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Flexibility 2.1: From Demand Response to Renewable Energy Communities

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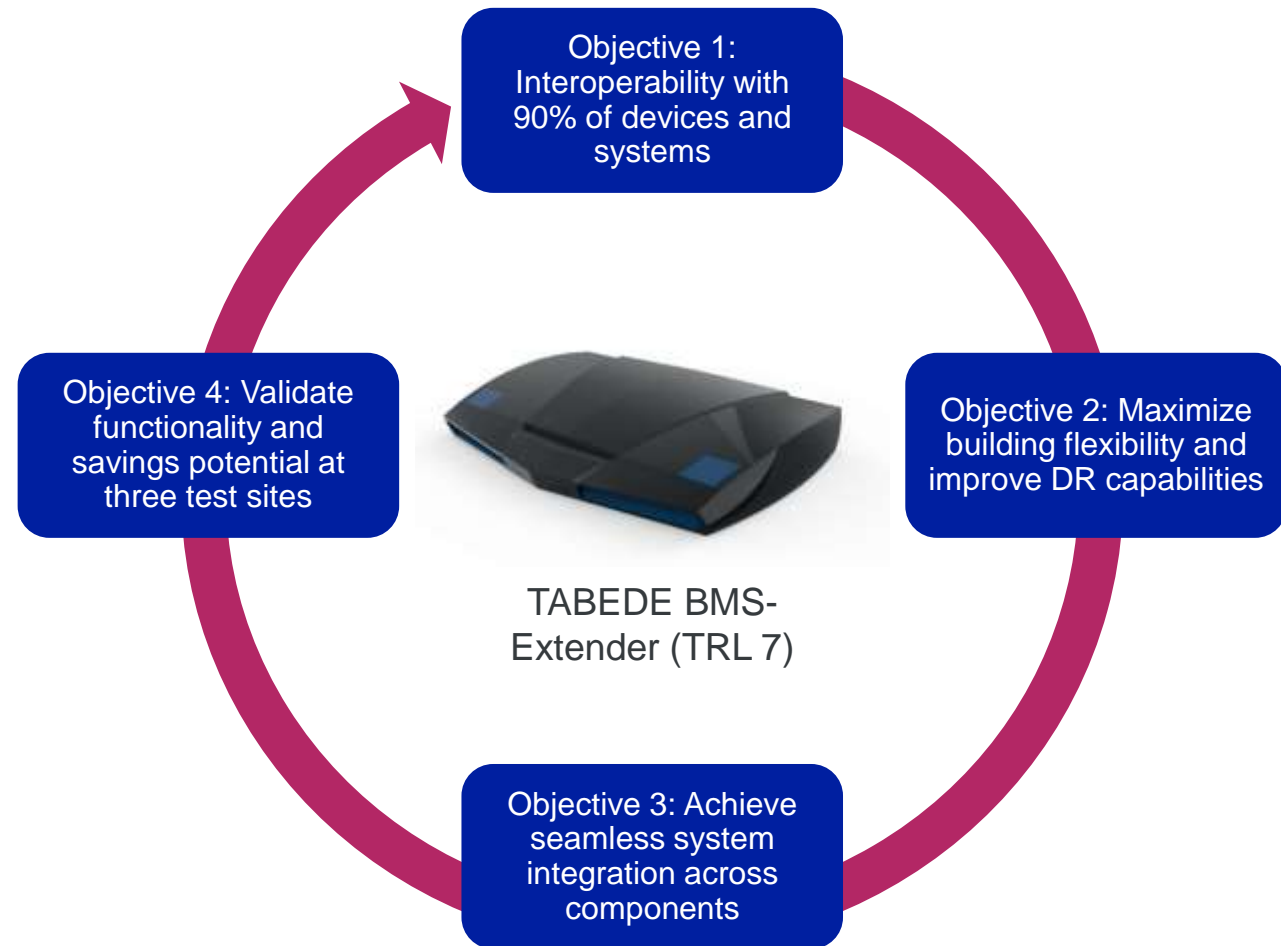


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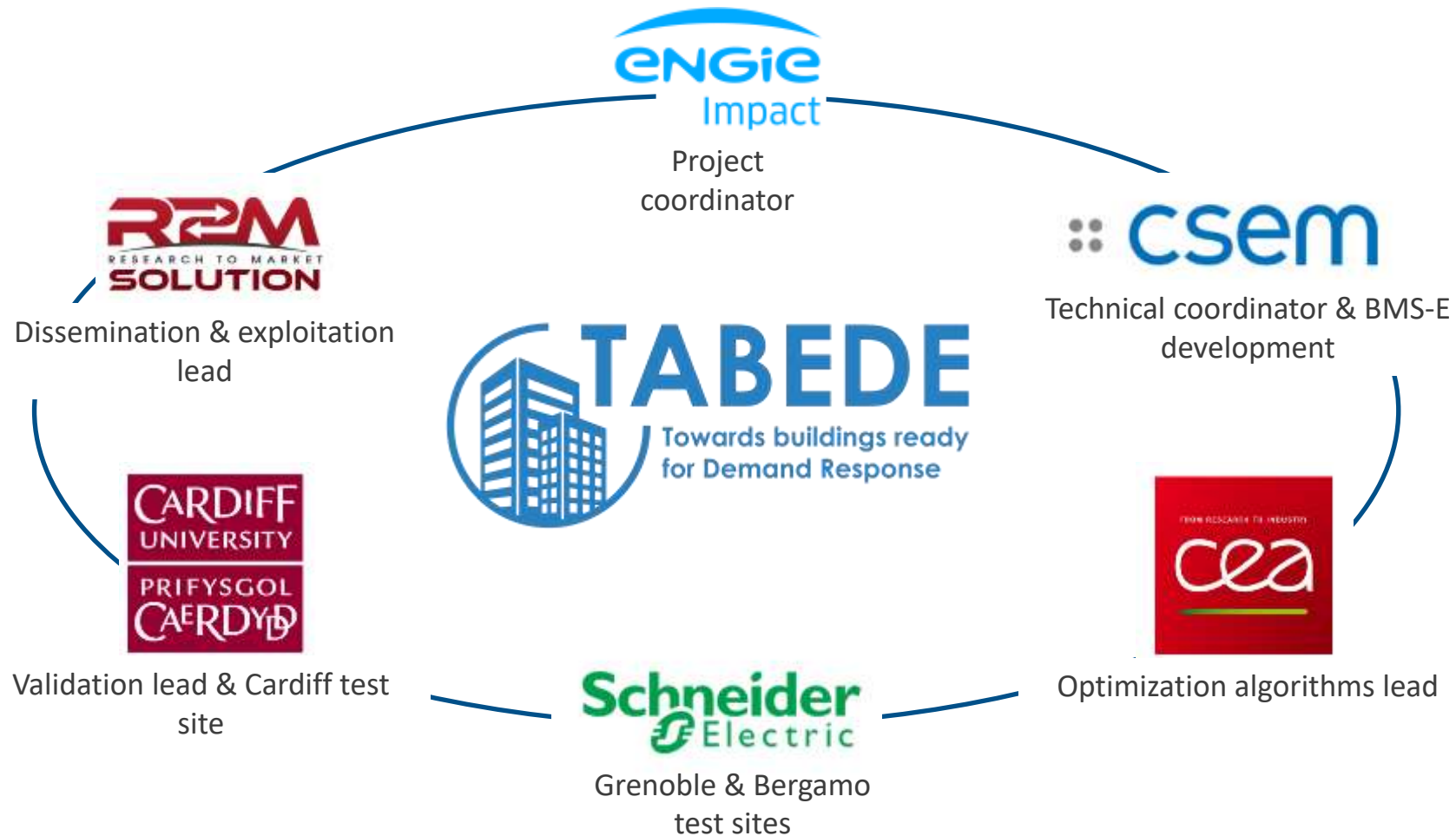
What is TABEDE?

TABEDE is a 3.5-year Horizon 2020 project that aims to allow all buildings to participate in demand response (DR) schemes, independently of communication protocols

The TABEDE system is a mix of hardware and software components that together optimize and control building loads based on DR signals, user preferences, and RES availability



Who is the TABEDE Consortium?



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TABEDE Test Sites



Cardiff, UK



Grenoble, FR



Bergamo, IT

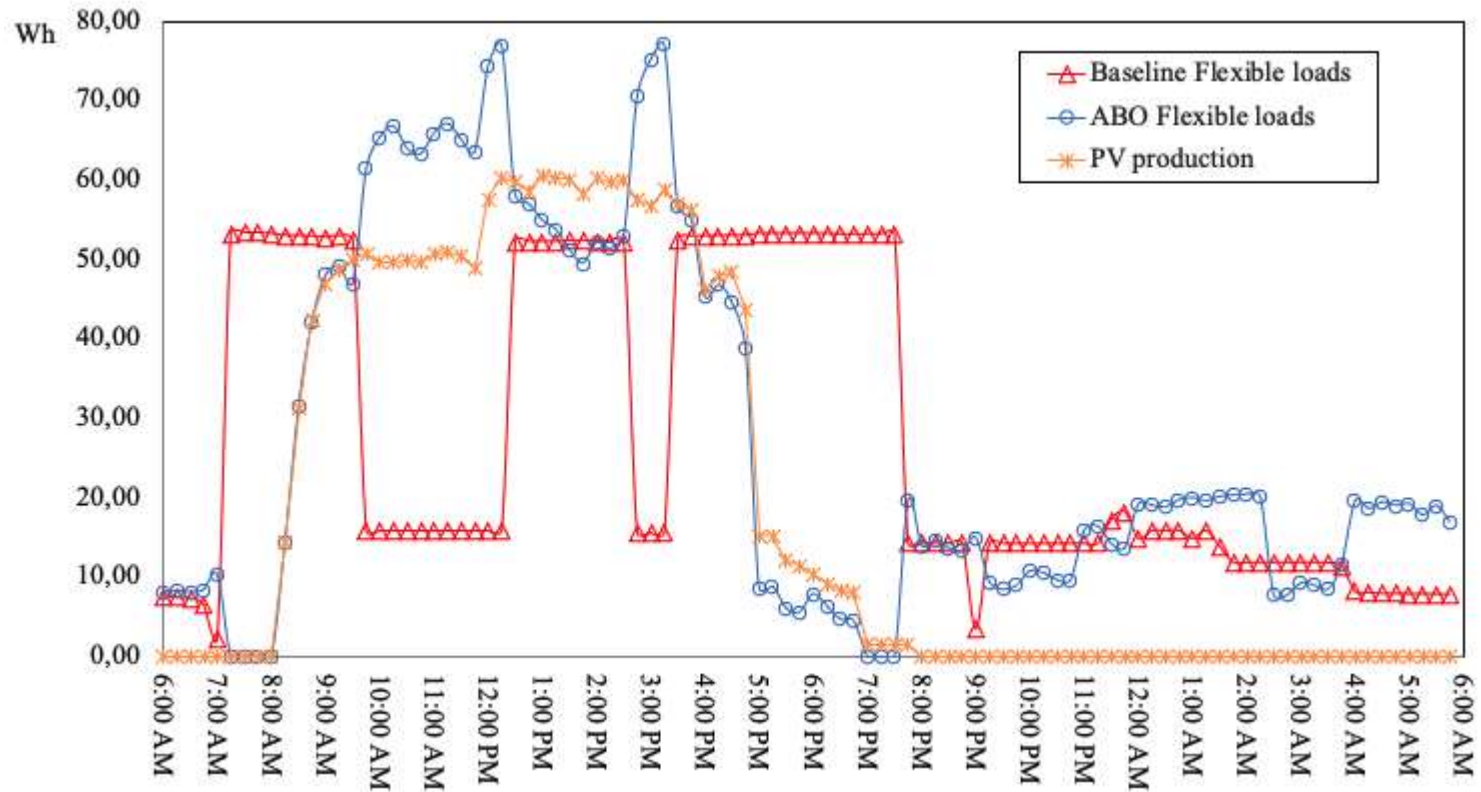
Location	Type	Objectives
1. Cardiff, UK	80 m ² , highly efficient smart house with 4 occupants	Load shifting to increase PV self-consumption by 10-25% and reduce energy costs by 10-30%
2. Bergamo, IT	160 m ² , typical home with average efficiency and 4 occupants	<ul style="list-style-type: none"> • Load shifting to reduce energy costs 10-30% • Activate thermal storage mechanism to achieve 100% PV utilization
3. Grenoble, FR	11k m ² , highly efficient commercial/ industrial building with 600 occupants	<ul style="list-style-type: none"> • Demonstrate TABEDE's applicability in a large, complex commercial building • Achieve energy cost savings through implicit and explicit DR



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Preliminary TABEDE Results from the Cardiff Test Site

ToU Price simulation—Baseline vs. Optimized Flexible loads



Peak price: 0,20 €/kWh; Off peak: 0,13 €/kWh;
Export tariff: 0,04 €/kWh

	Baseline	Optimized	Difference	%
Total consumption	5,73 kWh	5,73 kWh	--	--
Energy import	4,06 kWh	3,81 kWh	0,24 kWh	-6%
Energy export	0,24 kWh	0,00 kWh	0,24 kWh	-100%
Energy import cost	0,73 €	0,68 €	0,5 €	-8%
Export revenue	0,01 €	0 €	0,01 €	-100%
Total daily energy costs	0,72 €	0,68 €	0,04 €	-6%

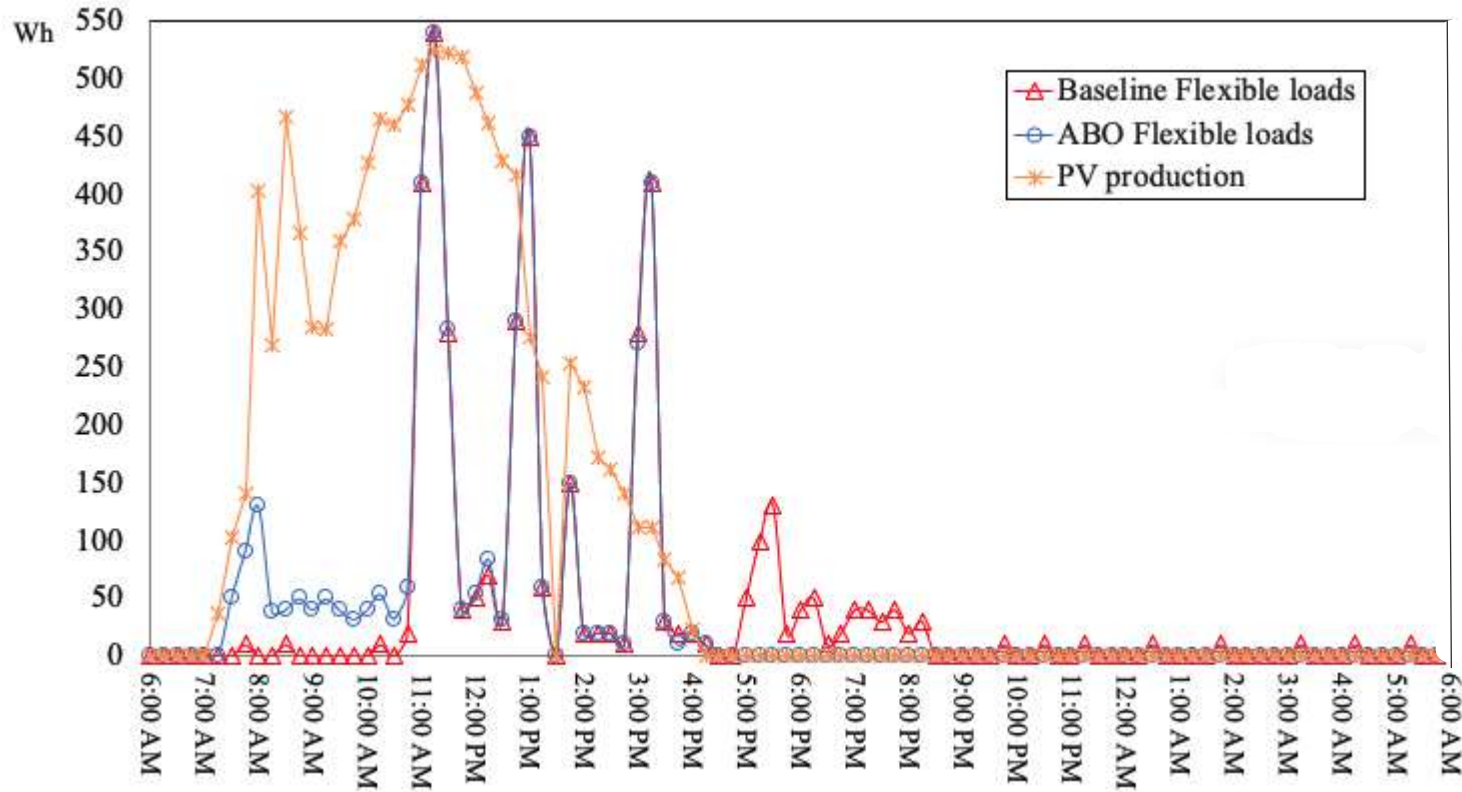
Across several similar tests, total daily energy cost savings have ranged from 4-12%



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Preliminary TABEDE Results from the Bergamo Test Site

ToU Price simulation—Baseline vs. Optimized Flexible loads



Peak price: 0,17 €/kWh; Off peak: 0,14 €/kWh;
Export tariff: 0,045 €/kWh

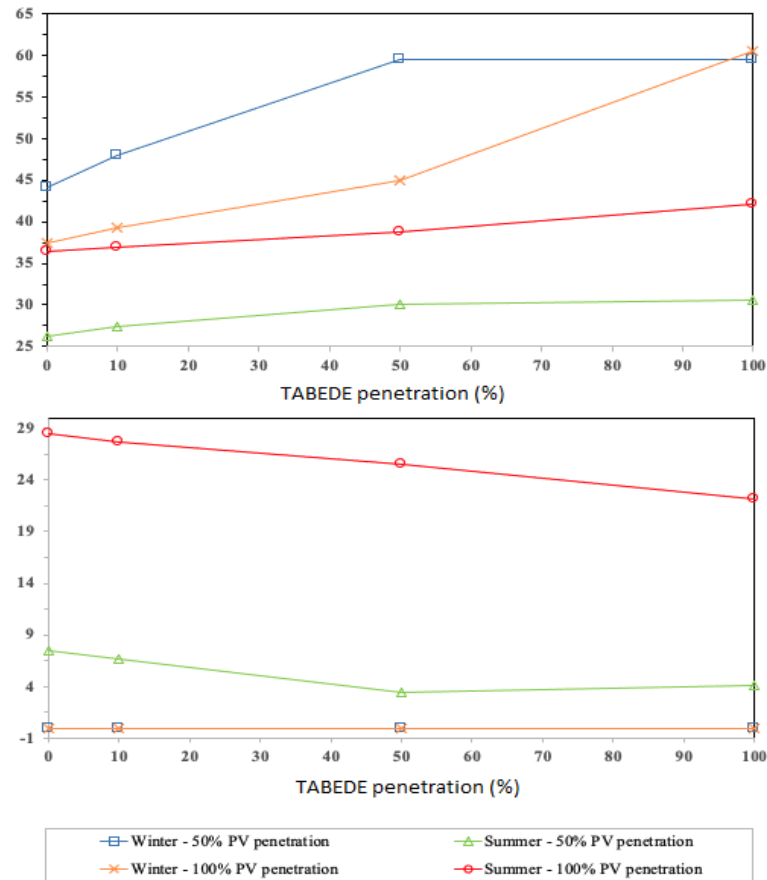
	Baseline	Optimized	Difference	%
Total consumption	20,9 kWh	20,9 kWh	--	--
Energy import	14,3 kWh	12,77 kWh	1,54 kWh	-11%
Energy export	4,78 kWh	3,24 kWh	1,54 kWh	-32%
Energy import cost	2,29 €	2,04 €	0,25 €	-11%
Export revenue	0,22 €	0,15 €	-0,07 €	-11%
Total daily energy costs	2,07 €	1,90 €	0,17 €	8%

Across several similar tests, total daily energy cost savings have ranged from 0,3-9%



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TABEDE District-Level Impacts—Early Results



- To assess TABEDE’s impacts at scale, we built a simulated neighborhood of interconnected buildings
- This allows us to estimate aggregate savings across a large set of buildings, and grid level KPIs such as loss prevention, congestion relief, RES curtailment reduction
- In early tests, TABEDE is shown to increase PV self-consumption across a range of scenarios
- When we impose congestion limits, this increase in PV self-consumption can reduce RES curtailment by 22-45%, depending on the scenario
- Ultimately, TABEDE’s impacts are highly dependent on the flexibility available within the buildings
- As a next step, we are incorporating behind-the-meter batteries to increase flexibility opportunities in the neighborhood



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