THE HEAT PUMP MARKET, ITS MARKET DRIVERS AND HOW TO HAVE AN IMPACT ON THEM IN FINLAND

Jussi Hirvonen, M.Sc., Executive Director, Finnish Heat Pump Association SULPU ry
In Finland Good and Developing Heat Pump market

- 800,000 heat pumps in Finland, a country with a population of 5.5 million people.
- Three Out of Four Builders Choose a Heat Pump
- They are already extracting 6 TWh/a of RES local renewable energy from the ground, the rock or the air from around the houses
- Finns are already investing 400 million Euros a year in heat pumps (in RES)
- On a European Scale, the Heat Pump Market Is Big (22 HPs per 1000 household/a)
The prerequisites for heat pumps are excellent

- the utmost North East Country of the European Union
- cold climate
- a lot of energy needed
- big country with a small population of 5 million,
- having e.g. a comprehensive gas network is unprofitable
- relatively cheap electricity (13 c/kWh)
- good drilling conditions favour Ground Source Heat Pumps
- Over 0.5 million directly electricity heated houses favour Air to air HPs
Special Characteristics of the Finnish Heat Pump Market

- the heat-pump market is dominated by air-source heat pumps in pieces of HPs
- ground-source heat pumps lead the market when looking at the figures in Euros and energy
- 75% of single-family house builders choose a heat pump
- largest geothermal site has 100km of drill holes
- also been started to save energy in district heating that has been produced with combine Heat and power production (CHP) or other means (read: to compete with DH)
- cooling is beginning to have an impact on the profitability of investments, since heating and cooling is provided through the same investment
- over 0,5 million directly electricity heated houses favour Air to air HPs
- the return on capital invested is almost always without exception over 10%/a
- the Finnish government does not offer any subsidy to heat pumps apart from the household tax deduction
The Heat Pump Industry Is a Significant Producer of Renewable Energy

Comparison of Renewable Energy Production in Finland, 2016

<table>
<thead>
<tr>
<th></th>
<th>Output Capacity</th>
<th>Renewable energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kW</td>
<td>MWh/a</td>
</tr>
<tr>
<td><strong>Detached house</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground-source heat pump</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Air-source heat pump</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Solar panel (19m²)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Apartment building</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground-source heat pump</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>Solar panel (190m²)</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td><strong>Power plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar (Largest in Finland, Kivikko 4500m²)</td>
<td>800</td>
<td>720</td>
</tr>
<tr>
<td>Windmill (1 pcs 3 MW)</td>
<td>3 000</td>
<td>9 000</td>
</tr>
<tr>
<td>Logistic centre with 300 boreholes</td>
<td>8 000</td>
<td>24 000</td>
</tr>
<tr>
<td><strong>Industries by the end of 2016</strong></td>
<td>MW</td>
<td>TWh/a</td>
</tr>
<tr>
<td>Solar</td>
<td>10</td>
<td>0,1</td>
</tr>
<tr>
<td>Wind</td>
<td>1 005</td>
<td>3</td>
</tr>
<tr>
<td>Heat pumps</td>
<td>3 000</td>
<td>6</td>
</tr>
<tr>
<td>Wood burning in furnaces</td>
<td>20 000</td>
<td>15</td>
</tr>
</tbody>
</table>
Market Drivers and How to Have an Impact on Them

Prerequisites for heat pumps in Finland are excellent.

The heat-pump business has clearly strengthened its position in the heating and cooling of houses.

However, it is only in the early stages of its success.

The right type of advocacy, lobbying, will have an enormous impact on the degree of this development.

The real market drivers have to be identified as well the means with which to influence them.

Average investment:
- GSHP 22.000€
- AWHP 12.000€
- EAHP 8.000€
- AAHP 2.000€
Profitability

<table>
<thead>
<tr>
<th>Heat-pump type</th>
<th>Savings per year, kWh</th>
<th>Savings per year, €</th>
<th>Investment, €</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground-source heat pump</td>
<td>14 000...17 000</td>
<td>1 800...2 200</td>
<td>14 000...20 000</td>
</tr>
<tr>
<td>Air-to-water heat pump</td>
<td>8 000...13 000</td>
<td>1 000...1 700</td>
<td>8 000...12 000</td>
</tr>
<tr>
<td>Exhaust-air heat pump</td>
<td>3 000...7 000</td>
<td>400...800</td>
<td>6 000...10 000</td>
</tr>
<tr>
<td>Air-source heat pump</td>
<td>2 000...7 000</td>
<td>250...800</td>
<td>1 500...2 500</td>
</tr>
</tbody>
</table>

Is it possible to have an impact on profitability? Yes!

As the market grows, market mechanisms bring the system investments to the right level.

Various subsidies are, in practice, always temporary and may boost the market for a short while, but should not be allowed to disturb market-based development in the long run.

The profitability of heat pumps is very dependent on the price of fuels, electricity and district heating. In any case, they include a lot of taxes.

For instance, by taking away the tax subsidy for fuel oil and by putting it in the same tax class as diesel transport fuel, heat pumps would receive a 20-30% leap in profitability. Like Swedes did.

The increase of electricity-price taxation would suit the heat-pump business, since the competitiveness of heat pumps would improve in 700 000 electrically-heated houses.
Information, Communication and Visibility

Consumers, decision-makers, politicians must all have as correct information as possible and as much of it as possible.

Here, if anywhere, is the place for advocacy, for lobbying. The Finnish heat-pump interest organization, the Finnish Heat Pump Association SULPU, has extensively focused on providing this information.

The principal messages when relaying this information must be carefully chosen and repeated systematically in the media, regardless of the channel of communication.

- A heat pump is profitable, the return on capital invested is excellent, it improves Finland’s current external balance, it offers employment, and is a major and profitable environmental act and investment increase the value of the house.

There is never enough of this type of lobbying, influencing.
Surveys Are the Best Fuel for Lobbying, Increasing Information, and for Quality

**Independent surveys:**

**HP market study 2030**
- A Total of 12 Billion Euros Will Be Invested in Heat Pumps, 3000 new jobs, 15 TWh/a RES

**Exhaust Air Heat Pump Study in District heating houses**
- They can save 40-50% of District Heating in an Apartment Building, 3-5 TWh/a

**Study on the Energy Saving Potential of Air to Air Heat Pumps in Single Family Houses**
- Air-source heat pumps can provide 40-60% of the heating of a single-family house

**Study on the impacts of the common types of heat pumps to the electricity peak demand in Finland**
- The increasing number of heat pumps is not growing the peak power demand in Finnish electricity system – vice versus

“The study indicated that even if the number of heat pumps increases significantly by 2030, and they collect 3–5 TWh renewable energy annually from the surroundings of new single-family houses, the electric power demand will even decrease. In addition, when the role of electricity increases in the energy system, further potential for smart control systems of power and energy will emerge.” rejoices SULPU’s Executive Director Jussi Hirvonen.
Quality and Training Systems

The quality of products, systems, installations and operations is important.

If the quality is poor it eats away at the achievements of the other market drivers.

The quality of heat-pump deliveries is currently good and is not in the way of market development.

Since 2010, Finland has been involved in the European heat pump EHPA Quality Label Scheme

The European EUCERT Training and Certification scheme and has implemented already in 2009. This scheme has also been used as a basis when the Renewable Energy Certified Heat Pump Installer Scheme has been created in Finland (Eu RES Directive)
Summary

- 800,000 heat pumps produce 9 TWh/a of energy, 6 TWh of which is energy that is extracted from around houses represents 15% of the heating energy of all Finnish buildings.

- An integrator that operates amidst and between renewable energy, electricity, and heating and cooling production and an interface to a carbon-free age.

- The heat-pump industry market drivers must, indeed, be identified in order to be able to influence them.

- Finnish heat-pump industry market drivers include profitability, the quality and quantity of information and communication, visibility, study results, and the quality of operations.

- Profitability is affected by not only investments but also by the price of energy. Bo can be influenced.

- Lobbying is a very essential aspect in creating the preconditions for a new industry.

- Fuel for lobbying can be acquired from surveys that are conducted by independent consultants.

In 2030, 1.7 million heat pumps in Finland producing 15 TWh worth of renewable energy. By then, a total of 12 billion Euros will have been invested in heat pumps, and 3000 new jobs will have been generated. The savings that will have been made will by then will be in the region of one billion Euros per year.

- A vision is a self-fulfilling prophecy