Programme Area: Smart Systems and Heat

Project: SSH Stagegate 1

Title: Review of International Smart Systems and Heat Initiatives

Context:

The Smart Systems and Heat Programme commissioned a short review of international initiatives, particularly relating to heat. The work is intended to provide a digestible overview which links to the driving policies where appropriate, and complements a review undertaken during the scoping phase of the programme.

Review of International Smart Systems and Heat Initiatives

Carried out for the Energy Technologies Institute

Final report
01 November 2013

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Introduction, observations and recommendations

The projects

Introduction

- The ETI has commissioned Delta-ee to carry out a review of international initiatives in the Smart Systems and Heat Programme areas. This follows an initial piece of research undertaken by the ETI in 2011 examining this question. ETI has requested a report that:
  - Examines initiatives (with a clear focus on heat), successes and lessons learned; their outcomes / next steps; and possible learnings for the UK
  - Identifies the policies driving these initiatives
  - Identifies who's involved and why
- The ETI has contracted Delta-ee to answer these questions through a short report examining ~10 projects from ~8 countries, utilising existing Delta-ee research as a base, and extending this through additional research.
- Delta-ee provided a preliminary country list and sample slide and incorporated feedback from ETI in developing this report.
- This final report follows a draft report submitted on 11 October 2013 and comments from the ETI on the draft report.
- As an additional option for the ETI, we are happy to provide an onsite presentation and / or further drill-downs into particular areas / projects.

Key observations for the ETI

1. **The vast majority of 'smart' projects do not involve heat,** or where heat is only a small proportion of the overall project (all projects in this report have some focus on heat).

2. Indeed, **we do not see any projects that look at how electricity, gas and heat networks can be used together** to solve future challenges from decarbonising electricity and heating. Denmark has individual projects separately looking at heat and electricity networks. The Netherlands and France have projects looking at how electricity and gas networks can work together.

3. Projects can be **classified** into
   - Wide smart grid projects involving many different kinds of loads, generation, storage, flexibility
   - Narrower projects focussed on a single (or very small number of) loads / generators

4. The majority of projects are driven by increasing quantities of wind power and photovoltaics. **Only a small number are driven by heat** and the future changes in provision of heat (e.g. electrification and district heating).

5. **Denmark has a plethora of projects that are highly relevant for the ETI** – it is "further ahead" than the UK, but the UK is headed (at least according to current government policy) in the same direction. In particular Denmark has several projects involving electric heat pumps and district heating.

6. **There are many different "problems" that different projects are solving**. Some projects focus narrowly on solving one of these problems, others are exploring how one platform can help solve several problems. Key specific problems that projects explored in this report address include:
   - Distribution network constraints
   - System-wide balancing of supply and demand on day-ahead basis
   - Balancing power (15 minute or less time frame)

7. **There are many different approaches to controlling / influencing flexible demand / generation**. Different approaches include centralised / distributed intelligence; type of communication; price signals that influence behaviour vs automation.

8. **The scale of projects differs widely**, from several tens of millions of pounds / Euros, to ~millions. Denmark and Netherlands have significant numbers of smaller projects that have relevance for the ETI.

6. **Recruiting customers into trials** has caused challenges for some projects (refer to pages 6, 11, 15). We recommend the ETI maintains a strong focus on the customer proposition.

7. **Some** – but the minority – of **projects are focusing on business models and regulatory frameworks** in addition to technical aspects.

8. There are a number of private projects being taken forward, independent of any public funding. If the price signals / market conditions are right, this shows that **the market will innovate.**

Key recommendations for the ETI

These are our summary recommendations – we are willing to discuss / expand upon these.

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1. **Recommended countries** where there are many learnings for the ETI:
    - **Denmark** is our first priority– there is a lot of relevant learning for the ETI re: heat pumps, market structures and district heating.
    - Our second priority country to build links to would be the **Netherlands** – some highly relevant projects, a focus on heat from some projects, and exploiting synergies between electric and gas networks.

2. **Specific projects / areas we recommend where the ETI can gain valuable learnings are**:

Topic	Project(s) / Country
Flexibility of HP operation	In Denmark, the Energienet.dk project (3a); Flexpower (3b); Smart City Kalundborg (2b); EcoGrid (4). The Bosch /IVT heat pump offering in Sweden (slide 16) is also of relevance, as is the Vattenfall Europe offering in Germany (slide 12).
Heat pumps in DH	Denmark (slide 8)
Electric storage heating	Projects in Ireland (slide 14); Germany (slide 12) and Sweden (slide 16) are highly relevant.
Customer insight / behaviour	Most projects have relevant learnings. We suggest that, if the ETI is interested in better understanding lessons learnt, further targeted drill downs into selected projects will yield valuable learnings.
Synergies between different energy networks	Denmark for heat network and electric heating synergies (slides 7 and 8); Netherlands for electricity and gas networks (slide 15)

3. **Consider customer recruitment for trials at a very early stage and place the customer proposition at the heart of project design** – many projects have not secured the planned number of trialists. Several projects appear to be technically focussed, and where they do evaluate the customer engagement in their project, do not explore how representative this is of the wider market, or use segmentation to identify different customer segments and develop tailored propositions for different segments. This topic and learnings from other projects may be worth further investigation by the ETI.

4. The ETI may be able to **utilise platforms** / **hardware** / **software** that has already been developed for other projects – or at a minimum learn from these platforms. This leverage may help the ETI adopt the best development path for the UK.

5. We see an **absence**, generally, **of how gas, electricity and heat networks can work together**, but some projects integrating two networks into a wider system. We believe this is a critically important aspect of a 'smart heat system' and recommend ETI consider lessons from other projects and countries in its' strategy.

6. There are learnings for **business models and market frameworks that the ETI could utilise** – these include system balancing; market places for flexibility; market models; through to managing impacts of electrification on distribution networks.

7. Can the ETI stimulate private sector initiatives? Or, work with the TSB / smart grid initiatives? There are several examples of **highly relevant purely private sector innovations** for example from Vattenfall, RWE, Fortum and IVT / Bosch.

linear Intelligent Networks

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A large, multi-partner project to explore how much flexibility can be secured from demand-side assets – main focus not on heating but some electric heating included

Manufacturers SIEMENS Miele

Key partners

Government Flemish Government

Network operators

EDF luminus LABORELEC GDF SUEZ

Academic vito vision on technology

For the ETI, this shows the challenges in developing a trial, and that technically demand can be shifted for four different types of benefit to the electricity system

What & who	Testing how much flexibility from influencing operating times of demand-side assets – involving several partners. Running from 2009-2014. 250 homes (aim was 1,000 but unable to recruit this many into trial), mainly appliances but some (~7%) electric water heaters. Plan was to include HPs but manufacturing partner pulled out.
Why & how	*Driven by anticipated growth in distributed generation and wind* Testing a number of business cases: 1. Supplier driven – portfolio management, testing influence of variable tariffs day ahead tariffs split into 6 time intervals, manual or automatic response 2. Supplier driven – flexibility for wind; day ahead wind forecasts; balancing every 15 minutes 3. Network driven – increase lifetime of transformers by keeping temperature in transformer low and stable 4. Network driven – manage impact of distributed generation on voltage levels €42M total budget - €10M from government
Results / next steps	From technical perspective, can shift demand effectively – including demand shifting with electric water heating. E.g. for wind flexibility, can partially match demand on 15 minute time intervals. Major issue recruiting / rewarding customers. Possible next step: - Market value analysis - Wider tests on 1,000+ homes - Better customer engagement - Include heat pumps

- Appliances: user sets a switch to say e.g. "I need washing finished in 6 hours" – control algorithm determines when it actually runs.
- Appliances communicate to a smart energy box in the home – and this then to an external server. Algorithms to control appliances sit on the central server.
- Electric water heater developed by Vito. Has 8 temperature sensors on the tank wall to assess thermal capacity & determine storage capacity. This is communicated to the central server. Control is simple on/ off.
- Heat pumps - challenges retrofitting control / communication to installed heat pumps (one reason why these weren't included).

1 Denmark – a hot bed of "smart heat" projects and initiatives

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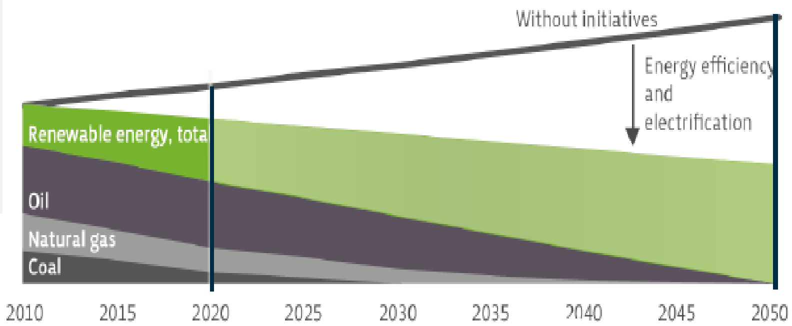
Denmark has a plethora of 'smart heat' initiatives, driven by an ambitious renewable energy strategy: in particular massive growth of wind electricity; electrification of heat; and currently ~50% of space heating met by district heat.

This slide paints the overall picture; the next slide provides an overview of several initiatives; the 3rd and 4th explore a number of projects

Denmark's energy strategy

- 100% renewable energy by 2050
- Wind producing 50% of electricity by 2020



Challenges, challenges, challenges

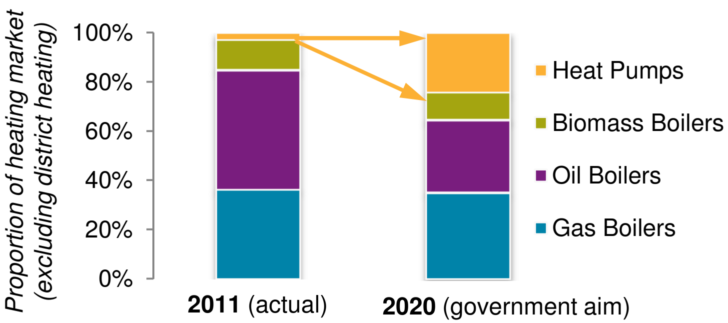
- Challenges in balancing power
- Challenges in matching supply and demand
- Distribution network constraints from increased electrification

Heat market

- 50% district heat
- 50% individual systems

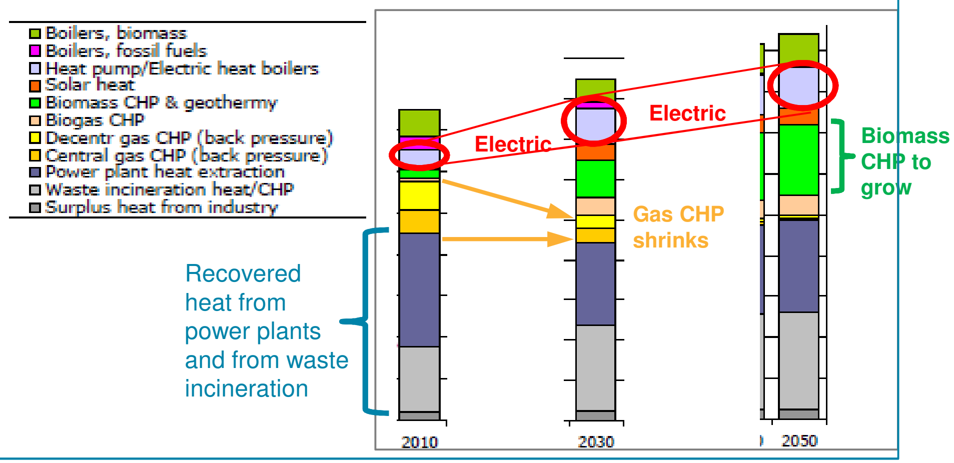
Individual systems

Danish heating market (individual heating systems): Government aims to increase total HP installs from 25,000 to 200,000 by 2020. New oil boilers banned.



District heating

Vision of Danish DH Association



2 a) Sidebar: drilling down into district heating
b) Smart City Kalundborg – focus on end user

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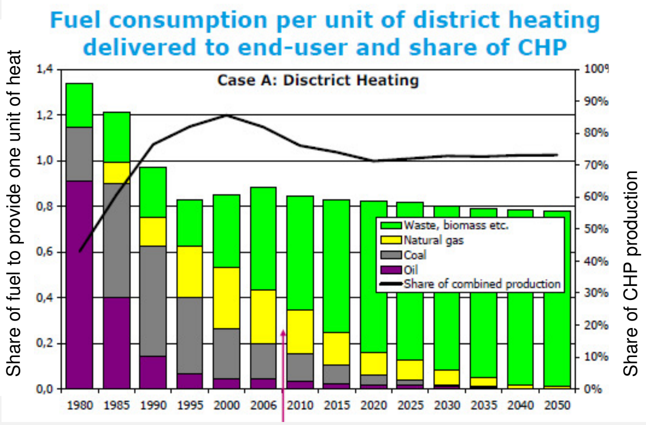
SIDEBAR - DISTRICT HEATING OUTLOOK IN DENMARK

District heat in Denmark currently provides ~one half of Denmark's space heating demand. The Danish DH Association forecast radical changes in fuel mix that will enable DH to completely decarbonise, as well as using electric heat pumps to offer large amounts of flexibility to the electricity system.

For ETI, learnings from Denmark for biomass CHP contribution to DH heat supply – and ways to incorporate electrification into district heating

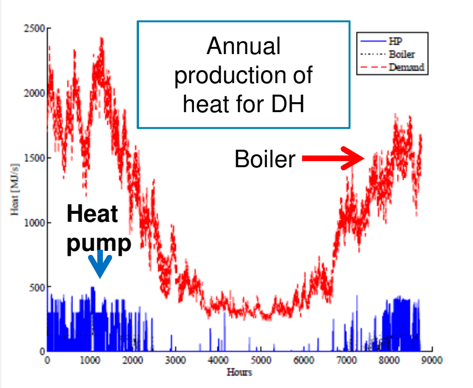
District heat is projected to become carbon free by 2050

- Gas & coal are part of today's fuel mix for DH
- Denmark's DH Association forecasts that biomass CHP will grow, making DH carbon free by 2050



Electric heat pumps are already starting to be used to provide flexibility

- HP and CHP together can provide large amounts of flexibility



A project in a small Danish city (~50,000) with government and industry funding

Smart City Kalundborg — BUSINESS OPPORTUNITIES OF "VIRTUAL GRID ENFORCEMENT" AND FLEXIBILITY PRODUCTS

Flexibility from heat pumps, EVs and other sources to incorporate high wind penetration and avoid DNO re-enforcements

For ETI, possible flexibility platform of interest involving large corporates who could bring solution to the UK. Interesting focus on end user information and apps

What & who	Utility SEAS-NVE, plus ABB, grid control specialist SPIRAE, Schneider and others. Budget of ~£11M.
Why & how	Smart city project to provide demand side flexibility for balancing and grid constraints. Key is creating a trading platform (Hub) for flexibility, and end user apps that provide user-friendly interfaces for customers. Price signals (e.g. free electricity at night) and automation will be used to influence demand.
Next steps	Running 2011 – 2015. Actual operation about to commence

3 a) Energinet.dk explores HP flexibility
b) Flexpower explores balancing services

Energienet.dk (TSO) trial of >300 heat pumps to understand how much flexibility heat pumps can provide. Open source control system developed.

Testing how much flexibility heat pumps can provide & how this varies by house type, storage capacity etc.

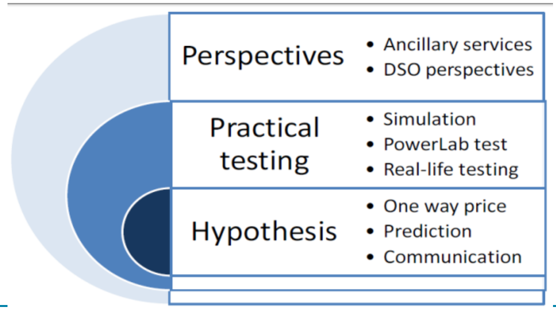
For ETI, a critical topic for electrification of heat in the UK. While there are differences in house types, heat distribution systems & climate between Denmark & UK, undoubtedly lots of learnings from this project for ETI.

What & who	Aims: ▶ Assess how long HP can be shut down in different building types while maintaining end user comfort ▶ Assess control and communication mechanisms necessary to shift HP operation ▶ Assess social and economic impacts and benefits on end users Partners include TSO (energienet.dk), DONG (utility), Liab (control box) and Danish Technological Institute.
Why & how	▶ >300 homes, with a variety of HP solutions – some will large thermal stores (300 – 500 litres), others with standard hot water storage tanks. Focuses on the retrofit market, with a wide variety of housing types. ▶ Open source control box that can be used with HPs from variety of manufacturers ▶ Control of heat pump based on price signals to each unit ▶ Central intelligence, with each HP sending detailed HP measurement data
Next steps	Project now nearing completion. Next steps?

Flexpower explores and trials potential for low cost balancing / regulating power from large numbers of distributed assets – including heat pumps

5 minute signals to large number of assets to provide up / down balancing for the system operator

For ETI, an example of how electric heating (and other loads) can be used to provide balancing services – using low cost, one-way communication

What & who	Led by research / consulting organisations with utility SEAS-NVE. Budget of €1.6M, • New source of regulating / balancing power • Price signals to distributed assets which can then respond • Simple one-way communication to keep cost down • Payment based on metering of the asset
Why & how	▶ Will be increasing need for regulating power in Denmark as wind capacity grows ▶ Tests involving CHP and electric heating 
Next steps	Project commencing

4 EcoGrid –testing different response models for day ahead and balancing markets

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EcoGrid is a European funded project centred in Denmark. It marries together technical flexibility of electric heat with commercial models for the balancing market

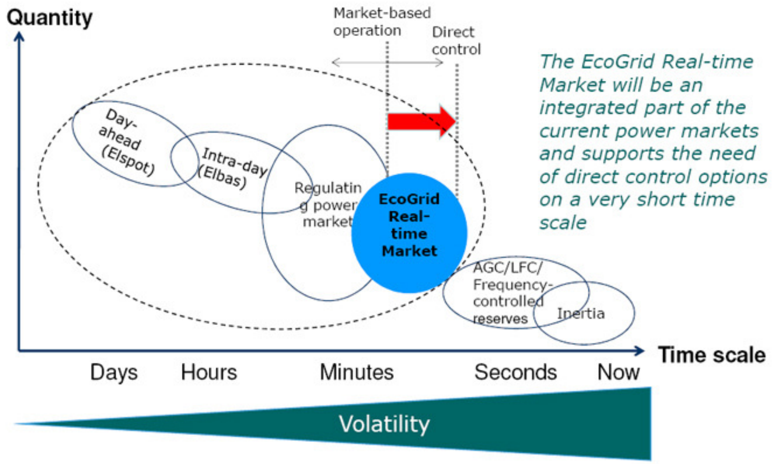
Balancing capacity from flexible demand – with a big focus on heat

EcoGrid eu www.eu-ecogrid.net

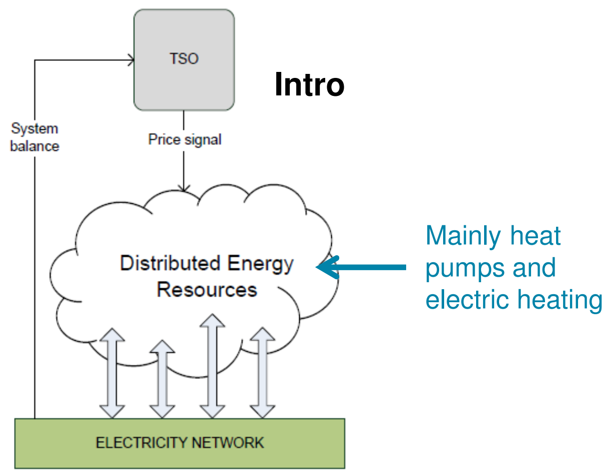
What & who	Several EU partners, but Danish TSO is key player. Trial of ~2,000 homes on Danish island.
Why & how	Integration of wind in Denmark and need for balancing (~5 min time frame) and commercial models for better settlement processes. Budget of €41 million, half from European Commission.
Next steps	700 households recruited, next step to implement the trial. Project completed in 2015.

- Real-time prices to be presented to consumers and allow users to pre-program their automatic demand-response preferences
- Day-ahead price signals sent for advanced scheduling. Price updated every 5 minutes to incorporate system imbalances.
- Mix of demand side responses:
    - 400-500 customers with price signals only from smart meters
    - 700 customers with HPs / electric heating autonomously responding to price signals
    - 500 customers with HPs / electric heating responding to aggregator control.

Intro



The fundamental idea



a) Voltalis – selling flexible electric heating into balancing market
b) Premio – a wide ranging smart grid project including heat

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- France is one of Europe's smart grid leaders – with a wave of smart grid projects, a number of which involve electric heat
- It has >30% of homes using electric (mainly resistance) heating – there is a big focus on this as a controllable load (not much focus, yet, on controlling heat pumps). There are few pilots involving flexible gas CHP.
- There is also one very interesting privately-led project, Voltalis, involving selling flexibility from electric heat into the balancing market

Voltalis – selling flexible electric heating into the balancing market

For ETI a simple model to secure flexibility from electric heating and monetise this. Challenges to reach scale & build large-enough customer base

What & who	Voltalis, a start-up, install a comms / control device, provide the customer with free analysis of their energy consumption in return for access to their electric heating & selling peak shaving (~3 kW per home) to the system operator
Why & how	Commercial opportunity in the balancing market, maybe capacity market in the future. Privately financed (>€50M invested)
Next steps	Have >10,000 customers – challenge to grow rapidly and achieve scale & profitability

- A privately-backed start-up, Voltalis has been in business for 7 years – to date secured more than 10,000 customers, >30 MW peak shaving
- Challenge in reaching customers, and then access to their electric (storage) heating
- Investment in trading platform – proven, established, generating revenues
- Regulatory framework tough, not yet profitable (needs >100 MW of peak shaving to be profitable), now looking to capacity market

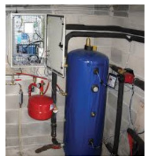
VOLTALIS
Vous êtes chauffé à l'électricité ?

PREMIO – a wide ranging smart grid project involving heat

For ETI a sophisticated control system working with many appliances and heating / HVAC. Potential learnings for ETI's work in the UK on the control system.

What & who	Led by EDF, together with several other partners, focusing on demand side response in the south of France with many appliances and many customer types
Why & how	Initiated in 2008, to integrate increasing amounts of renewables (in particular PV) through flexibility, considering the whole electricity value chain. Focusing on a transmission-constrained area
Next steps	One of a number of French / EDF smart grid projects – informing future projects & regulatory / business model discussions

- Includes time of use tariffs, plus automated control (direct load control) of electric space heating, hot water, and HVAC (including heat pumps)
- 'Day ahead' control, and 'within day' controls – the latter requiring response within 15 minutes
- The intelligence – and the brain of the system, is centralised – sending a signal to the (e.g.) heat pump. An algorithm defines the optimum timing, controls the 3-way mixing valve, and controls pre-heating of the water tank



1 a) RWE's 'wind to heat' trial
b) Vattenfall Europe's virtual heat / power plant

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Two utilities realise that there could be value opportunities through influencing the timing of when electric heating is running (and in Vattenfall's case the time when CHP is operating). Both are privately-led initiatives which have significant (several millions Euros) backing.

RWE 'Wind heating'

For ETI, a possible model (or source of learnings) to use electric storage heating to provide storage for the electricity system.

What & who	RWE is trialling remote control of when electric storage heaters are "charged" (80 homes)
Why & how	Better matching of supply and demand will help RWE manage intermittency from wind
Next steps	May launch in 2014/15 heating season

- Smart meter plus local 'controller' (from Siemens) for storage heater
- Statistical approach to response (to keep comms cost down)
- Increased customer comfort through better controls
- Testing commercial models – tough as energy component of electricity retail price is very low in Germany, also some regulatory challenges
- Participation on balancing market proven
- 14 GW of electric storage heater potential, & desire to extend to electric heat pumps

RWE

Vattenfall 'Virtual Power Plant' with heat pumps and micro-CHP

For ETI, a source of learning for virtual power plants (high element of central control) and a new potential business model

What & who	Vattenfall Europe (a 'big four' German utility) developed virtual power plant with CHP and heat pumps
Why & how	Driven by wind intermittency and wholesale market volatility; central control centre sending operation schedules to assets
Next steps	Scale up, grow, expand

- Vattenfall Europe has developed their own 'control centre' which generates operation profiles for their assets and dispatches these daily (intelligence is central)
- Started with large (non-residential, in some cases MW scale) heat pump and CHP assets, now down to single family homes. More technologies in the future
- Heat contracting model used – early days for single-family homes
- Requires heat pump / CHP to be pre-fitted with comms and 'steering' hardware & software. Initial partners include Stiebel

VATTENFALL

VHP READY Virtual Heat & Power

2 a) E Energy projects – Germany's flagship smart grid programme b) Rhur Region Projects – small, regional, heat focussed projects

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Germany's flagship smart grids programme has delivered sophisticated pilots, typically involving creating price signals for a variety of flexible loads, with some automation

E-Energy Projects

Lots of learning from time of use pricing / customer interfaces and integration of decentralised resources in a particular region – but only a partial / relatively minor focus on heat

What & who	6 projects, four of which focus on flexibility from customers. Each project involving a utility, ICT & product companies, and academic partners.
Why & how	For 6 projects, €140M funding, of which €60M from government. Aim to use ICT to deliver environmental, efficiency and security benefits to electricity system through smart grids.
Next steps	Not clear how the project learnings will be rolled out.

- **eTelligence** provided price signals to customers so they shift their demand, and daily schedules for CHP. A new marketplace was simulated to provide the price signals
- **MeRegio** is similar – creating price signals and passing them to households. Intelligence is more decentralised, with choices between manual and automatic control. Includes heat pumps and variety of appliances

With support from the regional government, Innovation City Rhur has over 125 projects on 'smart cities', with several smart energy projects – focussed on the city of Bottrop

Bite sized micro-CHP, fuel cell and demand response projects

Particular focus on smart micro-CHP projects of interest for ETI

What & who	▸ Regional smart-city project exploring potential for micro-CHP to provide flexibility for the electricity system. €7M budget. ▸ Covering engine and fuel cell micro-CHP technologies, about ~100 units
Why & how	Overall drivers for smart city project are environmental, economic and growth benefits. Phase 1: - Define monitoring, evaluation, control; identify products and customers Phase 2 - Operation: monitoring, testing different operational strategies, integration of thermal stores, virtual power plant potential.
Next steps	Project commencing and running from 2013 – 2015 (two heating seasons)

- Testing heat contracting business model
- Focus on optimising export / import of micro-CHP electricity for network benefit and to use electricity in local area

InnovationCity Ruhr Modellstadt Bottrop

Greenway Project – Dimplex storage heaters providing balancing services

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The aim is to demonstrate how the Glen Dimplex Quantum space and water heating system can be deployed as an aggregated demand side management tool

For the ETI, this trial demonstrates a technology which provides benefits to customers and the electricity system. It is very relevant and applicable to the UK market context.

What & who	One of two projects commissioned by the Irish TSO, 360 Quantum heaters have been installed – funding mainly from Irish sustainable energy agency.
Why & how	*Overall driver is wind intermittency & stress on system balancing* The heaters are connected using GPRS linked to a web portal. Via this comms solution, there is a 'digital handshake' every 60 seconds which sends instructions and receives data from the heaters. In this phase 1 trial, Dimplex runs the server (likely to be the role of an aggregator in long term).
Results	Successfully demonstrated remote load switching last winter: the load profile for off-peak 11pm-8pm was shifted from front-loaded to flat. Network operator Eirgrid/SONI has set up frequency response trials, whereby the heaters respond automatically to frequency excursions on the grid. This successfully demonstrated a response within a very short (300ms) timeframe and also that remote programming allows the response to be co-ordinated across groups of heaters (to improve grid stability).
Next steps	Currently seeking EU and national funding for up to €10m to extend the deployment to a phase 2 trial of over 1,000 homes in Ireland next year. Phase 1 demonstrates the technology. The Phase 2 trial aims to move beyond the technology and quantify the value that it brings to the electricity system in terms of DR, frequency response, grid capex reduction & consumers

Key partners

Manufacturers: GlenDimplex

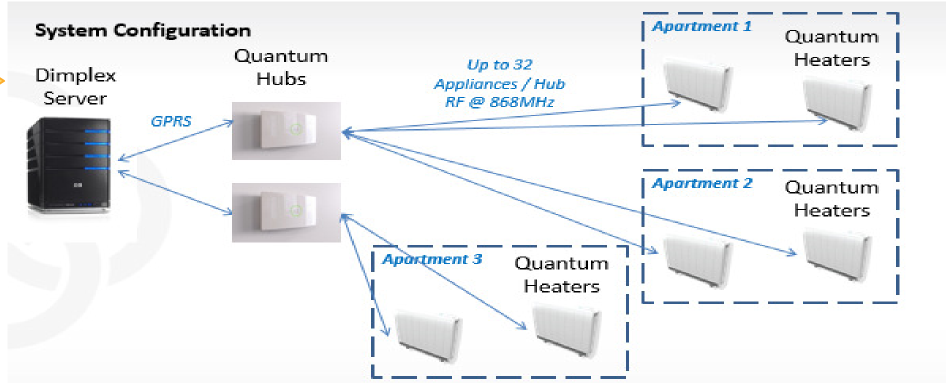
Government: The Green Way (Dublin's Cleantech Cluster), seai

Energy suppliers: SSE, electric Ireland

Network operator: EIRGRID, SONI

Key Objectives:

- ✓ Real consumers with real bills and savings
- ✓ Put a value on the services provided to the electricity system
- ✓ Demonstrate potential from energy arbitrage
- ✓ Identify "Big data" issues and value streams



a) Powermatching City – a sophisticated smart heat / grid project
b) Dutch gov funding for a range of focussed projects – inc. heat

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Powermatching City

Technical and commercial trial of flexible demand and generation

For ETI, technical insight into flexibility not only from heat, but also several other technologies, coupled with commercial models in similar market environment to UK. Sophisticated control strategy could be used in UK?

What & who	Flexibility from micro-CHP, hybrid heat pumps (and other technologies) – for benefit of retailer, generators, DNO and gas network
Why & how	*Recognising future value of / need for flexibility and growth in new loads (EVs, HPs, M-CHP).* Supported by €25M of government funding.
Next steps	Started in 2007 – finish in 2014. Next steps not clear – possibly expand to 5,000 customers

- Phase 1 focussed more on technical aspects, Phase 2 extended to commercial aspects & business models: 50 houses aimed for, but only 18 actually included.
- Software "rolls up" flexibility available from one household (and at what price). Demand curve for flexibility from the market. Automated negotiation to implement flexibility.
- Development of pricing models for customers, billing systems, and different demands for flexibility from different market players.

Key partners

Retailer / generator – essent

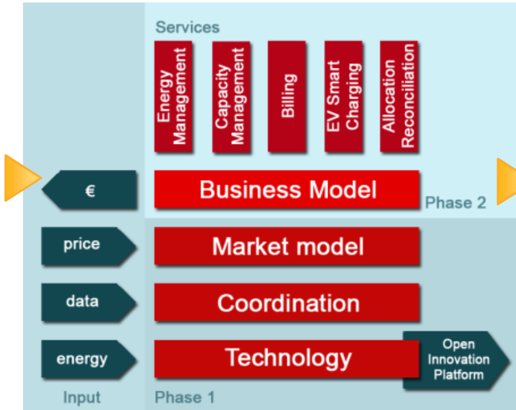
Elec. DNO – ENEXIS

Gas network op. – gasunie

Dutch government smart grid programme

The government has funded 12 smart grid projects of which 5 have at least some focus on heat

- Projects focusing on **non-residential heat** – for example at greenhouses; university campuses; business parks.
- **Couperus Smart Grid** – 288 homes in an apartment complex all with electric heat pumps. Using IBM's PowerMatcher, control of the heat pumps for the network operator (Stedin) and for balancing supply and demand by Eneco Trade.
- **ProSECco** – developing a Universal Smart Energy Framework that can be applied to several cases – including an all-electric residential area (new-build); a residential area with gas and electricity; and a residential area with district heating (incorporating underground thermal stores). Pilot projects will test the following five flexibility services: DR with appliances (inc. HPs and M-CHP); DR with EVs; local generation; storage energy management



Challenge for roll out is to keep cost of hardware low (possible using low cost 'raspberry pie' type hardware & software downloaded from the cloud) and standards for communication between the gateway and the appliances.

a) “Smart” electric heating
b) Sidebar: policy debate on district heating and electric heating

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Market signals through hourly time-of-use tariffs are resulting in innovative ‘smart electric heat’ propositions that shape the timing of electric heat according to wholesale market prices. And while not a “project” there is an interesting policy debate on future heat regulations – with implications for DH and electric heating.

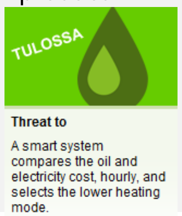
‘Smart’ electric heating using hourly ToU pricing

For ETI, shows that if hourly prices signals are opened up for individual customers, market may innovate with smart electric heat.

What & who	Influencing operation of electric resistance heating and heat pumps to hourly spot prices on the wholesale market. Electricity retailer, HEMS company & HP manufacturer
Why & how	Hourly ToU prices recently introduced for residential market - commercial offerings have developed on the back of this. Privately financed (market led)
Next steps	Offerings only very recently introduced – too early to judge success

Elec. retailer Fortum link up with HEM company to control electric resistance heating

- New offering, launched in 2012
- Works with electric storage heating, electric water heating and oil – electric bivalent systems
- Developing a HP product



Bosch launches ‘smart heat pump’ – operation shaped by reading of spot elec. prices

- HP connects to gateway – intelligence in the gateway
- Picks up energy prices from the market
- In-house development by Bosch (owns IVT)
- In future could be controlled by 3rd parties & other services added (e.g. remote diagnostics)

IVT VÄRMEPUMPAR

SIDEBAR: POLICY DEBATE OF INTEREST TO THE ETI

A mature heat pump and district heating market – policy battles and regulatory insight

Note this is not an “initiative” or “project” but we believe will be of interest to the ETI

1. Maximum demand for heat pumps

Regulations state that the maximum electrical demand for a heat pump is 4.5 kWe – at any point during a “1 in 3 year” winter. Driven by supply-demand balancing concerns, as well as distribution network concerns (problems with distribution networks in very cold 2010 winter).

2. Policy focus: district heat versus heat pumps

There is a debate around the focus of regulation of heat in the future. Should it be on:

a) Heat demand
b) Carbon intensity of heat supply

Simplifying the argument somewhat, the district heat industry appears to focus on (b), as too much of (a) would limit their heat sales and revenue. The heat pump industry is more focused on (a),

3. Little switching between HPs and district heat

There is a small battle on the fringes of urban areas between HPs and district heat, but largely district heat dominates urban areas, and HPs non urban areas.

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