

## Heat Pumps in Smart Grids



Heat pumps in smart grids can contribute to solutions for several energy system-related obstacles.

- Keeping grid load under control while renewable energy production grows
- Keeping grid load under control during extreme conditions (i.e. 'coldest week')
- Increase self-consumption of renewable energy sources
- Selling flexibility to the grid, for the benefit of balance responsible parties, grid operators, traders, etc.
- Allowing for a higher share of heat pumps in the energy system

### Key Findings

- 1 Flexible use of heat pumps in smart grids can help to solve real social problems related to the energy supply.** In some cases, smart grids are even expected to be necessary for further sustainable development of the energy supply chain.
- 2 End-users are generally interested in joining smart grid initiatives** to contribute to well-defined social goals, **even without the prospect of financial benefits.**
- 3 There are strong social drivers for smart grids**, but there are also several obstacles preventing the realization of the potential, among them are the **problem with making a solid business case for smart grids.**
- 4 The energy markets need to move** from the traditionally organisation around **large suppliers and small customers** towards a **more flexible market** operation in which customers are also delivering services (i.e. flexibility) to each other and professional market parties.

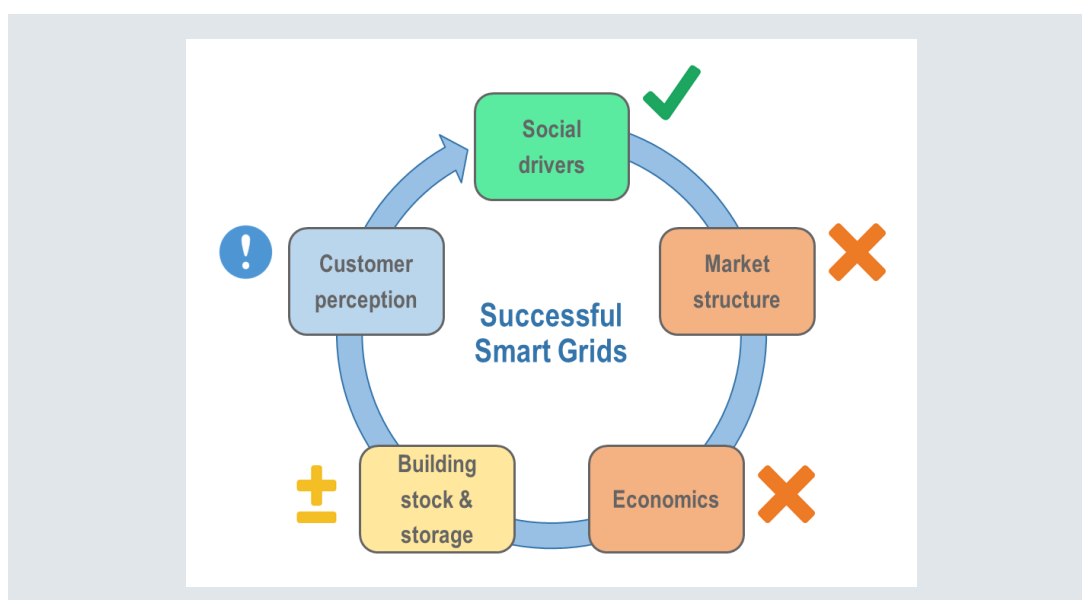


Figure 1. For large-scale use of smart grids, several factors are needed. The social drivers are quite strong in many countries. Market structure and economics provide serious hurdles, but through smart use of existing buildings and devotion to customer commitments, large steps can be made.

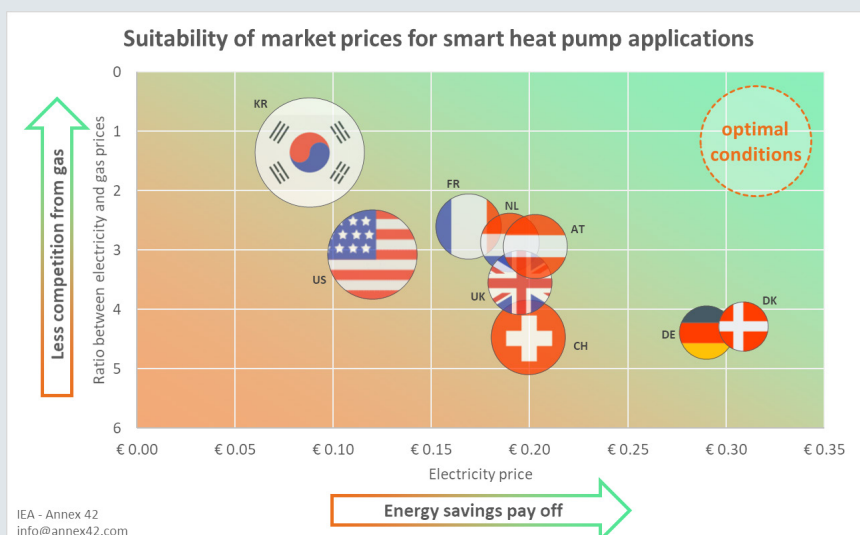


Figure 2. High market energy prices are generally good for heat pumps, since energy savings pay off quickly. Apart from the absolute price level, there needs to be a competitive edge towards traditional boilers; i.e. a good electricity-to-gas ratio. For optimal heat pump response to price fluctuations, the price component must contain a high 'potentially flexible' share (marker size).

## Background

Heat pumps have a tremendous potential to bring renewable heating into houses. Because heat pumps are electricity-driven, there is a direct interaction with other energy demands within the built environment, such as PV-panels and electric vehicles. By using heat pumps in a flexible way (i.e. a 'smart grid'), it is possible to better integrate these different electricity-producing and electricity-consuming devices. This helps the energy supply to be more reliable, with a higher share of renewable input. Heat pumps in smart grids can contribute to a better energy supply in many ways, and the basic driver for the work within Annex 42 has been to enhance the realisation of the different solutions.

## Objectives

The aims of the Annex 42 were to:

- ... generate information for policy makers
- ... develop information for stakeholders in the heat pump industry and its supply and consulting chain
- ... create a network of experts
- ... get insight in decision making processes related to heat pumps
- ... increase the knowledge and information about heat pumps, data and getting existing information available
- ... find synergy with renewable energy production to increase flexibility of the grid
- ... apply new technologies and identifying the needs for technological development.

## Further information

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Publications:	Final reports of Annex 42 and Executive Summary of Annex 42, available at <a href="http://www.heatpumpingtechnologies.org">www.heatpumpingtechnologies.org</a>
Internet:	<a href="http://www.heatpumpingtechnologies.org/annex42">www.heatpumpingtechnologies.org/annex42</a>