INTEGRATED ELECTRIC VEHICLES AND BATTERIES TO EMPOWER DISTRIBUTED AND CENTRALISED STORAGE IN DISTRIBUTION GRIDS

INVADE

This project has received funding from the *European Union's Horizon 2020 Research and Innovation programme* under Grant Agreement No 731148.

WHAT ARE WE **AIMING AT?**

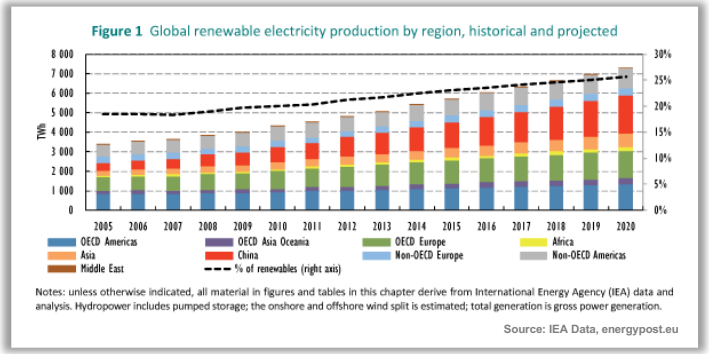
The INVADE project aims to provide a **Cloud-based flexibility management system integrated with EVs and batteries** empowering energy storage at **mobile, distributed and centralized levels** to increase renewables share in the smart distribution grid.

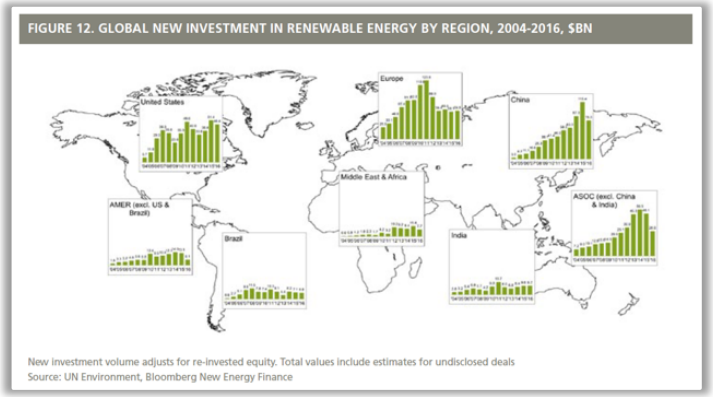
PILOTS **IMPLEMENETATIONS**

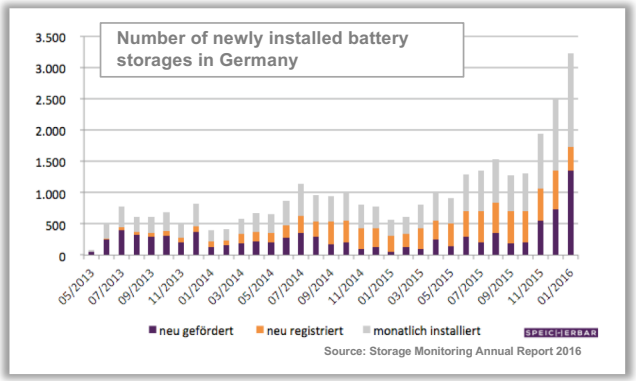
- 5 Pilot sites
- Technology partners:
  - Schneider Electric Norge
  - eSmart Systems
- Research partners:
  - Universitat Politècnica de Catalunya (UPC)
  - The Norwegian University of Science and Technology (NTNU)
  - Smart Innovation Norway

Further information:
https://h2020invade.eu/

DESRUPTIVE DECENTRALIZATION: **RENEWABLE ENERGIES**





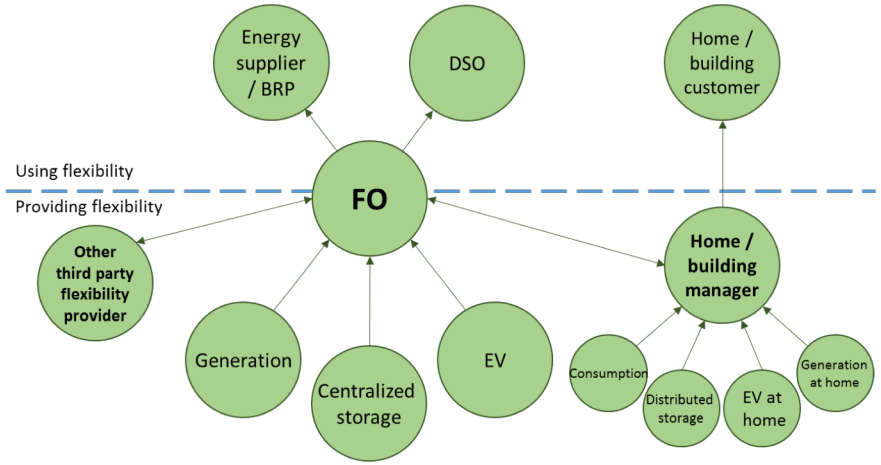


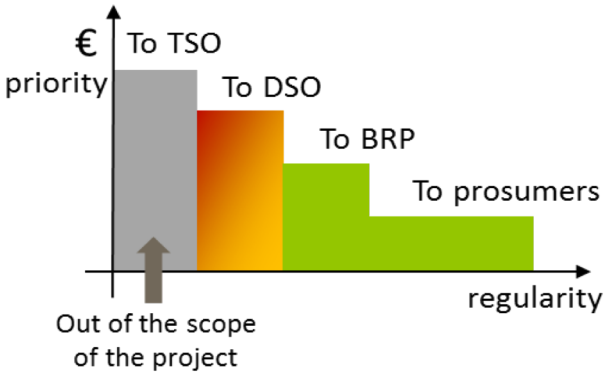
- The usage of renewable sources grows (at least worldwide)
- Decentral solutions are not in any case best solutions, there are “central” approaches for decentral problems
- All concepts require new technology for control, balancing and trading

INVADE

INVADE **SYSTEM DESCRIPTION**

The system is a peer-to platform based on direct control of demand and supply. The flexibility operator (FO) takes decisions based on flexibility contracts. Third party platforms can be integrated.





Flexibility resources to be controlled are:

- Batteries
- Electric vehicles
- Photovoltaic panels
- Water heaters
- Heat pumps

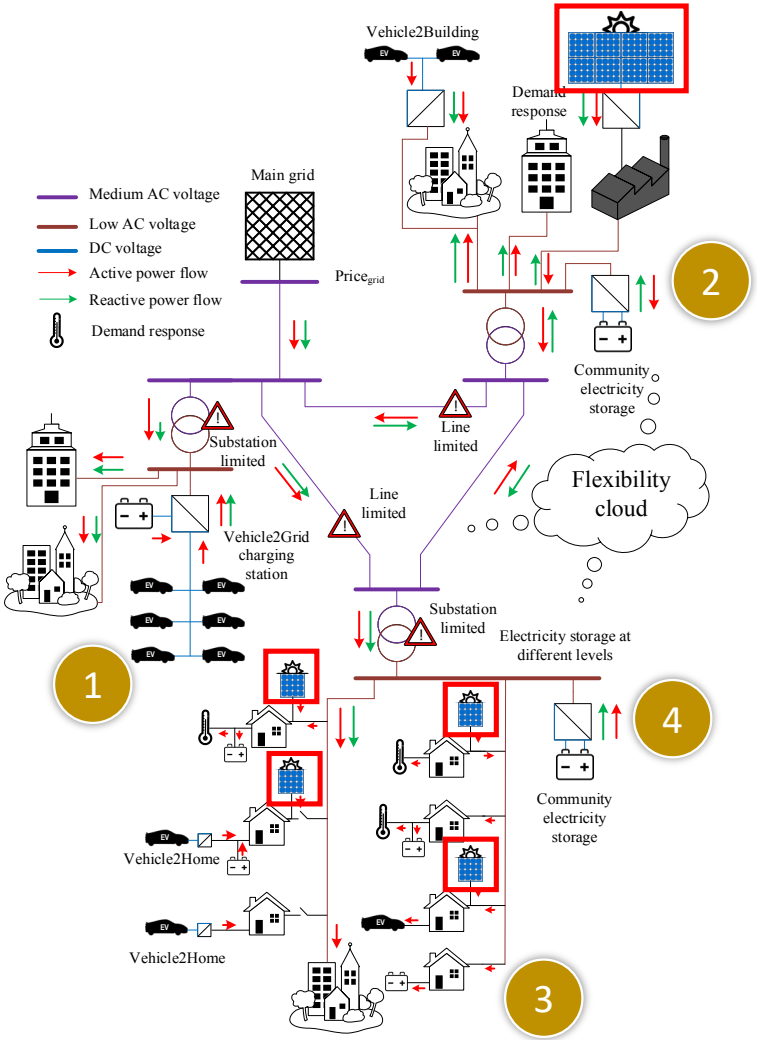
Flexibility services for:

- End-users/prosumers reducing electricity bill
- BRP to reduce imbalance penalties
- DSO to control grid congestions

INVADE

1. Mobile energy storage using EVs for V2G, V2B and V2H operations
2. Centralized energy storage using an array of batteries at the sub-station or street level
3. Distributed energy storage using individual batteries at the household level
4. Hybrid level energy storage solutions addressing a combination of use cases 2 and 3

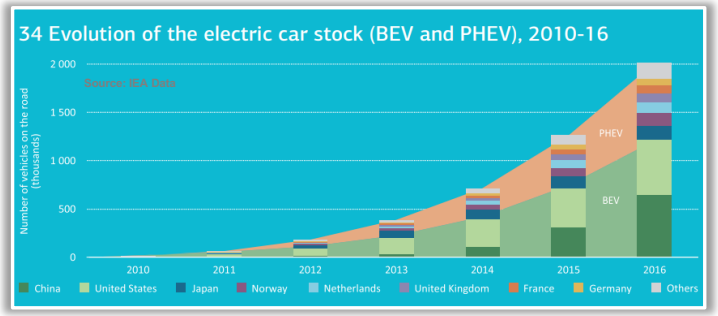
USE **CASES**



The strongest, disruptive German event is:
Use of battery storage when subsidies from the EEG expire.

INVADE

DESRUPTIVE DEVELOPMENT: **E-MOBILITY**(?)



City stations and privileged parking

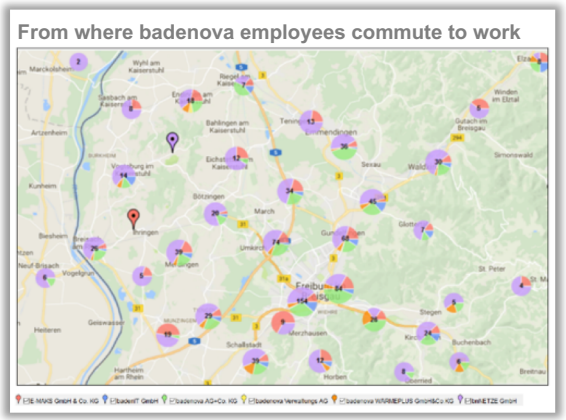
City stations and privileged parking

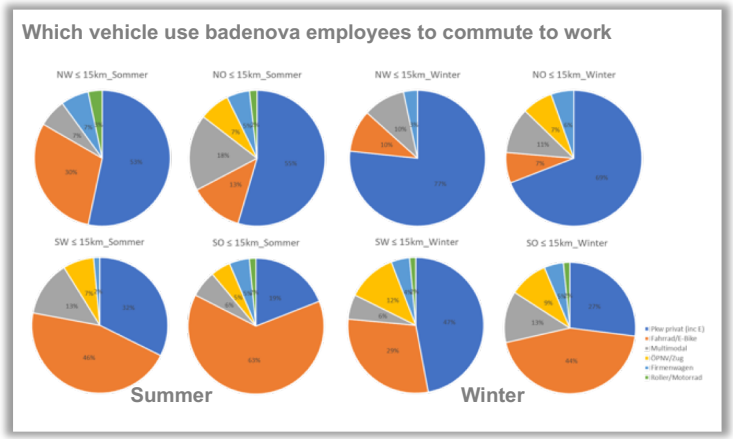
What customers seem to expect from electric mobility:

- “I want to refuel in 5 minutes and take two sandwiches and a coffee in passing.”
- “I drive to the gas station and refuel for the week”
- “My car needs a range of 800 km for holidays with children”

INVADE

WHAT SHALL WE **AIMING AT?**

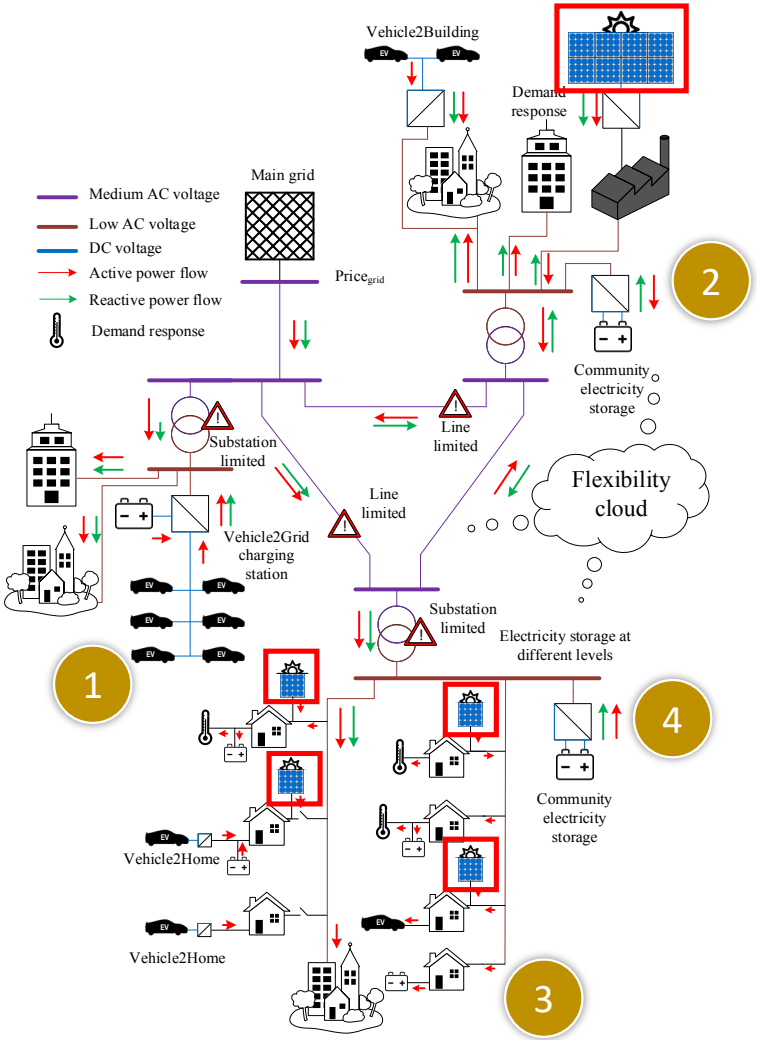




INVADE

1. Mobile energy storage using EVs for V2G, V2B and V2H operations
2. Centralized energy storage using an array of batteries at the sub-station or street level
3. Distributed energy storage using individual batteries at the household level
4. Hybrid level energy storage solutions addressing a combination of use cases 2 and 3

USE **CASES**



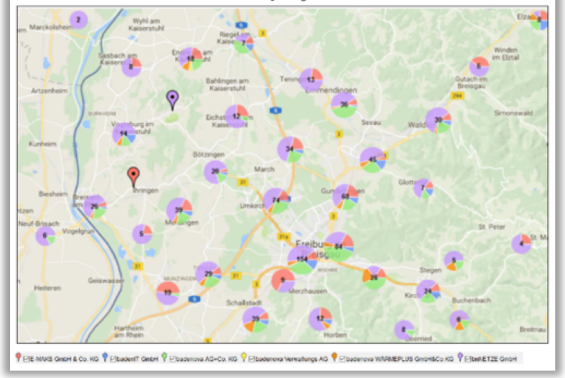
During summer:
eVehicles stay at home and could balance critical feeders

During winter:
Additional battery-capacity (and energy) is driven to commericial/industrial sites

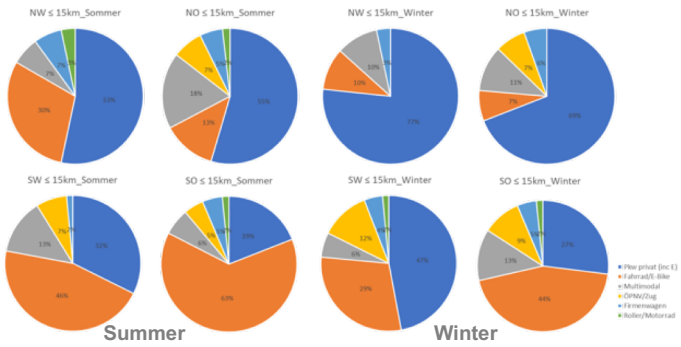
INVADE

WHAT SHALL WE **AIMING AT?**

From where badenova employees commute to work



Which vehicle use badenova employees to commute to work



The Greenpack® as an example of a battery system that can be used both in mobile and stationary applications

Source: www.greenpack.de

Questions that go beyond the INVADE project

- Is new business driven by investment or by people/consulting?
- If batteries and eMobility and decentral energy markets are disruptive – why do they grow so slow?
- Who can earn with platforms, a local player or a global one?
- Is disruption triggered by new benefits and values or by legal framework and subsidies?

INVADE