



# EU Regulations and their Impact on Heat Pumps

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# Energy markets in transformation

## Governing forces

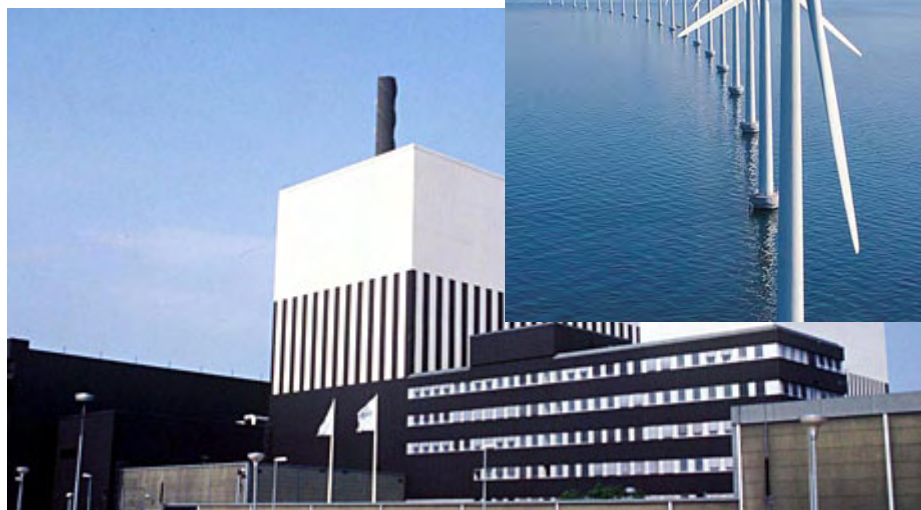
- Energy price development
- Policies
- Technological development



# Challenges

## Security of supply

- Generation of electricity with low carbon footprint
- Renewable electricity Wind- and hydro power ,PV
- Nuclear and Carbon capture and storage (CCS)



# Challenges

## Road transport

- Plug-in hybrid cars
- Bio fuels



# Third industrial revolution

- Focus on energy efficiency
- Renewable energy
- Low carbon technologies



# 20-20-20 by 2020

- Energy from renewable energy sources  
20 % renewable energy in EU as a whole
- Reduction of emissions  
20 % reduction of green house gas emissions
- Energy efficiency  
20 % improved efficiency



# Political tools available and under development

- Addressing ~~the use of renewable energy~~  
RES-Directive (existing)
- Addressing energy efficiency
  - energy performance of buildings Directive (existing)
  - energy labelling Directive (existing)
  - ECO-Design Directive (under development)
  - ECO-labelling Directive (existing)
- Addressing GHG-emissions
  - Kyoto
  - Emissions trading system (under revision)



# RES-Directive

- Energy from renewable energy sources

20 % renewable energy in EU as a whole

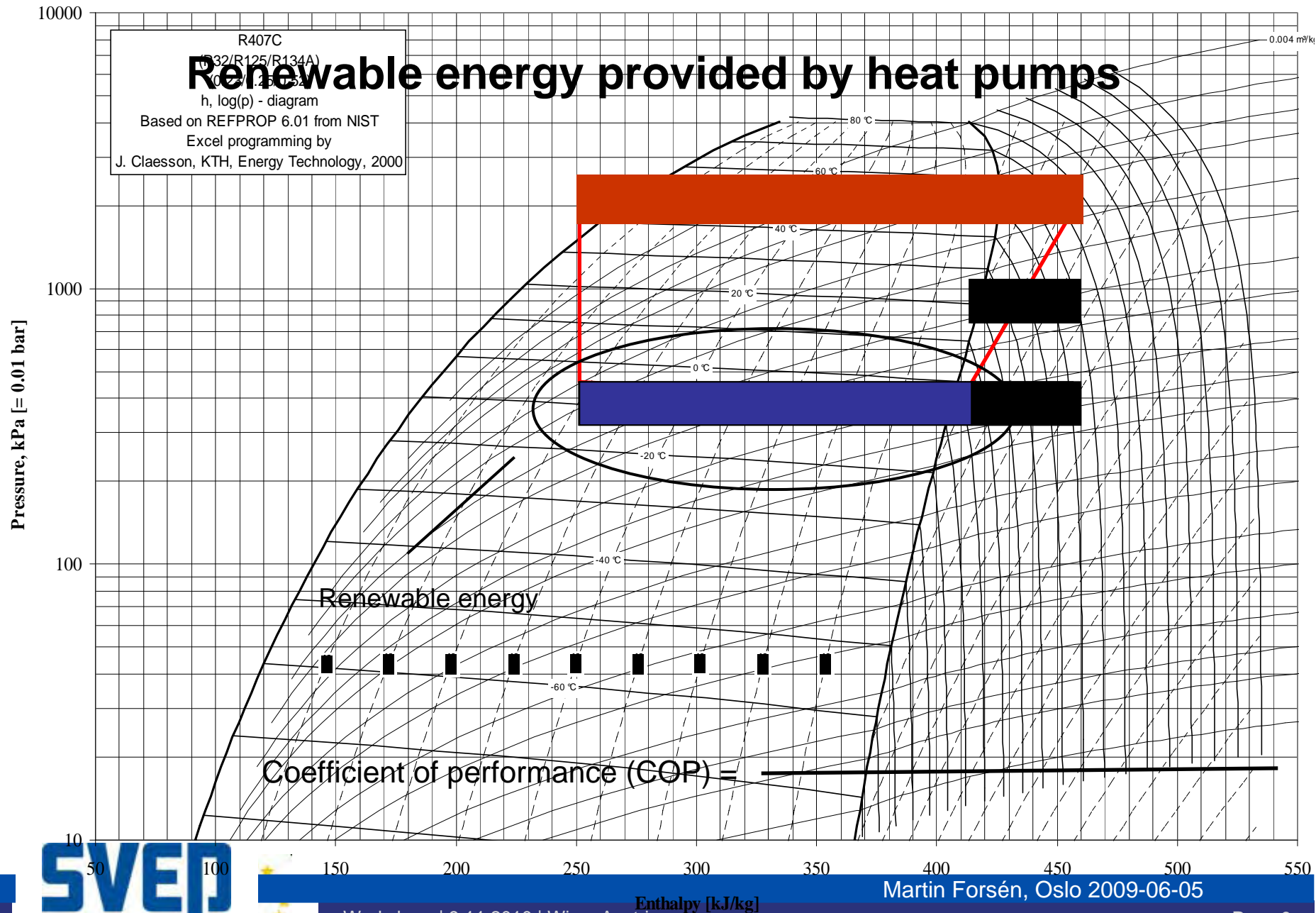
10 % fixed target for the transport sector

## Heat pumps in RES

“Aerothermal, geothermal and hydrothermal heat energy captured by heat pumps shall be taken into account for the purposes of paragraph 1(b) provided that the final energy output significantly exceeds the primary energy input required to drive the heat pumps.”



# Renewable energy provided by heat pumps



# RES-Directive

$$E_{RES} = \text{[red box]} - \text{[black box]}$$

or

$$E_{RES} = Q_{usable} \times (1 - 1/SPF)$$

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Requirement stated in the RES Directive

$$1,15 > \frac{\text{[red box]}}{\text{[black box] + [hatched box]}}$$

$$SPF > 1.15 * 1/\eta \quad \Rightarrow \quad \text{SPF} > 2.63 \quad (\text{presently})$$

$\eta = 0,438$  (European average efficiency in electricity generation, stated by Eurostat)

# Political tools available and under development

- Addressing the use of renewable energy  
RES-Directive (existing)
- Addressing energy efficiency  
~~energy performance of buildings Directive (existing)~~  
~~energy labelling Directive (existing)~~  
ECO-Design Directive (under development)  
ECO-labelling Directive (existing)
- Addressing GHG-emissions  
Kyoto  
Emissions trading system (under revision)



# Energy performance of buildings Directive

Published recast of the Directive, May 2010

- All new buildings finalised after December 31, 2020 must be of “Nearly Zero Energy Standard”
- Minimum performance requirements on new buildings
- Minimum performance requirements on existing buildings subject to major renovation
- Minimum requirements on all heat generators to be installed in buildings
- Energy performance certificates of buildings are to be available at the point of sale
- National plan on refurbishment of existing buildings to meet “Nearly Zero Energy”

# Political tools available and under development

- Addressing the use of renewable energy  
RES-Directive (existing)
- Addressing energy efficiency  
energy performance of buildings Directive (existing)  
~~energy labelling Directive (existing)~~  
~~ECO-Design Directive (under development)~~  
~~ECO-labelling Directive (existing)~~
- Addressing GHG-emissions  
Kyoto  
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## Overall aim

- Impose more energy efficient products
- Extend energy labelling scheme
- Improve customer information
- **Ban inefficient products from the European market**



# Energy using products Directive

Framework Directive for setting of environmental criteria requirements

Examples of prioritised product groups

Boilers

Water heaters

Computers

Imaging equipment

Televisions

Stand-by

Battery charges

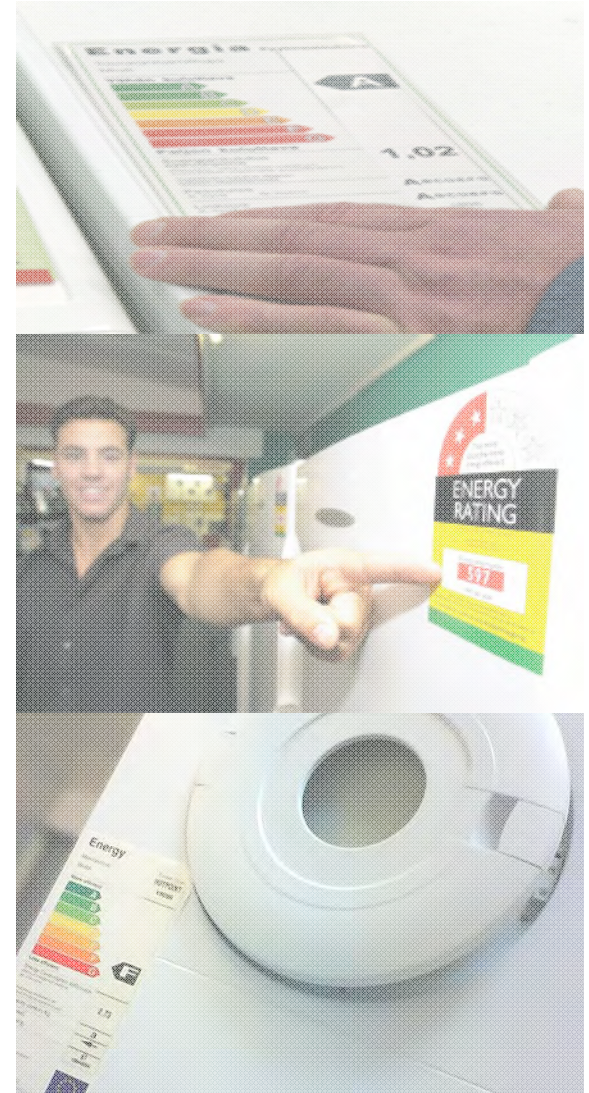
Residential room conditioners

Domestic freezers

Dishwashers/washing machines

Laundry dryers

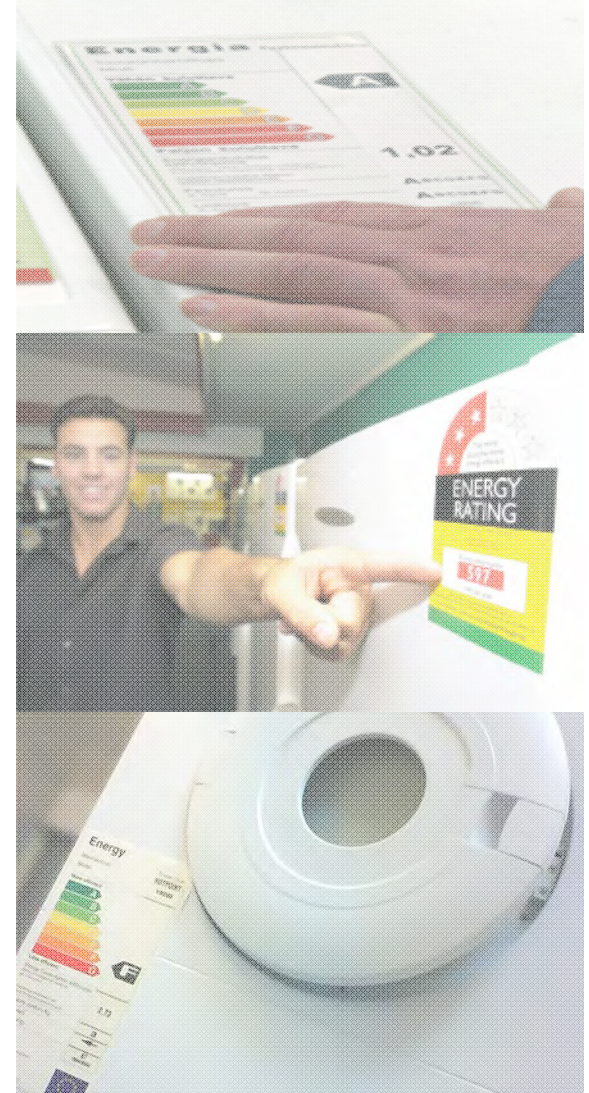
Vacuum cleaners



# Energy using products Directive

- Lot 1 boilers  
Oil-, gas- and electric boilers, heat pumps, solar thermal and combinations thereof  
(<http://www.ecoboiler.org>)
- Lot 2 Water heaters
- Lot 10  
Room air-conditioners (RAC), Local air-conditioners (LAC),  
Comfort fans

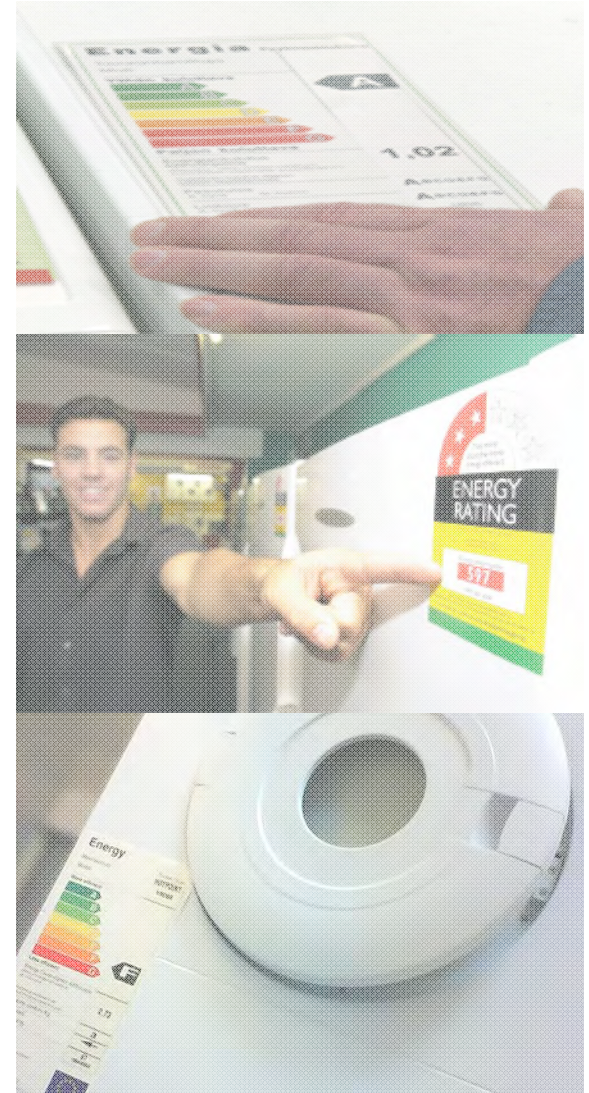
[http://ec.europa.eu/energy/efficiency/ecodesign/eco\\_design\\_en.htm](http://ec.europa.eu/energy/efficiency/ecodesign/eco_design_en.htm)



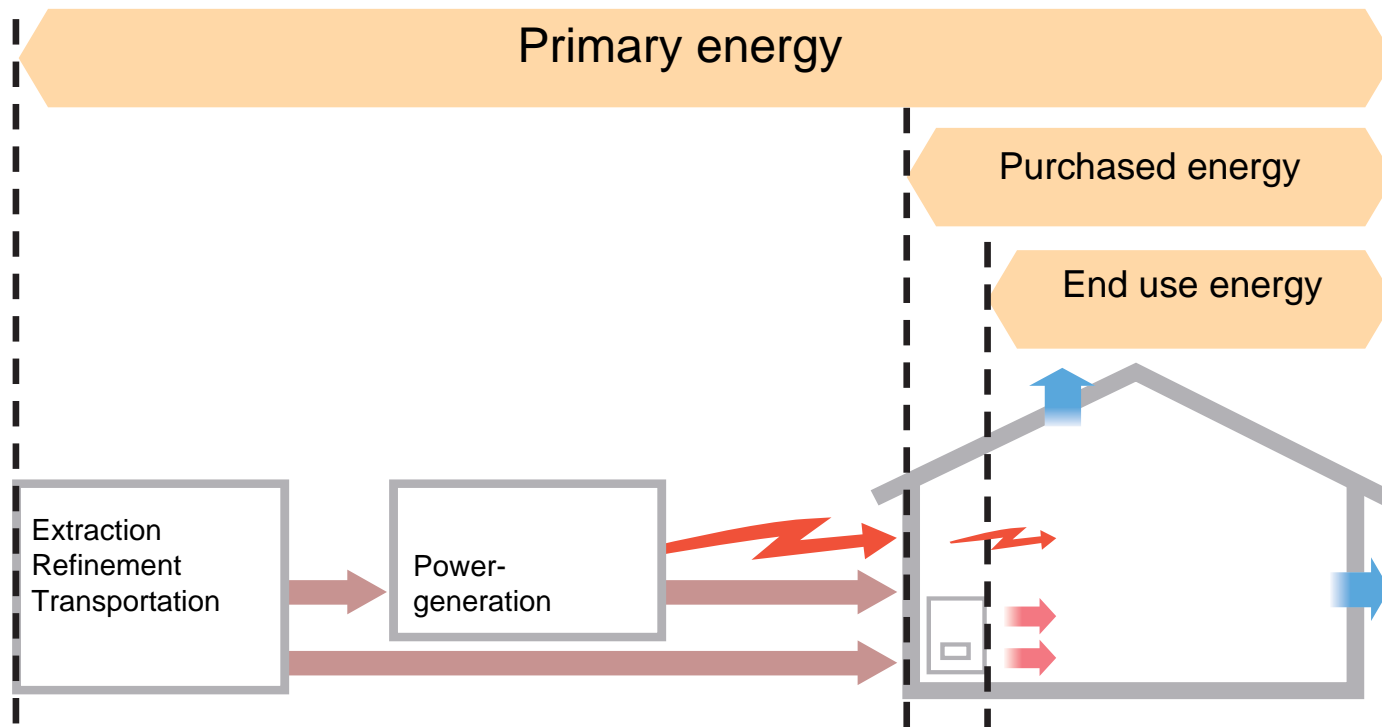


# Implications of a cross technology label

- Improved consumer information  
Enables straight forward performance comparisons
- Systems approach necessary  
Definition of system boundaries
- Primary energy efficiency
- Annual performance rating



# Primary energy efficiency – System boundaries



## Main parameters considered for performance calculation

- Primary energy factor (electricity)
- Three climate zones
- COP at various operating conditions
- Two heat distribution systems (radiators, underfloor heating)
- Buffer tank losses
- Type of distribution pumps (varying efficiency)
- Control systems
- Night set back
- Does not address green house gas emissions (<http://www.ecoboiler.org>)

## Three climate zones

Warm

Athens

Average

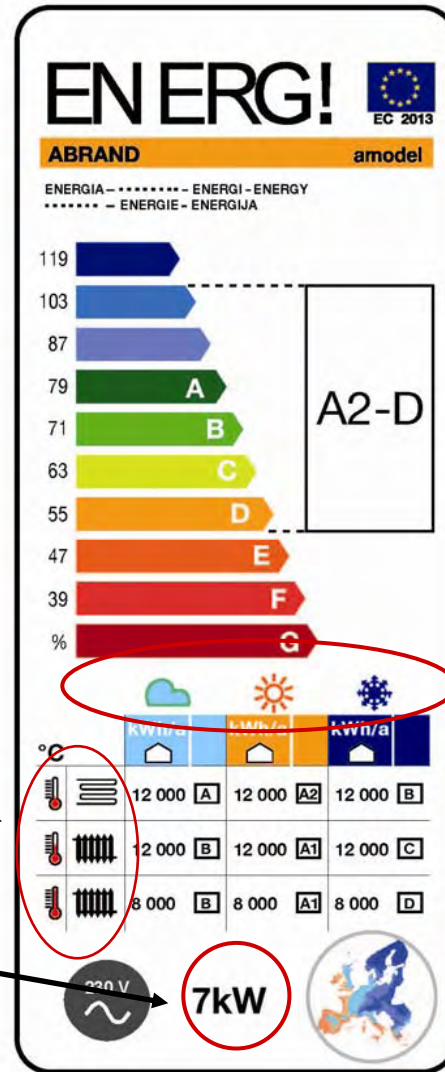
Strasbourg

Cold

Helsinki

Calculations are based on a temperature bin method

# Proposed label by SVEP



Climate zone

Achieved rating under varying conditions

Different temperature levels

Heat pump capacity Rated by the manufacturer

# Ecodesign minimum efficiency requirements

## Commission proposal

### Boilers with a maximum heat output of 10 kW

- Seasonal energy efficiency > 56 % per 1 Jan. 2011
- Seasonal energy efficiency > 64 % per 1 Jan. 2013

### Boilers with a maximum heat output of 70 kW

- Seasonal energy efficiency > 56 % per 1 Jan. 2011
- Seasonal energy efficiency > 75 % per 1 Jan. 2013

# Implications of the Ecodesign requirements

1 January 2013

- Electric boilers will not be allowed on the market  
Probable exemption; sparepart part of a product
- Stand alone conventional non-condensing gas- and oil boilers  
will be limited if allowed at all
- Condensing boilers in combination with solar thermal are expected to  
increase on the market
- Heat pumps will increase their market share
- Heat pumps will achieve a high rating on the energy label

# Challenges

- Refrigerants
- Quality assurance
- Cutting costs





# Heat pumps will make a major change



Thank you for your attention!