four members of the SEI project team. The firms within the collective and technology strands appointed four of their members to act as a negotiating team on their behalf. Within the collective agreement, one member of the negotiating team was nominated by the Irish Pharmaceutical & Chemical Manufacturers Federation (IPCMF). Within the technology agreement strand, two of the negotiating team members were members of the IBEC Energy Committee. For the individual agreement, Aughinish Alumina Ltd nominated a team from its senior management group to act as negotiators.

Negotiations took place over a period of approximately three months in the spring of 2003. Key negotiation issues included:

- Validation of audit results, and testing of the projected costs and applicability of each of the actions recommended by the auditors;
- The technical and economic criteria by which each proposed action would be evaluated for inclusion within the 'bundle' of actions to be implemented as part of the agreement;
- The energy management systems and structures that would be required of the participants as an important element of agreement compliance.

The outcome of each negotiation was a notional agreement based on the full list of possible actions and agreed process for self-assessment by firms to determine which actions should be implemented by each of the sites involved; the criteria to be used in assessing actions for inclusion in the list of required actions; and the means by which the taxation and exemption principles would be applied. For the individual company agreement strand, seven different categories of actions were included, ranging from energy management and policy to capital allocation procedures to specific production processes and projects. The full text of the technology and collective agreements is provided in Appendix 2 of the main project report.

The nature of the technology (thermal) agreement was such that it proved necessary to address the issue of Combined Heat and Power (CHP). CHP offers great potential for emissions reductions, although the current climate is not conducive to further market penetration by this technology at present. Not wishing to prejudge any broader policy decisions on possible incentivisation of CHP, an approach was developed within the technology agreement, and this approach was included as an annex to the full agreement (see Annex C in Appendix 2 of the main project report). In

outline, this involves a special tax exemption of 90% on fuel associated with the thermal output segment from good quality CHP plant. An electrical agreement would treat the electrical output segment from CHP in an equivalent manner. Participation in a CHP agreement would be conditional upon participation in a thermal and/or electrical agreement.

The two main economic threshold criteria for implementation of actions by firms were agreed as (a) a simple payback upper limit of five years for each separate action (in both the collective and technology agreements), and (b) an aggregate payback limit for the collective package of actions in each firm of 33 months (collective) and 42 months (technology).

Following consultation with all of the firms in the project, each of them signed a Declaration of Acceptance, in which they stated their acceptance of the process and outcome, while not committing in that declaration to any immediate implementation of the terms of the agreement.

Indicator	Technology agreement		Collective agreement
	Excluding CHP	Including CHP	
Average specific energy efficiency gain by end year 4 (%)	17.1	22.7	16.4
Average annual CO_2 savings by end year 4 (tonnes/annum)	1,150	1,512	3,390
Average investment required per company[1]	€99,100	€228,300	€293,000
Average investment as percentage of annual energy bill[2] (%)	20.6	44.0	23.1
Average annual energy cost savings by end year 4 (€/annum)	€80,900	€118,100	€226,400
Average simple payback[3] (years)	1.2	1.9	1.4
Total annual CO_2 savings by end year 4 (tonnes/annum)[4]	17,300	22,700	33,905

1 Total investment over four-year span of the agreement.
2 Total four-year investment as a percentage of a single annual energy bill.
3 Payback of the full bundle of actions required at the average installation, where such a package includes all actions up to the five-year upper payback criterion agreed in both agreement strands.
4 Annual CO_2 savings increase in each year of the agreement as the required actions are implemented.

Table 2: Analysis of agreement outcomes

A summary analysis of the outcomes of the negotiations in respect of the 25 sites covered by the technology and collective agreements is presented in Table 2 (see page vi). The carbon/energy tax liabilities of the sites are not included in this analysis.

For the individual strand, the actions contained in the agreement are expected to improve current efficiency by 5.4%, leading to abatement of about 69,000 tonnes CO_2/annum by end year 4.

Evaluation of the pilot project

Environmental effectiveness (impact on emissions)
The three pilot agreements lead to energy efficiency gains by the end of the agreement of 5.4% (individual agreement) to 17.1% (technology agreement), translating to a total reduction in annual CO_2 emissions of about 120,000 tonnes in the participating sites. These levels of efficiency gains are in line with the higher end of what has been agreed in other agreements measures across Europe. As a further comparison, firms in the LIEN, a non-binding voluntary agreement managed by SEI, have achieved an average of 1.4% efficiency gains per year through participation in the network.

As with the LIEN, savings from individual sites vary greatly, reflecting the different starting points in terms of prior actions taken by firms to reduce emissions, and the regulatory or technical constraints on process or operational changes.

Static efficiency (costs of agreements administration and participation)
Estimates were made of the resource inputs required of the regulator (SEI in this case) and of the participating firms for each of the agreement types. On the basis of the pilot, and of assumptions about likely learning curve efficiency gains in developing and implementing further agreements, it is estimated that the future cost (to the state and to the firms participating) of further agreements would be about €120,000 per individual agreement; €130,000 per collective agreement; and €140,000 per technology agreement. Once established, the marginal cost of adding further firms to collective and technology agreements could be low - especially for technology agreements, where no negotiations would be required of additional firms.

Dynamic efficiency (investment costs to firms per tonne CO_2 abated)
The net cost to the participating sites of implementing all relevant actions over the life of the agreement was considered, incorporating all costs and returns and using a discount factor of 10%. The cost of abatement was found to be -€8.30 / tonne CO_2 for the collective agreement and -€12.20 / tonne CO_2 for the technology agreement. This negative cost of abatement in both cases indicates that the investments are economically viable, i.e. the total savings outweigh the total costs of the project implementation. This is reflected in average paybacks for the whole bundle of actions of 1.4 years and 1.2 years for the collective and technology agreements respectively.

Impacts compared to tax without agreements
Using predictions by ESRI of price elasticities arising from a tax of €20 per tonne CO_2 on all energy streams, the long run impacts expected in a no-agreements scenario from the €17.50 per tonne tax used in the project would be 2.9% reduction (electricity) and 14.6% (gas). In the pilot project, savings of 14% for electrical energy and over 17% for thermal energy are expected by the end of the agreement, and these are based on a known set of actions to be taken to achieve such impacts. These savings represent a significant amplification of the emissions abatement of a tax alone.

Administration and monitoring
The action-based agreement model is a simple design and is transparent in its principles. However, in developing such agreements, gathering and analysing reliable data is crucial. This presented some problems in the pilot but would be expected to be less of an issue in a situation where the agreements were to be enforced in the context of a carbon/energy tax regime.

Since the pilot did not include an implementation phase, monitoring of agreements could not be tested. However, estimates were made of the resources required for monitoring purposes. The resource requirement for monitoring and liaison is estimated to be eight person days for each individual company or technology agreement, while each collective agreement would require about 15 person days. Audit costs for spot checks during the implementation period would be about €14,000 for an individual agreement; €6,000 for a collective agreement (assuming 10 firms), and €4,000 for a technology agreement (assuming 15 firms).

Equity and acceptability

Considering equity within the industrial sector, the bottom-up approach inherent in an action-based approach provides for equity among participating firms, providing the principles are fair and consistently applied. Such an approach takes account of the different starting points of the sites involved and thus allows for prior action on the part of firms to improve efficiency and reduce emissions.

There was a very wide spread among the sites in the pilot, in terms of the actions and investments they would be required to undertake , illustrating the above point: sites already near to BIP have far less to do than others that have taken no actions prior to the agreement. At the same time, the fact that all of the participating sites were prepared to sign a Declaration of Acceptance indicates that they felt the outcome represented a fair and equitable result.

Transparency is an important issue. Again, the bottom-up approach in the action-based agreements model provides for a high level of transparency, although confidentiality concerns may impose limits to transparency in a real-life agreements process.

In general, all parties share the objectives of environmental efficacy, economic efficiency, protection of competitiveness, and equity, although of course the relative importance of each of these will vary among stakeholders. From the point of view of industry, the agreements measure is seen as rational and equitable, with the possibility of leveraging meaningful levels of emissions abatement, while protecting competitiveness as far as possible. The bottom-up approach makes for greater acceptability, since emissions reduction levels are based on concrete actions that will reduce emissions and accelerate progress towards BIP, while achieving significant emissions targets. At the same time, agreements based either on actions or on relative targets (such as emissions per unit output) do not translate directly into absolute targets for reductions so; there is less of a direct link to Ireland's overall Kyoto targets than would be the case with an agreement based on absolute targets for reductions (although it should be noted that most target-based international agreements are relative rather than absolute).

Competitiveness

The pilot agreements consisted of sets of actions that could be economically justified individually, and that as a set lay well within the upper payback thresholds agreed in the negotiations. The ongoing cost savings to participating sites are such that they should impact favourably on profitability. At the same time, it must be recognised that capital allocated to emissions-reducing projects will be diverted away from other potentially strategically important activities. Furthermore, it would be important to ensure that levels of carbon/energy taxation in Ireland were more or less in line with those in other countries. It would also be important to ensure that agreements were available to as many firms as possible, as early as possible. The full package of agreements included in the pilot could assist in this regard.

International comparisons

An examination of the impacts achieved by negotiated agreements in Belgium, Denmark, the Netherlands and the UK indicates that the levels of CO_2 abatement identified by the pilot are in line with outcomes elsewhere. Indeed, the pilot project results tend towards the higher end of results elsewhere.

Overall assessment

The agreement among participating firms to payback criteria of 5 years (individual actions), and 33-42 months (all actions considered as a single project) represents a major breakthrough from the point of view of moving firms beyond business as usual. The normal payback limit for single actions among firms is around 1.5 years. The annual CO_2 abatement impact of 120,000 tonnes/annum for the pilot group alone is a significant result, and can be extrapolated to an estimated potential of 640,000 tonnes/annum from a full suite of agreements (see Table 3 page xi).

A spirit of collaboration within the process is vital, and this was achieved throughout the pilot.

The resource and information requirements implied by the pilot project are not unreasonable, and suggest a satisfactory level of administrative efficiency. For each of the agreement types tested, further efficiencies may be expected in any future replication, although the fully binding nature of such agreements may bring additional loads, such as legal costs.

Each of the three agreement types offers benefits. Individual agreements would be essential for any large firm with unique, high energy intensity processes. Collective agreements, and their potential for grouping similar firms together, are attractive for agreements with specific sectors. Technology agreements offer the possibility for widespread participation by firms at low cost to themselves or to the state.

Looking forward – implications for a negotiated agreements framework

Lessons from the pilot

i The pilot project has established the viability and potential efficacy of a negotiated agreements measure as part of a climate change policy for Ireland. It can achieve greenhouse gas abatement impacts significantly beyond those likely to arise from a tax alone. It can protect competitiveness by embodying economic tests in the requirements placed on firms, and by offering a tax exemption structure for participating firms, and especially for energy intensive firms or firms with large energy costs. Firms view the approach as desirable, and are willing to commit to investments with much longer paybacks and higher costs per tonne of CO_2 than business as usual.

ii The action-based agreement model worked well, providing an approach to agreements in which emissions reduction is rooted in clearly identified measures. It takes account of prior action taken by firms to reduce emissions, and hence is seen as an equitable model for agreements. It is possible to embody benchmarks for efficiency, calibrated against BIP elsewhere, and these benchmarks can even serve as proxies in assessing firms' compliance. Where appropriate (e.g. in horizontal agreements such as the pilot thermal agreement), there is the potential for including suppliers and consultants to industry, in support of accelerated uptake of BIP energy technologies.

iii A spirit of collaboration between state and industry is an essential ingredient for a successful outcome. This can be facilitated by a perception that the process is open and fair, at the same time as being demanding of all parties; by a process that recognises the limitations and interests of the firms as well as the national priority to maximise abatement; and by a prior history of collaboration and support between the main actors.

iv The negotiated agreements process calls for significant resource input of staff, finance and expertise, the costs of which are reflected in Tables 3 and 4 below.

v The measure relies on high quality, independent energy auditors, with a need for special training, and close monitoring of the audit process.

vi Information requirements are greater with action-based agreements than with target-based agreements, but they offer the benefit of clarifying the expected pathway by which emissions reductions will be achieved.

vii Development of agreements requires that adequate representational infrastructures be in place and involved. This is especially the case with collective agreements, but since technology agreements can be offered industry-wide following the negotiation process, involvement of industry representative bodies would be important here also.

Policy issues

i The pilot project confirmed that there is substantial potential for emissions reductions on the part of industry in relation to electricity use – possibly as high as 14% or more. Without either a downstream tax on electricity or some alternative incentivisation mechanism, this could be lost: it is unlikely that a tax alone will realise more than a small fraction of the full potential for emissions reductions from electricity use. The means of incentivising actions on electricity end use is a key issue for the future structure, operation and impact of negotiated agreements, and this should be explored further as a matter of urgency.

ii CHP poses special problems in developing a negotiated agreement. CHP can lead to substantial reductions in CO_2 emissions. Industry feels strongly that CHP requires considerable incentivisation in order to increase its market penetration for industrial power. CHP incentivisation can be partially addressed through agreements, even though – as industry maintains – this may represent only one element in a broader policy to incentivise this important technology. The CHP annex to the pilot technology agreement points to one possible approach. However, it is important to stress that the approach adopted in the pilot would be dependent on there also being an electrical agreement; the approach could be modified, but inclusion of the electrical aspect of CHP output would be difficult to justify in the absence of a rebatable tax on electricity, or some equivalent means of incentivising action on the part of industry.

iii Many of the largest industrial sites will be required to participate in emissions trading, and thus may presumably not be covered either by a carbon/energy tax or by negotiated agreements. However, depending on how allocation takes place, there is a possibility that some firms may wish to seek to opt out of emissions trading during the pilot phase, on the basis of participation in a negotiated agreement. This could be permitted provided the emissions abatement from the agreement matched that expected of emissions trading. Similarly, some firms otherwise not meeting the criteria for emissions trading may wish to opt in to the trading regime, as a result excluding themselves from the carbon/energy tax and from negotiated agreements. From a policy viewpoint, presumably it would be desirable to provide for maximum flexibility and, in particular, for the availability of least cost options for industry.

Towards a framework of negotiated energy agreements

i Based on the experience of the pilot project, SEI believes there is a role for a mix of agreement types.

ii Technology agreements are developed with a small representative group of sites, and can then potentially be available to any site, be it large or small. They are capable of capturing a significant proportion of industrial emissions. They offer great administrative efficiency, since once developed they are available as 'off-the-shelf' agreements to any site, without the need for any further negotiation. In practice, very large firms would be unlikely to participate in a technology agreement and the smallest firms may lack the necessary resources or knowledge to do so.

iii A total of three technology agreements would probably be required, focusing in turn on: thermal energy; electrical energy (all electrical end uses in industry); and CHP. A CHP agreement might be developed as part of a thermal and an electrical agreement, and participation in a CHP agreement might be conditional upon participation in the thermal and/or electrical agreements. It is considered that technology agreements would be appropriate for up to 820 companies each with an annual energy consumption of at least 2 GWh/annum (though no lower limit to participation is suggested). In practice, a participation level of around 500 such firms is considered realistic.

iv Collective agreements have an application to groupings of sites with specific, shared energy-using technologies, and where these technologies would not be captured by technology agreements. Typically, such groupings would be sectoral. Collective agreements have the additional advantage of bringing similar firms together, with great potential for mutual learning and support.

v SEI believes that there would be scope for about 10 collective agreements, involving approximately 150 sites in total.

vi About 10 industrial enterprises together account for 30% of total industrial energy consumption. Individual agreements among this group would thus address a considerable proportion of the potential for emissions reduction within the industrial sector. However, as pointed out previously, many of the largest firms are likely to be participants in emissions trading, and hence may not be eligible for a carbon/energy tax, and a negotiated agreement would thus not be relevant. Individual agreements could still be of importance to trading firms in considering whether to seek to opt out of trading in the pilot period. There may also be scope for individual agreements with some firms not required to participate in emissions trading.

vii SEI believes that a full negotiated agreements framework could include individual, collective and technology agreements. An analysis of Irish industry suggests a potential market for collective and technology agreements of about 1,000 sites, with about 650 expected to participate, embracing almost 40% of Irish industrial energy consumption.

Likely impacts of a full negotiated agreements measure on CO_2 abatement

Table 3 below shows the results of an analysis by SEI of the likely coverage and impacts of collective and technology agreements, for a full agreements measure.

The total estimated potential CO_2 abatement by the end of the agreements is 640,000 tonnes per annum, which represents a 6% saving for industry as a whole. Note that this does not include any of the potential from agreements with individual firms. SEI estimates that the potential for CHP in emissions reduction is about 52,000 tonnes, though this is unlikely to be achieved without substantial incentivisation in the current market climate for CHP.

Indicator	Agreement	
	Collective	**Technology**
Likely number of agreements	10	2 (excl.CHP)
Total number of firms involved	150	500
Total annual energy consumption	5,600GWh/a	3,600GWh/a
Total annual CO_2 emissions covered	2.5Mt/a	1.6Mt/a
Assumed impact levels	20% heat, 14% electricity	17% heat, 14% electricity
Projected annual CO_2 abatement	0.40Mt/a	0.24Mt/a

Table 3: Estimated markets and impacts of future collective and technology agreements

Administrative requirements for a full negotiated agreements measure

Based on the earlier estimates for the set-up and ongoing costs of each agreement type, and on the estimates for the numbers of agreements of each type, the estimated annual administrative costs for a full agreements system (excluding individual agreements) would be as shown in Table 4 below.

Administrative Requirements	Agreement	
	Collective	**Technology**
	10 groups, average of 15 firms each	*2 agreements[1] average of 250 firms each*
Set-up administration load	650 person days (65 per agreement)	220 person days (110 per agreement)
Total set up costs	€1,400,000	€330,000
Annual administration load	300 person days (2 per participant)	375 person days (0.75 per participant)

1 Thermal and electrical agreements only. Possible additional CHP agreement not analysed here.

Table 4: Estimated annual administrative requirements for a full agreements system

Finally, the total annual costs of administering a full negotiated agreements system as described above were estimated. These costs allow for components such as management, dissemination and general administration, and the set-up costs for a four-year agreement are spread evenly over each year. The results are shown in Table 5 (see page xiii).

In reality, the measure would be more cost effective than the above estimate, since abatement is cumulative and will extend beyond the four-year life of the agreements themselves.

Administrative Requirements	Agreement	
	Collective	**Technology**
Projected annual CO_2 abatement	0.40 Mt	0.24 Mt
Annual costs (including one quarter of set up costs)	€470,000	€233,000
Overall annual static cost per tonne CO_2	€1.20	€0.97

Table 5: Estimated static efficiency of collective and technology agreements applied across industry

Next steps

Further analysis is required to refine the estimates derived within the pilot project, and this will be undertaken as a priority by SEI. Among the necessary refinements are an update of the Census of Industrial Production energy data from 1998 to 2001 (2001 CIP data were not available during the pilot project) and a more detailed sectoral analysis of the potential markets for collective agreements. As broader policy develops, it will also be possible to incorporate into the analysis contextual changes that impact on markets, and other changes that would influence the findings of this project. Over the coming months, SEI will continue to develop this analysis into a more detailed picture of the future potential for a full agreements measure.