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Regulatory and Energy Assistance

Load research and profiling in the context of energy efficiency

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REAP- Projekat regulatorne i energetske asistencije u BiH

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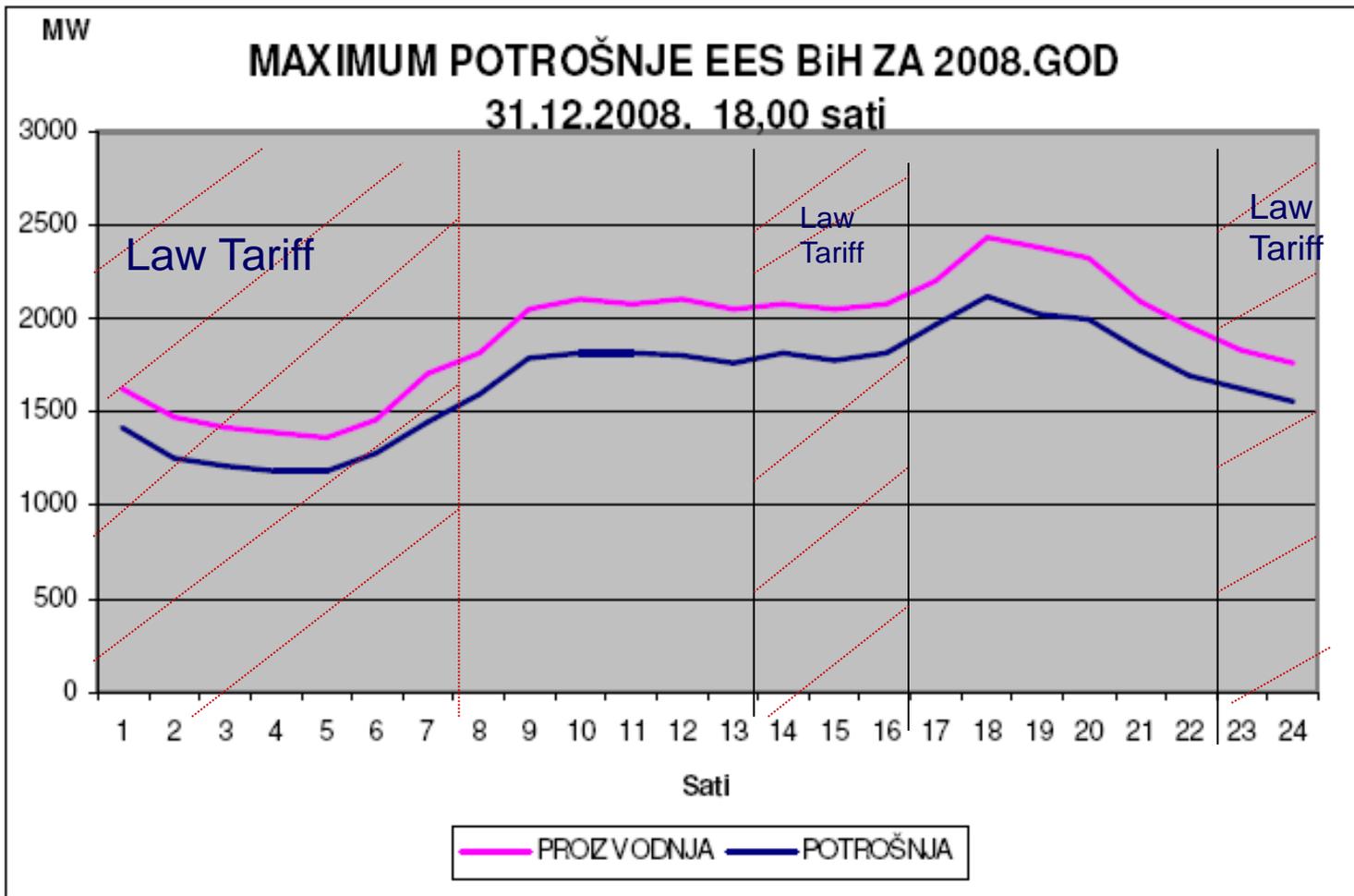
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Bosnia and Herzegovina (BiH) Regulatory and Energy Assistance Project (REAP)
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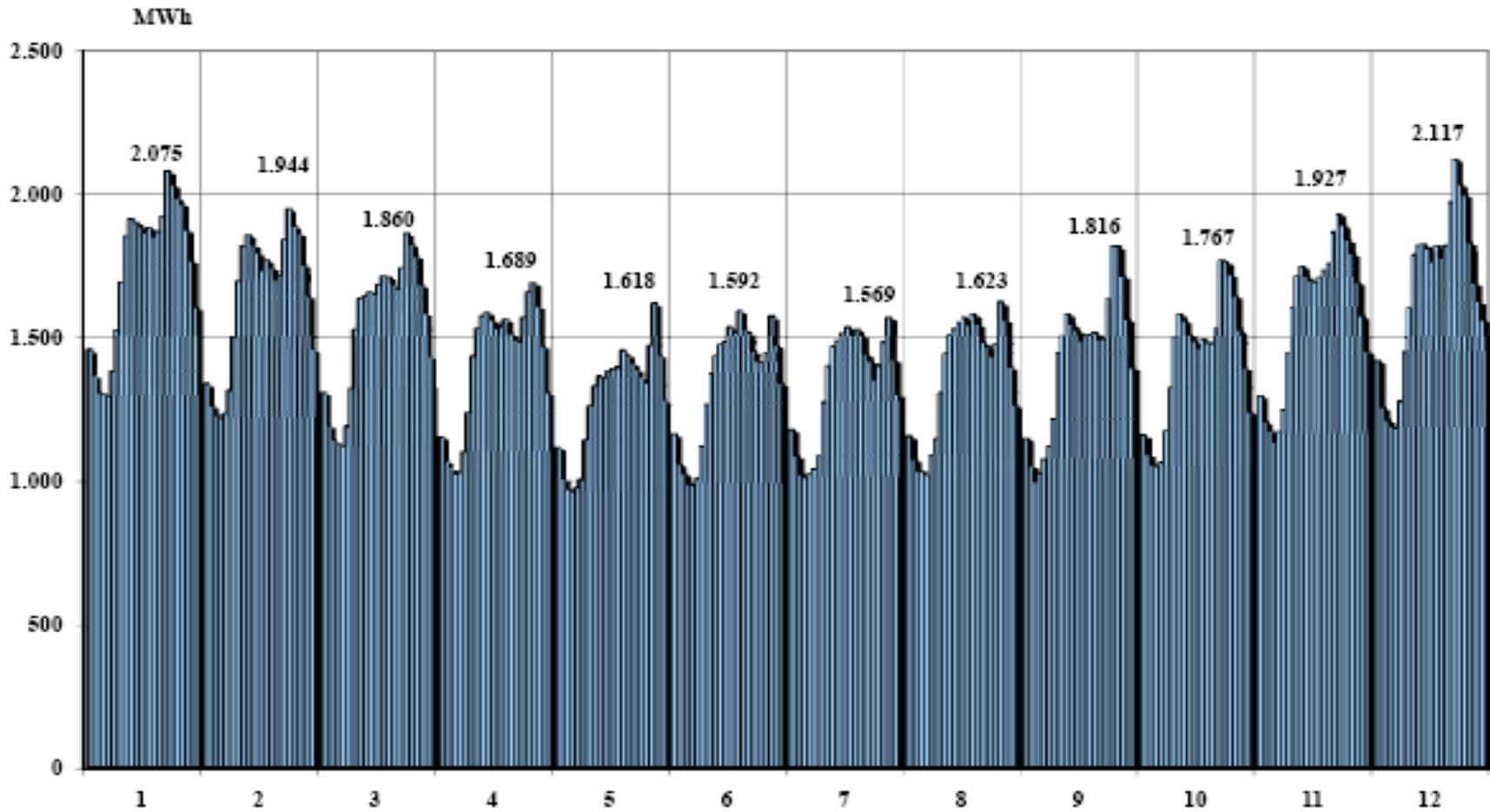
What is Load Research?

- **Load research is the study of customer electricity usage patterns at a very granular level, typically hourly data, to obtain a better understanding of how customers use electricity.**
- **Electricity pricing is complex because electricity cannot be economically stored.**
 - **Therefore, understanding customer consumption patterns and peak demands is important.**

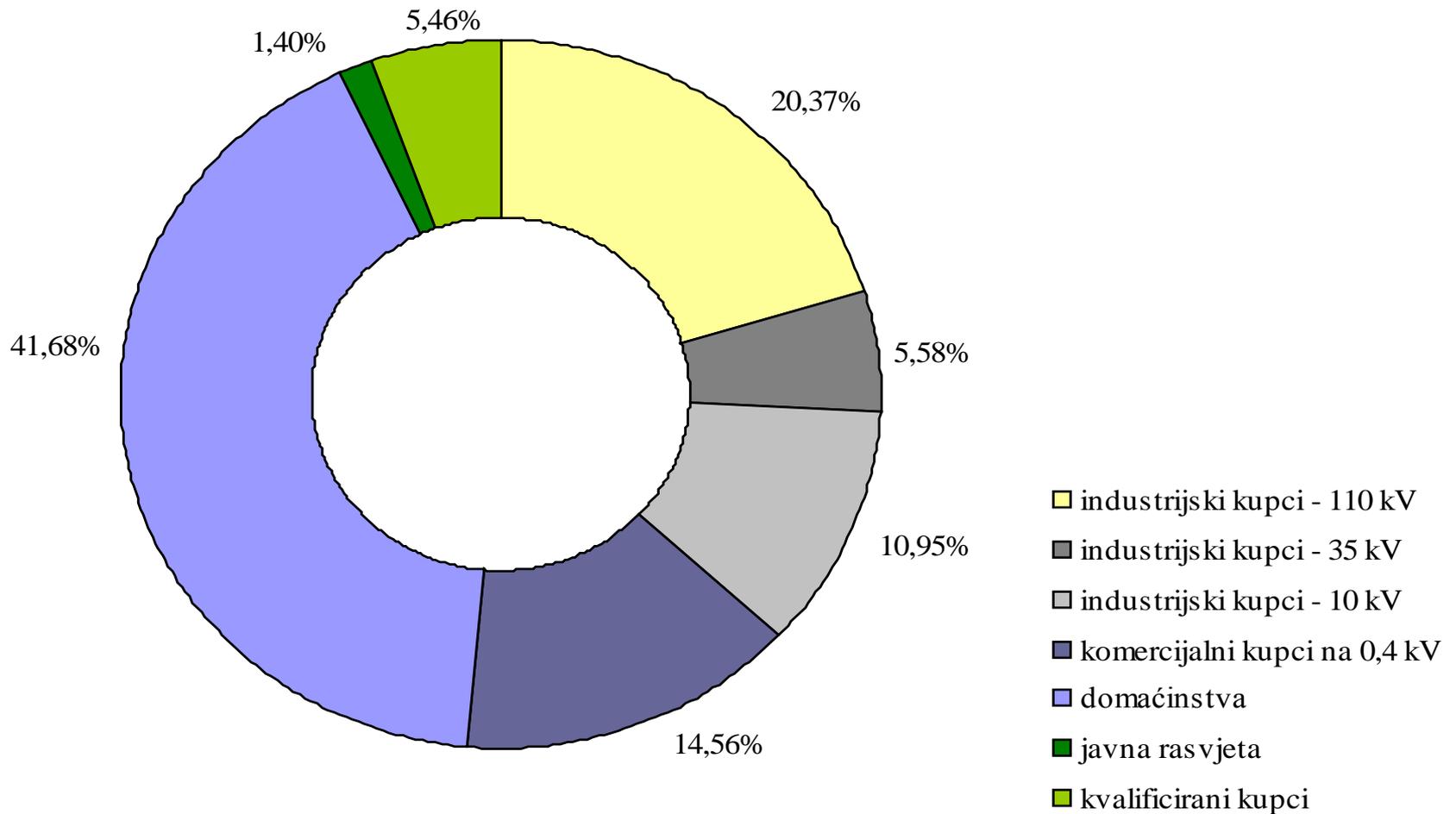
Maximum daily consumption in BiH on 31.12.2008



Characteristic daily load curve in 2008



Electricity consumption in BiH (%)

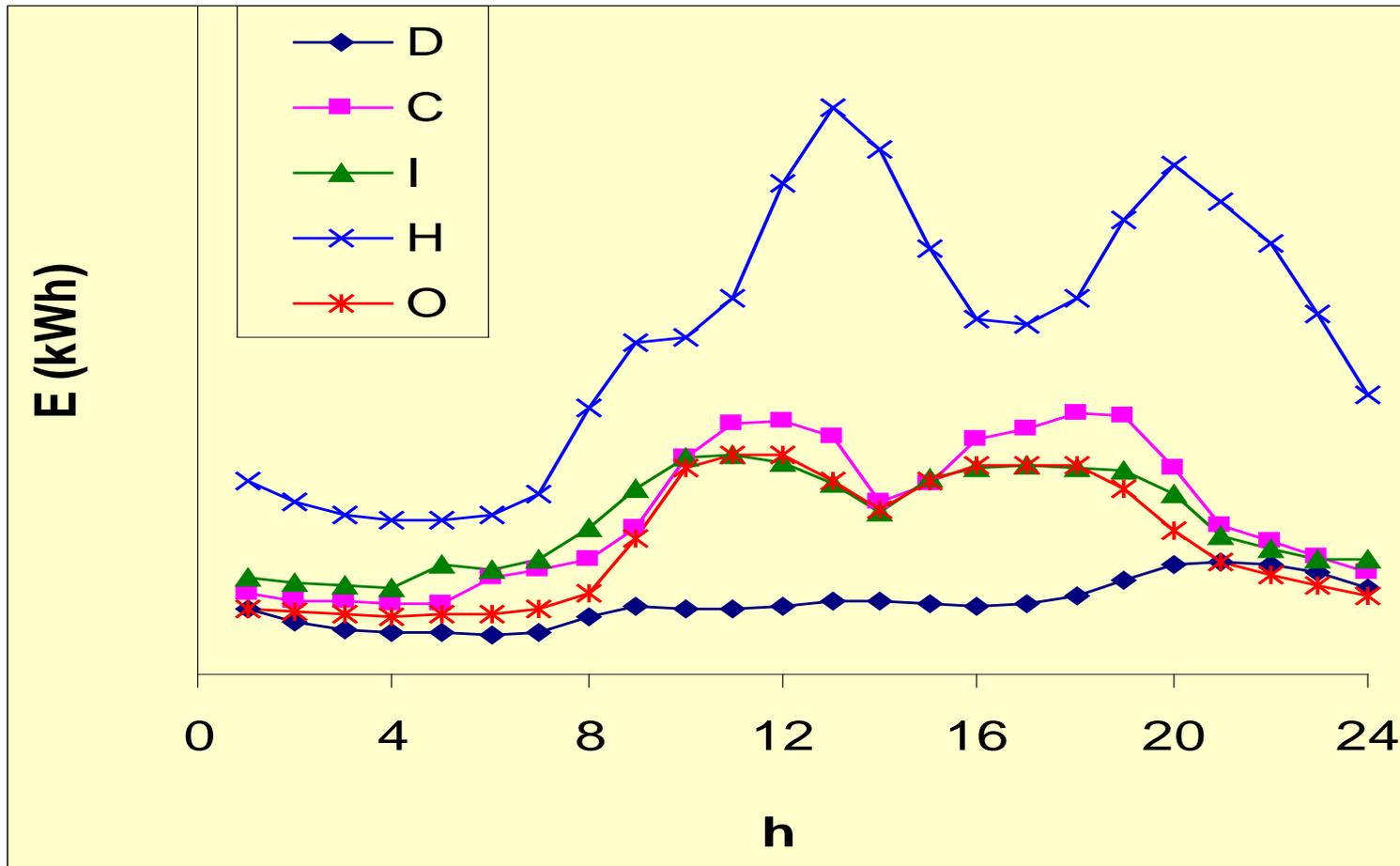


What is measured in power system in BH and how many customers are there?

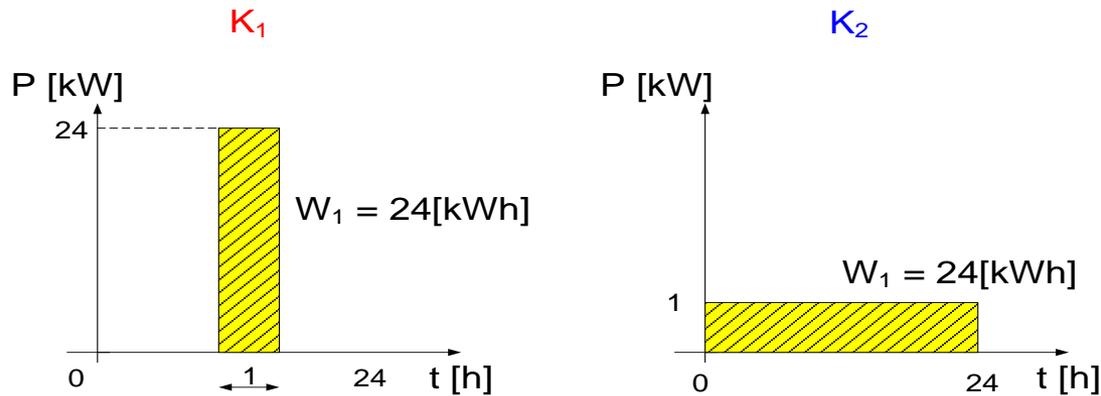
Category, group of consumption		Metering of active energy	Metering of reactive power	Metering of capacity
Customers 0,4 kV				
Household	I tariff group	X		
	II tariff group	X		
Other consumption	I tariff grup	X	X	X
	II tariff group	X		
	III, IV, V tariff group	X		
Public lighting		X		

	110 kV	35 kV	10 kV	0,4 kV			Total
				Other consumption	households	Public lighting	
Number of customers by categories	13	75	1.289	104.736	1.312.034	7.323	1.425.470
Part of customers by categories				7,3 %	92 %	0,5 %	
Customer share at 0,4 kV level				99,9 %			

Dijagrami opterećenja kupaca na NN-u



Why is this important?



- Customer pays all costs: Price = Energy Price + Capacity Price
- If capacity is measured then: Price = Energy Price x (1+k)
- For these two customers required distribution capacity is 25 kW
- If capacity is not measured both customer pay the same price because k is constant

Actual costs are not properly allocated – What price signals are sent to customers?

Price signals and rational energy usage

Price signals must:

- Assist in properly allocated costs to those who really cause them;
- Properly allocated costs → Rational energy consumption → Reduction of green house gases

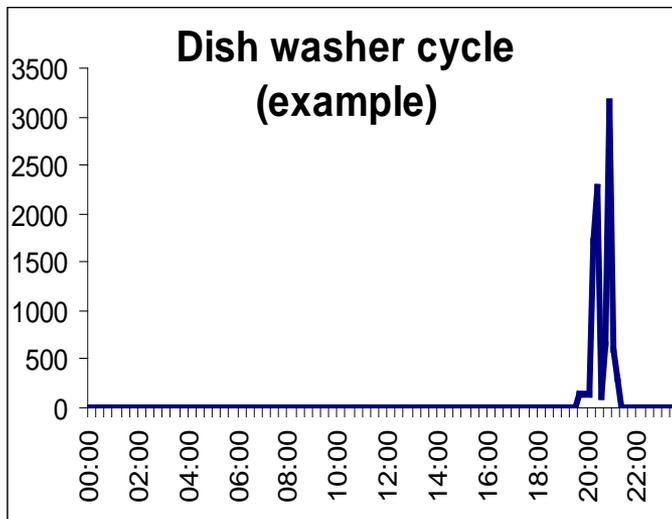
Load diagram enables more precise allocation of costs for operation of an Electricity System – BiH does not have it yet

How others do it?

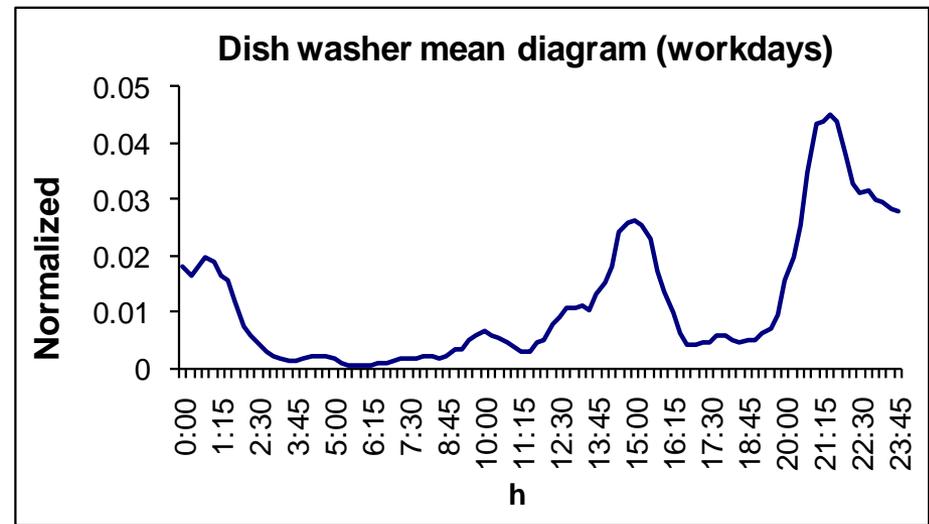
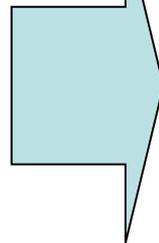
- **Installation of 1,4 million meters to measure capacity**
- **Why metering for a load diagram is being performed on samples – characteristic customer samples**
- **There are sampling methodologies, metering, data processing and customer classification according to load diagram characteristics**
- **Metering is performed during a period of 12 months on approximately 1000 samples selected in advance**
- **The result is load curves for customers on 0,4 kV voltage level**

How others do it?

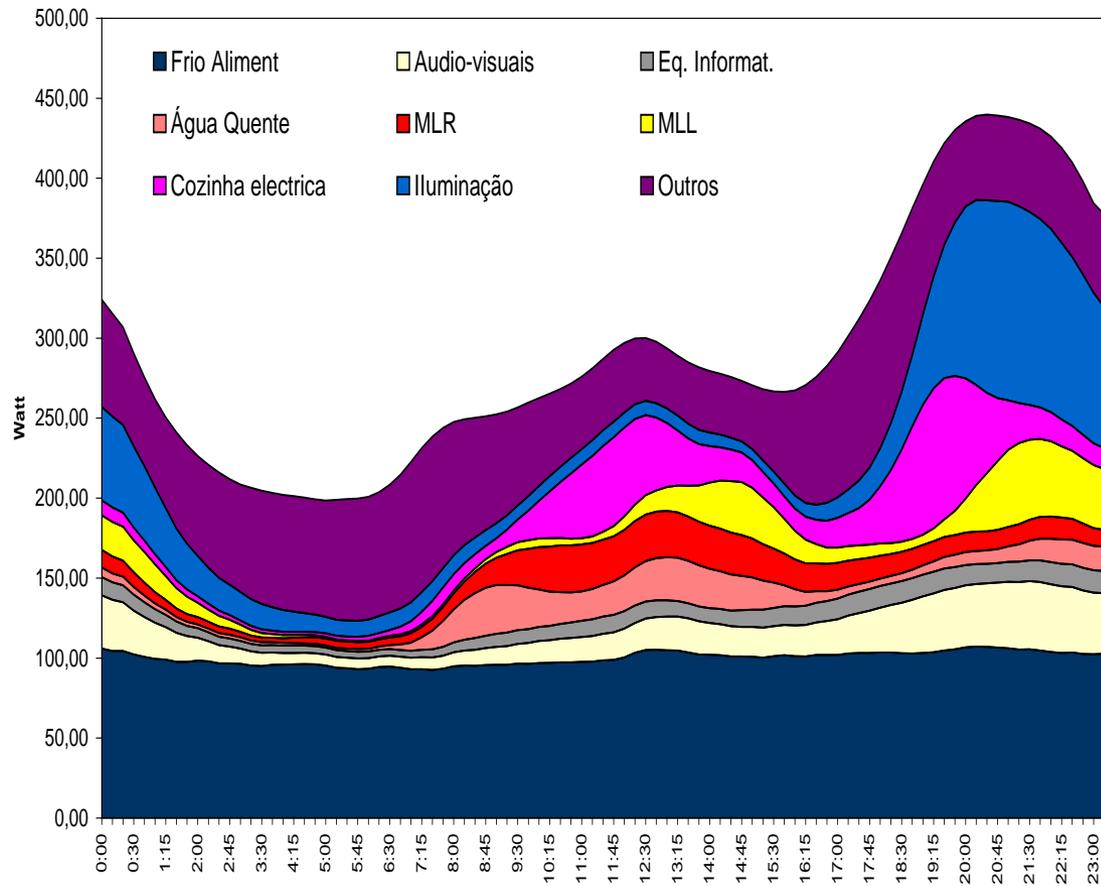
- Customer polling on the manner of electricity use
- Consumption of specific devices is being measured, for example, a dish washer



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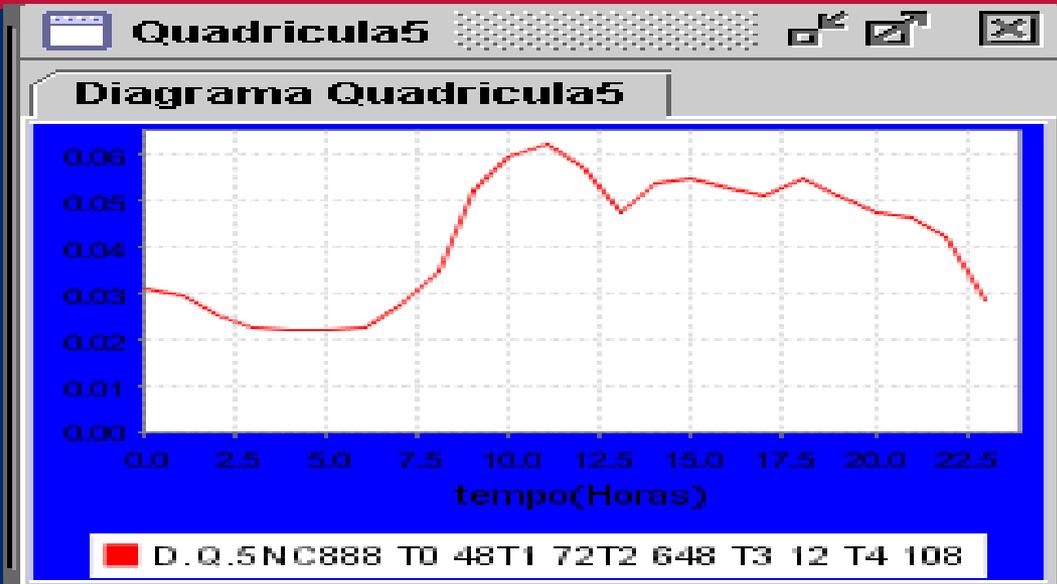


How others do it?

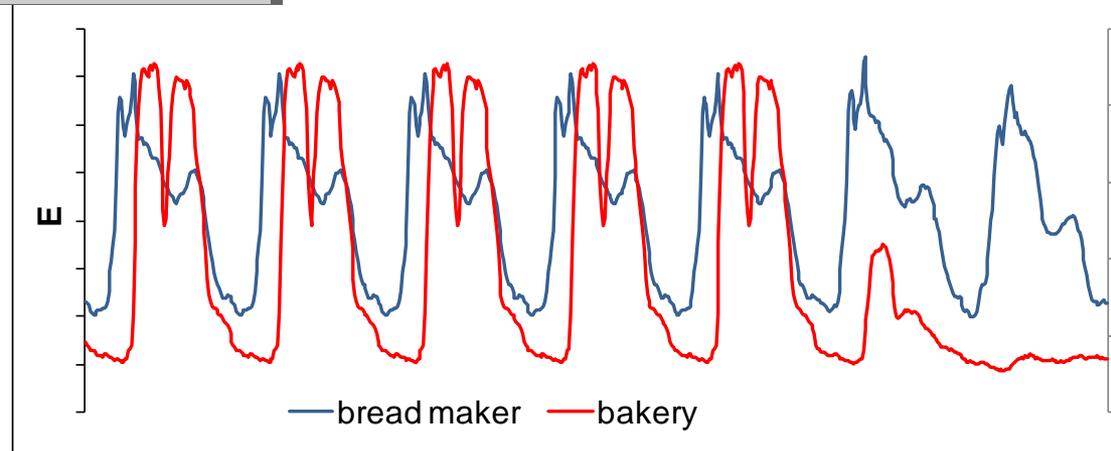


- Refrigerator
- Dish washer
- Lighting
- Washing machine
- TV & Hi-Fi

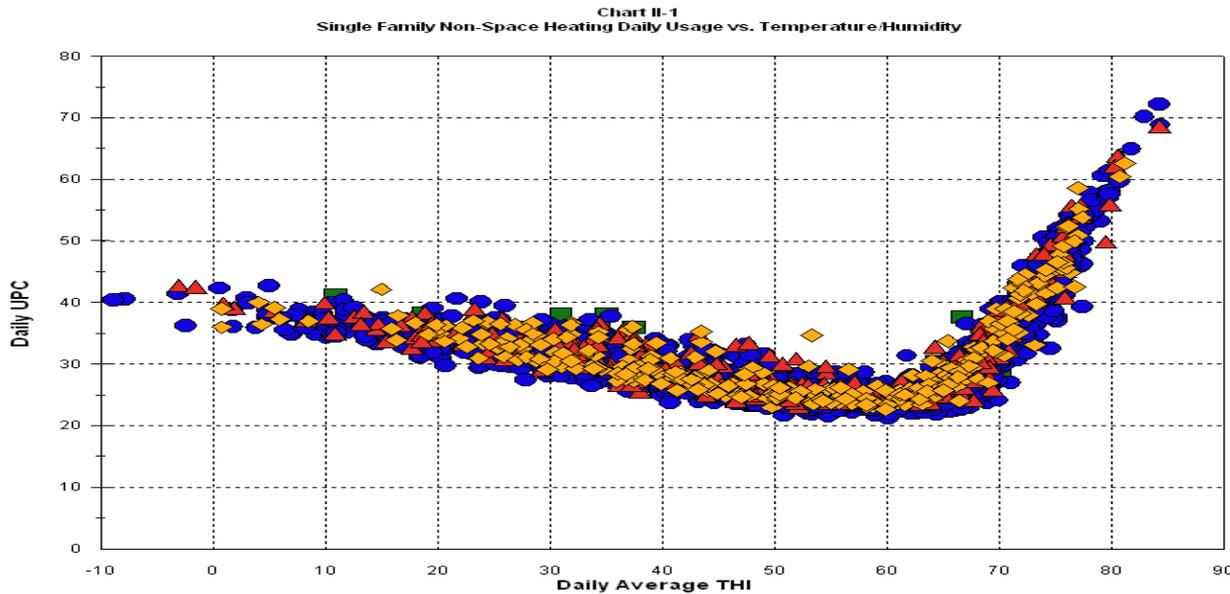
How others do it?



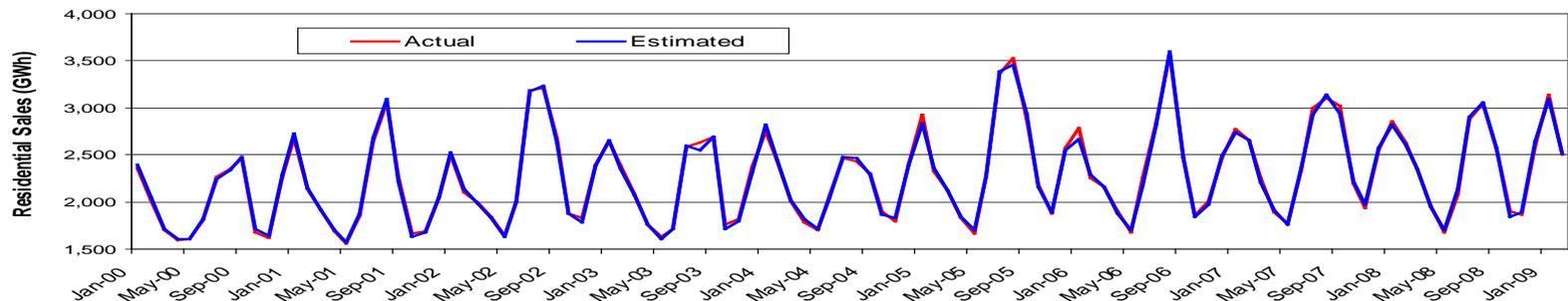
Consumption (typical week)



How others do it? – weather adjustment



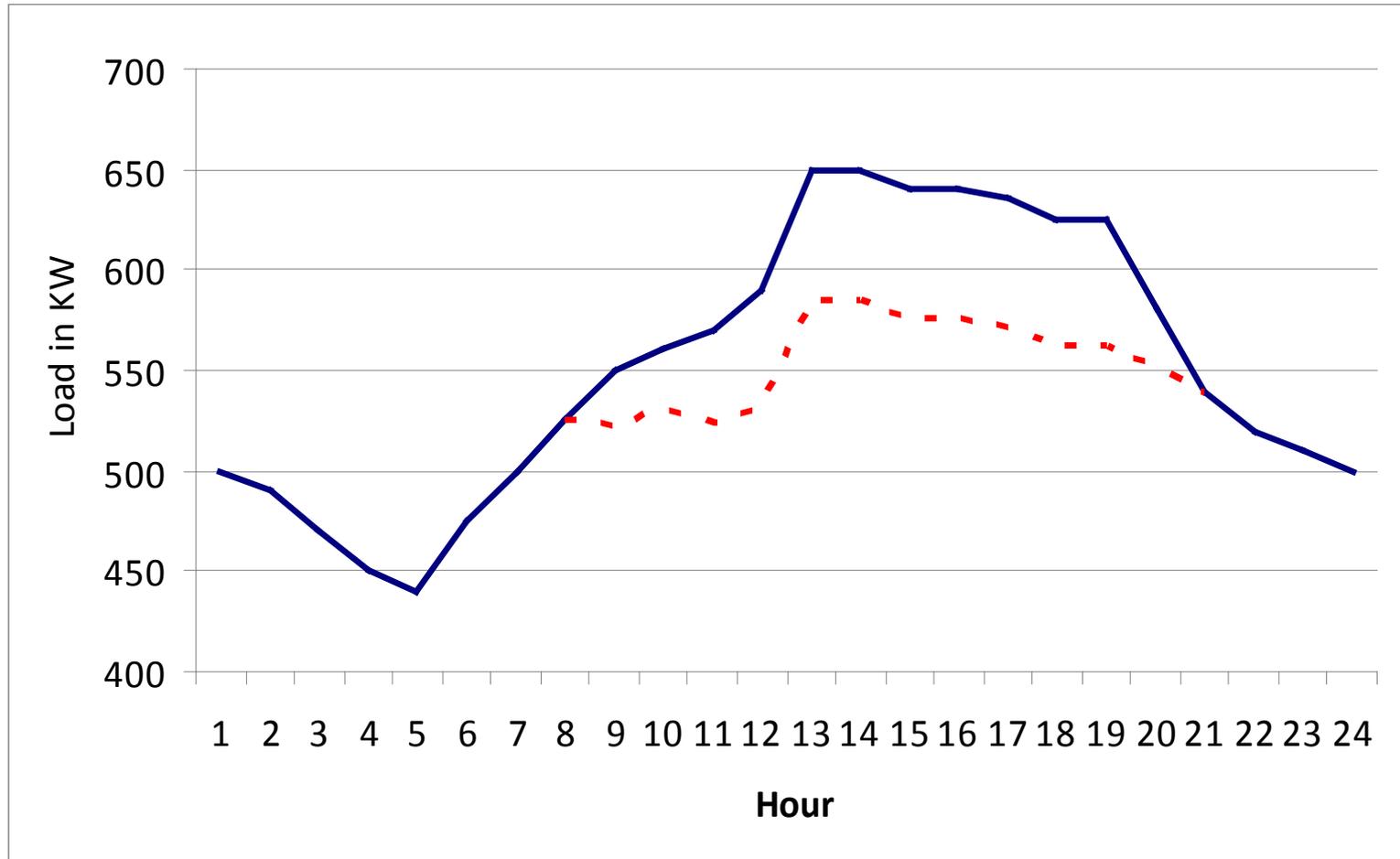
- The graph to the left is daily usage for single-family residential customers based on our residential sample.
- ✓ Relationship with weather for households based on the analysis of load research.



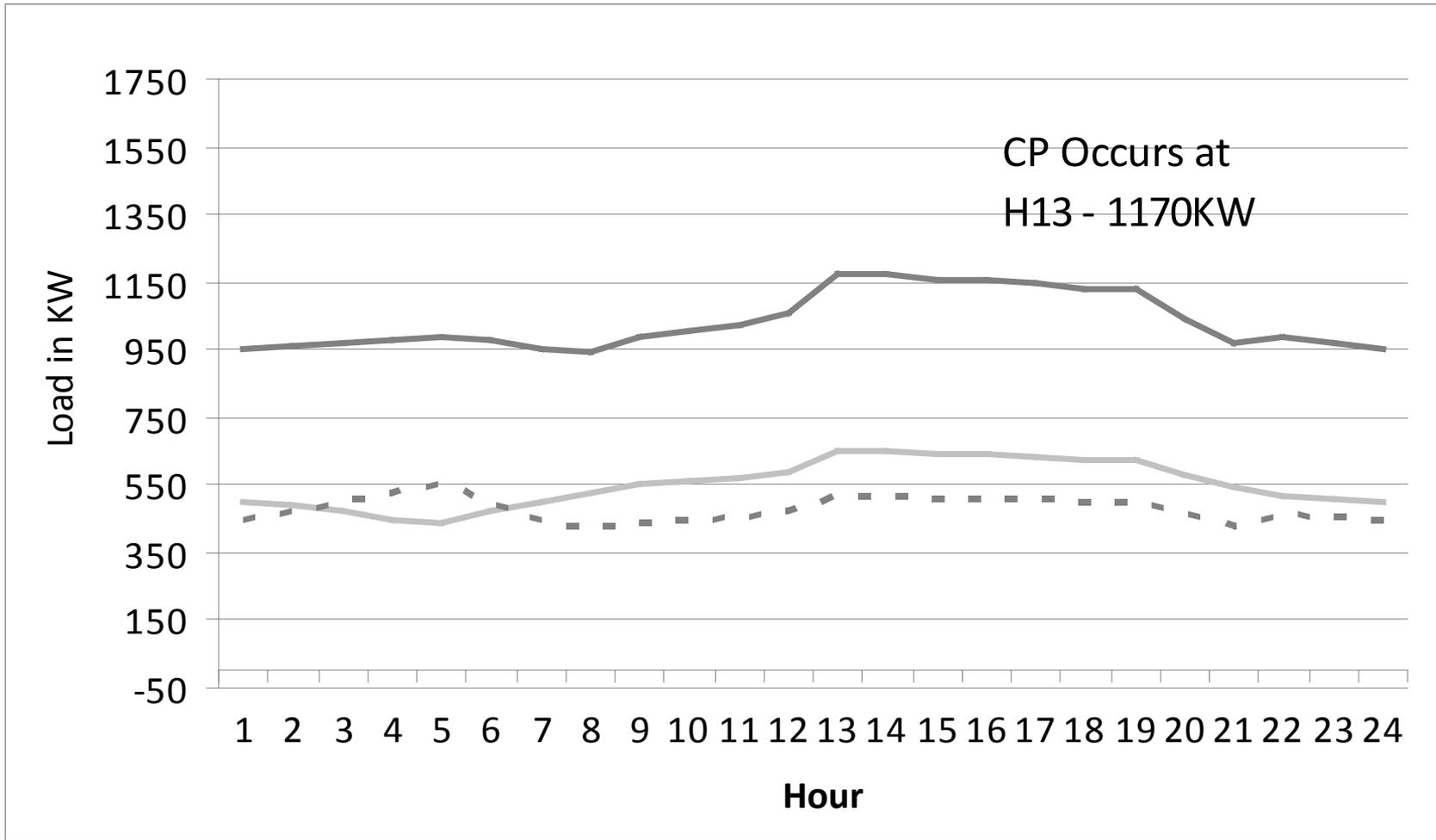
Demand side management and load research

- **Historically EPs were supply oriented**
- **Increase of system capacity, generation, investments in the new T&D capacities**
- **Up to now, attention was not paid to demand side management – there are no significant analyses and changes related to DSM**

DSM & Load research



DSM & Load research



DSM & Load research

- **With little investment in DSM, possible to optimize usage of capacities**
- **Load Research is input for DSM**
- **DSM planning process involves:**
 - Identification of system demand and power supply objectives
 - Analysis of various customer programs to meet objectives
 - Design strategy for program implementation
 - Assessment of program results
- **REAP proposes EPs could consider DSM as a tool to optimize development and usage of facilities**

Load research – Instead of conclusion

- **Load research may be used for:**
 - **Tariff design → Price signal → Rational use of energy**
 - **Demand side management → Rational use of capacity
→ Rational use of energy → Reduction CO₂**
 - **Planning the development of generation capacity → Rational use of energy → Reduction CO₂**
 - **Planning the development of T&D network → Saving**
 - **System dispatching → Less cost**
 - **Energy procurement → Less costs → Rational use**
 - **Cash flow planning**
- **Little has been done in BiH**
- **Huge potential that can be beneficial to all parties in the Sector**



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Thank you!

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