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Past implementation - exemplified by heat pumps

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Ecodesign and energy labelling in practice – experiences, challenges, regulation and impact
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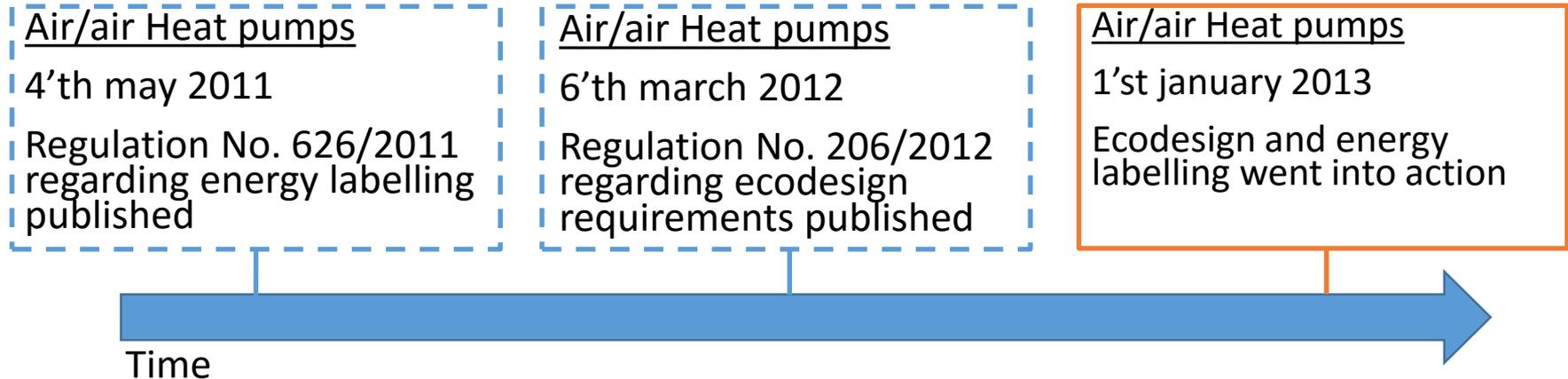


Ecodesign and Energy Labelling for Heat pumps



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Air / Air Heat pumps



Ecodesign and Energy Labelling for Heat pumps



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Air / water & liquid/water Heat pumps

Air/water & liquid/water Heat pumps

18'th february 2013

Regulation No. 811/2013 regarding energy labelling requirements for space heating

Regulation No. 812/2013 regarding energy labelling for water heating

Air/water & liquid/water Heat pumps

2'nd august 2013

Regulation No. 813/2013 regarding ecodesign requirements for space heating

Regulation No. 814/2013 regarding ecodesign requirements for water heating

Air/water & liquid/water Heat pumps

26'th september 2015

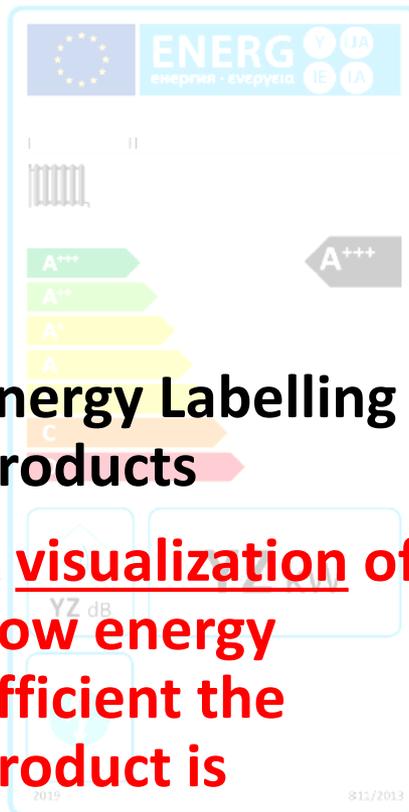
Ecodesign and energy labelling went into action

Time

What have been implemented?



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Energy Labelling of products

A visualization of how energy efficient the product is

	Klimaanlæg, undtagen klimaanlæg med dobbelkanal og enkeltkanal		Dobbelkanalklimaanlæg		Enkelkanalklimaanlæg	
	SEER	SCOP (Middel varmesæson)	EER _{rated}	COP _{rated}	EER _{rated}	COP _{rated}
Hvis kølemidlets GWP > 150 for < 6 kW	4,60	3,80	2,60	2,60	2,60	2,04
Hvis kølemidlets GWP < 150 for < 6 kW	4,14	3,42	2,34	2,34	2,34	1,84
Hvis kølemidlets GWP > 150 for 6 – 12kW	4,30	3,80	2,60	2,60	2,60	2,04
Hvis kølemidlets GWP < 150 for 6 – 12kW	3,87	3,42	2,34	2,34	2,34	1,84

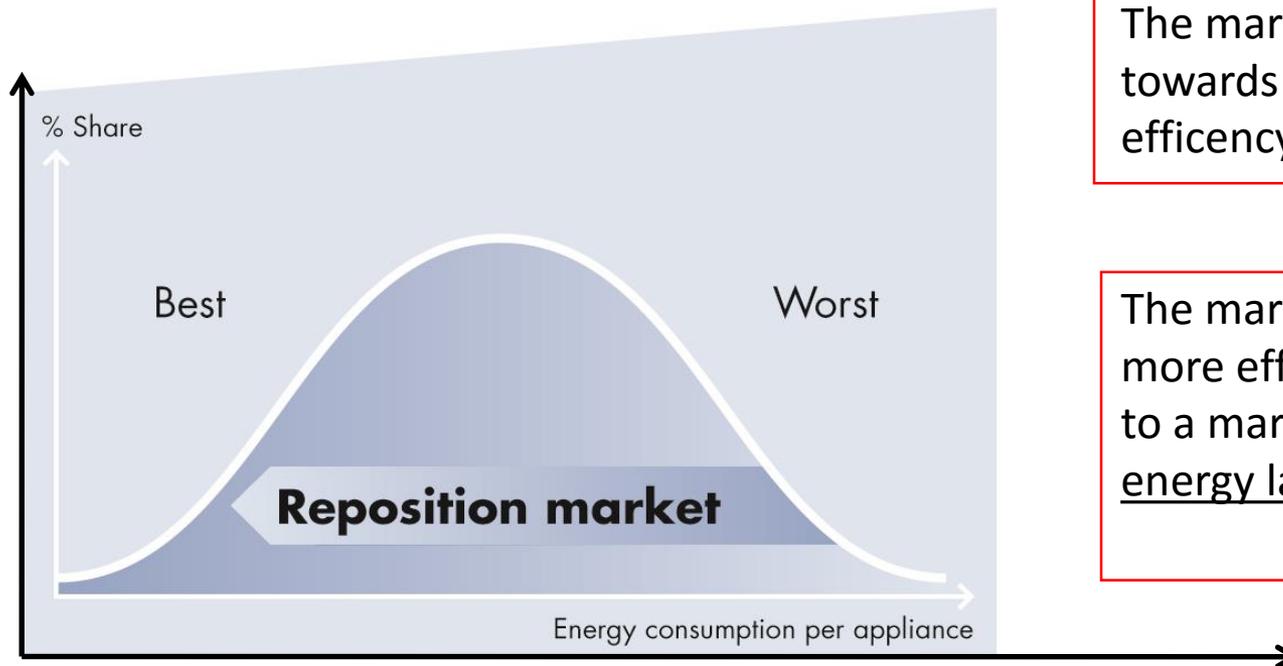
Ecodesign requirements

Ecodesign, including a requirement for minimum efficiency of a product

How will this change the market?



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The market is pushed towards higher energy efficiency through Ecodesign

The market is pulled towards more efficient products due to a market demand via energy labelling

Historical insight... Have the products evolved?



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DATA INPUT

- Historically, Denmark has had high demands for minimum energy efficiency of a heat pump
- Denmark have had a public available heat pump lists since 1997
- The standards for the tests have changed over the years
- This list is now referred to as the “Varmepumpelisten” – “The Heat Pump List”
- Access to the list is granted through a test conducted by an independent and accredited laboratory and a minimum efficiency equal to or larger than the demand in the Danish building code

DATA INTERPRETATION

With some minor calculations the available data may be brought to the same reference state.

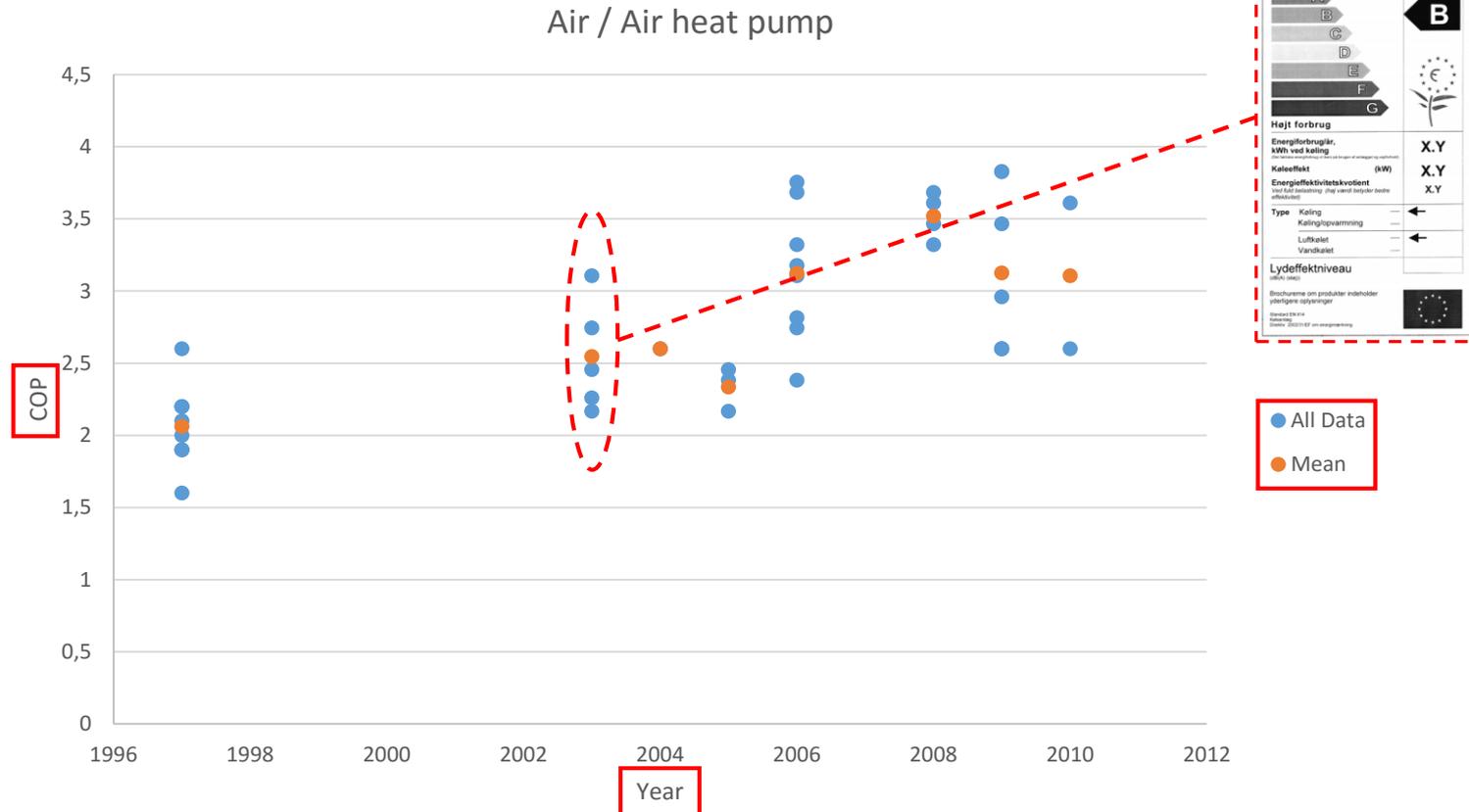
Important!: “Varmepumpelisten” reflects the better products but shows a tendency expected to be the same for the whole market.

So! Lets look at the how the products have evolved within different heat pump categories...

Historical insight... Have the products evolved?



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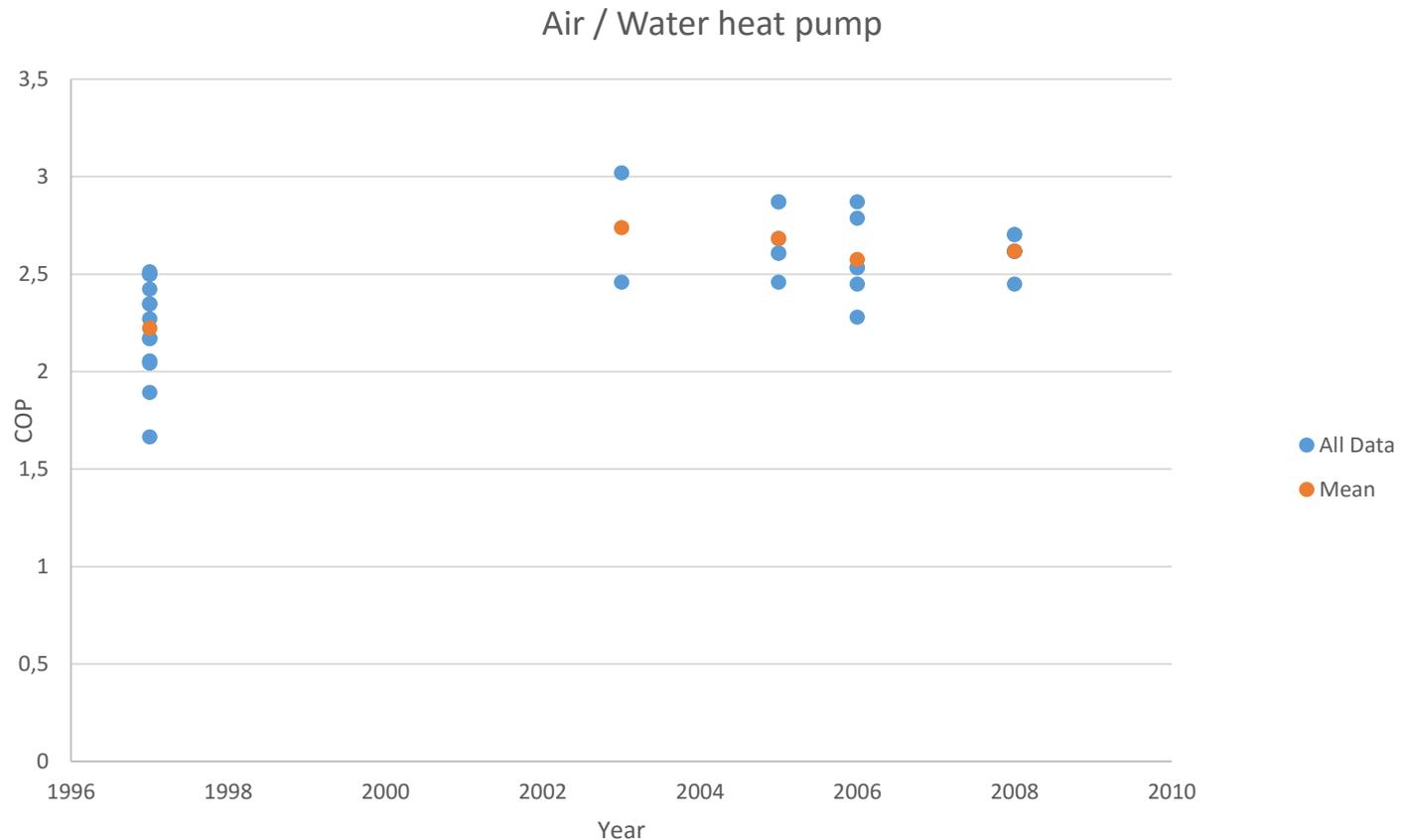


Test methods and calculation methods have changed – Variation is expected due to data conversion...

Historical insight... Have the products evolved?



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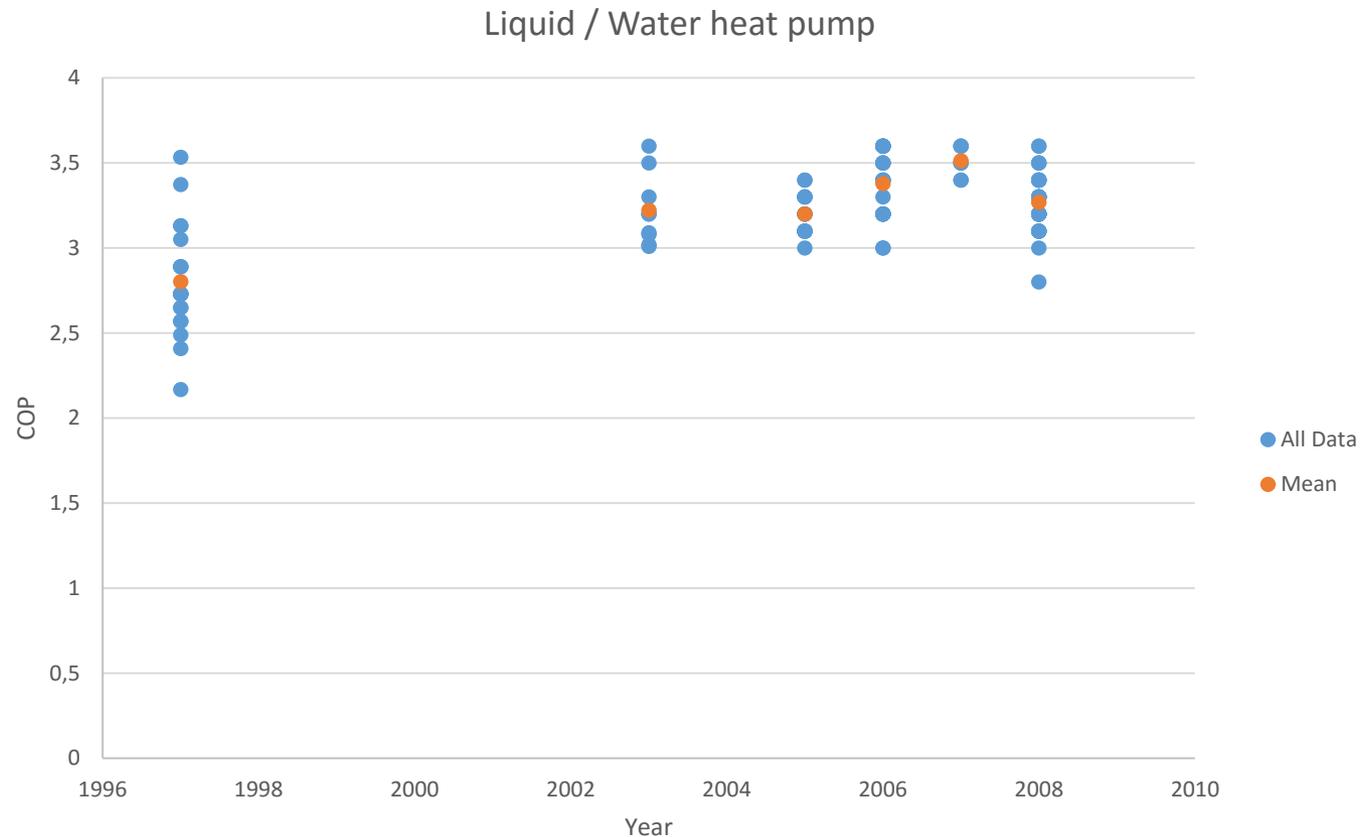


Test methods and calculation methods have changed – Variation is expected due to data conversion...

Historical insight... Have the products evolved?



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Test methods and calculation methods have changed – Variation is expected due to data conversion...

Historical regulation in Denmark vs. Ecodesign regulation

- Only heat pumps meeting the minimum requirements of the Danish building code may be installed
- **History:** Earlier the minimum efficiency demand in the Danish building code was the "Normeffektfaktor" (Norm efficiency factor - NEF)
 - NEF: Calculation of the annual energy efficiency from a series of full load test points. Efficiency reflects both water heating and space heating
- **Now:** The building code is aligned with the Ecodesign requirements – Minimum requirements through "Seasonal Space Heating Energy Efficiency" calculated from an SCOP test
 - SCOP: Calculation of the annual energy efficiency from a theoretical annual operating pattern including both full load and part load test points. Efficiency reflects only space heating

Historical regulation in Denmark vs. Ecodesign regulation

Former minimum requirements for liquid / water heat pumps:

Low temp.	"Normeffektfaktor" – NEF	SCOP (converted from NEF)
V/V > 6 kW	3,7	4,3
V/V 3 til 6 kW	3,6	4,2
V/V < 3 kW	3,0	3,5

High temp.	"Normeffektfaktor" NEF	SCOP (converted from NEF)
V/V > 6 kW	3,0	3,5
V/V 3 til 6 kW	2,8	3,3
V/V < 3 kW	2,6	3,0

Ecodesign requirements for liquid / water heat pumps:

Low temperature:

Seasonal Space Heating Energy Efficiency 115% -> SCOP= 3,075

High temperature:

Seasonal Space Heating Energy Efficiency 100% -> SCOP= 2,7

Historical regulation in Denmark vs. Ecodesign regulation

Former minimum requirements for air/ water heat pumps:

Low temp.	"Normeffektfaktor" – NEF	SCOP (converted from NEF)
L/V – "low temperature" (gulvvarme)	3,2	3,5
L/V – "high temperature" (radiatorvarme)	2,7	3,0

Ecodesign requirements for air/ water heat pumps:

Low temperature application:

Seasonal Space Heating Energy Efficiency 115% -> SCOP= 2,95

High temperature application:

Seasonal Space Heating Energy Efficiency 100% -> SCOP= 2,58

Status on the Danish Heat Pump list



- How efficient are the good products?

Mean SCOP for air / air heat pumps on the Danish heat pump list – “Varmepumpelisten”

Count: 54 products

SCOP: 4,47 (Equal to Energy Class A+)

Mean SCOP for air / water heat pumps on the Danish heat pump list – “Varmepumpelisten”

Count: 136 products

SCOP (high temperature) : 3,25 (Equal to Energy Class A++)

SCOP (low temperature) : 4,19 (Equal to Energy Class A++)

Mean SCOP for liquid / water heat pumps on the Danish heat pump list – “Varmepumpelisten”

Count: 110 products

SCOP (high temperature) : 3,71 (Equal to Energy Class A++)

SCOP (low temperature) : 4,87 (Equal to Energy Class A+++)

The same amount of heat pumps were admitted to “Varmepumpelisten” in 2014 and 2015

No tendency of heat pumps with low efficiency applying for admittance after introduction of lower requirements to minimum energy efficiency (Ecodesign) in the Danish Building Code.

Elaboration on these numbers...

Which reservations must be taken?

- The best products are listed on "Varmepumpelisten"

Possible thoughts:

- Are the introduction of Ecodesign requirements for heat pumps in Denmark a step back?
- Cheaper heat pumps with a lower efficiency are now allowed to be installed in Denmark

New buildings: Might be a good idea

Existing buildings: Might not be a good idea

Consequences we see in Denmark:

- Better products are being developed – overall positive impact on the product development and sold in Europe
- I.e. Variable compressors introduced in most air/air and air/water heat pumps

Experience and consequences

- **What are the experience of the producers and importers?**

 - A very large challenge for the smaller companies

 - Some companies are “gambling” by not having the correct information available

 - Even some large companies are not following the regulations

- **How have the end consumer welcomed the new information available. Do they know how to use the information?**

 - More information available – Easier to make the right decision.

 - Economy still the most important factor – a lot of private consumers install biomass boiler space heaters

- **Who have gained from all the new information which must be made available?**

 - Greater market transparency

 - More information made available for product development – a great advantage for i.e. DTI