

Electric Heating in Finland

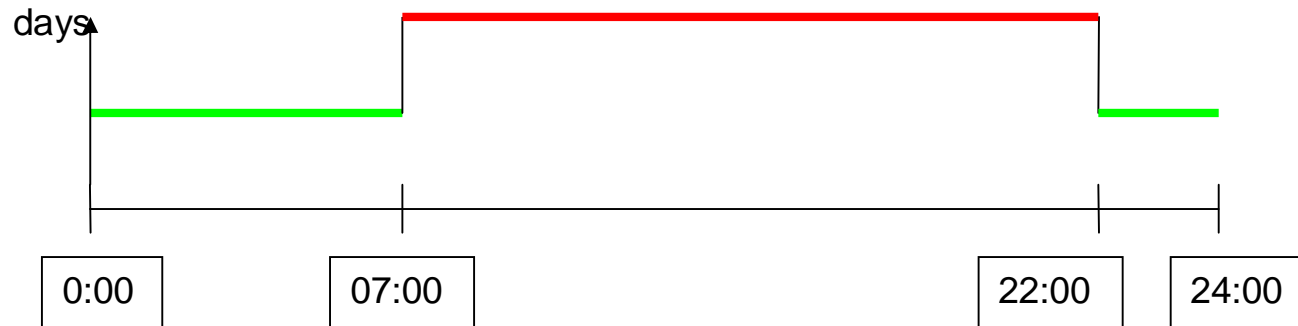
Existing Practice

Slides: Seppo Kärkkäinen

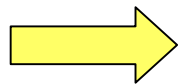
Demand response of electric heating in Finland Before the competition

Time of use tariffs are applied long time since the beginning of electric heating in Finland in the beginning of 1970s (**with fixed charge depending on the fuse size**)

Electricity price in working



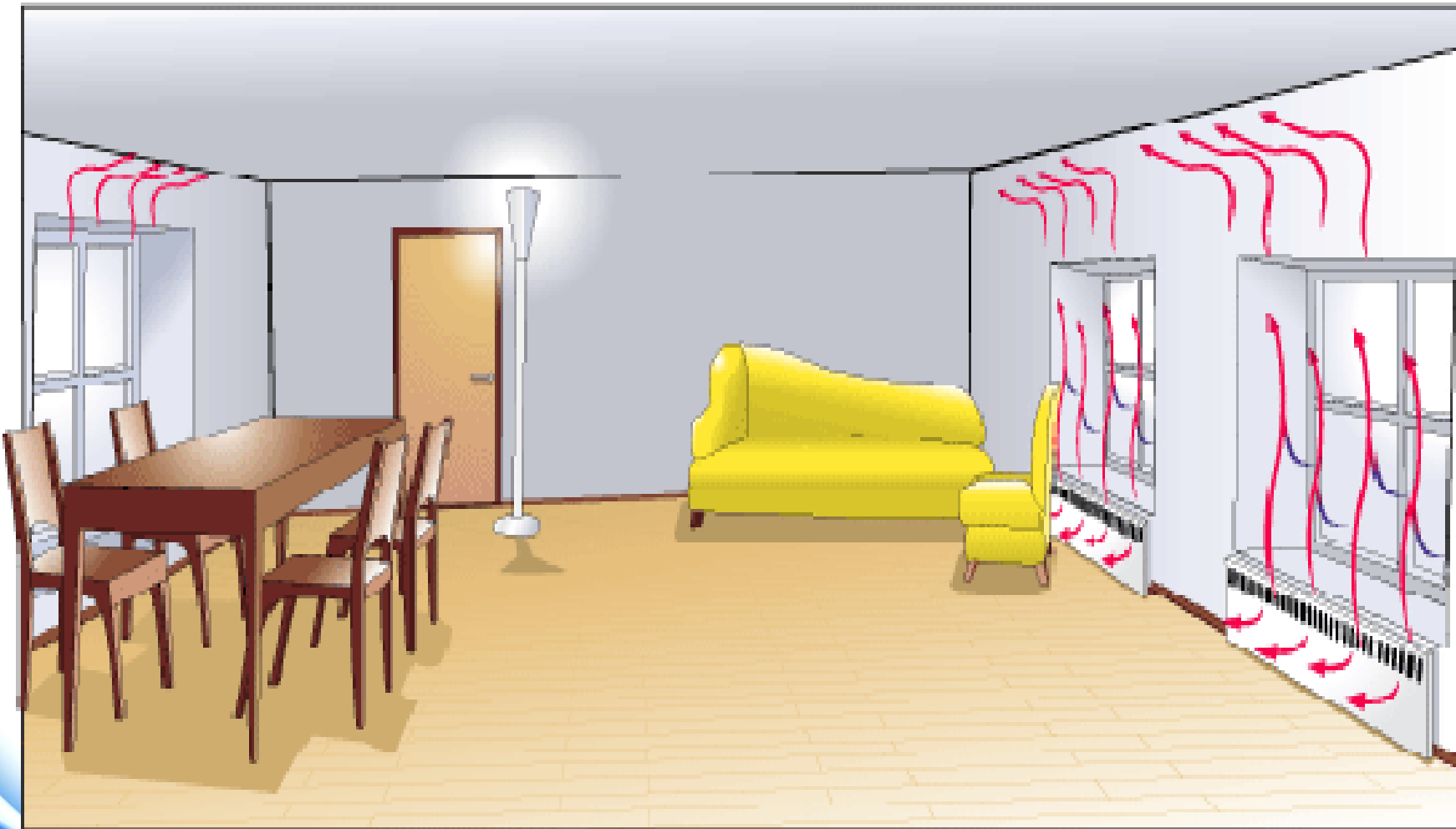
- Typical for working days
- Weekends often low-priced
- Also seasonal (winter – non-winter) variations possible



Development of new technologies:

- efficient heat insulation of houses, triple windows, heat recovery from ventilation
- use of meters with 2 – 4 registers for different price zones
- domestic hot water production in night time (heat storage)
- switching off part of heating when sauna (8 – 12 kW) is switched on (to decrease fuse size)
- direct load control of heating loads by using ripple control or DLC (due to the high incentive in whole sale tariffs)
- development of new technical solutions for electric heating (actual heating systems and heating control systems inside the house)

Technical solutions: Traditional radiator heating (direct resistance heating)

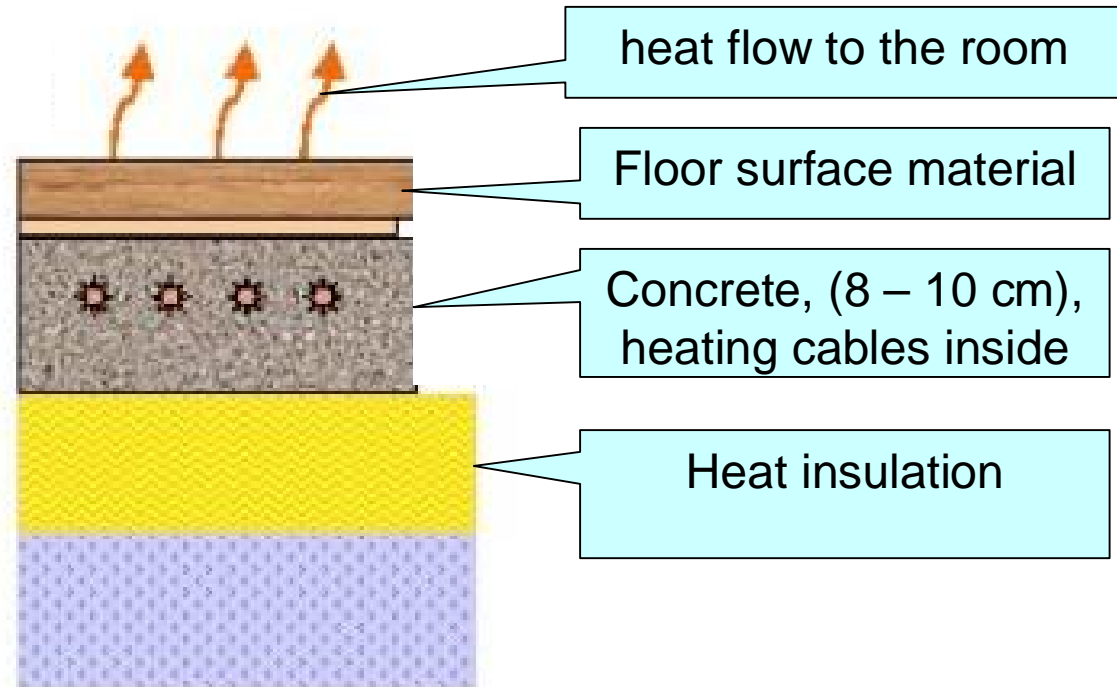


Technical solutions: Floor heating

Principle



Floor heating with storing capability

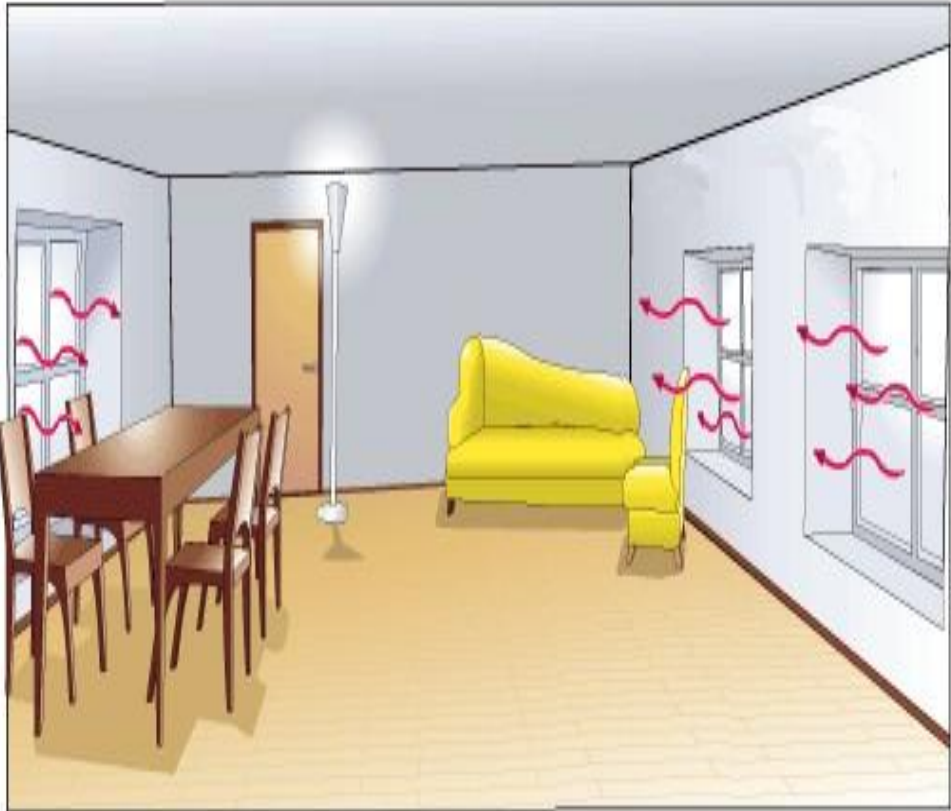


Technical solutions: Additional solutions to floor heating

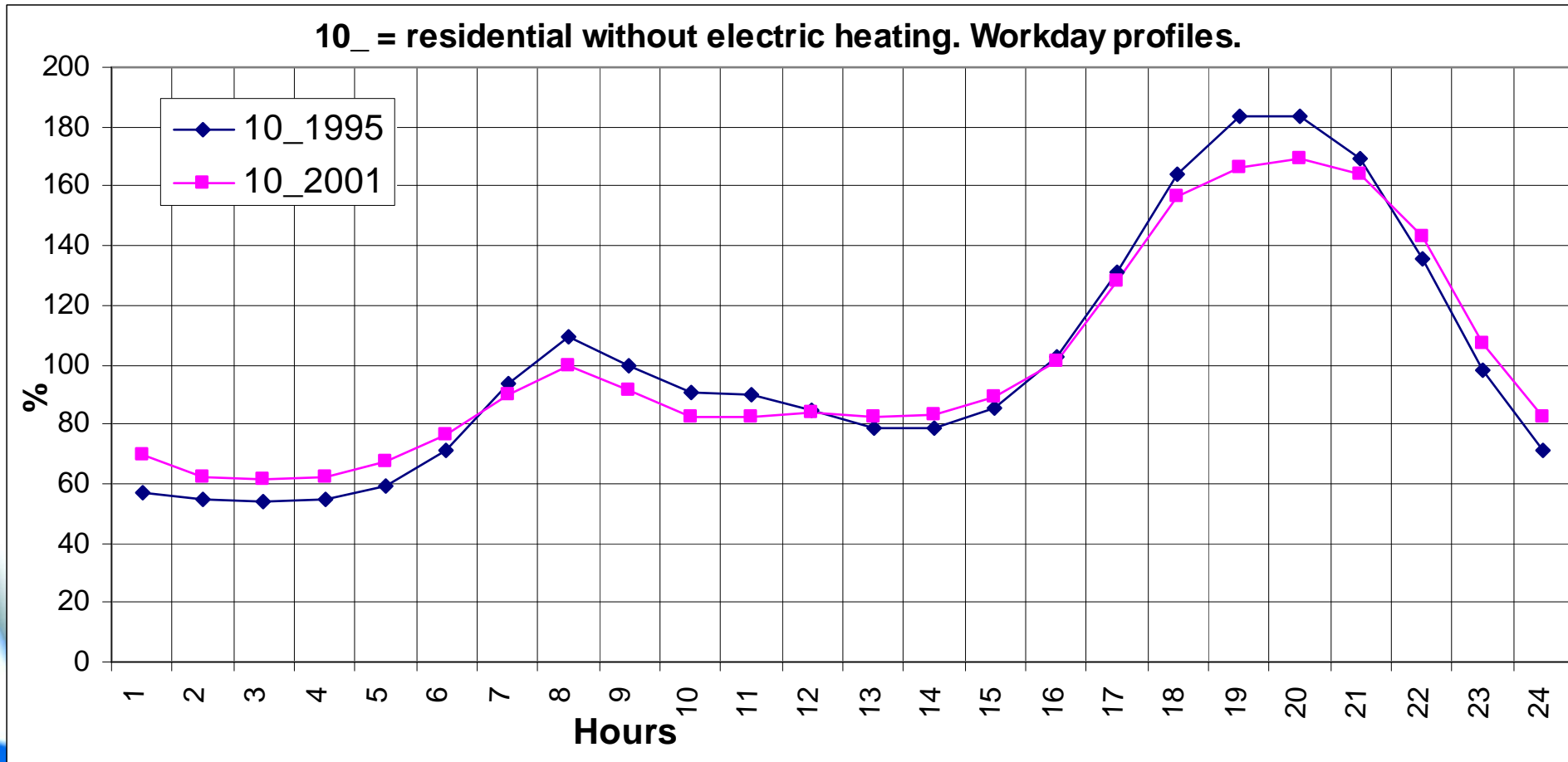
Roof heating



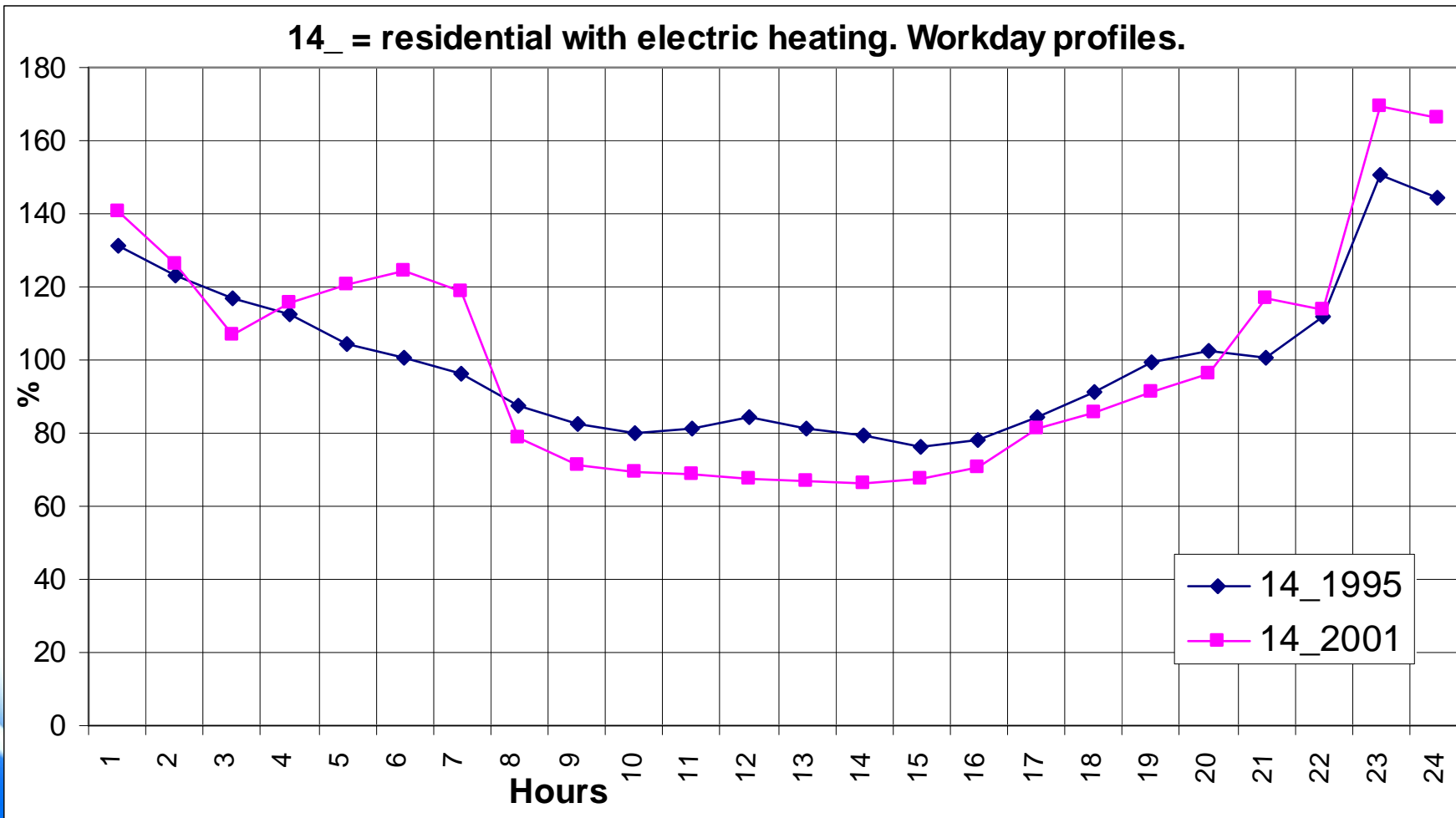
Window heating



Effect of pricing: average load profiles of residential customer without electric heating (flat tariff)
Average load profile

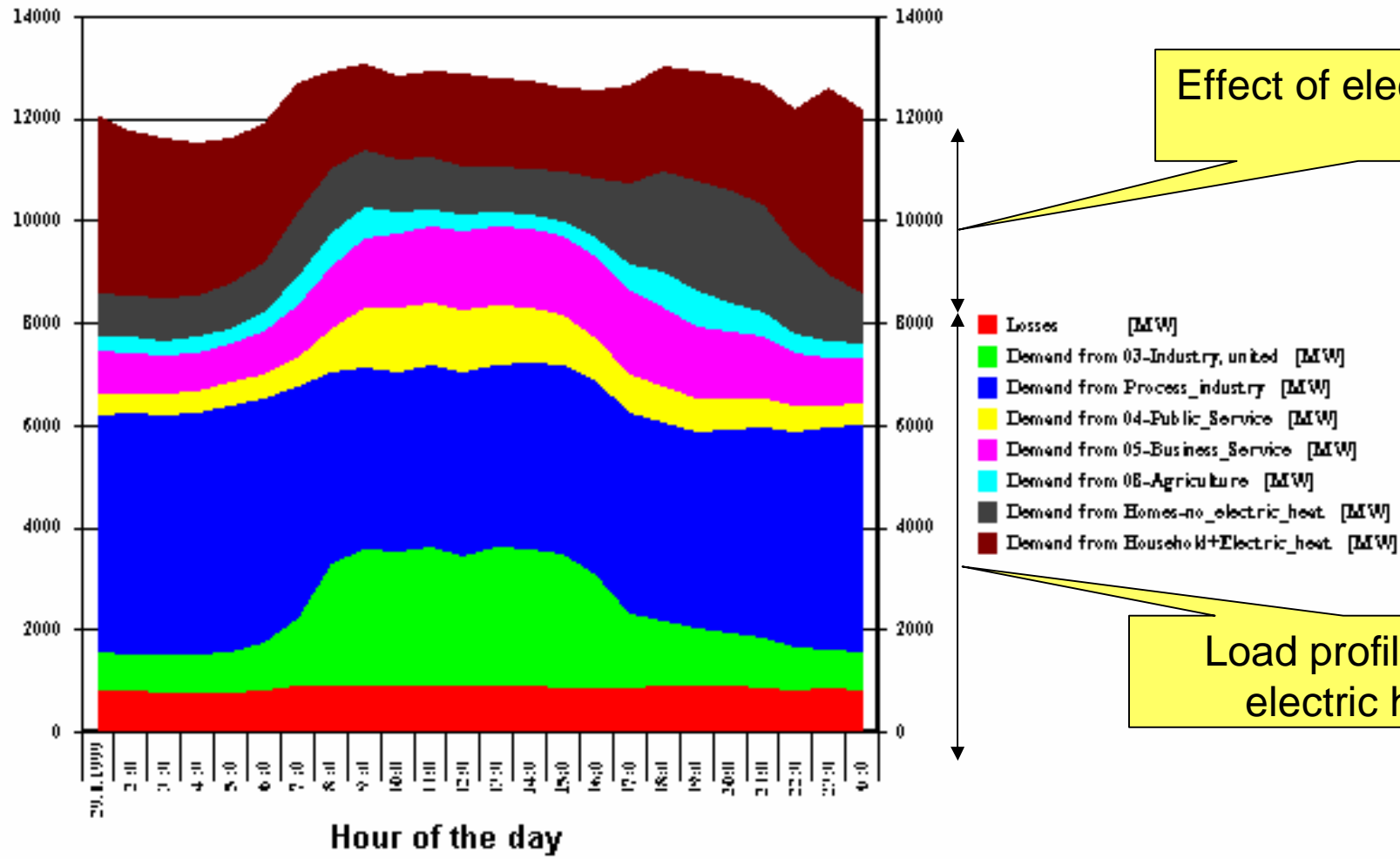


Effect of pricing: Average load profiles of small customers with electric heating
Large share of customers have TOU-pricing



Effect of demand response of electric heating in Finland

Peak load curve segmented into customer categories

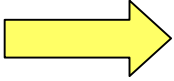


Effect of electric heating

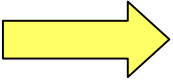
Load profile without electric heating

Effect of competition and unbundling on DR in electric heating in Finland

Unbundling of network business and retail business of distribution companies

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- network tariffs usually still include TOU-structure, may have changes in the future
 - retail pricing has different schemes depending on retailer (TOU still applied)
 - no incentives for direct load control (disappeared)

New challenges of DR in electric heating in Finland

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- The potential based on TOU-pricing is already exploited. New ideas needed
Next steps:
- real-time pricing based on the spot-price
 - automated meter reading with hourly bases
 - new type of load control: selling loads back into the market (aggregators needed)?