

ESCOs in Ireland:

Investigation of Energy Service Companies in 2000

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Abstract

An Energy Service Company (ESCO) is a firm that offers to reduce its client's energy bill, with the cost saving being split with the client. ESCOs in the full sense of the term offer finance for their projects, will accept the risk of the project and are remunerated in proportion to the savings achieved. On their part, clients may wish to contract out management of some or all of their energy affairs to save on management time and to benefit from the expertise and specialist knowledge of ESCOs.

This paper is a record of the state of ESCO activity in Ireland in 2000, based on investigations undertaken for the European Commission's BARRIERS project. This project investigated barriers to energy efficiency. The finding on ESCOs was that there are few companies in Ireland that offer ESCO-type services, and that they fell into three groups. They consisted of (1) companies that offer contract energy management, (2) companies that are engaged in the supply of Combined Heat and Power, and (3) those that manage their clients' facilities. One company of each type was interviewed with a view to identifying barriers to their fuller development into ESCOs that would engage in energy saving activity.

1 THE ESCO SECTOR IN IRELAND

1.1: Definitions

Energy Service Companies (ESCOs) offer services to customers who wish to contract out management of their energy affairs to a company that specialises in such matters. ESCOs can offer a variety of services including competitive purchasing of various fuels, Combined Heat and Power (CHP), efficiency measures, financing mechanisms for the funding of investments, monitoring of consumption and energy management generally. They are in a position, at least potentially, to offer energy efficiency across the board, from the supply to the end-use of energy.

There are few companies in Ireland that offer these services with even less that would call themselves an ESCO, and most would be involved with just one or other section of these activities. There could be said to be a spectrum of activities. At one end there are those activities that consist of contracting and procuring energy more cheaply, then there are those that transform it more cheaply, such as by CHP, ranging through to those activities that deal with the customer's processes, equipment and buildings and finally to energy-using behaviour in the client's organisation. ESCO-type companies operating in Ireland at present tend to be categorised into three broad groups, namely:

- companies offering contract energy management (CEM),
- those offering CHP and, thirdly,
- those offering facilities management (FM).

Companies offering facilities management deal with the client's use of energy, water, cleaning and other services. With contract energy management and CHP typically two elements are involved:

- financial arrangements for investment and
- provision of technical services for the energy management of a building or process.

In the US another term used is energy performance contracting (EPC). In a performance contract there is usually no upfront cost for the client who is guaranteed or who shares an amount of energy saving (IEA, 2000).

For the purposes of this study it would be useful if one could obtain a measure of the total turnover of ESCOs in Ireland. The approach of this study does not enable this to be calculated, except in so far as the companies that are interviewed volunteer an estimate of their share of the market at present. It should be noted that only the service element of CHP activities ought to be included under the ESCO heading and not the actual energy supplied.

This survey formed part of the BARRIERS project funded by DGXII of the Commission of the European Communities, under the Non-Nuclear Energy *JOULE* program of the Fourth Framework Program. The BARRIERS project looked at the question as to why organisations do not take up cost-effective opportunities to improve their energy efficiency. The project's final report, *Reducing barriers to energy efficiency in public and private organisations*, is available from SPRU (see references) and the main results are recorded in publications by the ESRI (O'Malley *et al.* 2003) and by Edward Elgar (Sorrell *et al.* 2004). The study assessed the importance of possible barriers to energy efficiency, ranging from organisational culture to hidden costs and, in doing so, used case studies from three sectors. These were the mechanical engineering sector, the brewing sector and the higher education sector. During the course of the study, respondents were asked about their recourse to ESCOs to improve their energy efficiency, and ESCOs themselves were sought out and interviewed to see how they might be encouraging the adoption of efficient energy use in client companies.

Companies that are potential clients of ESCOs, provided that they are aiming to maximise profits or minimise costs, have more incentive than outside agents to save on their energy use, in theory. This was indeed acknowledged by a UK firm engaged in contract energy management. It felt that "a competent in-house energy management team would not require CEM services, and the potential for in-house energy savings is theoretically higher" (Smith, 1993). In reality however conditions in many but the larger firms prevent this from being the case. Energy use is but one or two per cent of turnover and specialist energy knowledge on the part of energy managers could be the exception rather than the rule. Furthermore many firms do not have an energy manager. The ESCO on the other hand can accumulate specialist knowledge, exploit economies of scale and use longer paybacks because risk is shared over several projects. If the ESCO happens to be a utility (which provides CHP for example) it may be able to obtain finance on favourable terms, and offer attractive packages for annualising the capital cost of energy efficiency investments over several years.

An important question is whether the ESCO itself faces incentives that would encourage it to engage in energy efficiency on the client's behalf. The incentives are probably rather weak. One is reminded that the ESB used to offer some ESCO-type services as part of its Demand Side Management programme, whereby end-use efficiency at clients' premises was promoted. However as conditions changed, the conflict with the ESB's core activity of selling electricity meant that the programme was abandoned. End-use efficiency seems to be the Cinderella of ESCO activities and maybe it is only promoted by consultants who undertake energy audits. This is not to deny that other motives may cause behaviour to be energy efficient in a way that appears counter-intuitive. For example, a utility supplies guidance on energy efficiency thereby gaining a low return in the short term in order to build up customer loyalty in the long term. Or, as in the USA, the utility may have wanted to rein in demand if investing in new capacity was for some reason (such as strict environmental constraints) not desired. The activity may well have served energy efficiency temporarily but the motives should be understood.

A final point that has to be kept in mind is that the energy saving activity of an ESCO has to yield sufficient savings to reimburse the ESCO's costs as well as still be

attractive to the potential client. As we will see the energy saving part of ESCO activity happens to be but a minor part of ESCOs' outputs, if that. Management and equipment supply are the major part, and it appears that design, installation, monitoring and risk management are bundled into the project's costs rather than explicitly financed out of savings.

1.2: Liberalisation

Liberalisation on foot of the *Electricity Regulation Act 1999*, with recent amendments contained in the *Electricity (Supply) (Amendment) Act 2001*, has opened up the electricity market, which had previously been dominated by the Electricity Supply Board (ESB) (Stationery Office, 1999, 2001). Purchasers of electricity who use more than a certain amount of electricity per year have become eligible to buy on the open market and one hundred per cent of the market will be open in 2005.

Suppliers of CHP had been restricted to selling electricity to eligible customers and to their own main heat customer, and this was the situation prevailing at the time that the interviews described below were undertaken. The above-mentioned amendment act has meant that CHP operators can now sell electricity to anybody, removing what were fairly strict and evidently inhibiting conditions, and there could be more enthusiasm for providing CHP as a result, all other things being equal. At the time of the analysis there were some 78 CHP installations, totalling some 130 MWe of electricity capacity, and contributing 2 per cent of Ireland's electricity requirements, according to the then Irish Energy Centre (2001, 2002). (The Irish Energy Centre has been replaced by Sustainable Energy Ireland in the meantime.) In their report on future potential of CHP they consider that there is a potential market of around 700 MWe where the theoretical economic return and payback are sufficiently attractive for companies to make the investment.

The *European Cogeneration Review*, produced by an association for the promotion of cogeneration, reported that CHP schemes qualifying under the 'Alternative Energy Requirement IV' scheme of 1997 were able to secure 3 pence per kWh for sales to the ESB (COGEN, 1999). CHP schemes not qualifying could only secure 1.88 pence, for day hours. The *Review* stated that this price reflected the variable cost of the lowest cost station and that the then method of calculating this price was 'selective'. Indeed in its *Discussion Paper on Market Pricing* (CER, 2002a), the Commission on Electricity Regulation remarks that "the structure and level of prices in the imbalance market (i.e., top up and spill prices) did not appear to be conducive to the promotion of market entry by new participants". A major improvement in the pricing regime since that time has been implemented, in terms of both the price level and its transparency. By consequence, renewed interest from potential suppliers of CHP could arise if other conditions do not deteriorate.

Other support to CHP has come in the form of investment funds under the Irish Energy Centre's *Energy Efficiency Investment Support Scheme*, which had resulted in 6

schemes of over 1 MWe each and 8 small schemes, thereby developing a 'critical mass'. The *National Climate Change Strategy* has set a target for CHP to reduce CO₂ by 2010 that would require roughly a doubling of capacity, according to the Irish Energy Centre (2002). The point was made by ERM (1998) in their report which addresses the issue of limitation and reduction of CO₂ emissions that, per tonne of CO₂ abated, CHP represented an expensive way of reducing emissions, when compared with generating electricity from combined cycle gas turbines or oil fired capacity. This view was not necessarily shared by the Irish Energy Centre which pointed to the importance of assumptions applied. Some £4 million has been allocated to support CHP in the National Development Plan 2000-2006.

Where the market for gas is concerned, some 60 per cent of the gas market was open at the time of the study, meaning that gas users can purchase from suppliers other than Bord Gais. But this represents only the top 10 gas users. The required consumption for eligibility is 263 GWh per year, though this is due to fall sharply to 527 MWh. The gas transmission network is currently limited geographically, but the opening up of the market and the bringing on stream of a new source from the Corrib field should see some extension of the gas network, thereby facilitating more CHP development.

In general the end result of liberalisation is a lowering of energy prices overall which, gas price apart, is not conducive to the development of CHP and indeed of energy efficiency in general. On the other hand, more bodies are now allowed to supply CHP and that is possibly important for the development of ESCOs. In addition the very act of scrutinising energy use and supply by potential ESCOs could result in opportunities coming to light and more ESCO-type activities coming forward. But it is recalled that in the US, where ESCOs are most to be found, their origins date largely to the late 1970s and early 1980s when energy prices rose dramatically following the OPEC oil price hikes of 1973 and 1979. These events, according to the National Association of ESCOs in the US, created the opportunity to make a business out of reducing customers' growing energy costs.

While the low electricity price and the relatively high gas price make the immediate outlook unattractive for ESCOs, and CHP in particular, the outlook in the medium term is more mixed. In addition to increased attention and the improved opportunities arising from technical developments, the introduction of tradable emissions permits or carbon taxes and their consequent price raising effects could give some encouragement to CHP. Unfortunately, however, if the permits option dominates rather than the tax option, the price rises could be relatively unpredictable and we will see that uncertainty discourages ESCO-type activity.

2 CASE STUDIES OF ESCOS

The ESCO case studies are now described. Six potential ESCOs were approached and asked to participate in the study but three did not adequately fit the ESCO description or were otherwise unable to take part. It will be seen that the ESCO market is undeveloped at present. The three sorts of ESCO-type activity listed in the introduction above are represented to some extent in the cases covered. Company A is a 'facilities

management' company, which intends to broaden its activities into other ESCO-type functions of energy saving. Company B is engaged in CHP and contract energy management and is a branch of an energy supplier. Company C is another facilities management company that does not see itself evolving in the direction of undertaking other ESCO-type activities. The companies were interviewed on the basis of a questionnaire, a copy of which is given in Appendix 1. The questions about ESCOs that were asked of enterprises in the main part of the study, as potential clients of ESCOs, are reproduced in Appendix 2.

2.1: Company A

Company A is one of the companies in Ireland that would come closest to an ESCO, strictly defined. Its personnel have a grounding in electrical contracting and energy management consultancy and they offered facilities management at the time they were surveyed. In the region of £2 million of their turnover, or 50 per cent, would be accounted for by energy services that they supply. They offer a wide range of services, in particular high quality monitoring, tariff analysis, and projects that they 'design, build and handover'. In fact all the services listed in the ESCO questionnaire, shown in Table 1, are offered except the wider facilities management functions such as security, cleaning, telecommunications, etc. They have offered financing services but these were declined in the past because their customers have been cash rich. They are not currently involved in the sale of energy, though they could become involved.

Table 1: *Services that may be offered by ESCOs*

Operation and maintenance of boilers
Fuel purchase
Design, installation and operation of new boiler plant
Design, installation and operation of CHP plant
Monitoring and controls (e.g. BEMS)
End use efficiency investment for HVAC (heating, ventilation and air-conditioning)
End use efficiency investment for electricity
Design, installation and maintenance of new build/refurbishment
Finance for energy efficiency investments
Wider facilities management (including security, cleaning, telecoms, environmental, etc.)
Other

Source: ESCO questionnaire, see Appendix 1.

The business of Company A is 80 per cent with industry and the remainder is with the public sector and commercial sector, both representing 10 per cent each. As for energy efficiency projects proper, Company A offers all sorts including nearly all those listed in the questionnaire, reproduced in Table 2. However they are not much engaged in building insulation. The absence of engagement in building insulation will be seen to be a feature in all three case studies of ESCOs.

Table 2 Energy efficiency projects that ESCOs might engage in

Fuel switching
Boiler replacement
CHP (combined heat and power)
Controls and BEMS
Building insulation
Lighting
Awareness and housekeeping
Process energy improvements

Source: ESCO questionnaire, see Appendix 1.

As for the amount of savings achieved by Company A, their involvement with customers at present is short-term in nature and they are therefore not on site to undertake ongoing assessments. However, they have undertaken *ex post* evaluations of their projects that received support from the Irish Energy Centre's *Energy Efficiency Investment Support Scheme*. These evaluations showed savings of 15 to 20 per cent compared to the baseline though, as they say, the baseline is not easy to define. They consider that further improvements in energy efficiency could be made, with longer paybacks of up to six years, which would probably still be worthwhile.

Company A considers that the market has definitely expanded in the last five years. This is the result of rising awareness, which in turn is due to the Irish Energy Centre and due to attention arising from the liberalisation process. In addition there is a trend among customers to focus more strongly on core business rather than on energy inputs and facilities.

Contracts

Though Company A is likely to move to areas of work where contracts comprise involvement over a period of time, to date the services they have supplied have been once-off in nature. They operate on a fixed fee for their 'design, build and handover' projects and, rather than being based on the energy savings as would be the case in an ESCO strictly defined, their fee is based on the project cost.

Company A therefore faces very little risk and in fact that situation has occurred because of the nature of the customers to date. These have been in sectors where new technology is an imperative in their quest for ISO14001 certification. Should company A gain customers in other sectors, where environmental certification is not a requirement, then risk-sharing is more likely to be reflected in the contract and shared savings will become a feature. If company A becomes engaged in CHP supply (in addition to consultancy on CHP), then again there will probably be a move to contracts based on kWh sales. It was clear however, that the situation is quite uncertain at present, with options needing to be explored and developed.

Barriers, Motivations and Policy

Relatively low savings and the existence of risks constitute barriers to energy efficiency investment. Company A has found that clients will quote other ways of investing the amount under discussion that will yield them higher returns and not involve such risk as

investing in energy efficiency. Eventually some means of sharing the risk will need to be devised.

Smaller sites would be considered but not sites in the domestic sector, unless it was a group of public sector houses, for example. A minimum energy use in the region of £100,000 would be the threshold above which they would consider becoming involved. Small organisations would be avoided as would bureaucratic organisations because of the time they take to come to a decision.

The use of Public Private Partnerships (PPPs, which are like Private Finance Initiatives in the UK) would offer more scope, where public projects are involved.

The higher education sector, they felt, would not fall into the category of ‘bureaucratic’ and Company A would consider working in this sector. They would also consider the brewing sector, though they do not happen to have contracts with the brewing sector. They would consider the mechanical engineering sector to have too few companies that spend more than the £100,000 threshold for them to target that sector.

In that part of their activities that involved energy supply, Company A did not envisage take-or-pay contracts being widely used by target organisations and so did not foresee discouragement to energy saving arising from that quarter. In any event they did not consider that site demand would be likely to be found to be too small subsequent to the agreement. Nevertheless, as was seen in one of the cases in the brewing sector (in the main body of this study), if there were excess energy that could not be sold on for some reason, this could indeed be a disincentive to energy efficiency.

Turning now to the obstacles facing potential customers in making a contract with an ESCO, these possible obstacles are listed in the first half of Table 3. Company A considered all of these obstacles to be important, in particular lack of awareness of and information about the energy management market, as well as low energy prices and consequent neglect of the issue. In addition, the view that there were not many savings to be had and the desire not to be tied in to a long contract were obstacles. Turning to the lower half of Table 3 where the motivations for entering into a contract with an ESCO are listed, all the motivations applied as far as Company A was aware, except for shortage of capital, which did not apply to all the sectors with which they were involved. For example it did not apply to pharmaceutical companies or to third level education, in their view.

Table 3: *Obstacles to, and motivations for, entering into a contract with an ESCO*

Obstacles

- Lack of awareness/information about the energy management market
 - Low energy prices & consequent neglect of issue
 - Complexity of contracts and measurement of what is being bought
 - Lack of adequate contract management skills
 - Want to keep the savings for themselves
 - Don't think there are many savings to be had
 - Don't want to be tied in to long term contract
-

Opposition from existing estates staff, plant management staff etc.
Opposition to staff redundancies or staff transfer
Loss of autonomy over production, comfort or convenience
Don't trust consultants and energy management companies to do what is best for the client

Motivations

Prospect of significant energy cost savings
Shortage of capital
Lack of technical expertise
Management priorities to concentrate on core business
Environmental concerns

Source: ESCO questionnaire, see Appendix 1.

In sum, Company A said that ESCOs were not well developed in Ireland and policies would need to tackle a broad range of issues if they were to make progress. Information, awareness raising and higher energy prices would obviously help, so would the provision of model contracts that incorporated risk sharing, for instance, and assistance for small businesses. In the context of ongoing liberalisation, the unbundling and increased transparency in pricing of transmission will encourage efficiency and direct more attention to costs. Despite this advantage, CHP bears the risk of closures and consequently has to avoid the 'spaghetti' end of the market. This is that part of a project that integrates the customer's site services into a CHP exercise to gain extra efficiency. Unlike the CHP plant proper, these have no scrap value if, for example, the client closes down and so this potential efficiency improvement tends to be omitted.

2.2: Company B

Company B is a branch of an energy supplier. It engages in CHP, contract energy management and energy facilities management. Its 'products' are CHP, expertise and services. Turnover (excluding the power sold from the CHP) amounts to some £10 million and they consider that they have about a third of the market for energy services. The market however had not expanded as well as in the UK in their view. Understandably, their interest lies not so much in conservation but in management of energy including smoothing its demand.

They sell nearly all the services listed in Table 1 or else organise their outsourcing. They would not be involved however in end-use efficiency investment in heating and ventilating controls but rather in overall efficiency investment, neither do they engage in management of non-energy facilities. Their market lies 50 per cent in the industrial sector, with the commercial sector following at 30 per cent and the remaining 20 per cent going to the public sector. The existence of big customers dictated this mix. They are considering customers with smaller sites, but not the domestic sector.

Company B, and indeed its competitors, are engaged with clients in the higher education sector and the brewing sector among others, because of the large energy demand in those sectors. They are not at present engaged in the mechanical engineering

sector. The minimum value of energy use that is attractive for a CHP contract is £250,000, and 24-hour heat demand is best. While there is no type of organisation that they avoid, they aim for secure organisations or those with sites that can be reused, owing to the exposure to potential risk. The type of energy efficiency project offered includes CHP, boiler replacement, controls and BEMS. In the past they engaged in building insulation, lighting, awareness, housekeeping and process energy improvements but, importantly, they do not find that these are favourable activities for contract energy management.

The savings that they achieve for their clients would lie in the region of 20 per cent, but these would be largely financial rather than volume savings. A 'bad' project would save 15 per cent, and a 10 per cent saving would not be considered worth pursuing. Company B considers that it could improve energy efficiency in some of its customers' premises because it could offer electronic and mechanical expertise more economically.

Contracts

In the contract for CHP Company B tends to charge an ongoing fee plus a fixed, reduced, fee per unit of energy supplied. They consider that the risk is shared this way, though the charge is not related to actual savings arising. They do not operate a take-or-pay contract and it is probably in this sense that Company B considers that it shoulders the risk. In the outturn, owing to client growth, the saving compared to the 'before' situation (rather than compared to what it would have been now) may only be in the region of, say, 10 per cent. Their contracts would be set for 10 or 15 years.

Barriers, Motivations and Policy

In the view of Company B environmental concerns, though the stated driver, are probably the least important motivation for an organisation to engage an ESCO. The prospect of energy *cost* savings would be the main motivation for clients followed by lack of in-house technical expertise and the desire on the part of the client to concentrate on the core business.

The prime obstacles to entering into a contract would tend to be low energy prices and consequent neglect of the issue because energy only constitutes some one per cent of clients' costs, according to Company B. Lack of awareness, the desire to keep savings for themselves and unwillingness to be tied to a long-term contract are also obstacles. Opposition from the potential client's existing staff and concerns about redundancies and related issues are often a consideration and need to be addressed. Then again, it can work the other way, if management actually want to reorganise their staff. Recalling that a common complaint of interviewees in the other sectors in the main part of this study was the 'lack of time', this should really work to ESCOs' advantage.

Company B considers that policies to overcome the obstacles should include awareness raising, by giving the main ESCO players a platform and getting them to advertise more. Stable and transparent prices are needed and indeed higher prices would cause people to assess their actions more, though, as energy suppliers themselves, they could hardly advocate higher energy taxes. Model contracts would be helpful. Small businesses could be helped with user-friendly targeting and monitoring systems. Policies of target setting, provided they are realistically calculated, are a good approach.

Subsidies for audits and loans for energy saving are useful as kick starts to engage an ESCO.

Where CHP is concerned, the power procurer (ESB) should impose gentler penalties embodied in the maximum demand tariff, which at the time of interview created unnecessarily serious difficulties in the event of CHP downtime. Selling on, or wheeling, of electricity need to be allowed and a fair price for export to the grid needs to be set, based on long run rather than short run marginal cost.

2.3: Company C

Company C is a company offering facilities management in the wider sense, that is, in areas additional to energy, and they operate as if they were the client's representative. They procure and contract and, being on-site all the time, they resemble ongoing management consultants.

Management philosophy in many client companies is moving towards concentrating on the core business and therefore services are increasingly being sourced from outside the organisation. Many client companies have arrived in Ireland with outsourcing arrangements already in place. They proceeded to outsource from companies offering facilities management in the UK or elsewhere, there being no Irish equivalents at the time. The parent of Company C arrived in Ireland with its facilities still being managed in-house but they then decided to outsource, using their own company that they set up as a facilities management company. That is the origin of Company C.

Company C has perhaps 5 per cent of the facilities management market, which had grown quite a bit by the early 2000s. Company C offers nearly all the services listed in Table 1, though in fact they do not currently procure CHP plant or organise finance for energy efficiency investments, but they offer more facilities services than those listed.

They deal mainly with the industrial sector and to a small extent with the commercial sector, reflecting the areas with which they are familiar. They would be willing to become engaged with the sectors that are covered in this study, namely, higher education, brewing and mechanical engineering, and smaller sites also, but are not involved with them at present. Given that energy is not the main item on which they provide facilities management, there is no question of a minimum threshold of energy use. They simply aim for potential clients that use a mixture of high quality services.

Company C is involved in managing rather than in saving energy. However they would be likely to engage in all the energy efficiency projects listed in the questionnaire, but measurement of achieved savings 'doesn't arise'. To some extent cost savings can materialise through bulk purchasing arrangements, which reduce the price paid but these are monetary savings. If potential savings in energy proper are large they would undertake them 'as a matter of course'.

Contracts

Company C operates for a fixed fee paid annually, for a period of say 10 to 15 years. The uncertainty of the situation current at the time of interview was unhelpful to the formulation of contractual arrangements.

Barriers, Motivations and Policy

Clients are interested in being able to concentrate on their core business and lack the technical expertise to deal with their facilities. The prospect of significant energy cost savings appeals to them, though these savings would not necessarily arise from energy efficiency. The brief from some of Company C's clients might include energy efficiency, but "as soon as production is compromised then energy efficiency is out".

Obstacles to energy efficiency would include lack of awareness and low energy prices. Realistically most energy savings are on a small scale, or else they represent 'megabucks but are risky'. Furthermore, installation is sometimes a risky business if the client has 24-hour production and cannot afford downtime. Clients are wary of being tied by long contracts and concerns about loss of autonomy over production would be paramount. Opposition on the part of existing staff and concern about redundancies can also be important obstacles.

Company C said that something has to be done to overcome lack of awareness because in Ireland there seems to be a general view that companies offering facilities management merely look after the photocopiers. Examples and case studies are needed of successful ESCO operations. Market liberalisation seems to be making uncertainty worse, though if negotiations with the 'electricity pool' look like being complicated, companies will outsource their purchasing activities which would create business. Model contracts for energy services would seem to be a good idea. Private finance initiatives in the manner of Public Private Partnerships are useful, though CHP tends to be offered on a build-own-operate basis, which gets over the financing problems there.

To overcome the problem of suspicion, Company C suggests that ESCOs could try to arrange some sort of certification of their members, along the lines of the Chartered Institution of Building Services Engineers (CIBSE) in the UK. If some form of qualifications could be drawn up this might be helpful in improving the image of ESCOs and provide some assurance of quality.

2.4: Verdict on the ESCO Case Studies

Some findings emerge quite strongly from this, albeit unrepresentative, set of discussions with three ESCOs. In the first place the ESCO market is fairly undeveloped and people are not familiar with the potential and probably need reassurance. On the other hand the market is growing alongside the trend to outsourcing and the focus on energy costs consequent on deregulation. Uncertainty surrounding deregulation has however impeded development of ESCOs.

The ESCOs interviewed said that they generally searched for clients with large energy bills and while they would tend to sell on the basis of reduced energy costs, these reductions did not necessarily reflect reduced energy use. The verdict is that end use of

energy was not much of a consideration and, consistent with this, building insulation and like issues are virtually ignored at present.

It was not feasible to gauge the size of the ESCO market from information derived in the interviews. The imputed current market for ESCO services comes to between £30 million and £40 million, on the basis of two cases, but a fuller survey and analysis would need to be undertaken in order to have a reliable estimate. To gain an idea of orders of magnitude in Ireland we can consider the figures of total expenditure on (non-transport) energy by the industrial, commercial and public sectors. Total expenditure would be approximately of the order of £1500 million (Smyth, 2000). As an outside estimate, if a half of this expenditure could be subject to savings of 20 per cent, then the savings amount to £150 million, and this would be the amount to be shared out between client and ESCO.

3 ROLE OF ESCOS IN THE SECTORS COVERED IN THE MAIN STUDY

This section provides a brief assessment of the role that energy service companies can play in the sectors analysed in the main study, that is, in the higher education, brewing and mechanical engineering sectors. Results are primarily based on the interviews conducted in these customer sectors.

3.1: The Role of ESCOs in the Higher Education Sector

The establishments in the higher education sector that were interviewed were well aware of ESCOs and contract energy management. They pointed out that these services were not well developed in Ireland and most felt that they could manage energy better themselves. One made the important observation that emerges from the ESCO case studies, that is, that ESCOs are good on the supply side but not on the demand side. In other words energy conservation does not feature strongly.

A majority stated that they had bad experiences with companies offering energy services though, it should be added, not of companies organising or offering audits including the Irish Energy Centre.

The responses of the higher education sector to the question *Do you consider contract energy management to be an attractive option for you?* were as follows:

- Energy management is typically done in-house though we have taken on partners to finance projects. ESCOs are appropriate on the supply side, not the demand side. Power purchasers had been considered but we found that we could do it and save the fee.
- Consultants are used as appropriate, but in-house management gives best value for money. ESCOs are not really available in Ireland.
- Energy management is essentially an in-house activity. Using ESCOs has not been considered. Also we were unimpressed with a company that did energy purchasing for us, and did not get a good tariff.

- We have had a bad experience with a subcontractor and would not consider CEM now.
- ESCOs are not competent. We would avoid them, except for CHP perhaps.

Companies offering CHP were not criticised and a few respondents had CHP or had actively considered it.

Factors favouring the use of ESCOs in the higher education sector

Factors favouring the use of ESCOs in higher education include the large size of the energy bill of higher education institutions and the almost total lack of risk where the ongoing future of the client is concerned. As of yet the fashion for outsourcing and concentration on core business has not taken on in the higher education sector. The problem in some universities of multiple calls on the energy manager's time and inability to devote sufficient attention to energy matters could encourage them to resort to ESCOs in the future, though they might claim that they do not have the time even to investigate properly what ESCOs could offer.

To the extent that some energy managers in the higher education sector have difficulty borrowing for investments, the offer of finance for energy efficiency investments by some ESCOs could make the sector well disposed to them. However the improved borrowing framework for investment by some institutions in the higher education sector may reduce this attraction.

Barriers to the engagement of ESCOs in the higher education sector

The problem with third level education as far as ESCOs are concerned is that establishments will already have incumbent energy and estates managers who will not naturally wish to see themselves potentially replaced. Provided that college energy managers are motivated they are likely to be able to lead a competent in-house energy management team producing 'theoretically higher' energy savings. The exception would be where the energy manager has multiple responsibilities and energy issues, not being a priority, receive inadequate attention.

The bad experience on the part of some universities that had engaged outside bodies appears to have reduced any enthusiasm that there might have been for ESCOs.

3.2: The Role of ESCOs in the Brewing Sector

The breweries that were interviewed make no regular use of outside contract energy management or ESCOs, other than for CHP.

In one of the breweries there is a CHP plant on-site that is operated by an outside contractor. There is a 15-year contract between the brewery and the contractor for the supply of electricity and steam. The brewery exports its excess electricity to the power procurer (the ESB). At one stage it had extra excess which the physical link for selling on was unable to accommodate and this constituted a barrier to improving efficiency in their use of electricity at the time. However, this was a temporary situation and the brewery is now able to sell on any surplus electricity to the ESB as the necessary

connection is available. The brewery regards the arrangement with the CHP contractor as generally successful.

Breweries expressed some degree of openness to considering contract energy management. They had not ruled it out indefinitely. A few of these breweries were undertaking wide-ranging reviews of their operations at about the time of these interviews, and the possibility of contracting out for utilities was an option to be considered in their reviews. In reply to the question whether the brewery uses energy service companies and what is the rationale for their choice, the following answers were given.

- Energy is mainly an in-house activity. The brewery's own expertise is building up but we have an open mind really.
- Can't speak for the company but ESCOs are emerging elsewhere. They will happen at some stage.
- We're not clear about use of ESCOs *per se* but the brewing sector is increasingly sub-contracting out its utilities.
- We use consultants from time to time. This could be changing and we might end with just the core activity.
- We use consultants from time to time. ESCOs have not been considered so far but we are now being approached by them and are keeping our options open.

At least three of the breweries, therefore, appeared to be aware of the possibility that energy management could be out-sourced one day and they did not show hostility to the idea.

Factors favouring the use of ESCOs in the brewing sector

Some breweries are sufficiently large for them to be attractive clients to ESCOs and the 24-hour production process makes them amenable to the potential for CHP as part of the deal. The open mind of the personnel in the breweries would also be a factor that could be helpful to ESCOs, who would need to be capable and put forward competitive proposals. Such competition could help to raise the standard generally of ESCOs attempting to become established in Ireland.

The fairly homogeneous nature of the brewing sector would also make it easier for ESCOs to build up specialist expertise in the field.

Barriers to ESCOs in the brewing sector

The presence of energy managers in breweries would mean that ESCOs attempting to break in to the market would need to show themselves to be able to offer superior management capability. Energy cost savings may not be sufficient and supply of CHP might be a necessary addition in order to justify engaging an ESCO, though it may not be feasible if a brewery is too small. If the selling on of electricity has become more worthwhile then more opportunities would be opened up.

The uncertain outlook for some breweries could add an element of risk to ESCOs' involvement with installation of energy saving investment items. In addition, breweries could be concerned that confidentiality might be breached with information about their

trading performance becoming available to their competitors in such a small market for ESCOs.

3.3: The Role of ESCOs in the Mechanical Engineering Sector

The companies in the mechanical engineering sector that were interviewed had generally not heard of ESCOs, and had not availed of such services except for audits and some investment advice. Some companies thought that the organisations that had undertaken their audits were ESCOs. It is likely that these had been specialist energy audit firms rather than full-blown ESCOs.

The role of ESCOs and contract energy management was briefly described to respondents. Replies to the question *Do you consider contract energy management to be an attractive option for your company?* were as follows:

- No, we can do it ourselves.
- We have installed monitoring and targeting.
- We would consider it, but our processes aren't rocket science, we could do it ourselves.
- It would be attractive alright. We didn't know about them.
- It would appeal to us. ESCOs have resources while we don't.
- We wouldn't trust them. It would reflect badly on us if they saved money.
- Doubt they would be attractive, but have an open mind.

These responses are not surprising, given that the small amount of ESCO activity that exists in Ireland to date would not have been directed at the mechanical engineering sector, and given the low profile of energy services generally.

Factors favouring the use of ESCOs in the mechanical engineering sector

Though a heterogeneous sector, mechanical engineering consists of many firms where energy use is not especially large and which therefore might begrudge management time spent on accumulating specialist knowledge about energy use. Ventilation and safety issues as well as noise, might also cause management to feel that they need to seek advice. In the current growth phase, production is likely to be paramount and distraction from the core business would be particularly irksome. Financing energy efficiency investment might also be seen as a risky prospect. These factors all suggest that the sector could benefit from engaging ESCOs and that there would be a latent demand for the role that ESCOs could play.

Barriers to ESCOs in the mechanical engineering sector

Despite the factors that favour the use of ESCOs listed above, there is a notable mismatch between the role that ESCOs could play and the type of client that appeals to ESCOs. Many firms engaged in mechanical engineering would not have energy consumption above £100,000 per year that was quoted as the threshold by one of our ESCOs, and £250,000 by the other.

There are a few big energy users engaged in mechanical engineering and, indeed, three of the cases in the main study used in excess of £250,000 and another in excess of £100,000. The sector therefore warrants investigation. That said, the sector does feature

many smaller users and it is here that the mismatch occurs and constructive thinking is required if this is to be overcome.

Other considerations weighing against ESCOs, as expressed in the responses, would include the lack of knowledge about them, some suspicion about their worth, and staff resistance to job loss or to being shown up as having ignored energy savings in the past. In some cases the lack of importance attached to energy owing to its low ratio of expenditure to turnover, about one per cent on average for the case studies, would discourage attention to the issue altogether.

4 POLICIES TO SUPPORT ESCOS

We turn now to investigate some pointers for helping ESCOs to attain their potential and, more importantly, to help them strive for increased energy efficiency. It was seen above that investing in energy efficiency at the client's establishment was not a prominent ESCO activity. The barriers that emerged were:

- problems of information and trust,
- problems of regulations surrounding CHP that prevailed at the time of the interviews
- procedural issues with contracts
- uncertainties owing to price changes
- worries about equipment performance leading to risk averse behaviour, and
- lack of profitability owing to low energy prices.

Policy suggestions outlined here are divided into those directed at:

- the political/legislative level
- the informational and organisational level, and thirdly at
- the economic or fiscal level.

4.1: Policies at the Legislative and Political Level

Measures of a legislative and political or quasi-legal nature are discussed first to help set the context for behaviour.

Measures to counteract distrust of ESCOs are needed. One way that might achieve this would be to have a certification or accreditation system. Certification could be entrusted to Sustainable Energy Ireland (the Irish Energy Centre's successor) or to a new body, or else it could be undertaken by an independent body supported by an association of ESCOs. It would be helpful if ESCOs could be seen to have a proven track record and, to achieve this, results from case studies should be available from the association, say. The results should be in terms of physical energy savings and not just financial savings. ESCOs themselves would need to show evidence of being able to appraise investment and communicate results clearly. Also it should be evident that the ESCO market is

subject to competition and that ESCOs are sourcing items competitively and not just from a few suppliers with whom they happen to be familiar.

Conditions under which CHP companies operate should be fair. Suppliers of CHP should face prices for export and import of electricity that are based on sound economic principles. Interest in investing in CHP evaporates while pricing conditions are unfavourable, another illustration of the importance of prices. There are several issues being considered by the Regulator concerning long-run and short-run marginal costs which, as with all utilities, deserve careful consideration and ought to be clear (CER 2002b, Scott 1995).

Transparency of pricing and facilitation of comparisons should be objectives in the setting of energy prices. Jargon should be avoided. An example to emulate and perhaps link to is the highly relevant regular tabulation of 'useful energy costs' produced by Sustainable Energy Ireland (2004) web link. The same should apply to the likes of transmission charges, as well as to energy service charging, where possible. The relevance of this to the development of ESCOs lies in the need for correct signals to influence choices. Improving the general levels of energy management and expertise by means of ESCOs would be pointless if the incentives that they in turn face are misleading.

Incidentally, the Electricity Regulation Act 1999 allows the possibility of establishing public service obligations, which could be used to support use of CHP. While this could undoubtedly encourage the penetration of CHP it would not be the best way to counter the barriers to this technology. Allowing prices to reflect true economic costs including environmental considerations as far as practicable, is a better way.

4.2: Policies on Information and Organisation

Measures are now listed that improve the level of information and trust, regarding ESCOs. Organisational developments are also suggested.

Measures to improve information and dispel distrust of ESCOs would include more widespread use of sectoral guidelines and benchmarks. These would give information on, for example, the amount of energy used per unit of output of certain items, or per unit of different processes. These could help people to judge whether their plant is wanting, or whether ESCOs are proposing or effecting genuine improvements and efficiency.

It is of course possible that ESCOs currently in business might actually stand to gain from increased energy consumption on the part of their client, especially if the contractual arrangements are unsatisfactory. Therefore benchmarks for various sorts of energy use would be important, acting as independent checks on efficiency achievements.

ESCOs themselves, having presumably already targeted the large energy consumers, are probably beginning to look at the next consumer size down. From our observations, it was noted that very many sectoral case studies complained that they were short of time

to investigate energy use properly. ESCOs could profitably target clients where management personnel are subject to pressures on their time. This might be achieved by pointing to time savings when promoting or providing information on ESCOs.

We saw that there was a mismatch inherent in the potential market for ESCO activities, in that the companies most in need of help are SMEs and yet these are the small consumers that ESCOs tend to avoid. On the other hand, we also saw that an ESCO said that it would consider a public housing scheme, for example. In other words, if there is some energy efficiency activity that could be readily repeated then it could be worth their while entering that type of market. This points to the idea of tapping into trade associations, as recommended by Gruber and Brand (1991), for example. Certain types of potential customer, grouped by process or product, in certain size categories, could negotiate through their association with the guidance of the Sustainable Energy Ireland perhaps. They could, as a group, specify their requirements and negotiate a group contract with an ESCO. Alternatively, different types of ESCOs could emerge, with certain specialisms - the client however could be faced with less choice in that case.

The UK Building Research Establishment (2000) has analysed the development of energy service providers for small and medium-sized enterprises (SMEs). They make similar suggestions for encouraging ESCO involvement with SMEs, except that they recommend in the UK that the utilities, the energy service provider and the Energy Savings Trust be the organisational unit. There is probably more benefit to be had, however, if the trade association is involved as it will be more representative of customers, rather than perceived as another organisation exhorting energy efficiency. The potential conflict of interest on the part of utilities has been highlighted. Their core activity is to sell energy, though this is not to deny that utilities have much to offer by way of established contact with and knowledge of customers, economies of scale and access to cheaper credit. In the UK example the utilities would operate a grant scheme funded by the Energy Savings Trust for (1) an energy audit and for (2) energy efficiency investment when a contract is signed. A number of pilot projects are to be run by the Energy Savings Trust and the proportion of energy used in each sector that is amenable to improved energy management has been identified in a scoping study. A threshold of sterling £20,000 expenditure on energy is considered reasonable. Perceived obstacles were the costs of identifying and acquiring participating organisations and of the initial audits, which is where a grant becomes necessary.

Leaving aside ESCOs' involvement with SMEs and turning to the specification of the contract, to a large extent the contract can help to maintain correct incentives. More research and guidelines on contract specification is advised. The Chartered Institute of Building Services Engineers (CIBSE, 1991), for example, has prepared models of the types of contracts that can be considered, as the IEA (2000) has also been doing. Whether or not certain types of contract would be legally required is a matter for consideration. At present it is important to recognise and avoid distorting incentives in contracts. A possible model might involve a contract that provides for a fixed annual price amounting to less than the current fuel bill and then a shared savings bonus at the end for higher than expected savings.

It is clear that certain types of contract should be generally avoided. These would include contracts such as take-or-pay contracts, for CHP for example, or indeed any condition that prevents an energy saving activity from reaping the rewards of the effort put into it. Distorting incentives in energy use are commonly accepted because their effects, especially their pervasiveness and long-term impacts, are not widely acknowledged.

4.3: Fiscal Policies

Fiscal measures include grants or subsidies on the one hand and taxes or charges on the other.

Subsidies can be beneficial as a mechanism for kick-starting a worthwhile activity. Criteria for awarding financial support need to stand up on environmental and economic grounds because they call on taxpayers' money. The area where there could be justification for grants is with SMEs. The development of ESCOs for larger clients can probably be left to other measures. Encouragement to develop SME associations or cooperation with the Sustainable Energy Ireland could be aided in order to fulfil some of the tasks mentioned above.

A prominent issue arising in the case studies of ESCOs is the absence of attention paid to end-use efficiency and to areas like insulation of buildings in particular. One can only conclude that these activities must be less profitable. A grant-aided retrofit programme could encourage ESCOs to take part. Given that retrofitting is labour intensive and therefore expensive there might be a better argument for reducing labour taxes. Such benefits get partially passed on and could result in raised participation rates by labour, which could be welcome in times of tight labour supply. Raising the price of energy through taxes that reflect energy's external damage costs would also improve the profitability of activities that were only marginally profitable heretofore. These reforms, which come under the heading of green budget reform - reform that brings in revenue to help reduce other taxes thereby keeping the overall tax take unchanged - are well-suited to improving energy efficiency and are beginning to form part of the government's strategy on climate change.

The benefits of a stable price environment, as pointed out in the Green Paper on Sustainable Energy (Department of Public Enterprise, 1999) and by FUTURE COGEN (2001), are endorsed by respondents' fears about risk described in the sectoral and ESCO case studies. Given that uncertainty is inimical to ESCOs, to CHP and to energy efficiency investment, applying tradable emissions permits as a means of attaining Ireland's targets under the Kyoto agreement on greenhouse gases, is not as helpful as applying carbon taxes. By choosing permits as a mechanism, proposed policy is foregoing the relative price certainty that is more easily attained with taxes.

Indeed, as pointed out in the EU Commission's Policy document on CHP, one of the principal remaining barriers to CHP in the liberalised market is the failure to tax energy correctly (European Commission, 1997). Given that the implications of low energy prices are a dominant theme in the comments from respondents, a tax that was

introduced gradually, took account of fuel price movements and gave reasonable price assurance would help because it would automatically be pervasive while involving minimal administration. The failure to date to make energy prices reflect the cost of external damage is a barrier that applies to the development of ESCOs, energy technologies and to energy efficiency in general.

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Appendix 1: Questionnaire for Energy Service Companies (ESCOs)

Study by ESRI of

Barriers to Energy Efficiency

Questionnaire for Energy Service Companies (ESCOs)

Companies supplying energy services (the generic term is ESCOs) offer the potential to improve energy efficiency. This questionnaire aims to investigate aspects of these companies in Ireland, including how they draw up their contracts, the potential market, liberalisation and government policy in general. The aim is to discover what barriers impede development of ESCOs.

Companies (or branches of companies) engaged in the following fields fall under the ESCO heading: Contract Energy Management (CEM), Facilities Management (FM) and CHP companies. Some questions listed here may be irrelevant to your company or branch and can be skipped, though you are welcome to volunteer your opinions on them.

Your company or branch

- Referring to your sales of **energy services**, what is your annual *turnover and approximate market share*?
- How has the market *expanded* over the last 5-10 years?

Contracts

- What *services* do you offer?
 - O&M of boilers
 - fuel purchase
 - design, installation & operation of new boiler plant
 - design, installation & operation of CHP plant
 - monitoring & controls (e.g. BEMS)
 - end use efficiency investment for HVAC
 - end use efficiency investment for electricity
 - design, installation and maintenance of new build/refurbishment
 - finance for energy efficiency investments
 - wider facilities management (including security, cleaning, telecomms, environmental, etc.)

- Other (specify)
- How are contracts *specified*?
e.g.
 - heat services
 - shared savings
 - fixed fee
- What is the typical *duration*?

Sectors

- What *proportion* of your business is in:
 - the public sector
 - the commercial sector
 - industry
- What are the *reasons* for this mix?
- Are you considering expanding the business to include *smaller sites* and the *domestic sector*?

Specific sectors

- To what extent do you have contracts in:
 - the higher education sector
 - the brewing sector
 - the mechanical engineering sector
- What are the *reasons* for your market share in these sectors?
- Under what *conditions* could the market in these sectors expand?

Clients

- What is the *minimum value/quantity of energy use* at a single site that you would consider attractive for a contract?
- What *types of organisation* do you target (or avoid) and why?

Energy efficiency

- Which *type of energy efficiency project* are you most likely to engage in - e.g.:
 - fuel switching
 - boiler replacement
 - CHP
 - controls & BEMS
 - building insulation
 - lighting
 - awareness & housekeeping
 - process energy improvements
- What are the *typical savings* in energy consumption achieved through your contracts? How does this vary between a) type of site; b) type of contract?
- Typically, what is the *potential* for further improvement in energy efficiency in your existing clients?
- Can the contract terms *limit* energy efficiency opportunities (e.g. take-or-pay)?

Motivations & barriers

- What do you consider are the *primary motivations* for an organisation to enter in to a contract - e.g.:
 - prospect of significant energy cost savings
 - shortage of capital
 - lack of technical expertise
 - management priorities to concentrate on core business
 - environmental concerns
- What do you think are the *primary obstacles* to entering into a contract? e.g.
 - lack of awareness / information about the energy management market
 - low energy prices & consequent neglect of issue
 - complexity of contracts and measurement of what is being bought
 - lack of adequate contract management skills
 - want to keep the savings for themselves
 - don't think there are many savings to be had
 - don't want to be tied in to long term contract
 - opposition from existing estates staff, plant management staff etc.
 - opposition to staff redundancies or staff transfer
 - loss of autonomy over production, comfort or convenience

- don't trust consultants and energy management companies to do what is best for the client

Policy

- How may these *obstacles* be overcome?
- How would you assess the impact of energy *market liberalisation* on your business?
- How could *public policy* help your business e.g.
 - information & awareness raising about potential of ESCOs
 - model contracts and assistance for small businesses
 - subsidies for CEM audits
 - higher energy prices
 - UK-style *Private Finance Initiative* to help your markets in the public sector?
 - Other (specify)

Thank you for your co-operation.

This project is part of the EU JOULE programme and is also being undertaken by the UK Science Policy Research Unit SPRU and by ISI in Germany.

Appendix 2

Questions about ESCOs asked of the enterprises in the main part of the study.

Question on ESCOs posed in the Pre-interview Questionnaire

Do you use contract energy management? Yes No

If yes, could you briefly indicate the coverage of the contract:

.....
.....
.....

Question on ESCOs posed to the Energy Manager in the main questionnaire

- Do you consider **contract energy management** to be an attractive option for your brewery? If not, why not? If yes, then for which functions are they most appropriate?