



**Successful Sustainable Renovation Business
for Single-Family Houses - SuccessFamilies**

The project is part of the Nordic Call on
Sustainable Renovation NICE project number 08191 SR

Deliverable 3.2

Report on business models for one-stop-shop service for sustainable renovation of single family house

Revision : 3.1

Due date : 30 September, 2011

Actual submission date : 10 December, 2011

WP Leader: Mid Sweden University



Deliverable Administration & Summary					
No & name	D 3.2 Business models				
Status	Final	Due	September 2011	Date	10.12.2011
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Editor	Krushna Mahapatra				
Application					
Comments					
Document history					
V	Date	Author	Description		
0	18.01.2011	MSU/km	ToC		
1	05.05.2011	MSU/km	First version for comments		
2	16.06.2011	All	Version commented by all partners		
3	10.12.2011	MSU/km	Final		
3.1	29.10.2012	VTT/maj	Acknowledgements added		

Acknowledgements

We acknowledge financial support from NICE (Norway), Tekes (Finland), EBST (Denmark), and CERBOF and the Jämtland County Administration in Sweden. The project partners VTT Technical Research Centre of Finland and several private companies, Technical University of Denmark (DTU), Segel AS (Norway) and Mid Sweden University also contributed to the funding.

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1 EXECUTIVE SUMMARY

In Nordic countries significant primary energy efficiency potential exists in houses built before 1980. These houses are more than 30 years old and need to be renovated. This provides an opportunity for implementation of energy efficiency measures, but the renovation market is dominated by handicraft-based individual solutions. There is a need for one-stop-shop business models where an overall contractor offers full-service renovation packages including consulting, independent energy audit, renovation work, follow-up (independent quality control and commissioning) and financing. There is a significant business potential for such a model as the renovation market for single-family houses could be in the order of hundreds of million Euros per year in each Nordic country. Homeowners will get an improved quality renovated house with little risk or responsibility which usually is the case with traditional renovations, the energy cost will be reduced, market value of the house is likely to increase, mortgage banks will have a safer asset and there are societal benefits in terms of reduced energy use and greenhouse gas emission. However, there is uncertainty over who will be responsible for guarantee of the renovation work if the service provider goes bankrupt. Insurance companies could be involved to address this issue.

The aim of the report is to analyze and develop one-stop-shop business models to offer full-service renovation packages in the Nordic countries. The report will contribute to identify potential models that can be tested in pilot studies and will be an important source of market information for companies planning to develop a one-stop-shop concept.

A comparative assessment of models proposed in the Nordic countries shows that different type of actors may play the key role in a one-stop-shop for energy efficient renovation of single-family houses. In some models the service provider collaborates with financing institutions to provide renovation financing. There are differences on how customers are contacted, while the similarities are more on how the service is provided. A main challenge is how to secure independent advising.

Even though there is strong business potential for one-stop-shop energy renovation concept, still it has been somewhat difficult to start or run such a business. One of the main reasons is the uncertainties about the customer base. One way to attract more customers is to offer subsidies for energy efficiency measures. In Denmark, Sweden and Finland there are tax deductions for labour cost for home renovation and other household work. An amendment to such programs to incorporate specific requirements regarding energy efficiency of implemented measures could be a way to increase homeowners' interest in energy efficient renovation.

A guarantee on energy or energy cost saving may encourage energy efficient renovation of houses as energy cost saving is one of the most important factors in the homeowners' decision to implement energy efficiency measures. But, at present it is less likely that such guarantee will be given as the full service energy renovation concept is yet to be tested and not enough experience exists regarding energy savings potential in the context of varying household energy behaviour. However, such concepts exist for industrial and public buildings (the ESCO concept) and are emerging for residential buildings. Highlighting the energy (e.g. cost reduction) and non-energy benefits (improved thermal comfort or indoor air quality) of energy efficiency improvements may create customer interest in energy efficient renovations.

One way to kickstart the market is to provide public funding for few demonstration projects to test different business models, e.g. those identified in this report. Such projects will bring together actors interested in one-stop-shop concept and they will gain some experience. In such demonstration projects the full-scale energy renovation actions could be realised in shorter timeframe than in traditional piecemeal renovations. Advertisement of results of successful demonstration projects may

attract more customers and entrepreneurs.

Existing models in Denmark and Finland include financing by the service providers in collaboration with financing institutions. Still, mortgage financing is the most cost efficient option to finance energy efficiency renovation of single-family houses (Mahapatra et al. 2011). However, the need to self-finance the amount not covered in the mortgage loan may not encourage homeowners to go for energy efficiency renovation. This could be addressed if government provides soft loans or subsidies to cover the investment cost beyond the mortgage (base) loan. Attention should be given to the limitation of mortgage financing for energy efficient renovation of recently bought houses. Banks may consider an energy efficient renovation plan prepared by an entrepreneur and pre-evaluate the post-renovation value of the house in collaboration with real estate agents. This valuation could form the basis for the bank to confirm the homeowner and the entrepreneur that certain amount of investment cost would be covered by mortgage refinancing.

2 INTRODUCTION

There is considerable potential to reduce primary energy use and GHG emissions from the European Union building sector, which uses about 40 % of the final energy and contributes to 36 % of greenhouse gas emissions in the EU (European Parliament, 2010). The greatest potential lies in improved energy efficiency of the operating phase which dominates the life cycle energy use of a building. In Nordic countries about 60 % of final energy use in buildings is for space heating and hot water purposes.

Single-family houses (excluding row houses) account for an average of 40 % of the dwelling stock in the Nordic countries, varying from 30 % in Sweden to 57 % in Norway (Tommerup et al., 2011). More than 80 % of these buildings are more than 30 years old and majority of them need some renovation (Tommerup et al., 2011). Technical solutions exist for residential energy efficiency improvement and they can be cost effective if implemented during major renovation works (Lausten, 2008; Erlandsson et. al. 1997; Norrman and Johansson, 1995). However, there is a substantial lack of business concepts for energy efficient renovation of single-family houses in the Nordic countries. The renovation market is dominated by a craftsman based approach with individual solutions. A package of measures are given less priority may be due to a lack of information, knowledge or awareness about the energy and non-energy benefits of such measures, or due to a lack of financing capabilities to cover the investment costs involved. When several measures are sourced from different companies, a homeowner faces the difficulty of coordinating the activities of number of actors and he/she has to take the risk and responsibility of construction and workplace regulations. Moreover, if there is some problem during or after renovation, it might be difficult to ascertain whose fault it is.

To address these disadvantages of traditional individual solution renovation approach and to speed up the implementation of energy efficient renovation of single-family houses there is a great need for one-stop-shop business models where an actor offers full-service renovation packages including consulting, independent energy audit, renovation work, follow-up (independent quality control and commissioning) and, financing. Recently, few such concepts have emerged in the Nordic countries. Traditional construction or renovation companies can or in some cases they do carry out all types of renovations themselves or with help from other companies, but they usually do not do energy auditing or offer financing. Furthermore, not all companies have exposure to energy renovations to low or passive house standards.

There seems to be a significant business potential for full service or one-stop-shop renovation concept. For example, in Sweden there are about 2 million single-family houses. If annually 2% of these houses i.e. about 40,000 houses would be renovated with an average investment cost of about 20,000 to 40,000 € the total market potential would be about 800 million to 1.2 billion Euros. This is an extremely conservative estimate as the yearly market for renovation and extension of single family houses in Norway is approximately 38 Billion NOK (Haavik, 2011) or about 4.8 billion Euros (1 euro = 7.87674 NOK on June 16, 2011).

The aim of the report is to analyze and develop one-stop-shop business models to offer full-service renovation packages in the Nordic countries. The report will contribute to identify potential models that can be tested in pilot studies and will be an important source of market information for companies planning to develop a one-stop-shop concept.

Value proposition (VP):

This building block describes the bundle of products and services that solve a customer problem or satisfy needs of a specific customer segment. The value proposition of the one-stop-shop business model is that a single actor is responsible to offer all relevant steps necessary for the energy efficient renovation of a building - from planning, over actual renovation to cleaning and maintenance of the installations as per contractual agreements. The value of such a model over traditional individual craftsman based renovations is that the homeowners get a professionally renovated house that reduces operating energy and maintenance costs, while they will avoid the trouble of coordinating a number of actors and the risks and responsibilities of construction and workplace regulations. A single entrepreneur means homeowners are more secure about where to turn when there is any problem during or after renovations. Furthermore, homeowners' lack of knowledge, awareness, or access to energy efficiency measures will be lesser problem for them to implement such measures.

Channels (CH):

The "channels" building block describes how a company communicates with and reaches its customers to deliver a value proposition. Channels make the customers (1) aware of and (2) help them evaluate the products/services of a company, (3) allow the customers to purchase specific product/service (sales), (4) deliver a value proposition to the customers (distribution) and (5) provide post-purchase support. A right mix of direct (e.g. mass media advertisement) and indirect channels (advertisement and sale through a partner store) is important to fulfill these five functions of channels. Usually, at the initial phases of market formation mass media advertisement is useful to reach the innovators and later on word-of-mouth is important for later adopters (Rogers, 2003).

Customer relationship:

This building block describes the type of relationship a company establishes with specific customer segments. Customer relationship is aimed to attract new customers, retain existing customers and encourage re-purchase. Since majority of potential adopters make an adoption-decision based on interpersonal communication (Rogers, 2003), it is important that existing customers are happy with the company services as they may pass on their experiences to potential new customers. Customer relationship could be personal assistance (phone, email, or on-site at the point of sale), dedicated personal assistance (most effective), self service (e.g. at fuelling stations), automated services (e.g. various online services), communities (a company provided online platform for customers to interact and share information) and co-creation (encouraging customers to share their ideas for new product/service development). In Nordic countries dedicated personal assistance is most common for renovation business dominated by small-size local firms.

Revenue stream (RS):

The revenue stream building block represents the source of income for a company, e.g. through the sale of product/services, commission from suppliers or partners, fees for coordinating suppliers and buyers, fees to rent/lease equipments etc. The revenue stream in one-stop-shop is likely to be from asset sale (building products/components) and fees for project management and coordination of number of actors required to renovate a house.

Key resources (KR):

This building block describes the key resources or assets required to deliver the value proposition. Those resources can be physical, intellectual, human capital, or financial. For the full service renovation of single-family houses, the key physical resources include all that is required for conventional renovation, e.g. machines and equipments to carry-out the renovation, vehicles to transport goods and workers etc. Additional physical resources required from the partner companies include supply of heating systems and equipments to conduct energy audit. The human resources include skilled and experienced workers to do proper energy audit and analysis, quality renovation, and offer good customer service. Intellectual resources include company reputation to attract customers (brand) and software to conduct energy analysis and cost-benefit calculations. Overall, the service provider needs financial resources to conduct the business, especially when homeowners make payments for the renovation work after the renovation is done.

Key activities (KA):

This building block describes the most important things required to create and offer a value proposition, reach markets, maintain customer relationships, and earn revenue. The key activities in the one-stop-shop business model include marketing to attract customers, coordinating activities of number of actors involved in the renovation process, energy audit/building inspection, energy analysis, apply for subsidies and building permits, renovation of the building, post-renovation commissioning, financing (or help customers arrange financing), and customer service.

Key partnerships (KP):

Each company has its core competency and it may be illogical or uneconomic for the company to own all resources or perform all activities by itself required to offer the value proposition. Hence, companies create partnerships to optimize the allocation of resources and activities, reduce risk and uncertainty, or acquire specific resources and activities. The key partnership for full service renovation of single-family houses could vary among the Nordic countries depending on who is the service provider, e.g. a renovation company in partnership with energy consultants and heating systems installers. See chapter 4 for examples of such model.

Cost structure (CS):

This building block describes the most important costs inherent in the business model and highlights the most expensive key activities and key resources. For example, when a consortium of existing companies (e.g. renovation company, energy consultant & heating system installer) offer full service renovation, they already possess the required resources to renovate a house and therefore, there may not be any significant additional cost to offer full service renovation. In fact, there could be benefits of economy of scale with increased use of the existing resources. However, for the service provider there will be a marketing cost to inform and attract customers, costs for free-of-cost preliminary building inspection and cost estimations for a package offer, dedicated customer service, post-renovation commissioning, and information material to educate the homeowners about operation and maintenance of the building.

Table 1. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses (Based on Osterwalder and Pigneur, 2010)

<p>Key partners</p> <ol style="list-style-type: none"> Partnership may vary from country to country. Key activities and resource acquired depends on who offers the service; for example, for a renovation company, energy auditor and energy analyses are important. 	<p>Key activities</p> <ol style="list-style-type: none"> Marketing Building inspection and energy audit Present report with recommendations and energy certificate Project management <ol style="list-style-type: none"> Help obtain approvals from local authorities and apply for subsidies Renovation including product purchases Quality assurance Post renovation commissioning Customer service Information provision on energy efficient use of the house 	<p>Value proposition</p> <ol style="list-style-type: none"> One-stop-shop to offer all types of home renovation services, especially energy efficiency measures On-site visit Single-point contact Provide knowledge on holistic renovation including potential extension of the house. Energy audit/building inspection by an independent agency Fixed price for the total work as agreed in the contract Guarantee on the renovation work (thorough planning and coordinated implementation improves quality of renovation) Help obtain construction permissions and apply for subsidies Financing (e.g. coordinate with banks) Information provision on energy efficient use of the house 	<p>Customer relationship</p> <ol style="list-style-type: none"> Personal assistance (house visit, email, phone calls, etc.) Dedicated personal assistance Communities: Provide an online platform for customers to discuss with each other <p>Channels (To make the customers (i) aware of and (ii) help them evaluate the products/services, (iii) allow the customers to purchase, (iv) deliver a value proposition to the customers and (v) provide post-purchase support)</p> <ol style="list-style-type: none"> Advertisement in newspapers and magazines (i) Home delivered fliers (i) Meetings (i,ii) Sales force (i,-,iv) Web sales (i-iii, v) Own stores (i - v) Partner stores/partner contacts (i - v) Wholesaler (i - v) <p>(numbers in the brackets refer to the functions that could be fulfilled)</p>	<p>Customer segments</p> <ol style="list-style-type: none"> All houses in the need of renovation are of interest (mass market), but initially houses built before 1980 are targeted Two distinct segments are <ol style="list-style-type: none"> Houses on sale (easy to identify houses that needs renovation, but difficult to get finance) Houses where homeowners lived for long time (easier to get finance, but may be difficult to identify)
<p>Cost structure</p> <p>Depends on cost driven or value driven model.</p> <ol style="list-style-type: none"> Fixed costs Variable costs Economies of scale 		<p>Revenue stream</p> <ol style="list-style-type: none"> Asset sale (equipments and building products) Brokerage fee (coordinating the customers and suppliers) Subscription fee (e.g. ESCOs offer service for a monthly fee) 		

4 EXAMPLES OF ONE-STOP-SHOP BUSINESS MODELS IN NORDIC COUNTRIES

4.1 Examples from DENMARK

The CleanTech concept developed by Dong Energy offers heat pump solutions, insulation, windows, solar heating and building thermography. The package offer includes full service in cooperation with partners. Dong Energy themselves takes care of advice, sale and coordination, e.g. handles the necessary paperwork and possible application for a national renovation subsidy and offers financing solutions.

Table 2. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses in Denmark. Dong Energy Cleantech. (Based on Osterwalder and Pigneur, 2010)

Key partners 1. Energy utility (service provider) 2. Various contractors (customer visit and installation) 3. Suppliers (strong company brands like Rockwool, Danfoss, Velfac) 4. Bank (Nordea) and mortgage credit institution (Totalkredit)	Key activities 1. Marketing 2. Advice (primarily on single products to achieve largest energy savings) 3. Contact to partners (e.g. arrangement of customer visits) 4. Offer for renovation 5. Service/after sales (checking customer satisfaction etc.)	Value proposition 1. Qualified advice 2. Relevant products 3. Competitive products and prices 4. “one-point-of-contact” / “hassle-free” 5. Dong energy quality and delivery guarantee 6. Financing (both mortgage loan and loan with no security) 7. Handling of possible subsidies	Customer relationship 1. Dedicated personal assistance by the Cleantech team of skilled energy advisers	Customer segments 1. Owners of single-family houses with energy saving potential 1.1 Houses with an oil-fired burner 1.2 Houses built before the first oil crisis of 1973.
Cost structure 1. Salary of product manager 2. Consultancy, administration and support costs 3. Marketing costs	Revenue stream 1. Product sales	Key resources 1. Product manager (everyday manager) 2. Experienced consultancy, administration and marketing personnel	Channels 1. Information on nationwide television (i) 2. Banks affiliated to a large mortgage credit institution (Totalkredit) who refer interested homeowners to Cleantech and can finance possible bought solutions (i) 3. On site visit to the homeowner (i-iv) 4. Telephone, email (v)	

The second concept is holistic energy renovation by Adsboll, which is a well known and trusted local contractor in south Denmark. Its activity originates from being a partner of Green Business Growth, a private-public partnership for energy efficient buildings in the region of south Denmark with the aim of creating growth in green building and renovation. Adsboll works together with a network of pre-selected partners that are well known and/or trusted in the market. The craftsmen used are trained in relevant courses arranged by the mentioned partnership to become “energy-craftsmen” with special knowledge of energy efficient renovation.

Table 3. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses in Denmark. ProjektLavenergi. Key actor: medium sized contractor O. Adsboll & Sønner A/S . (Based on Osterwalder and Pigneur, 2010)

Key partners 1. Medium sized contractor (service provider) 2. Local utility company – energy advice department (Trefor-energy), responsible for the energy examination of the house. 3. Producers of façade and roof windows, façade insulation system, ventilation system etc. 4. Bank and mortgage credit institution 5. Green Business Growth partnership – support on PR, organization and campaigns concerning ProjektLavenergi	Key activities 1. Marketing 2. Carry out analysis of the house 3. Present report with recommendations 4. Offer for holistic renovation or parts of the “whole” package depending on the situation 5. Public relations in cooperation with Green Business Growth	Value proposition 1. Knowledge of holistic energy efficient renovation in connection with execution of needed renovation 2. Holistic renovation based on concept of external air tightening and insulation of the house 3. Personal visits to the homeowner 4. Free of charge on site analysis, technical analysis and fixed price offer for relevant energy efficient renovation 5. Advice on financing 6. Project management	Customer relationship 1. Dedicated personal assistance by contractor and key personnel at the utility company	Customer segments 1. Owners of single-family houses from 1970/80’s in mainly the area of Kolding in the region of south Denmark/Jutland
	Key resources 1. Project managers at Adsboll and Trefor 2. Administration and marketing personnel at Adsboll		Channels 1. Information in local newspapers (i) 2. Information on company web site and separate pilot project web site (i, ii) 3. Information on key partners web sites (i) 4. “Open house” arrangement (pilot project) (i - iii) 5. Direct contact to existing customers of need of renovation (i-v) 6. Telephone (v)	
Cost structure 1. Salary to project manager at Adsboll (salaries to Trefor project manager and personnel for mandatory energy saving activities) 2. Marketing and travel costs 3. Administration and support costs		Revenue stream 1. Return from renovation projects		

4.2 Examples from FINLAND

There are two examples of business models analyzed below from Finland. The first one is the ENRA concept which was offered by a group of companies offering different individual energy renovation services or solutions in a holistic package. The technical solutions offered were energy-efficient windows and doors, heat pumps, internal extra insulation or new insulation, and demand-based ventilation with a heat recovery. At the moment (May 2011), the concept is on break and is not offered by anyone since the core company Rustholli (a renovation service provider) went bankrupt at the end of 2010. According to the representatives of the company, the reason for bankruptcy was not due to their launch of the one-stop-shop concept. Rather, the one-stop-shop concept formed only a marginal share of their revenue and the whole company had serious cash deficits. The concept is now owned by a company called NordBuild.

Table 4. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses in Finland. ENRA concept. (Based on Osterwalder and Pigneur, 2010)

<p>Key partners</p> <ol style="list-style-type: none"> 1. Renovation company (service provider) 2. Window and door manufacturer 3. Ventilation system manufacturer/supplier 4. Insulation manufacturer 5. Heat pump supplier 6. Energy auditor and certificate supplier 	<p>Key activities</p> <ol style="list-style-type: none"> 1. Marketing 2. Building inspection and energy audit 3. Present report with recommendations and energy certificate 4. Fixed price offer for holistic renovation 5. Project management <ol style="list-style-type: none"> 5.1 Help obtain approvals from local authorities and apply for subsidies 5.2 Quality assurance 5.3 Inspection when renovation is completed 6. Service/after sales 7. Offer guidance on how to use the house in an energy efficient way 	<p>Value proposition</p> <ol style="list-style-type: none"> 1. One-stop-shop to offer all kinds of renovation services 2. Personal visit on site 3. Scheduled renovation plan 4. Single-point contact 5. Provide knowledge on holistic renovation 6. Fixed price for the total work as agreed in the contract 7. Energy certificate 8. Information provision on energy efficient use of the house 9. Project management 10. Help obtain construction permissions and apply for subsidies 	<p>Customer relationship</p> <ol style="list-style-type: none"> 1. Dedicated personal assistance 	<p>Customer segments</p> <ol style="list-style-type: none"> 1. Primarily single-family houses from 1940-90's (mainly so called "Veteran houses")
<p>Cost structure</p> <ol style="list-style-type: none"> 1. Material costs 2. Salaries & overheads 3. Marketing costs 4. Travel costs 5. Subcontracting from the other partners 	<p>Key resources</p> <p>At the moment, the concept is "resting" and is not offered at all</p> <ol style="list-style-type: none"> 1. Project managers 2. Administration and marketing personnel 3. Renovation employees 4. System installers from subcontractors 5. Equipment for renovation 6. Vehicles for transportation of people and equipment 7. Known brands of the suppliers 		<p>Channels</p> <ol style="list-style-type: none"> 1. Information on geographic area-specific newspapers (i) 2. Information on the website of local house owner's association (i) 3. Information on the core company's website (i, ii) 4. Invitation to local information evenings (i-iii) 5. Home visits (ii-v) 6. Telephone (v) 	
<p>Revenue stream</p> <ol style="list-style-type: none"> 1. The energy audit and the energy certificate 2. Renovation material and work 3. Installation of systems 				

The other concept deals with the services to be offered soon (2012 onward) by the two hardware store chains K-Rauta and Rautia. K-rauta is an international specialty store for builders, renovators and interior decorators. Its operating area includes Finland, Sweden, Estonia, Latvia and Russia. Rautia is the nationwide hardware and builders' supplies store chain, which serves builders and renovators at over 100 locations throughout Finland. Both chains belong to the Kesko group (www.kesko.fi). So, the energy renovation services in both chains are basically the same. The analysis below is based on the information that was publicly available in 2010 (Aalto, 2010).

Table 5. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses in Finland. K-Rauta & Rautia concept. (Based on Osterwalder and Pigneur, 2010)

<p>Key partners</p> <ol style="list-style-type: none"> 1. Hardware store chain (service provider) 2. Product and material suppliers (insulation, heat pumps, heating systems, ventilation systems, fireplaces, windows, doors, lamps, all other building materials) 3. Renovation service providers: planning, installations, renovations, energy surveys, heat camera inspections 4. Bank 	<p>Key activities</p> <ol style="list-style-type: none"> 1. Marketing 2. Selling all products which are needed in house renovations: Insulation, heat pumps, heating systems, ventilation systems, fireplaces, windows, doors, lamps, all other building materials 3. Selling (in co-operation with company customers) most of services which are needed in house renovations: planning, installations, renovations, energy certificate, heat camera inspections 4. Flexible financing services 5. Energy surveys 6. Solutions are sold in easy and understandable packages/modules 7. Energy saving renovation service centers inside the stores 	<p>Value proposition</p> <ol style="list-style-type: none"> 1. One-stop-shop to offer all kinds of renovation services 2. Fixed price offer, minimum surprises of extra costs 3. Different ways of buying: all installed, partly installed, just products. Flexible project schedules, etc. 4. All other building and housing material products and services also from same vendor. 5. Flexible funding, frequent customer benefits 6. Easy access energy saving renovation services under one roof and getting all from one trusted vendor, nationwide 	<p>Customer relationship</p> <ol style="list-style-type: none"> 1. Dedicated personal assistance 	<p>Customer segments</p> <ol style="list-style-type: none"> 1. People renovating their houses (not defined more in detail)
	<p>Key resources</p> <ol style="list-style-type: none"> 1. Two well-known brands 2. Distribution network 3. Customer database through Kesko group 4. Large variety of products available through stores 		<p>Channels</p> <ol style="list-style-type: none"> 1. Active sales out from stores (i-v) 	
<p>Cost structure</p> <ol style="list-style-type: none"> 1. Material and product costs 2. Labour costs (salaries & overheads) 3. Marketing costs 4. Travel costs 5. Subcontracting of the renovation work 		<p>Revenue stream</p> <ol style="list-style-type: none"> 1. Payment from customers from the services and products purchased 2. Commission from product suppliers 		

4.3 Example from NORWAY

The Norwegian company Bolig Enøk is a newly established daughter company of one of the two major insulation actors in Norway; Glava AS. One of Bolig Enøk's business ideas is to offer a Project Manager to owners who have a need for renovation of their single family houses. Due to the broad competence of the Project Manager, the homeowner gets technical analysis, recommendations and project management of the renovation process served by one person. The Project Manager takes care of contacts with all involved actors such as main contractor, subcontractors, authorities as well as assisting in applying for relevant grants. The homeowner will be invoiced for the complete project by Bolig Enøk, which thereby takes on the risk towards the customer. It is important for Bolig Enøk not to provoke the mother company Glavas' two main distribution channels; retail chains and carpenters. Each renovation project will therefore buy all products (including insulation) through local suppliers.

Table 6. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses in Norway Example from Bolig Enøk, Project Manager (Based on Osterwalder and Pigneur, 2010)

<p>Key partners</p> <ol style="list-style-type: none"> 1. Building product supplier (service provider) 2. Contractors 3. Local retail stores 4. Various partners with expertise in building physics and energy and heating. (Sintef, Glava, KVT) 	<p>Key activities</p> <ol style="list-style-type: none"> 1. Marketing 2. Building inspection and energy audit 3. Present report with recommendations and energy certificate 4. Project management <ol style="list-style-type: none"> 4.1 Help obtain approvals from local authorities 4.2 Tendering process 4.3 Regular contact with suppliers and homeowner 4.4 Quality assurance; both price levels and product/ competence/ service by sub suppliers 4.5 Assist in filing of applications for subventions 4.6 Inspection when renovation is completed 5. Execution of renovation (by hired contractors) 6. Service/after sales 	<p>Value proposition</p> <ol style="list-style-type: none"> 1. Provide knowledge of holistic renovation including potential extension of the house. 2. Personal visits to the homeowner 3. On site analysis 4. Technical analysis with recommendations 5. Energy certificate 6. Project management 7. Offer holistic renovation service 	<p>Customer relationship</p> <ol style="list-style-type: none"> 1. Dedicated personal assistance. The Project Manager is the main (only) contact to the customer 	<p>Customer segments</p> <ol style="list-style-type: none"> 1. Owners of single family houses from 60- 80ies in selected areas in the region of Østfold, Akershus and south east of Oslo. 2. Homeowners who have capacity to increase their mortgage loan
	<p>Key resources</p> <ol style="list-style-type: none"> 1. Two Project Managers 2. Administration and marketing personnel in Bolig Enøk 		<p>Channels</p> <ol style="list-style-type: none"> 1. Information in local newspaper (i) 2. Information in House owner Associations magazine (i) 3. Local community environment plans 4. Direct mail (i) 5. Invitation to local information evenings (i-ii) 6. On site visit to the homeowner (ii-v) 7. Telephone (v) 	
<p>Cost structure</p> <ol style="list-style-type: none"> 1. Salaries to Project Managers counts for majority of the costs. Therefore effective use of their hours is the most critical factor for profitability. 2. Travel costs 3. Marketing costs 4. Administration and support costs 		<p>Revenue stream</p> <ol style="list-style-type: none"> 1. Analysis and Energy Certificate: NOK 6.900 incl. VAT 2. Renovation: NOK 100.000-3.000.000 NOK incl. VAT * 		

* This was the initial planned revenue model, and is still the model which would be best for the customer, however Bolig Enök has faced an important legal issue. The guarantee period for the customer is longer (consumer law) than what Bolig Enök may claim towards their suppliers (B2B law). Currently they therefore receive all the invoices and control them before they forward them to the house owner who pays directly to the suppliers. Bolig Enök invoices the customer for their service as project management.

4.4 Example from SWEDEN

Presently there is no established company offering one-stop-shop energy efficient renovation of single-family houses. Here (Table 7) we propose a model (*Enrenov*) where an existing renovation company coordinates with an energy audit company and heating system installers/retailers to offer such a service.

Table 7. A business model canvas applied to full service or one-stop-shop concept for energy efficient renovation of single-family houses in Sweden (Based on Osterwalder and Pigneur, 2010)

<p>Key partners</p> <ol style="list-style-type: none"> 1. Renovation company (service provider) 2. Energy auditor (partner) 3. Retailer/installer of heating systems (partner) 	<p>Key activities</p> <ol style="list-style-type: none"> 1. Marketing 2. Building inspection and energy audit 3. Present report with recommendations and energy certificate 4. Cost estimation for holistic renovation packages 5. Project management <ol style="list-style-type: none"> 5.1 Help obtain approvals from local authorities and apply for subsidies 5.2 Renovation including product purchases 5.3 Quality assurance 5.4 Post renovation commissioning 6. Customer service 7. Post renovation information provision to the customers 	<p>Value proposition</p> <ol style="list-style-type: none"> 1. Offer all types of home renovation services 2. Single-point contact 3. Free-of-cost preliminary building inspection/energy audit report 4. Detailed energy analysis/building inspection by independent agency 5. Free of cost price estimation for the renovation work 6. Help apply for subsidies and obtain construction permissions 7. Coordinate with banks to facilitate mortgage financing 8. Fixed price for the total work as agreed in the contract 9. Guarantee on the renovation work for two years 10. Free of cost information on energy efficient use of the building 	<p>Customer relationship</p> <ol style="list-style-type: none"> 1. Dedicated personal assistance 	<p>Customer segments</p> <ol style="list-style-type: none"> 1. Houses built before during 1960-80 and heated with resistance heaters, but all houses in the need of renovation are of interest 2. Homeowners who have capacity to increase their mortgage loan 	
<p>Key resources</p> <ol style="list-style-type: none"> 1. Vehicles and machines, energy audit equipments 2. Skill and experience to attract customers, conduct proper energy audit, and to do quality renovation 3. Energy analysis tools and database of condition of houses 4. Finance to start and run a business 		<p>Channels</p> <ol style="list-style-type: none"> 1. Advertisement in newspapers and magazines, home delivered fliers (i) 2. Local area meetings (i-iii) 3. On site visit to the homeowner (ii-v) 4. Website, telephone, email (v) 5. Interaction with energy auditors when house is sold (i) 6. Interaction with heating system retailers/installers (i) 			
<p>Cost structure</p> <ol style="list-style-type: none"> 1. Costs involved in traditional renovation (labour, material, free of cost building inspection etc.) 2. Marketing costs 3. Cost for post-renovation commissioning and information material 			<p>Revenue stream</p> <ol style="list-style-type: none"> 1. Payment for detailed energy analysis (if renovation is not executed) 2. Payment from customers for renovation work 3. Commission from suppliers of building products and heating systems 		

5 COMPARATIVE ASSESSMENT OF PROPOSED MODELS IN THE NORDIC COUNTRIES

The one-stop-shop concept means that a single service provider is responsible for holistic renovation of single-family houses as per the wishes of the house owners, including implementation of energy efficiency measures, or kitchens and bathrooms. *Ideally*, this means that the value proposition and key activities should be same, but the service provider could be different. And depending on the in-house capability of the service provider, the partnership and key resources could be different. Also, the channels and customer relationship to serve the customers could be different.

However, a comparative assessment of existing or proposed one-stop-shop models in the Nordic countries showed that the value proposition varies, which means there are possibilities for improvements. Also, in some models e.g. ENRA, ProjektLavenergi, Bolig- Enøk, Enrenov (proposed) the service provider actively looks for customers through local meetings, while it is not the case in other models such as Dong-cleantech and K-Rauta & Rautia. One major issue is how to offer independent but quality advice to the customers in order to improve trustworthiness of the business proposition. In some models financing is not available, and guarantee on energy savings is lacking in all models.

Table 8: Comparative assessment of proposed/existing models from the Nordic countries

	Dong-cleantech	ProjektLavenergi	ENRA (currently not in operation)	K-Rauta & Rautia	Bolig- Enøk	Enrenov
Customer segment	Houses with oil boilers House build before 1973	1970-80s	1940-90	All houses in the need of renovation	1960-80s	1960-80s
Value propositions	Full-service renovation Includes financing	Holistic renovation based on concept of external air tightening and insulation of the house Includes financing	Full-service renovation No financing services	Full-service renovation (on customer choice from do-it-yourself to turn-key) Includes financing	Full-service renovation No financing	Full-service renovation No financing
Channels	Mass media and website Personal contacts Key partner contacts	Mass media and website Open house arrangement Personal contacts Key partner contacts	Mass media and website Local meetings Personal contacts Key partner contacts	Mass media and website Local (mass) media Personal contacts Own stores	Mass media and website Local meetings Personal contacts Local community	Mass media and website Local meetings Personal contacts Key partner contacts
Customer relationship	Dedicated personal assistance	Dedicated personal assistance	Dedicated personal assistance	Dedicated personal assistance	Dedicated personal assistance	Dedicated personal assistance
Revenue streams	Customer payment for the renovation	Customer payment for the renovation	Customer payment for the renovation	Customer payment for the renovation Commission from suppliers	Customer payment for the renovation and detailed energy audit and analysis report*	Customer payment for the renovation and detailed energy audit and analysis report Commission from suppliers
Key resources	Product manager (everyday manager) Experienced consultancy Administration and marketing personnel	Project managers Administration and marketing personnel	Project managers Administration and marketing personnel Renovation employees	Two well-known brands Distribution network	Two project managers Administration and marketing personnel	Labour, equipment, and skill and experience for energy audit and renovation Energy analysis tools and database of condition of houses Finance to run the business
Key activities	Marketing Building inspection and energy audit Project management Help obtain approvals	Marketing Building inspection and analysis Project management Help obtain approvals	Marketing Building inspection and energy audit Project management Help obtain	Marketing Building inspection and energy audit Project management	Marketing Building inspection and energy audit Project	Marketing Building inspection and energy audit Project management Help obtain

	from local authorities and apply for subsidies Completion of renovation Post renovation information provision to the customers Service/after sales	from local authorities and apply for subsidies Completion of renovation Service/after sales	approvals from local authorities and apply for subsidies Completion of renovation Post-renovation inspection Post renovation information provision to the customers Service/after sales	Help obtain approvals from local authorities and apply for subsidies Completion of renovation (with help from partners) Solutions are sold in easy and understandable packages/modules	management Help obtain approvals from local authorities and apply for subsidies Tendering process Completion of renovation (by hired contractors) Post-renovation inspection Service/after sales	approvals from local authorities and apply for subsidies Completion of renovation Independent post-renovation inspection Post renovation information provision to the customers Service/after sales
Key partnership	Service provider: energy utility Key partners: contractors, Products/heating system suppliers, financial institutions	Service provider: medium sized contractor Key partners: local utility company, products/heating system suppliers, financial institutions, Green Business Growth Partnership	Service provider: renovation company Key partners: products/heating system suppliers, energy auditor	Service provider: hardware store chain Key partners: product manufacturers, installation companies, energy auditors, financial institutions	Service provider: building product supplier Key partners: contractors, local retail stores, energy experts (Sintef, Glava, KVT)	Service provider: renovation company Key partners: heating system retailers/installers, energy auditor
Cost structure	Salary of product manager Marketing Consultancy Administration and support	Salary of project manager Marketing Travel Administration and support	Material and product Salaries & overheads Marketing Travel Subcontracting from the other partners	Material and product Salaries & overheads Marketing Travel Subcontracting from the other partners	Salary of project managers Marketing Travel Administration and support	Costs involved in traditional renovation Marketing Post-renovation commissioning and information material
Possibility for improvement	Guarantee on energy savings Independent quality advise by third party Support deep renovation Actively search for customers	Guarantee on energy savings Independent quality advise by third party	Financing Guarantee on energy savings Independent quality advise by third party	Guarantee on energy savings Independent quality advise by third party Actively search for customers	Financing Guarantee on energy savings Independent quality advise by third party	Financing Guarantee on energy savings

* This was the initial planned revenue model, and is still the model which would be best for the customer, however Bolig Enök has faced an important legal issue. The guarantee period for the customer is longer (consumer law) than what Bolig Enök may claim towards their suppliers (B2B law). Currently they therefore receive all the invoices and control them before they forward them to the house owner who pays directly to the suppliers. Bolig Enök invoices the customer for their service as project management.

6 CONCEPTS SIMILAR TO ONE-STOP-SHOP CONCEPT

6.1 EPC and ESCO concepts

Energy Performance Contracting (EPC) is an energy management service that allows an external organisation (e.g. an Energy Service Company, ESCO) to enter into arrangements with property-owners to improve energy efficiency of their property by implementing various measures. Services may include a wide range of activities such as energy audits, project design and implementation, maintenance and operation, monitoring and evaluation of savings, property/facility management, energy and/or equipment supply. ESCOs are different from the traditional energy consultants or equipment suppliers in the fact that they can also finance or arrange financing for the operation, and their remuneration is directly linked to demonstrated performance regarding the level of energy savings or energy service. Hence, the providers of one-stop-shop service for energy efficient renovation of single-family houses can be called ESCOs if they can arrange financing and give some kind of guarantee on energy and/or cost savings.

Table 6 is an overview of ESCOs in the Nordic countries. ESCOs have so far targeted mainly industries and public buildings. Their activity in the residential sector is almost non-existent mainly due to the difficulty to give guarantee on energy/cost savings as it is not possible to control occupant behaviour and due to the fact that the small size of individual projects means that profits may not be significant (Mahapatra et al., 2011). Some companies, e.g. Dong Energy Cleantech in Denmark and K-Rauta in Finland, started or are starting to offer variants of one-stop-shop service, including financing, for renovation of single-family houses, but they do not give any guarantee on energy or cost savings.

However, in future it may be possible to give guarantee on energy savings in residential buildings as such concepts are slowly emerging. For example, the ESCO RENESCO Ltd (earlier Sun Energy Baltic Ltd) offers long term contract (20 years) for extensive renovation and maintenance of apartment buildings in Latvia (RENESCO, 2011). The energy consultation company Ekodoma Ltd is entrusted with energy auditing and monitoring after renovation. The flat-owners are guaranteed a specific indoor temperature and they pay for the same amount of energy as before the renovation (similar to guarantee on energy, not cost). The company recovers the investment cost and earns profits from the money/energy saved from the renovation. This means the company takes all the technical and financial risks, liabilities and responsibilities needed to realize the energy savings.

Table 6: Summary of ESCO activity in the Nordic countries as of 2007 (Hansen et al. 2009; Bertoldi et al. 2007; Lindgren and Nilsson 2010 [for Sweden])

ESCO information	Denmark	Finland	Norway	Sweden
Target group	Mainly industries, particularly brewery, and lately public buildings	Energy intensive industries and public buildings	Mainly public and commercial buildings	Mainly public buildings and to some extent industries
Number of ESCOs	Around 5 companies for last many years	Increased from 3 in 2003 to 11 in 2007	From 7 companies in 2002 to 10/15 in 2007	Increased from around 5 in 2005 to 27 in 2008
Type of ESCOs	Local energy companies, equipment suppliers, Energy management companies Example of ESCOs Amplex A/S Siemens Building Technologies A/S COWI A/S, Danish Energy Management, Schneider Electric Buildings Denmark A/S	Building service companies, consultancies, equipment suppliers, and local energy companies, Example of ESCOs Energiansaastöpalvelu Enespa Oy YIT Oy Retermia Oy Are Oy Foster Wheeler Energia Oy Suomen Lämpöpumpputekniikka Oy TAC Finland Oy Kuusankosken Aluelämmitys Oy Etelä-Savon Energia Oy	Private, equipment suppliers, consultants, electric utilities and oil companies Example of ESCOs CebyC AS Dalkia-OPAK Facilities Management AS Fabricom AS PROFSYS AS Siemens Building Technologies Ltd.	Local companies, equipment suppliers, energy supply companies, building service companies, consultancies Example of ESCOs ABB, Skanska, TAC, Bravida, ÅF, WSP Environmental. Dalkia Facilities Management AB, Dalkia Industripartner AB, Honeywell Building Solutions, Siemens Building Technologies AB, Johnson Control
Most popular technology	Industrial processes, e.g. in brewery, control systems, ventilation	Heat recovery, production processes, HVAC, new area: efficiency of recycling raw materials, refrigeration plants of ice rinks	Control system, HVAC, lighting, heat recovery, heat-pumps, local alternative heat production	Improved control systems, ventilation and heat recovery
Main success factors	Obligation on energy producers/distributors to implement energy efficiency	Voluntary Energy Conservation Agreement between industry and government Govt. investment subsidy	Third party financing is widely used	Targeted strategic activities include ground studies and market studies, pilot projects and guidelines for procurement, dissemination and capacity building Govt. investment subsidies
Barrier	Third party financing (bank) has had marginal role	Third party financing (bank) has had marginal role Normal procurement process does not recognize EPC Complicated accounting procedure unfavourable to ESCOs	Public procurement procedures do not consider benefits of EPC other than economic factors Contracts used are not in line with national standards (NS/EN)	Third party financing (bank) has had marginal role Mistrust in ESCOs and EPC due to the failures in the 1970s/80s

6.2 A non-profit initiative in USA (Efficiency Vermont, 2010)

Out-side Europe there is a concept similar to the one-stop-shop proposed in this report. Efficiency Vermont in the United States of America is a consumer funded (an energy efficiency charge on electric bills), private non-profit energy efficiency utility which provides technical assistance and financial incentives to Vermont households and businesses to implement energy efficiency measures. Efficiency Vermont works directly with retailers, architects, builders, and contractors who provide energy-efficient products and services to homeowners.

Efficiency Vermont supports a network of independent “Home Performance with ENERGY STAR contractors”, certified by the Building Performance Institute, to perform energy audits, diagnose building problems and to install the recommended energy efficiency improvements. The energy audit report typically includes a comprehensive evaluation of building air tightness and insulation, heating system, lighting, appliances, and windows (there is a fee for this service), and recommended improvement measures. If a homeowner wants, the contractor completes the recommended improvements and assists the homeowner in accessing available incentives and financing options. Efficiency Vermont provides contractor training and quality assurance.

7 CONCLUSIONS

In the Nordic countries significant primary energy efficiency potential exists in single-family houses built before 1980. These houses are more than 30 years old and need to be renovated. This provides an opportunity for large-scale implementation of energy efficiency measures. To tap this opportunity there is a need for one-stop-shop business models where an overall contractor offers full-service renovation packages including consulting, independent energy audit, renovation work, follow-up (independent quality control and commissioning) and financing.

We have analyzed various existing or planned one-stop-shop business models for full-service energy efficient renovation of single-family houses in the Nordic countries. Examples of service provider include an energy utility in Denmark, building product warehouse in Finland, an insulation company in Norway, and a construction/renovation company in Sweden.

There is significant business potential as the renovation market for single-family houses in each Nordic country could be in the order of hundreds of millions Euros. Homeowners will get an improved quality renovated house with little risk or responsibility which usually is the case with traditional renovations with individual solution, the energy cost will be reduced, market value of the house is likely to increase, mortgage banks will have a safer asset and there is societal benefits in terms of reduced energy use and greenhouse gas emission. However, there is uncertainty over who will be responsible for guarantee of the renovation work if the service provider goes bankrupt. Insurance companies could be involved to address this issue.

Even though there is strong business potential for one-stop-shop energy renovation concept, still it has been somewhat difficult to start or run such a business. One way to kickstart the market is to provide public funding for few demonstration projects to test different business models, e.g. those identified in this report. Such projects will bring together actors interested in one-stop-shop concept and the dissemination of the project results may stimulate the market. However, a major uncertainty with the one-stop-shop business model is to find enough interested customers. Following regulatory, economic and informational measures may improve the situation.

1. Regulation: In all Nordic countries, except for Finland, energy audit report or energy performance certificate is mandatory (voluntary in Finland) when a house is sold. Such a document usually contains a list of recommended measures to improve the energy standard of the house. The idea behind the energy audits/certificates is that prospective buyers will factor the energy audit information in the house purchase decision and implement the recommended energy efficiency measures. In Sweden and Denmark the energy audit is done by certified energy auditors, while in Norway house owners can themselves use a web tool to generate the certificate. Furthermore, the energy audit report in all Nordic countries is not very detailed and comprehensive.

In all Nordic countries it might be made mandatory to have detailed energy and building condition audit for all houses of certain age (e.g. those built before the 1980s), not only those on sale. A joint audit by the energy auditors and building consultants might provide a basis for a set of recommendations to be implemented, either at a time or in phases to improve the energy performance of the house. However, the house owner must be interested to implement the suggested measures.

Different building regulations, product standards and energy audit procedures in different countries may hinder market development of one-stop-shop renovation concept as companies

interested in offering such a service in several Nordic countries have to be familiar with national regulations and approval processes. Hence, steps may be taken to make the regulations and product standards more uniform in Nordic countries.

2. **Financing:** The most cost efficient option to finance energy efficiency renovation of single-family houses in the Nordic countries is mortgage refinancing. However, the need to self-finance the amount not covered in the mortgage loan and a higher cost for the top loan (typically amount above 75% of the appraised value of a house) may hinder the homeowners to go for energy efficiency renovation. This could be addressed if government provides soft loans or subsidies to cover the investment cost beyond the mortgage (base) loan. In some countries, e.g. Germany and Norway, there are preferential loans for energy efficient renovation of single-family houses.

Attention should be given to mortgage financing limitation for energy efficient renovation of recently bought houses. Banks may consider an energy efficient renovation plan prepared by an entrepreneur and pre-evaluate the post-renovation value of a house in collaboration with real estate agents. Based on this valuation banks could confirm the homeowner and the entrepreneur that certain amount of investment cost would be covered by mortgage refinancing. The rest may be covered by government sponsored soft loan or investment subsidies.

3. **Tax deduction linked to energy efficiency measures:** In Denmark, Sweden and Finland there are tax deductions for labour cost for home renovation and other household work. However, often this tax deduction is used for non-energy related measures such as improving kitchen, painting, a new or improved balcony, or house cleaning. An amendment to the tax deduction programs to incorporate specific requirements regarding energy efficiency of implemented measures may increase homeowners' interest in energy efficient renovation.
4. **Guarantee on energy savings:** Annual energy cost is one of the most important factors in the homeowners' decision to implement energy efficiency measures (Mahapatra and Gustavsson, 2008; Nair et al., 2010). Hence, a guarantee on energy or energy cost saving may encourage energy efficient renovation of houses. But, at present it is less likely that such guarantee will be given as the full service energy renovation concept is yet to be tested and not enough experience exists regarding energy savings potential in the context of varying household energy behaviour. However, such concepts exist for industrial and public buildings (the ESCO concept) and are emerging for residential buildings. It is possible that service providers may consider offering a guarantee on energy savings based on theoretical calculations. Also, it should be emphasised that the energy efficiency improvements bring along other benefits like improved thermal comfort or internal air quality.
5. **National information campaigns** where authorities encourage people to think holistically when doing a renovation of their houses. Messages such as "don't miss the opportunity to ..." may be promoted in order to create a "pull-effect" in the market.
6. **Demonstration projects:** One way to kickstart the market is to provide public funding for a few demonstration projects to test different business models, e.g. those identified in this report. Such projects will bring together actors interested in one-stop-shop concept and they will gain some experience. In such demonstration projects the full-scale energy renovation actions could be realised in shorter timeframe than in traditional piecemeal renovations. Advertisement of results of successful demonstration projects may attract more customers and entrepreneurs.

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