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TABEDE

Taking Demand Response to Scale: the TABEDE solution

28th October 2020

TABEDE
Towards buildings ready
for Demand Response

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- Project overview and context
- Proposed technical solution
- Test sites
- Next steps

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What is TABEDE?

TABEDE
Towards buildings ready for Demand Response

TABEDE is a 3-year project funded by the European Commission that aims to allow all buildings equipped with Energy Management Systems to integrate energy grid demand response schemes, independently of communication standards.

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TABEDE Consortium Team

ENGIE Impact / TRACTEBEL ENGIE

Project lead
& WP2 lead

R2M RESEARCH TO MARKET SOLUTION

WP6 lead (dissemination & exploitation)

csem

Technical coordinator & WP3 lead (communication bridges)

CARDIFF UNIVERSITY / PRIFYSGOL CAERDYDD

WP5 lead (validation) & Cardiff test site

Schneider Electric

Grenoble & Bergamo test sites

cea FROM RESEARCH TO INDUSTRY

WP4 lead (novel building management)

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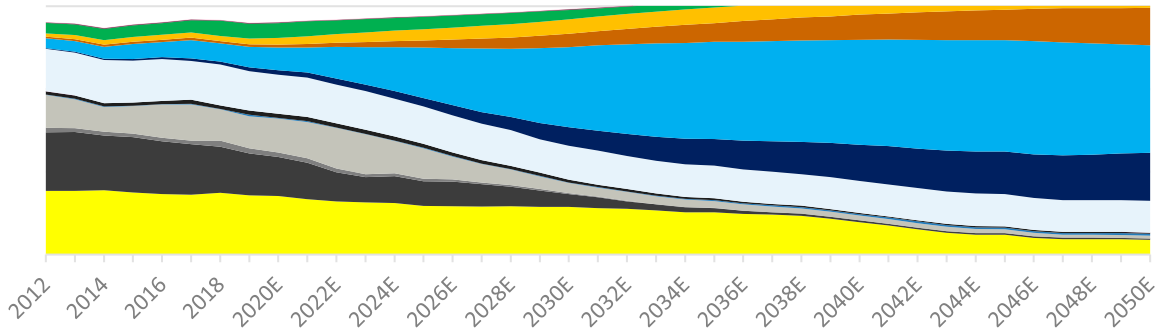
While Europe's renewable energy deployment brings significant social benefits, it increases system variability and thus requires more (demand) flexibility

European Generation Mix toward 2050 (BNEF)



Social Benefits of Renewable Energy in Europe until 2030

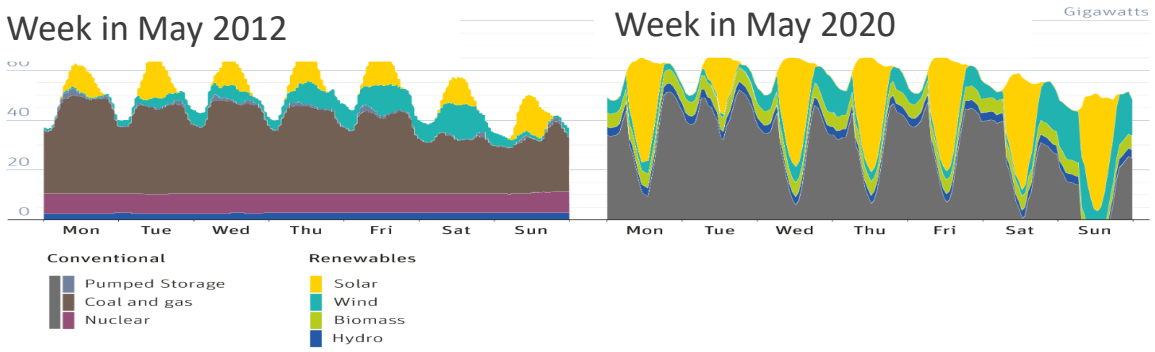
€180 billion
Of additional public and private investment per year from 2021

900,000 new jobs
In Europe linked to the clean energy sector

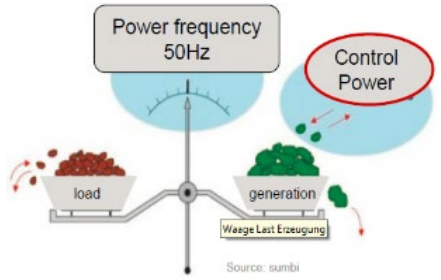
1% increase
In economic growth over the next decade

≤ 40 % reduction
Of Greenhouse Gas Emissions

Example from Germany

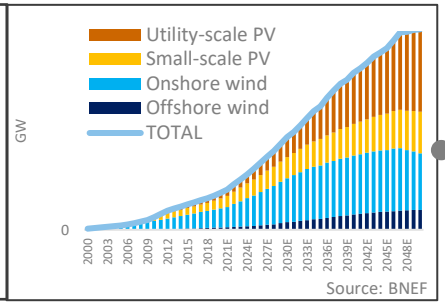


For a stable and reliable energy system, demand and supply must always be in balance

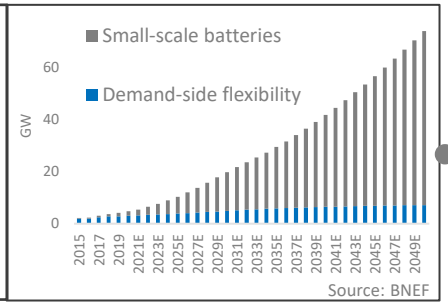


The significant uptake of renewable deployment goes along with increasing flexibility potential, e.g. via automated demand, storage and electric vehicles

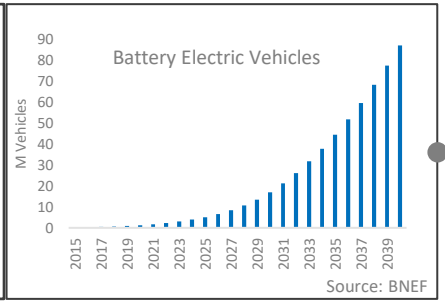
- **With increasing variable Wind & Solar production …**
- **About 780 GW and 1.8 TW wind and solar capacity across Europe by 2030 and 2050 respectively**

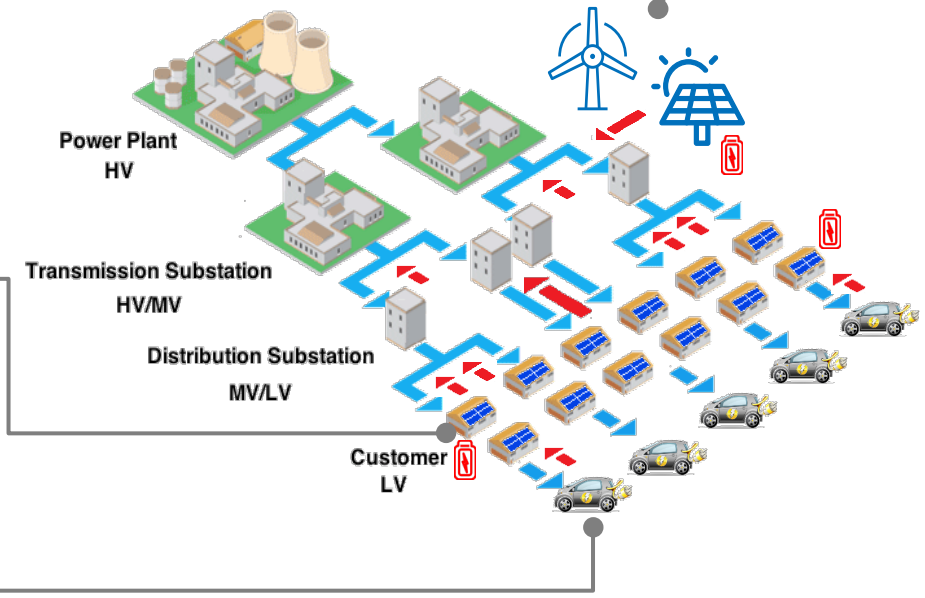


- **… consumers can support the grid by valorizing their flexibility and local assets …**
- **About 20 GW and 75 GW of distributed flexibility across Europe by 2030 and 2050 respectively**



- **… including EVs, that may create or relieve grid congestion**
- **About 17 M and 87 M Battery Electric Vehicles across Europe by 2030 and 2040 respectively**





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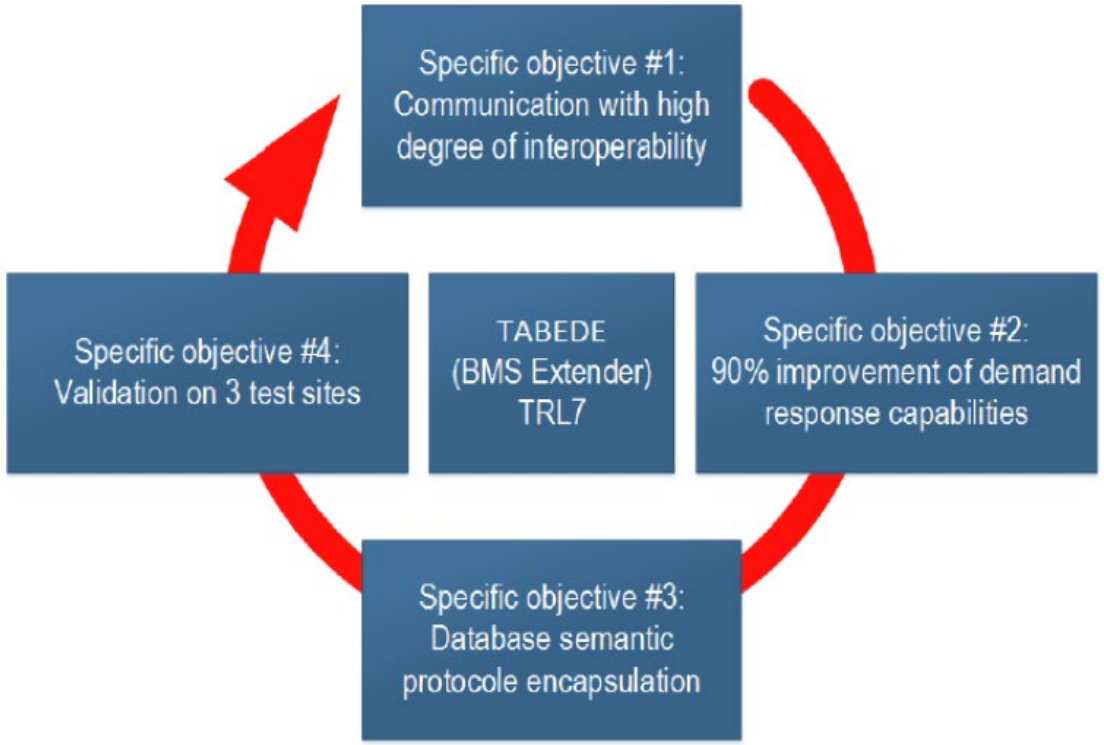
TABEDE extender objectives



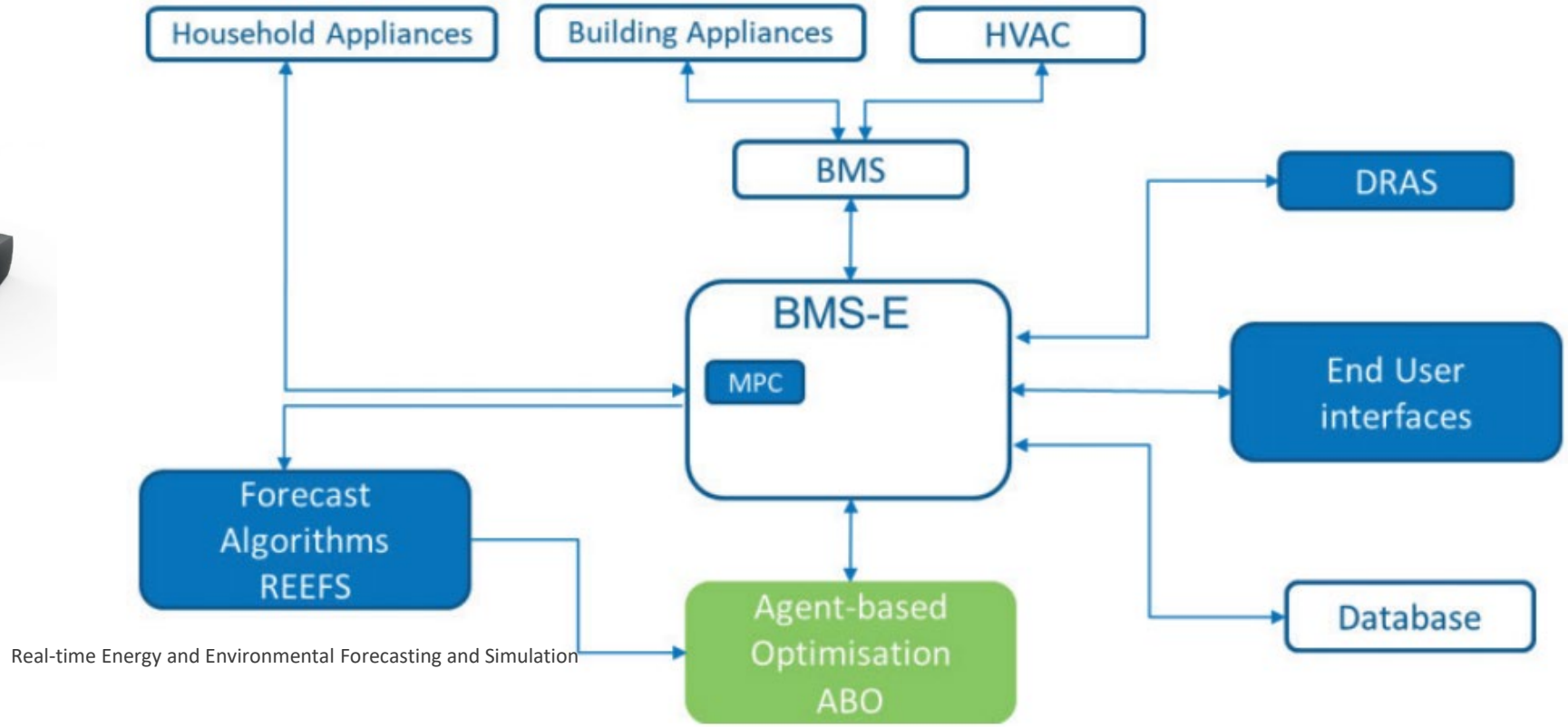
Specific objective #1:
- Numerous field buses available
- Software architecture modularity:
  - Allows easy integration of new protocols
  - Allows seamless deployment locally or in the cloud

Specific objective #2:
- Set-points can be provided to take control actions
- Information can be customized by the end-user

Specific objective #3:
- Devices and appliances are identified for flexibility assessment
- ABO, DRAS and BMS-E exchange semantic information via MQTT

Specific objective #4:
- Already working for 2/3 test sites

TABEDE overall architecture & constitutive elements



Real-time Energy and Environmental Forecasting and Simulation

Communication Bridges—BMS-Extender

Characteristics:

- Hosts a computer-module Raspberry Pi on a custom-designed board
- Running Linux Raspbian
- Molded polyhurethane housing

Inputs/Outputs:

- 1x Ethernet
- 3x USB (for optional ZigBee, Z-Wave, …)
- WiFi
- Bluetooth
- EnOcean
- Modbus
- KNX

User Interfaces:

- 6x status LEDs (e.g. power, error, connection)
- 3x buttons (power, pairing, reset)
- Single-page application frontend

Communication Bridges—BMS-Extender

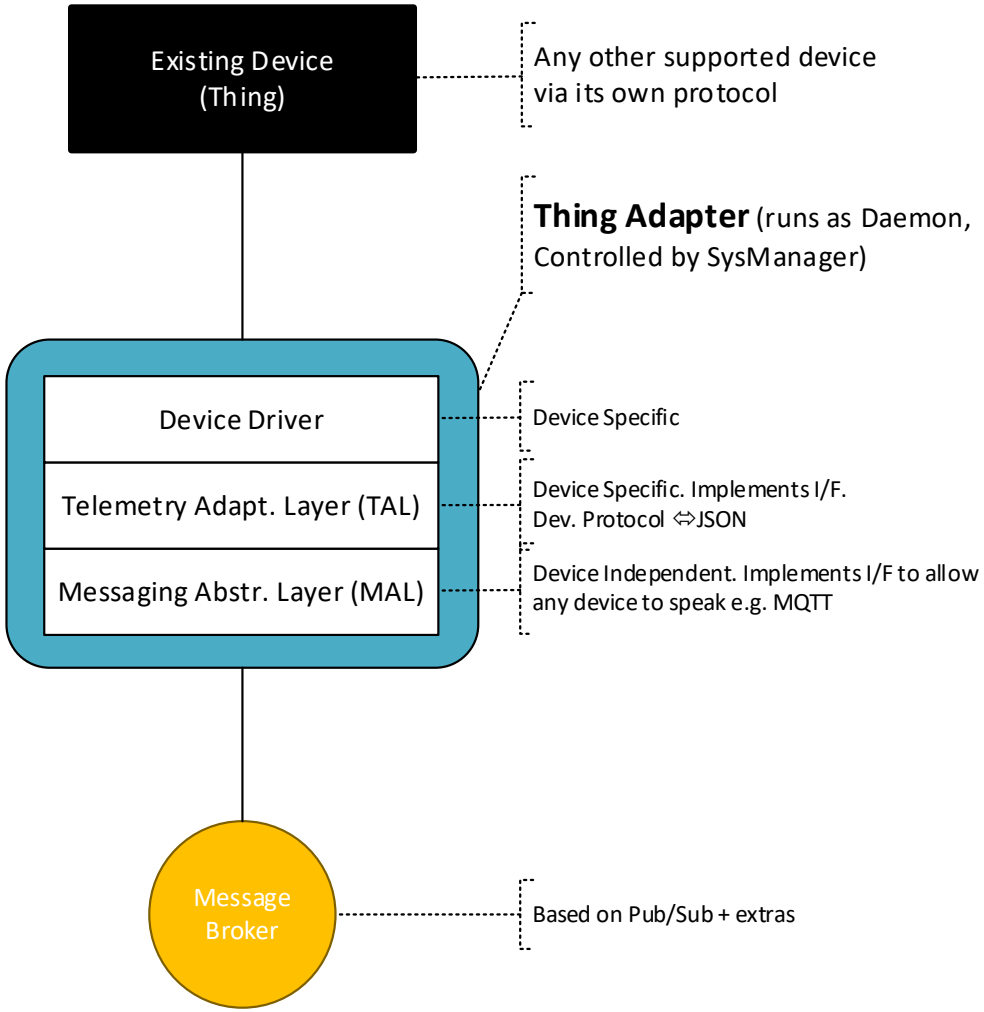
The BMS-E supports the following protocols:

- WiFi
- Bluetooth
- EnOcean
- Modbus

An Ethernet and three USB ports allow accomodating growing peripherals such as:

- KNX
- ZigBee
- Z-Wave

The modularity of our software architecture allows seamless integration of any type of protocol / field buses. A common layer of interoperability is at the heart of our architecture. This typically allows any new protocol to be supported very easily simply by developing a very simple driver.



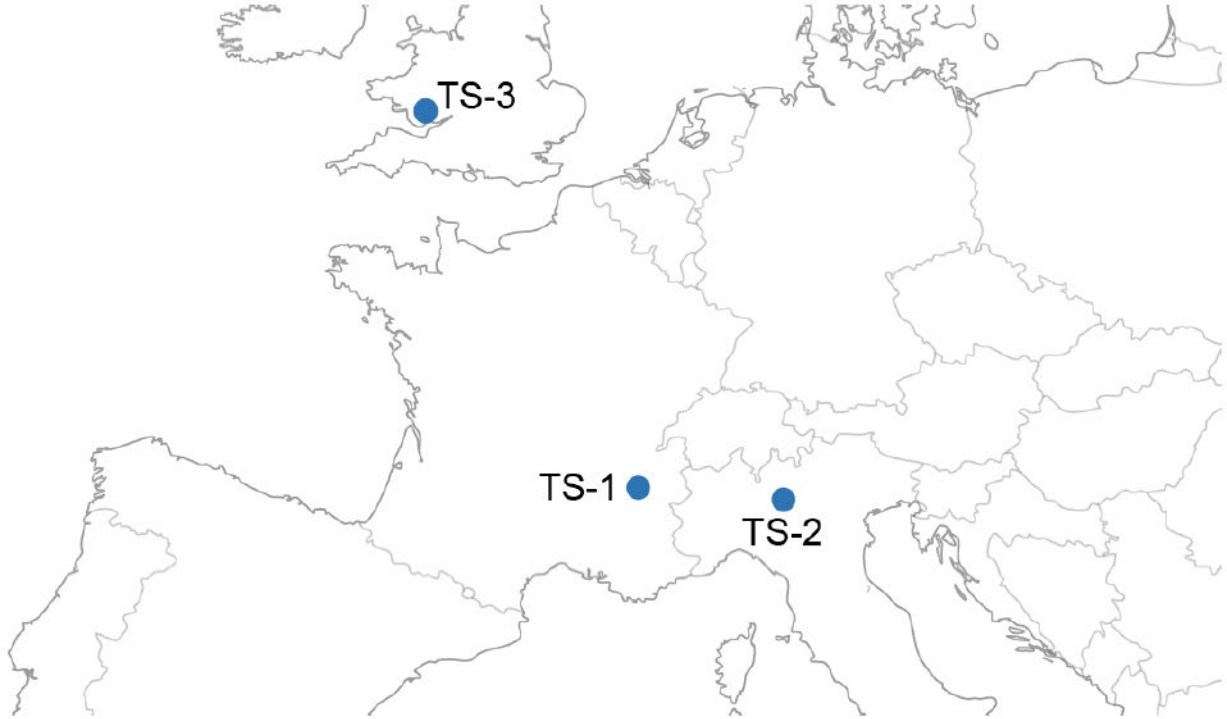
End user interface

- Widgets to show appliance data
- Graphic visualization of data

- Graphic input of user preferences

Final solution

TABEDE test site overview



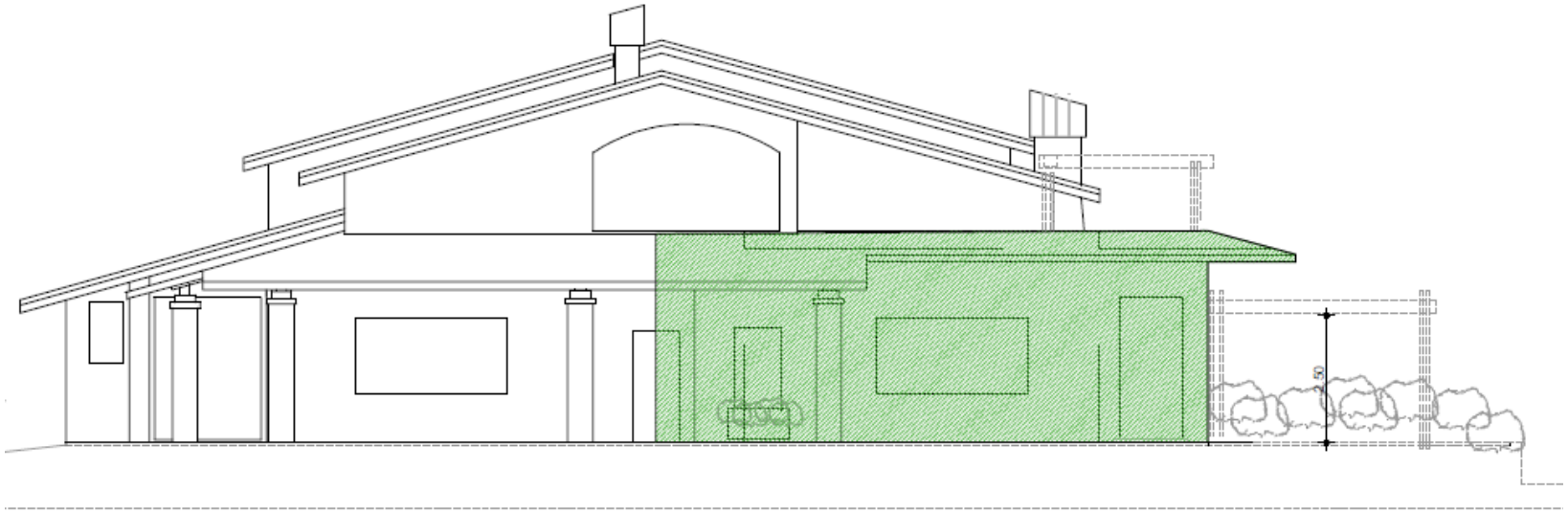
Site	Location	Type	Responsible
TS1	Grenoble, France	Industrial Campus	SCHN
TS2	Bergamo, Italy	Residential Building	SEI
TS3	Cardiff University, UK	Smart House	CU

Schneider, Grenoble, FR, test site

- Use case 1: Test full system loop to validate TABEDE's applicability to a large commercial building
- Use case 2: Analyze flexibility and cost savings from implicit DR signals
- Use case 3: Analyze flexibility and cost savings from explicit DR signals

Schneider, Bergamo, IT test site

- Use case 1: TABEDE controls appliances to respect maximum 3 kw power request from electricity provider
- Use case 2: TABEDE adjusts device consumption patterns to reduce costs in response to differentiated electricity prices
- Use case 3: TABEDE directs excess solar PV generation to heat and store water in on-site tank



Cardiff, UK, test site

- Use case 1: Test interoperability of BMS-E through automatic detection of home devices
- Use case 2: TABEDE optimizes device consumption to match on-site solar PV production
- Use case 3: Test effectiveness of MPC backup solution for thermal comfort if TABEDE connection is lost
- Use case 4: TABEDE optimizes electric bill in response to solar production and differentiated electric tariffs

Transferring TABEDE technologies to the market:
Follow the TABEDE progress and join the DR conversation, we want to hear from you!

http://www.tabede.eu/media/

www.tabede.eu

@tabede_project

TABEDE_Newsletter_first-edition_March-2020

TABEDE_Newsletter second edition June-2020

"*Flexibility, Demand Response and Building Management Systems* (curated by the TABEDE H2020 Project)"
https://www.linkedin.com/groups/12405267/

https://attendee.gotowebinar.com/register/2386626032532185 75

: *“Real case applications of TABEDE BMS-Extender system for Demand Response*” (Fri, Nov 20, 2020 2:30 PM - 4:00 PM CET). Registration
link: https://attendee.gotowebinar.com/register/23866260325 3218575

2 - please also ask the workshop attendees to sign up to receive our newsletter
updates: http://www.tabede.eu/media/ and this will help us grow our stakeholder community that we'll need to report on for the upcoming D6.3 due at M42.