

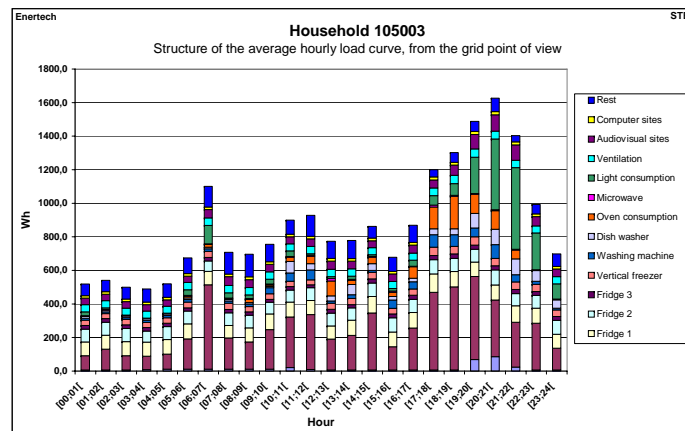
Consumer behaviour in Swedish households: routines and habits in everyday life

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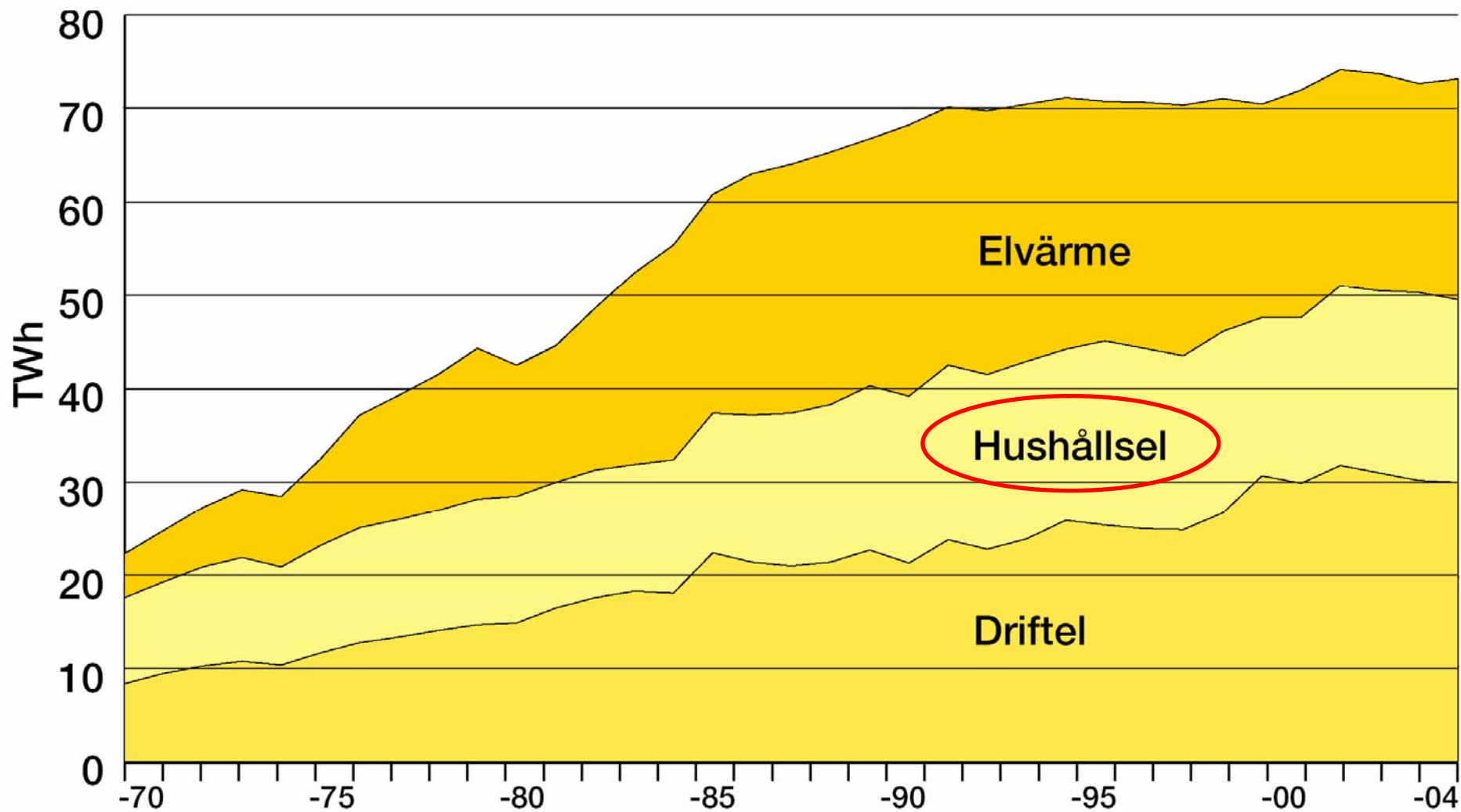
Presented by
Peter Bennich
The Swedish energy agency

Contents

- Background
- Part 1: Measurements of the domestic end use of electricity
- Part 2: Behavioural study



Electricity use in the residential sector 1970 – 2003

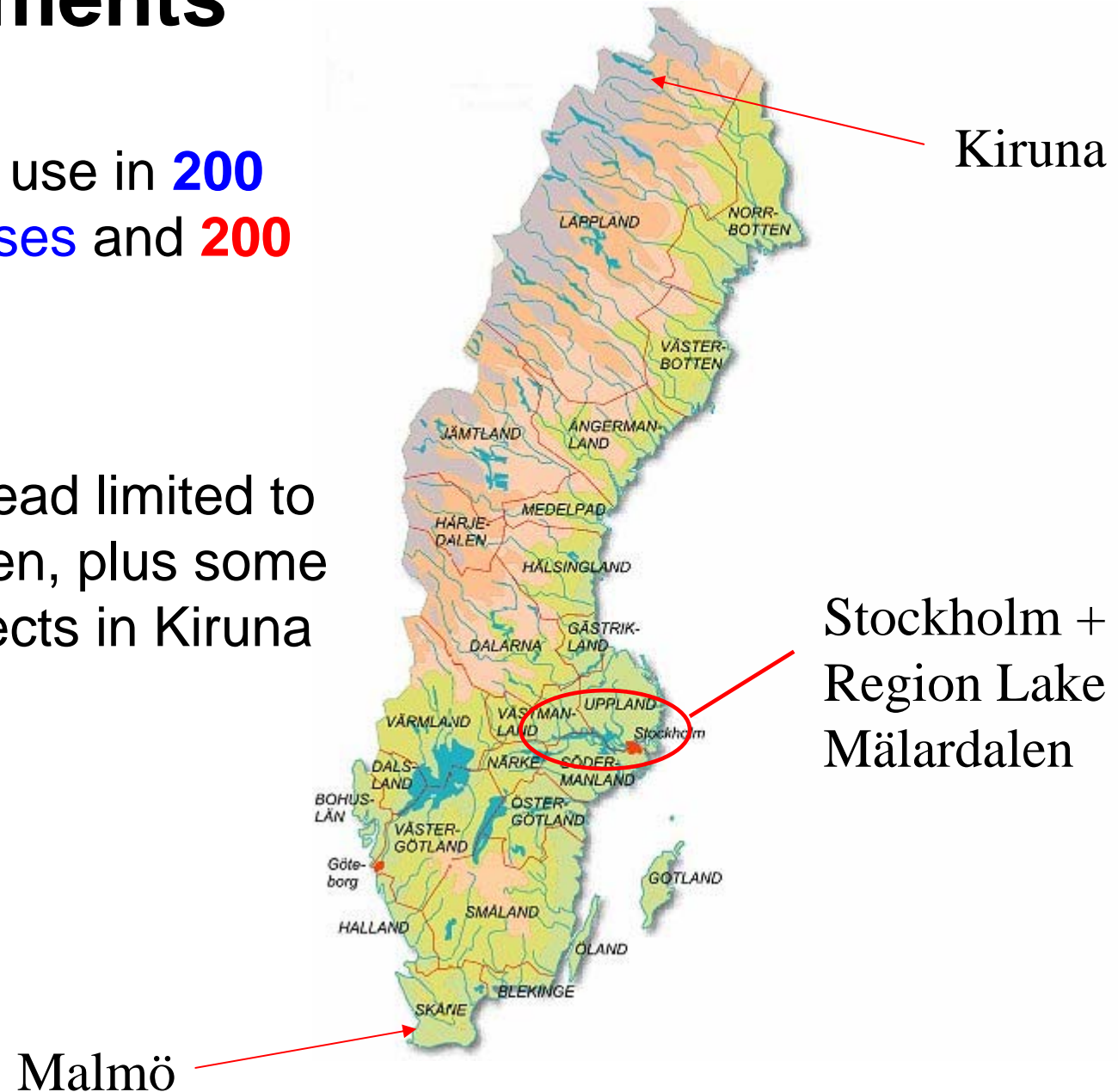


Purpose

- Improved prognoses of energy use and policy instruments for increased energy efficiency requires better resolution of the energy statistics
- Example of questions at issue:
 - Why does not the domestic electricity use decrease despite the fact that e.g. white goods become increasingly more energy efficient?
 - How large is the contribution from standby-consumption?
 - What constitutes peak loads, when do they occur (the grid perspective)?
- More precise: three basic questions:
 - How does the *distribution of apparatus* really look like in different types of households?
 - How *energy efficient* are these apparatus?
 - How does the *user patterns* look like?

Measurements

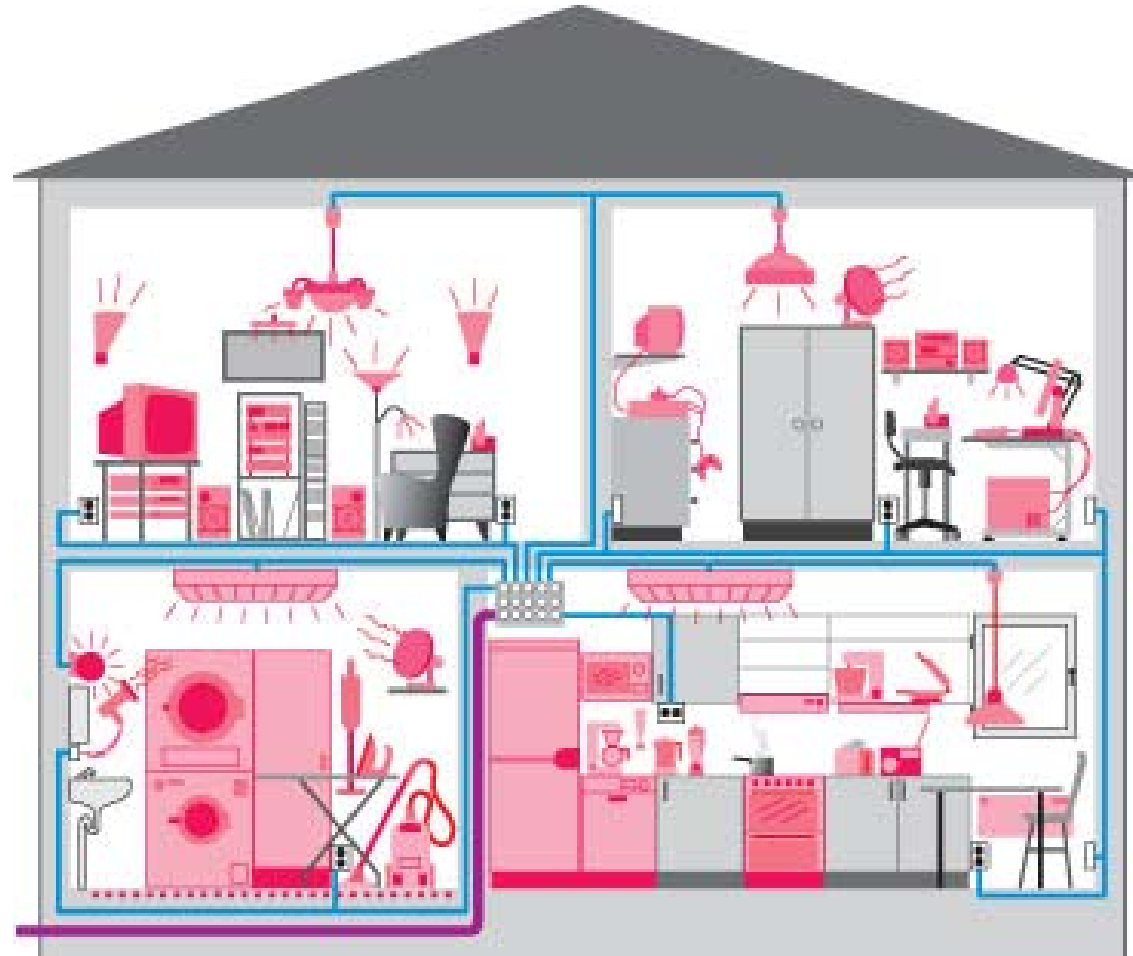
- Domestic end use in **200 detached houses** and **200 apartments**.
- Geographic spread limited to lake Mälardalen, plus some reference objects in Kiruna and Malmö



Basic information

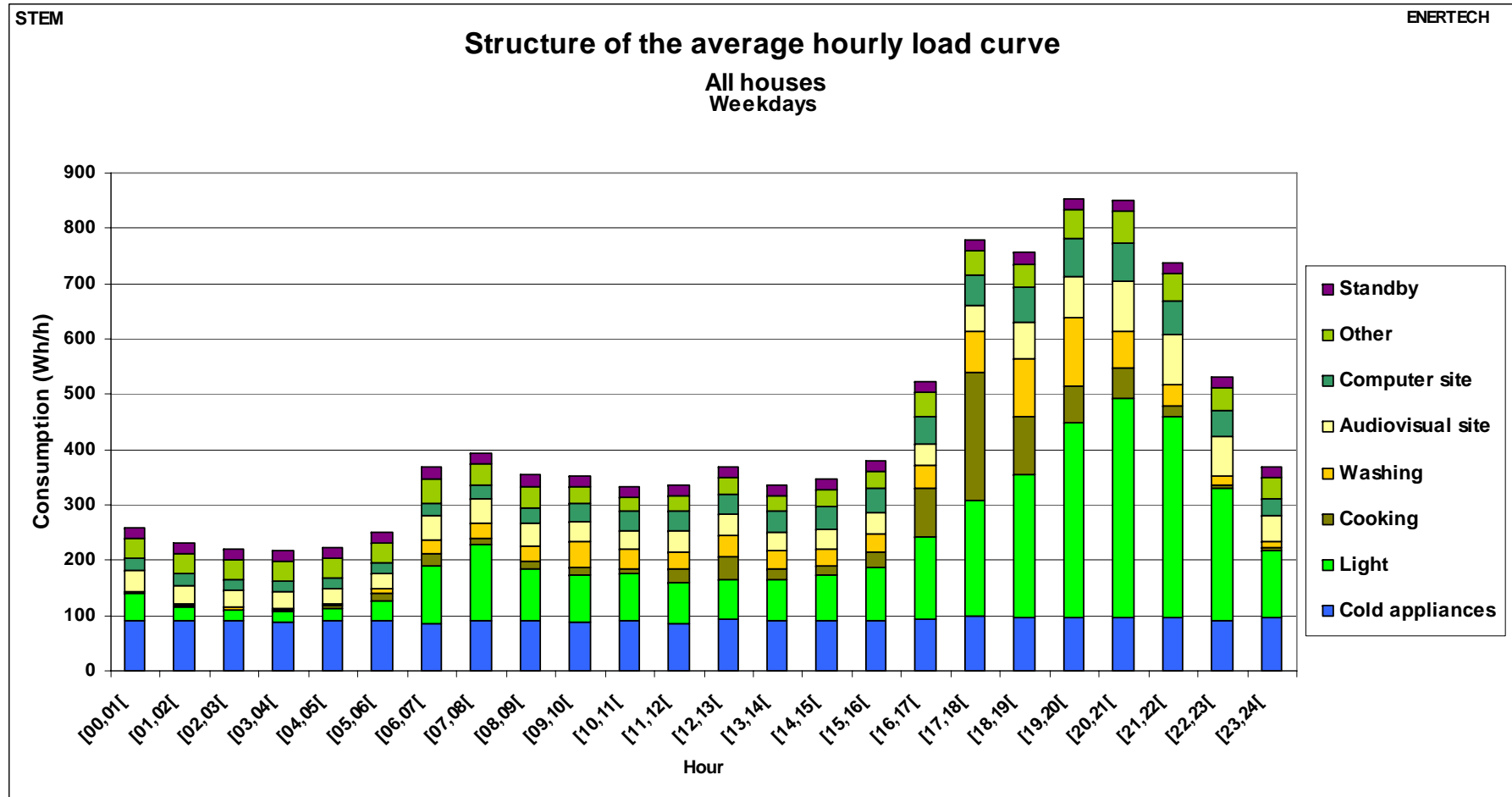
- House or apartment
- Type of heating system
- Locus type: city, small city; country side
- Family structure:
 - Number of people
 - Age
 - Gender
- Income
- Distribution of apparatus (incl lights): type and model; in what room
- Nominal standby power of relevant apparatus

Actual measurements



Many loads (especially light sources)... Easily over 60 in a house (35 – 45 light sources)

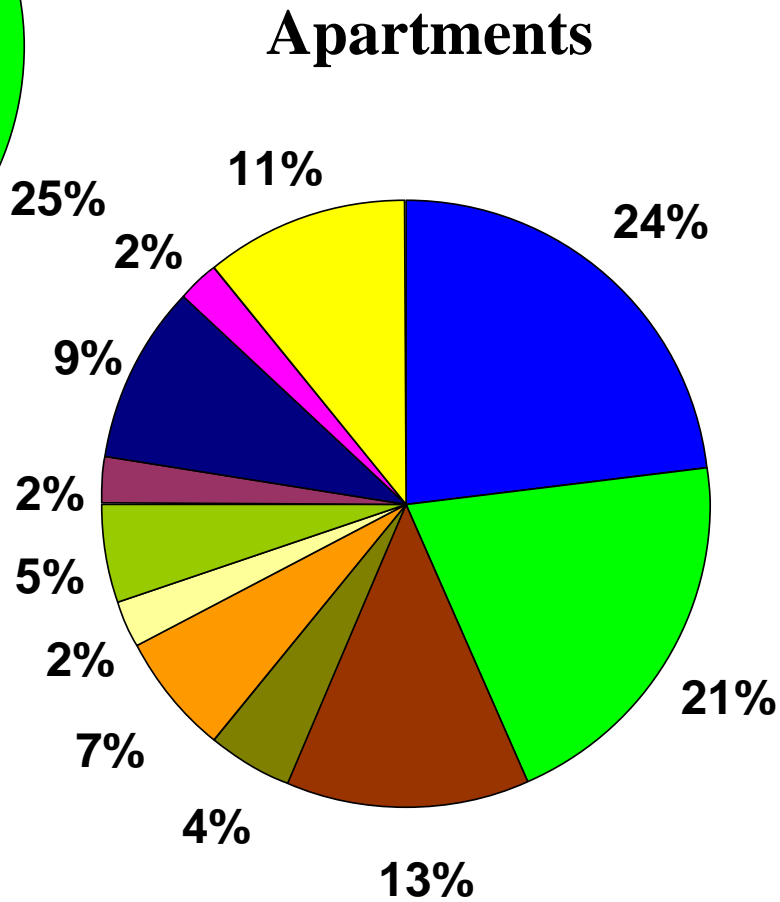
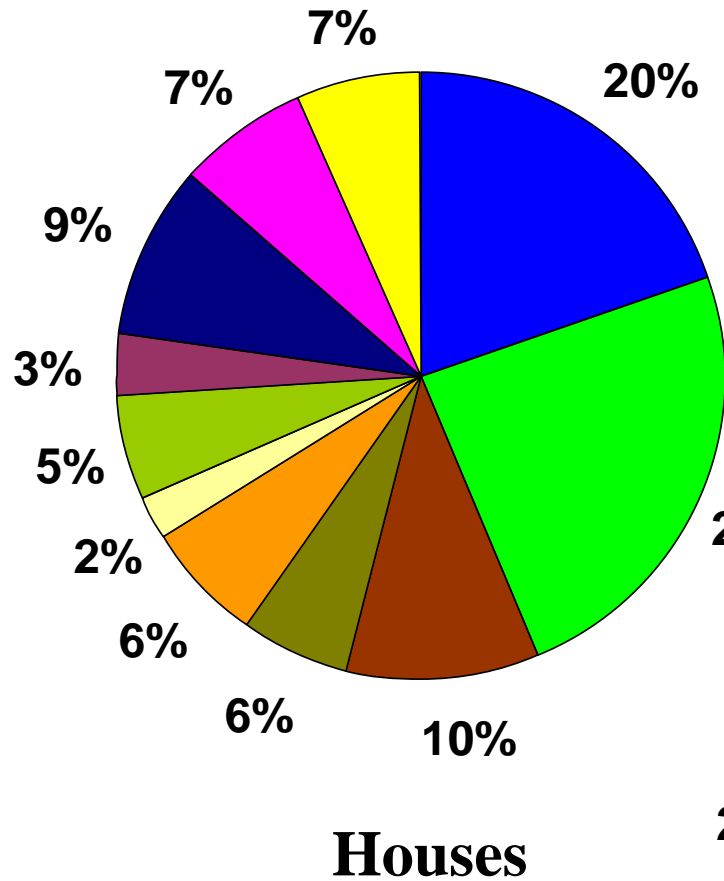
Load curves: detailed information on user patterns



Preliminary results

	Houses, all households [kWh/yr]	Apartments, all households [kWh/yr]
Fridge and freezers	1020	720
Lighting	1275	630
Cooking	510	390
Dish washers	306	120
Wash and dry	306	210
Stereo	102	60
TV	255	150
DVD, VCR etc	153	60
PC and related eq.	459	270
Others	357	60
Not measured	357	330
<i>Sum</i>	<i>5100</i>	<i>3000</i>

Relative distributions



- Cold appl
- Lighting
- Cooking
- Dish
- Wash, dry
- Stereo, radio
- TV
- DVD + VCR etc
- PC site
- Others
- Not meas.

Some observations:

Large spread of the results:

Houses: from 2000 to 7000 kWh/yr

Average ca **5100** +- 750 (15%) *not definitive value!*

Apartments: from 1000 to 5000 kWh/yr

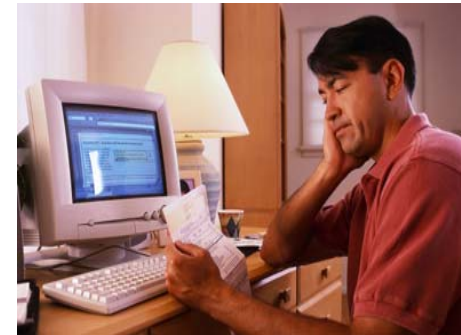
Average ca **3000** +- 450 (15%) *not definitive value!*

- **Lighting** is the largest load: 1994 it was second
- **Cold appliances** comes second: 1994 it was the largest
- **Entertainment electronics** (TV, PC etc) comes on third place: **has increased a lot since 1994!**

Two behaviour studies in conjunction with the measurements

- Consumer behaviour and use of domestic apparatus – *this presentation*

Anna Green and Kajsa Ellegård



- Use of lighting – presented in paper 6.163

Helena Krantz, Mats Bladh et al



Important factors influencing our domestic activities

- **Structure of the households:** age, gender, variable structure,...
- **Resources and restrictions of the households:** economy, residential type and size,...
- **Set of apparatus:** number and types of; permanent and intermittent use;...
- **Work and school:** working/school hours, transportation,...
- **Globalisation:** geographical locus of work and school; family and friends,...

Method and scope

- **Qualitative method:**
 - Interviews – 14 households
 - Diaries in 8 of these households:
 - two weekdays, one weekend day
- **Small selection but large spread**
 - 14 households in total (next slide)
- **Focus on the following apparatus:**
 - "Food and storage" (stove, oven, fridge, freezers etc)
 - "Information and entertainment" (PC, broadband, TV, stereo, mobile telephone, etc)
 - "Washing and cleaning" (washing machines etc)

Selected households (11 in this slide...)

Geographical spread

- 1 Malmö
- 5 Stockholm
- 1 Järna
- 1 Västerås
- 1 Strängnäs
- 2 Kiruna



Residential type

- 6 detached houses



- 5 apartments



Family structures

- 2 households without kids:
2 persons, 60+
- 3 households with one old kid:
3 persons, 2 parents 50-60 +
one old kid
- 6 households with kids:
2 parents; small and teenage
kids; some cases of alternating
staying

Food and storage

Breakfast...

- Sometimes together, but is individual; different choice of food. Serial use of apparatus
- Eat-on-demand: Apparatus is on and on the whole morning...
- Some people don't eat at home; breakfast at work or kindergarten...

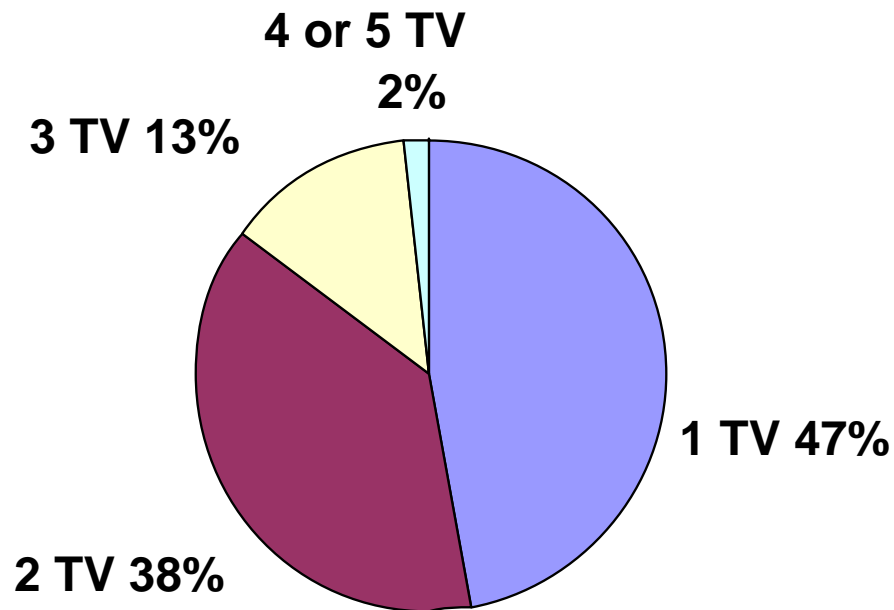


Example on breakfast in a family

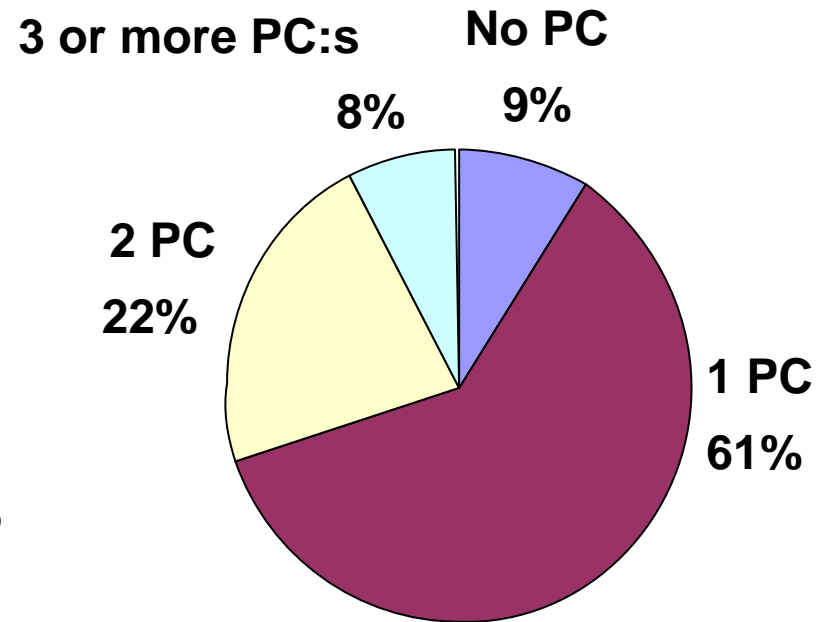
- 6 persons:
 - 2 parents
 - 2 teenagers from a previous marriage
 - 2 small kids in the present marriage
- **Mother:** breakfast at home each day except every third week when it's just a small breakfast – bring breakfast to work
- **Father and small kids:** father begins work at 07.30; takes a fruit and a "snus", delivers the kids to kindergarten early; they get breakfast there.
- **Teenagers** stay one week at a time in this family; have breakfast as normal. Stays the other week at their other parent (i.e. no breakfast in this family).

Information and entertainment

Trend: *increasing number of apparatus and electricity use*



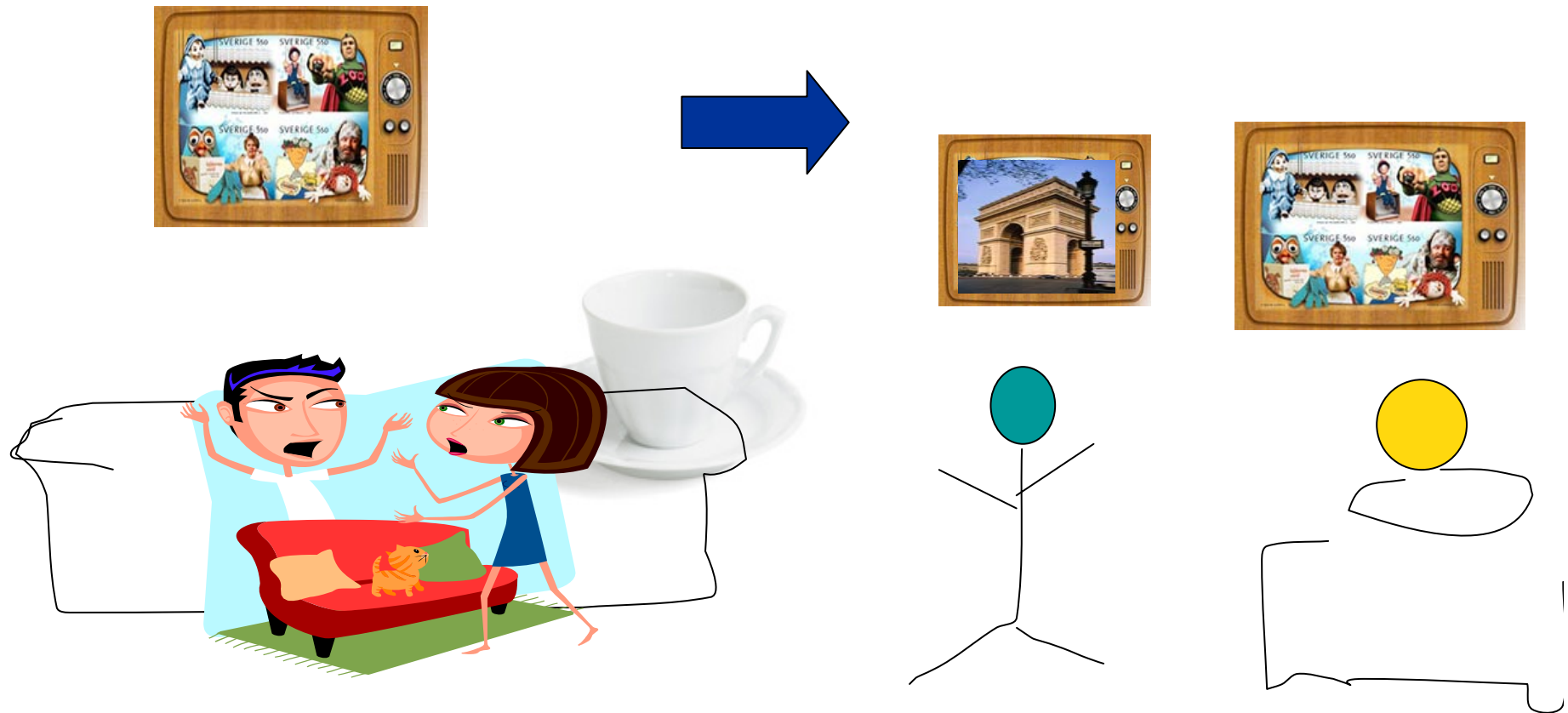
TV:s in the homes



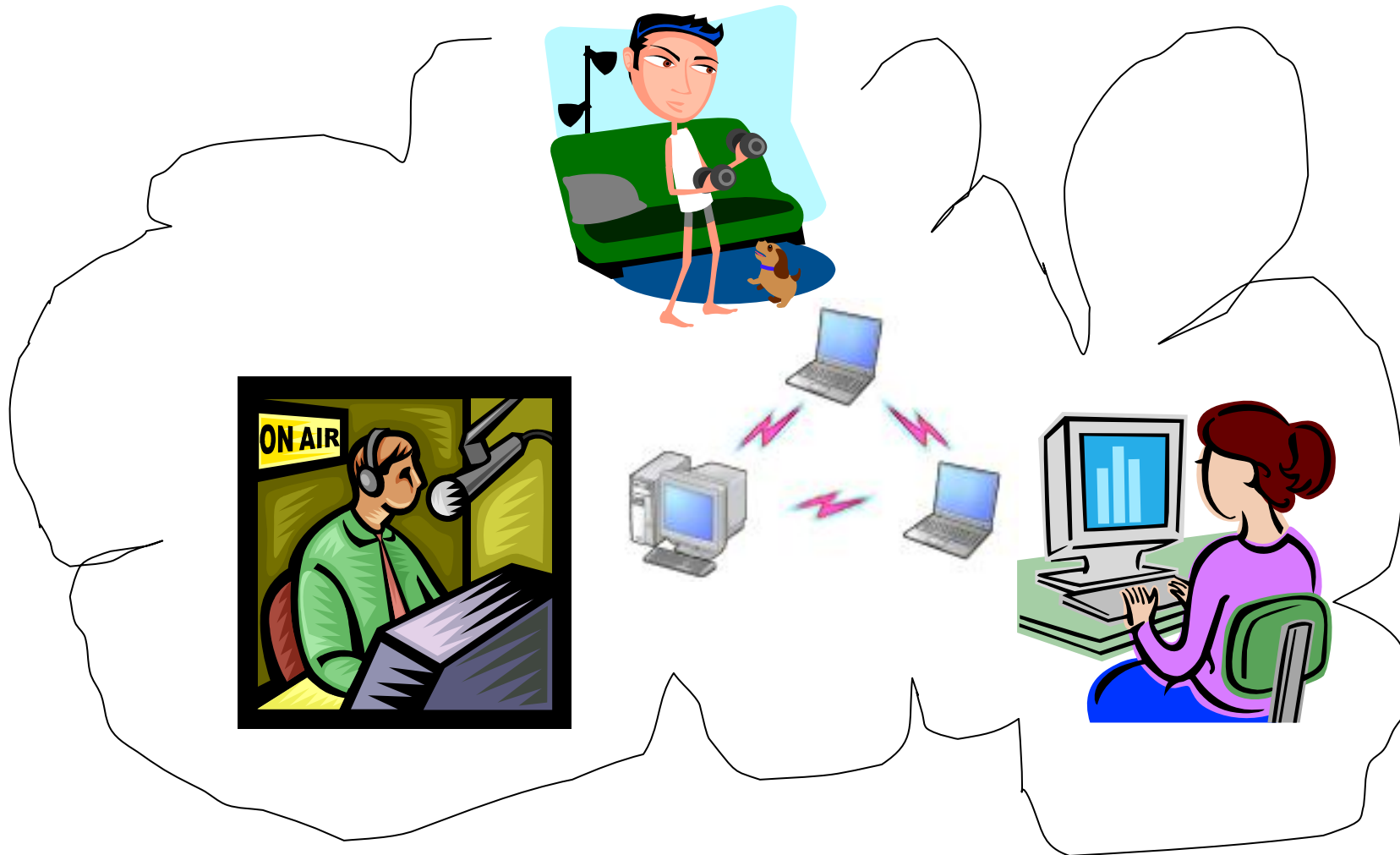
PC:s in the homes

Why..?

From "gathering around the fire" - communal use - to
parallell, individual, use



In some cases... gathering around the "cyber-fire"! Individual *double use*



All in all: Different user patterns

- **Communal use:** two or more family members use an appliance together (e.g. watching TV together)
- **Use for common goals:** one member uses appliances that serves many members (e.g. cooking the family dinner)
- **Serial use:** the same appliance is used at different times by different members (e.g. the tea-kettle)
- **Parallel use:** the same type of appliances are used at the same time by different members in different places in the dwelling (e.g. TV or PC)

Trend towards more individual use – add patterns like:

- **Individual simultaneous use** (e.g. cooking and listening to the radio)
- **Individual by-turn use** (e.g. *alternating* between TV and PC without switching off the appliance not in use for the moment)
- **Individual double use** (e.g. two or more appliances must be turned on *at the same* time to achieve the desired function).

Observation:

The *interplay* between household members is crucial:

- Competition and/or negotiation of common resources
- Is more and more solved by adding *more* resources
- Tendency from communal use to individual use
 - Ex: All must have their own set of PC, broadband, TV, stereo etc.
The electricity use increase even more...

Remaining part to be done:

Return to the households; show them the individual measurement report and discuss the results... what measures, if any, are the households prepared to do in order to reduce their consumption?

Interviews during fall 2007

Final report early 2008