



FINLAND FUTURES
RESEARCH CENTRE

Energy scenario construction for a village

DEEM training

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Village electricity use

How to construct a scenario



- What are the factors which affect the electricity use?
- How these factors can be assessed?
- What are the important factors from the point of view of electricity system planning?
- How the factors may change in the future?

Electricity system planning



- Different programmes available for electricity system planning
- HOMER is a system for small scale village level system planning
- To be able to use the planning models you have to know about the electricity demand and different aspects related to it (like load curve)

Electricity demand

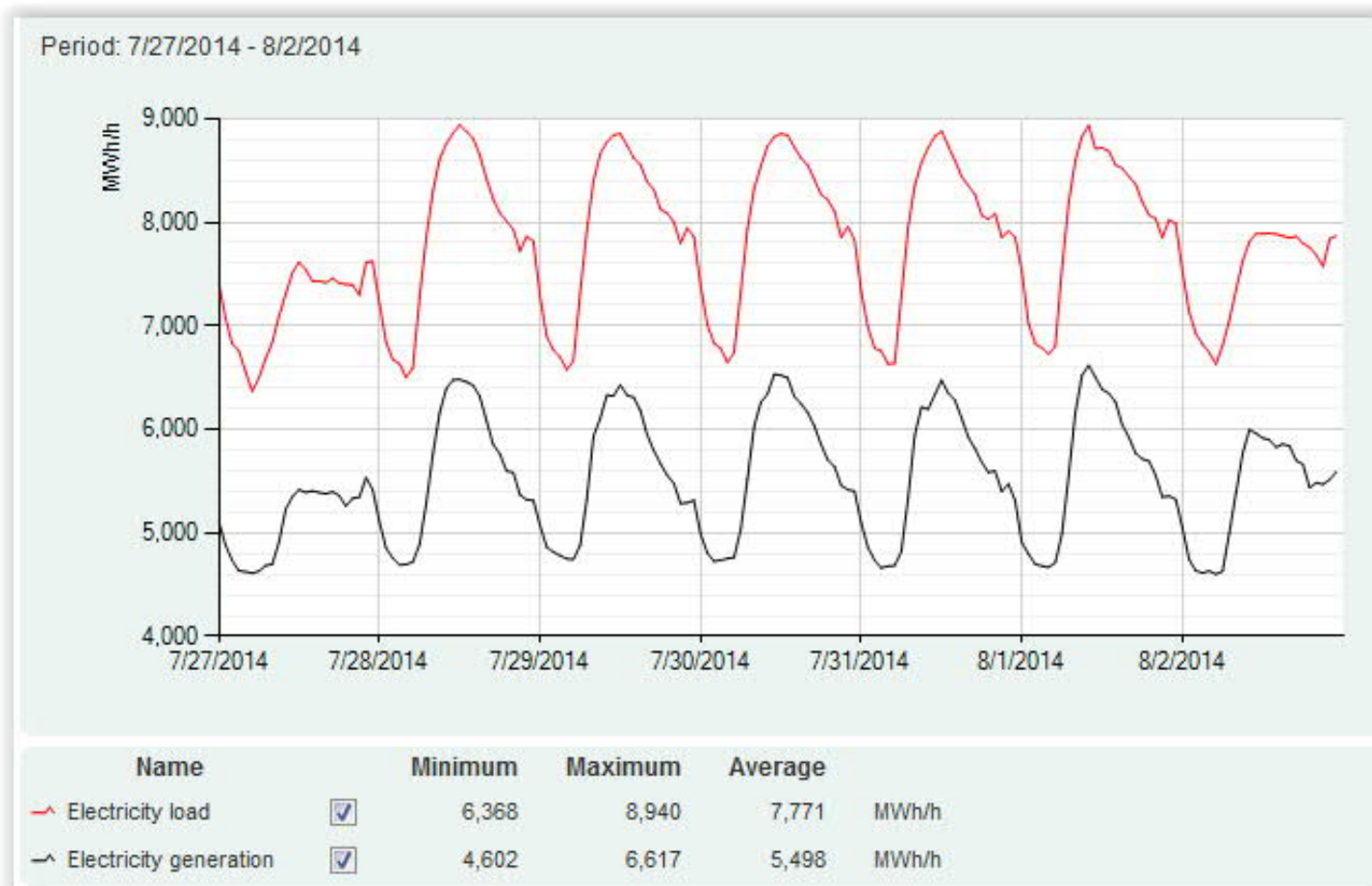


- Factors affecting the demand:
 - Size of the village
 - Number of households
 - Household is usually seen as the energy consuming unit
 - Household activities that need electricity
 - Equipment and their properties
 - How long they are used (per day)
 - Industrial activities (carpenter, rice miller, etc.)
 - Service activities (cafe, hairdresser, school, health center, etc.)

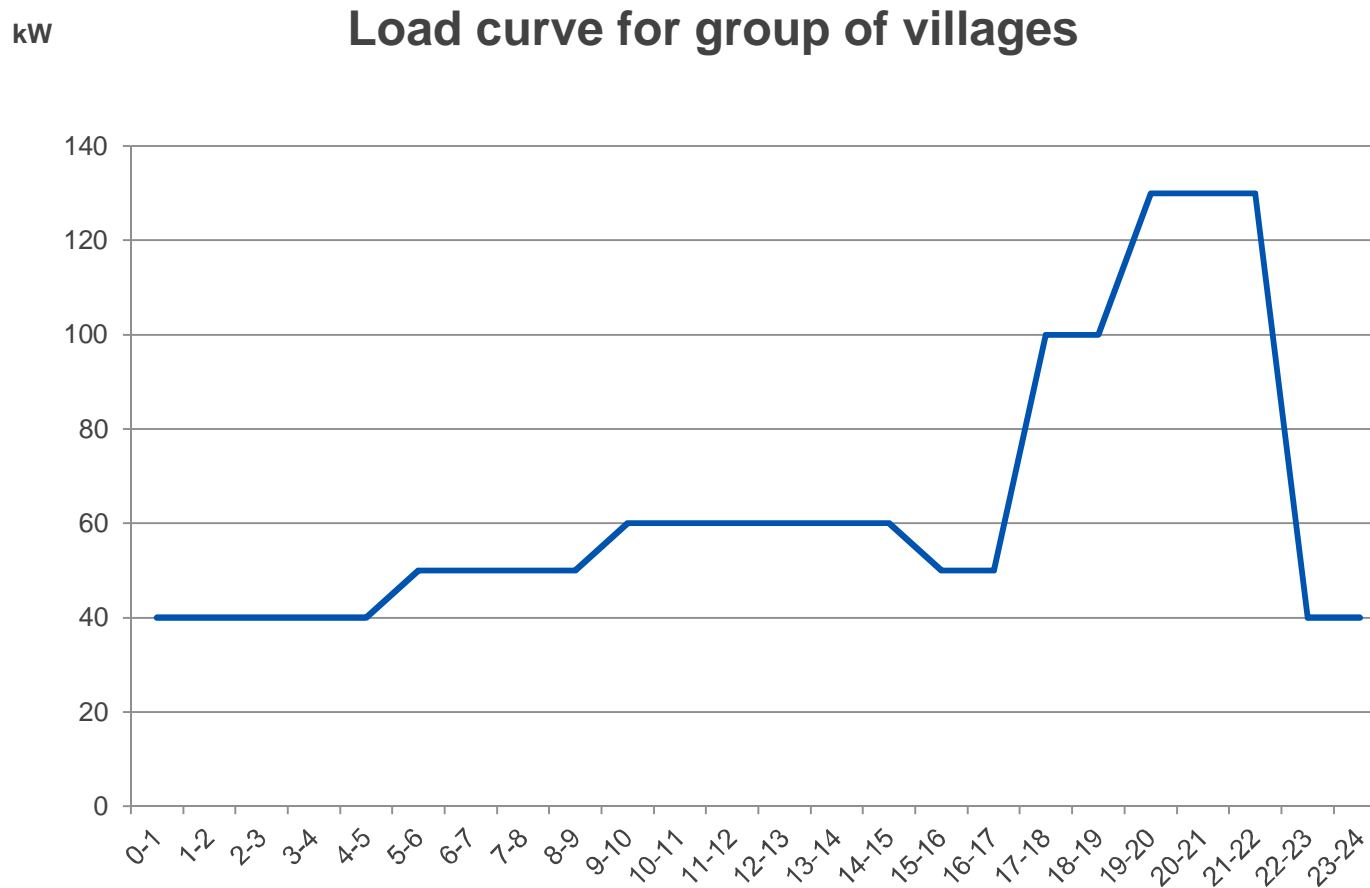
Electricity system properties

- Electricity supply must always match the consumption
- Production must be controlled to equal the demand in order to keep the frequency and voltage at constant level (not to damage devices)
- Demand varies considerable during the day, week and season

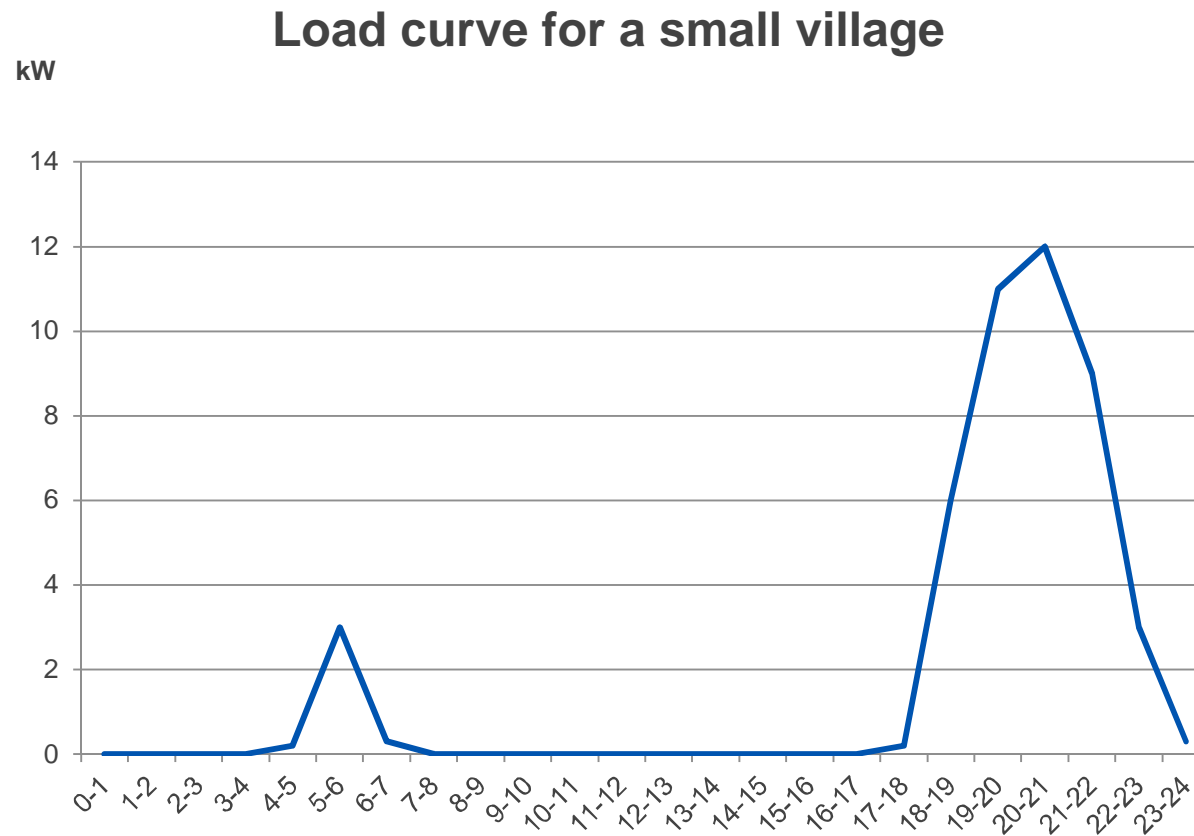
Electricity demand in Finland in one week



Load curve for a group of villages in Cambodia



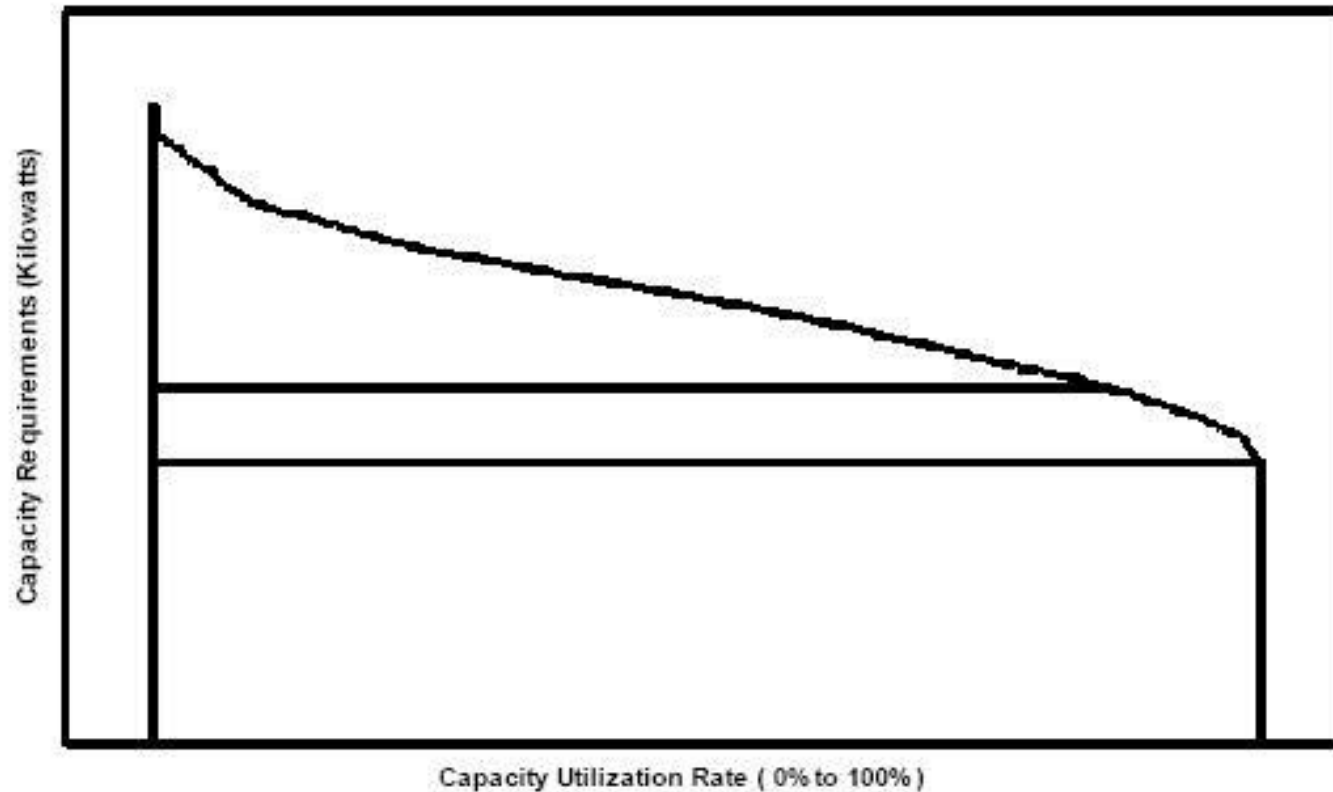
Load curve for a small village



Factors affecting investment planning

- Peak load (highest demand in kW) and its duration
- Base load or lowest demand and its duration
- The load duration curve (LDC) is used in electric power generation to illustrate the relationship between generating capacity requirements and capacity utilization

Load duration curve



A load duration curve illustrates the variation of a certain load in a downward form such that the greatest load is plotted in the left and the smallest one in the right. On the time axis, the time duration for which each certain load continues during the day is given

How to get information of electricity demand



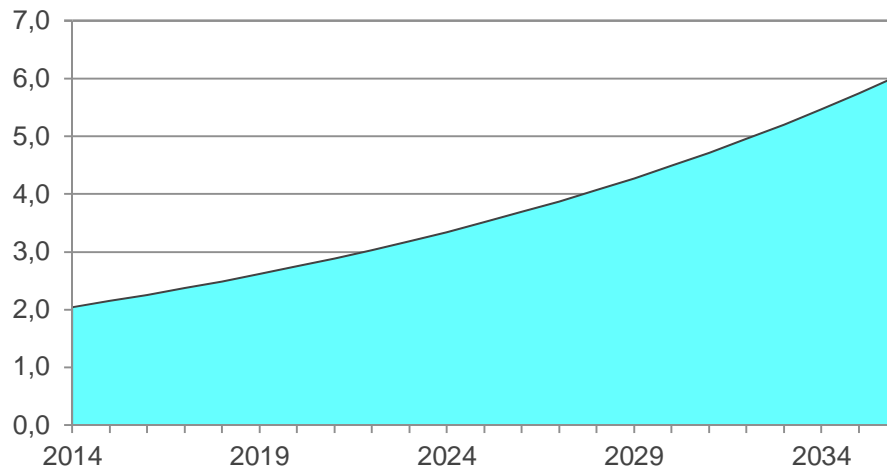
- Make assumptions of household (and other) consumption
- If the electrification is in the planning phase you have to make assumptions (no data exists), but you can get information of already electrified villages
- Carry out a survey, where energy use is asked in detail (survey will be discussed in next lectures)

Excel based calculation of potential electricity demand

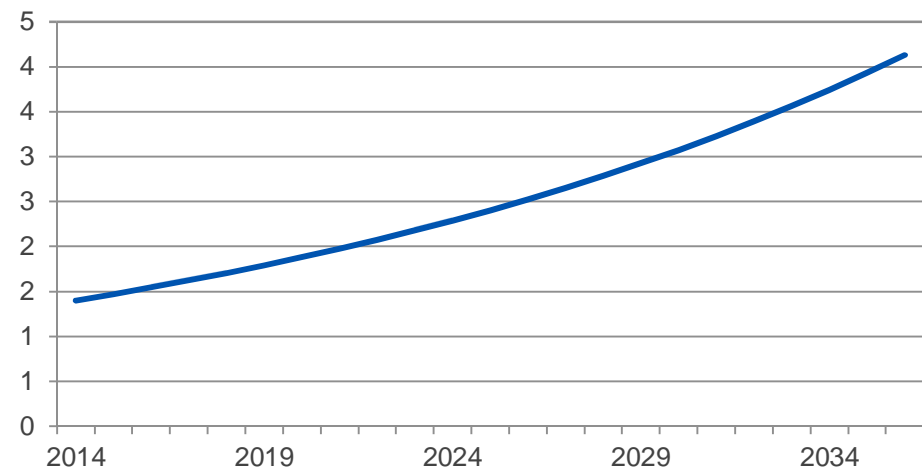


Simple results

Annual electr cons. MWh, lamps

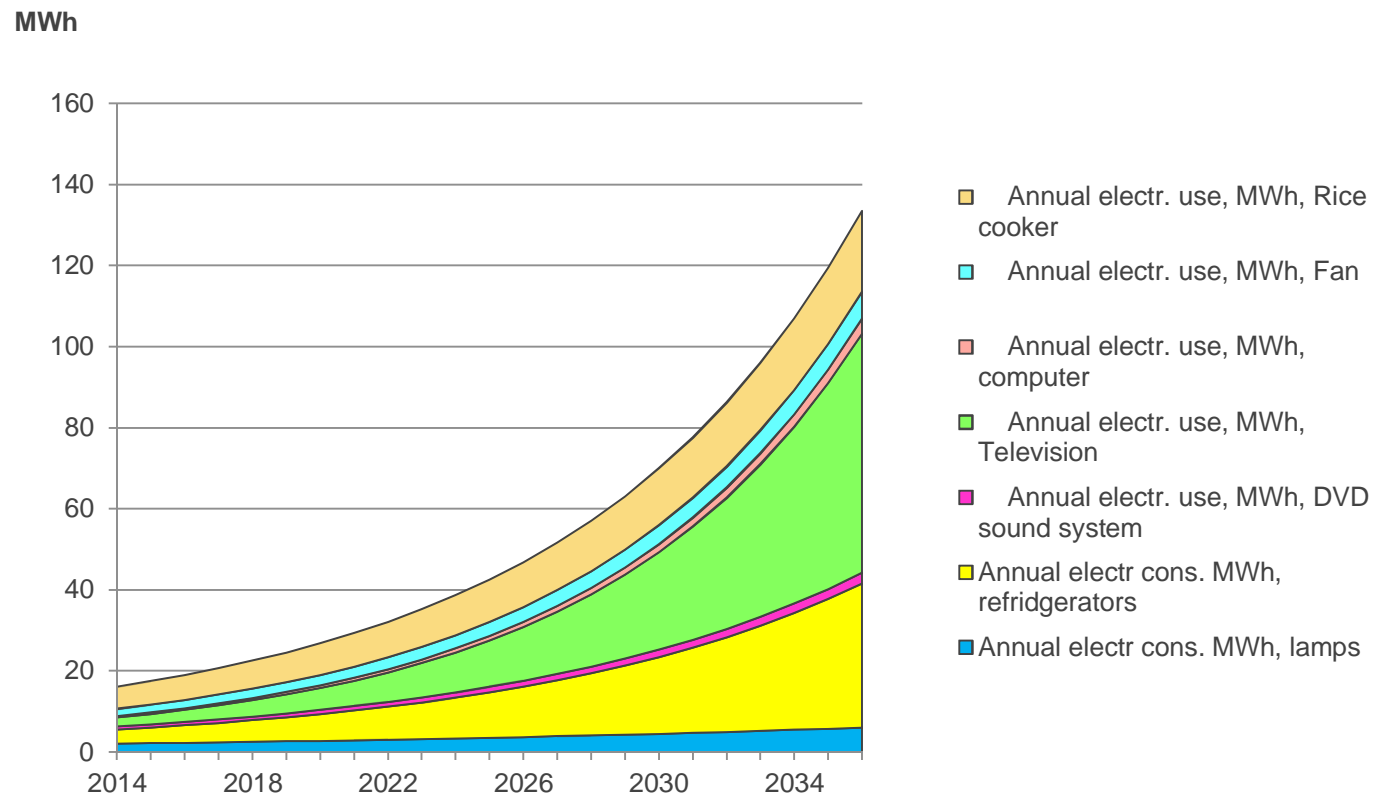


Power demand kW, lamps

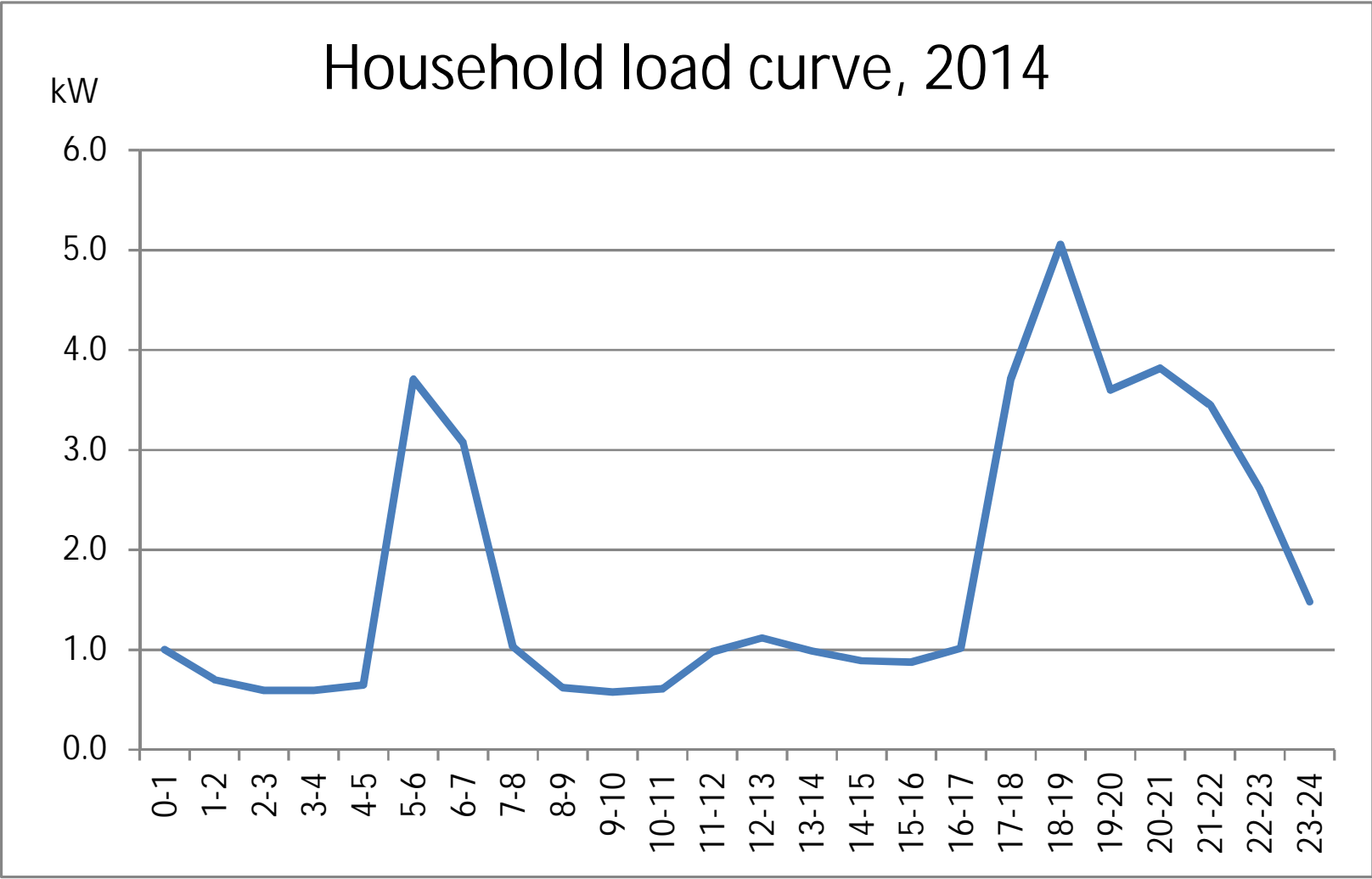


Simple results

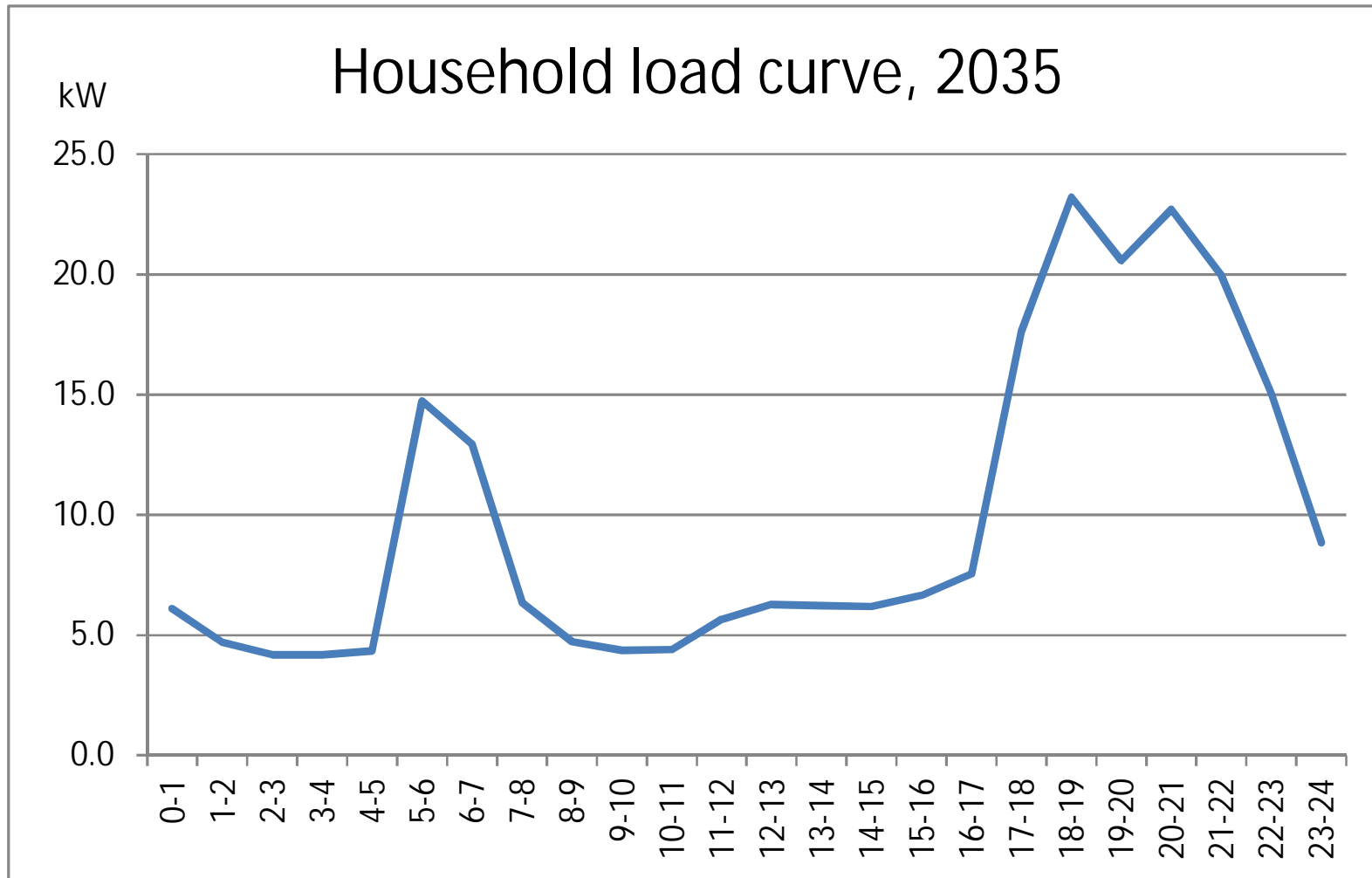
Household annual electricity consumption



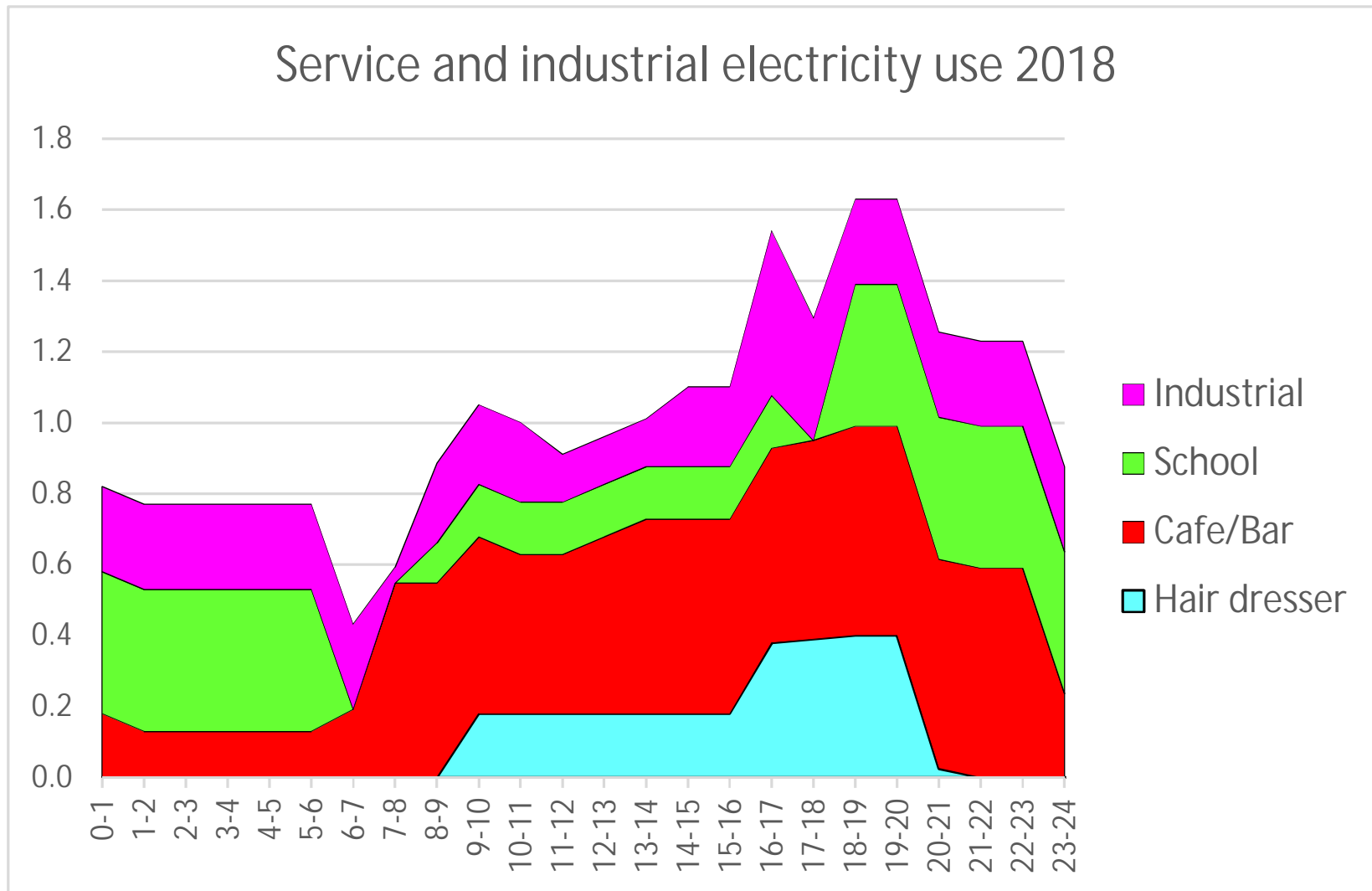
Household load curve



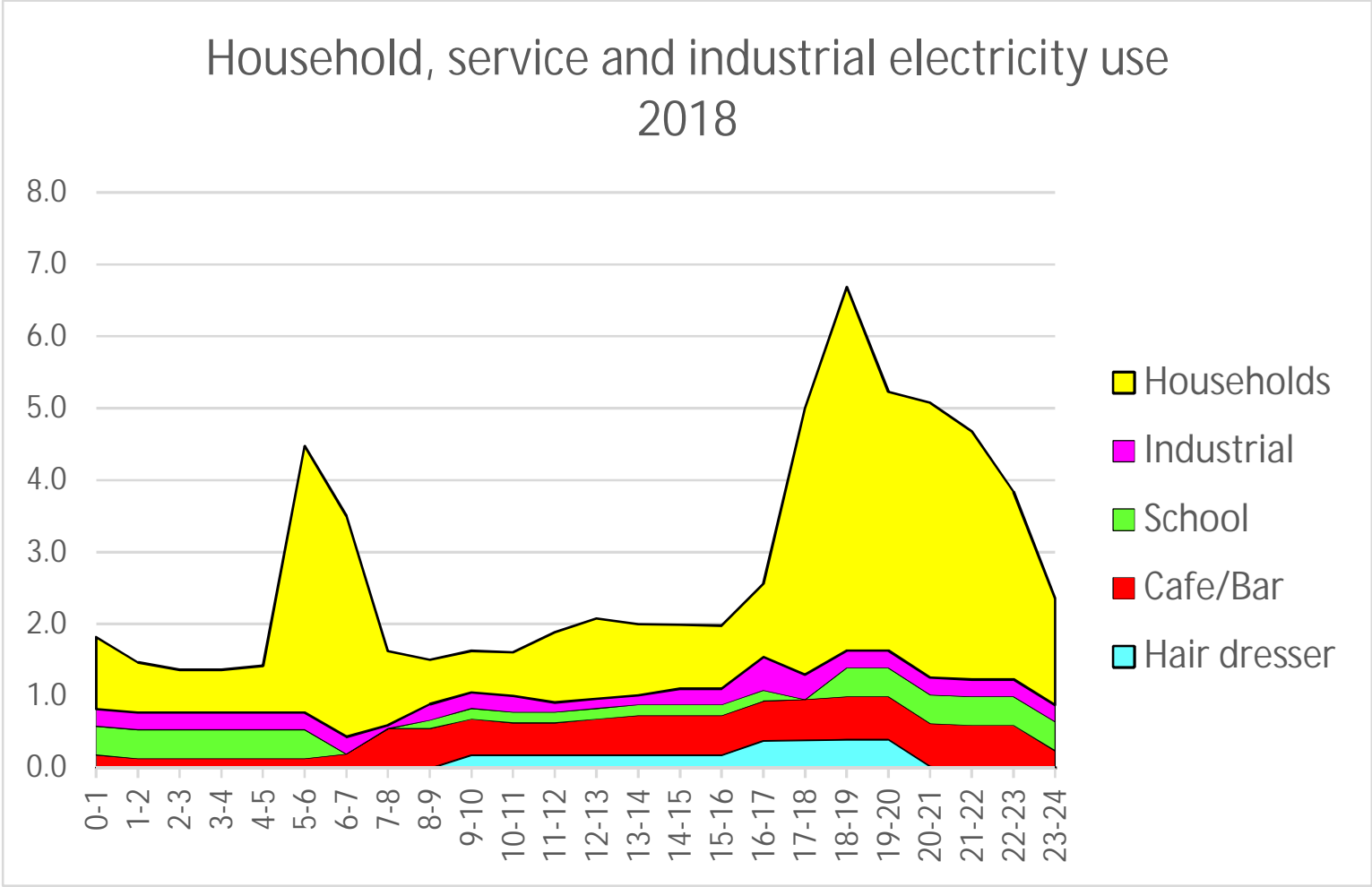
Household load curve



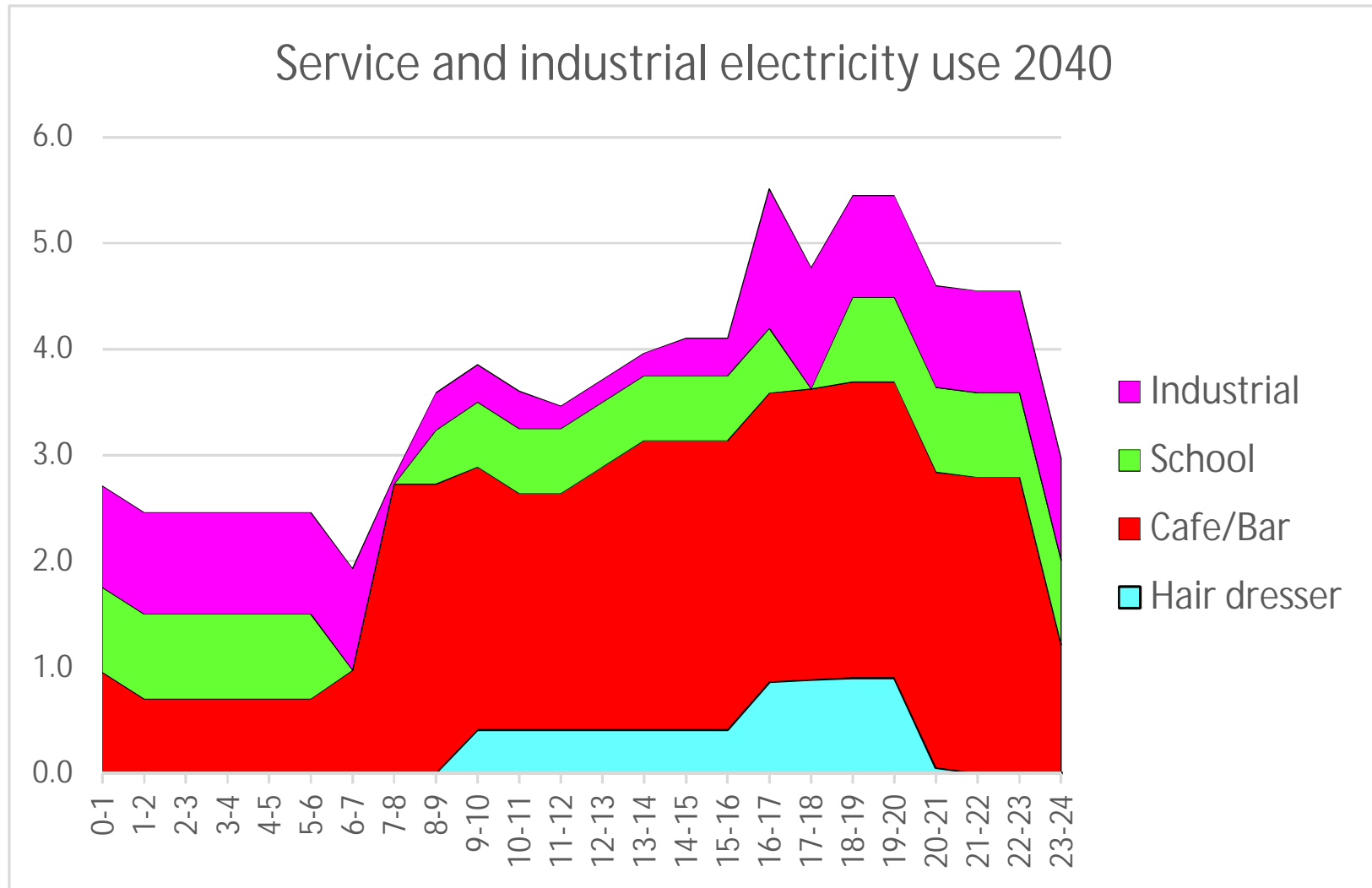
Village service and industrial load curve



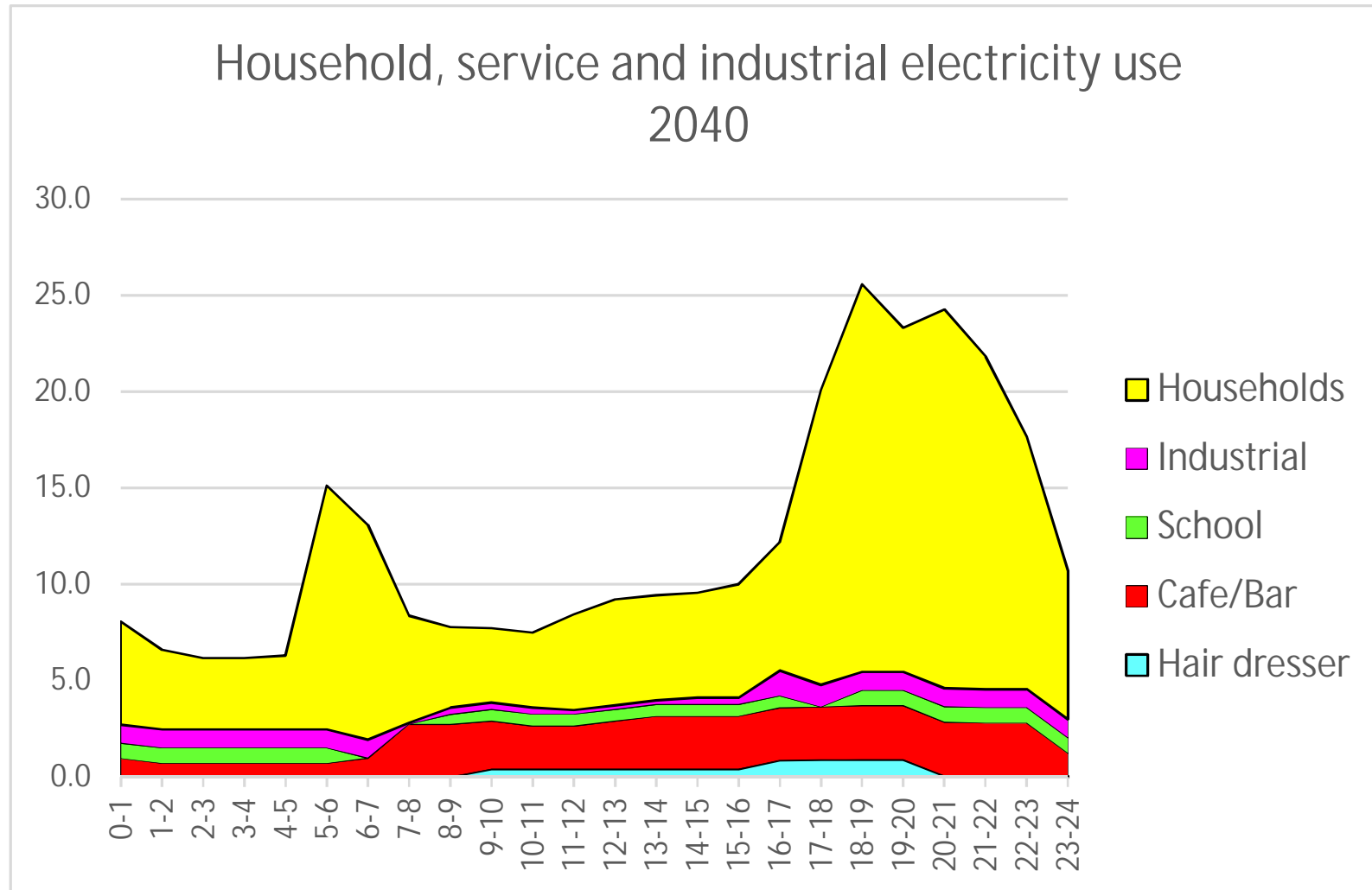
Household, service and industrial electricity load curve in a village



Village service and industrial load curve



Household, service and industrial electricity load curve in a village



Case villages



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Thank you



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