REDUCE ENERGY USE:
-IN BUILDINGS
-BY BEHAVIOUR CHANGES

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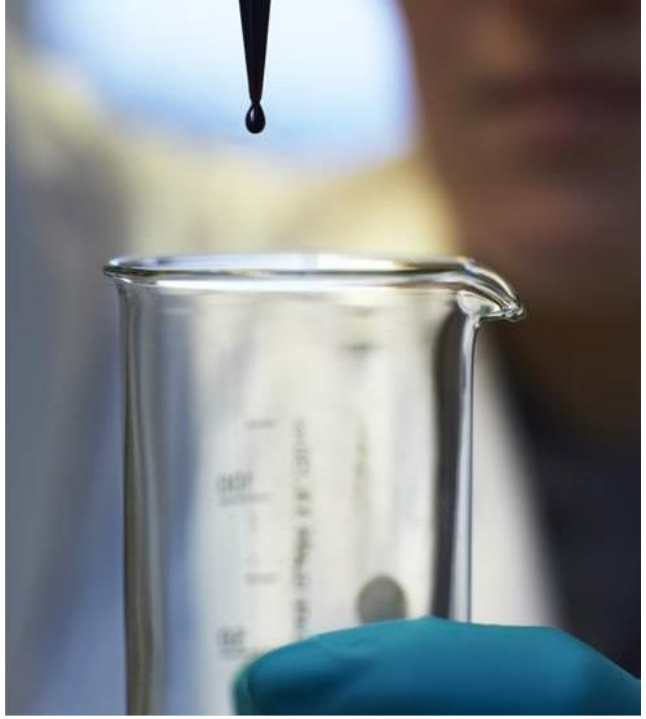
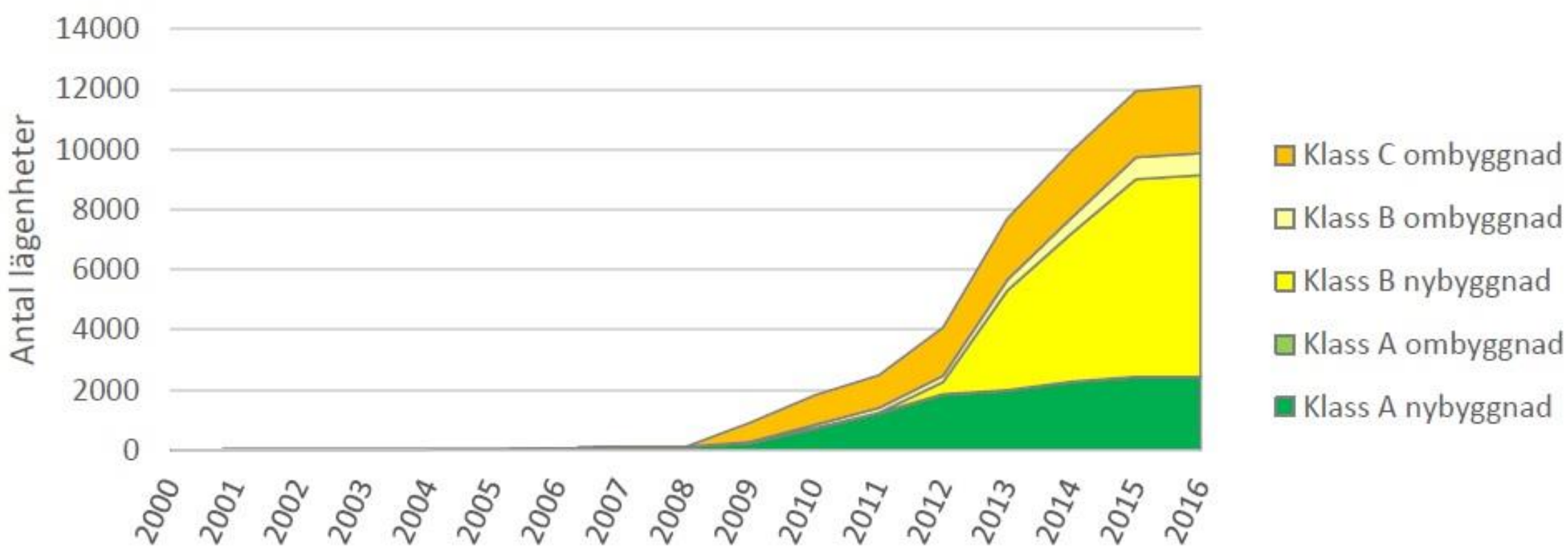
Research Institutes of Sweden

Build environment
Energy and circular economy



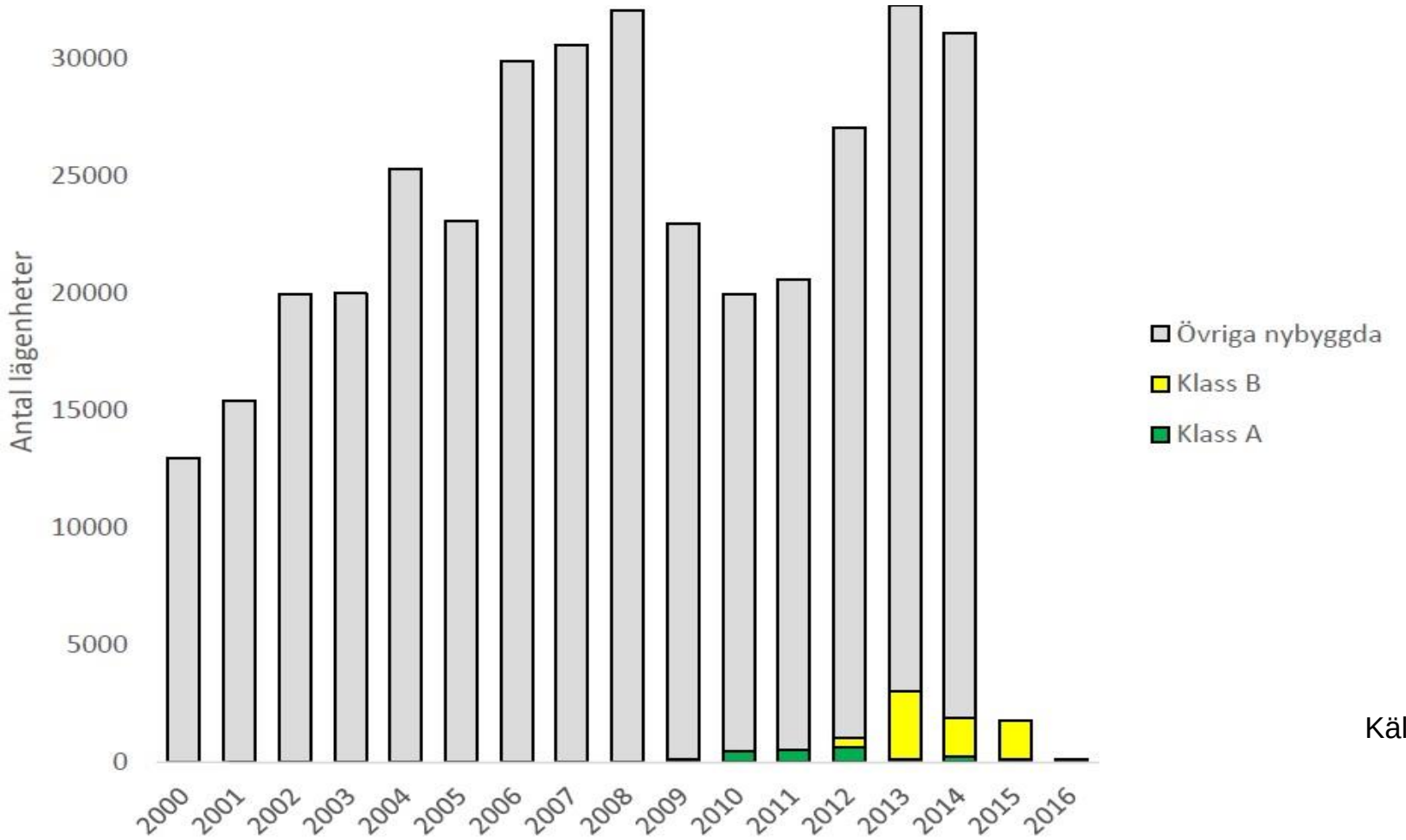
Global challenges for the build environment

Swedish low energy buildings



Källa: Lågan

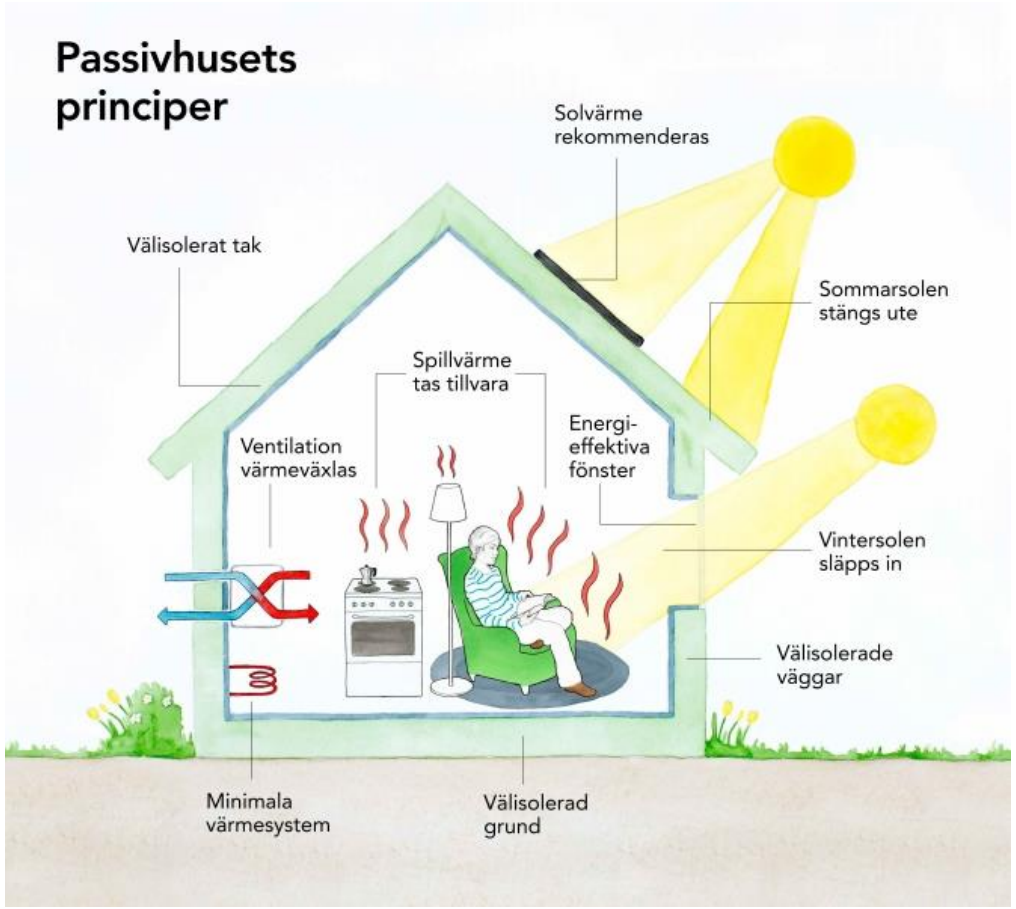
Swedish percentage low energy of total build houses



Källa: Lågan

Example: Passiv houses

Bild: Gunilla Persson



Source: Passivhuscentrum

Reduce energy use in buildings

Existing building stock has greater potential!

- Insulation (prefabricated building parts or site specific) of walls and roof
- Change of windows and doors (lowe u-value)
- Seal the building envelope to reduce heat leacage
- Heat recovery systems (ventilation air and water)
- Energy efficient installations (pumps, fans, elevators, LED lighting etc)
- Energy efficient household machines (computers, TV, refridgerator, washing machine, stove etc)
- Improved insulation of technical installations (water and ventilation pipes, heat storage tanks etc)
- Improve montioring and control systems to only use energy when needed
- Add solar PV panels

LCA

- LCA – Life Cycle Assessment
- The environmental impact of a product or service
- Through out the life cycle – raw materials, enrichment, production, transports, use and recycling/waste

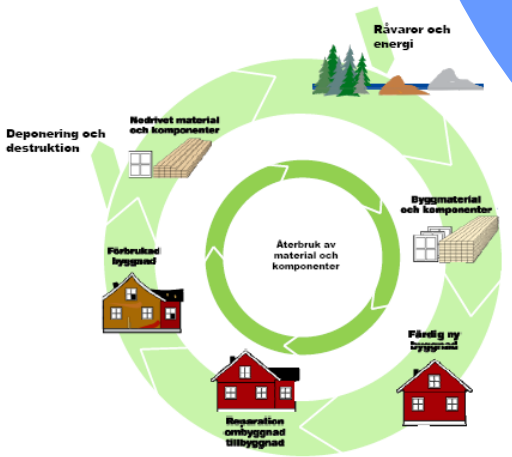
LCC

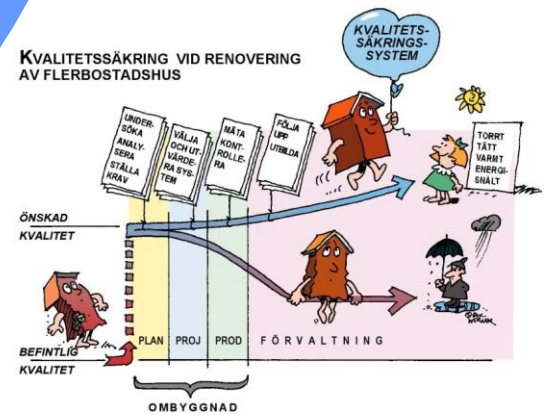
- LCC – Life Cycle Cost
- The total cost of a product or service through the whole life cycle
- Investment, education, service, repairs, intrest
- Use it to find the best solution over time

Zero Emission Buildings

Low energy houses
Passive houses
Plus energy houses
New building
Retrofitting

- Energy efficient and robust building construction and services
- Healthy indoor environment
- Quality assured building process and management
- Materials with low environmental impact and long life expectancy
- The impact of user behaviour on the energy use in buildings
- Environmental assessment





Kongahälla – going from low energy to plus energy district

Aim:

- To radically reduce energy use in new residential housing and commercial buildings
- To identify opportunities to produce heat and electricity for a positive net energy production on a yearly basis at district level

Partners: SP och Municipality of Kungälv

Expected results:

- Supporting documentation for how to move forward with energy efficiency in the district Kongahälla.

NEED4B
New Energy Efficient Demonstration for Buildings

NEED4B Demonstration site in Sweden

BORÅS AND VARBERG PILOTS

This project has received funding from the European Union's Seventh Programme for research, technological development and demonstration under grant agreement N.º: FP7/285173/NEED4B

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Facts about the houses

- Forskningsvillan (Borås) with 4 artificial occupants
- Family villa (Varberg) with a real family of 5
- 198 sqm gross area each
- Single family, pre fabricated, wooden framed villas
- Designed to suite the Swedish market and be very energy efficient, cost effective and environmental friendly

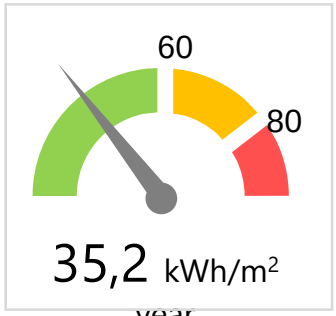
Building envelope improvements

Technologies

- Ground source heat pump providing heating and hot water
- Ventilation unit with heat recovery
- Floor heating
- LED lighting
- Solar PV (3,6 kWp, generating about 3000 kWh per year)

Overall Results: Borås

Primary Energy Consumption



Annual Energy Savings

73%

Annual CO_2 Emissions Savings

735 kg

Annual Money Savings

1,185 €

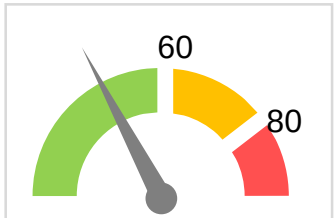
Payback Period of EE solutions

11 years

(*) Savings comparing to a building of the same age according to normal practice or national regulation

Overall Results: Varberg

Primary Energy Consumption



Annual Energy Savings

68%

Annual CO_2 Emissions Savings

687 Kg

Annual Money Savings

1,108 €

Payback Period of EE solutions

11 years

(*) Savings comparing to a building of the same age according to normal practice or national regulation

Lessions learned

- User behaviour is a key point in low energy houses and can have big impact on energy use
- Improvements regarding building envelope tested in the project is now part of Deromes standars solutions in some parts
- Borås house now serves as full scale lab for several other research projects

Reduce energy use by behaviour change

Reduce energy use – who is the winner?

The building owner…?

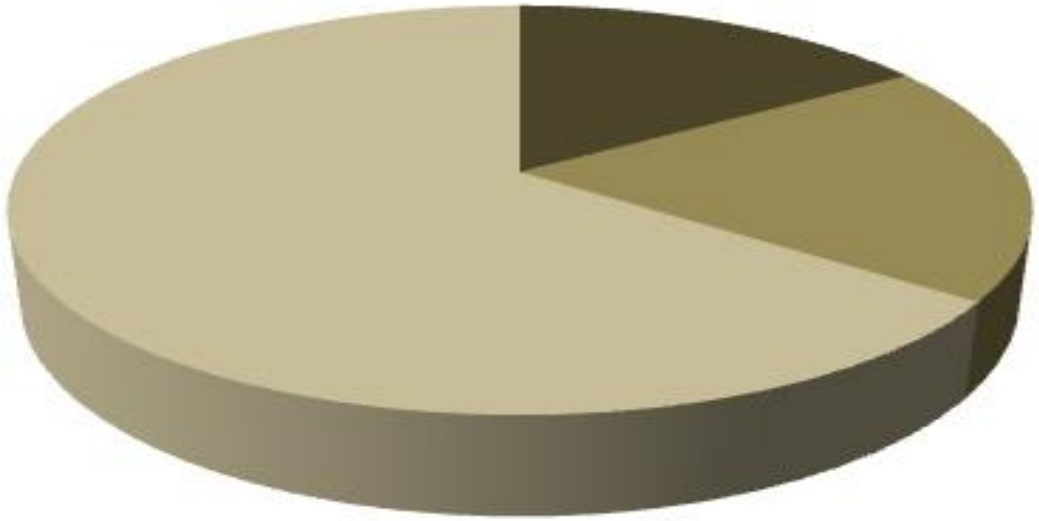
- Economic
- Environmental and social responisbility
- Higher standard for tennents
- More satisfied tennants

The tennants…?

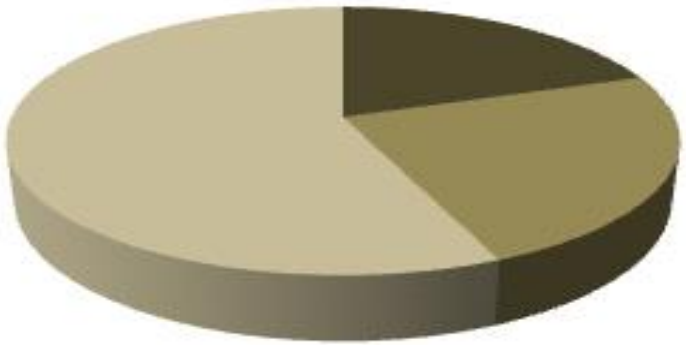
- Raised awareness and the ability to act
- Lower costs
- Less energy use
- Better indoor comfort

Energy use: Current – New – Future houses

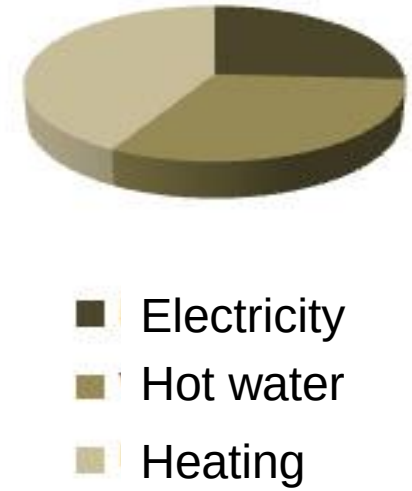
Current houses



New houses today

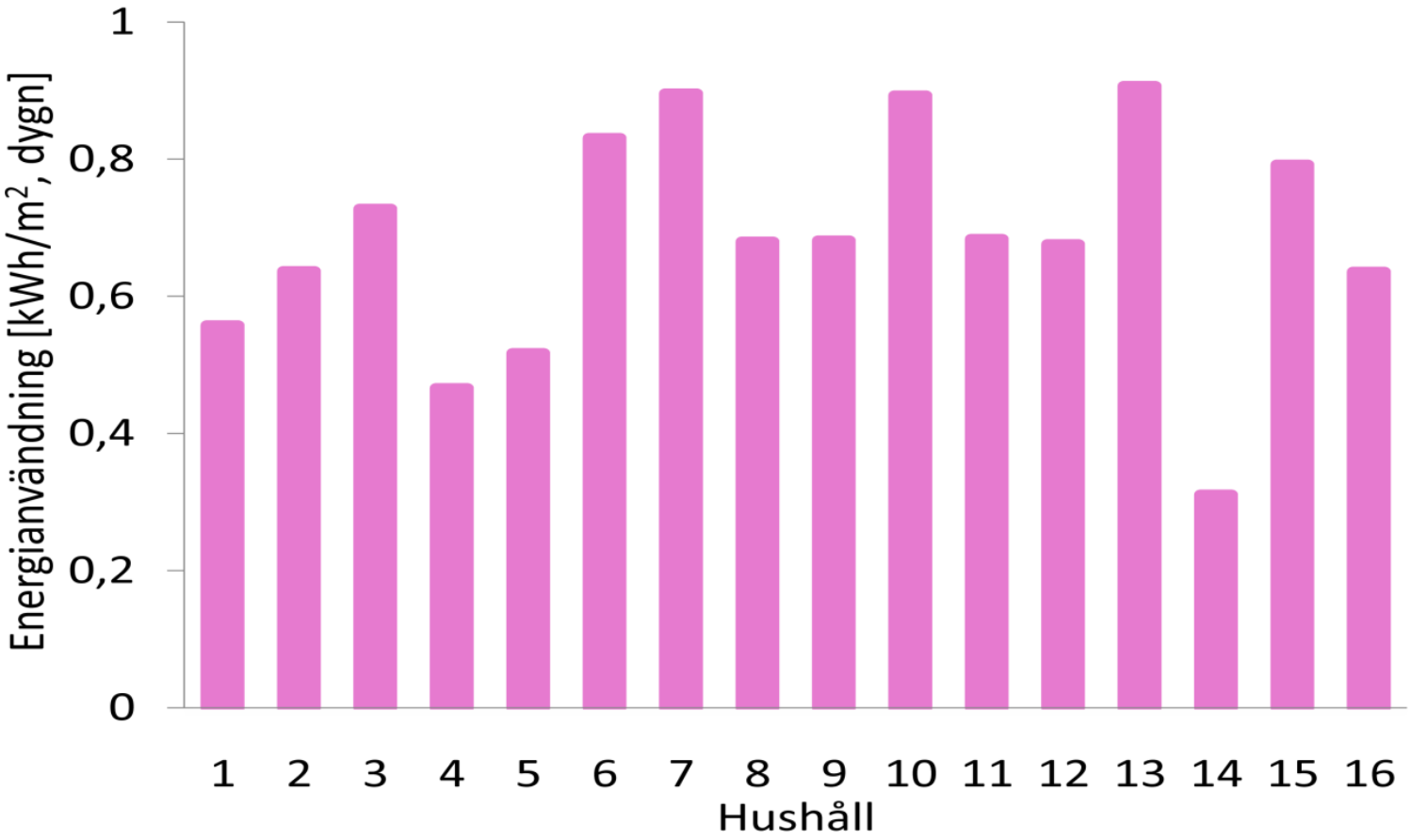


Future houses



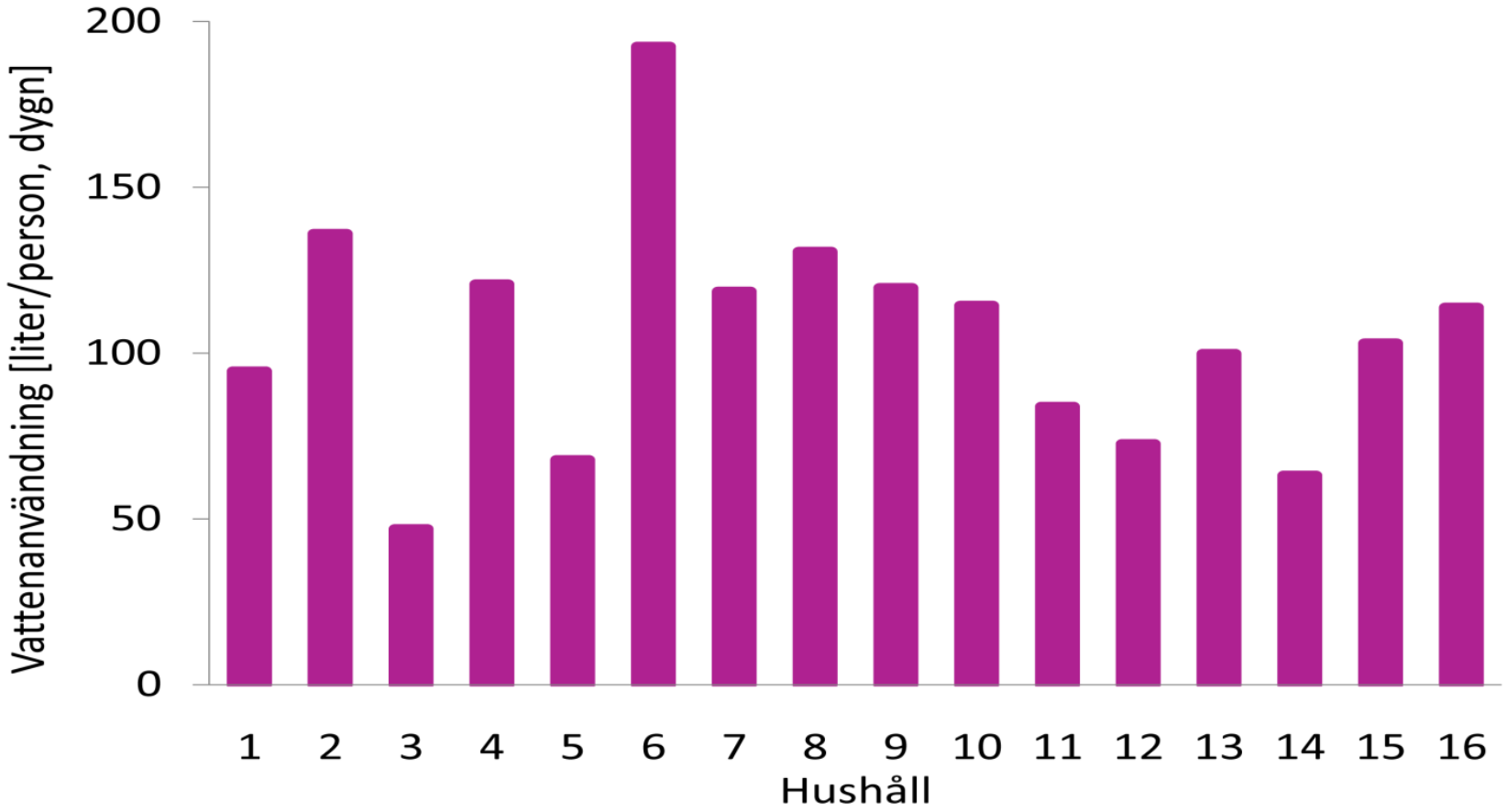
The behaviour of the tennants will be a bigger and bigger part of the energy use

Example: Swedish study; Same houses, very big difference in energy use



"The energy use can vary a lot between different households!"

The variation for use of hot water is even bigger



Electricity varies during the year, energy improvements done

Energy behaviour
- but does it really matter…?

Estimations on potential for energy savings by behaviour change is as high as 20 % !

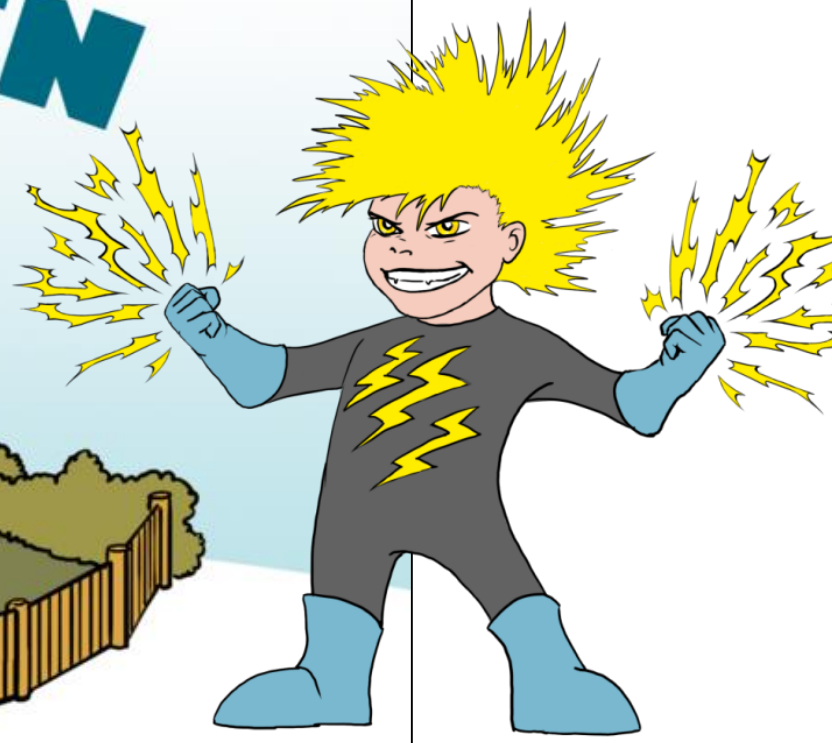
	Rarely	Often
No/low cost	LED lights Lower indoor temperature Air tightness Low flow taps 	Habits and lifestyle Shower quick Air dry laundry Turn off lights and stand-by 
High cost	Investments white goods, TV, computer, heating system 	

"Choose energy wise when you can"

Example of energy visualisation

Källa: eon.se

STRÖMTJUVEN



Ett verktyg av projektet FörskoleVis

SP Science Partner

SWEDISH ICT INTERACTIVE

Gleerups Utbildning

Energimyndigheten

Naturskyddsföreningen

VÄSTRA GÖTALANDSREGIONEN

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BeyondViz – energy efficient behaviour at work

SP your Science Partner

SWEDISH ICT INTERACTIVE

KTH VETENSKAP OCH KONST

BORÅS STAD

HÖGSKOLAN I BORÅS

TeliaSonera

yanzi

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THANK YOU!

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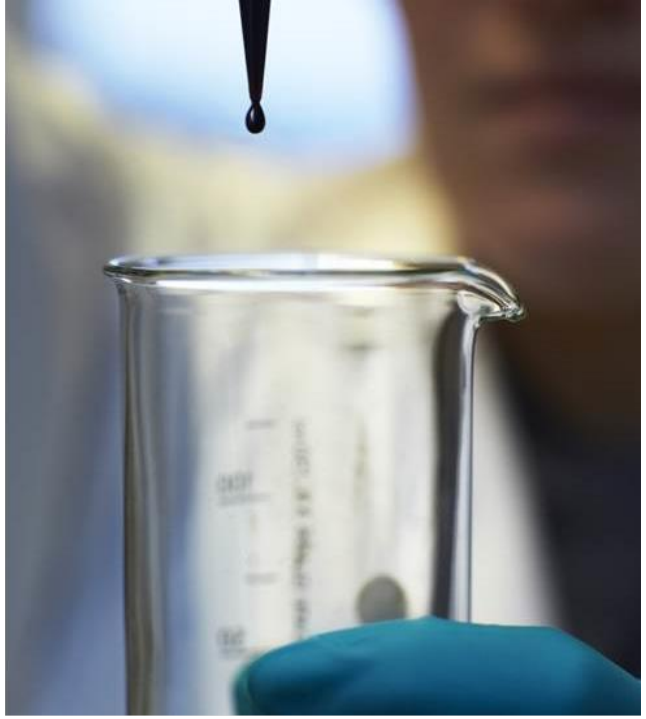

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