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NOVICE

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Description of the related task and the deliverable in the DoA	Joint service models between ESCOs and Aggregators will be identified taking into consideration the market analysis and the mapping of gaps and barriers performed in T3.1. Following the most promising models, a SWOT analysis will be performed to identify all the advantages, disadvantages, capabilities, gaps and potential effects of these collaborations. The financial, demographic, technical and social matters will be taken into account from the perspective of both parties to ascertain the potential value. This analysis will be promoted through a review workshop incorporating input from a wide representation of both stakeholders. To increase the validity of the analysis, the SWOT analysis will add weighting and criteria to each factor. The advantages will be reinforced matching the strengths of the joint services to opportunities in the market, and diverse strategies will be 2nalysed to convert weaknesses or threats into strengths or opportunities. Solintel(L) Perform the SWOT analysis for joint services IERC Assist in the preparation of the SWOT analysis and prepare (along with the host of 2nd project meeting) the review workshop of stakeholders Tecnalia & Kiwi & e7 & JA & NLGES & Bilfinger Assist in the preparation of the SWOT analysis (each partner from the perspective of the market actor that represents) and the review workshop of stakeholders				
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2 ABBREVIATIONS

BEMS	Building Energy Management System
BRP	Balance Responsible Party
CHP	Combined Heat and Power
DR	Demand Response
DSO	Distributed Systems Operator
EE	Energy Efficiency
EED	Energy Efficiency Directive
EPC	Energy Performance Contract
ESCO	Energy Service Company
EU	European Union
FM	Facilities Management
FM	Facilities Management
HVAC	Heating, Ventilation & Air Conditioning
ICT	Information & Communication Technology
LTECV	Law on Energy Transition for Green Growth
m^2	Square meters
MW	Mega Watt
MWh	Mega Watt hour
NEEAP	National Energy Efficiency Action Plan
NOVICE	New Building Energy Renovation Business Models incorporating dual energy services
NREAP	National Renewable Energy Action Plan
RES	Renewable Energy System
ROI	Return on Investment
SME	Small and Medium-sized Enterprise
SWOT	Strengths, Weaknesses, Opportunities, Threats
TSO	Transmission System Operator
USP	Unique Selling Point
VAT	Value Added Tax

3 EXECUTIVE SUMMARY

The NOVICE project aims to develop and demonstrate a new joint services business model that will consolidate revenue streams from both energy savings and demand response via Energy Performance Contracting. To do this successfully, ESCOs and aggregators must collaborate in order to provide an integrated service to clients seamlessly. In doing so, partners should be able to extract better value by:

1. Leveraging on a single point of contact for both EPC and DSR actions
2. Performing baselining and implementing measurement and verification plans just once for both EPC and DSR actions
3. Reducing payback times for EPC contracts by adding an additional revenue stream from DSR services.
4. Using building and equipment archetypes to simplify deployment, commissioning and operations of new infrastructure

Work Package 3 of the NOVICE project seeks to review the regulatory framework in which this new business model will operate and analyse the market opportunities for ESCOs and aggregators working together to deliver this joint energy service. The purpose of this task is to carry out a SWOT analysis for the joint services business model taking into account the different market conditions that exist throughout the EU-28 and the different perspectives of each of the key actors in the energy services supply chain.

SWOT analysis has long been established as a strategic planning technique allowing companies and individuals to identify the Strengths, Weaknesses, Opportunities and Threats related to a particular business model, competitor or investment opportunity. While this approach has its limitations, it is considered is a suitable starting point for drafting a detailed strategy for the combined ESCO (energy saving) and Aggregators (demand response) business model in each country. One particular augmentation to this classic tool that has been applied here is to take into account each category from the perspective of stakeholders in the value chain, in this case the ESCO, Aggregator, Financier, Client and Facilities Management companies. This provides a much more detailed picture of the potential for NOVICE in each country than a traditional SWOT. For each country, the SWOT analysis answers the following questions:

- What are the **strengths** of the NOVICE model for each stakeholder in the context of each country's market?
- What are the **weaknesses** of the NOVICE model for each stakeholder in the context of each country's market?
- What **opportunities** does the market in each country present to each stakeholder involved in operating the NOVICE model?
- What **threats** does the market in each country present each stakeholder involved in operating the NOVICE model?

A SWOT analysis has been prepared for 9 European countries (France, Belgium, Ireland, United Kingdom, Germany, Sweden, Italy, Denmark and Austria). For each country, the NOVICE model has been assessed in the context of the national energy policy framework, the requirements set by the TSO for participating in the DSR market, and the level of maturity of the ESCO and DSR markets. Detailed assessment for each country can be found in Section 5 of this report. Whilst the specific market conditions in each country differ, countries that are considered to have the same level of EPC or DSR market maturity identified similar strengths, weaknesses, opportunities and threats for the

NOVICE model. As a result, a more general SWOT analysis broken down by high, medium and low levels of market maturity is given in Section 6 which and allows organisations in countries outside of this study to make use of the findings.

The SWOT analysis and review of market conditions have highlighted that there is currently no single European country that presents the optimum conditions for implementing the NOVICE model, (if there was, then arguably the market actors in that country would already have implemented a profitable joint services business model). However, it is possible to pick out the policies, regulations and market forces that are most conducive to the implementation of a combined energy efficiency and demand response service model. The list of conditions that would be ideal for implementing a NOVICE approach include the following:

- A strong and well-established ESCO market that is trusted by their clients.
- Government support for implementing EPCs such as
    - informational schemes that promote the benefits of EPC to potential clients
    - finance for EPC feasibility studies
    - government supported frameworks for EPC contracts
- Several DSR markets that are open for participation by aggregated loads or generators.
- Aggregation is legally allowed, clearly defined and well regulated.
- Aggregators do not need permission from the BRP, TSO or DSO in order to offer their services to customers.
- Both generation and demand response can be aggregated and offered to the market.
- Prequalification process is not overly bureaucratic and relates to pooled loads rather than individual units or sites.
- Government is committed to increasing energy efficiency, reducing the proportion of electricity from nuclear power, and increasing the share of renewables on the grid.
- A white and/or green certificate scheme with an energy obligation that encourages participation of the private sector in energy efficiency projects.
- Incentives for implementing energy efficiency actions exist in all business sectors.

Of all the countries assessed, the ones that are most suited to the NOVICE approach are the UK and France, closely followed by Ireland. The UK and France both have well developed ESCO markets, several DSR markets that are open to participation and a TSO that is open to adjusting the regulations to encourage more participation in flexibility markets. Both markets still have barriers to overcome, however, there are no regulations that would prevent the delivery of a joint services business model if clients could be persuaded to accept it. In Ireland, whilst the ESCO market is still small, this is largely due to the lack of awareness of the benefits of EPC among clients rather than any regulatory barriers. The Irish TSO has opened several DSR markets and is hampered mainly by large minimum load requirements and the need to bid into the market annually. Despite this, it would be possible to operate a joint services EPC in Ireland if clients could be persuaded to participate.

The countries least suited to implementing the NOVICE model are currently Italy, where aggregation of loads to participate in the DSR markets is not yet legally allowed, and Denmark, where the large proportion of hydro-electric power stations on the grid and excess capacity on the network means there is a weak business case for demand response services.

4 INTRODUCTION

4.1 BACKGROUND

The NOVICE project aims to develop and demonstrate a new joint services business model that will consolidate revenue streams from both energy savings and demand response via Energy Performance Contracting. To do this successfully, ESCOs and aggregators must collaborate in order to provide an integrated service to clients seamlessly. Work Package 3 of the NOVICE project seeks to review the regulatory framework in which this new business model will operate and analyse the market opportunities for ESCOs and aggregators working together to deliver this joint energy service. Moreover, the specific objectives of this work package include: assessing the market maturity status for the operation of ESCOs and aggregators in Europe; evaluating and identifying the differences between the current business models used by ESCOs and aggregators; identifying and quantifying the business opportunities that the dual energy services model brings to ESCOs and aggregators; recognizing the barriers that could prevent a potential collaboration between ESCOs and aggregators; and identifying ways to overcome those barriers.

One of the most common business tools used to assess the internal and external factors that can affect a business is the SWOT analysis. This framework for analysing the **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats is a useful tool for strategic planning and evaluating the best ways to minimize threats and weaknesses, and take advantage of opportunities and strengths. The purpose of this task is to carry out a SWOT analysis for the joint services business model taking into account the different market conditions that exist throughout the EU-28 and the different perspectives of each of the key actors in the energy services supply chain. A previous task (T3.1) has already mapped the market structure and potential for joint energy services in 9 European countries that demonstrate a range of levels of market maturity in terms of policies that enable or impede implementation. The report that accompanied that task (D3.1 – Mapping of market potential, barriers and gaps for the dual energy services scheme) will be the basis for this SWOT analysis.

The SWOT analysis presented in this document will capture the advantages, disadvantages, capabilities, gaps and potential impacts of collaborations between ESCOs and aggregators in different countries in Europe. Financial, regulatory, technical and social matters will be taken into account from the perspective of all the key actors in the supply chain and used to analyse the best strategy to encourage the introduction of the joint service models across the EU market.

4.2 JOINT SERVICE MODEL

Before analysing the SWOT elements of the NOVICE model for specific geographies and tier country groups, it is important to revisit the definition of the combined business model. In a simplified definition, the NOVICE model is looking to establish a synergetic approach between ESCOs and aggregators to new retrofit projects. In doing so, partners should be able to extract better value by:

5. Leveraging on a single point of contact for both EPC and DSR actions
6. Performing baselining and implementing measurement and verification plans just once for both EPC and DSR actions
7. Reducing payback times for EPC contracts by adding an additional revenue stream from DSR services.
8. Using building and equipment archetypes to simplify deployment, commissioning and operations of new infrastructure

9. Reducing financial and operational risks by diversifying the revenue streams.

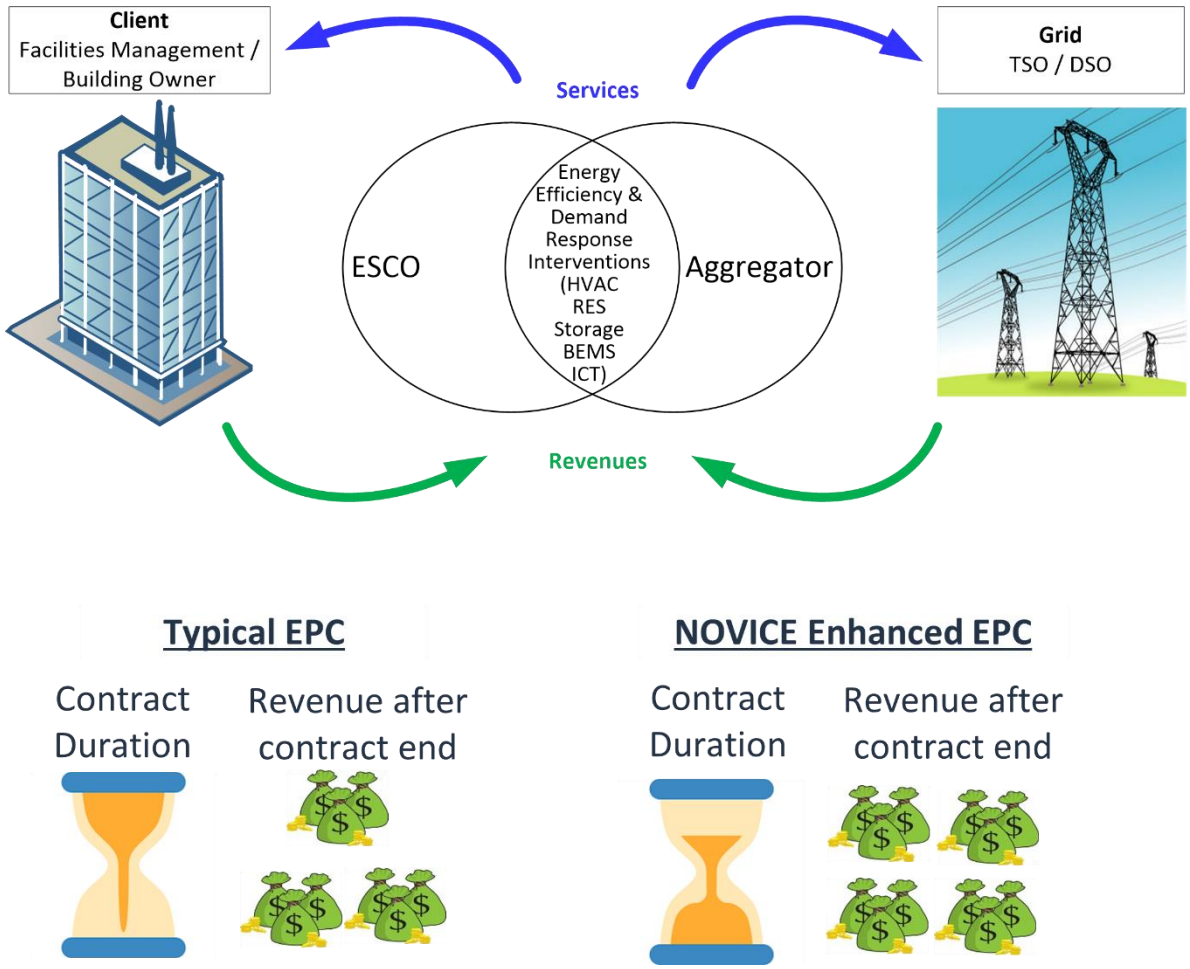

Figure 1: NOVICE combined business model

While the generic NOVICE model will always have an ESCO and an aggregator as partners, there are several different flavours in which this model can operate in different markets based on different types of market constrains such as market maturity for both types of services, regulatory framework (especially for DSR services which are more heavily regulated than EPC contracts). The main variations for the NOVICE mode will fall into one of the following:

1. **ESCO and Aggregator as equal partners in a three party agreement to provide EPC and DSR services.** Specific roles and responsibilities are clearly highlighted in the contract and each party is contractually responsible for delivering the associated services. Finance is provided either by the client or by a specialised third party (typical to ESCO contracting)

2. **Aggregator as a named subcontractor for DSR services in an EPC contract augmented with DSR.** The aggregator will have certain contractual responsibilities for delivering DSR services for the client but the main revenue risks will be held by the ESCO as the main contracting party.

3. **Aggregator as a generic service provider in an EPC contract augmented with DSR services.** In this version, the ESCO will have the freedom to choose the aggregator and even switch DSR

suppliers for the duration of the EPC contracts. This may provide higher flexibility for the client but could also introduce higher volatility over the DSR revenues due to different revenue models across the DSR market.

In this respect, country specific analysis can be the starting point in promoting one of the models above, based on specific market conditions that will favour particular variations of the combined model. The results of the SWOT analysis combined with results from the facilitator model analysis, sample framework agreements, and building and equipment archetype analysis will create the basic toolbox for aggregators and ESCOs and enable them to tweak any of the models above to the extent that it best reflects their interests, market conditions and client target groups.

4.3 METHODOLOGY

SWOT analysis has long been established as a strategic planning technique allowing companies and individuals to identify the Strengths, Weaknesses, Opportunities and Threats related to a particular business model, competitor or investment opportunity. While this approach has its limitations, (mainly due to its static view, capturing a snapshot at a particular point in time), it is considered a suitable starting point for drafting a detailed strategy for the combined ESCO (energy saving) and aggregators (demand response) business model in each country.

While there are many ways to approach the components of the SWOT matrix, one widely used method is to consider strengths and weaknesses as being internally focussed (i.e. what are the strengths and weaknesses of the joint services business model in the context of each country's market conditions and regulatory framework) and opportunities and threats being externally focused (i.e. what opportunities and threats do the market conditions and regulatory framework present to the operation of the joint services model. By evaluating the business model in this way, actions that the business can take internally to eliminate or mitigate the effects of any potential weakness can be deployed, and strategies for exploit existing market opportunities and overcoming market threats can be developed.

One particular augmentation to this classic tool that has been applied here is to take into account each category from a different stakeholder's perspective. This approach will make it easier to extract useful and actionable items from the analysis directed at the relevant group of stakeholders. For example, this analysis shows the strengths and weaknesses of the NOVICE model from the point of view of the ESCO, Aggregator, Financier, Client and Facilities Management companies for each country. It also shows the opportunities and threats that the market in each country presents to the NOVICE model from the point of view of each stakeholder. This provides a much more detailed picture of the potential for NOVICE in each country than a traditional SWOT would give. For each country, the SWOT analysis answers the following questions, which are also summarised in Figure 2:

- What are the **strengths** of the NOVICE model for each stakeholder in the context of each country's market?
- What are the **weaknesses** of the NOVICE model for each stakeholder in the context of each country's market?
- What **opportunities** does the market in each country present to each stakeholder involved in operating the NOVICE model?
- What **threats** does the market in each country present each stakeholder involved in operating the NOVICE model?

This work builds on the results from D3.1 - Mapping of market potential, barriers and gaps for the dual energy services scheme. To account for the specific regulatory and market conditions in each country, the analysis was performed on a country by country basis for each of the 9 countries that were examined in D3.1 (France, Belgium, Ireland, UK, Germany, Sweden, Italy, Denmark and Austria). The SWOT analysis for each country is presented in Section 5 of this report. These are representative of mature, developing and immature markets across the EU, and form the basis of the more general conclusions discussed in Section 6 that can be drawn for each type of market.

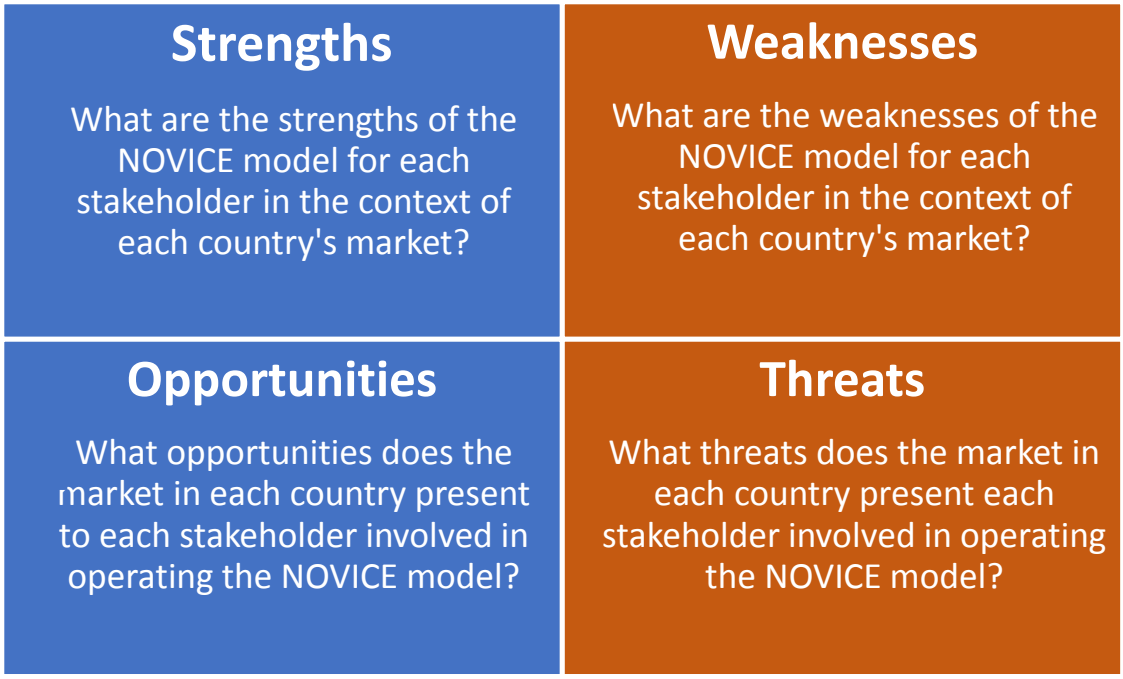

Figure 2: Questions answered by the SWOT analysis

5 SWOT ANALYSIS BY COUNTRY

Analysis for each of the countries presented in this section has been made on the basis of D3.1 and examination of publicly available documentation, such as the most recent NEEAP and NREAP that each country has published. It uses the **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats method to estimate how the proposed NOVICE model would interact when deployed in the countries mentioned in D3.1. Market characteristics are presented for convenience in summary form, followed by the SWOT analysis and a discussion of its findings.

5.1 FRANCE

5.1.1 Market description summary

a) Demand response and ESCO market maturity

- The ESCO market in France is one of the most mature in Europe.
- The "chauffage" model of energy service outsourcing, where ESCOs take on responsibility for the operation and maintenance of equipment and sell the outputs to the client (e.g. heat or light), is commonly used.
- ESCO clients mainly come from the public sector and relate to public buildings due to the number of policy initiatives placing obligations on the public sector to reduce energy consumption. EPC projects in the residential sector are growing particularly in the social housing sector. In the industrial sector, EPCs are still relatively rare.
- The ancillary and wholesale electricity markets are open to demand response and participation from new actors such as aggregators.
- Critical peak pricing tariffs have been used to promote demand response.
- The high sourcing costs mandated by energy retailers means that most of the revenues generated by participating in the demand response market must be paid back to the retailer by the aggregator and consumers.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- France has introduced the Law on Energy Transition for Green Growth (LTECV) to improve the energy performance of buildings. This sets out energy reduction targets for the tertiary sector to reduce final energy consumption by 60% by 2050 based on a 2010 baseline.
- The LTECV also includes measures to provide assistance through financing of energy efficient renovation projects through the 'Energy transition special envelope' fund and/or approved third party financing companies.
- A series of tax credits and incentives are available to purchase and install high performance equipment for energy saving and renewable energy production;
- LTVEC mandates that energy renovations must be included when major renovations are done on roofs, facades or building extensions.
- The Thermal Regulations for existing buildings requires that buildings with a floor area greater than 1000 m^2 that are undergoing major renovations must reduce primary energy consumption by 30% compared to the baseline before renovation.

- For any building undergoing minor renovation, the item-by-item Thermal Regulations set a minimum performance requirement for items being replaced or installed including insulation, heating, hot water, cooling and ventilation equipment.
- A standardised framework was put in place in 2013 to regulate the relationship between aggregators and retailors/BRPs.
- The French TSO has regularly adjusted the demand response programmes and the associated rules for participation to better fit the capabilities of demand side response providers (SEDC, 2017)
- The French government has committed to reducing the share of nuclear energy on the grid from 75% down to 50% and increasing the share of renewables. The timescales for this change in the energy mix are unclear but recent reports suggest 2035 as the new target date.

c) Market size estimates

- ESCO market in France is the largest in Europe, with approximately 350 ESCOs, 10 of which offer EPCs and guarantees of energy savings.
- The size of the energy services market (excluding supply) in France was estimated at EUR 10.6 billion in 2015 (source: NEEAP France 2017 update).
- The potential growth rate of the energy services and energy efficiency market is estimated at 16% per year (source: NEEAP France 2017 update).
- The installation, operation and maintenance market is estimated at €8.42 billion for 2015, with the highest percentage being operation of collective boiler rooms.

SWOT analysis of the NOVICE model for the French market Table 5-1 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the French energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in France, and the **opportunities and threats** that the French market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-1 SWOT analysis of the NOVICE model for the French market

FRANCE	
Organisation	**Strengths of the NOVICE model**
ESCO	• NOVICE is a low risk, way of bringing demand side response skill set to the ESCO immediately, without large investment in training or developing in-house expertise. • The ability to provide DSR as well as EE services allows upselling of additional services to existing clients which is an easier way of generating more revenue for the ESCO than finding new clients. • Working with aggregators brings access to new markets e.g. the industrial sector, a key market for aggregators but one which has traditionally been avoided by ESCOs in France. • Offering DSR as well as EE services will give ESCO a USP in an already crowded market.
Aggregator	• ESCOs already have a large client base through which they can introduce DSR as an additional service. This is an easier way to

	increase revenues for the aggregator than building relationships with new clients. • ESCOs are well trusted by the market so working with them will allow easier access to new clients in new sectors e.g. public sector where traditionally ESCOs are strong but aggregators are weak. • Being able to offer EE as well as DSR services will give the aggregator a USP.
Financiers	• The case for financing for aggregation is strengthened by working with well-established ESCOs. • The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment. • Diversification of investment portfolio with new actors in the EPC market.
Client (building owner)	• NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs. • Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Reduces the financial burden of complying with regulations (e.g. LTEVC and thermal regulations) when renovating large buildings.
FM Company	• Ability to facilitate the NOVICE approach gives FM company a USP. • Adding DSR to existing energy related contracts could generate a new revenue stream for FM companies. • Working with aggregators FM companies can provide an additional service to clients without need to train new staff or take on new risk.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC. • As the ESCO is the client facing contractual service provider the financial and reputational risk associated with underperformance of the aggregator is borne by the ESCO. • Added complexity of administration and transaction costs related to managing revenue streams from DSR. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance.
Aggregators	• Aggregator does not build a direct relationship with the client. • Complexity of contractual arrangements increases when combining with energy efficiency. • Significant proportion of revenues from DSR go to retailer rather than client or aggregator so little financial gain from offering dual services. • Revenues are handled by the ESCO which could result in longer payment times for aggregator. • EE measures typically reduce the load available for participating in DSR, which reduces revenues for aggregators.

Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • Finance is being provided to an ESCO for equipment that will be outside of their control, which increases the risk of loan default.
Client/building owner	• Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.
FM Company	• The FM Company is the client facing contractual service provider so they bear the additional financial and reputational risk associated with underperformance of the aggregator. • The NOVICE model requires a more complex contractual arrangement with the client. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.
Organisation	**Opportunities for the NOVICE model**
ESCOs	• Numerous tax incentives and energy efficiency policies create opportunities for expanding NOVICE into the residential and social housing sectors. • Tariff structure allows for variable pricing mechanisms to account for peak times and critical peak pricing to encourage load shifting or DR. • There is no need to contract with a BRP so ESCOs could offer joint services without requiring a third party to be involved. • The LTECV and Thermal regulations require energy efficiency upgrades during renovation projects which encourages clients to consider EPCs. • The French government is planning to reduce the share of nuclear and increase the share of renewables on the grid. This will require additional demand response capabilities to cope with variability in supply.
Aggregators	• The TSO has regularly adjusted the demand response programmes and the associated rules for participation to better fit the capabilities of service providers. • In France many markets are open for participation including Balancing mechanism, capacity mechanism, ancillary services wholesale markets and distribution network services creating many opportunities for aggregators to work with building owners.

	• Existing regulatory framework clearly defines the relationship between aggregators and retailers/BRPs, facilitating association. • Generators and CHP plants are allowed to export to the grid and receive payment for the energy generated creating the opportunity to bring existing plant online during times of peak demand. • Combining feed in tariffs with export tariffs and DR revenues could improve the business case for installing battery technology for accessing flexibility markets.
Financiers	• Forecasted sustained growth in ESCO and DSR market gives more certainty to investors of higher ROIs on combined projects. • High degree of certainty in continued government support for EE and DSR initiatives give confidence to investors that revenues from NOVICE projects are secure. • Robust energy regulatory framework gives confidence that long-term revenue streams are available using a NOVICE approach.
Client/building owner	• There is a wide array of incentives and tax deductions allow some clients to access tax credits for energy renovations. • TSO is open to adapting its products to encourage consumer participation in DSR market which could allow participation in more DSR markets in future. • Regulatory framework allows generators to export to the grid which could allow them to bring idle equipment online at times of peak demand & receive additional payments.
FM Company	• Potential new service partnership models offered by EPC and DSR options. • Legislation framework facilitates their association with ESCOs and aggregators as their roles and responsibilities are clearly defined.
Organisation	**Threats to the NOVICE model**
ESCOs	• Interest in participating is highly motivated by state subsidies and policies that can be modified or phased out according to political interests. • Change in discount percentages from those subsidies can potentially define profitability or default. • Change in state policies affecting relationship of public building sector (currently the largest client sector for EPC) with ESCOs.
Aggregators	• Significant proportion of demand response revenues are allocated to retailers and suppliers to the detriment of aggregators which can weaken the business case. • Aggregators are allowed to bid either for DR only or Generation only contracts – i.e. DR and Generation cannot be aggregated into one bid.
Financiers	• Financial default by parties who cannot meet specific terms of the EPC due to distorted risk assessment, sharp changes in energy prices, or weather occurrences that influence energy production and savings estimations. • TSO is regularly changing the DR schemes and payment levels introducing uncertainty into the business model.

Client/building owner/FM company	• Periods of high energy price volatility can make unattractive for clients to enter long-term EPC. • In times of political uncertainty, tax credits could be removed with relatively short notice, hindering taking decisions on long-term renovation plans.

5.1.2 Discussion of SWOT findings

France is strong candidate for early adoption of a NOVICE style approach to EPCs. The joint services business model could be adopted by ESCOs and aggregators without significant difficulty. The main risk to the model is the current requirement for aggregators to pay most of the revenues from demand response back to the retailer or BRP. This weakens the business case and limits the benefits that a joint services business model could bring to the stakeholders in the value chain but does not in itself prevent participation or collaboration. There are clear indications that regulation on this matter is likely to change in the near future which will make it more favourable for independent aggregators to enter the market.

In general, the targets and policies set by the French Government around energy efficiency and DSR present opportunities to organisations offering a joint services approach. The required improvement in energy efficiency, reduction in the share of nuclear power on the grid and the increase in renewable energy will drive the need for deeper energy renovations and a more open flexibility market which will only strengthen the business case for NOVICE. Whilst there is always some uncertainty over the longevity of policy measures in the event of a change in government, it seems unlikely that there will be significant deviations from these commitments by future governments.

ESCOs and aggregators in France that act now to develop joint services business models for their clients will be in a stronger position compared to their rivals, and could experience significant growth once the French TSO opens more markets to demand response. Robust contracts will be needed to cover any potential disputes that may occur when bringing together different market actors with differing priorities. This will protect all parties' interests, including clients, and it will be imperative that this is correctly implemented to ensure that all stakeholders benefit from the contract.

5.2 BELGIUM

5.1.1 Market description summary

a) Demand Response and ESCO market

- The DSR market in Belgium is still in its developmental stages but the ancillary services, primary and tertiary reserves and interruptible contracts markets are open to demand response. The secondary and wholesale market remains closed to DSR.
- The main barrier to growth in the DSR market is the need for independent aggregators to obtain the agreement of the client's energy retailer/BRP or become a BRP themselves before engaging in demand response services. This makes it difficult for independent aggregators to enter the market.
- A further barrier to uptake of DSR is that although the DSO does not participate in DSR, they must approve requests for customers to participate in DSR programs, which can take up to 6 months. The DSO is also legally able to block participation if there is a capacity issue.
- The energy services market in Belgium is considered stable and moderately-sized, with some growth expectations.

- ESCOs are a mix of public and privately owned entities. In general, private ESCOs contract directly with private sector clients. Publicly owned ESCOs provide a platform for third party financing by providing advance payments for works, which they then subcontract to smaller equipment suppliers and installers and recover their costs from accrued savings. In this way publicly owned ESCOs act as EPC facilitators.
- Lack of subsidies for EPC projects is one of the main barriers preventing uptake of this business model.
- A further barrier to EPCs is the bureaucratic complexity of the country. Each of the three regions in Belgium is able to set their own energy efficiency policy and approaches towards incentivising the ESCO market.
- The legal framework for the ESCO sector in Belgium is not yet developed and EPC is not defined by law in spite of EED provisions.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- A new law is expected to be ratified in Belgium that will formalise the role of the independent aggregator and establish the aggregator's right to access consumers directly without the permission of the consumer's BRP or retailer. This will remove many of the barriers to DSR currently experienced in the Belgian market.
- Belgium currently operates 7 nuclear reactor facilities which provide approximately 50% of the country's electricity. Earlier this year the government committed to phase out the use of nuclear by 2025 and boost the share of renewables and gas.
- Each region is responsible for EE policies including energy transformation, transmission, distribution, and demand response. The federal government brings them in line with European Directives and coordinates energy infrastructure management between regions.
- Federal tax credits for energy renovation of roofs, and for industry acquisition of equipment for energy saving are available. As the framework is unclear, roof tax credit might still overlap with regional ones. A reduced VAT rate of 6% is applied for purchases relating to renovations buildings older than 10 years.
- ESCOs for SMEs is a programme that was set up by the government and administered by VLAIO to encourage SMEs to use ESCOs to implement energy efficiency measures. This pilot scheme set up 4 EPC style contracts between ESCOs and SMEs but has had limited success beyond this.
- The European Energy Efficiency Fund can be used to fund large scale projects that include renewable energy, energy efficiency and smart grid technologies
- Network operators offer premiums to SMEs if an energy audit or study is carried out which identifies measures that would make significant energy savings and the SME actually implements the measures. The premium is set at €0.035 per kWh of primary energy saved which could significantly impact the financial viability of project.

c) Market size estimates

- In 2014, there were 10-15 ESCOs in Belgium, 6 of which are large enterprises (as daughter companies of international ones), 3 are publicly owned and the rest are SMEs.
- The current market size is estimated at €1-5 million and is forecast to continue to grow in the coming years, mainly due to the expansion of publicly owned ESCOs which are expected to make largest contribution to growth by acting as EPC facilitators

- The number of EPC projects in operation in Belgium is small – only 5 have been reported in the last 3 years. Without best practice case studies it is difficult to persuade clients to invest in this type of contract.

5.2.2 SWOT analysis of the NOVICE model for the Belgian market

Table 5-2 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the Belgian energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Belgium, and the **opportunities and threats** that the Belgian market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-2 SWOT analysis of the NOVICE model for the Belgian market

Belgium	
Organisation	**Strengths of the NOVICE model**
ESCO	• Public sector ESCOs that provide a platform for third party financing already subcontract to smaller service providers – DSR could be handled the same way with minimal risk or change to existing working practices. • NOVICE is a low risk, way of bringing demand side response skill set to the ESCO immediately, without large investment in training or developing in-house expertise. • The ability to provide DSR as well as EE services could reduce contract length and perceived risk which could help alleviate the fears of potential public and private sector clients and kick-start the EPC market in Belgium. • The NOVICE model could be presented as a best practice example of a complete EPC to encourage uptake – it doesn't have to compete with traditional EPC models as these have not yet gained traction in Belgium. • Being able to offer EE as well as DSR services by working with an aggregator will give the ESCO a USP. • Introductions to aggregator clients that have potential for EE is an easier way to increase revenues for the aggregator than building relationships with new clients.
Aggregator	• Being able to offer EE as well as DSR services by working with an ESCO will give the aggregator a USP. • Introductions to ESCO clients that have potential for DSR is an easier way to increase revenues for the aggregator than building relationships with new clients. • EPC market is forecast to grow so being able to access this market using the NOVICE model could increase revenues.
Financiers	• The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment.

	• Diversification of investment portfolio with new actors in the EPC market. • NOVICE presents potentially higher value projects with shorter payback periods which are more attractive to investors.
Client (building owner)	• NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs. • Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Can participate in DSR and EE without the need for in-house specialist skills.
FM Company	• Possible new revenue stream through offering the client DSR plus EE, or acting as a facilitator of EPC contracts. • Ability to facilitate the NOVICE approach gives FM company a USP as there are not many EPC facilitators in Belgium. • Adding DSR to existing energy related contracts could generate a new revenue stream for FM companies. • Working with aggregators FM companies can provide an additional service to clients without need to train new staff or take on new risk.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• Could introduce delays in the project since there is a legal obligation for aggregators to seek agreement from BRP and DSO in order to provide DSR services. • If the client switches to a new electricity supplier during the EPC, a new agreement is needed with the new BRP which could create difficulties for the EPC. • EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC. • Aggregators and their services are not widely known to potential clients which could make the NOVICE model harder to sell than a traditional EPC. • As the ESCO is the client facing contractual service provider the financial and reputational risk associated with underperformance of the aggregator is borne by the ESCO. • Added complexity of administration and transaction costs related to managing revenue streams from DSR. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance.
Aggregators	• Aggregator does not build a direct relationship with the client. • ESCOs are not mature in terms of market experience and their services are not widely known so potentially limited benefit of working together. • Complexity of contractual arrangements increases when combining with energy efficiency. • Revenues are handled by the ESCO which could result in longer payment times for aggregator. • EE measures typically reduce the load available for participating in DSR, which reduces revenues for aggregators.

Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • Finance is being provided to an ESCO for equipment that will be outside of their control, which increases the risk of loan default.
Client/building owner	• Customers cannot choose who their aggregators will be as this requires bilateral contracts between BRP and aggregator. • Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Clients are locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.
FM Company	• The FM Company is the client facing contractual service provider so they bear the additional financial and reputational risk associated with underperformance of the aggregator. • The NOVICE model requires a more complex contractual arrangement with the client. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.
Organisation	**Opportunities for the NOVICE model**
ESCOs	• Publicly owned ESCOs act as EPC facilitators and, with the right awareness raising and capacity building, could promote the NOVICE model to clients and private sector ESCOs in Belgium. • Belgium plan to significantly reduce their nuclear capacity and increase proportion of renewables on the grid in the coming years which will require an increase in the flexibility of buildings. • The premium offered by Network operators to SMEs that implement energy savings could help to incentivise EPCs by making them more financially attractive. • A new law that formalises the role of the aggregator and removes the need for agreement from the BRP will make the NOVICE model more attractive for ESCOS. • The ESCOs for SMEs programme could be a vehicle for promoting the NOVICE style of EPC and generating best practice case studies. • All ESCOs are associated under one umbrella association (Belesco) which could enable lobbying for future legislation and favourable conditions. • As there is no legal framework for EPCs, ESCOs could push for one that benefits the implementation of the NOVICE model.

Aggregators	• Belgium plan to significantly reduce their nuclear capacity and increase proportion of renewables on the grid in the coming years which will require an increase in the flexibility of buildings. • A new law that formalises the role of the aggregator and removes the need for agreement from the BRP will make the NOVICE model more attractive for Aggregators. • Lack of legal framework makes it easier to assume dual roles and offer a wider range of services.
Financiers	• Proposed changes in legislation around the status of the aggregator give financiers more confidence that there is government support for NOVICE model contracts. • Government commitment to reduce use of nuclear gives more confidence that NOVICE style EPCs are secure investments. • Access to premium payments from network operators for investment in energy efficiency measures increases financial viability of projects.
Client/building owner	• Access to premium payments from network operators for investment in energy efficiency measures increases financial viability of projects.
FM Company	• Potential new service partnership models offered by EPC and DSR options. • EPC is an opportunity for FM provider to perform additional maintenance and repair. • Lack of restrictive legislation can help strengthen relationship with clients, since NOVICE model could be adopted by technically strong FM providers as an additional service to clients.
Organisation	**Threats to the NOVICE model**
ESCOs	• Lack of examples of successful EPC contracts in public & private sector has led to a low uptake of EPCs in Belgium. There is general mistrust or lack of understanding preventing large scale roll out of EPCs. • Public sector clients tend to contract with public sector ESCOs, while private sector clients tend to contract with private sector ESCOs. This makes it difficult for ESCOs to expand into new markets. • Regulatory framework for energy is different in each region of Belgium making it difficult for ESCOs to operate nationally. • Clients, building owners and FM companies are relatively unaware of the opportunities available in EE and DSR and lack understanding in these areas making it difficult to sell a NOVICE style approach to them.
Aggregators	• DSOs can block or delay participation in DSR markets. • Bureaucracy around energy regulations and differences between regions can cause difficulties in participation in the energy markets.
Financiers	• Few government subsidies available for EPCs making it harder for projects to demonstrate financial viability. • Small market size means loans are likely to be offered at non-preferential rates, and can restrict the number of financiers interested in participating.

Client/building owner/FM company	• Periods of high energy price volatility can make it unattractive for clients to enter long-term EPC. • In times of political uncertainty, tax credits could be removed with relatively short notice, hindering taking decisions on long-term renovation plans. • Publicly owned ESOCs could be dissolved or absorbed by other government departments following a change in government or leadership which introduces uncertainty for client.

5.2.3 Discussion of SWOT findings

Although the DSR market is open to participation by independent aggregators, there remain significant barriers that prevent them from doing so in Belgium. Aggregators must obtain prior agreement from each consumer's retailer or BRP before engaging in demand response services which is time consuming and costly. In addition, the DSO must approve requests for customers to participate in demand response which often takes time as it is not in the DSO's interests to approve such requests. All these delays make it difficult for third party aggregators to participate and hamper the implementation of the joint services model in Belgium.

The ESCO market is small largely due to the lack of best practice case studies and examples of successful projects making it difficult to persuade clients of the potential benefits of EPCs. There are no subsidies or support programmes promoting EPCs and growth in the market has largely been a result of growth in public sector ESCOs who act as EPC facilitators and subcontract to smaller companies. Adopting the NOVICE business model to offer joint services could allow ESCOs to offer reduced contract lengths and faster payback periods to clients which could help to increase uptake of EPCs.

A further restricting factor concerns the organization of Belgian bureaucracy, which is constantly changing in respect to energy policy due to the ability of regional authorities to set their own regulations. The main challenge in the Belgian market is to create a framework that presents greater opportunity for independent aggregators to participate in the DSR markets. Legislation to formalise the role of the independent aggregator and establish their right to access consumers directly without permission of the consumer's BRP is expected to be implemented in the near future. This is essential for the successful adoption of the joint service model.

5.3 IRELAND

5.3.1 Market description summary

a) Demand Response and ESCO market

- Participation in the DSR market has been allowed for many years, but the TSO, EirGrid, is phasing out many of the old programmes and replacing them with new structures under the Delivering a Secure, Sustainable Electricity System (DS3) programme.
- An integrated single energy market (I-SEM) is being launched in 2018 which is designed to integrate the whole island's electricity market with the European electricity markets to enable the free flow of energy across borders.
- Aggregators can participate in the balancing market and ancillary services, wholesale markets and interruptible contracts. Customers are paid for making capacity available to the electricity market, even if they are never required to dispatch that availability.
- The minimum load for participation in the balancing market is 4 MW but aggregation is allowed and the aggregator does not require agreement from the BRP prior to managing the load. 4 MW is a relatively large entry requirement given the small market and nature of the types of load typically found on the system.
- One barrier to entry in the DSR market is that each individual unit in an aggregated pool of loads must fulfil all technical and prequalification requirements which are onerous, costly and time consuming to complete. This prevents aggregators from working with smaller loads.
- The electricity tariff structure does not incentivise implicit demand response as it is relatively flat and lacks any actionable time of day or seasonal price signals that would normally influence customer behaviour.
- The ESCO market in Ireland is currently small with few examples (less than 5) of successful EPCs in operation. Research from Codema suggests that the reason for the low uptake of EPCs is linked to the lack of examples of successful projects in Ireland and a lack of EPC facilitators in the country.
- There are a number of policy incentives attempting to drive growth in the EPC market (see summary of relevant legislation and policies below) but to date their impact has been small.
- Most EPCs in Ireland to date have been private sector projects where clients have engaged ESCOs directly rather than through an open tendering process. There is currently only 1 public sector EPC in operation (Dublin City Council) despite efforts to promote energy efficiency in the public sector.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- In its NEEAP, the Irish Government set a national target to improve energy efficiency by 20% by 2020 on a 2009 baseline. The most recent NEEAP projected that Ireland is likely to miss this target with a shortfall of 3.77%.
- A key focus of the NEEAP is for the public sector to set an example to other sectors on the use and procurement of energy. The public sector is required to improve energy efficiency by 33% by 2020 on a 2009 baseline.
- The National Energy Services Framework (NESF) was set up in 2013 to promote EPCs as a tool for achieving the required energy savings targets. It provides best practice guidelines

and advice on how to implement EPCs & ESCs for public and private sector organisations wishing to procure energy services.

- Building regulations in Ireland require that reasonable upgrades to building fabric are made to a cost optimal level when more than 25% of the surface of the building envelope undergoes a renovation.
- The government's Long Term Renovation Strategy 2017-2020 identifies energy efficiency improvements in commercial buildings and public sector buildings as crucial to meeting the energy efficiency targets outlined in the NEEAP and focusses on highlighting the benefits of upgrades to persuade decision makers to invest in upgrades.
- The Irish Energy Efficiency Fund is worth €75 million (with €35 million from the Irish Government) provides loans for energy efficiency projects like those deployed under EPCs.
- The Accelerated Capital Allowance scheme encourages investment in energy efficient equipment and allows companies to write off 100% of the purchase value of qualifying equipment against profit in the year of purchase, which helps with cash flow.
- The Irish Government has a target for 40% of electricity consumption from renewable sources by 2020.
- The TSO has introduced the DS3 programme to increase uptake of DSR to the network to assist with increasing the capacity of renewables on the grid. Further additions and refinements to the programme are likely in the coming years.

c) Market size estimates

- Market value for ESCOs is not accurately known, but estimates are in the region of €49-110 million.
- Number of ESCOs not currently known but are estimated at 13-17. A number of companies do not identify themselves as ESCOs but act as energy service providers with no performance guarantee.

5.3.2 SWOT analysis of the NOVICE model for the Irish market

Table 5-3 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the Irish energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Ireland, and the **opportunities and threats** that the Irish market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-3 SWOT analysis of the NOVICE model for the Irish market

Ireland	
Organisation	**Strengths of the NOVICE model**
ESCO	• NOVICE is a low risk, way of bringing demand side response skill set to the ESCO immediately, without large investment in training or developing in-house expertise. • The ability to provide DSR as well as EE services could reduce contract length and perceived risk which could help alleviate the fears of potential public and private sector clients and kick-start the EPC market in Ireland.

	• The NOVICE model could be presented as a best practice example of a complete EPC to encourage uptake via the NESF – it doesn't have to compete with traditional EPC models as these have not yet gained traction in Ireland. • Being able to offer EE as well as DSR services by working with an aggregator will give the ESCO a USP. • Introductions to aggregator clients that have potential for EE is an easier way to increase revenues for the aggregator than building relationships with new clients.
Aggregator	• The number of large loads >4 MW in Ireland is limited so aggregators will need to develop new products like NOVICE in order to survive in the long term. • Being able to offer EE as well as DSR services by working with an ESCO will give the aggregator a USP. • Introductions to ESCO clients that have potential for DSR is an easier way to increase revenues for the aggregator than building relationships with new clients. • EPC market is forecast to grow so being able to access this market using the NOVICE model could increase revenues.
Financiers	• The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment. • Diversification of investment portfolio with new actors in the EPC market. • NOVICE presents potentially higher value projects with shorter payback periods which are more attractive to investors.
Client (building owner)	• NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs. • Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Reduces financial burden of complying with building regulations when renovating more than 25% of building envelope. • Can participate in DSR and EE without the need for in-house specialist skills.
FM Company	• Possible new revenue stream through offering the client DSR plus EE, or acting as a facilitator of EPC contracts. • Ability to facilitate the NOVICE approach gives FM company a USP as there are not many EPC facilitators in Ireland. • Adding DSR to existing energy related contracts could generate a new revenue stream for FM companies. • Working with aggregators FM companies can provide an additional service to clients without need to train new staff or take on new risk.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC.

	• Aggregators and their services are not widely known to potential clients which could make the NOVICE model harder to sell than a traditional EPC. • As the ESCO is the client facing contractual service provider the financial and reputational risk associated with underperformance of the aggregator is borne by the ESCO. • Added complexity of administration and transaction costs related to managing revenue streams from DSR. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance.
Aggregators	• Every site must fulfil technical and prequalification requirements which is time consuming and costly for smaller sites targeted by NOVICE. • Aggregator does not build a direct relationship with the client. • ESCOs are not mature in terms of market experience and their services are not widely known so potentially limited benefit of working together. • Complexity of contractual arrangements increases when combining with energy efficiency. • Revenues are handled by the ESCO which could result in longer payment times for aggregator. • EE measures typically reduce the load available for participating in DSR, which reduces revenues for aggregators.
Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • Finance is being provided to an ESCO for equipment that will be outside of their control, which increases the risk of loan default.
Client/building owner	• Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.
FM Company	• The FM Company is the client facing contractual service provider so they bear the additional financial and reputational risk associated with underperformance of the aggregator. • The NOVICE model requires a more complex contractual arrangement with the client. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.

Organisation	Opportunities for the NOVICE model
ESCOs	• Numerous tax incentives and energy efficiency policies create opportunities for EPCs in the Irish market e.g. ACA capital allowances, Energy Efficiency Fund, NESF. • Reforms to the electricity market and DS3 programme make it possible for smaller buildings to participate in DSR. Further markets are likely to open in future. • Irelands Long Term Renovation Strategy 2017-2020 suggests that the commercial sector has already reduced energy consumption through no cost behavioural measures and must now invest in equipment and envelope upgrades to improve efficiency further. EPCs covering EE and DSR offer a way of achieving this with minimal cost to the client. • EPC market is largely untapped to date meaning that there is high potential for growth.
Aggregators	• The TSO has regularly adjusted the demand response programmes and the associated rules for participation to better fit the capabilities of service providers. • Ireland's target of 40% renewable electricity by 2020 and the expansion of wind energy is driving the need for more flexibility on the market which will lead to more opportunities for aggregators as the market develops. • DSOs are expected to need demand side flexibility services in the near future to manage congestion at the distribution network level, which would work well with the NOVICE model due to the size of building likely to be involved. • DR revenues could improve the business case for installing battery technology with renewables for accessing flexibility markets.
Financiers	• High degree of certainty in continued government support for EE and DSR initiatives give confidence to investors that revenues from NOVICE projects are secure. • Robust energy regulatory framework gives confidence that long-term revenue streams are available using a NOVICE approach.
Client/building owner	• There is a wide array of incentives and tax deductions allow some clients to access tax credits for energy renovations. • The Energy Efficiency Fund can provide loans for EPC style contracts that mean no upfront capital is required for NOVICE style projects. • Regulatory framework allows generators to export to the grid which could allow them to bring idle equipment online at times of peak demand & receive additional payments.
FM Company	• Potential new service partnership models offered by EPC and DSR options. • Legislation framework facilitates their association with ESCOs and aggregators as their roles and responsibilities are clearly defined.
Organisation	**Threats to the NOVICE model**
ESCOs	• Lack of examples of successful EPC contracts in public & private sector has led to a low uptake of EPCs in Ireland. There is general

	mistrust or lack of understanding preventing large scale roll out of EPCs. • Electricity tariff structure is relatively flat which does not encourage implicit demand response. • Clients, building owners and FM companies are relatively unaware of the opportunities available in EE and DSR and lack understanding in these areas making it difficult to sell a NOVICE style approach to them.
Aggregators	• Aggregators are allowed to bid either for DR only or Generation only contracts – i.e. DR and Generation cannot be aggregated into one bid. • Prequalification requirements could become more stringent and more costly over time. • Bidding for provision of DSR services takes place annually. Once bidding has closed, new entrants cannot enter the DSR market until the next year. This could cause delays to NOVICE style projects.
Financiers	• Financial default by parties who cannot meet specific terms of the EPC due to distorted risk assessment, sharp changes in energy prices, or weather occurrences that influence energy production and savings estimations. • TSO is regularly changing the DR schemes and payment levels introducing uncertainty into the business model. • Little sign of the EPC market growing in recent years. • Smaller NOVICE style projects, (under €500k) could be subject to higher interest rates which makes them less favourable.
Client/building owner/FM company	• Periods of high energy price volatility can make it unattractive for clients to enter long-term EPC. • In times of political uncertainty, tax credits could be removed with relatively short notice, hindering taking decisions on long-term renovation plans.

5.3.3 Discussion of SWOT findings

The ESCO market in Ireland is relatively new and still in the developmental stages, but there is a positive outlook for growth through the National Energy Services Framework and the Irish government's targets on energy efficiency. Potential markets such as using EPCs for public sector buildings have been opened, and grant schemes and subsidies can be used for delivering EE to the private and residential sectors. However, the novelty of EPC and ESCO still needs to find its way to form a wider client base. There are currently few examples of successful projects and this is hampering the growth of the market. The first public sector EPC was awarded in 2016 by Dublin City Council but no further public sector EPCs have been tendered by other local authorities.

Similarly, the DSR market is open in Ireland but is hampered by large minimum load requirements, stringent prequalification requirements and the need to bid into the market annually. As a result most participants are large industry clients with onsite generators or large loads that can be controlled easily. To attract smaller customers and promote DSR through aggregation there need to be more successful case studies and improved legislation on the matter.

There is nothing to prevent the joint services model being adopted in the Irish market, but uptake is likely to be slow until the EPC and DSR markets mature sufficiently. ESCOs and aggregators that

consider the best way to implement the joint services model now will be in a strong position to take advantage of the markets as they develop.

Different remuneration and incentives mechanisms are in place, but improvements can be made to the prequalification requirements for participation. An umbrella association is needed in order to better represent the interests of the sector.

5.4 UNITED KINGDOM

5.4.1 Market description summary

a) Demand Response and ESCO market

- The UK ESCO market is large and growing thanks to the success of financial support and EPC facilitation programmes.
- The Salix revolving fund provides loans to the public sector to implement energy efficiency measures with repayments based on savings.
- The RE:FIT programme (in England and Wales) and the CEF programme (in Scotland) provide support to facilitate the development of EPCs for the public sector, including local authorities, hospitals and schools.
- As a result, the ESCO market is flourishing in the public sector, but private sector contracts remain rare. This is largely due to the split incentives of energy efficiency projects between landlord and tenant in commercial buildings and a lack of information for and capacity within commercial building owners to procure EPCs.
- The UK was the first country to open several energy markets to DR participation from consumers but despite the maturity in terms of years of operation there are still barriers to participation for aggregators.
- Almost all ancillary service programmes in the UK are open to demand response and aggregation but aggregators are unable to access the Balancing Mechanism or wholesale markets as bilateral agreement from the BRP/retailer are required.
- Aggregators can also access the capacity mechanism as there is no prerequisite for agreement between retailer and aggregator. This means that retailer (rather than aggregator) is exposed to imbalance payments or costs resulting from customers' actions. However in practice most participation in the capacity market is from generators, with only one demand side response aggregator winning a contract in the last round of tendering.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- The energy services market is a growing and competitive market. This has been largely due to government support for its development as part of implementing a smart energy system nationwide through financial support for innovative DSR.
- Financial incentives and programmes such as Salix, RE:FIT and CEF in the public sector have contributed towards positive environment for EPCs within the market and continue to boost the number of EPCs in the public sector. The government has committed to funding Salix until 2020.
- National Grid launched a new stakeholder-backed initiative called Power Responsive, with the goal of stimulating participation of flexible technologies in the electricity system.

- The UK government is investing in research into smart grid systems and battery storage technology in an effort to enable and develop demand response. In addition, smart meters are being rolled out to all homes and businesses by the end of 2020
- Central government departments in the UK are obligated to reduce greenhouse gas emissions by 32% by 2020 on a 2009 baseline.
- The CRC scheme in the UK is an obligation on high energy users in both the public and private sectors to improve energy efficiency. The scheme was originally set up as a cap and trade mechanism to encourage cost effecting energy efficiency improvements but was simplified after phase 1 so that obligated parties simply purchase allowances equivalent to the amount of carbon emitted. Allowances are currently selling for £17.20 per tonne of CO_2 which incentivises organisations to invest in measures that are more cost effective than purchasing allowances. The CRC scheme will close in July 2019 and be replaced by an increase in the climate change levy (a tax on non-domestic energy consumption)

c) Market size estimates

- The Building Research Establishment estimates that value of the ESCO market is around £180 million and new investments supporting emissions reduction in the public sector are worth around £1.66 billion.
- There are approximately 50 active ESCOs and 15 DSR aggregators present in the UK market. ESCOs range from large multinationals, large local companies and SMEs. It is estimated that 20-25 of ESCOs in the UK market offer EPCs.
- Power Responsive report (2017) shows that onsite generation constitutes the majority (about 67%) of demand side flexibility technology participating in DSR. This is followed by load response (28%), generation for export only (3%) and energy storage (1%).
- EPCs have been carried out across a wide range of public buildings in different sectors including local authorities, the National Health Service, schools, and universities. It is estimated that there were 100 new projects between 2014 and 2016.

5.4.2 SWOT analysis of the NOVICE model for the UK market

Table 5-4 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the UK energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in the UK, and the **opportunities and threats** that the UK market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-4 SWOT analysis of the NOVICE model for the UK market

United Kingdom	
Organisation	**Strengths of the NOVICE model**
ESCO	• The NOVICE model will be a positive enhancement to the existing established public sector EPC frameworks RE:FIT and CEF. • Being able to offer EE as well as DSR services by working with an aggregator will give the ESCO a USP in the RE:FIT and CEF frameworks.

	• Working with aggregators with existing industrial clients could give the ESCO access to the industrial market which is traditionally harder for ESCOs to penetrate. • NOVICE is a low risk, way of bringing demand side response skill set to the ESCO immediately, without large investment in training or developing in-house expertise. • The ability to provide DSR as well as EE services could reduce contract length and perceived risk which could help to persuade more private sector clients to use EPCs. • Introductions to aggregator clients that have potential for EE is an easier way to increase revenues for the aggregator than building relationships with new clients.
Aggregator	• Working with ESCOs on the RE:FIT and CEF frameworks will give access to the public sector clients that already use and trust this framework. • Being able to offer EE as well as DSR services by working with an ESCO will give the aggregator a USP. • Introductions to ESCO clients that have potential for DSR is an easier way to increase revenues for the aggregator than building relationships with new clients.
Financiers	• The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment. • Diversification of investment portfolio with new actors in the EPC market. • NOVICE presents potentially higher value projects with shorter payback periods which are more attractive to investors. • The advantages of NOVICE could attract finance outside of the established SALIX funding (e.g. higher proportion of private investors).
Client (building owner)	• An EPC based on the NOVICE model could reduce the cost of CRC compliance by making more expensive EE projects economically viable. In future, Climate Change Levy payments will be reduced by minimising energy consumption. • Allows the client to take advantage of smart grid options as part of EE investments. • NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs. • Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Can participate in DSR and EE without the need for in-house specialist skills.
FM Company	• Possible new revenue stream through offering the client DSR plus EE, or acting as a facilitator of EPC contracts. • Ability to facilitate the NOVICE approach gives FM company a USP. • Adding DSR to existing energy related contracts could generate a new revenue stream for FM companies.

	• Working with aggregators FM companies can provide an additional service to clients without need to train new staff or take on new risk.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC. • As the ESCO is the client facing contractual service provider the financial and reputational risk associated with underperformance of the aggregator is borne by the ESCO. • Added complexity of administration and transaction costs related to managing revenue streams from DSR. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance.
Aggregators	• Aggregator does not build a direct relationship with the client. • Complexity of contractual arrangements increases when combining with energy efficiency. • Revenues are handled by the ESCO which could result in longer payment times for aggregator. • EE measures typically reduce the load available for participating in DSR, which reduces revenues for aggregators.
Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • Finance is being provided to an ESCO for equipment that will be outside of their control, which increases the risk of loan default.
Client/building owner	• Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.
FM Company	• The FM Company is the client facing contractual service provider so they bear the additional financial and reputational risk associated with underperformance of the aggregator. • The NOVICE model requires a more complex contractual arrangement with the client. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.
Organisation	**Opportunities for the NOVICE model**
ESCOs	• Salix financing, RE:FIT and CEF have funding until at least 2020.

	• UK Government is committed to electrification of heat and increasing uptake of electric vehicles which will necessitate growth in the DSR market. • UK Government projections suggest 65% of energy will be generated locally by 2050 which will require flexible, smart buildings able to respond to changes in supply and demand. NOVICE model will help to achieve this in a range of buildings.
Aggregators	• The National Grid is under pressure due to the growth of small scale generation on the distribution network and large scale renewable on the transmission network. This makes it likely that they will increase the opportunities for participation in DR in coming years to cope with these changes. • The Power Responsive initiative aims to stimulate participation from industrial and commercial clients through distributed generation, storage and demand response. This will bring more opportunities for a range of size of clients from different sectors to participate in NOVCE style projects. • DR revenues could improve the business case for installing battery technology with renewables for accessing flexibility markets. • A number of trials for new DR mechanisms are underway which could lead to more opportunities for participation from different clients and sectors.
Financiers	• Shorter paybacks and higher returns on investment could attract private sector funders to invest in NOVICE style projects.
Client/building owner	• Some evidence that smart buildings (energy efficient and flexible) have a higher resale and rental value in the UK. • Some evidence that smart buildings increase the health, comfort and productivity of the workforce. • Regulatory framework allows generators to export to the grid which could allow them to bring idle equipment online at times of peak demand & receive additional payments.
FM Company	• Potential new service partnership models offered by EPC and DSR options.
Organisation	**Threats to the NOVICE model**
ESCOs	• The UK Government policies on energy efficiency and DSR post Brexit are, as yet, unclear. It is likely in the short term that existing regulations will remain in place, but the lack of targets stemming from EU Directives could allow the Government to change direction. • It is unclear how long mechanisms like Salix, RE:FIT and CEF will remain available, particularly post Brexit. • Uncertainty caused by Brexit negotiations could make both public and private sector organisations reluctant to commit to EPC contracts several years in duration. • Split incentives of energy efficiency benefits between landlords and tenants prevents many clients from participating.
Aggregators	• Air quality regulations may restrict the use of diesel standby generators for DR in future.

	• There is a lack of transparency in the DSR market in the UK as many services are not procured through the open market and the TSO (National Grid) is able to exercise its discretion in awarding contracts. This makes it risky for new entrants to participate. • Tariffs associated with the various DR and flexibility markets vary from year to year making it difficult to estimate and guarantee the potential revenues from participating in DSR. • Relationship between BRP and aggregator not yet fully resolved making it difficult for aggregators to participate in some markets.
Financiers	• Uncertainty over the impact that Brexit will have on energy prices, and energy related legislation may cause financiers to be reluctant to invest in NOVICE style projects. • Lack of transparency in the DSR market, its complexity and the changing nature of the market structure, make financiers reluctant to invest.
Client/building owner/FM company	• Brexit is causing uncertainty in all sectors making organisations less willing to participate in long term contracts or new business models. • Lack of transparency in the DSR market, its complexity and the changing nature of the market structure, make clients reluctant to participate.

5.4.3 Discussion of UK SWOT findings

The ESCO market in the UK is well established with a large number of public sector clients thanks to the availability of funding and frameworks to support EPC feasibility studies and subsequent implementation of energy efficiency measures. EPCs in the private sector remain rare. The DSR market has been open for many years and there are fewer barriers to entry as aggregation is allowed and can be offered without needing agreement from the BRP. However, to date the majority of participation has come from mobilising idle onsite generators rather than load management or turn down. This may not be the case in future as the TSO (National Grid) continues to make changes to regulations to allow greater participation and air quality regulations could restrict the use of backup diesel generators for demand response.

The NOVICE model is could operate well in the UK market in its current form and further reforms will strengthen the requirements for joint energy services. ESCOs and aggregators that are willing to work together could benefit from accessing new markets and gaining a USP that differentiates them from other market actors. As the proportion of renewables on the grid increases and the role of nuclear declines, the TSO will be under even greater pressure to augment the level of allowable flexibility services. Research projects are already underway to investigate the potential for energy storage and demand response in the residential sector which is a strong signal that the DSR market will continue to grow in future.

5.5 GERMANY

5.5.1 Market description summary

a) Demand Response and ESCO market

- In principle, demand response and aggregation of loads are allowed in the German wholesale and balancing markets but in practice it is very difficult for independent aggregators or large consumers to participate due to the regulatory and administrative barriers.

- Regulations require independent aggregators to seek bilateral permission from multiple parties (client, TSO, DSO and BRP) before offering the customer's flexibility to the market. In practice this means that most participants are large industrial clients.
- The electricity tariff structure in Germany favours flat electricity consumption and offers discounts on network charges to large energy users that maintain a flat usage profile. This is a major barrier to flexibility as customers that respond flexibly lose these discounts.
- Prequalification of loads providing demand response must be done at asset level rather than at pool level for each of the 4 TSOs operating in Germany. This creates a significant administrative burden for aggregators and limits participation to larger loads.
- The German ESCO market is the largest and most developed in Europe.
- Financing for EPC contracts is generally easily available to ESCOs from banks who understand the nature of repaying investments from savings as a widely accepted practice.
- EPC project sizes in Germany tend to be very large (over €1 million), which prevents SMEs from winning this type of work.
- 75% of EPC projects are implemented in the public sector and have an average duration of 12 years. In the private sector contract durations tend to be in the range 3-6 years.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- The German Government has a target of 35% renewable electricity supply by 2020.
- Nuclear power currently accounts for approximately 12% of Germany's electricity generation capacity and there are plans to phase out nuclear power completely by closing the last 7 nuclear reactor plants by 2022.
- Germany has a target to reduce greenhouse gas emissions by 40 % by 2020 and by 80- 95 % by 2050 compared to 1990 levels.
- The target for the share of renewable energy in gross final consumption of energy is 18 % by 2020, and 60% by 2050.
- In the building sector, the target for 2050 is to have a building stock which is almost climate-neutral. Refurbishment of buildings has been identified as a key priority area.
- There are several grants, soft loans and support schemes available to ESCOs and their clients to drive the ESCO market. Some are available to either ESCO or client, others rely on the client to make the application, and still others are aimed specifically at SME ESCOs.
- The German Federal Ministry for Economic Affairs and Energy (the BMWi) is aware of the current barriers to uptake of demand response via independent aggregators and is addressing these issues by consulting with stakeholders on the policy conditions needed for the future of generation and supply of electricity.

c) *Market size estimates*

- Approximately 500 companies offer contract-based energy services of various types in Germany. Of these, around 175 are defined as ESCOs with the rest comprising mostly energy supply companies.
- Around half of all ESCOs in Germany earn less than €500,000 per year with only a few larger ESCOs earning above €10 million per year from energy service contracting.
- Energy Supply Contracts are the most common type of business model used by ESCOs, accounting for 75% of all projects. Only 20% of projects use the EPC business model with the remaining 5% of projects relating to finance only or less complex business models.

- Annual revenue from energy services in Germany is approximately €3.5 – 5.0 billion with around 8% of this attributable to EPCs.

5.5.2 SWOT analysis of the NOVICE model for the German market

Table 5-5 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the German energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Germany, and the **opportunities and threats** that the German market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-5 SWOT analysis of the NOVICE model for the German market

GERMANY	
Organisation	**Strengths of the NOVICE model**
ESCO	• NOVICE is a low risk, way of bringing demand side response skill set to the ESCO immediately, without large investment in training or developing in-house expertise. • The ability to provide DSR as well as EE services allows upselling of additional services to existing clients which is an easier way of generating more revenue for the ESCO than finding new clients. • Working with aggregators brings access to new markets e.g. the industrial sector, a key market for aggregators but one which is less common for ESCOs in Germany. • Offering DSR as well as EE services will give ESCO a USP in an already crowded market.
Aggregator	• Finance providers are already familiar with the EPC model of upfront financing and payments through savings which helps the aggregator deal with some of the administrative costs of accessing the DSR markets. • ESCOs already have a large client base through which they can introduce DSR as an additional service. This is an easier way to increase revenues for the aggregator than building relationships with new clients. • ESCOs are well trusted by the market so working with them will allow easier access to new clients in new sectors e.g. public sector where traditionally ESCOs are strong but aggregators are weak. • Being able to offer EE as well as DSR services will give the aggregator a USP.
Financiers	• Case for financing for aggregation is strengthened by working with well-established ESCOs. • The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment. • Diversification of investment portfolio with new actors in the EPC market.

Client (building owner)	• NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs. • Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Reduces financial burden of complying with regulations when renovating large buildings.
FM Company	• Ability to facilitate the NOVICE approach gives FM company a USP. • Adding DSR to existing energy related contracts could generate a new revenue stream for FM companies. • Working with aggregators FM companies can provide an additional service to clients without need to train new staff or take on new risk.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• Administrative burden of gaining agreement from TSO, DSO, BRP and client could cause significant delay to projects. • Not many DSR markets are easily accessible so the number of sites that are suitable for a NOVICE style contract is small. • EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC. • As the ESCO is the client facing contractual service provider the financial and reputational risk associated with underperformance of the aggregator is borne by the ESCO. • Added complexity of administration and transaction costs related to managing revenue streams from DSR. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance.
Aggregators	• Aggregator does not build a direct relationship with the client. • Setting up DSR contracts is already highly complex due to the requirement for agreements with TSO, DSO, BRP and client and adding energy efficiency increases complexity further. • Revenues are handled by the ESCO which could result in longer payment times for aggregator. • EE measures typically reduce the load available for participating in DSR, which reduces revenues for aggregators.
Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • Finance is being provided to an ESCO for equipment that will be outside of their control, which increases the risk of loan default. • DSR market is undergoing change and reform which increases uncertainty and risk.
Client/building owner	• Participating in DSR could reduce the premium discounts received for flat consumption profiles. • Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.

FM Company	• The FM Company is the client facing contractual service provider so they bear the additional financial and reputational risk associated with underperformance of the aggregator. • The NOVICE model requires a more complex contractual arrangement with the client. • Relies on aggregator to accurately estimate potential revenues from DSR. Incorrect assumptions could result in not achieving the guaranteed level of performance. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.
Organisation	**Opportunities for the NOVICE model**
ESCOs	• The German Federal Ministry for Economic Affairs and Energy is consulting with stakeholders to remove barriers to participation in the DSR market. This will make NOVICE model easier to implement in future. • The German Government's commitment to phasing out nuclear and increasing renewables on the grid means that changes to improve accessibility of the DSR market are inevitable, which favours the NOVICE approach. • German public sector have more stringent targets and are expected to be exemplary – NOVICE model would help them achieve this. • Federal Government is supportive of measures to open up the EPC market to SMEs offering EPCs through simplified contracting models and a guarantor programme.
Aggregators	• The target to have climate neutral buildings by 2050 will drive the need for refurbishment and flexibility in buildings. The NOVICE model allows aggregators to tap into this market. • There are several grants, soft loans and support schemes available to ESCOs and their clients. Absorbing DSR into an EPC via an ESCO allows the aggregator to take advantage of some of these support schemes.
Financiers	• Forecasted sustained growth in ESCO and DSR market gives more certainty to investors of higher ROIs on combined projects. • High degree of certainty in continued government support for EE and DSR initiatives give confidence to investors that revenues from NOVICE projects are secure.
Client/building owner	• There is a wide array of incentives and tax deductions allow some clients to access tax credits for energy renovations. • TSO is open to adapting its products to encourage consumer participation in DSR market which could allow participation in more DSR markets in future.
FM Company	• Potential new service partnership models offered by EPC and DSR options.
Organisation	**Threats to the NOVICE model**

ESCOs	• Federal authorities restrict the approval of EPCs in local authorities due to debt levels. This would restrict implementation of NOVICE style EPCs in areas that would benefit most from this model. • Interest in participating is highly motivated by state subsidies and policies that can be modified or phased out according to political interests. • Change in discount percentages from those subsidies can potentially define profitability or default. • Change in state policies affecting relationship of public building sector (currently the largest client sector for EPC) with ESCOs.
Aggregators	• Tariff structure promotes flat consumption profiles which puts off clients from participating in flexibility programmes. Investment in expansion or reinforcement of their networks is encouraged. • Individual assets (rather than pooled loads) must be prequalified with every TSO (there are 4 in Germany) which makes it less viable to implement NOVICE in buildings with smaller loads. • DSO can block participation in DSR market if they deem it necessary or cause unnecessary delays during project approval. • BRPs can block independent aggregators from participating in the DSR market as they are seen as competitors offering similar services.
Financiers	• Low cost of energy increases payback periods. • DSR market is likely to undergo reforms which introduces uncertainty until the new system is in operation.
Client/building owner/FM company	• Periods of high energy price volatility can make unattractive for clients to enter long-term EPC. • In times of political uncertainty, tax credits could be removed with relatively short notice, hindering taking decisions on long-term renovation plans.

5.5.3 Discussion of SWOT findings

The ESCO market in Germany is one of the largest in Europe mainly due to the availability of finance and other government support schemes that raise awareness and promote energy efficiency in buildings. However, although the DSR market is legally and technically open to participation and aggregation, participation is limited. The main reasons for this are the requirements for independent aggregators to seek bilateral agreements from the TSO, DSO, BRP and client before commencing the service and the tariff structure which favours a flat (rather than flexible) consumption profile. In addition, prequalification of aggregated resource must be done at the asset level rather than the pool level, and the complexity of the process makes it too expensive to consider smaller loads. In light of the phasing out of nuclear and the commitment to increasing the proportion of renewables on the grid, the German government is actively consulting on measures to make the market more accessible for aggregation.

The NOVICE model offers a clear market advantage to ESCOs who can use it to differentiate themselves in a crowded market and to aggregators who can work with ESCOs to access the public sector client base. However, until reforms are embedded into the DSR market, joint energy services remain possible in theory but limited in practice.

5.6 SWEDEN

5.6.1 Market description summary

a) Demand Response and ESCO market

- EPCs have been offered in Sweden since the 1990s and have experienced moderate growth to date with around 100 small to medium sized EPC projects being implemented between 2005 and 2014 with an average duration of 5-6 years and average energy savings of 18%.
- 80-90% of EPC clients are in the public sector, and only two ESCOs operating in Sweden currently offer services to the industrial sector
- There are approximately 5-6 EPC facilitators in Sweden but few are currently active due to the slow-down in the market.
- From 2004-2009 the Swedish Government offered financial support schemes for energy efficiency which helped to grow the EPC market, but since these schemes ended there has been a marked reduction in the number of new EPCs signed.
- Most public sector clients self-finance EPCs because they can get more favourable credit lines from the municipal investment bank. The bank does not usually ask what the loans are to be used for, so there is a potential market for green loans to be developed.
- The legal and administrative burden for EPC projects in Sweden is high and the market suffers from lack of standardisation, meaning there is no "typical" EPC in use and every provider offers something slightly different.
- The main sources of energy in Sweden are hydroelectric, nuclear, wind and geothermal.
- Participation in DSR and aggregation of resources is legally possible in Sweden
- Primary, Secondary and Tertiary Reserves are open to demand response and aggregation of loads but in practice there are no independent aggregators operating in the Swedish market.
- Aggregators must become a BRP to participate and must obtain a contractual agreement from the customer's BRP in order to participate. This hampers the market as the administrative burden of being a BRP is high and most BRPs see aggregators as a direct competitor so are unlikely to cooperate.
- Swedish ancillary services are dominated by hydropower as it is cost efficient and rapidly adjustable, but demand response is expected to grow as the share of intermittent renewables on the grid increases.
- Some modernisation of the system is required as TSOs still use telephone calls rather than electronic systems to activate specific loads.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- The main sources of energy in Sweden are hydroelectric, nuclear, wind and geothermal. Hydroelectric accounts for over 90% of renewable energy generation.
- Sweden has a national target to improve energy efficiency by 50% by 2030 and to achieve a renewable energy share of 50% by 2020. By 2040, Sweden plans to produce all electricity on the grid from 100% renewable sources.
- Nuclear power currently accounts for approximates 40% of electricity production but there is a plan to phase out nuclear power over time and replace it with renewables.

- The Swedish Electricity Act was amended in 2014 to mandate that network tariffs are designed in a way that ensures that participation in demand response in balancing markets and procurement of ancillary services is not hampered.

c) Market size estimates

- The market in Sweden is moderate in size and has experienced some growth between 2004 and 2009 due to successful promotion, channelled policy strategy, available finance mechanisms and public concern for climate change. However, demand is still low and has declined since the closure of financing schemes for energy efficiency in 2009.
- In 2009 there were 27 ESCOs, with 5-6 supplying EPC under the "chauffage" service model.
- The Swedish ESCO market is currently valued at of 60-80 million euros, but has potential for growth to 300 million per year.

5.6.2 SWOT analysis of the NOVICE model for the Swedish market

Table 5-6 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the Swedish energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Sweden, and the **opportunities and threats** that the Swedish market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-6 SWOT analysis of the NOVICE model for the Swedish market

SWEDEN	
Organisation	**Strengths of the NOVICE model**
ESCO	• The ability to provide DSR as well as EE services could reduce contract length and perceived risk which could kick-start the EPC market in Sweden. • The NOVICE model could be presented as a best practice example of a complete EPC to encourage uptake – it doesn't have to compete with traditional EPC models as these have not yet gained traction in Sweden. • Could attract large industrial clients, traditionally not the target market for ESCOs.
Aggregator (BRP in the case of Sweden)	• Access to a greater range of load types and sizes for providing flexibility.
Financiers	• The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment. • Diversification of investment portfolio with new actors in the EPC market. • NOVICE presents potentially higher value projects with shorter payback periods which are more attractive to investors.
Client (building owner)	• NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs.

	• Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Can participate in DSR and EE without the need for in-house specialist skills.
FM Company	• Possible new revenue stream through acting as an EPC facilitator. • Ability to facilitate the NOVICE approach gives FM company a USP as there are not many EPC facilitators in Sweden.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• There are currently no independent aggregators in Sweden. It's unlikely that a BRP would want to collaborate with an ESCO. • EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC.
Aggregators (BRP in the case of Sweden)	• No incentive for BRPs to provide energy efficiency services to clients. • Building related demand response sources are more expensive to operate than hydroelectric sources.
Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • Finance is being provided to an ESCO for equipment that will be outside of their control, which increases the risk of loan default.
Client/building owner	• Customers are unable to choose their aggregator since it must be the BRP at the moment. • Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.
FM Company	• The NOVICE model requires a more complex contractual arrangement with the client. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.
Organisation	**Opportunities for the NOVICE model**
ESCOs	• Sweden have targets to improve energy efficiency by 50% by 2030 which could drive further uptake of EPCs. • Sweden is currently working on methods of supporting the role of independent aggregators participating in the balancing markets.
Aggregators	• Sweden plan to significantly reduce their nuclear capacity and increase proportion of renewables on the grid in the coming years which will require an increase in the flexibility of buildings. • Sweden is currently working on methods of supporting the role of independent aggregators participating in the balancing markets.

	• Since the independent aggregation market is new it will be easier for new aggregators to assume dual roles and offer a wider range of services. • An electronic system to activate specific loads, instead of the current telephone authorisation system is being developed. • Regulations require network operators to set tariff structures that do not hamper participation in the DSR markets.
Financiers	• Proposed changes in legislation around the status of the aggregator give financiers more confidence that there is government support for NOVICE model contracts. • Government commitment to reduce use of nuclear gives more confidence that NOVICE style EPCs are secure investments. • There is an opportunity to develop a specific credit line linked to energy efficiency since most banks that lend to public sector offer the same terms for all projects.
Client/building owner	• EPCs could be linked to the requirement for an energy audit every 4 years in large organisations.
FM Company	• Potential new service partnership models offered by EPC and DSR options.
Organisation	**Threats to the NOVICE model**
ESCOs	• Lack of examples of successful EPC contracts in public & private sector has led to a low uptake of EPCs in Sweden. • There are no longer any government backed finance initiatives supporting uptake of energy efficiency which has caused a slow-down of EPC market. • Clients, building owners and FM companies are relatively unaware of the opportunities available in EE and DSR and lack understanding in these areas making it difficult to sell a NOVICE style approach to them. • Low cost flexibility available from hydroelectric power makes it difficult to compete in the DSR market.
Aggregators	• The market for independent aggregators is currently non-existent and will take time to develop and mature. • There is no incentive for BRPs to offer energy efficiency services, work with ESCOs or enter into bilateral agreements with independent aggregators. • Low cost flexibility available from hydroelectric power makes it difficult to compete in the DSR market. • Integration with Nordic energy grid can bring foreign actors into play with more competitive price structures or better organization.
Financiers	• Few government subsidies available for EPCs making it harder for projects to demonstrate financial viability. • Small market size means loans are likely to be offered at non-preferential rates, and can restrict the number of financiers interested in participating. • Most public sector clients are able to self-finance.
Client/building owner/FM company	• Periods of high energy price volatility can make it unattractive for clients to enter long-term EPC.

5.6.3 Discussion of SWOT findings

The most significant barrier to uptake of the joint services model in Sweden is the requirement to either become a BRP or ask permission from the BRP in order to offer aggregation services to clients. This has led to the situation in Sweden where aggregation is legally allowed, but in practice there are no independent third-party aggregators participating in the market. The bureaucracy involved in becoming a BRP is prohibitively complex and most BRPs are unwilling to enter into agreements with independent aggregators as they are seen as competitors. Until this situation is rectified, the joint services model cannot be a practical offering to clients.

An additional barrier is the prevalence of hydropower on the grid which can be easily and cheaply deployed to meet the country's current flexibility needs. However, with plans to phase out nuclear power and generate all the country's electricity from renewable sources by 2040, the government and TSO is under pressure to change the regulations to allow aggregators to participate in the market and plans are already in place to remove the requirement for BRP consent. Once this transition is complete, the market will be able to support the NOVICE model and ESCOs that are prepared to work closely with newly formed aggregators will have a market advantage that could considerably boost the number of EPCs undertaken each year.

Work is underway to integrate the Nordic energy markets. This is both an opportunity and a threat to the NOVICE model as it could result in greater or fewer requirements for aggregated demand response depending on the distribution of generation sources and energy demands.

5.7 ITALY

5.7.1 Market description

a) Demand Response and ESCO market

- The DSR market in Italy is currently immature, with most of the country's flexibility needs being met by hydro and gas power stations.
- There is no legal framework for participation in the balancing market or any flexibility market other than the interruptible loads programme, which is rarely called upon and requires a minimum load size of 1 MW to participate.
- Payments for interruptible contracts programme are attractive and related mostly to availability payments rather than utilisation.
- Aggregation of loads is not permitted in Italy so there are no independent third party aggregators operating in the country.
- There are plans for new regulations that will open more of the flexibility markets in Italy including the Capacity Mechanism and the balancing market, but the new framework has not yet been implemented and will take time to mature.
- The Italian ESCO market is one of the most developed and largest in Europe as ESCO projects, including EPCs have been in existence for decades
- In contrast to most other countries in Europe, the Italian ESCO market focusses mainly on the industrial sector due to the incentives provided by the White Certificate Scheme (WCS). When a client implements a certified energy efficiency project, white certificates are awarded to the project which can be sold to energy suppliers to fulfil their obligations under the Energy Efficiency Obligation. These are valuable, tradable commodities for ESCOs which makes industrial projects more viable.

- The Italian public sector finds it difficult to participate in EPCs due to the high level of bureaucracy involved which often causes delays in payment. This can cause cash flow issues for ESCOs if they have multiple such projects running together.
- The main barriers to progression of the ESCO market relate to a lack of government policy supporting EPCs in the public sector and a lack of finance as most banks are unfamiliar with the concept of using energy savings to guarantee the loan.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- Italy has a target to reduce primary energy consumption by 24% by 2020 compared to the 2006 baseline through energy efficiency measures. The main policy measure to achieve this is the White Certificate Scheme.
- White Certificates are issued to project owners for the implementation of energy efficiency measures per tonne of oil equivalent saved. DSOs and energy suppliers have an obligation to reduce energy consumption of users and surrender a certain number of White Certificates each year that verify the amount of energy saved through energy efficiency projects. Since DSOs are removed from consumers, most energy efficiency projects are implemented by ESCOs and other service providers who receive White Certificates that can be sold to DSOs who need them to meet their obligations.
- Italy plans to increase the total energy generation from renewables to 27% by 2030 (currently at 17.5%) and eliminate energy generated from coal power stations by 2025. Italy has no nuclear power plants in operation.
- The “Green Certificate” program put incentives on renewable energy generation for each MWh generated from renewable sources. Electricity generators can either supply an equivalent amount of renewable electricity into the system and/or purchase Green Certificates. These certificates are tradable and have driven the increase in renewable capacity in recent years.
- Recently implemented legislation has begun to reform the Balancing market by opening it to demand response, distributed generation, renewable energy systems and high performance cogeneration but it is still focussed on generation capabilities rather than management of loads.
- Upcoming legislation in Italy will attempt to remove some of the barriers to participation in the market including opening the balancing and reserve markets, allowing aggregation, and a review of balancing pricing.
- An electricity interconnection between Italy, North Africa and Balkan countries is planned. This will improve connectivity of wind and solar power sources in the Southern regions where the yield is higher but could simply result in more electricity exports to non-EU countries at times of high generation rather than additional flexibility the Italian market.
- Tax relief measures are available for final consumers when installing local renewable energy measures such as solar thermal systems, heat pumps, etc.

c) Market size estimates

- The ESCO market was valued at €500 million in 2013, with a potential market size evaluated at €1-10 billion per year.
- There were 150 certified ESCOs in 2016. EPC is a common offering for all of them, and most manage between 1-5 such contracts per year.

- Half of current EPCs have a value of €200,000 to €500,000 per year, but contracts with lower or higher value can also be found.

5.7.2 SWOT analysis of the NOVICE model for the Italian market

Table 5-7 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the Italian energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Italy, and the **opportunities and threats** that the Italian market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-7 SWOT analysis of the NOVICE model for the Italian market

ITALY	
Organisation	**Strengths of the NOVICE model**
ESCOs	• The NOVICE model can have good acceptance in the market since EPC is a common offering by well-established ESCOs. • ESCOs in Italy are highly experienced in running EPCs so transition to the new model should be straight forward. • The ability to provide DSR as well as EE services allows upselling of additional services to existing clients which is an easier way of generating more revenue for the ESCO than finding new clients. • An ESCO with enough experience and a large enough client that meets the minimum load requirement could participate in the interruptible loads market.
Aggregators	• Aggregation is not allowed.
Financiers	• Financiers are currently not actively involved, but market conditions are convenient to provide favourable interest rates and guarantees in a new stream of revenue in the EPC market. • Case for financing for aggregation is strengthened by working with well-established ESCOs. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment and a USP.
Client (building owner)	• Under NOVICE model, clients can choose a more competitive EPC since EE and DSR offered in one contract. • Reduces complexity to apply for energy incentives as this can be done by the model adopters.
FM Company	• Involving FM companies under the NOVICE model gives the FM company a USP to reach new clients.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• The NOVICE model does not remove any of bureaucracy or risk in dealing with public sector clients so this market remains inaccessible to ESCOs. • Most DSR markets are still closed and aggregation is not allowed so there will be few sites/clients that are suited to a NOVICE style approach.

	• Association with other companies might affect offering a full-ranged EPC due to role dilution.
Aggregators	• Aggregation is not allowed.
Financiers	• Lack of involvement of financial sector, as banks don't have technical knowledge or experience to participate in EPC projects. • Uncertainty in predicting DSR profitability.
Client (building owner)	• EPC or EE offerings by different companies not clearly defined, makes it difficult to choose one over the other. • Client loses some of the control of operating onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Long-term (several years) contract with the chosen ESCO and aggregator restricts the client's ability to respond to changes in the business. Some clients cannot engage in that type of contracting.
FM Company	• The NOVICE model requires a more complex contractual arrangement with the client and third party providers in an already complex and bureaucratic system. • Role not clearly defined when participating in such consortium. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.
Organisation	**Opportunities for the NOVICE model**
ESCOs	• New connectivity infrastructure within Italy allows association with new energy generators. • Government targets on energy efficiency could drive the public sector to participate in EPCs. • Forthcoming legislative changes could reform the electricity market, allow aggregation and open more opportunities to participate in more flexibility markets.
Aggregators	• Forthcoming legislative changes could reform the electricity market, allow aggregation and open more opportunities to participate in more flexibility markets. • Government targets to increase renewable capacity and reduce dependence on coal will result in a greater need for flexibility services and opportunities for new entrants to the market.
Financiers	• Large market offering by value, with stable growth. • Possibility to develop products suited to the public sector to drive growth in this market. • White and green certificates are well established in the market and supported by the government.
Client (building owner)	• Contracting EPC through the NOVICE model can make it relatively easier to avail of tax relief measures for renovation and replacement of inefficient equipment. • ESCOs can assist client to access white and green certificates for projects that are implemented under EPC which strengthens the business case, reduces payback period and strengthens return on investment.
FM Company	• Potential new service partnership models offered by EPC and DSR options.

Organisation	Threats to the NOVICE model
ESCOs	• It will take time for the proposed changes in legislation to be implemented and refined to create a working system. • Bureaucratic processes and legal measures that are not streamlined or not made more efficient will hinder development of EPCs for the public sector. • The white certificate issuing process is stalled at the moment, only existing ones are being traded.
Aggregators	• Aggregation not yet allowed. • Proposed market reforms will take time to implement and refine to the point that service provision becomes viable for independent aggregators. • The bureaucracy that prevents ESCOs contracting with public sector clients could also prevent aggregators from contracting with them in future. • Potential reduction in energy prices to unprofitable levels due to connectivity with non-EU regions destined mostly for energy import. Other types of agreements or ownership of energy supply in foreign countries would be needed. • Bureaucratic measures are not changed or made more efficient. • No legal framework is made to promoting consumer generation.
Financiers	• As the share of renewable on the grid increases and the cost of installations come down, subsidies could disappear. • Public sector bureaucracy that causes late or non-payment is seen as too high a risk for financiers to provide loans. • Financial default by parties who cannot meet specific terms of the EPC due to distorted risk assessment, sharp changes in energy prices, or weather occurrences that influence energy production and savings estimations.
Client/building owner	• Periods of high energy price volatility can make unattractive for clients to enter long-term EPC.

5.7.3 Discussion of SWOT findings

The Italian ESCO market is unusual in that the majority of clients are large industrial companies in the private sector. In most other European countries, ESCOs target public sector clients but in Italy the public sector is avoided due to the high level of bureaucracy and risk of late or non-payment. The success of ESCOs in the private sector is largely due to the white and green certificate schemes. These tradable certificates for certified energy savings and certified renewable energy generation respectively, have created a market in which ESCOs can thrive in the private sector by selling certificates associated with their projects to obligated DSOs and energy suppliers.

Although the Italian ESCO market is one of the most developed and stable in Europe, the DSR market is immature and lagging behind other European countries. The current market conditions mean that it would be very difficult to operate a joint services business model in Italy at the present time. In particular, the lack of open DSR markets in which customers can participate and the inability to aggregate loads have presented major barriers to growth in the DSR market. The Italian TSO currently relies on hydro and gas power stations to provide the required flexibility, however as the level of renewables on the grid increases, the need for flexibility will grow and will drive changes in the

structure of the market. Proposals to open more DSR markets and allow aggregation are already being discussed but it is likely to be many years before these changes are implemented to the extent that a NOVICE approach would be viable.

In summary the Italian market is not currently suited to the implementation of a joint services business model, but the forthcoming legislative and regulatory changes could see this situation reversed in the coming years. When that happens, ESCOs and aggregators that are ready to form partnerships could have a significant advantage in the market.

5.8 DENMARK

5.8.1 Market description

a) Demand Response and ESCO market

- There is currently little demand for flexibility from TSOs and DSOs in Denmark because the country has sufficient capacity in its electricity network compared to other countries in Europe. This has led to low prices for demand response services because Denmark is easily able to handle the balancing of the electricity market. As the level of renewable capacity on this grid increases, this is expected to change.
- The balancing market and ancillary services are open to DSR providers and aggregation is legal in Denmark. However the low prices and regulatory barriers make it very difficult for new participants to enter the market.
- Third party aggregators require an agreement with the customer's BRP/retailer to contract with the client. There is no incentive for the BRP to provide this agreement as aggregators are seen as competitors.
- As a result of the above, there are no independent aggregators in Denmark and all flexibility services are offered through the energy retailer.
- Balancing programmes tend to be designed for large generators rather than demand response units.
- The ESCO market is small and offers a range of services that includes including EPCs. The EPC market has grown since 2006 when municipal buildings began to carry out energy renovations.
- The vast majority of EPCs are with public sector organisations, and there has been an average of 4 new projects per year since 2007. Smaller public sector municipalities, without the in-house resource to research and procure energy efficiency technologies use EPCs to procure a large number of EE measures in a short time frame and benefit from larger energy savings than they would be able to achieve alone.
- EPC projects tend to be financed by the municipality either directly or via their access to public sector loans which offer favourable interest rates. Normally renovations financed by loans would not be allowed, in order to keep the municipal taxes under control, but an exception is made for EE renovation.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- Denmark has a target to reduce gross energy consumption by 14.5% by 2020 based on a 2006 baseline.
- Currently 40% of electricity in Denmark is generated from renewable sources. The country's target is to reach 50% by 2030 and 100% by 2050. There are currently no

nuclear power plants in Denmark due to a law passed in 1985 which prohibits their construction.

- The Danish Energy Agency disseminates information and best practice concerning ESCOs and EPCs in relation to energy renovations.
- Price subsidies are in place for renewable energy generation, particularly wind, biogas and biomass.
- There is no specific legal framework for EPCs but there are several Government strategies that are currently driving the EPC market including: over 40 municipalities have signed up to The Covenant of Mayors, a commitment to go beyond the EUs targets on energy efficiency and emissions; The Danish Energy Efficiency Obligation Scheme encourages energy suppliers to collaborate with or establish ESCOs; Initiatives by government institutions to share knowledge and best practice on EPCs has raised awareness of the advantages of the business model; Government funded R&D projects on EPCs are ongoing.
- An official standard for EPCs is under development in Denmark to formalise the model and ensure that risk and responsibilities are fairly shared between client and provider.
- The Danish Energy association is carrying out a redesign of the DSR market in consultation with stakeholders. The intention is to create a market that is more flexible and includes the facilitation of a market that is suitable for independent aggregators.

c) Market size estimates

- There are approximately 20-25 ESCOs operating in Denmark, of which 6-10 active providers offer EPCs.
- A single Swedish ESCO dominates 50% of the market.
- ESCO market was valued at €140-150 million in 2013 with a potential of €1-7 billion.
- Work is being carried out to integrate the Nordic energy markets to allow greater flexibility, greater integration of renewables and to ensure a secure and stable energy supply across borders.

5.8.2 SWOT analysis of the NOVICE model for the Danish market

Table 5-8 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the Danish energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Denmark, and the **opportunities and threats** that the Danish market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-8 SWOT analysis of the NOVICE model for the Danish market

DENMARK	
Organisation	**Strengths of the NOVICE model**
ESCO	• Combining DSR with EE can give ESCOs a USP. • The ability to provide DSR as well as EE services could reduce contract length which could attract large industrial clients, traditionally not the target market for ESCOs. • NOVICE model gives incentives to develop the ESCO market through new products.

Aggregator (BRP in the case of Denmark)	• Access to a greater range of load types and sizes for providing flexibility.
Financiers	• The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan. • EPCs operated under the NOVICE model have a potentially shorter payback period due to the inclusion of both EE and DSR revenue streams, giving more favourable returns on investment. • Diversification of investment portfolio with new actors in the EPC market. • NOVICE presents potentially higher value projects with shorter payback periods which are more attractive to investors.
Client (building owner)	• NOVICE model offers shorter contract lengths with ESCO, faster payback, better ROI compared to traditional EPCs. • Only one contract is required covering both EE and DSR which reduces the administrative burden on the client. • Can participate in DSR and EE without the need for in-house specialist skills.
FM Company	• Possible new revenue stream through acting as an EPC facilitator. • Ability to facilitate the NOVICE approach gives FM company a USP as there are not many EPC facilitators in Denmark.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• There are currently no independent aggregators in Denmark. It's unlikely that a BRP would want to collaborate with an ESCO. • EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC.
Aggregators (BRP in the case of Denmark)	• No incentive for BRPs to provide energy efficiency services to clients. • Low price for demand response services results in a weak business case.
Financiers	• Revenues from DSR are difficult to predict with certainty which could introduce higher risk. • The collaboration suggested by NOVICE needs further testing due to the underdeveloped aggregator market.
Client/building owner	• Customers are unable to choose their aggregator since it must be the BRP at the moment. • Client loses some of the control of the operation of onsite equipment. • Client must accept some level of disruption to thermal comfort of building occupants and/or production levels during a DR event. • Locked in to a long-term (several years) contract with the chosen ESCO and aggregator, which restricts the client's ability to respond to changes in the business.
FM Company	• The NOVICE model requires a more complex contractual arrangement with the client. • If equipment or services do not meet client expectations FM personnel will be expected to fix the problem, increasing maintenance and repair costs. • Additional third party suppliers and additional technical infrastructure on site increases complexity and risk.

Organisation	Opportunities for the NOVICE model
ESCOs	• Denmark have targets to improve energy efficiency by 14.5% by 2030 which could drive further uptake of EPCs. • Denmark is currently working on methods of supporting the role of independent aggregators participating in the balancing markets. • NOVICE model can be promoted through the Danish Energy Agency, which disseminates information and best practice concerning ESCOs and in particular to energy renovations. • A NOVICE model consortium can avail more easily from research funds such as those to investigate new energy saving models, e.g. for district cooling.
Aggregators	• Denmark plan to significantly increase proportion of renewables on the grid in the coming years which will require an increase in the flexibility of buildings. • Denmark is currently working on methods of supporting the role of independent aggregators participating in the balancing markets. • Associating through the NOVICE model could bring benefits for a potential export tariff due to the opening of Nordic markets, as they would be better organized and prepared. • Since the independent aggregation market is new it will be easier for new aggregators to assume dual roles and offer a wider range of services. • A NOVICE model consortium can avail more easily from research funds such as those to investigate new energy saving models, e.g. for district cooling.
Financiers	• Proposed changes in legislation around the status of the aggregator give financiers more confidence that there is government support for NOVICE model contracts. • Government commitment to increase the amount of renewables on the grid gives more confidence that NOVICE style EPCs are secure investments.
Client/building owner	• EPCs could be linked to the requirement for an energy audit every 4 years in large organisations.
FM Company	• Potential new service partnership models offered by EPC and DSR options.
Organisation	**Threats to the NOVICE model**
ESCOs	• Clients, building owners and FM companies are relatively unaware of the opportunities available in EE and DSR and lack understanding in these areas making it difficult to sell a NOVICE style approach to them. • There is currently no demand from DSOs and TSOs for flexibility services as the grid is able to cope well with balancing supply and demand. • Offering DSR services requires agreement from the customer's BRP which is difficult and time consuming to obtain, and can block participation.

Aggregators	• The market for independent aggregators is currently non-existent and will take time to develop and mature. • There is no incentive for BRPs to offer energy efficiency services, work with ESCOs or enter into bilateral agreements with independent aggregators. • There is currently no demand from DSOs and TSOs for flexibility services as the grid is able to cope well with balancing supply and demand. • DSR market currently favours large generators rather than smaller demand response loads. • Integration with Nordic energy grid can bring foreign actors into play with more competitive price structures or better organization.
Financiers	• Few government subsidies or formal frameworks available for EPCs making it harder for projects to demonstrate financial viability.
Client/building owner/FM company	• Periods of high energy price volatility can make it unattractive for clients to enter long-term EPC.

5.8.3 Discussion of SWOT findings

The most significant barrier to uptake of the joint services model in Denmark is the requirement to either become a BRP or ask permission from the BRP in order to offer aggregation services to clients. This has led to the situation where aggregation is legally allowed, but in practice there are no independent third-party aggregators participating in the market. The bureaucracy involved in becoming a BRP is prohibitively complex and most BRPs are unwilling to enter into agreements with independent aggregators as they are seen as competitors. Until this situation is rectified, the joint services model cannot be a practical offering to clients.

An additional barrier is the TSO's low requirement for flexibility since the network has sufficient capacity to cope with changes in demand. This has led to low pricing and a weak business case for demand response services. This situation is set to change in coming years as renewable capacity on the grid increases to 100% by 2050. The Danish Energy Association is consulting with stakeholders on market reforms that will increase flexibility and facilitate the development of a market that is suitable for independent aggregators. Once this transition is complete, the market will be able to support the NOVICE model and ESCOs that can diversify their offering and work closely with newly formed aggregators will help to provide a new dynamic to the EPC market.

Work is underway to integrate the Nordic energy markets. This is both an opportunity and a threat to the NOVICE model as it could result in greater or fewer requirements for demand aggregated demand response depending on the distribution of generation sources and energy demands.

5.9 AUSTRIA

5.9.1 Market description

a) Demand Response and ESCO market

- The DSR market has improved in reducing prequalification requirements but its structure remains complex and expensive. Consumers can participate, but aggregators need a bilateral agreement with the BRP before load management can commence, which creates an obstacle for entering the market.
- The most attractive markets for DSR are tertiary control market due to the low technical barriers to entry and the secondary control market due to the large number of activations each year and potential for high revenues.
- Aggregators can only attract customers with large amounts of flexible load and/or backup generation (e.g. industry) to contribute to a pool. Smaller resources are still reluctant to participate due to low revenue streams.
- The Austrian Government is keen to reduce network losses and increase renewable energy generation from wind and PV, therefore there are plans to modernise the DSR market.
- The ESCO market is well established in Austria and has a supportive legislative framework in which to operate.
- The majority of EPC contracts relate to public sector buildings and have a duration of more than 10 years. There are very few private sector organisations participating due to the typically long contract lengths.
- A bottleneck for EPCs is the restrictions placed on local authorities by supervisory authorities who control public debt levels. In cases where the local authority is in debt they are restricted from taking on more debt via an EPC, even though this model could be suitable for them.
- The predominant ESCO business model is energy supply contracting (ESC) accounting for around 85 % of all ESCO projects. Only 10% of the market is covered by EPCs and the remaining 5% involve financing only, or they are based on operation contracting and other less complex solutions.

b) Summary of relevant legislation and policies supporting implementation of the NOVICE model

- 73% of electricity generated in Austria is from renewable sources. The Austrian Government has set a target for 100% of electricity to be generated from renewable sources by 2030.
- In 2014 amendments were made to regulations to ease the burden of prequalifying loads and to open the balancing market to DSR and aggregation. Further measures to open the market are planned and include optimising real time data exchange between DSO, TSO and other participants to support pooling by independent aggregators and enhancement of the rules around independent aggregation.
- The Austrian Energy Efficiency Law requires an increase in energy efficiency of 20% by 2020. This law requires large energy suppliers to implement energy efficiency measures in energy customers. Suppliers are able to ‘purchase’ savings that have been made from energy efficiency projects implemented by third parties but in practice the actual price paid is too low to incentivise implementation.

- On a national level, subsidies are available for the implementation of certain energy efficiency technologies and loans are available to finance EPC projects in street lighting and buildings.
- In Upper Austria an EPC subsidy scheme exists which can provide up to 40% of the investment costs and has resulted in 140 EPC projects in Upper Austria between 2006 and 2015.

c) Market size estimates

- In 2015, around 40 companies were operating as ESCOs, with 22 offering EPC services.
- The market in Upper Austria is still buoyant and growing due to the availability of subsidies but in other areas of the country EPCs are declining
- Austrian Energy Efficiency and Performance Contractors (DECA) is the umbrella association to which almost all ESCOs belong.

5.9.2 SWOT analysis of the NOVICE model for the Austrian market

Table 5-9 summarizes how the business model for joint services proposed by NOVICE would interact with current characteristics of the Austrian energy market, from the point of view of ESCOs, aggregators, financiers, clients and facility management companies. As described in the methodology section, the SWOT outlines the **strengths and weaknesses** of the NOVICE model in Austria, and the **opportunities and threats** that the Austrian market presents to the NOVICE model **from the point of view of each stakeholder.**

Table 5-9 SWOT analysis of the NOVICE model for the Austrian market

AUSTRIA	
Organisation	**Strengths of the NOVICE model**
ESCO	• NOVICE is a low risk way of bringing demand side response skill set to the ESCO but some in-house investment and training are needed to develop the EPC as it is currently a very small offer of the total EE market. • Offering DSR as well as EE services will give EPC a USP and a nationwide boost to the EPC as a product. • NOVICE model makes EPCs more attractive to private sector clients who favour shorter contract lengths.
Aggregator	• Working with established ESCOs could give access to the public sector clients that already use and trust the EPC model. • NOVICE model potentially gives the aggregator access to smaller clients who have traditionally not entered the DSR market due to small returns on investment. • Being able to offer EE as well as DSR services by working with an ESCO will give the aggregator a USP. • Introductions to ESCO clients that have potential for DSR is an easier way to increase revenues for the aggregator than building relationships with new clients.
Financiers	• Market is well-regulated and relatively stable which strengthens case for finance of NOVICE adopters. • The NOVICE model results in a second revenue stream for EPCs which reduces the risk of default on a loan.

	• Diversification of investment portfolio with new actors in the EPC market. • Access to government subsidies and tax breaks strengthens the ROI and reduces the risk to investors.
Client (building owner)	• NOVICE facilitates access of building owner to subsidies for energy efficiency improvements e.g. tax breaks for energy efficiency equipment. • For smaller buildings, the NOVICE model might make it more attractive to participate as an energy generator. • For larger private self-generators, the NOVICE approach provides a more organized approach to using their surplus energy either offsite or by exporting in response to a DSR event.
FM Company	• Working with aggregators FM companies can provide an additional service to clients without need to train new staff or take on new risk.
Organisation	**Weaknesses of the NOVICE model**
ESCOs	• Additional layer of complexity in market contracting, even if regulatory barriers are being modernised which could put off some clients. • Contract length may still be too long for the private sector clients. • Market for DSR and aggregation is still immature and undergoing change. This could introduce extra administrative costs and could change the likely payments from DSR which introduces risk of underperformance to the ESCO and client. • The need for an aggregator to obtain a bilateral contract with the BRP could cause a delay to starting an EPC which could put off clients.
Aggregators	• Aggregator does not build a direct relationship with the client. • Complexity of contractual arrangements increases when combining with energy efficiency. • Revenues are handled by the ESCO which could result in longer payment times for aggregator. • EE measures typically reduce the load available for participating in DSR, which reduces revenues for aggregators.
Financiers	• DSR financing not attractive as few aggregators can participate under current regulations. • Revenues from DSR are difficult to predict with certainty which could introduce higher risk.
Client/building owner	• Current nature of EPC limits the use to larger buildings in the public sector. • Long-term contracting restricts the client's ability to respond to changes in the business.
FM Company	• Additional third party suppliers and additional technical infrastructure on site increases complexity and risk. • The NOVICE model requires a more complex contractual arrangement with the client.
Organisation	**Opportunities for the NOVICE model**

ESCOs	• NOVICE is a convenient model for energy suppliers to subcontract a company that will help demonstrate compliance with energy reduction requirements at the transmission and final consumer level. • Changes to DSR market will make it easier for new market actors to participate in future. ESCOs that adopt the NOVICE model will be ready for this. • The Government's commitment to 100% renewable electricity by 2030 will create a demand for DSR services. ESCOs that adopt the NOVICE model will be ready for this. • Use of grants and subsidies for energy efficiency improvements at the building level allows to reach smaller residential clients.
Aggregators	• Changes to DSR market will make it easier for new market actors to participate in future. Aggregators that adopt the NOVICE model will be able to access more clients by being able to offer a wider range of services. • The Government's energy efficiency targets could drive more private sector clients towards EPC style contracts. Aggregators that adopt the NOVICE model will be able to access this market. • Projected increase in renewable capacity on the grid will create a demand for more DSR services and a more accessible market. • Real time data exchange between all market actors via smart meter roll out can facilitate the opening of more markets that are more accessible for smaller clients.
Financiers	• Schemes such as the housing renovation bank can be offered in a more substantial manner to more clients by using the NOVICE model.
Client/building owner	• Final consumers will have new options for EE and EPC through an energy supplier that contracts a NOVICE model adopter. • Value-added participation in programmes for residential improvements related to EE. • Allow participation in government programmes for renewable energy generation.
FM Company	• Potential new service partnership models offered by EPC and DSR options. • Potential to increase client base.
Organisation	**Threats to the NOVICE model**
ESCOs	• Change in state subsidies or energy policies that can be modified or phased out according to political interests. • Change in state policies affecting relationship of public building sector (currently the largest client sector for EPC) with ESCOs. • Non-uniform practices across regions can affect the overall national offering, lowering growth.
Aggregators	• Until regulations are changed to allow aggregators to contract directly with clients without agreement from BRP, the costs of participation could be too high.

	• New regulatory framework for increased DSR participation may not become open enough for NOVICE or may develop too slowly to enable aggregators to participate in the near future. • There is continued focus on client-side energy efficiency improvements and fewer developments on energy source flexibility.
Financiers	• Financial default by parties who cannot meet specific terms of the EPC due to distorted risk assessment, sharp changes in energy prices, or weather occurrences that influence energy production and savings estimations. • High complexity in contracting can restrain the amount of profit to be made from financing.
Client/building owner/FM company	• Periods of high energy price volatility can make unattractive for clients to enter long-term EPC. • In times of political uncertainty, tax credits could be removed with relatively short notice, hindering taking decisions on long-term renovation plans.

5.9.3 Discussion of SWOT findings

The ESCO market in Austria is well established, well regulated and is of moderate size. In recent years the market has shown signs of shrinkage but diverse opportunities remain for smaller clients and residential households in the form of government subsidies and consolidated aids for energy efficiency.

DSR on the other hand, needs further development as it is not attractive for aggregators to participate due to the high complexity and costs. Aggregators must have a bilateral agreement with the BRP in order to offer their services to customers and the prequalification and requirements of open DSR markets make it prohibitively expensive for smaller loads to participate. However the Government is taking steps to open the market including optimising real time data exchange between DSO, TSO and other participants to support pooling by independent aggregators and enhancement of the rules around independent aggregation.

Combining EE with DSR is technically possible in Austria now, and offering a joint services model could help to revitalize the ESCO offering and potentially promote growth in both EPC and DSR sectors. However, until access to the markets is improved, participation is limited to large customers. Government subsidies and requirement to perform energy audits of large companies offer an opportunity for reform but active lobbying is needed for government to take favourable action in the form of clear legislation.

6 JOINT SERVICE SWOT ANALYSIS FOR RANKED MARKETS

In the NOVICE project report 'Mapping Market Potential, Barriers and Gaps for the Dual Energy Services Scheme' (D3.1) the ESCO and DSR markets of 9 European countries were analysed, ranked and categorised according to their level of market maturity (high, medium and low). An individual SWOT analysis for same 9 countries has been presented above in Chapter 5 of this report. In Chapter 6 we will summarise the findings of this analysis using the same categorisation of high, medium or low market maturity level. This approach is more relevant for countries that have not been assessed in detail in Section 5 or do not appear in the ranking table. By using the general characteristics, market stakeholders can quickly assess the level of market maturity in their country and the Strengths, Weaknesses, Opportunities and Threats of a joint services business model like NOVICE in the particular market in which they operate.

	DR access to markets	Service providers access to markets	Product requirements	M&V, payments and penalties	ESCO market development	ESCO market size	ESCO market value	Access to finance	Total
France	5	5	5	3	5	4	5	4	36
Germany	3	1	3	3	5	5	5	4	29
Austria	3	1	5	3	5	4	4	3	28
United Kingdom	5	3	3	3	3	3	4	4	28
Ireland	5	5	3	1	3	3	3	3	26
Belgium	3	3	5	3	3	3	2	3	25
Denmark	3	1	3	3	4	3	4	3	24
Finland	5	1	3	5	3	3	2	2	24
Sweden	3	1	3	3	2	3	3	3	21
Italy	1	0	1	1	5	4	5	4	21
The Netherlands	3	1	3	3	3	3	2	2	20
Poland	1	1	1	1	2	2	2	2	12
Spain	0	0	1	0	3	2	2	2	10
Portugal	0	0	1	0	2	2	2	2	9

Figure 3: Summary of

6.1 HIGH MARKET MATURITY LEVEL (GREEN) SWOT ANALYSIS

6.1.1 Characteristics of countries with high market maturity

Highly mature markets for the joint services model have most of the following characteristics:

- A well-established ESCO market that is stable and/or growing.
- Government policies that promote or support, either through information or financially, the use of EPCs to deliver energy efficiency savings, and/or the implementation of energy efficiency measures.
- Ambitious Government targets to increase the proportion of renewable energy on the grid, and/or reduce the proportion of nuclear electricity generation.
- A TSO that has opened several DSR markets to demand response (e.g. balancing and ancillary market, capacity mechanism, wholesale markets, interruptible loads, critical peak pricing).
- Aggregation is legally allowed, there are independent aggregators operating in the market, and there are few regulatory, financial or bureaucratic obstacles to demand response aggregators participating in the market.
- An electricity tariff structure that incentivises flexibility.

6.1.2 General SWOT analysis for countries with high market maturity

The following SWOT analysis for the joint service model will generally be relevant to countries that are classed as highly mature markets:

Strengths

- Combining service offerings opens up new markets that have traditionally been closed to either ESCOs or aggregators. For example in many European countries, ESCOs thrive in the public sector while aggregators typically have more private sector clients. By offering a combined service the partnership could leverage each other's strengths to access new markets and grow their client base.
- Using the NOVICE model is a low risk way for ESCOs and aggregators to bring new skill sets into the business without needing to invest in training or develop in-house expertise.
- Upselling an additional service to an existing client is much easier than engaging a brand new client so expanding the service offering by combining services allows ESCOs and aggregators to use a new approach to growing their business.
- The ability to offer both energy efficiency and demand response services gives ESCOs and aggregators a USP in a crowded market.
- The combined services approach results in a dual revenue stream (from energy efficiency and demand response) reducing overall payback periods and EPC contract lengths.
- Dual revenue streams and shorter contract lengths could increase the ROI of the project which reduces the level of risk from the point of view of the investor, and could result in more favourable loan terms being available.
- The administrative burden on clients is reduced since there is only one contract to manage that covers both EE and DR

Weaknesses

- EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC.
- The NOVICE model assumes that the ESCO is client facing and the main contracting party. This means that aggregators may not be able to build a relationship directly with the client.
- The performance guarantee that forms part of every EPC relies on both ESCO and aggregator making accurate estimates of the likely revenues from their services which can be difficult in markets where the regulations and tariffs are frequently changing.
- There is a reputational risk to the client facing party (normally the ESCO) through relying on services and equipment that is outside their control.
- Even in high maturity markets, clients may not be familiar with EPCs or demand response services so the benefits of combining services could be limited.

Opportunities

- In high maturity markets, government policies that commit to increasing the level of renewables on the grid, reducing nuclear capacity and increasing savings through energy efficiency are driving a need for a dual services approach. This creates opportunities for the dual services model to thrive.
- Network operators that are open to expanding the role of DSR as a means of guaranteeing service provision without large infrastructure investments are likely to incrementally open more markets and remove barriers to participation.

- ESCOs and aggregators may be able to influence network operators through participation in feedback mechanisms like consultations or calls for evidence.
- Markets with energy tariffs that encourage flexible rather than steady energy consumption present opportunities for using both implicit and explicit demand response strategies as part of an energy services package.
- In markets where aggregation is allowed, dual services for the residential sector is becoming increasingly viable.

Threats

- Highly energy efficient buildings have a smaller turn-down potential than inefficient buildings. Large revenues for DR services could reduce the incentives for implementing energy efficiency.
- Lack of information and transparency leads to low awareness of the opportunities for dual energy services among building owners/managers, finance providers and service providers.
- Incentives, market conditions, regulations and tariff structures that are subject to change introduce uncertainty into the market. This increases the level of risk associated with dual energy services and makes it difficult for new actors to enter the market.
- High levels of bureaucracy around pre-qualification of sites for participation in the DSR market can cause delays and additional costs associated with contract administration.

6.2 MEDIUM MARKET MATURITY LEVEL (AMBER) SWOT ANALYSIS

6.2.1 Characteristics of countries with medium market maturity

Markets with medium maturity for the joint services model have most of the following characteristics:

- Either an established and well-developed ESCO market or an established and well-developed DSR market, but not both.
- Aggregation is legal, but there are significant barriers to entry for independent aggregators meaning that there are few (or none) active in the market. For example, aggregators needing to gain a bilateral agreement from the BRP, TSO or DSO before providing services to clients is a significant barrier to entry.
- DSR services tend to be provided mostly by large generators, or by large industrial sites rather than smaller aggregated loads. The minimum load for participation is 1 MW or greater.
- One or two DSR markets are open to participation from aggregators.
- There is little knowledge of EPCs or trust in the ESCO market.

6.2.2 General SWOT analysis for countries with medium market maturity

In a market showing medium levels of maturity, the strengths and opportunities are similar to those of a market with a high level of maturity but there are more weaknesses and threats to be overcome. The following SWOT analysis for the joint service model will generally be relevant to countries that are classed as having a market of medium maturity:

Strengths

- Using the NOVICE model is a low risk way for ESCOs and aggregators to bring new skill sets into the business without needing to invest in training or develop in-house expertise.
- Upselling an additional service to an existing client is much easier than engaging a brand new client so expanding the service offering by combining services allows ESCOs and aggregators to use a new approach to growing their business.
- The ability to offer both energy efficiency and demand response services gives ESCOs and aggregators a USP. Where EPC and/or DSR markets are less well established, the dual services model can be introduced as a best practice approach without conflicting with traditional models.
- The combined services approach results in a dual revenue stream (from energy efficiency and demand response) reducing overall payback periods and EPC contract lengths.
- Dual revenue streams and shorter contract lengths could increase the ROI of the project which reduces the level of risk from the point of view of the investor, and could result in more favourable loan terms being available.
- The administrative burden on clients is reduced since there is only one contract to manage that covers both EE and DR.

Weaknesses

- In markets where permission is needed from third parties (e.g. the BRP or DSO) in order to participate in the DSR market, the administrative burden of gaining agreement from all parties could cause significant delays and additional costs to projects.
- Where access is limited to only a small number of DSR markets, the minimum load threshold for participation is high, or prequalification is required on a site-by-site basis rather than as a pool of loads, participation is limited to large sites/loads only. The additional administrative burden and costs associated with participation would be too high to be beneficial to smaller sites.
- EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC.
- The NOVICE model assumes that the ESCO is client facing and the main contracting party. This means that aggregators may not be able to build a relationship directly with the client.
- The performance guarantee that forms part of every EPC relies on both ESCO and aggregator making accurate estimates of the likely revenues from their services
- There is a reputational risk to the client facing party (normally the ESCO) through relying on services and equipment that is outside their control.

Opportunities

- Government policies that commit to increasing the level of renewables on the grid, reducing nuclear capacity and increasing savings through energy efficiency are driving a need for a dual services approach. This creates opportunities for the dual services model to thrive.
- Any grants or subsidies that are available for energy efficiency projects could drive uptake of EPCs.
- Network operators that are open to expanding the role of DSR as a means of guaranteeing service provision without large infrastructure investments are likely to incrementally open more markets and remove barriers to participation.

Threats

- Clients, building owners and FM companies are relatively unaware of the opportunities available in EE and/or DSR and lack understanding in these areas making it difficult to sell a dual services approach to them.
- In markets with sufficient grid capacity there is little or no demand from DSOs and TSOs for flexibility services as the grid is able to cope well with balancing supply and demand.
- Offering DSR services requires agreement from the customer's BRP and/or DSO which is difficult, time consuming and costly to obtain, and can block participation.
- Where the minimum load threshold for participation is high, or prequalification is required on a site-by-site basis rather than as a pool of loads, participation in a dual services business model is limited to large sites/loads only.
- Periods of high volatility in energy prices can reduce the willingness of clients to enter into long term contracts.
- Proposed market reforms to encourage growth in either the EPC or DSR markets are likely to take time to implement and embed which reduces the viability of a dual services model in the short term.

6.3 LOW MARKET MATURITY LEVEL (RED) SWOT ANALYSIS

6.3.1 Characteristics of countries with low market maturity

Markets with low maturity for the joint services model have most of the following characteristics:

- An ESCO market that is not well-established and/or a DSR market that is closed to demand response.
- Aggregation of demand response services is not legally possible.
- Flexibility is already achieved through other means (e.g. hydro power) and/or there is a low market price for flexibility services due to there being enough capacity on the network already.
- The government has no financial or informational support schemes for EPCs and the implementation of energy efficiency measures.
- The government has no plans to increase the proportion of renewable capacity on the grid or decrease the amount of nuclear power.

6.3.2 General SWOT analysis for countries with low market maturity

In markets showing low levels of market maturity, there are few strengths and many weaknesses to offering a joint services model due to the restrictive nature of current regulations and policies around EE and DR. However, as the market matures there could be many opportunities for companies that are ready to take advantage of the associated policy changes. The uncertainty in the market and the length of time it will take to establish regulations and policies that benefit the dual services model are the main threats. The following SWOT analysis for the joint service model will generally be relevant to countries that are classed as having a low level of market maturity:

Strengths

- If either the ESCO or DSR market is already well established there is potential for growth through expanding the service offering, upselling additional services and creating a USP.
- Large clients, with large loads or onsite generators that meet the minimum threshold requirements for participation could benefit from shorter EPC contract lengths by participating in a joint services model.
- Finance providers may be more willing to lend for large projects with shorter contract lengths.

- A dual revenue stream from EE and DR makes the project less risky and more attractive to third party investors.
- In markets with less developed ESCO markets the joint services model could be presented as a best practice example of a complete EPC to encourage uptake without having to compete with traditional EPC models as these have not yet gained traction.

Weaknesses

- There may be no independent aggregators operating in the market due to the requirement aggregators to gain permission from the BRP to offer flexibility services to clients.
- EPCs are already complex. Adding an additional service may make it more difficult to persuade clients to sign up to an EPC.
- Revenues from DSR are usually lower and can be more difficult to predict in low maturity markets making it less attractive for investment.
- Low prices for flexibility services result in a weak business case for the joint services model.
- Lack of examples of successful projects make it difficult to persuade clients of the benefits of a joint services model
- Client loses some level of control of the equipment on site and may need to accept some loss of occupant comfort during a DR event.

Opportunities

- Pressure to deliver EU targets on energy efficiency and renewable energy will drive policy changes that encourage uptake of EPCs and expansion of flexibility services on the grid.
- Forthcoming legislative changes could reform the electricity market, allow aggregation and open more opportunities to participate in more flexibility markets.
- The introduction or expansion of white and/or green certificate schemes could drive participation in EPCs and flexibility markets.
- Where the ESCO market is not already well established, there is an opportunity to introduce a joint services model as the best practice EPC without having to compete with embedded views of traditional EPCs.
- In countries where there has been low take-up of EPCs to date, there is still a large untapped market for energy efficiency and demand response. Companies that are ready with a service offering when policies are updated will be in an excellent position to take advantage of this market.

Threats

- It will take time for any proposed changes in legislation or policy to be implemented and refined to create a working system.
- Bureaucratic processes and legal measures that are not streamlined or not made more efficient will hinder development of the market for EPCs and flexibility.
- Potential reductions in energy prices due to energy imports from non-EU regions could lead to increased payback periods and unattractive contract lengths.
- A lack of legal framework for EPCs and flexibility services increases the risks of operating in these markets and can prevent finance providers from lending.

- In markets with few financial or informational support schemes for either energy efficiency or demand response, there is low general awareness of the benefits of EPC and DSR making it difficult to persuade clients to participate.
- In markets that can achieve flexibility through other means e.g. existing hydro power or enough excess capacity on the network, there is little reason for TSO to open flexibility markets or to develop energy tariffs that encourage flexibility.

7 DISCUSSION & CONCLUSION

The purpose of this work was to analyse 9 European markets in detail to examine their suitability for implementing the joint services model proposed by the NOVICE project. By carrying out a SWOT analysis, it has been possible to identify the market conditions that are best suited to the NOVICE project as well as the threats or barriers that could prevent successful implementation of the project and future roll out of the proposed business model.

The SWOT analysis and review of market conditions in the 9 countries assessed have highlighted that there is no single European country that presents the optimum conditions for implementing the NOVICE model, (if there was, then arguably the market actors in that country would already have implemented a profitable joint services business model). However, it is possible to pick out the policies, regulations and market forces that are most conducive to the implementation of a combined energy efficiency and demand response service model. The list of conditions that would be ideal for implementing a NOVICE approach include the following:

- A strong and well-established ESCO market that is trusted by their clients.
- Government support for implementing EPCs such as;
    - informational schemes that promote the benefits of EPC to potential clients
    - finance for EPC feasibility studies
    - government supported frameworks for EPC contracts
- Several DSR markets that are open for participation by aggregated loads or generators.
- Aggregation is legally allowed, clearly defined and well regulated.
- Aggregators do not need permission from the BRP, TSO or DSO in order to offer their services to customers.
- Both generation and demand response can be aggregated and offered to the market.
- Prequalification process is not overly bureaucratic and relates to pooled loads rather than individual units or sites.
- Government is committed to increasing energy efficiency, reducing the proportion of electricity from nuclear power, and increasing the share of renewables on the grid.
- A white and/or green certificate scheme (or similar policy) with an energy obligation that encourages participation of the private sector in energy efficiency projects.
- Incentives for implementing energy efficiency actions exist in all business sectors.

Of all the countries assessed, the ones that are most suited to the NOVICE approach are the UK and France, closely followed by Ireland. The UK and France both have well developed ESCO markets, several DSR markets that are open to participation and a TSO that is open to adjusting the regulations to encourage more participation in flexibility markets. Both markets still have barriers to overcome, however, there are no regulations that would prevent the delivery of a joint services business model if clients could be persuaded to accept it. In France the business case for a combined services model is still weak because the majority of revenues are paid to the retailer rather than the aggregator but reform of this rule is currently under discussion and the conditions for aggregators are likely to improve significantly in the coming months. In the UK, the ESCO market is very well developed in the public sector and many DSR markets have been open for a number of years but participation is largely at the discretion of the TSO which, until recently, has favoured participation by sites with onsite generators rather than those with turn down capacity. In Ireland, whilst the ESCO market is still small, this is largely due to the lack of awareness of the benefits of EPC among clients rather than any regulatory barriers. The Irish TSO has opened several DSR markets and is hampered mainly by large

minimum load requirements and the need to bid into the market annually. Despite this, it would be possible to operate a joint services EPC in Ireland if clients could be persuaded to participate.

The review of market conditions shows that the following barriers are common in several countries and must be overcome before the joint services model can be successfully rolled out across Europe:

- Aggregation of loads is either:
  - Not legally allowed, or;
  - Aggregation is allowed but participation requires the permission of the BRP which in practice means that there are no independent aggregators operating in the market.
- The network already has excess capacity therefore the revenues available for flexibility services are small, making the business case for participation weak.
- The network has the ability to import and/or export to other countries to achieve their flexibility needs or has access to large capacity hydro-electric power plants which already provide the required flexibility.
- Prequalification of sites for participation in DSR services is onerous, time-consuming and required on an individual site basis rather than on a pooled load basis, making it prohibitively expensive to include smaller loads.
- EPCs are not well known or well understood by clients as a potential solution for implementing energy efficiency measures with guaranteed savings at no upfront cost.
- There are no national support mechanisms, either informational or financial, in place to support and promote the uptake of EPCs as a means of achieving deep energy savings in buildings.

The countries least suited to implementing the NOVICE model are currently Italy, where aggregation of loads to participate in the DSR markets is not yet legally allowed, and Denmark, where the large proportion of hydro-electric power stations on the grid and excess capacity on the network means there is a weak business case for demand response services. Whilst there is evidence that the situation in both countries is changing with new regulations being introduced to open the flexibility markets and encourage participation, it will take time to embed these new operating practices and the markets may not be mature enough to sustain a joint services model for several years.

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