Enervalis
Creating the internet of energy

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Smartpower Suite

Microgrid services for Local Energy Communities

Nuhma Het Limburgs klimaatbedrijf

elia Powering a world in progress

ABB Power and productivity for a better world™

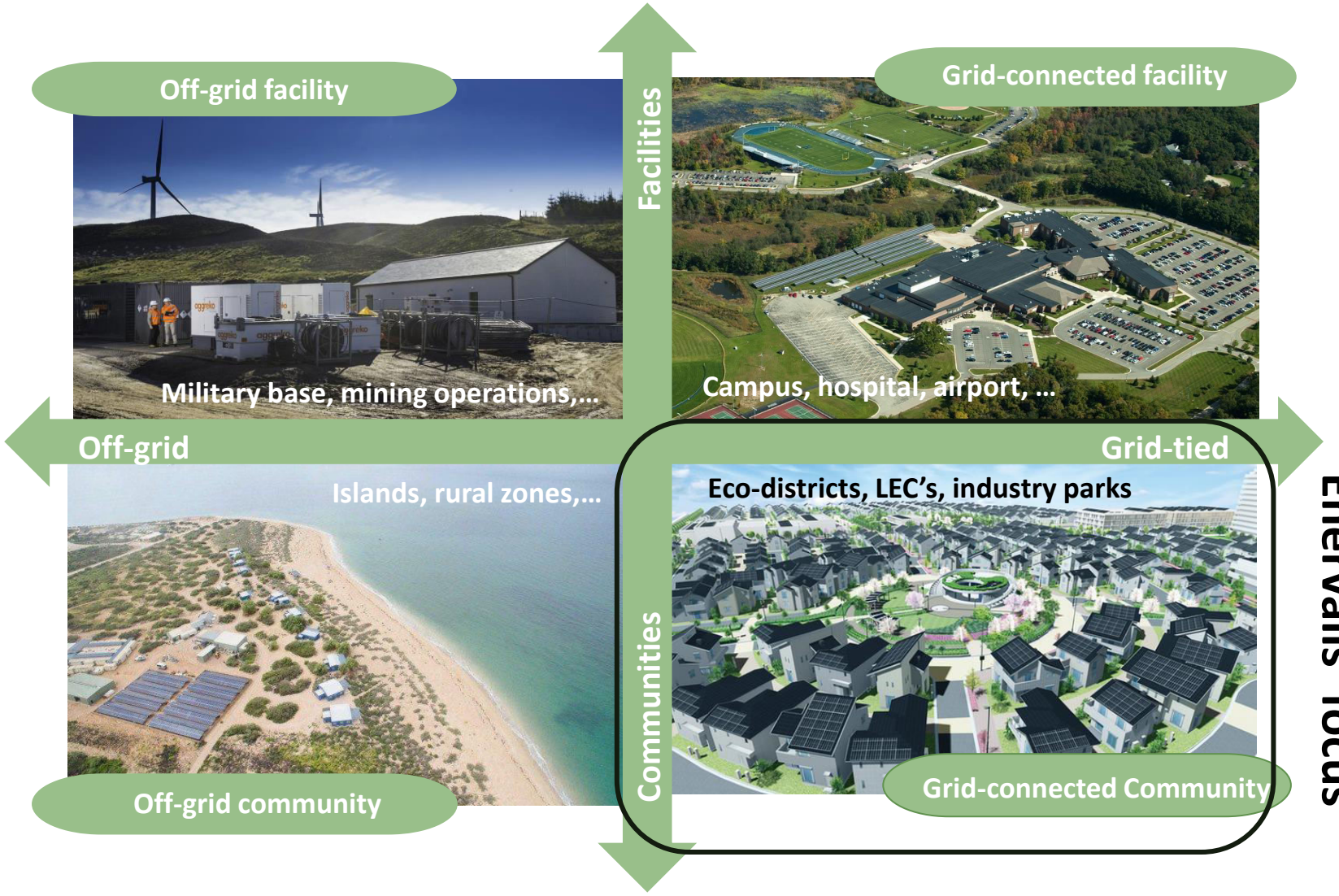
LRM Oxygen for growth

eit InnoEnergy Knowledge Innovation Community

Microgrids: different definitions & applications

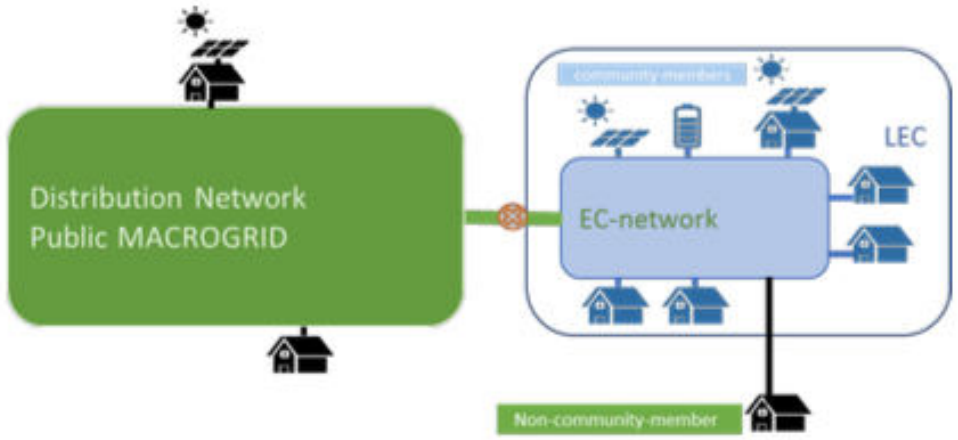
Definition:

"A microgrid is a group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the main grid and that connects and disconnects from such grid to enable it to operate in grid-connected and/or 'island' mode"



The concept of ‘Local Energy Communities’

"a legal entity which is based on voluntary and open participation, effectively controlled by shareholders or members who are natural persons, local authorities, including municipalities, or small enterprises and micro enterprises.
The primary purpose of an energy community is to provide environmental, economic or social community benefits for its members or the local areas where it operates rather than financial profits.
An energy community can be engaged in electricity generation, distribution and supply, consumption, aggregation, storage or energy efficiency services, generation of renewable electricity or provide other energy services to its shareholders or members."



- ✓ EU member states are obliged to put in place the legal and regulatory framework for LEC’s under the EU clean energy package
- ✓ LEC’s should be allowed to own and operate their own distribution grid
- ✓ Openness to other network charges for the LEC compared to individual households
- ✓ LEC’s should be able to participate in energy and ancillary services markets
- ✓ Participation in a LEC should remain voluntary

… But how will a LEC perform all these tasks for its community members without the necessary expertise while the DSO is not allowed under the EU Clean Energy package to directly control DER’s?

Advanced microgrid control based on artificial neural networks

Advanced microgrid control is an optimization problem:

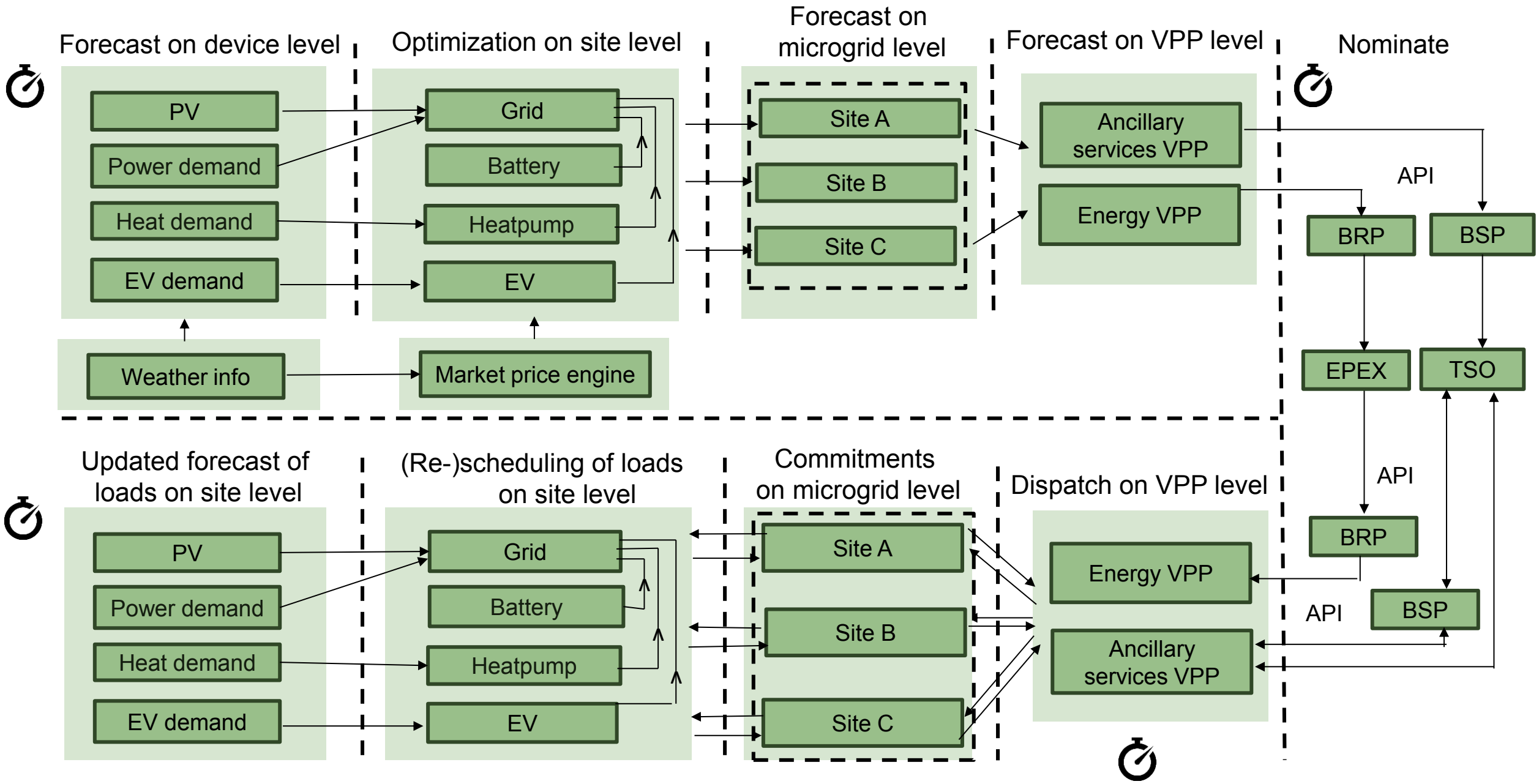
You minimize energy costs under constraints while maximizing the objective for the LEC and the individual community members

Objective	Energy costs	Constraints
✓ Not more expensive than grid electricity ✓ Optimal comfort ✓ Increased resiliency ✓ Maximum green ✓ Minimize human intervention	✓ Behavioral EE ✓ Active EE control ✓ RE self-consumption ✓ Capacity fees & CPP ✓ Energy markets ✓ Ancillary services	✓ EU grid codes (power quality) ✓ Grid connection capacity ✓ USEF flex orders ✓ Islanding mode ✓ Back-up power capacity

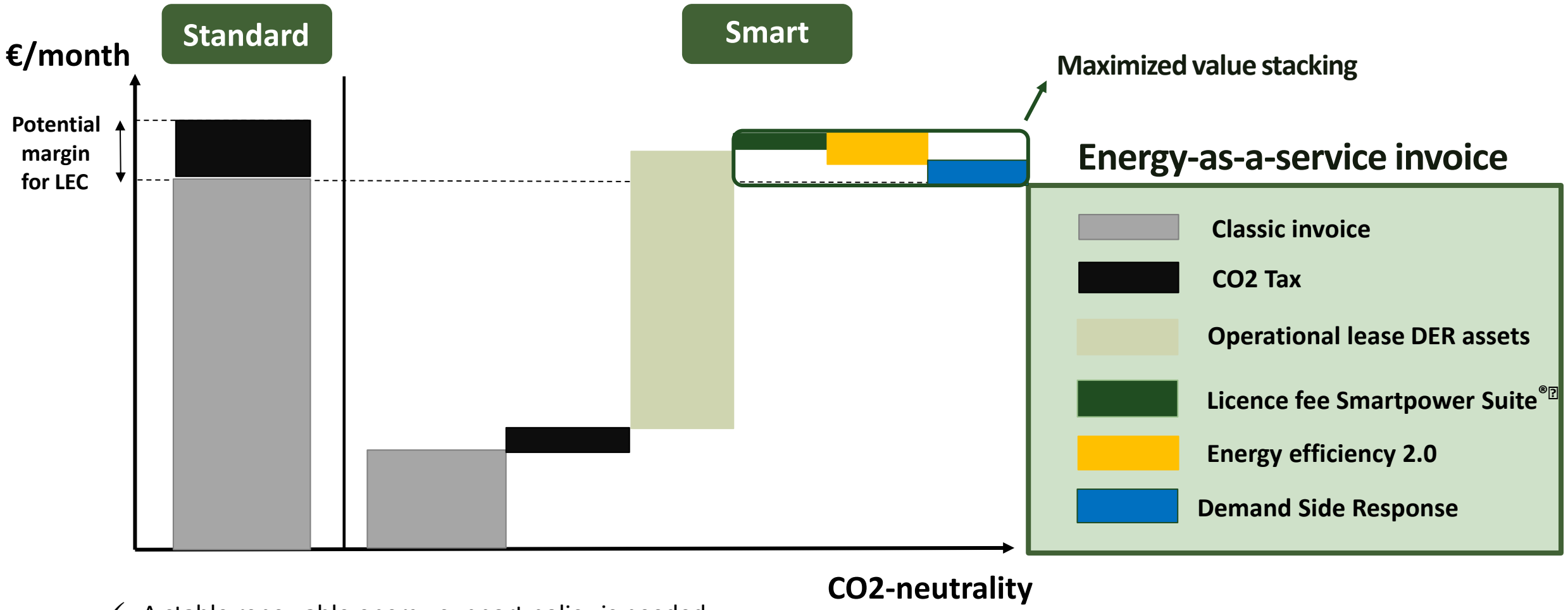
Operating microgrids is like operating a site:

It's a complex site in a VPP where RE supply and demand are locally matched under grid constraints and that interacts with the main grid as a single controllable unit

Forecasting, optimization & dispatching of a microgrid



Microgrids-as-a-Service for LEC's



- ✓ A stable renewable energy support policy is needed
- ✓ a CO2-tax will improve the economics of Microgrids-as-a-service
- ✓ The value of resiliency is difficult to quantify and valorize in Flanders. Possible blackouts this winter could have a positive impact
- ✓ Basic microgrid infrastructure should be included in new constructions. -> Subsidies from government?