

Liberating the power of Energy Services and ESCOs in a liberalised energy market

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Abstract

Energy Services Companies (ESCOs) could help to address barriers to energy efficiency and micro-generation, by providing information, finance, installation, operation and maintenance under a long-term contract.

Three distinct types of market for energy services are identified in the UK. First, the commercial and industrial sector, using a '**facilities management**' or '**performance contract**' model, where the ESCO offering is most developed, and where there remains great potential. Second a **community model**, where decisions are taken by or on behalf of a group of customers in the same location (for example, but not exclusively, a Community Heating scheme). There is particular opportunity in new build, and in social housing. Third, a **household model**, where energy suppliers, contractors or equipment suppliers to existing residential customers may evolve to include energy efficiency and micro-generation. The facilities model is well known, while ESCOs specialized in servicing households are virtually almost non-existent. What is new in this paper is the outlining of the communities model (especially the opportunities in new build) as an opportunity to transfer the ESCOs model to smaller customers as an intermediate step to serving households and discussing the opportunities of diffusing the ESCO concept among households via equipment and service suppliers. The paper explores opportunities and barriers as well as policy options to promote each of the three models. The paper takes the UK as a case study to demonstrate opportunities and barriers. Liberating Energy Services could make a range of measures on the customers side of the meter competitive with new supply, and is therefore the logical completion of a fully competitive market, albeit one that could at the same time achieve economic efficiencies and carbon reductions.

Introduction - the need for energy services

Energy Services Companies (ESCOs) could help to address barriers to energy efficiency and micro-generation, by providing information, finance, installation, operation and maintenance under a long-term contract.

There are a range of reasons why the potential for energy efficiency is not achieved. These include:

- Lack of understanding of the saving opportunity;
- Lack of time to address energy, since energy forms a small portion of overall expenditure;
- Lack of capital, or a high cost associated with borrowing capital;
- A lack of capacity to install measures;
- Consumers' and financial institutions' aversion to risk and to new technologies and service delivery routes;

There are a range of reasons why the potential for micro-generation¹ may not be achieved including all the above reasons plus:

- Issues associated with installation such as connection, metering, notification to network operators
- Difficulties in securing top-up and back up sources of electricity and heat (when demand is greater than output) and sale of surplus electricity to other customers (when output is greater than demand)

Where ESCOs were once seen as a way of addressing these issues for energy efficiency, they are also important for generation of low carbon heat and electricity, and at all scales from above 100 MW

¹ Micro-generation is taken to include a portfolio of plant that deliver heat and or power and or cooling with no or low carbon content compared to conventional supplies. They may serve an individual site or a community or a single household.

on an industrial site, to 1KW in the home. Energy services packages may overcome many of the barriers described above through some combination of design, build, finance, operation and maintenance of installations.

If governments are committed to serious cuts in carbon emissions, the potential for energy savings and for micro-generation will need to be achieved. Energy services may be useful in delivering across a range of sectors and timescales, for example, in the UK, around three quarters of CHP in buildings or recently installed on industrial sites is thought to have been installed on an energy services basis. Energy Services may be crucial to achieve future targets for CHP and renewable energies. Longer term, the *40% House* report [1] suggested that in order to achieve the scale of change needed in housing, more than half of households might be supplied on an energy services basis by 2050. The potential is not a UK potential but could benefit all G8 countries [2].

Indeed, ensuring demand management options are assessed on a level playing field with new forms of supply, and ensuring that embedded generation is assessed on a level playing field with central generation is arguably nothing more than the completion of a properly and fully liberalised energy market. This is as true at the European scale as at the national level, and the European Union has a longstanding interest in promotion of energy services.

What Energy Services offer

An industry seminar organised by the UK Energy research Centre [3] put considerable emphasis on the need to get the definition of energy services consistent and more widely understood, not just among consumers but practitioners, potential purchasers, and policy-makers too. In particular 'Energy Service' and ESCO are different concepts, which too often have different meanings and are confused.

Customers' service needs vary widely. Thus service provision need to be tailored to satisfy particular market niches such as: billing and metering; joint utility supply (e.g. electricity, gas, heat, water, telecommunications); energy analyses of buildings and industrial processes; energy, lighting and building management (including security); installing, financing and operating efficient equipment and CHP schemes on customers' premises; 'green' electricity provision, possibly at premium prices; equipment maintenance and leasing contracts; individual building renovation and insulation; and possibly involvement in large-scale urban development and renovation [4]. Energy service contracts allow the client to reduce operating costs, transfer risk and concentrate attention on core activities. Energy service contracting is a form of outsourcing. It will only be chosen where the expected reduction in the *production cost* of supplying energy services can more than offset the *transactions cost* of negotiating and managing the relationship with the energy service provider. [5]

Energy Services encompass a range of activities, such as energy analysis and audits, energy management, project design and implementation, maintenance and operation, monitoring and evaluation of savings, property/facility management, energy and/or equipment supply, provision of service (space heating/cooling, lighting, etc.).

Energy Service Companies (ESCOs) create the focus needed to implement economically sound energy efficiency ideas [6]. Their experience is valuable to facility owners who:

- Do not understand their energy bills,
- Do not believe they have any wastage,
- Do not understand their energy use and where savings opportunities may lie or how to design retrofits,
- Do not know how to raise finance without debt, or
- Do not recognise the role of operational monitoring in controlling energy costs.

ESCOs provide a valuable service for facility owners and the environment by finding and implementing self-financing energy savings opportunities, which reduce energy waste and emissions.

An ESCO is a company that fulfils some or all the following requirements:

- An ESCO can provide integrated energy services to their customers (mainly large energy users, but also utilities), which may include implementing energy-efficiency projects (and also renewable energy projects), frequently on a turn-key basis.
- An ESCO can provide performance and savings guarantees, and its remuneration is directly tied to the energy savings achieved. In this case an ESCO risks its payments on the performance of equipment and services implemented. Some ESCOs finance projects, recovering their investment cost from the resulting savings. Some ESCOs assist their clients in acquiring financing by providing a savings guarantee, which acts as a safeguard for financing institutions.
- The financing of the project can be ensured through two main types of contracts: Guaranteed Savings and Shared Savings. In a shared savings contract the ESCO guarantees the cost of energy saved; the cost savings are split for a pre-determined length of time in accordance with a

pre-arranged percentage; this division is dependent on the cost of the project, the length of the contract and the risks taken by the ESCO and the consumer. In a guaranteed savings contract the ESCO guarantees a certain level of energy savings; the performance guarantee is the level of energy saved. In the shared saving contract, the ESCO assumes the performance and credit risk; in the guaranteed savings contract, the client assumes the credit risk, while the ESCO assumes the risk for the savings.

Bertoldi and Rezessy [6] have characterized the EU ESCO market. Most ESCOs have been founded either by large companies or as subsidiaries of large companies (equipment manufacturers, facility management companies, energy utilities). The objectives for these companies do not necessarily focus solely on exploiting the financial opportunity of energy savings; other factors also act as strong drivers for offering energy services, such as selling energy, financing sale of their equipment, retaining a large energy customer or acquiring a new customer by adding value via energy services to the supply of otherwise homogenous commodities such as electricity or gas. Most ESCO projects in Europe have been based on the shared savings concept. Chauffage (supply of energy) contracts are also commonly used. The guaranteed savings concept has been used rarely; There is some "build, own, operate, transfer" of ownership to the site (BOOT). ESCOs have so far mostly provided financing themselves (mainly in France, Italy and Germany); Only recently have more ESCOs started using third party finance (e.g. banks). More third party finance and guaranteed saving contracts are needed, otherwise investment is limited by company capital availability and their credit line. This makes ESCO markets illiquid by locking out small companies; in addition the ESCO market in Europe is segmented in 'functionally specialised' companies. The recent energy industry restructuring has stimulated projects in CHP for large commercial centres, hospitals, and industrial facilities; it has also triggered public lighting projects, where municipalities tendered lighting operation, including the supply of electricity. The majority of ESCOs' projects in EU MS have focused on co-generation; public lighting; HVAC and EMS. The majority of ESCO projects in Europe have been undertaken in the public sector, which is perceived as a safer client that never goes out of business or changes production volumes or operation. According to Bertoldi and Rezessy [6], Germany and Austria are the premier ESCO markets. In Germany in 2003, there were around 500 ESCOs, with a turnover circa 3bn Euro, serving around 120,000 sites, estimated to be around 9% of the market potential. Investment is led by public buildings as a way of outsourcing. Berlin alone has 1,500 buildings served by an ESCO; the buildings are grouped in a number of pools to minimize transaction costs. The total guaranteed savings in Berlin is 9,5 million Euro/year (25.4%), with a total CO₂-Reduction (1993-2003) in excess of 145.000 tonnes. This required a total Investment of 40.3 million Euro [7, 8]. Austria has 35 companies; in Austria 600 to 700 buildings have received an energy performance contract, which represent roughly 6-7 % of all public and private service building sector and about 4% of total floor area. Projects have been implemented in about 300-400 federal buildings (about 50% of total floor area of federal buildings) grouped in 12 pools. France is a mature market dominated by a few large companies. Hungary has 29 companies, and about two thirds of customers are municipalities. In Holland energy management is common but there is almost no energy performance contracting. In Denmark there are few ESCOs, though there are a lot of municipal energy companies running CHP on district heating and a great number of Government energy efficiency programmes. Denmark and the Netherlands being European leaders in energy efficiency action with very limited ESCO activity demonstrate that ESCOs are only one way of achieving investment in energy efficiency projects. Bertoldi and Rezessy viewed the UK as a leader in Europe in the development of the ESCO market. However, in recent years, with the implementation of new electricity trading arrangements in 2002 and falling electricity prices, together with rising gas prices, many indigenous ESCO companies have withdrawn from the market. Those companies that remain are predominantly French, Danish or Swedish in origin.

The Energy Services Directive, which has been under development in the Commission for a number of years, was adopted in May 2006 [11]. The Directive sets targets for Member States for energy end-use savings resulting from policies and programmes of 1% per year, cumulative, for 9 years, (from 2008 until 2017). The Directive covers households; agriculture; commercial and public sectors; as well as (with some exceptions) transport and industry. All types of energy will be taken into account, from electricity and natural gas to district heating and cooling, heating fuel, transport fuels, coal, and biomass. The practical implications of the Directive are that it requires much more intelligent metering and billing; the Directive gives encouragement to explore the use of white certificates, allowing trading of energy savings across a number of sectors. Both these measures would encourage development of energy services.

Market opportunities for ESCOs

A seminar organized by the UK Energy Research Centre identified three broad models of energy services as shown below [3]. Three distinct types of market are identified, with different opportunities and barriers. First, the commercial and industrial sector, using a **'facilities management'** or **'performance contract'** model, where the ESCO offering is most developed, and where there remains great potential. Second a **community model**, where decisions are taken by or on behalf of a group of customers in the same location (for example, but not exclusively, a Community Heating scheme). There is particular opportunity in new build, and in social housing. Third, a **household model**, where the energy supply, contractors or equipment suppliers offering to existing residential customers may evolve to include energy efficiency and micro-generation. This is the hardest market for ESCOs to break into, especially in the short term, since the transaction costs of servicing millions of small (and skeptical) consumer is large compared to the savings without significant policy intervention. There is a well-established incumbent model of supply with significant barriers to new market entry for an alternative business model.

Table 1: the three broad models of energy services

	A facilities management model	A community model	A domestic energy supplier model
Description	<ul style="list-style-type: none"> • Energy services as a way of retaining large industrial customers on a long term supply contract • Energy services as part of a facilities management approach to commercial and public sector buildings • Energy service as a mean of delivering engineering services or new equipment 	<ul style="list-style-type: none"> • Energy services companies managing design, build, finance and operation of community Heating schemes, often as a partnership between a private sector company and a Local Authority, or a new-build housing developer. • Large new build housing developments could follow a community ESCO model where the developer involves an ESCO partner with exclusive responsibility for a the operation, maintenance and possibly energy supply to a defined area (at least for a period of say 10 yrs), even if the solution adopted is solar thermal and microCHP not community heating. 	<ul style="list-style-type: none"> • Energy services offerings to existing households by utilities companies, contractors or equipment manufacturers and suppliers • In Great Britain, under the Energy Efficiency Commitment, suppliers can receive a 50%-uplift on the savings of energy efficiency measures promoted via through energy service activities. This uplift, however, is limited to 10 % of the overall activity. Of the six major suppliers with an EEC target three submitted schemes that would take them over the 10 % threshold if take up had been as forecasted; in reality the energy services uplift was only 3.6% of all insulation activity, and in reality, the definition of energy services fell well short of what is commonly understood to be ESCO activity • Micro-generation adds significantly to the range of options that could be included in an ESCO offering
UK Examples	<ul style="list-style-type: none"> • CIBSE have had Guidance on Contract Energy Management since 1991 [12] • Around 1200 CHP schemes in buildings, totalling almost 350 MW of capacity, of which 80% are estimated to be offered on an energy services basis [13] 	<ul style="list-style-type: none"> • Woking BC partnership company Thameswey Energy[14], Southampton Geothermal Heating [15], Aberdeen Heat and power, and a range of schemes delivered under the Community Energy programme [16] • Large new build housing development is Greenwich Millennium Village, which has both community heating and solar PV. 	<ul style="list-style-type: none"> • Some EEC programmes have sought partners (eg Housing associations or local authorities to help deliver measures
The UK potential	<ul style="list-style-type: none"> • Potential – a proportion of 1.7 million industrial commercial and public sector sites in the UK. 	<ul style="list-style-type: none"> • Potential market of around 175,000 new homes per annum, or an estimated 10M new homes by 2050 • Some 5M existing homes are rented from a Social Landlord in the UK (Registered Social 	<ul style="list-style-type: none"> • Around 18m homes are currently owner-occupied. These are homes where the individuals that occupy the building are responsible for managing the energy inputs and infrastructure, and where

		Landlord or Local Authority) [17]. Around 5m existing homes could be served by community heating [18] but they are not necessarily the same dwellings.	evolution of traditional suppliers are the main route for ESCOs.
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It is important to recognise the full range of opportunities. There is more experience with larger customers, but there is also significant opportunity to extend the market to medium- and smaller customers. From the householder perspective, an energy service offering will mean the provision of heat, light and power for the home, paid for through a financing arrangement linked to the ongoing reduction of fuel bills (compared to the business as usual case). The installation of smart meters, energy efficiency measures, or micro-generation, would be needed to create ongoing and guaranteed reductions in energy consumption.

Opportunities and barriers

Each of these models is currently faced with a number of opportunities and barriers.

Barriers

There are a number of generic barriers to energy service provision in liberalised energy markets.

- The dominant **business model** in liberalised gas and electricity markets has an emphasis on size to reduce kWh price. A customer base of some 4 or 5 million customers is seen as the minimum size to create appropriate economies of scale. In the UK there are thus only around 5 major suppliers, with little real price or service quality differentiation of offering.
- **Barriers to new entrants:** costs of securing and retaining a household supply license; exposure to risk in energy wholesale markets without upstream assets; high entry costs through the need for substantial marketing. Partnerships with energy suppliers and/or contractors are therefore the most likely models for involving other commercial players in the market.
- Potential new suppliers feel **it is difficult to be innovative** in this commercial and regulatory environment .
- Customers (whether households or businesses) will not want to buy into a medium or long term **commitment** since another supplier might prove to be cheaper, or they might move.
- Inadequate consumer protection frameworks against “cowboys” in the energy service provision business. **Consumer protection frameworks** are needed, e.g. affiliation with the Energy Services Trade Association could be encouraged if a mechanism could be put in place to enable the removal of affiliation from poor-performers. ESCO accreditation schemes by another party (e.g. in the UK EST or OFGEM) is also a valuable option.

Table 2 provides an overview of other barriers to the provision of energy services specific to each ESCO model in the UK.

Table 2: Other barriers are specific to each type of ESCO model in the UK

Barriers specific to the facilities management model	Barriers specific to the community model	Barriers specific to the domestic energy supplier model
<ul style="list-style-type: none"> • Energy as a fixed or variable cost - many clients mistakenly see energy as an uncontrollable overhead rather than a risk or opportunity. • Cheap energy and short fixed contracts mean companies have been less concerned about energy. Recent price rises and contracts up for renewal mean this might change. • Organisational structure – a company's grouping into departments, reporting lines and budgets often make the complete outsourcing of energy services very difficult • There are other investment priorities; lack of budget for energy investment; no life-cycle costing • Much commercial space is rented, meaning the costs lie with landlords and often bills lie with tenants. The market potential is there but there is no motivation for lessors or lessees 	<ul style="list-style-type: none"> • Housing developers want to get in and get out and have no commitment to a site. An ESCO may have to be a separate organisation from the developer. • The upfront cost of lower carbon solutions can be high compared to standards heating systems, even if carbon emissions and life cycle costs are lower. • There is little evidence that people prefer homes that have lower environmental impact or low energy cost. New housing developers cannot recover the cost of an upfront investment • Lower carbon solutions are not needed to get through planning and building regulations hurdles. • There is very little experience with this kind of model except in social housing. Housing developers are risk and cost averse. • Some technologies have a bad 	<ul style="list-style-type: none"> • Consumers show little recognition of the concept of energy services and there are difficult issues with consumer trust, largely because the motivation for the approach is not understood [19]. Energy efficiency is not a priority for consumers; actions can not be 'shown off' to peers; not much interest in fuel bills due to low energy prices and bills often show credit; most people don't get round to actions; perceived disruption to the home and hassle; upfront cost; concern with borrowing with a 2-5 year tie-in; suspicion of energy suppliers and fear of commitment • Confidence in relevant trades to carry out works to quality standards – some form of accreditation is required • Transaction costs can be high compared to the savings. The cost savings won't go far if they have to

<p>to make changes.</p> <ul style="list-style-type: none"> • ESCO offerings can be very different and thus hard to compare - and may not be easily matched to customers needs. • Lack of services integration e.g. there may be an incumbent M&E contractor which does not offer energy management services, and unless the energy service provider can work effectively with or replace the maintenance contractor then savings in practice may be difficult. 	<p>reputation (like old community heating) because they have in the past been badly maintained. This colours perceptions of new schemes.</p> <ul style="list-style-type: none"> • Consumers often prefer individual rather than communal solutions. • Bill collection is expensive for small numbers of consumers. The Energy suppliers can spread costs over millions of households. 	<p>be shared between audit, investment, ESCO profit and householder. Need to either increase cost savings (e.g. micro-generation) or enhance the value of savings, also by bundling numerous similar projects in pools to reduce transaction costs.</p> <ul style="list-style-type: none"> • The Energy Services offering needs commercial development. The Design Council recently did some work on what an ESCO or HOUSE Co might look like [20]. • Barriers to new market entrants(energy suppliers) are high, e.g. costs of securing and maintaining a supply license; exposure to risk in wholesale markets without upstream assets (reduced ability to hedge); high entry costs such as marketing • Meters are currently installed by suppliers, who have no incentive to upgrade to more expensive smart meters due to the risk the customer will switch supplier, leaving a 'stranded asset'. Longer term contracts, or change in meter ownership model may help. • Customers are free to switch suppliers with 28 days notice (the 28-day rule), though a pilot is exploring the implication of longer tie-ins. • Home owners may be resistant to losing control.
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Opportunities

There are a number of generic opportunities for energy service provision in liberalized energy markets.

- The potential for sale of electricity via **private wire** (i.e. a private electricity network not owned by the distribution company, and thus incurring no use of system charges for export) to facilitate a package of measures.
- A **micro-generation commitment** could help to enhance the value of ESCOs and improve the business case for them.
- **Energy price rises** are an opportunity, - the commercial sector will be more inclined to take interest; domestic consumers concerned about energy prices are often more interested in price freeze tariffs.
- ESCOs might naturally develop an advantage if and when energy prices rise, with higher demand in relation to supply, or through mechanisms that put a **price on carbon**, or through White Certificates

It is important to remember that competition in electricity and gas supply began in the UK with a small number of large players and thresholds were gradually lowered to include all customers including households. The development of the energy services market could follow a similar pattern.

Other opportunities are specific to each model as listed in Table 3.

Table 3. Other opportunities are specific to each type of ESCO model in the UK

opportunities specific to the facilities management model	opportunities specific to the community model	opportunities specific to the domestic energy supplier model
<ul style="list-style-type: none"> • Public procurement is currently limited (e.g. the Private Finance Initiative has a poor record on energy performance contracting) – needs to play a much greater role. This would help to develop a more consistent definition of Energy Services. • The public sector can borrow 	<ul style="list-style-type: none"> • Key sectors such as local government or social housing could take a lead. The London Mayor is understood to be exploring setting up an ESCO for London, and English Partnerships and the Housing Corporation could be active in supporting developments they are involved in, in developing ESCOs. 	<ul style="list-style-type: none"> • Schemes established under the community model could take a lead in connecting homes close to the core community. In the UK, district heating schemes grow their connected load at an estimated 5% per annum once established. • Although they raise the transaction costs, there is considerable

<p>money at lower rates than the private sector. It could lever third party finance.</p> <ul style="list-style-type: none"> • Incentives much greater for those companies included in the EU Emissions Trading Scheme (EU ETS) • There is a lack of knowledge of grants/subsidies available. Better communication about these is needed. 	<ul style="list-style-type: none"> • Housing developers could contract out all energy infrastructure on a site to an ESCO to design build operate maintain and bill. The ESCO can design and manage the assets to achieve least life cycle costs • In new build developments, the cost of energy efficiency and micro-generation is the marginal cost over and above what would be installed anyway (e.g. gas boilers, gas network). If scaffolding is present to install a roof, the marginal cost of installing PV and solar thermal at the same time is lower than in retrofit situations dedicated solely to renewable technologies installation. Economies of scale can be made to install devices in a thousand homes in one go. Systems (e.g. metering and generation systems) can be integrated from the start. • In new build developments, an electrical network has to be installed to each home, which is usually given to the distribution network operator (DNO) to manage because it is seen as a liability. If this is designed and installed by an ESCO it can be retained and used to sell surplus electricity by private wire. This attracts 8p p kWh rather than 2p, and completely changes the economics of electricity generation • An ESCO could be a facilitator of services within a community including car clubs, IT, or other community goals. Involvement is key with local stewardship and a local dividend • Many programmes (Renewables Obligation and EEC) are invisible to people. Yet to achieve a 60% CO2 (?) reduction needs behaviour change. ESCOs are big enough to start behaviour change, as a communication route for and to get buy-in to deep carbon cuts. 	<p>consumer interest in home energy audits – people are keen to know how energy efficient they are. Audit support schemes may be linked with a provision to implement all no- and low-cost measures identified.</p> <ul style="list-style-type: none"> • Micro-generation might be a new opportunity partly because of the cost of the asset and the income stream, but also because many technologies reduce peak demand (i.e. expensive energy). • Energy Suppliers need to differentiate their offerings; the current churn levels of customers between suppliers is unsustainable. Whilst there is currently much emphasis in market-place on switching energy suppliers, encouraging loyalty is cost-effective business for suppliers because it costs 5 times as much to acquire a new customer as to retain an existing one. But there are easier and cheaper ways for energy suppliers to obtain loyalty than energy service provision e.g. reward schemes
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Policy Recommendations

Given these opportunities and barriers, a number of policy recommendations flow. Again, many of these are particular to the model of ESCO envisaged.

Table 4 Policy Recommendation to support ESCO development

A facilities management model	A community model	A domestic energy supplier model
<ul style="list-style-type: none"> • Organisation of training courses for energy managers, making them aware of ESCO activities, ESCO-type projects, and measurement and verification methods and protocols for measuring energy savings. • Ensure that ESCOs provide a qualified and reliable service. Define the minimum set of qualifications for ESCOs, together with a system to 	<ul style="list-style-type: none"> • The organisational model developed to implement community heating is more developed than many realize, eg Woking and Thamesway, Merton though more publicbusiness models or templates would be useful, • Surestart could be a good model for a national framework for development of local services². 	<ul style="list-style-type: none"> • The consumer appetite for energy services is low, and the deals that suppliers offer largely do not meet consumer wishes. In this market condition it would be more effective to concentrate on improving consumer information about their energy use, and ways of reducing it. • In the short term, better information and access to information is required

² <http://www.surestart.gov.uk/aboutsurestart/> . Sure Start is a Government programme which aims to achieve better outcomes for children, parents and communities. It promotes services such as childcare, health and emotional development for young

<p>assure the quality of service..</p> <ul style="list-style-type: none"> • Create more information for financial institutions, and provide incentives to the "first movers" in this sector. • Develop funding sources. Funding feasibility studies, energy audits and the preparation of financing applications would increase their ability to secure additional information and decrease the amount of equity capital required. A revolving fund to finance energy efficiency measures could be set up. Dedicated debt organisations offering 80-100% financing for projects could be established as a link between the market and conventional lending institutions. Under this option, a master loan agreement would be standardised and executed between an ESCO and the debt facility which would commit the lender to provide financing according to defined terms and conditions. Cash-flow based financing matches better the specifics of energy efficiency projects than traditional asset-based financing. Benefits of forfeiting of energy savings. • Standardise contracts and proposals and measurement and verification (M&V). The development of standard procedures for M&V of savings as well as for standard contract terms can help both end users and the financial community better understand performance contracting. • Promote energy performance contracting in government buildings. Government-owned property is a major energy user and can represent a significant proportion of the potential ESCO market. ESCOs can provide government organisations with valuable expertise and private sector investment capital. However, energy performance contracting is very often regarded as unconventional finance by government authorities. Rules and regulations may simply not allow energy performance contracting on government property and need urgent review. There might be a key role for PFI. 	<ul style="list-style-type: none"> • How to develop the capacity of individuals and champions • Encourage Local Authorities to use powers they already have to partner in such schemes • Require Almos the Housing Corporation to develop plans for ESCOs • Planning requirement - at least 10% of energy used in housing developments to be generated on site, though the planning regime • There is a need for a different type of license (other than a standard Electricity Supply License) for energy services or bundled services. Review license exempt supply regime to make it easier for small schemes to sell power • Require distribution network operators to reach agreement with community schemes over ownership of private wires to enable private wire supply to households 	<p>through smart metering and billing. If Bills were on the web, with frequent updates from meters, customers could input their own surveys and do on-line option appraisals. Finance and contacts with installers could be offered on-line.</p> <ul style="list-style-type: none"> • Information on energy use is hard to come by for installers. Some claimed it was easier to get info on the selling price of a house (eg via www.ourproperty.co.uk) than to get information on the energy used by it. • Implement a microgeneration obligation on domestic suppliers • Allow ESCOs to claim Enhanced Capital Allowances on investments in households • Creation of further incentives for new market entrants • Establishing white certificates scheme should enable new market entrants to participate. • Implementing a scheme of Personal Carbon Allowances³ • Creating Awareness in small contractors. Small contractor <i>training</i> and support is needed for selling, financing, predicting and demonstrating of energy savings, • Energy efficiency financial products for households need to be packaged so that there is minimal incremental effort for the small contractor, and the contractors must learn how to represent and work with the financing
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children, and support for parents. It works by helping services development in disadvantaged areas alongside targeted financial help for parents to afford childcare, and ensuring local service provision is underpinned nationally by a common set of principles.

3 Personal Carbon Trading or personal carbon allowances are like the EU emissions trading regime but extended to households. Emissions rights would be granted for domestic energy use, personal travel and aviation. Households that used less than their allowance could sell it to households that used more. A cap on emissions could be slowly tightened. UKERC is researching implementation of Personal Carbon Trading, see http://www.ukerc.ac.uk/component/option,com_events/task,view_detail/aid,22/Itemid,0/

A large part of most nations' energy savings potential is usually contained within SMEs and households who have little ability to make energy savings. However, there is a large energy efficiency potential to be tapped by *diffusing ESCO concepts* amongst all existing small contractors serving the SME and household sector. There are three main approaches to encouraging uptake of ESCOs in homes, these are:

- Developing ESCOs in new build and in communities such as social housing
- developing existing energy suppliers into ESCOs, and
- developing existing equipment and service suppliers into ESCOs.

These routes are explored next.

Developing ESCOs in new build

As outlined above, ESCOs in new build are a particular opportunity, since there is the opportunity to make decisions on behalf of a community that is yet to exist, and to install energy efficiency at marginal cost (compared to levels of ex-post insulation or replacement of boilers that would have existed anyway). There is also the opportunity for economies of scale for equipment purchase. For the builder or developer who wants to build and move onto the next project and retain no ongoing interest in a site, contracting out provision of energy infrastructure simplifies construction, and allows a more sophisticated and integrated provision of energy, with the ESCO retaining an operational billing and maintenance role. The key policy drivers to such an approach in new build are planning regulations (e.g. a raft of authorities now require at least 10% of electricity to be generated on site from renewables or CHP) and revisions to building regulations in 2006, with further regulations every 5 years. There is much interest in aiming for zero net carbon new build for the UK by 2020 (equivalent to the top end of an A on the new energy label for homes, based on the Energy Performance of Buildings Directive). **Managing the infrastructure** necessary to this objective would be an opportunity for ESCOs.

Developing Energy Suppliers into ESCOs: White Certificate Schemes

A new policy tool to foster investments in energy efficiency has been recently introduced in a number of EU Member States. A tradable certificate for energy savings (TCES) portfolio involves four key elements [22]: (a) the creation and framing of the demand, by an obligation to save energy imposed on some market actor in the energy sector; (b) the tradable instrument (certificate) certifying the obtained savings and the rules for trading; (c) institutional infrastructure to support the scheme and the market (measurement and verification, evaluation methods and rules for issuing certificates, a data management and certificate tracking system and a registry); (d) cost recovery mechanism in some cases.

Variations of this policy mix have been introduced in Italy, Great Britain, and since 2006, also in France. In the Flemish region of Belgium there are savings obligations imposed on electricity distributors without certificate trading option. In **Great Britain**, the Energy Efficiency Commitment (EEC) runs in 3-year cycles from 2002 to 2011. It replaced the previously existing Energy Efficiency Standards of Performance (EESOP), which ran from 1994 to 2002 establishing the principle of pooled spending on energy efficiency for **domestic consumers**. EEC-1 program required that all gas and electricity suppliers with 15,000 or more domestic customers deliver a certain quantity of 'fuel standardised energy benefits' by encouraging or assisting customers to take energy-efficiency measures in their homes. The overall savings target was 62 fuel standardised TWh (lifetime discounted) and the total delivered savings reached 86.8 TWh. In EEC-2 (2005-2008) the threshold for obligation has been increased to 50,000 domestic customers. The target has been increased to 130 TWh; however also due to carrying over of savings from EEC-1 already in 2005 more than a quarter of this target has already been achieved. Suppliers must achieve at least half of their energy savings in households on income-related benefits and tax credits. Projects can be related to electricity, gas, coal, oil and LPG. Suppliers are not limited to assisting their own customers only and can achieve improvements in relation to any domestic consumers in the UK. Carbon benefits estimations take into account the rebound effect – the likely proportion of the investment to be taken up by improved comfort – by adjusting the benefits to 'comfort factors'; in addition dead-weight factors are considered to account for the effect of investments that would be made anyway. At present saving certificate trading is not a feature of the scheme in Great Britain, but suppliers can trade obligations.

White certificates could in principle support the development of energy services and ESCOs to the residential sector. Some white certificate schemes allow ESCOs (in Italy) or any project developer that aggregates savings above a certain size threshold (France) to certify their energy saving projects and sell them in the certificate market (either on a spot market or via over-the-counter bilateral

contracts). This would bring additional cash to the ESCO project and could increase the confidence of finance institutions in energy efficiency projects. In addition, white certificates schemes could mandate a certain level of savings in the residential sector, or by making residential project more attractive (e.g. through easier measurements and verification procedures or through giving bonus for action in the residential sector). The relationship between White certificates and the new carbon market needs further exploration.

Developing equipment and service suppliers into ESCOs

Most households already have trusted contractors who know their premises and facilities well. These firms provide maintenance, breakdown repairs and sometimes small capital upgrades. Though these contractors are often very small (often employing only 1-2 people) and local in scope, they are backed by large organisations (e.g. boiler manufacturers who provide training and support for their products, many of whom are investigating micro CHP and other forms of micro-generation) as well as some larger suppliers of maintenance and breakdown cover (e.g. British Gas). There is a lot of room for aggregation of companies into larger organisations. Such providers could become “*mini-ESCOs*” for the SME and residential sectors.

There is already an ongoing working relationship between small contractors and their customers. As a result the small contractors do not incur any additional costs to build credibility with their client. They do not have to provide formal savings guarantees to convince customers of their capabilities. Both contractor and client know that the larger ongoing relationship could easily be broken if the client feels it is not getting what it expected. Small contractors are particularly sensitive to maintaining good customer relations. The ongoing **client/small contractor relationship** for other services could be the foundation for an “ESCO-type” sale of incremental energy efficiency products and services, without the overhead of building a new relationship with a new ESCO. To begin behaving as mini-ESCOs, there are three areas where small contractors typically need development and help:

- Selling Energy Efficiency: Small contractors need to recognise that there is incremental profit from selling more products or services to their existing clients. Often small contractors are conservative and will prefer to stick to their successful and well-established business model, even though they usually know of savings opportunities within customer facilities. Pursuit of the opportunity to expand their business will require small contractors to: a) decide to tackle a new opportunity, and b) learn how to sell their clients on energy efficiency measures.
- Financing Energy Efficiency: In many markets there may need to introduce new financial products for savings-based financing of small energy efficiency projects (cash flow based financing). Such financing typically must find ways to accommodate the specifics of energy efficiency projects (energy savings generate a stream of financial savings) and to handle the credit risks of small energy users. A credit enhancement role may be adopted by governments as part of their commitment to the environment. Energy efficiency financial products for households need to be packaged so that there is minimal incremental effort for the small contractor, and the contractors must learn how to represent and work with the financing.
- Saving Evaluation Techniques Effort should be focussed on making the estimation of savings simple to perform and easy for the customer to understand. Though equipment suppliers may provide information about typical potential savings from their product, few situations are ‘typical.’ Small contractors need to understand possible areas of savings prediction error and evaluate how much precision is needed for each customer. They also need procedures to manage any new performance risks they might undertake.

Successful integration of ESCO-type techniques into the business methods of small contractors, i.e. making them mini-ESCOs, will require training and support. Unfortunately, the natural tendency of a small contractor is to continue with its successful business model. Only competitive forces are likely to move a contractor to try something new. The natural rate of diffusion of energy efficiency techniques to small contractors can be accelerated beyond the speed of competitive forces by exposing and explaining the opportunities to small contractors. This “expose and explain” effort involves *confronting* small contractors with the real opportunity to increase their business volumes, and then *training* and supporting them. There are some common themes that may be addressed centrally, such as the co-ordination of banks and public bodies in the development of pre-approved energy efficiency loans for small and medium sized enterprises

Conclusions and next steps

Three distinct types of market are identified in this paper. First, the commercial and industrial sector, using a ‘**facilities management**’ or ‘**performance contract**’ model, where the ESCO offering is most developed, and where there remains great potential. Second a **community model**, where decisions

are taken by or on behalf of a group of customers in the same location (for example, but not exclusively, a Community Heating scheme). There is particular opportunity in new build, and in refurbishing existing social housing. Third, a **household model**, where energy suppliers' or contractors' offer to existing residential customers may evolve to include energy efficiency and micro-generation. This is the hardest market for ESCOs since the transaction costs of servicing millions of small (and skeptical) consumer is currently large compared to the savings. There is a well-established incumbent industry with significant barriers to new market entry for an alternative business model. The paper explores opportunities and barriers as well as policy options to promote each of the three models, and in particular the residential sector,

The facilities model is well known, and ESCOs for households much talked about (almost as a holy grail). What is new in this paper is the outlining of the communities model (especially the opportunities in new build and in social housing) and the use of contractor as an opportunity to transfer the ESCOs model to smaller customers as an intermediate step to serving households.

For policy makers, performance contracting could be the preferred model for energy procurement in the public sector; the public sector could support low cost borrowing; savings could be traded through emissions trading or white certificates; consistency of product offering would help. For communities, both the planning framework and building regulations could require micro-generation. Central government, local government and social housing providers can all play a key role. For households, changes to the current regulatory environment are needed to reduce barriers to new entrants. The Energy Efficiency Commitment (or similar scheme under the Energy Services Directive) could be expanded to cover more sectors, and tradable elements could be introduced for saving projects (e.g. through white certificates). Promoting information to consumers through audits, smart metering and informative billing will raise awareness. Contractors and financial institutions are two additional important players that need to be engaged in the provision of energy services to the residential sector. The issue remains a live one. The UK is likely to miss its 2010 target for a 10% cut in CO₂, and other governments look to be struggling to meet Kyoto obligations. Further measures are needed. Liberating Energy Services could make a range of measures on the customers side of the meter competitive with new supply, and is therefore the logical completion of a fully competitive market, albeit one that could at the same time achieve economic efficiencies and carbon reductions. In policy terms the UK Treasury is continuing to explore with industry, ways to develop the ESCO market [21]. In research terms, in the UK the University of Oxford is researching new build housing as a particular opportunity for ESCOs. DG JRC of the European Commission has reviewed and analyzed national experiences with ESCO development in Europe concluding with a set of suggestions that may form the foundation of a possible long-term strategy to further the development of ESCOs in Europe [6].

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