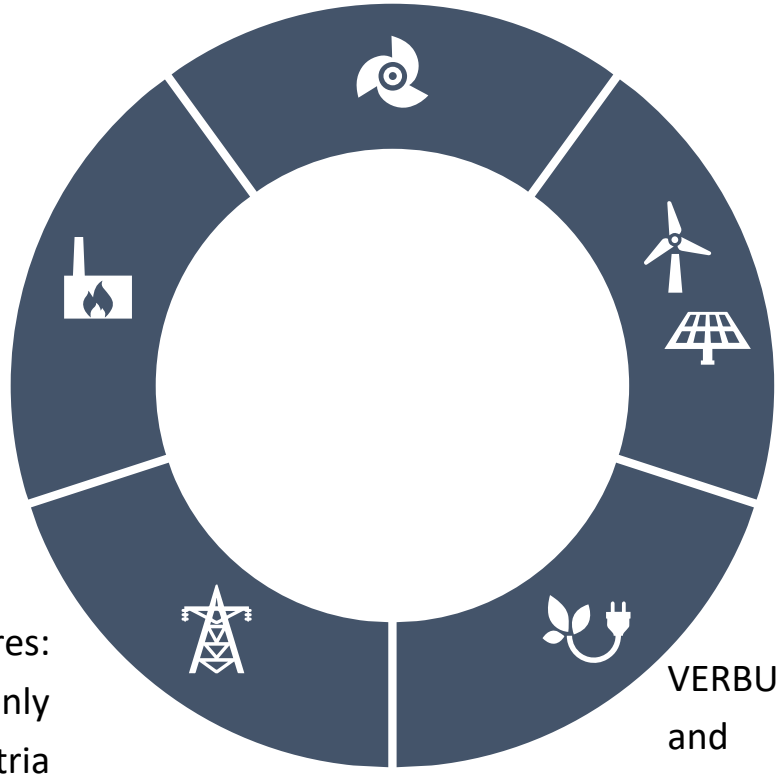
Session "Power System Flexibility"

Speaker :

Gerhard Gamperl
Director – Business Development
VERBUND AG, Austria

VERBUND - top in Austria

129 VERBUND hydropower plants with over 8,200 MW of maximum electricity capacity.



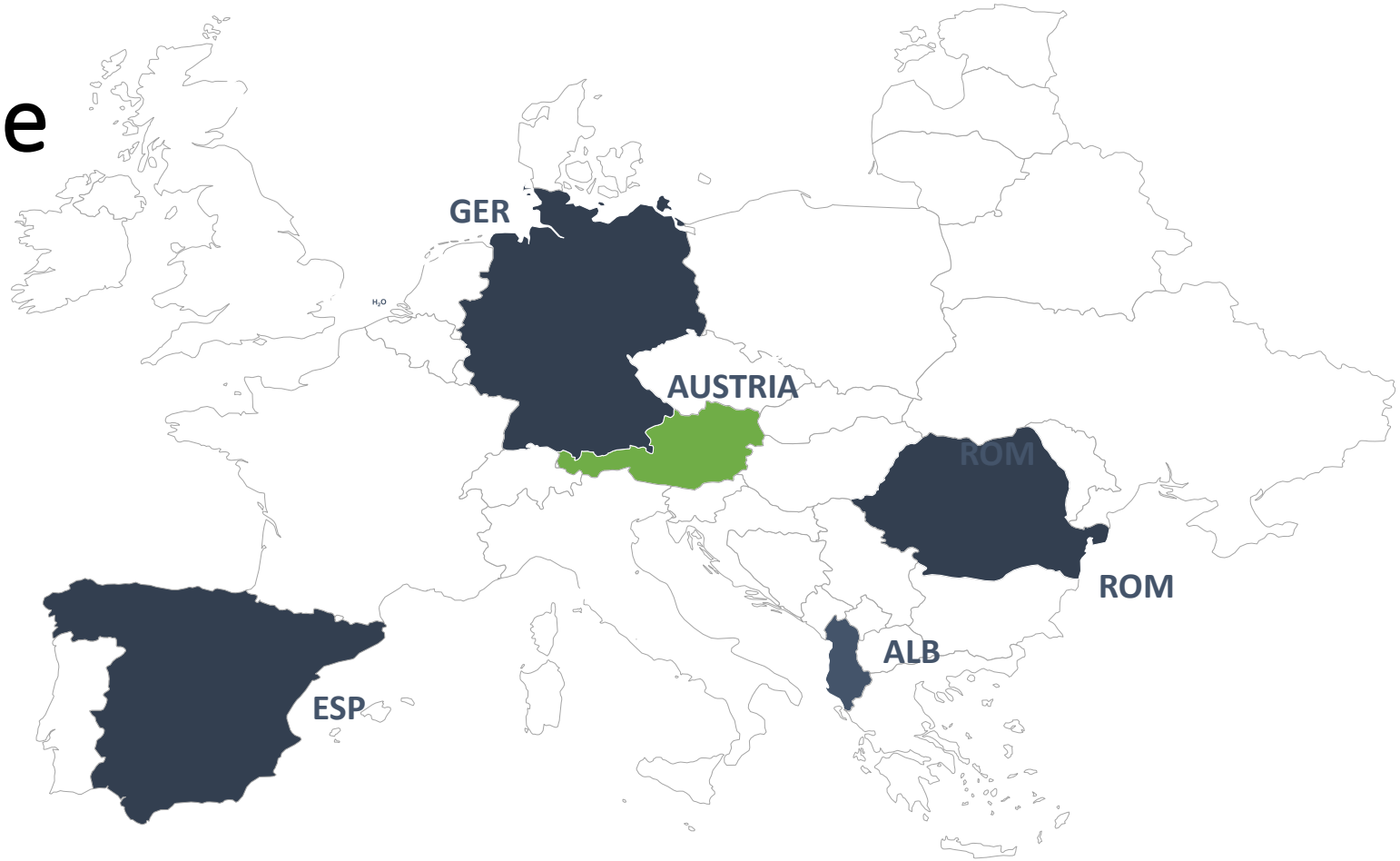
AUSTRIA: up to **1/4** of the total electricity generation shall be produced from solar and wind power by 2030.

Grid length of around **3,400** kilometres: APG (Austrian Power Grid) as the only supra-regional TSO in Austria

VERBUND **No. 1** in the business sector B2B and more than **500,000** private B2C customers

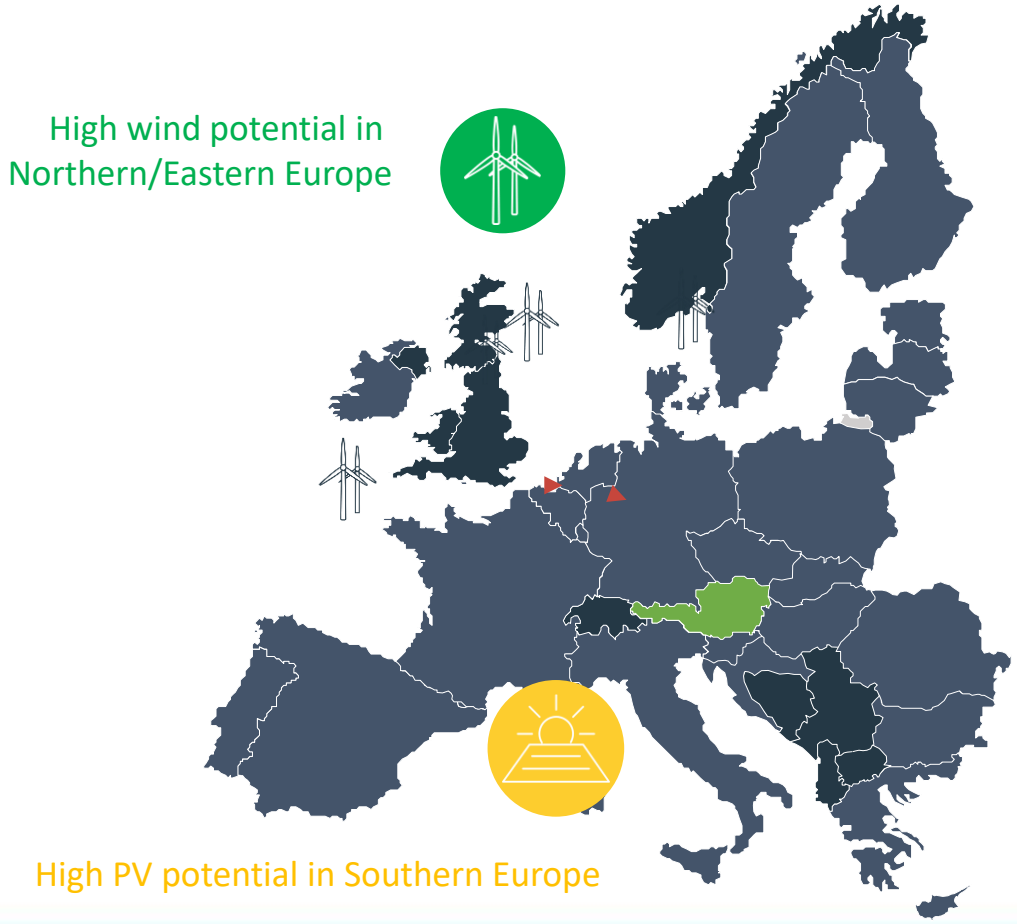
VERBUND in the heart of Europe

VERBUND in Europe



Grids: backbone of flexibilities

Trans-European Power Exchange enables flexibility and decarbonisation



...enables portfolio effects
(weather-dependent renewable production)

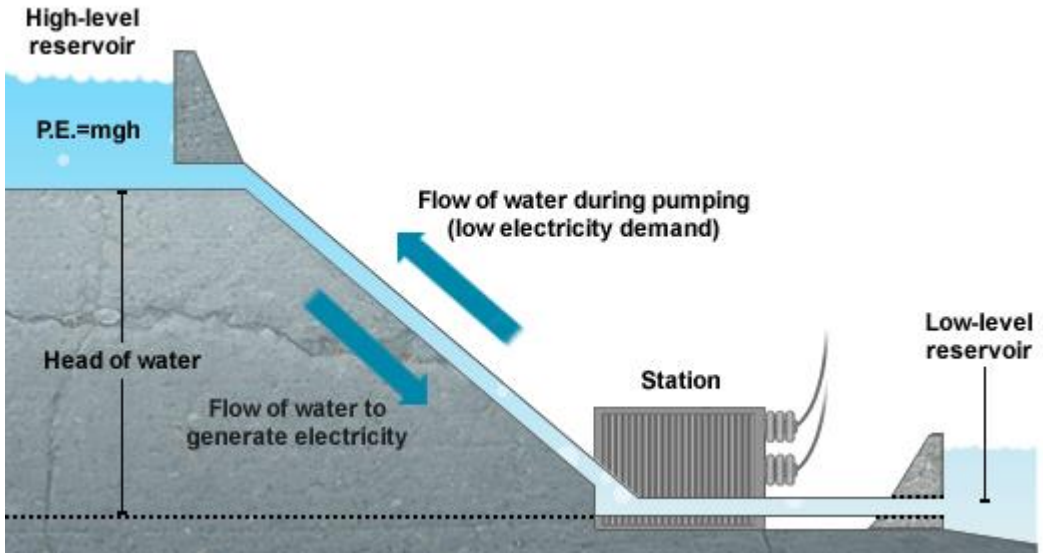
...decreases generation costs of the whole energy system

....reduces demand-increase for energy storage

...creates added value for the European economy

Hydro-storage: Austrias battery

Pumped-storage hydroelectricity



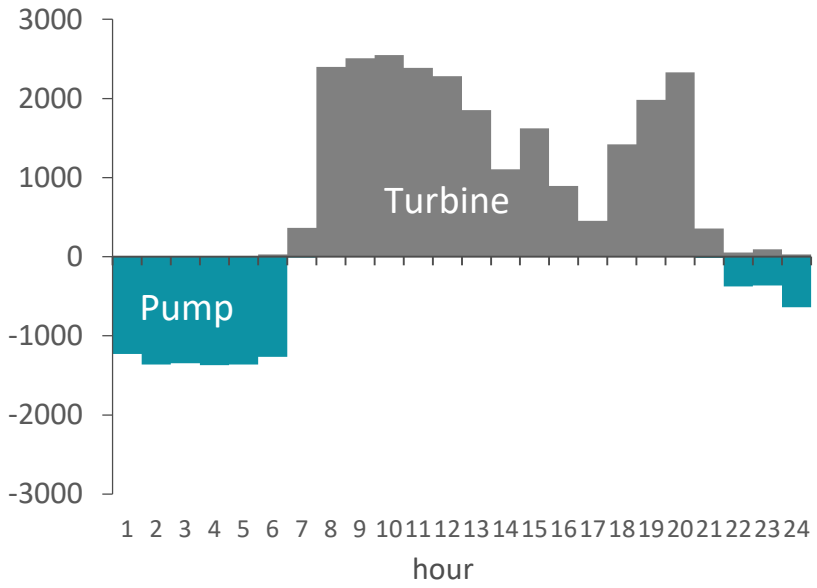
Pumped-storage: portfolio of utilisation

- Market strategy and operation based on dedicated optimisation models
- Peak predominantly as hedging product
- Natural inflow hedged
- Generation during highest demand
- Base production additionally for load balancing

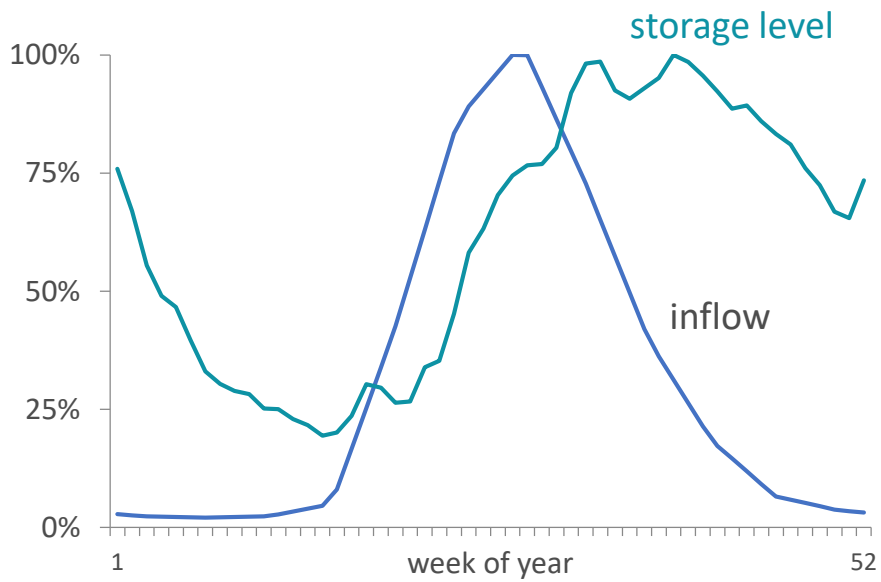
Hydro-storage: Austrias battery

Hydro Pumped storage – portfolio optimisation opportunities

Pumped storage portfolio dispatch (MW)
work day

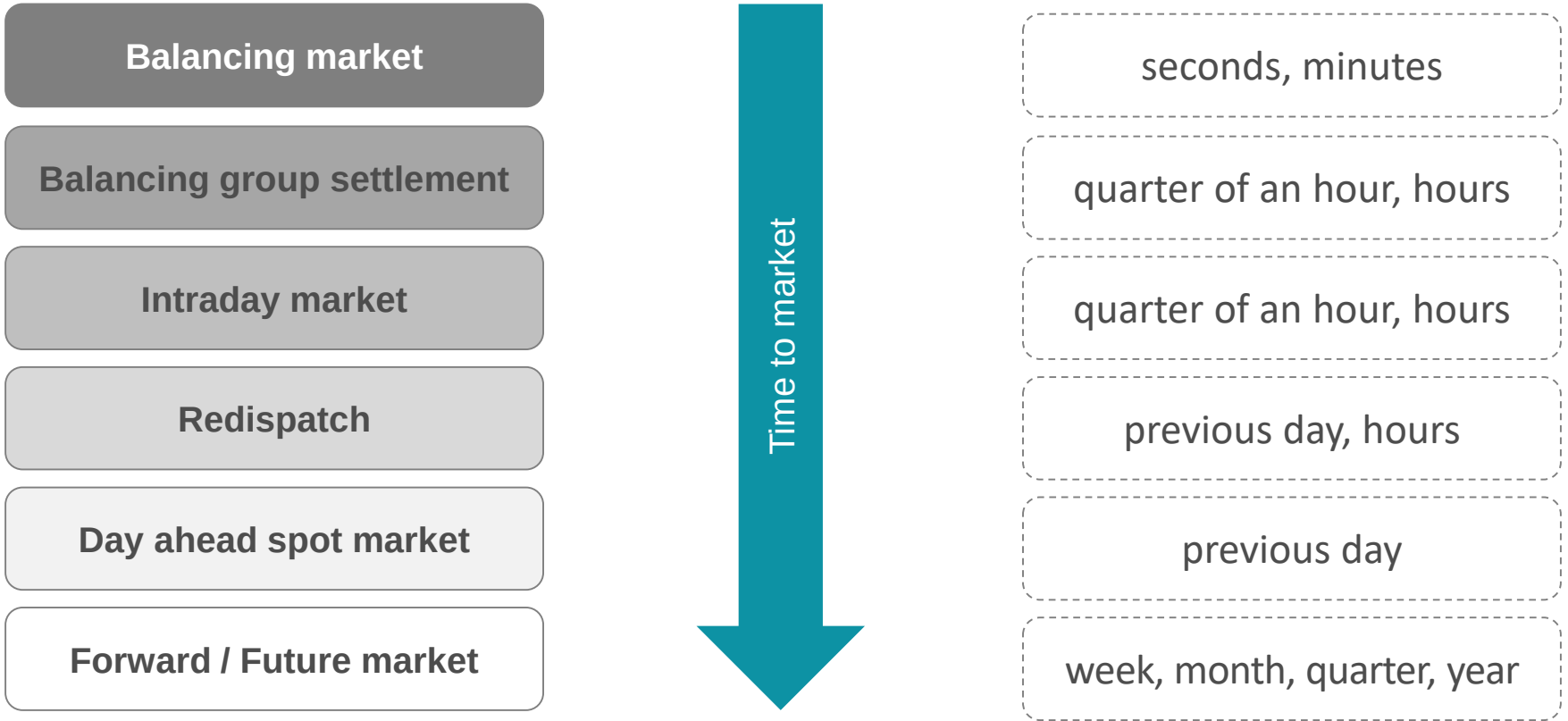


Inflow and storage level (%)
full year



Hydro-storage: Austrias battery

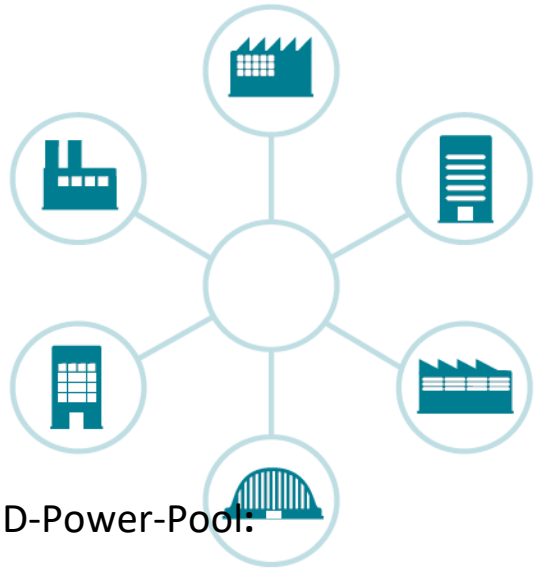
Use of (pumped storage) power plants in different market & product segments



Management of flexibilities

VERBUND Power-Pool – Demand Response

- **Flexibilities** of **generation** and **consumption** in trade and industry are **bundled** and intelligently controlled
- The targeted, automated activation of VERBUND-**Power-Pool** guarantees the **supply of balancing energy** as required.



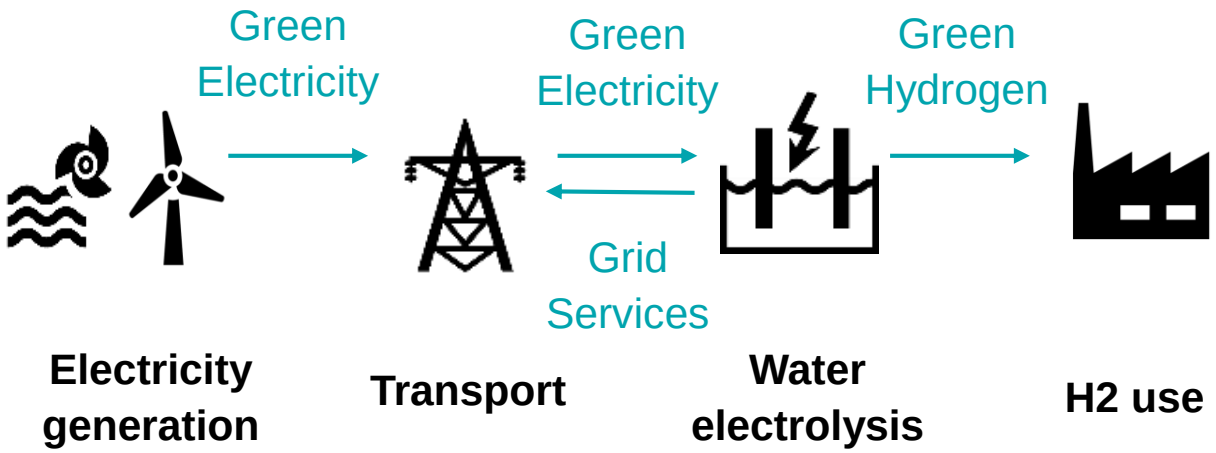
Advantages of Power-Pool-Mechanism for industrial companies and plant operators:

- Attractive additional earnings
- Very little one-off in-house expenses
- No additional ongoing expenses
- Full retention of operational control in-house
- Support with the integration of renewable energies
- Positive PR work and improved image

Launch of VERBUND-Power-Pool:

- **Largest aggregator** in Austria
- **Biggest industrial corporates** in Austria are under contract: steel-mills, refineries, pulp & paper etc.

Green Hydrogen – future battery



Green Hydrogen – future battery

Green hydrogen as an energy carrier for decarbonisation

H2FUTURE PLANT in Linz, voestalpine

Low-emission steel industry
H2FUTURE / voestalpine

Mobility & transportation
H2Zillertal

Application in a gas-fired power plant
HotFlex

Clean closed-loop economy in the cement & chemical industry
C2PAT

Pan-European value chain for green hydrogen
Green Hydrogen @ Blue Danube

Industrial battery storage

Battery storage for security, flexibility and stability

Reduce grid utilisation costs, **stabilise** the **electricity supply** and generate **additional earnings** through participation on the energy market

Multi-use approach of battery storage
for large and industrial customers

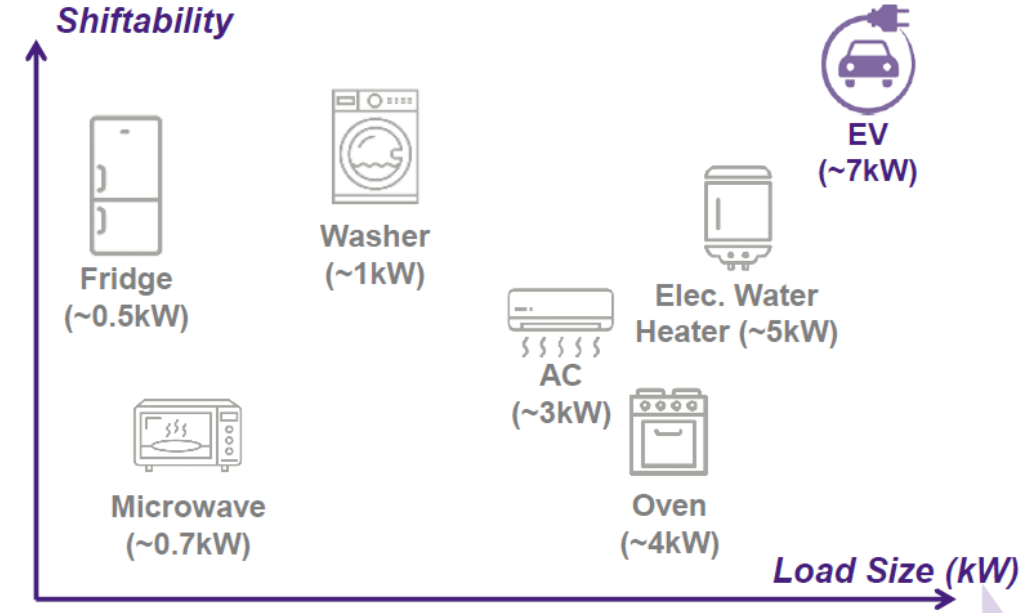
VERBUND as a direct contact partner

- Consultation & engineering
- Financing
- Delivery, testing & erection
- Operation

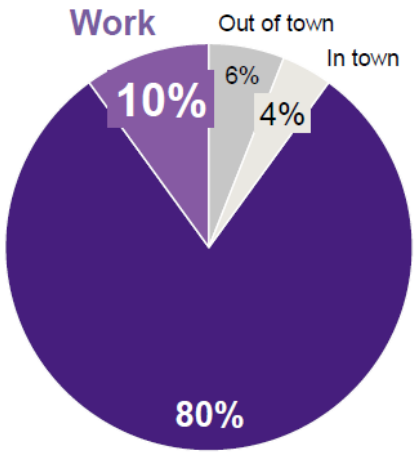
Electric vehicles – V2G

EVs are highly flexible distributed energy resources

enel x



50- 70 km average daily commute requires 10-15 kWh energy per day with 1-2 h charge time



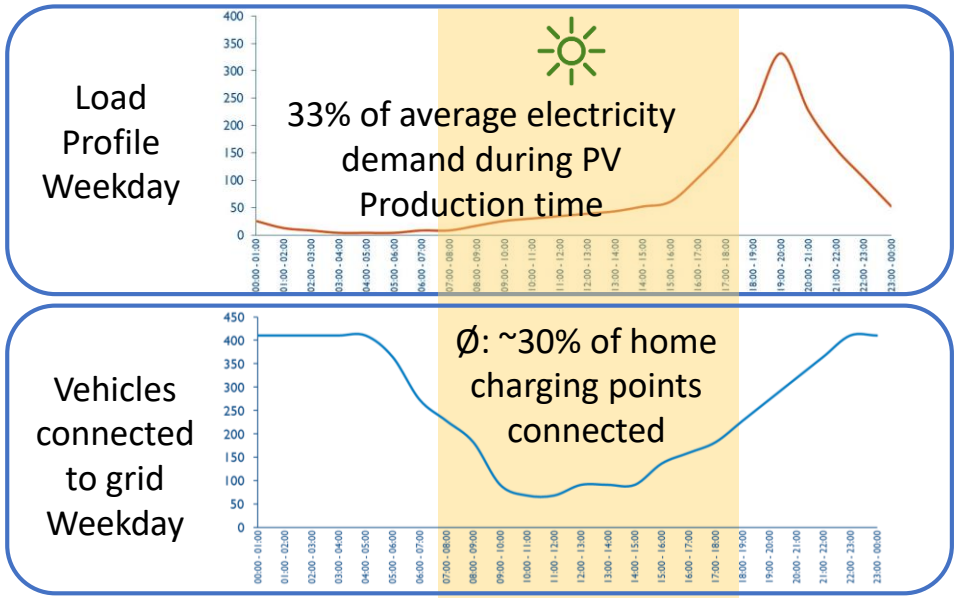
Most long duration charging (over 6 hours) happens at home and work, but drivers usually need less than 2 hours of charging, creating many **opportunities to provide flexibility**

Home and Workplace EV charging: a highly flexible load

E-vehicles for system flexibility

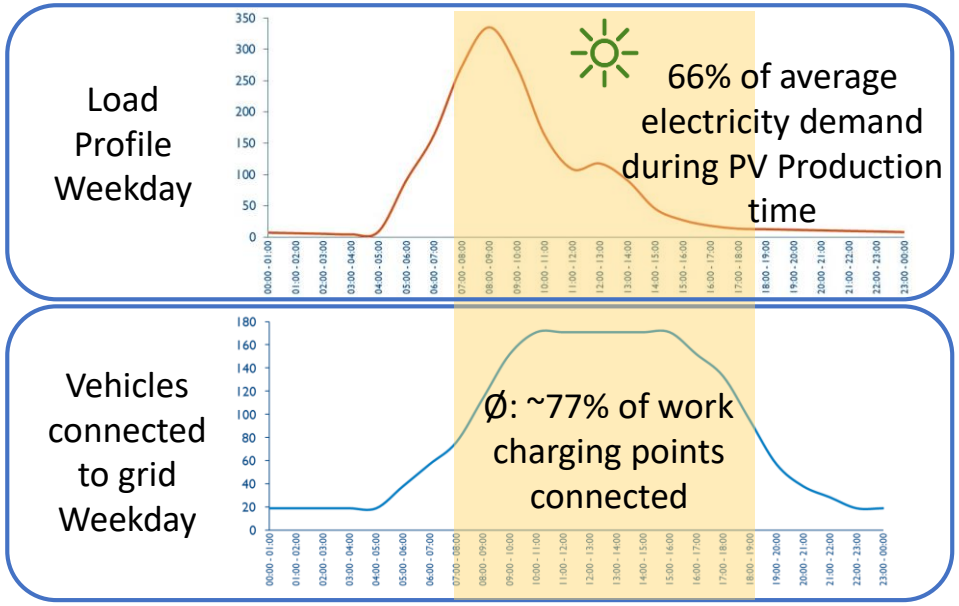
Synergies between E-vehicles load profiles & PV production time

Home charging



- Little synergy of electricity demand (load profile and vehicles connected to the grid) and PV production times at weekdays, but high synergies on weekends
- Weekend: 48% of average electricity demand during PV Production time

Workplace charging



- High synergy of electricity demand (load profile and vehicles connected to the grid) and PV production times at weekdays

Source: ADL, Verbund

Key Takeaways

Summary

- **We have to fundamentally rethink the design of the energy system**
  - **Electricity will become the central energy carrier in the future**
  - **Networks/grids are the pillar of the energy system**
  - **In times of crisis: acting beyond the existing power system is key - broadening the sourcing-portfolio for sustainable security of supply !**
- **We need more resilience in the market: sustainable generation, batteries, (pump) storage, V2G, demand response, green hydrogen, decentralization**
- **IPCC report: global strengthening towards green energy & electricity !**

Thank You !
Gerhard Gamperl
Director – Verbund/Austria

For discussions/suggestions/queries email: www.indiasmartgrid.org
www.isgw.in
Links/References (If any)

India Smart Grid Forum
CBIP Building, Malcha Marg,
Chanakyapuri,
Delhi-110021
Website: www.indiasmartgrid.org