

A joint publication by:



# Unleashing the Opportunity

European Best Practice  
in Building Successful  
Heat Pump Markets



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# Why Heat Pumps?

## The technology is proven

“In total, more than 4,5 million heat pumps have been installed in Europe since 2005.”

## The benefits to the environment are substantial

“The current European installed base of heat pumps produces 34,89 TWh of renewable energy from the air, water and the ground and is responsible for the abatement of 8,13 Mt of Greenhouse gas emissions (GHG) per annum. This is equivalent to taking approximately 1.6 million cars off the road. Current European heat pump sales trends would further increase this number by an additional 266,000 cars per year.”

## They can provide a competitive long term alternative to conventional systems

“When the total cost of ownership is considered, over a longer time horizon, heat pumps can provide a compelling argument.”

Heat pumps harness **free energy** from the environment, to provide complete **heating** and **cooling** to consumers in an **environmentally friendly, reliable,** and **cost effective** way.

**Simple. Efficient. Reliable. Clean.**

# Introduction

This joint publication from the European Heat Pump Association and leading decentralised energy consultants Delta Energy & Environment highlights elements of European best practice that can meaningfully contribute to building successful and sustainable heat pump markets.

Heat pump technology is not new – it is well proven in many countries as a reliable, cost effective and environmentally friendly alternative to conventional heating systems. Today in Europe, more than 750,000 systems are installed annually, and approximately 4.5 million systems have been deployed since 2005.

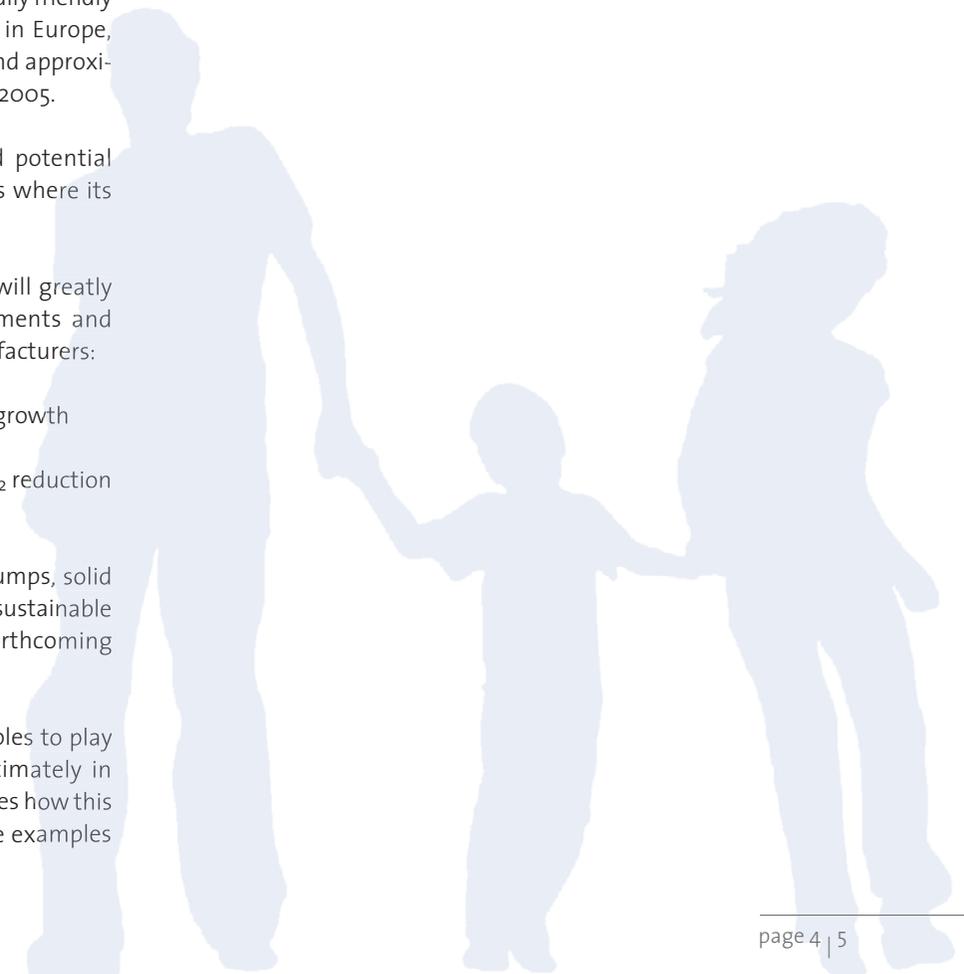
Heat pump technology still offers huge untapped potential however, especially in some new, emerging markets where its benefits are now being fully recognised.

Unleashing the significant heat pump opportunity will greatly benefit a range of stakeholders including governments and policy-makers, energy utilities, and technology manufacturers:

- Heat pumps can create new revenue streams and growth opportunities for these market participants.
- Heat pumps can directly contribute to meeting CO<sub>2</sub> reduction and energy efficiency targets.

To maximise the market opportunities from heat pumps, solid foundations must be put in place to enable long term sustainable growth. These foundations are presented in the forthcoming section as The Five Guiding Principles.

This Guide is aimed at the stakeholders who have roles to play in implementing these Guiding Principles, and ultimately in capturing value from these markets. This Guide outlines how this may be achieved, illustrated by experiences and case examples from various European markets.



# The Five Guiding Principles

The Five Guiding Principles identified here represent the core foundations for building a sustainable heat pump market.

The first two – building a strong policy framework and ensuring quality are critical at the early stages of market development. The next two principles – relating to marketing, awareness-raising and the development of strong customer propositions – will enable and amplify market growth. Finally, market monitoring can feed back to all stakeholders, guiding on-going market support and development.

There is a role for you as a stakeholder, in supporting or implementing these Guiding Principles. We explore these roles next.

1

Build a Strong Policy Framework

2

Ensure Quality Permeates the Entire Sector

3

Raise Awareness Through Marketing and Promotion

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Develop a Compelling Customer Proposition

5

Monitor Ongoing Market Requirements

# The Stakeholders

The key stakeholders involved in building a heat pump sector comprise Government and policy makers, industry associations, utilities, manufacturers and installers.

There is a critical role for all these market participants in executing the five guiding principles. Stakeholders may play lead or supporting roles depending on the unique characteristics of the market or its stage of development.

Through the stages of market development the stakeholders should work with a common purpose to achieve the shared objectives of building quality and confidence, enabling growth and developing and supporting the sector.

□ denotes lead role    ■ denotes support role

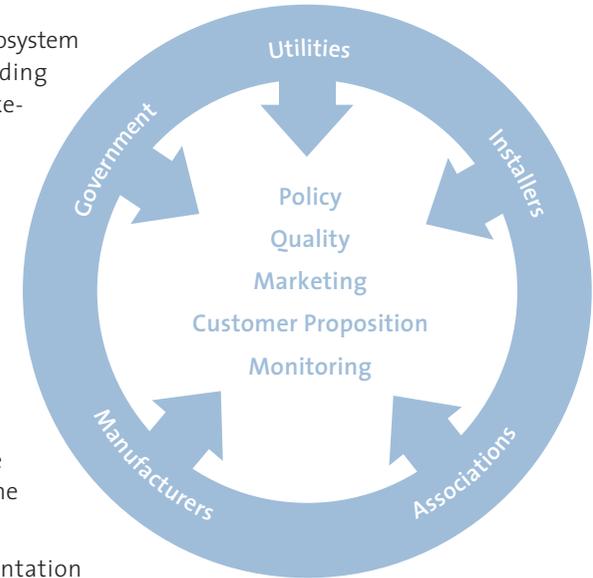
Role	Government	Associations	Utilities	Manufacturers	Installers
Build a Strong Policy Framework	□	■	■	■	■
Ensure Quality Permeates the Entire Sector	■	□	■	□	□
Raise Awareness Through Marketing and Promotion	□	□	□	□	□
Develop a Compelling Customer Proposition	□	■	□	■	■
Monitor Ongoing Market Requirements	■	□	■	□	■



# The Heat Pump Market Ecosystem

The heat pump market ecosystem connects the Five Guiding Principles and the Stakeholders.

At the centre of the ecosystem are the five guiding principles: policy, quality, marketing, customer proposition, and monitoring. These form the foundations of a sustainable heat pump market. Ultimately, they will enable the transition from niche to mass market.



Driving the implementation of the five guiding principles are the stakeholders: Government, Industry Associations, Utilities, Manufacturers, and Installers. They are the key market participants who can act as catalysts to enable the heat pump sector to emerge, and ultimately to develop along the path to sustainable and stable growth.

Underpinning this activity are the core objectives of building confidence and quality, enabling growth and developing and supporting the market.

This Guide will present each of the five guiding principles individually and explore the role the stakeholders play in delivering on those principles. In each case, examples of best practice will be used to illustrate how steps and initiatives have been taken to build stable, sustainable and successful heat pump sectors in a variety of European markets.

# The Five Guiding Principles to Successful Heat Pump Market Development



# 1 Build a Strong Policy Framework

Building a strong policy framework allows heat pumps to unleash their value potential as contributors to emission reduction targets, energy savings, and as creators of new revenue streams

A strong policy framework should recognise heat pumps in policies and regulations, so that their full benefits can be delivered. If this policy framework is in the context of a long-term committed strategy, market stakeholders can have the confidence to support and develop the market.

## How to build a strong policy framework

A strong policy framework for heat pumps should have the following elements:

- Heat pumps should be included in policy and regulation within the context of a long-term vision, which sets a framework for the development of low carbon technology markets, and takes a market-wide approach to understanding and assessing the needs of each technology.
- Heat pumps should be given a long-term guarantee of support which gives the industry and other stakeholders the confidence to invest in heat pump technology and market development.

## A strong policy framework gives stakeholders the confidence to develop the market

- It gives the heat pump and heating industry confidence to invest in R&D to develop the optimum products for the market, and expand production capabilities.
- It gives other players (e.g. financing companies, utilities, major installers) the confidence to offer attractive customer propositions (e.g. financing).
- It gives utilities the confidence to engage with heat pumps as an attractive business and revenue stream.
- It gives consumers security and confidence in heat pumps as an attractive alternative to conventional solutions.

## Build a Strong Policy Framework

### Role of Stakeholders

What activities can stakeholders engage in to help build a strong policy framework?

- support role
- lead role

### GOVERNMENT & POLICY MAKERS

Long-term committed strategy which recognises HPs in policy & regulation, gives the industry & other stakeholders the confidence to invest in heat pump product and/market development.

### INDUSTRY ASSOCIATIONS

Have an important role to promote heat pumps to policy-makers, to provide the supporting evidence for the promotion of the technology, and to ensure heat pumps are treated equitably in regulations.

### UTILITIES

A long-term & committed strategy from utilities gives the heat pump industry confidence to invest and supports end-user and installer confidence in the technology. Utilities can play a role in lobbying/ensuring heat pumps are correctly recognised by policy-makers.

### MANUFACTURERS

At all stages of market development manufacturers are important influencers. This may be achieved through active involvement in associations and committees at national and EU level, and integrating this policy work into company strategy.

### INSTALLERS

As the 'face' of the industry to consumers installers play an important role in feeding back market requirements to assist in shaping and altering energy policy. Their work assists in establishing confidence in the sector particularly during the introduction and growth phases.

## Best practice in practice

### Industry Associations lobbying for policy change (UK)

The UK Heat Pump Association (HPA) and BEAMA (British Electrotechnical & Allied Manufacturers Associations) have been instrumental over a number of years in the UK in shaping future regulations affecting heat pumps. This has been achieved for example through lobbying for changes to the Standard Assessment Procedure (SAP) – the methodology for assessing the energy & environmental performance of buildings. In collaboration with the other industry groups, the Micropower Council and the Heating and Hot Water Industry Council (HHIC), the UK HPA and BEAMA campaigned for the inclusion of Air Source Heat Pumps in the UK government's renewable heat incentive scheme, the RHI, to ensure fair treatment in relation to other renewable technologies.

### Energy Agency promotes heat pump running cost comparison

The Sustainable Energy Authority of Ireland (SEAI) publishes a quarterly fuel cost comparison, which compares the costs and efficiencies of various space heating fuels. The initiative followed lobbying by the Heat Pump Association of Ireland, to enable consumers to be informed, from an objective source, of the cost advantages of heat pumps. It shows how an association had ensured that the national energy agency is focused on positioning heat pumps favourably as a viable alternative.

### Long-term government heat pump promotion

The Swiss Federal Office of Energy (SFOE) was instrumental in setting the framework for, and driving, heat pump market growth. As part of a long-term vision to reduce dependency on oil, the SFOE designed a heat pump promotion programme and was involved in setting up and partially funding a heat pump association (FWS), to lead the programme. Evidence of the long-term vision is seen in the early recognition of the future grid impact of the planned increase in heat pumps. This led to the development of a regulatory framework which is still in place and which encourages utilities to offer a heat pump tariff enabling the installed base to be controlled at peak times to manage grid congestion.

### Utilities lobbying for inclusion of specific types of heat pumps into regulations

GDF Suez in France has been instrumental in shaping policy and regulation, and dedicates resources to ensuring their interests in heat pumps are met. For example, they have been heavily involved in lobbying for the integration of hybrid heat pumps (heat pump and gas boiler) and gas heat pumps into French thermal regulations. Through this lobbying activity they can ensure that the use of gas remains a viable option in France. The activity of GDF helps to ensure that these emerging types of heat pumps receive the policy support required to allow the market to grow.

beama



seai  
SUSTAINABLE  
ENERGY AUTHORITY  
OF IRELAND



GDF SUEZ  
BY PEOPLE FOR PEOPLE

# 2

## Ensure Quality Permeates the Entire Sector

Ensuring quality is the foundation of successful, sustainable heat pump markets – without it markets will fail

This means establishing at an early stage the foundations for quality throughout the sector and value chain. Successful heat pump markets have been built on strong programmes focused on quality. Due to the relatively complex nature of the technology compared with conventional systems, it is vital that quality is ensured throughout the value chain from production to installation, and through to on-going maintenance.

### How to build quality

Quality can be ensured through:

- Product R&D, testing & labelling.
- Provision of installer support & training.
- Installer accreditation and certification schemes.
- On-going monitoring of performance through field trials.

There is a role for all industry stakeholders in these activities.

### Ensuring quality builds confidence and enables market growth

- It provides evidence to policy-makers that heat pumps can be a key part of the solution to meeting their targets.
- It builds confidence amongst installers that the technology is a viable solution for their customers.
- It builds confidence amongst end-users that heat pumps are a cost effective and reliable heating and cooling alternative.

## Ensure Quality Permeates the Entire Sector

### Role of Stakeholders

What activities can stakeholders engage in to help build a strong policy framework?

- support role
- lead role

### GOVERNMENT & POLICY MAKERS

This stakeholder can put the policy framework in place to ensure quality through certification and labelling schemes, the formation and development of industry associations, and they may also facilitate and fund field trials.

### INDUSTRY ASSOCIATIONS

They play a key role in supporting manufacturers' sales and marketing strategies, the development and upholding of quality labelling and certification programmes, and in the provision of installer training, facilitating trials, the establishment of test centres and overall policing of the sector.

### UTILITIES

Utilities may facilitate and fund trials, support installers through training and product selection, and can in some cases provide installation services themselves.

### MANUFACTURERS

Manufacturers are instrumental in funding on-going R&D to develop optimum products for the market. They can support the national quality and accreditation programmes and get involved further down the value chain to ensure the quality of installers and installations.

### INSTALLERS

Installers are responsible for ensuring installation best practice from specification to actual installation and after sales support and maintenance. Working with manufacturers and associations, they have an important role in education of consumers and promotion of the technology.

## Best practice in practice

### Swiss Heat Pump Association Early Focus on Quality

The Swiss Government commenced its heat pump promotion programme in the 1990s, which involved setting up & funding the Swiss Heat Pump Association, who played a pivotal role at an early stage in ensuring quality. This was achieved through a number of initiatives:

- Introduction of minimum efficiency standards.
- Development of a product test centre.
- Introduction of a programme of long-term field testing of installed units.
- Developing & running an installer training programme.
- Establishment of a 'Certified installer' label for trained installers.

The approach drove the transformation of the sector – heat pumps are now the heating technology of choice in the Swiss market.



### Sweden Establishes Heat Pump Court

An independent complaints board was set up by the Swedish Heat Pump Association to represent consumer interests following HP installations. This enables consumers to bring claims against installers for poor performance or lower than expected cost or energy savings. Decisions of the court are made public and offending installers are identified and disciplined. The benefits to the Swedish heat pump market have been threefold:

- Consumer confidence in heat pump performance has been greatly enhanced.
- It provides the manufacturer an incentive to ensure the quality of its installer network.
- It gives the installer an incentive to ensure high quality installations in line with consumer expectations.



### Manufacturers and utilities becoming active further down the value chain

A greater level of support and/or connection to installers is required for heat pumps than for conventional systems such as boilers – especially in emerging markets. This is the case as subtleties in system design & sizing can have a significant impact on performance. Some manufacturers and utilities are taking steps to ensure quality by becoming more directly involved further down the value chain.

Viessmann (Germany) requires that installers are accompanied by a Viessmann engineer on their first 6 installations. For Viessmann, it ensures the quality of the installation and helps their product achieve a reputation as a high performing heat pump. For the installer, the additional cost is balanced by the increased confidence the end-user has in the performance of the heat pump and better prospects for future sales.

British Gas (UK) acquired a heat pump installation company, to bring heat pump installation capabilities and therefore quality control, in-house.



# 3

## Raise Awareness Through Marketing and Promotion

Awareness raising, promotion and successful marketing can be instrumental in demystifying heat pump technology, and in so doing build consumer confidence

This means presenting and disseminating a simple, easily understood and compelling message to consumers. Central to this is giving consumers the confidence to embrace the technology, and create pull in the marketplace to assist in transitioning heat pumps from a niche product to one having mass market appeal.

### How to raise awareness

- Product promotions and programmes.
- Information dissemination.
- Roadshows, information seminars, press and PR activities.
- Involvement of trusted actors and brands.
- On-going field trials, and tests with published results.

There is a role for all industry stakeholders in these activities.

Successful marketing and promotion builds confidence and positions heat pumps favourably compared with alternative technologies

- It keeps heat pumps highly profiled for all the right reasons amongst policy makers as a solution of choice in meeting their energy savings and emission reduction targets.
- It attracts participation and active engagement in the market by reputable actors.
- It builds confidence amongst customers and positions heat pumps as a reliable, cost effective, energy efficient and environmentally friendly heating alternative.

## Raise Awareness Through Marketing and Promotion

### Role of Stakeholders

What activities can stakeholders engage in to help build a strong policy framework?

- support role
- lead role

#### GOVERNMENT & POLICY MAKERS

They have an important role in raising awareness of heat pumps within the wider energy market, with energy market players, and with end-users. They can positively position heat pumps as part of national energy strategies and ensure their inclusion in energy savings and emission reduction programmes.

#### INDUSTRY ASSOCIATIONS

Ultimately can create a positive image for the sector through facilitating marketing events for end-users & installers, publication of trial results, and proof of heat pump performance. This can extend to communicating performance information to policy-makers, utilities & other key influencers.

#### UTILITIES

Energy suppliers have direct contact to end-users, and as such can influence decisions on heating system choice through direct marketing and provision of information & advice. At a minimum they can promote, facilitate and incentivise, if not becoming active players in their own right.

#### MANUFACTURERS

Manufacturers with trusted brands can operate across the entire value chain, going beyond traditional boiler channels, to influence distributors, installers and consumers. As such they can be key influencers in the adoption of the technology.

#### INSTALLERS

The installer is the 'face' of the industry to the end-user so they play a critical role in influencing consumer choice regarding heating technologies. Their advice and the quality of their work can be instrumental in building consumer confidence in the technology and sector.

## Best practice in practice

### Japanese Utilities Lead in Market Building with Eco-Cute

Japanese utilities were instrumental in bringing the Eco-Cute CO<sub>2</sub> heat pump to market. R&D funding was key to driving the initial technology development, along with attractive heat pump tariffs. The critical success factor however was the way in which the electric utilities have both targeted and marketed to customers. Initially this focused on off-gas grid homes, and subsequently then developed to support the all-electric home concept whereby Eco-Cute sits within a household-wide all-electric solution encompassing hot water and space heating. In addition the strategy had a number of other features which contributed to its success:

- A long term perspective was taken by all stakeholders across the sector.
- Electric utilities and manufacturers implemented a compelling marketing and promotion programme.
- All manufacturers used the shared Eco-Cute branding.

### German Utility RWE Facilitating and Incentivising

Raising awareness and building confidence was the result of activities undertaken by leading German utility RWE who whilst not engaged in actively selling heat pumps took measures to promote the technology.

RWE established an "online heat pump forum" – essentially a portal designed to provide information on heat pumps to end-users, and to connect end-users with installers and heat pump products. Installers pay a small fee to advertise on the portal and are included in a database searchable by post code. Manufacturers also pay a fee and benefit from advertising directly to consumers.

From the end-user perspective, a product or installer's inclusion in the portal indicates RWE's 'seal of approval', and gives confidence in the product and its performance, and in the installer's capabilities.

### Danish Energy Agency's Long Term Promotional Strategy

As part of a long term strategy to increase total heat pump installations from 25,000 in 2011 to 200,000 in 2020 the Danish Government, through the Danish Energy Agency is undertaking a wide ranging promotional campaign.

The overall programme comprises a number of elements including:

- Subsidies.
- Heat pump trials.
- A heat pump promotion and information dissemination campaign.

An important element of the programme encompasses an active marketing, awareness raising and education initiative for installers.

It demonstrates the important role marketing and promotion can play as part of a long term, integrated energy strategy.

### EDF Actively Driving the Market

French utility EDF Energy has taken a proactive approach to the market by actively selling heat pumps. As such the company has taken the strategic decision to go beyond facilitating and incentivising the introduction of the technology and is investing heavily in awareness raising and promotion to establish a position in the market.

This involves:

- Selling and installing product via installation partners.
- Building relationships with key manufacturers.
- Positioning themselves as 'green energy experts'.

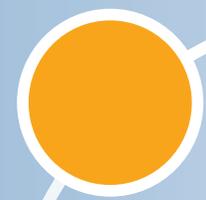
Their promotional positioning has enabled them to leverage an existing trusted brand to continue to promote their gas alternative by offering hybrid solutions to new and existing customers.



RWE

DANISH ENERGY AGENCY





# 4

## Develop a Compelling Customer Proposition

A compelling customer proposition can catalyse heat pump market growth – if built on the strong foundations of long-term policy support and quality of products and installation

Both the upfront investment and running costs of heat pumps must come down if they are to move beyond being a niche product in many markets.

### How to develop a compelling customer proposition

Many factors can contribute to building a strong customer proposition for heat pumps, placing them on a level playing field with other competing technologies:

- The reduction of the upfront cost of heat pumps through technology and installation cost-reduction.
- The provision of heat pump tariffs.
- The provision of government grants, subsidies and incentives.
- The availability of private financing.

Developing a compelling customer proposition increases the rate at which heat pumps can transition to having mass market appeal

- It makes the technology more affordable for end-users.
- Guaranteed government support facilitates the availability of private financing.
- Financial support from government or a major company gives the customer a 'stamp of approval' for HP technology.
- It can create a level playing field between competing technologies.
- It can be a trigger for large-scale market growth if heat pumps are favourably supported.

# Develop a Compelling Customer Proposition

## Role of Stakeholders

What activities can stakeholders engage in to help build a strong policy framework ?

- support role
- lead role

### GOVERNMENT & POLICY MAKERS

This stakeholder can provide incentives including subsidies, tax incentives and financing. They may also encourage other participants to get involved in financing and influence on tariff structures and energy prices.

### INDUSTRY ASSOCIATIONS

Associations play a pivotal role in lobbying to ensure heat pumps are included in any financing / incentive schemes, and that the technology is given a level playing field with competing technologies.

### UTILITIES

Utilities can play an important role in making the acquisition and operation of heat pumps a straightforward and affordable proposition for customers through preferential tariffs and financing.

### MANUFACTURERS

Manufacturers are responsible for driving down initial upfront costs of the technology. Their arrangements with installers and engagement with government incentive schemes can improve the overall value proposition to customers.

### INSTALLERS

Installers may be positioned to offer financing deals through partnerships with financing companies and guaranteed funding streams through government incentives.

## Best practice in practice

### Heat Pump Tariffs

There are several examples of preferential tariffs being offered which create a strong customer proposition and benefit market players.

In Switzerland, 80% of the ~900 local network operators offer a heat pump tariff which provides the customer a significantly cheaper electricity rate (up to 40% cheaper than the standard rate). Since the early 1990s this has been in exchange for being able to control heat pumps to avoid grid congestion.

In Germany, EnBW and RWE offer heat pump tariffs – which tie customers into long-term supply contracts, increasing customer 'stickiness'.

In Japan, electric utilities have long offered low night time tariffs to encourage the use of the Eco-Cute heat pump systems at night to avoid grid peaks.

### Government incentives

The value of incentives is partially financial, but critically they provide a 'seal of approval' for new technologies – building confidence in the technology amongst consumers, installers, utilities and other market players. Examples of National incentive schemes include:

- In Germany the MAP subsidy scheme supported the promotion of high performing heat pumps.
- The French tax credit – partly responsible for creating the market boom in 2008.
- The UK RHI – not fully in place yet, but the promise of a long-term per kWh incentive is likely to encourage finance providers to engage in the market. The preceding RHPP grant has already encouraged one supplier to offer a grant to 'double the RHPP' payment.

### Private financing: ESCO approach

Geothermal International, a UK installer, is offering financing of heat pumps on commercial customer sites thanks to a partnership with the ESCO Greenrock. The heat is sold to the customer through a heat contract (at a price generally cheaper than the equivalent running cost of traditional heating systems).

For the end-user this model avoids upfront costs and reduces the risk of uncertain running costs – providing an attractive long term proposition. The ESCO model opens up a suite of opportunities for large installers and other market players to be positioned to offer financing.

### Private financing: Utilities

GDF Suez and EDF in France both offer interest-free or low interest loans to help pay for efficiency improvement measures such as the installation of heat pumps. Loans of up to € 20,000 are available over a period of 10 years – to ease the impact of the high upfront costs.

Vattenfall's virtual power plant in Germany controls the operation of heat pumps on customer sites, splitting the value generated with the HP owner. The proposed model (from 2013) is to install the HP for free/at reduced price on customer sites, selling the heat at a preferential rate (a very strong customer proposition), whilst Vattenfall capture value by controlling the HP.

EnBW

RWE



GDF SUEZ  
BY PEOPLE FOR PEOPLE

EDF

VATTENFALL

# 5

## Monitor Ongoing Market Requirements

Monitoring the evolving heat pump market trends and requirements enables better positioning of the sector for future growth.

This means profiling the sector (heat pumps and the wider heating/cooling market) – to understand customer preferences, technology responses and product requirements. This understanding facilitates more focused R&D, installer training, marketing approaches and policy lobbying activities to maximise the future opportunities for heat pumps.

### How to monitor market requirements

Shifting market requirements can be tracked for example through:

- Running field trials.
- Monitoring existing installations.
- Gathering end-user feedback.
- Sector profiling e.g. customer segments, applications, growth rates, comparison to other heating technologies.

Monitoring ongoing market requirements ensures the development of the correct products and policy structures.

It keeps track of market needs which can be:

- Fed back to the sector to ensure that (1) correctly aligned products for each market are developed, and (2) the industry learns from and builds on past experiences.
- Fed back to policy-makers to shape future policy frameworks / incentive structures to support HPs and create a level playing field between competing technologies.

# Monitor Ongoing Market Requirements

## Role of Stakeholders

What activities can stakeholders engage in to help build a strong policy framework?

- support role
- lead role

### GOVERNMENT & POLICY MAKERS

This stakeholder can lead or initiate field trials, and is responsible for responding to the results of monitoring in shaping their policy framework, incentive schemes and market support framework.

### INDUSTRY ASSOCIATIONS

Associations may play a critical role in monitoring market trends, customer needs and heat pump performance. This information is invaluable and should be fed back into the industry and to government.

### UTILITIES

Utilities have a unique position with their connection to customers and are well positioned to support, fund and run field trials, provide trial sites and feed the results back to the other sector stakeholders.

### MANUFACTURERS

Manufacturers gain ultimately through more targeted and focused R&D by supporting the monitoring of installations, gathering customer feedback. This information also informs their future product development, sales and marketing strategies.

### INSTALLERS

Installers can use their position as the customers' main point of contact, to track trends and requirements through monitoring installations and gathering customer feedback.

# Best practice in practice

## Examples of field trials across Europe

**Swiss HP trials:** These trials, initiated by the Swiss Government and led by the heat pump industry association, are the longest running set of heat pump trials in Europe. The main trial ran from 1994–2003 and some units are still being monitored today. The trials identified technology issues, which were fed back to manufacturer R&D programmes, and installation issues, which were fed back and addressed in installer training schemes. As a result heat pump performance increased throughout the trial decade.

**Energy Saving Trust HP Trial, UK:** The first stage of this trial ran from 2008–2010, and provided the first real performance data for heat pump installations in the UK. The results indicated that while heat pumps could make a significant contribution to Government targets, there were key technical issues to be addressed to assist in increasing the performance of installed systems. The second phase of the trial was completed during 2012 and aimed to use the learnings from the first phase to improve performances achieved.

**Fraunhofer ISE HP Monitor project:** The Heat Pump Monitor project (funded partly by the utility EnBW) runs from 2010–2013 and follows Fraunhofer ISE's HP Efficiency trial (2006–2010). Minute-by-minute performance data is collected from systems installed across Germany. The project aims to collect real data to improve understanding of the impact on HP performance of changing variants – HP technology, building type, heat source, the nature of the heat demand, level of insulation, heat distribution system.

## Dimplex remote monitoring

Dimplex (Germany) can monitor the performance of installed heat pumps where they have been installed with the optional 'remote diagnostics' tool. End-users and installers can access the data online. Additionally, Dimplex is publishing the data from selected heat pumps online, based on several performance criteria.

The tool allows installers to track installation performance and identify when the system is not performing satisfactorily. The transparent publication of data online enables end-users to remotely check the performance of their systems and provides real performance data for potential end-users, building their confidence in the technology.

## Market Statistics and Monitoring

Various organisations at European and National level contribute significantly to monitoring market requirements. For example:

- EHPA, in conjunction with the National Associations, publishes comprehensive annual heat pump trends and statistics covering a growing number of European countries.
- Delta-ee's Heat Pump Innovation Monitor provides independent and expert analysis of technologies and markets, helping energy suppliers to stay up to date with the latest technology trends, manufacturers to identify the best growth opportunities across Europe and all stakeholders to learn from best practice in international markets.

Other participants such as BSRIA in the UK and the BWP in Germany are also serving the sector or their members in profiling and tracking the sector.



# The Path to Sustainable and Stable Growth



Europe's regions are at different phases of heat pump market development. Some countries have already reached stages of sustained growth, following many years of heat pump sector development. Others are closer to the market introduction stage, or are on the path to sustained growth

The characteristics of the sector reflect a market that is constantly evolving, developing and growing. This is best illustrated by the diversity of applications and environments in which heat pumps have been successfully deployed across the continent today. A number of these are illustrated on the following pages.

We hope that this Guide has assisted you as a stakeholder in understanding those elements of best practice that have contributed to building successful heat pump markets over many years across Europe. We further hope that it has provided some useful insights and tools to assist in your efforts to build the sector, capture value, and ultimately realise the true potential of this unique technology.



# Heat pumps at work



## Residential: Low Energy Single Family House, Düsseldorf, Germany

This system is typical of a simple, cost competitive but very effective heat pump application in a residential setting that can be seen replicated in similar environments in many countries throughout Europe.

Installed in 2009, it provides a comfortable living environment for a family of two adults and four young children with year round heating and cooling and domestic hot water.

The basic installation comprises a ground source heat pump, connected to an underfloor heating system throughout the house. Three vertical bore holes each approximately 30 m deep deliver the 'free energy' to the system.

The efficiency of the system is enhanced by the use of a modulating pump, enabling it to respond quickly to the changing heating requirements of the

occupants. Zoning enables temperatures in each room to be controlled separately, and remote access and control is made possible via an internet link.

The 145 m<sup>2</sup> house is classified as a 'low energy house' and has a total heating load of 55 W/m<sup>2</sup>. The electricity consumed by the heat pump is measured via a separate electricity meter, and as is typical in Germany a special heat pump tariff applies, enabling the owners to benefit from a preferential low rate.

The overall system performance since installation is viewed as very efficient by the owners. The average Seasonal Performance Factor (SPF), as recorded by the meter, is 4.27 since commissioning in 2009. Sufficient space heating and hot water is provided all year round by the system, without recourse to any auxiliary heating systems.

## Commercial: EnergieAG Power Tower, Linz, Austria

Corporate headquarters of Austrian Energy Utility, EnergieAG, the Power Tower demonstrates the application of heat pumps in the first high-rise office tower to meet the strict passive house energy efficiency building standard.

In accordance with the Passive House standard the building has no connection to the local district heating system, and requires no fossil fuel inputs to maintain a comfortable interior climate. The site, which is home to over 600 employees, comprises an underground garage, a two story building and the 19-story office tower.

Heat is extracted from the earth beneath the building via 46 geothermal boreholes each 150 m deep, and used in conjunction with a ground source heat pump system to provide both heating and cooling services for the entire building. Another special feature of the system enables excess heat accumulated during cooling operations in the summer to be pumped back into the soil and used for heating in the winter.

The efficiency of the system is also enhanced by the use of heat recovery and ventilation to cool the data centre and through the provision of free cooling to both the data centre and offices.



## Large Scale: Volcano Buono, Naples, Italy

Located in Naples, Volcano Buono is an example of engineering, architecture and energy efficiency residing together in harmony. Adjacent to the 'real' volcano, it hosts 160 shops, 20 restaurants, a supermarket, a 9 screen cinema and a 158 room four star hotel.

The structure itself comprises a vegetation-covered concrete, steel and glass complex conceived by Renzo Piano, the renowned contemporary architect. Originally the application provided a number of design and engineering challenges, not least the scale and shape of the building – an enormous 170 m x 40 m, sloped, asymmetrical square structure, comprising multiple levels.

A Water Loop Heat Pump system was deployed to provide both the heating and cooling requirements of the various buildings within the entire complex. Working in unison with this backbone are an array of 65 rooftop air to water, and air to air heat pumps units and air handling systems. Over 150 individual heat pumps are additionally deployed to provide comfort heating and cooling to the shops.

A significant benefit of the system is that it enables the transfer of heat within the complex between buildings requiring cooling and those with heating requirements. This contributes to significantly increasing the efficiency of the system, and it is also deemed to result in approximately 35 % lower carbon emissions than conventional systems.

The heat pumps provide an important component to what is a wholly integrated energy efficient design approach comprising a façade integrated PV system, triple glazing, active shading, insulation, efficient lighting and low internal heating and cooling loads. Overall the building is expected to use 50 % less energy than a comparable building using traditional methods.

## District Heating & Renovation: Yorkshire, United Kingdom

Located on the historic Fountains Abbey and Studley Royal estate in North Yorkshire, also a UNESCO World Heritage site, How Hill holiday cottages were converted from 18th century farm buildings into five environmentally-sympathetic holiday homes.

As a challenging renovation project, in the initial stages the option of separate small heat pump systems for the five cottages was explored. Subsequently however a communal system, using two 14 kW ground source heat pumps operating in parallel was selected. Free energy is provided via eight 50m vertical boreholes.

The heat pump system supplies low temperature warmth to underfloor heating throughout each cottage. Each holiday home has a dedicated circulation pump and controls for the underfloor heating and a separate hot water cylinder,

creating a very safe, low maintenance system, important because of the high turnover of guests at the cottages, and with high levels of user comfort required.

The centralised plant, including a 200 litre buffer tank to pre-heat the water, is housed in an adjacent part of the old farm

buildings. In addition to space heating the system also provides domestic hot water to the cottages. Over its lifetime the heat pump system is expected to save over 150 tonnes of CO<sub>2</sub>, compared with a conventional heating system.

The installation illustrates the suitability of heat pump technology in difficult renovation applications, where the technology can deliver a compelling alternative to conventional solutions.



## Heat Pump City: Etten Leur, Netherlands

Correctly deployed, heat pump technology can be utilised in many applications and environments within a town or city; using a large share of renewable energy, stabilizing the city's energy demand, and making more efficient use of the available resources. Etten Leur in the Netherlands, winner of the EHPA's Heat Pump City of the Year award in 2012, provides an example of how a large urban centre can implement an integrated design approach to harness this capability.

The municipality, located close to Breda in the southwest of the Netherlands, introduced their first policy on sustainable building and energy savings as far back as 1980, and commenced their first heat pump project in 2002. This initial demonstration project comprised 20 dwellings and a school connected to ground source heat pumps. Today, close to 1,000 dwellings have either already been constructed or are currently under construction, most of which are served with individual closed loop ground source heat pumps. In addition to residential dwellings they also include the new city hall, cultural centre, and a school building.

The more recent developments involving these 1,000 residential dwellings have included the development of a "zero-energy" neighbourhood with individual ground source heat pump connected to vertical ground heat exchangers. Further residential housing and municipal buildings are planned and all of this development is taking place in the context of a 'no gas' infrastructure.

The project presented a number of quite unique challenges. Not least by virtue of its scale and density – as it is one of the largest of its kind in the world. This necessitated close co-ordination through several phases of different architects, contractors, installers and heat pump manufacturers.

A large part of the system has been in operation now for five years and the system has performed well and stood the test of a prolonged cold winter. The success of Etten Leur illustrates the applicability of heat pumps in meeting the demanding heating and cooling needs of large urban centres and contributing to a greener, more energy efficient future.



# EHPA

The European Heat Pump Association represents the majority of the European heat pump industry.

Its members comprise of heat pump and component manufacturers, research institutes, universities, testing labs and energy agencies. Its key goal is to promote awareness and proper deployment of heat pump technology in the European market place for residential, commercial and industrial applications.

EHPA aims to provide technical and economic input to European, national and local authorities in legislative, regulatory and energy efficiency matters. All activities are aimed at overcoming market barriers and dissemination of information in order to speed up market development of heat pumps for heating, cooling and hot water production.

[ehpa.org](http://ehpa.org)



# DELTA-EE

Delta-ee provides commercial insight and market expertise in decentralised energy and low carbon strategies.

Its research services include the HP Innovation Monitor that identifies, tracks and evaluates the key drivers influencing future heat pump market development across Europe. In depth reports drill down into the detail for key drivers. Country reports analyse the impact and forecast the outlook for national markets.

Ongoing updates, briefing notes and analyst support ensure subscribers stay up to date – and don't miss important developments. Clients include heating equipment manufacturers, utilities and policy makers.

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Design by  
Ebmeyer & Ebmeyer GmbH,  
Munich  
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Photos: Fotolia | PaulPaladin,  
Thomas Nowak, Ochsner Corporation,  
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