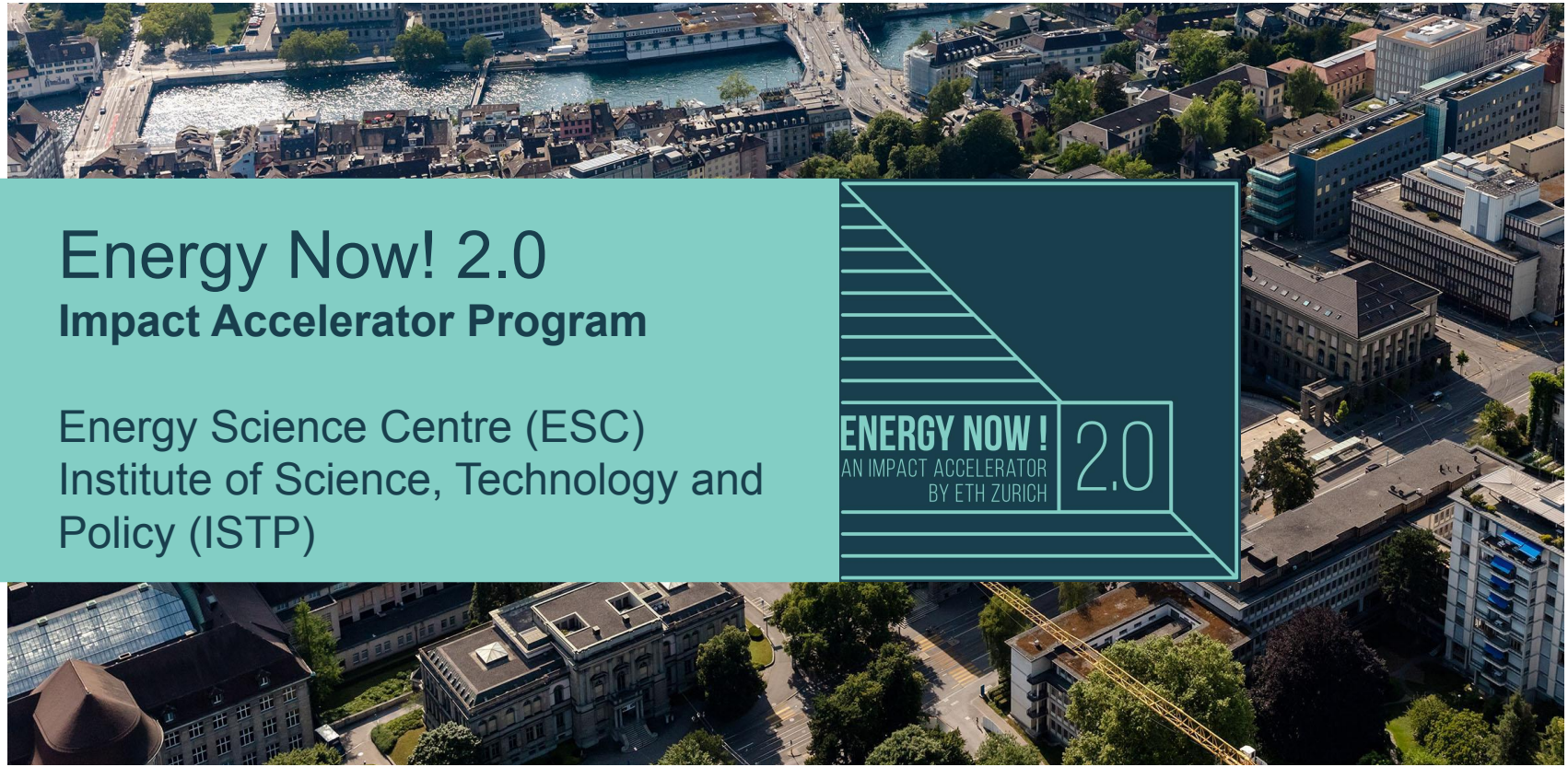
ETH zürich



Energy Now! 2.0

Impact Accelerator Program

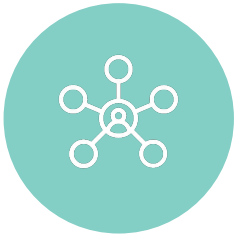
Energy Science Centre (ESC)
Institute of Science, Technology and Policy (ISTP)

https://esc.ethz.ch/events/energy-now.html

PROGRAMME

Reflection on the first edition of Energy Now! (Introduction by Christian Schaffner + last year's participant)	17:00
Paving the way of Energy Now! 2.0 (guest speaker: Tobias Schmidt)	17:15
Pitching challenges: (by Industry Partners)	17:30
• VBZ • ShareP • Swissgrid, BKW, Tiko, Ahoy-Hoy • Siemens	
Panel Discussions and Apéro	18:00

Energy Now! 2.0 Impact Accelerator Overview



"Energy Now!" is an **ETH initiative** that aims to tackle **real-world challenges** currently faced in the transition towards a sustainable Swiss energy system. It aims **to facilitate the dialogue** between the industry partners and students.

Teams from any scientific field **propose and develop solutions** over a short timeframe. These solutions could take various form from technological solution to policy measure.

Teams will then work on their solutions over the course of **8 weeks** to make a **real impact!**

Energy Now! – Background

In winter 2022, Switzerland, like many other European countries, faced the threat of an **energy shortage** – both of natural gas and electricity.

The **increasing demand for electricity** and the integration of **renewable energy** need to be considered in the Swiss energy system to avoid potential energy and electricity shortages in the **future.**

Energy Now! 2.0 – Participation

- At least one team member needs to be an ETH Zurich affiliate (student, researcher, or staff).
- Team size of roughly **3-5 students**.
- We encourage **interdisciplinary** teams as the challenges require diverse skill sets ranging from coding and prototype building to communication, policy making and more.
- **Partners** will help **shape ideas**, give **feedback** on proposed solutions and play the role of a **mentor**.

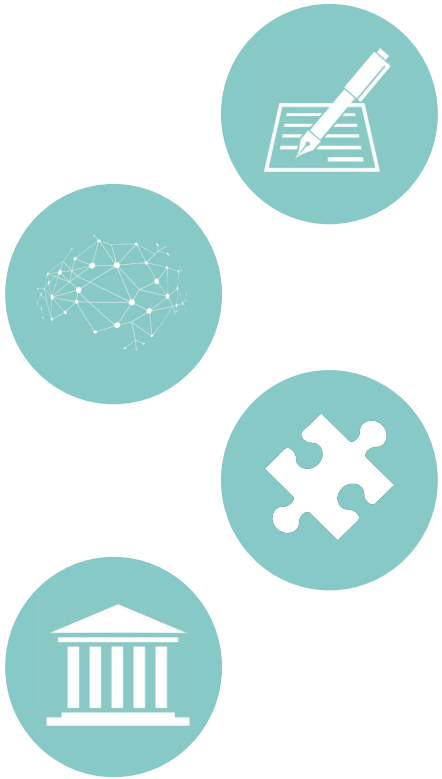
Energy Now! 2.0 – Registration

- The deadline for registration is **Thursday, 5 October** 2023.
- All members of a team should register with their contact information, referencing the same team name in each of their application.

Energy Now! 2.0 – Process and Events

- Final submission: **November, 23**
- The **final session** of this initiative will be held as part of the **Energy Week @ ETH** where participants will present their work during final pitches.

Energy Now! 2.0 – Outcome



Submission:

You are free to surprise us about the presentation of your solution. It could be a **pitch video,** an **exhibition**, a set of **policy measures**, a physical **prototype** or any other suitable format.

Criteria:

The **feasibility** of the solutions will be the primary focus of Energy Now! 2.0, as it aims to achieve concrete impact.

It includes the **scalability** of technological development, the necessary supportive **policy framework**, and the **economic** viability of the solution.

List of challenges

This year's challenges are themed around pressing problems related to **flexibility** potential of the electricity grid as well as **efficient** use of energy and heat in the **transportation system**.

- Visualising flexibility for different stakeholders
- Heat-on-demand for trams
- Public transport – Energy Tool
- The billing problem of bidirectional charging in e-mobility
- Unified EV charging: Bridging diverse charging stations and apps

Register here for a challenge!

https://esc.ethz.ch/events/energy-now/registration.html

Energy Now! 2022 - A look back

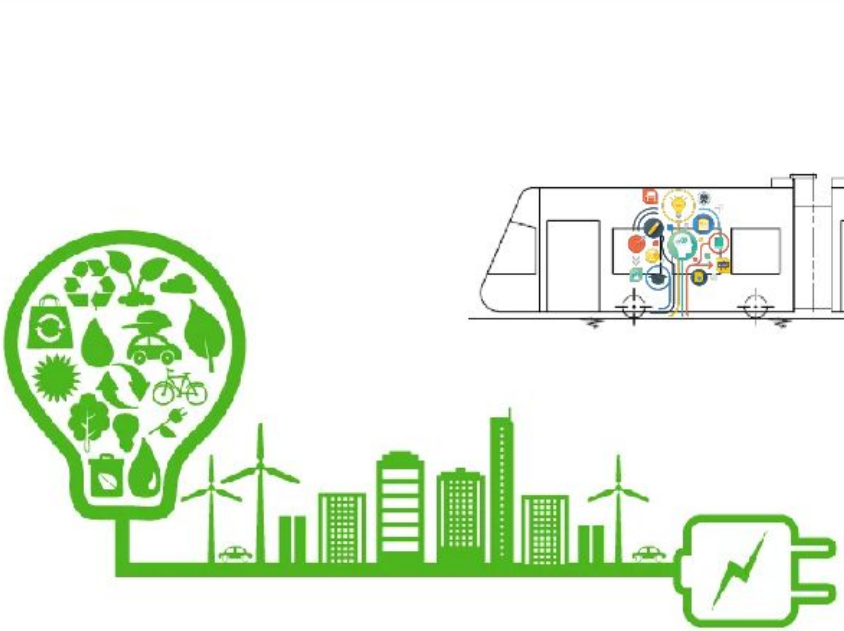
PROGRAMME

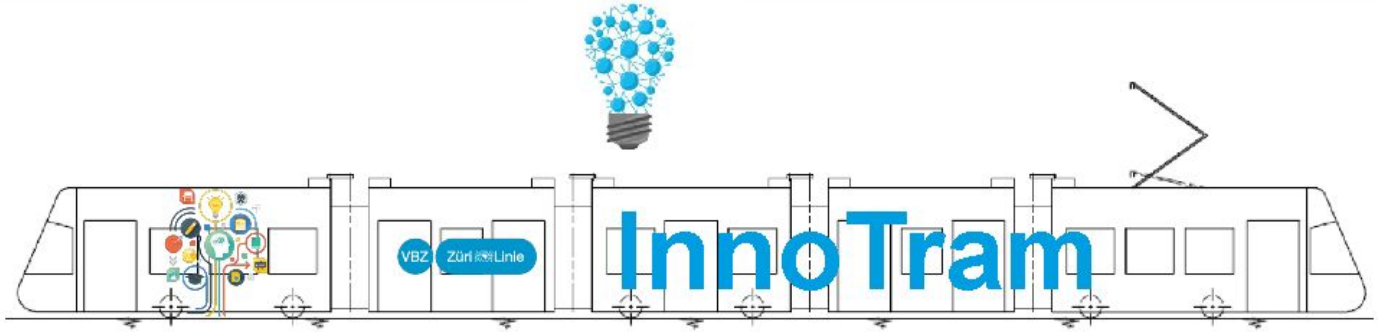
Reflection on the first edition of Energy Now! (Introduction by Christian Schaffner + last year's participant)	17:00
Paving the way of Energy Now! 2.0 (guest speaker: Tobias Schmidt)	17:15
Pitching challenges: (by Industry Partners)	17:30
• VBZ • ShareP • Swissgrid, BKW, Tiko, Ahoy-Hoy • Siemens	
Panel Discussions and Apéro	18:00

PROGRAMME

Reflection on the first edition of Energy Now! (Introduction by Christian Schaffner + last year's participant)	17:00
Paving the way of Energy Now! 2.0 (guest speaker: Tobias Schmidt)	17:15
Pitching challenges: (by Industry Partners)	17:30
• VBZ • ShareP • Swissgrid, BKW, Tiko, Ahoy-Hoy • Siemens	
Panel Discussions and Apéro	18:00

VBZ @ Energy Now!





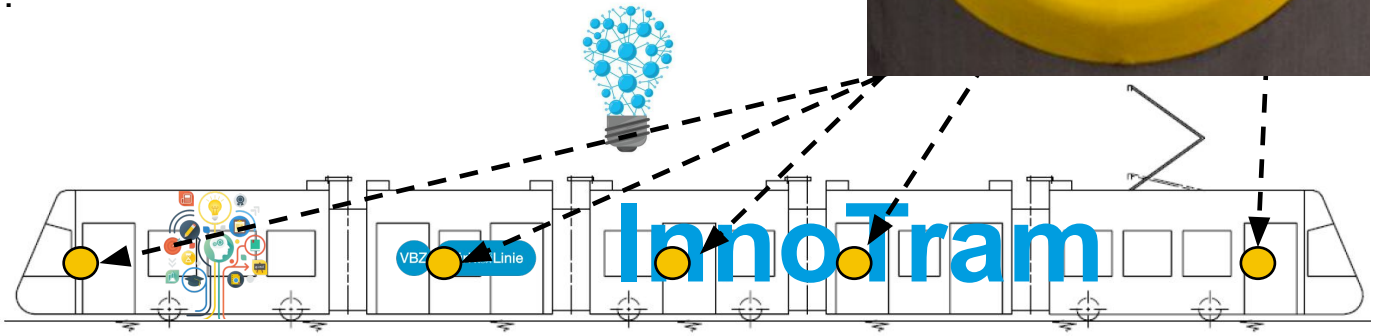
Inhalt

- Heat-on-demand for Trams
- Public Transport – Energy Tool

Heat-on-demand for Trams

What?

- A winter energy savings idea for VBZ for one test tram.
- Instead of having the heating system in the tram being switched on all the time, we would like to test the idea of installing new buttons which will switch the heating on for only a limited time (e.g. 15 min?) when requested by a passenger.



Heat-on-demand for Trams

How?

- Design the electrical and mechanical installation
- Devise the communication strategy
- Prepare a passenger survey

Why?

- It's not widely known, but tram heating systems in public transportation use a lot of energy (electrical heating).
- On very cold days, heating VBZ trams requires almost the energy needed for driving.

Inhalt

- Heat-on-demand for Trams
- Public Transport – Energy Tool

Public Transport – Energy Tool

- Trams and E-busses consume a lot more energy for heating than most people expect. For VBZ, we measured energy consumption & energy savings achieved by lowering the temperature on the Cobra tram fleet. However, we, and other vehicle operators, need a quicker way to estimate this for other tram and E-bus types.

- Help us develop a web-based tool that public transport operators can use to estimate how much energy their bus and tram fleets use for heating as well as the potential savings from lowering the vehicle temperatures.

Public Transport – Energy Tool

- A simple (?) tool in which operators can enter data like fleet size (number of vehicles), vehicle size (length, capacity), location (for climate information), operation data, heating types, station stop frequency…

- Use our VBZ measurements as well as information from other sources to make an estimate of how much energy the fleet uses each winter for heating and how much they could save by lowering the vehicle temp.


Share.P
Sustainable Parking Management
Share.P System
CITY/BUILDING/EV
friendly

The Fragmented Landscape of EV Charging

- Inconsistency in user experience across different platforms.
- Each system often requires a unique app or membership.
- Multiple charging stations run on different systems.

SUSTAINABLE DEVELOPMENT GOALS

The future of mobility is electric, but only if it is fragmented.

SUSTAINABLE DEVELOPMENT GOALS

Share.P™

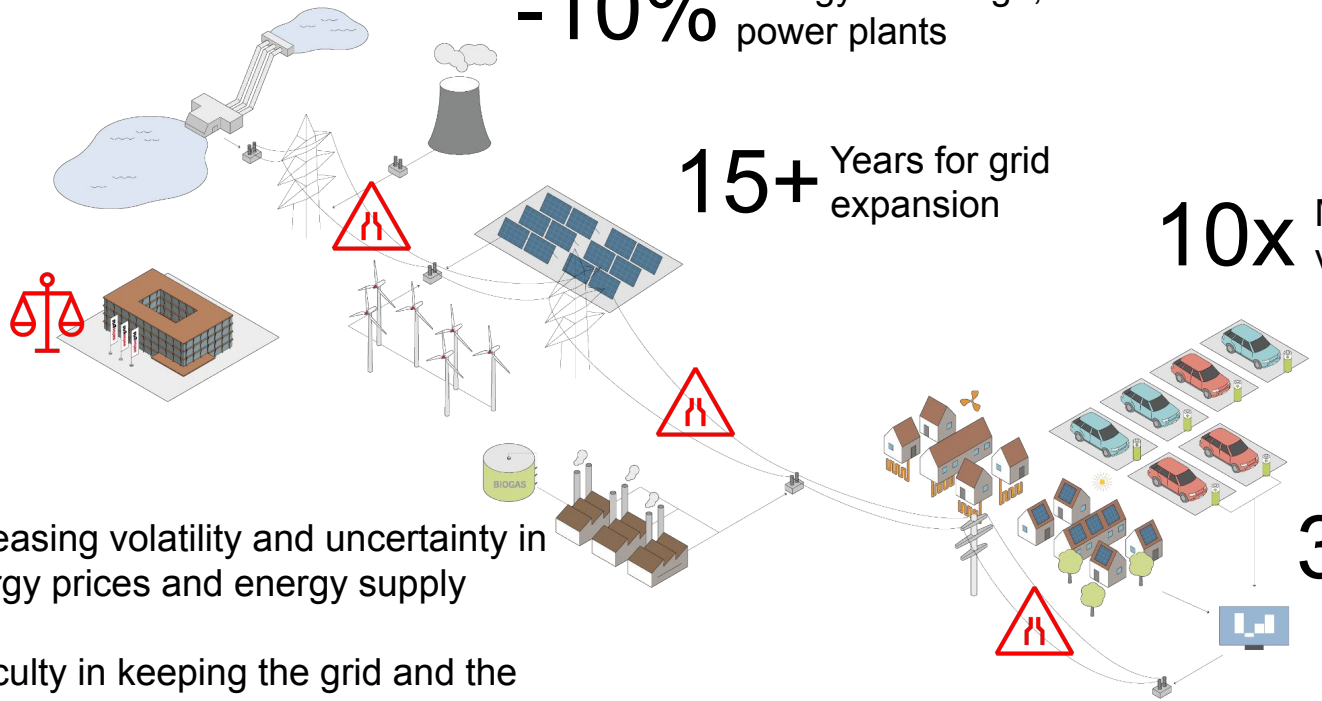
Sustainable Parking Solution

Less cars. Less traffic.
More safety.

30 minutes we need to help you
Call to find our how ©

www.sharep.io office@sharep.io +41 44 591 60 11

In this decade



-10% Energy from large, controllable power plants

15+ Years for grid expansion

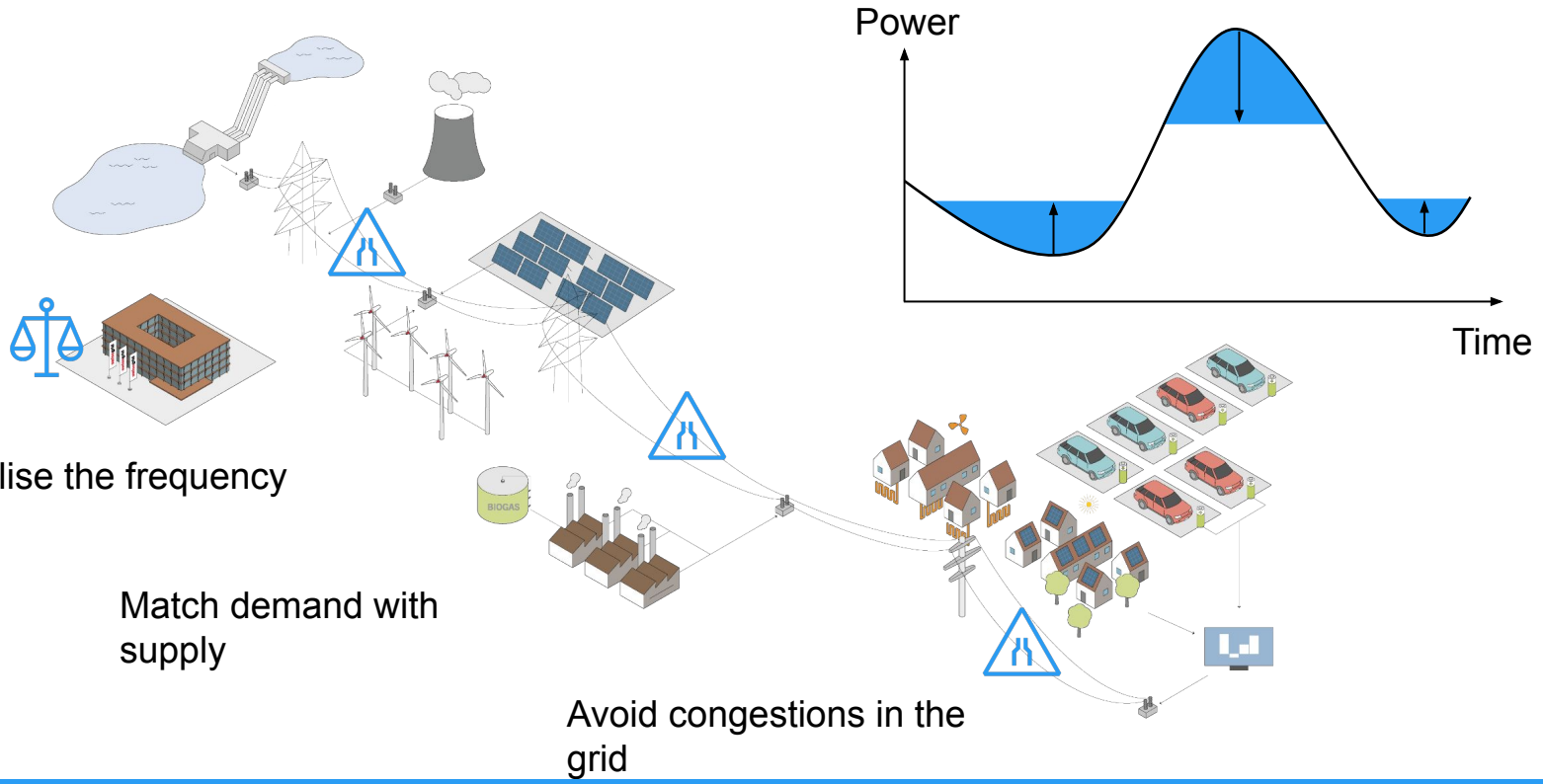
10x More electric vehicles

3x More distributed PV

- Increasing volatility and uncertainty in energy prices and energy supply
- Difficulty in keeping the grid and the entire electricity system stable
- And that's just until 2030

Data source for changes in energy supply: Energieperspektiven 2050+ (Prognos AG, 2022)

Flexibility from distributed energy resources



Stabilise the frequency

Match demand with supply

Avoid congestions in the grid

Stakeholders must know about the flexibility potential

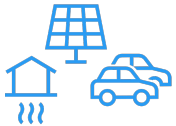
Roadmap to visualising distributed flexibility

Ideation

"Beyond Labels" challenge at Energy Data Hack Days 2023

Initialisation: Energy Now! 2.0

There are many potential topics to work on



Identify the technical flexibility potential

Model the baseline production/consumption

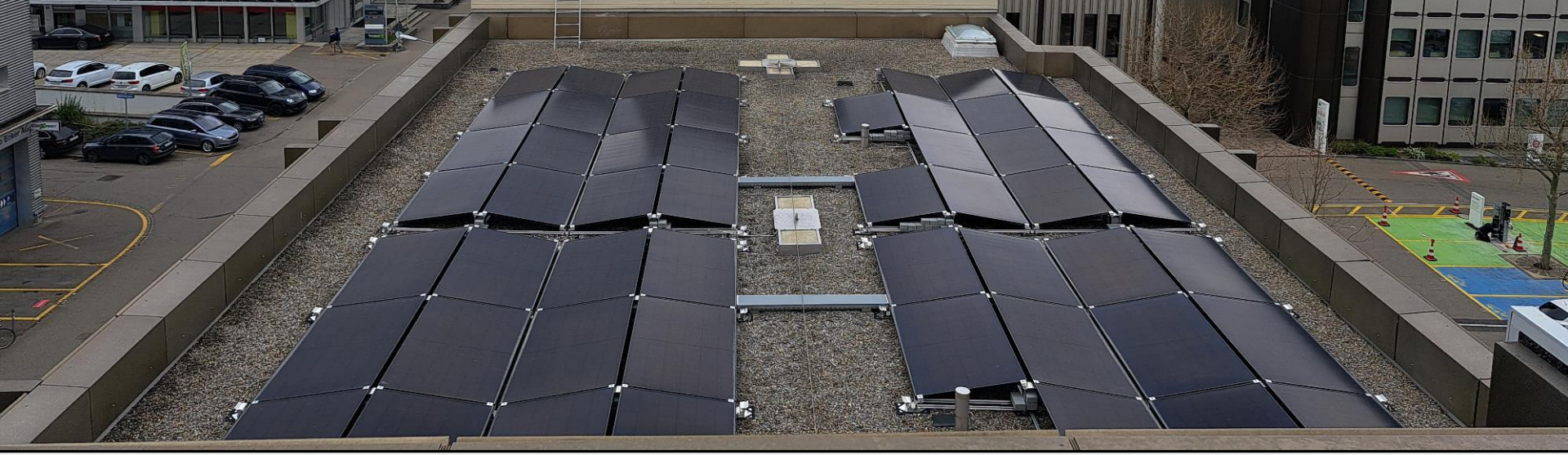
Identify the available flexibility per resource type

Develop a concept how to visualize flexibility at different levels across space and time

Implement software prototypes

Build-Up

Potential future research / pilot project based on the results of Energy Now! 2.0



Challenge - bidirectional charging, cost calculation
2023-10-02
Ingo Herbst, Siemens Smart Infrastructure

SIEMENS

Flexibility through eMobility - Bidirectional Charging

What is the topic?

- Bidirectional charging **V2G** is communicated as one of the biggest potentials to solve energy flexibility issues connected to the new sustainable energy world
- The technical feasibility of bidi charging is proven
- There exists no finance model to our knowledge that
  - takes account for the costs of the bidirectional V2G charging projected onto the eCar owner
  - estimates the costs in a verifiable & customer acceptable way

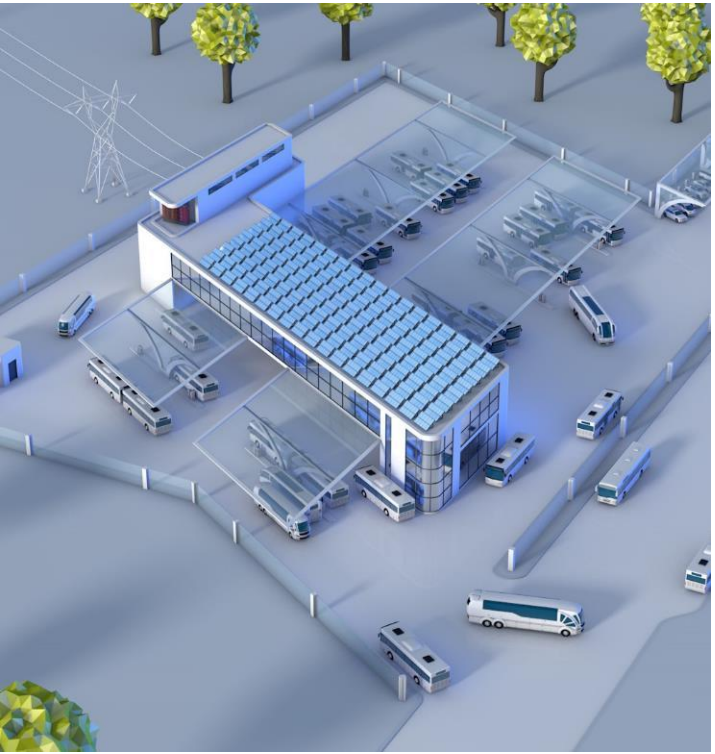
What is the task?

- Clearly **discuss all** the **different cost elements**
- Calculate & compare **total power loss** of bidi charging
- Find a **calculation model** for the **total cost** for the **eCar owner**
- **Propose solutions** that **serve all** and **avoid conflicts**
- If you can't find a fair calculation model, then **come up with new mobility models** that avoid the need for power loss calculations

Technical details to be clarified

- How to calculate **energy (&cost) given away** by the car
  - example: SOC_{Start} = 60%, SOC_{end} = 40% -> E_{given} = ??? (kWh)
  - Tariff used for E_{given} ???
- **Operation & standby losses & how to measure** them
  - **Converter losses** charging / decharging **HV** battery (~10%?)
  - HV battery efficiency
  - **Standby losses 12V** battery (~4kWh/day?)
  - How to calculate the total losses of the flexibility service with multiple cycling? In particular, if you do not go through the starting SOC…
- Consider **AC and DC charging** (both in discussion!)
  - All the losses have nothing to do with the end customer
  - The only numbers available are SOC and energy in and out – what else would you need?
- **SOC is** based on a **battery model,** it's NO Measurement
- If you need **battery capacity**: how to calculate/estimate it
  - Example VW: **gross** / net / initial 0…100% / real 0…100%
    82kWh / 77kWh / 72kWh / 69kWh (@35'000km)

Kontakt



Dr. Ingo Herbst
RG CH SI S
Freilagerstr. 40
8047 Zürich
Tel.: +41 585 581 836
Mobil: +41 79 346 18 83
E-Mail: ingo.herbst@siemens.com

siemens.ch

SIEMENS

PROGRAMME

Reflection on the first edition of Energy Now! (Introduction by Christian Schaffner + last year's participant)	17:00
Paving the way of Energy Now! 2.0 (guest speaker: Tobias Schmidt)	17:15
Pitching challenges: (by Industry Partners)	17:30
• VBZ • ShareP • Swissgrid, BKW, Tiko, Ahoy-Hoy • Siemens	
Panel Discussions and Apéro	18:00