



Electricity consumers profiling- German Load Profiles

ELECON – Workshop

28.10.-29.10.2014

Otto-von-Guericke-University Magdeburg

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FAKULTÄT FÜR
ELEKTROTECHNIK UND
INFORMATIONSTECHNIK

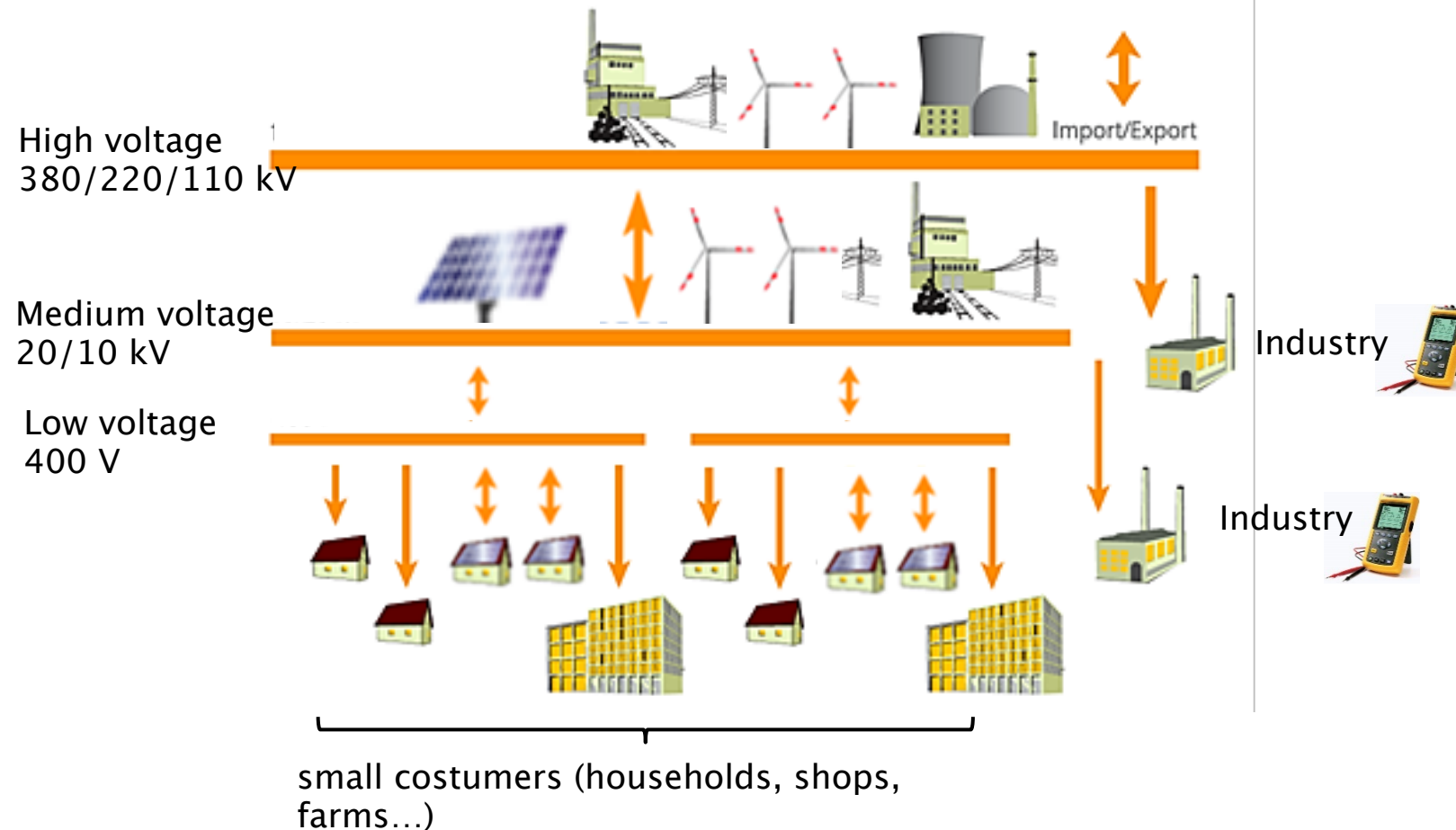
Chair for Electric Power Networks and Renewable Energy Sources (IESY/LENA)
Univ.-Prof. Dr.-Ing. habil. Z. A. Styczynski

- Introduction
- Unbundling
- Necessity of load profiles
- Load profile calculation
- Standardized load profiles
 - Households
 - Business
 - Agriculture
 - Further profiles
- Summary

Background of the ELECON-Project:

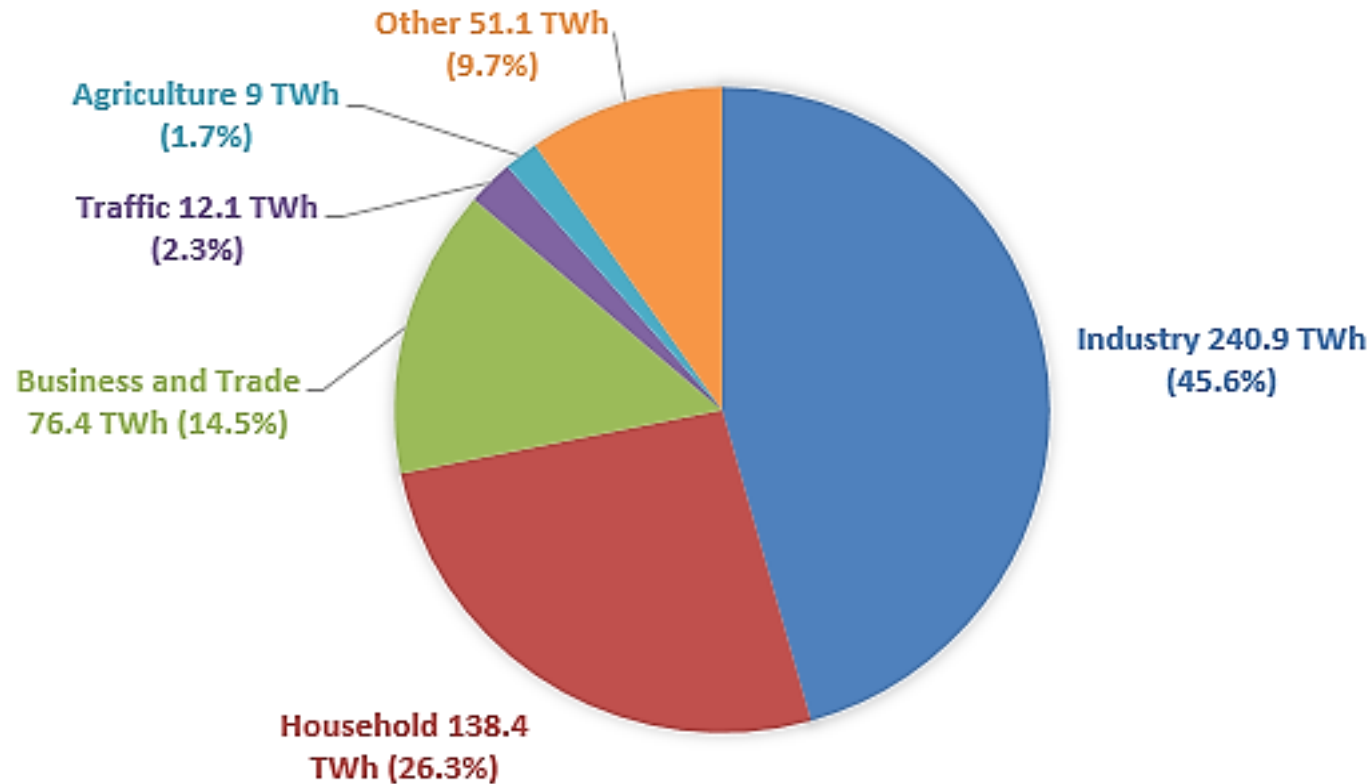
- Gain: Increase in Energy efficiency by
 - demand response programs
 - identification of non-technical losses
- WP2: Electricity consumer profiling and characterization

Introduction- German power system



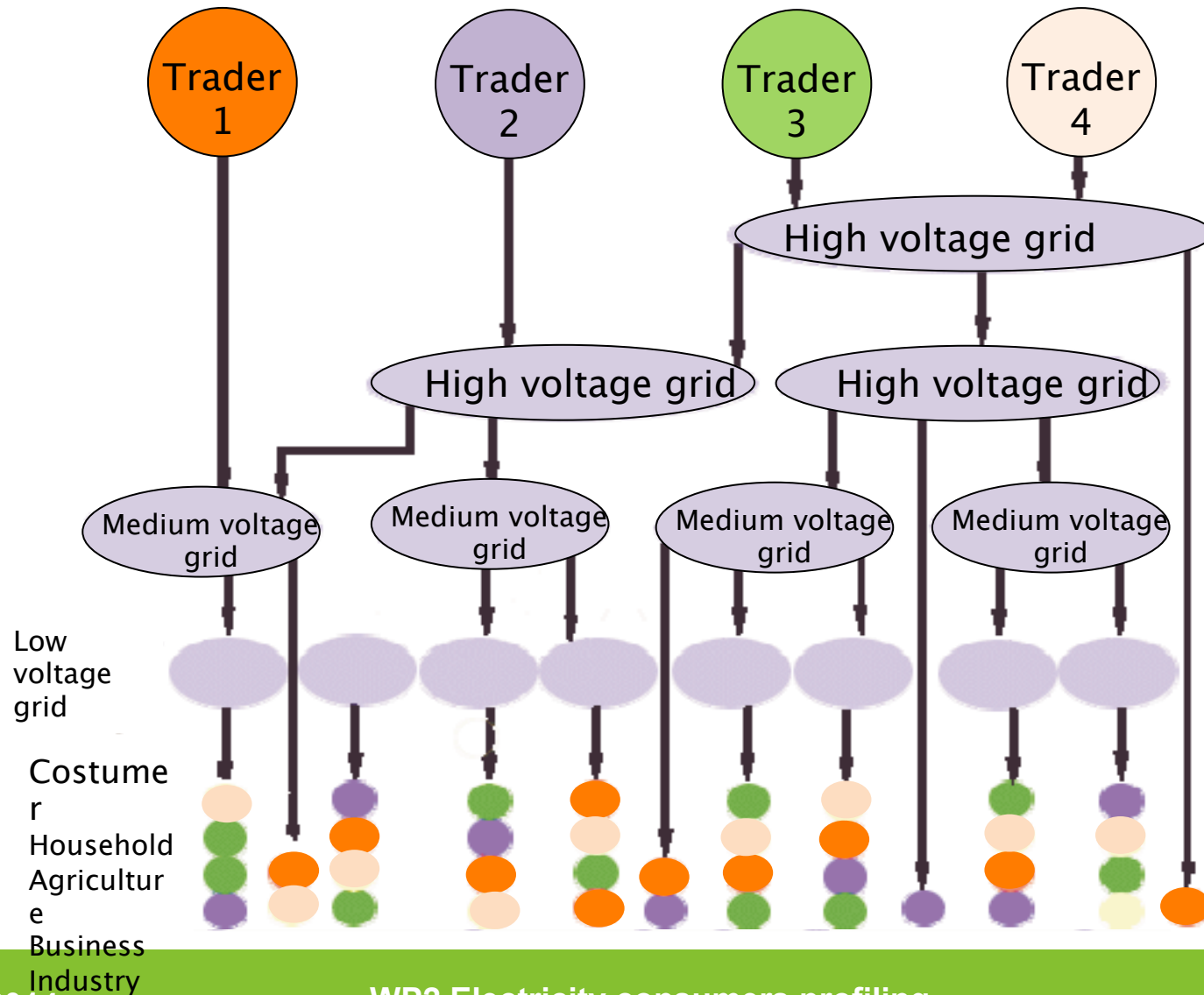
Introduction- Energy consumption

NETTO ENERGY CONSUMPTION BY SECTOR



Netto Customer Energy consumption: 528 TWh

Unbundling

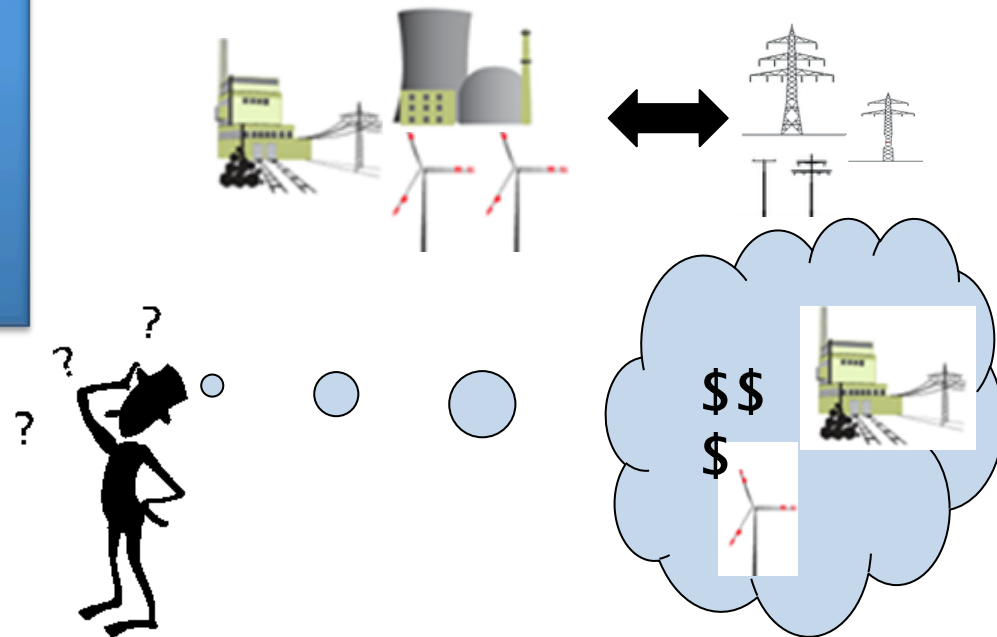


Unbundling and Energy price

•Unbundling law § since 1998:
separation of generation and
transmission and energy sale

Exception for operators with less than
100'000 customers (law EnWG § 7)

Customer can freely
choose between energy
provider

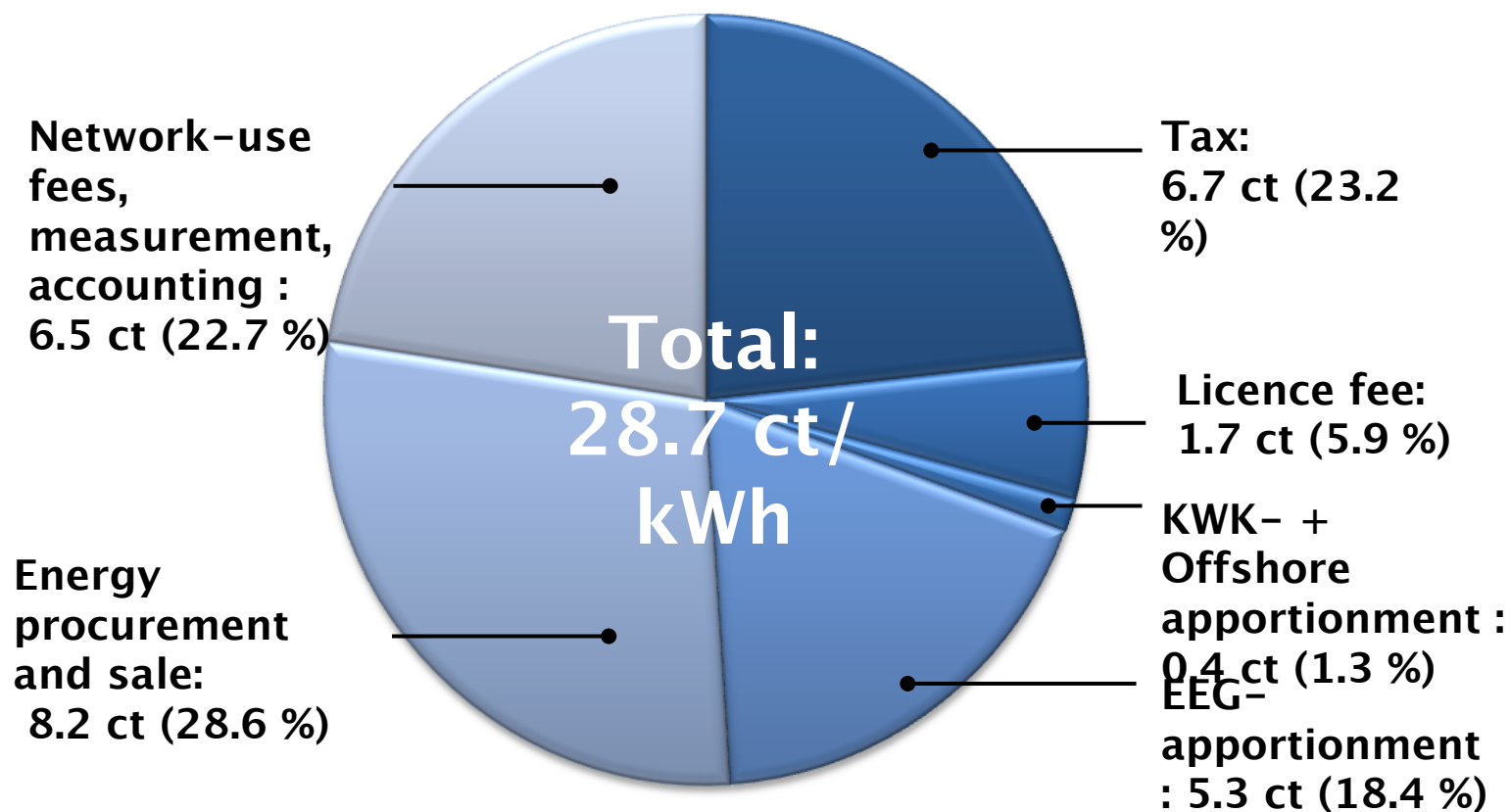


BUT: - **financial compensation** per kW/h for power plants,
system operator (TSO/DSO), trader
- need of **demand forecast**



Unbundling and Energy price

Energy price calculation for small customers



Necessity of Load profiles

- accounting (system services, electricity production),
- reliable electricity generation forecast,
- grid stability

How to estimate the quantity of energy consumption



Industrial consumers
with high demand:
Measurement system



small consumers with
small demand:
additional work and
costs for
measurement system

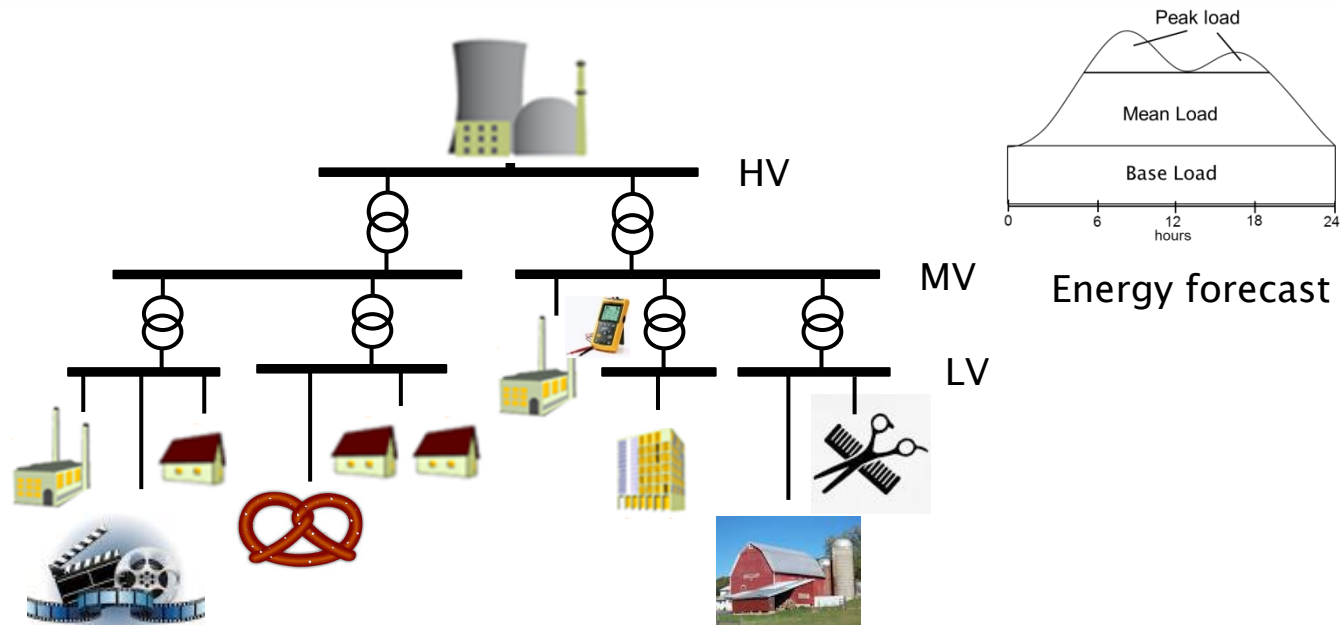


Necessity of Load profiles

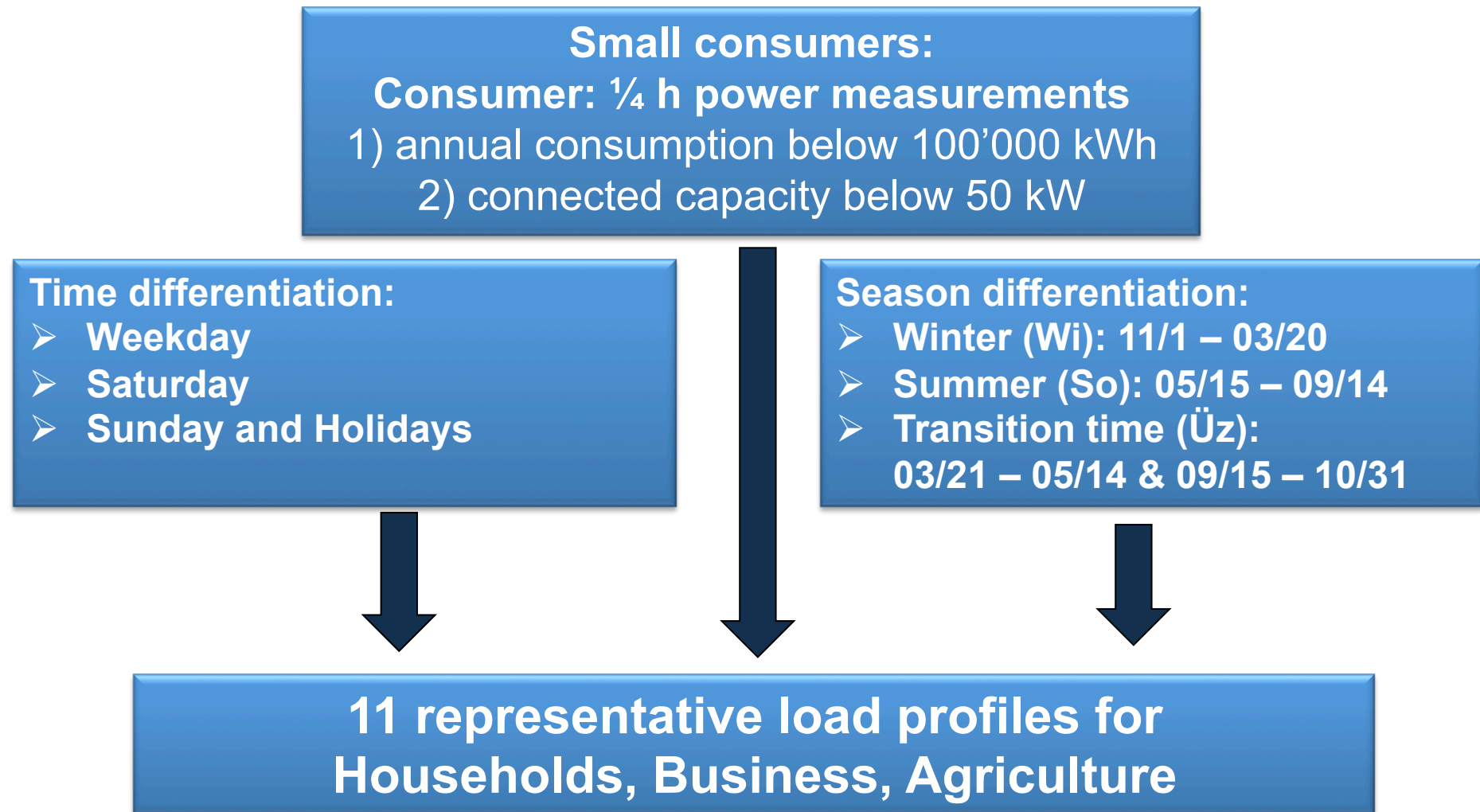
Solution: load profiles for different consumer groups

Benefits of using standardized load profiles:

- simplified provider change for customers
- Simplified calculation of energy demand forecast → different consumer groups

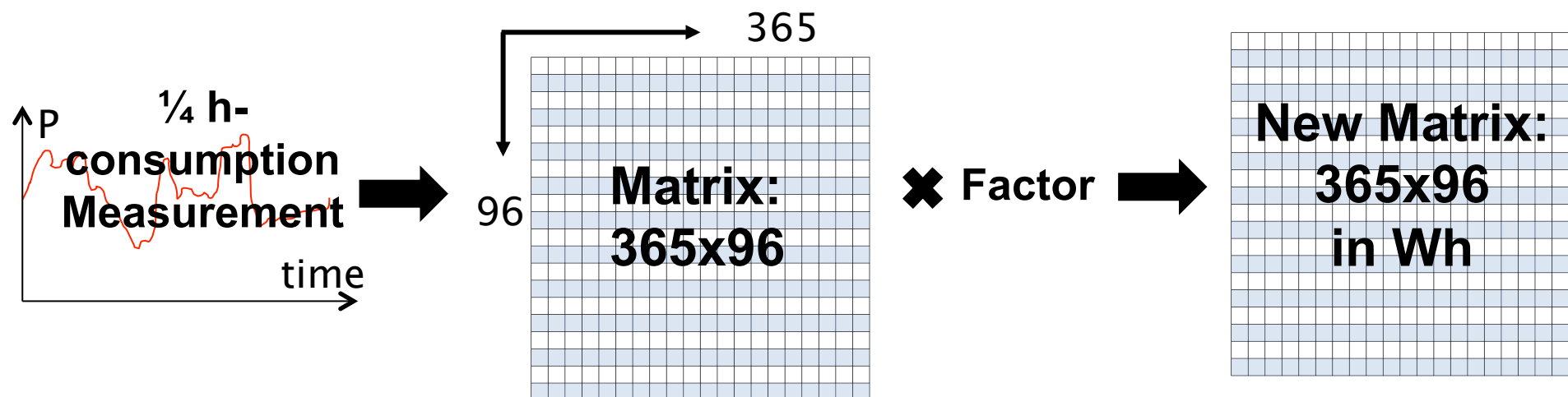


Load profile calculation methodology



Load profile calculation normalization

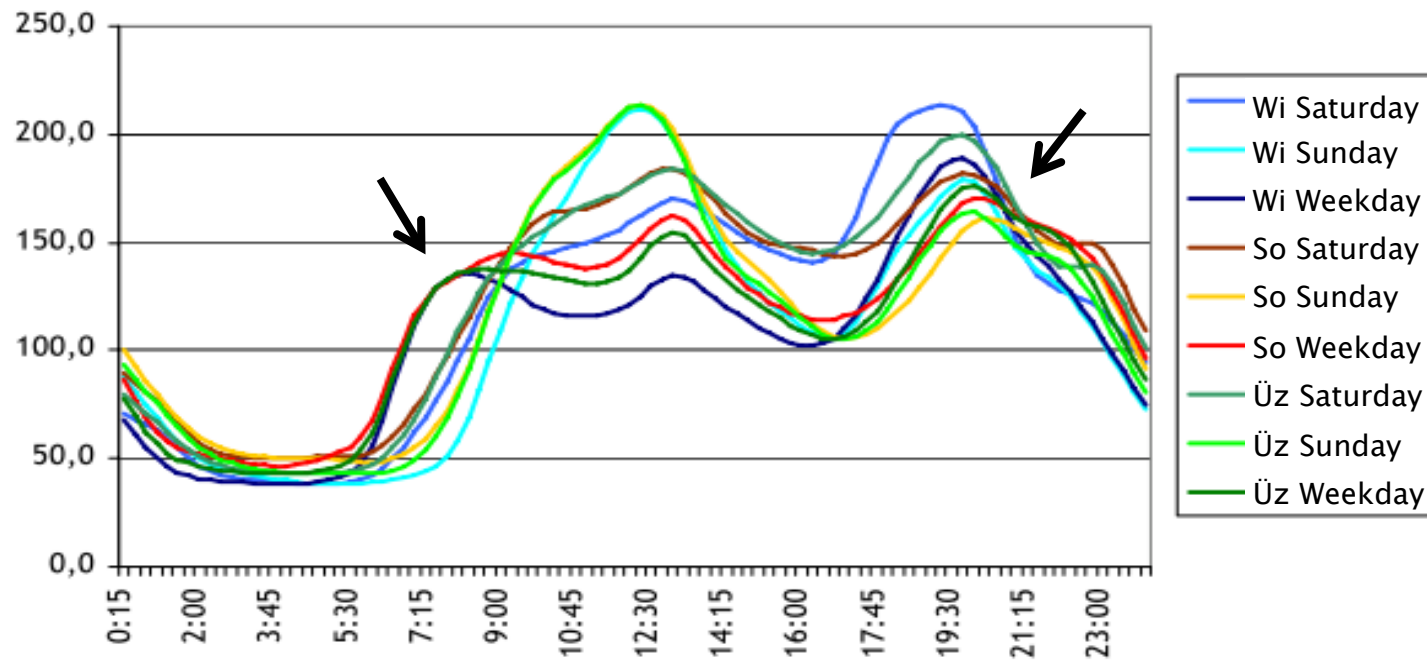
- Normalization, for example based on last year consumption, to quantify individual customer load schedules and load profiles
- **Normalization on an annual consumption of 1000 kWh**



Standardized load profiles

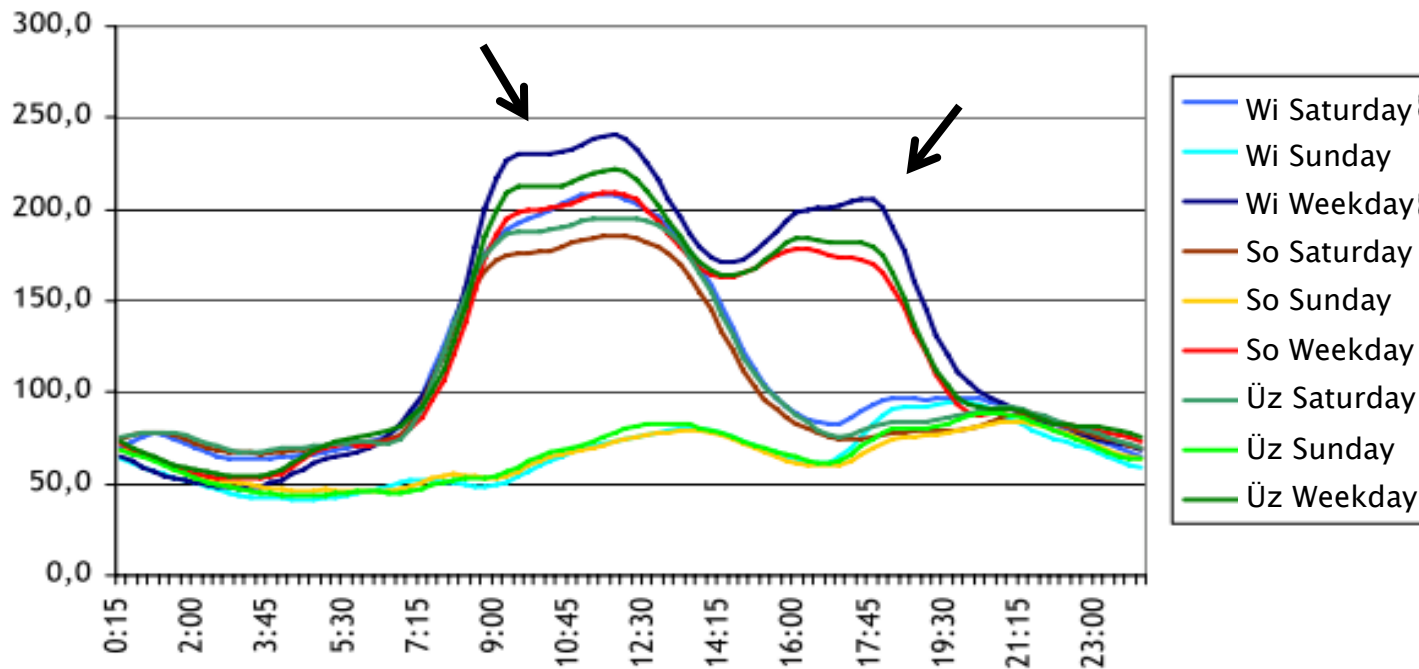
Acronym	Description
H0	Household
G0	Business general
G1	Business on working days 8am – 6pm
G2	Business with high and predominantly consumption in evening hours
G3	Business continuously
G4	Business shop/barbershop
G5	Business bakery
G6	Weekend business
L0	Farm
L1	Agriculture dairy farming / sideline animal breeding
L2	Other agriculture

H0-Households



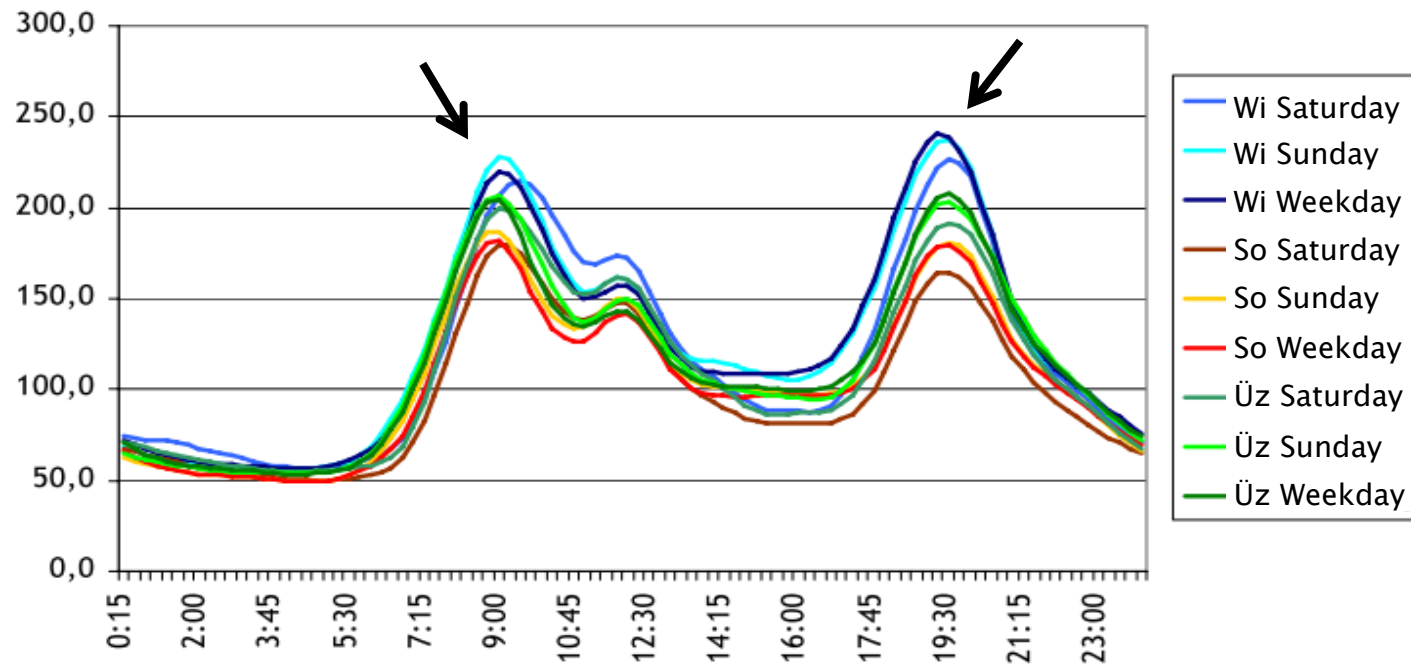
- All households
- Households with small business demand

Load profile Business Business-general- G0



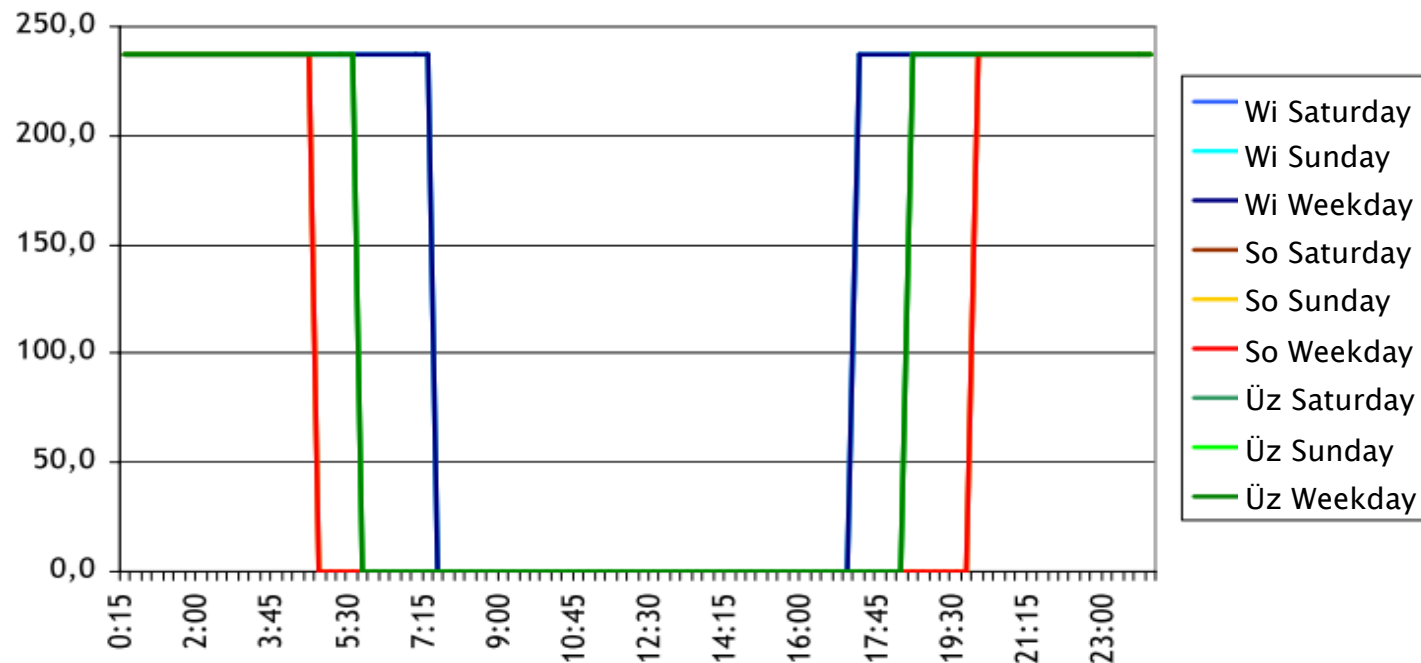
- Weighted average of total group G1-G6
- If an assignment to one of the business profiles G1-G6 is not possible

Load profile Agriculture Farm - L0



- If assignment to profile L1 or L2 is not possible
- Average of L1 and L2

Further profiles



B1 public lighting:

- Constant consumption during switch on time
- Shot down during day

Summary

- Necessity: **scheduled electricity generation = Customer demand**
- **11 standardized load profiles:** Household (H0), Business (G0-G6) and Agriculture (L0-L2)
- Differentiation of profiles in time, season and consumer groups
- Benefits of the profiles:
 - Simplified accounting (system operator, trader ...)
 - Scheduled demand forecast
 - Simplified energy provider change for customer and provider

Thank you for your attention!



ELECTRICITY CONSUMPTION ANALYSIS & ENERGY EFFICIENCY

ELECTRICITY CONSUMPTION ANALYSIS & ENERGY EFFICIENCY

André Richter

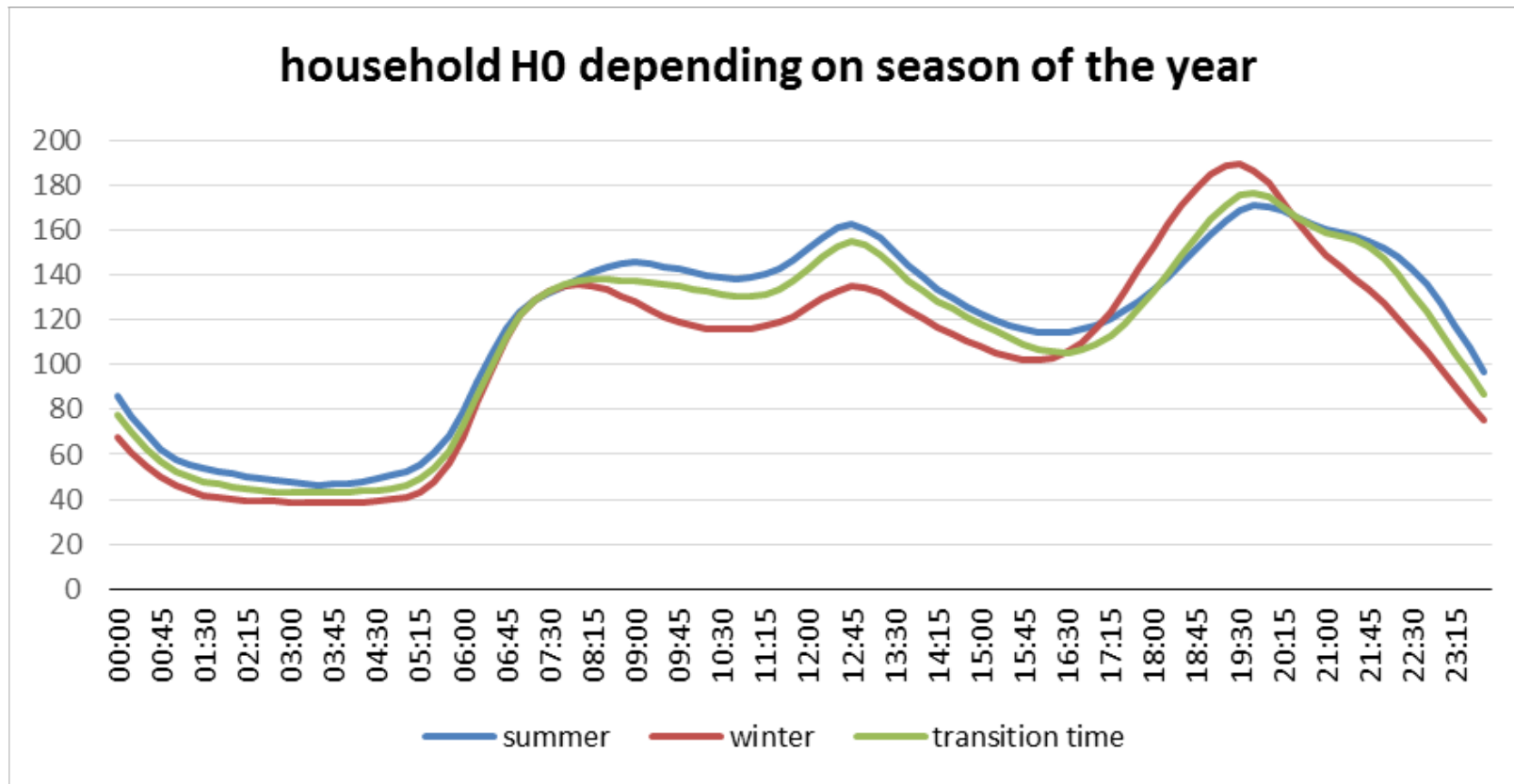


29.10.2014

WP2 Electricity consumers profiling-
German Load Profiles

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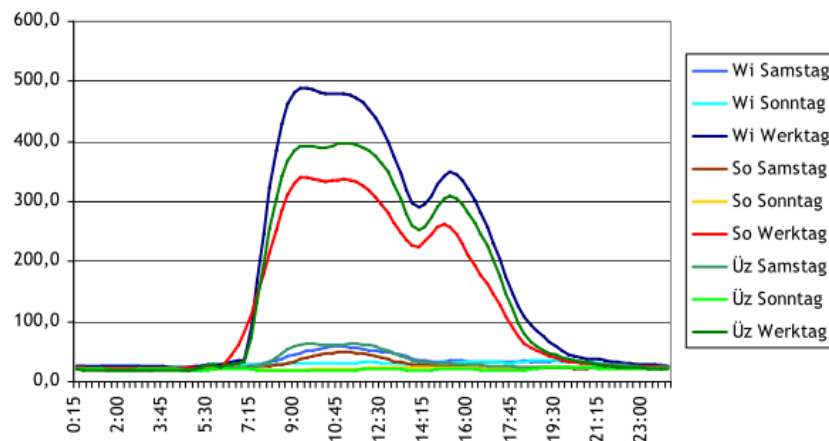
Load profile time and season differentiation



Season differentiation:

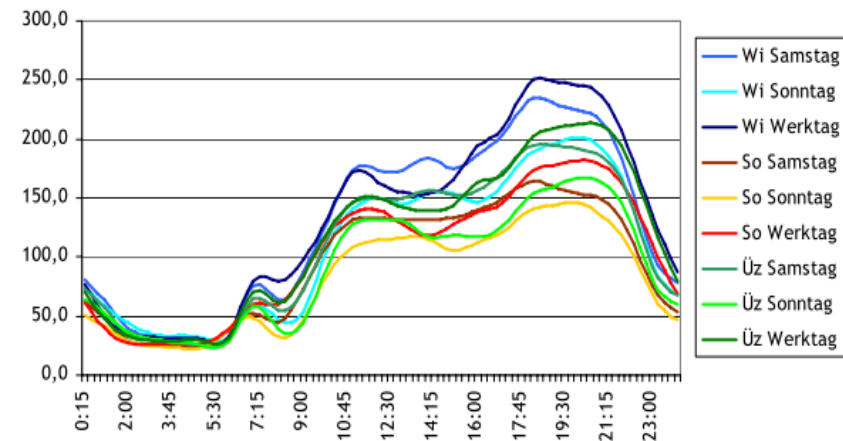
- Winter (Wi): 11/1 – 03/20
- Summer (So): 05/15 – 09/14
- Transition time (Üz): 03/21 – 05/14 & 09/15 – 10/31

G1 Business on weekdays 8am–6pm



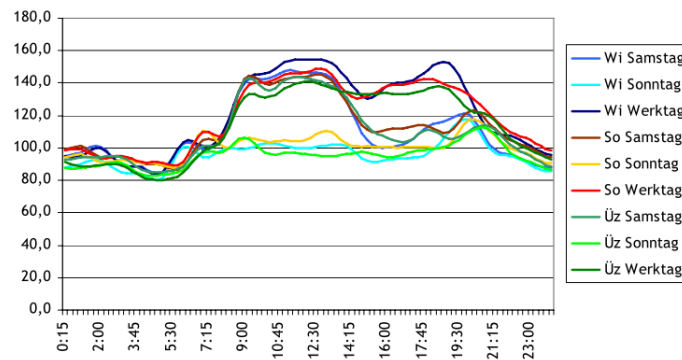
- Consumption between 8am – 6pm on weekdays
- Doctors, lawyer, schools, kindergartens, banks...

G2 Business high consumption in evening hours



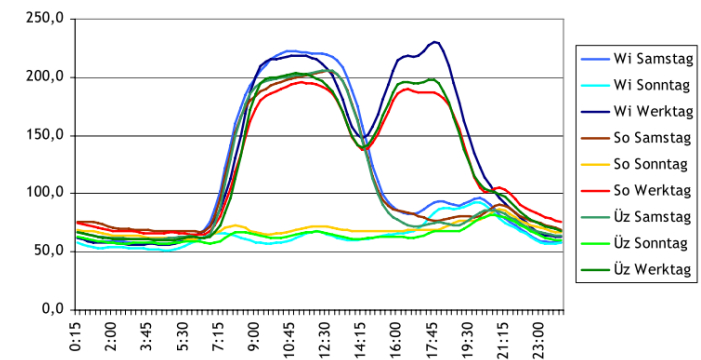
- Predominantly oriented lightning power consumption
- Evening hour consumption
- Petrol stations, restaurants, fitness center

G3 Business continuously



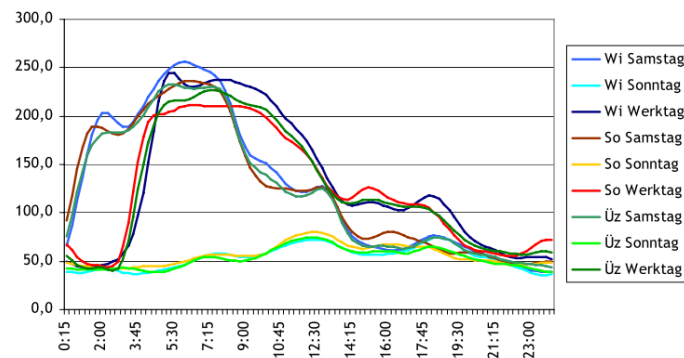
- Uniform consumption
- Continuous base during the week and the year
- Drinking water pumps, systems with forced ventilation, cold stores

G4 Business shop /Barbershop



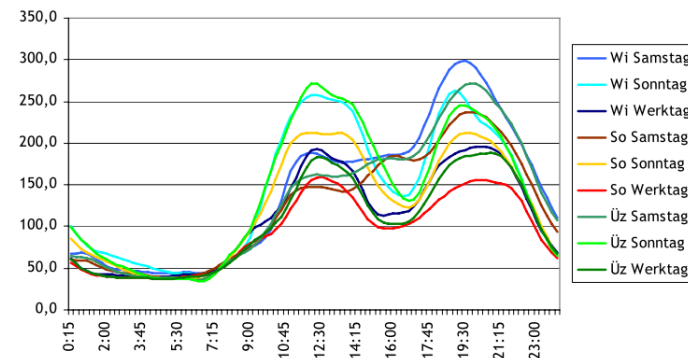
- General shops
- Weekday opening and Saturday until 3pm
- Barbershops, all kinds of shops, sales oriented bakeries with in-store baking

G5 Business bakery



- Bakeries with main consumption at night until 3am
- Daytime selling with low demand

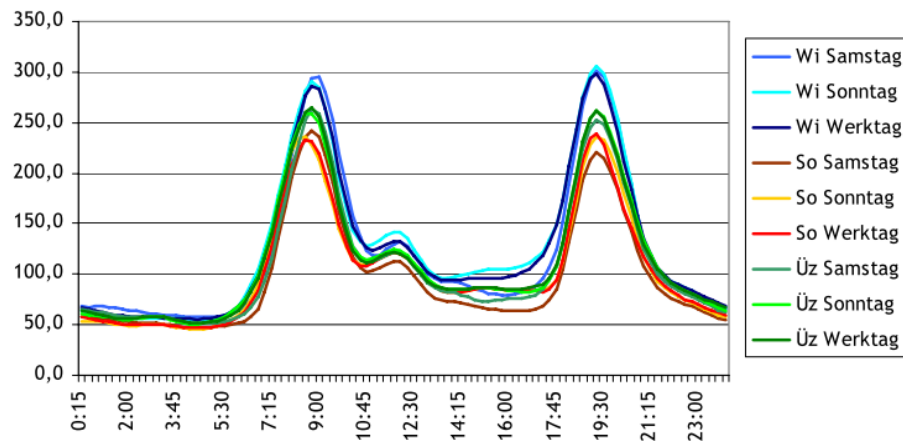
G6 Weekend business



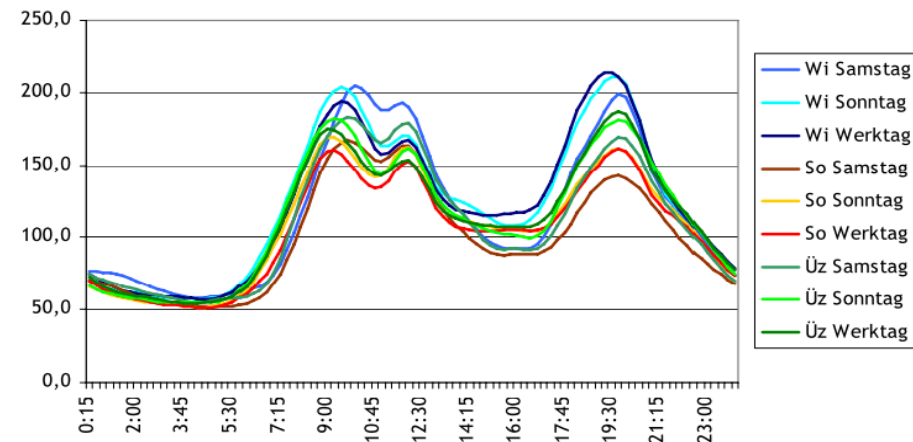
- Main consumption on weekend from 11am
- Restaurants, petrol station with car wash, movie theatres

L1 dairy farming / animal breeding

L2 other agriculture

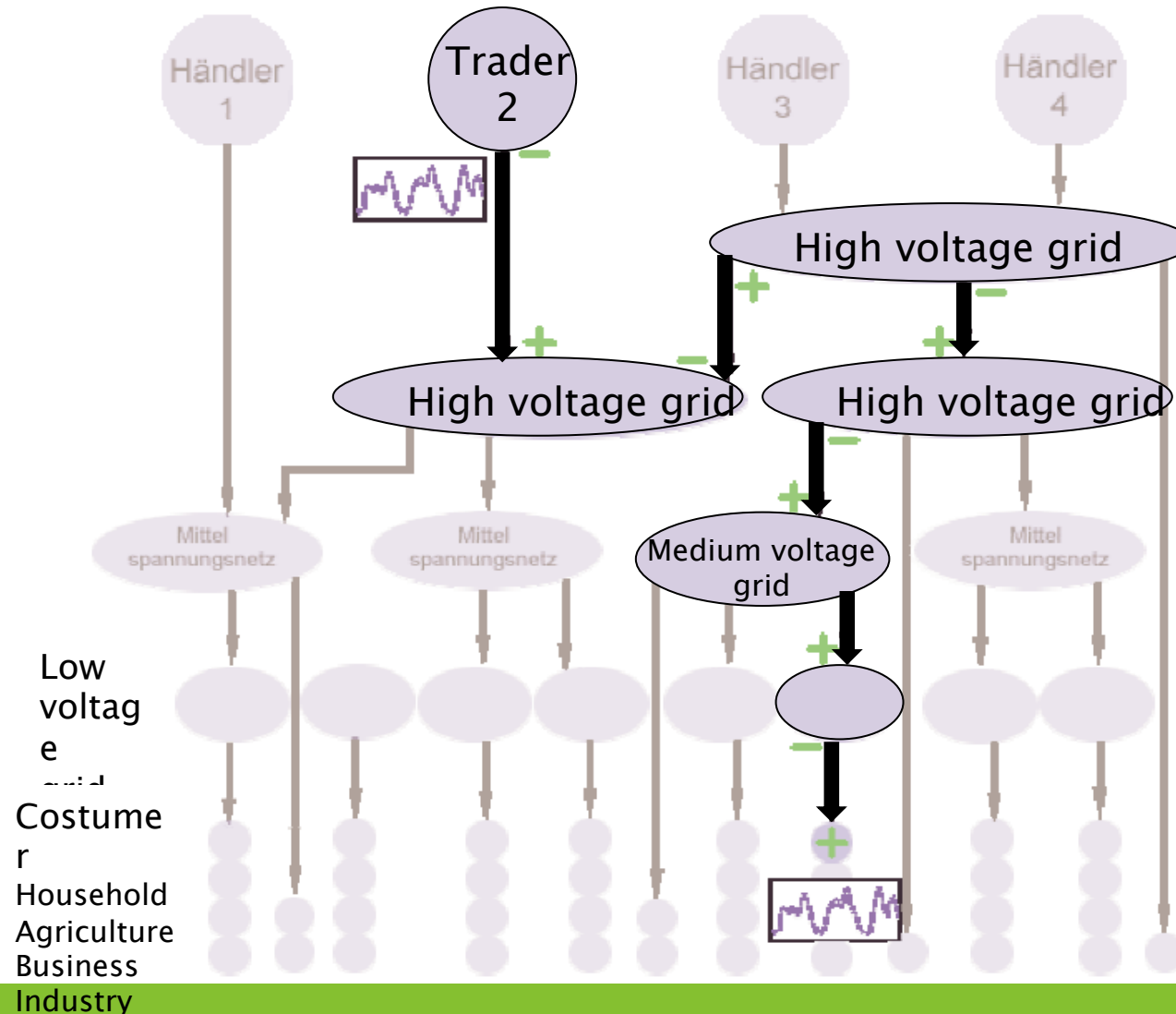


- Dairy farming
- Consumption dominated by two times of milking and subsequent cooling of milk



- Characterized by coexistence of household and farm production

Unbundling and Forecast



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