Microgrid Services for Local Energy Communities

How to integrate a microgrid in a real estate development

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Agenda

- **The project overarching objectives, the consortium**
- Project Key exploitable results
- The main lessons learned and barriers
- Needs for future R&I activities
- Deployment prospects of the most promising solutions
- Identify needs for further testing
- Information about the use/need of an inter-regional cooperation

Project Ambition

flux50 feasibility study

- Product: energy gateway + cloud based cluster control
  - ABB — gateway, smart components, PV, battery, …
  - Enervalis 'Creating more value with energy' — software (gateway) and platform as a service
- Market: new urban districts
  - eandis — renovation and development Mechelen site
  - fluvius. — DSO
- Financial aspects
  - KBC — loan, operational lease, insurance
  - supporting cooperation's of joint owners (flats)

Mechelen Klimaatneutraal

Research, trends, workshops

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Focus: Mechelen site

Tendering real estate development

- No gas => district heating based on ATES and heat pumps
- 800 dwellings
- 4700m² retail and catering
- 6600m² offices
- 600 parking spaces
- Maximize PV
- Mobility hub (EV sharing, charging)

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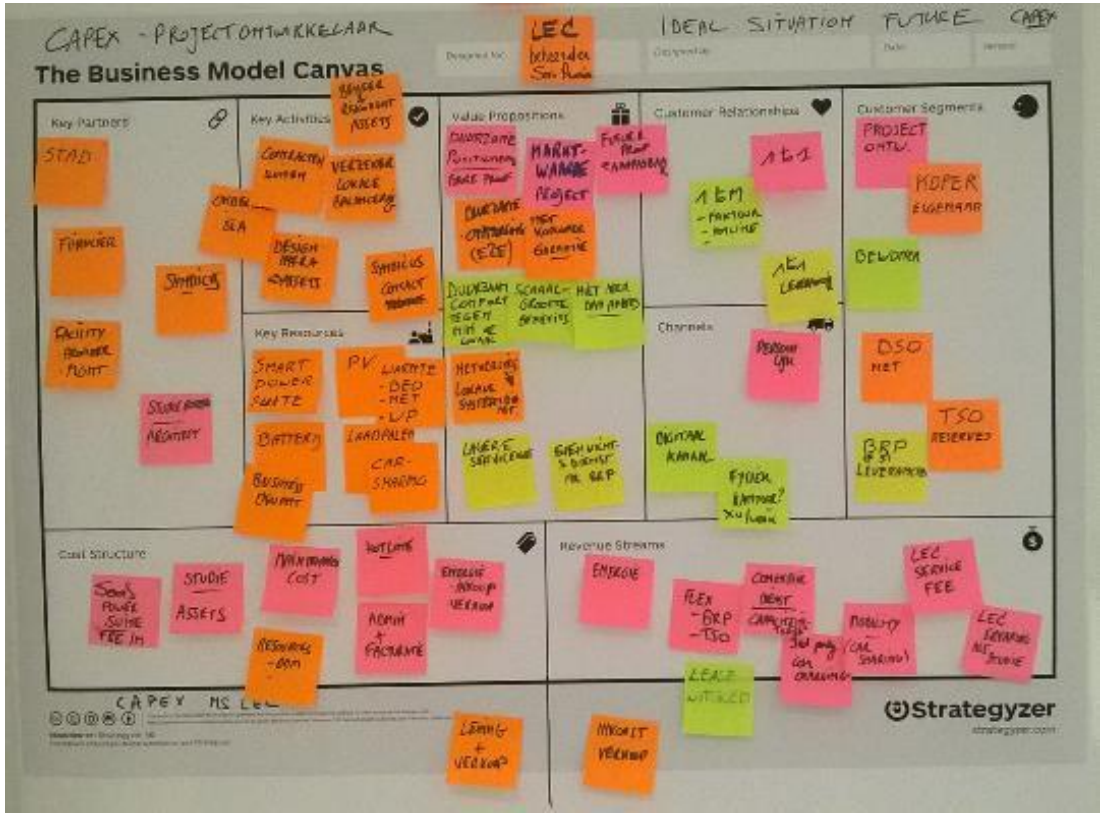
Business Model Canvas

- Customers (timing!)
- Key partners
- Relations
- Costs
- Revenues
- …

CAPEX <> OPEX



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Microgrid Service Provider for Local Energy Communities

Scope

- Maximize local renewable production and consumption
- Optimize design and dimensioning through bundling of scattered capabilities
- Flexibility is valorized
- Optimized procurement
- Purchase power through scale
- Circularity by design

Operational car lease
= service package

- Fixed fee for contracted km + time
- Includes taxes
- Insurance
- Maintenance
- Tires
- Resale

Microgrid Service Provider for Local Energy Communities

OPEX

- Monthly costs reduced by economies of scale: € ### ###.##
  - Investments (PV, batteries, charging stations, …)
  - Grid fee, energy purchases
  - Financing, services
- Monthly income: € ### ###.##
  - Invoicing energy towards occupants and EV charging
  - Selling surplus PV
  - Selling flexibility to BRP, aggregator
  - Participating in reserve markets

€ ### ###.##

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Microgrid Service Provider for Local Energy Communities

OPEX **+ services**

- Service package should offer additional services and savings
  - Increase attractiveness
  - Make total package profitable
- Add-ons
  - Coaching
  - Smart Grid Ready house hold appliances
    (limited brands and types, saves on integration + full warranty)
  - Different comfort levels: vary capacity in time
  - Mobility vouchers
- Economies of scale (same services for multiple LECs)

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Interactions

- Real Estate Developer
- Owner / Occupant
- DSO

Real Estate Developer

Temporary involved

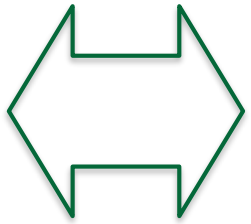
Profit = Value

What occupants want

- Individual gas boiler, control, risk and cost responsible

Limit Liability

Hand over management to syndic



Total Cost of Ownership

- Costs

Additional CAPEX

- Shared district heating, PV, battery => performance risk

High Complexity

24h/7d support and optimization

Owner / Occupant

- Future Proof (owner)
- Total Cost of Ownership: service package offering comfort and sustainability for a price not more than usual
  - = Cost price dwelling (Owner)
  - = Monthly invoice (Occupant)
- Additional complexity managed via service package (coaching, warranty, interventions, …)

Occupant: Invoice Not More than Usual

Current tariff structure

- Current Flemish energy invoice based on kWh includes:

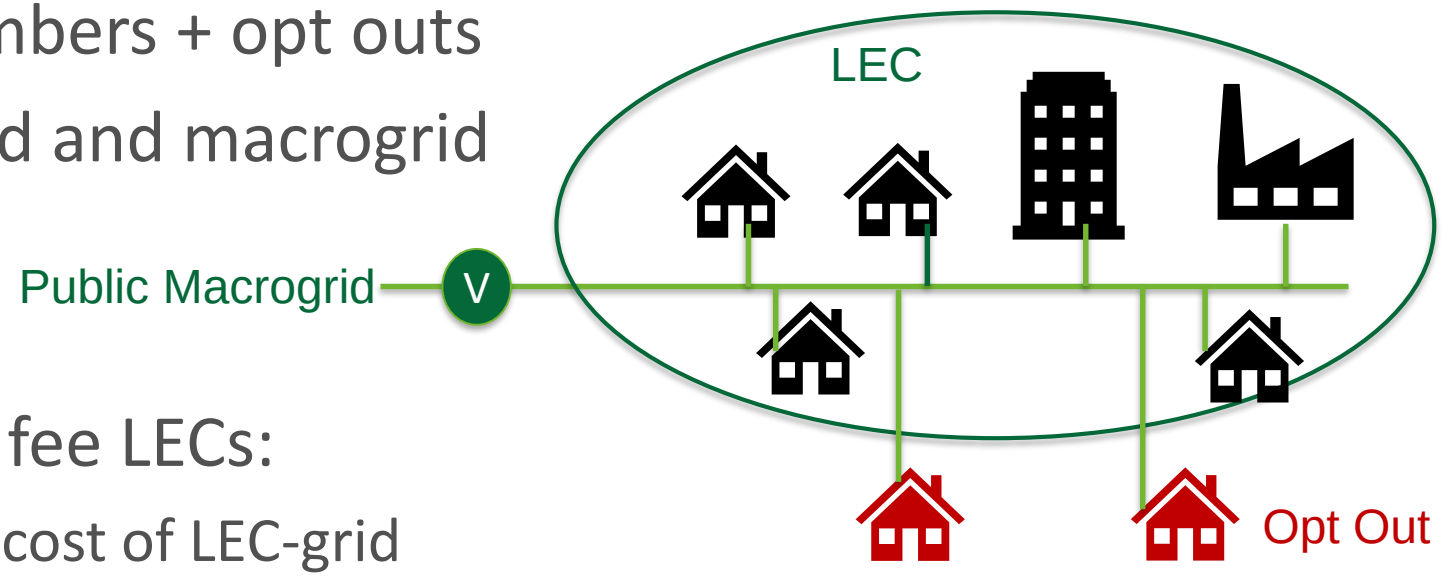
CONSUMER	PROSUMER (<10kW)	PROSUMER (>10kW)
• Commodity energy 25-30%	net metering on yearly basis	real time use is free
• Grid fee	prosumer tariff (~28% discount)	normal grid tariff + injection fee
• Levies	discount via net metering	discount for real time use
• No Certificates	no GEC for new installations	GEC 10 years offering 5% return (if >55% real time use)

- Can Local Energy Communities become a new client segment for DSO's, having a tariff structure that reflects their local energy use?

Financing the energy transition: grid tariff + levies

Reflection on grid tariffs and levies for Local Energy Communities

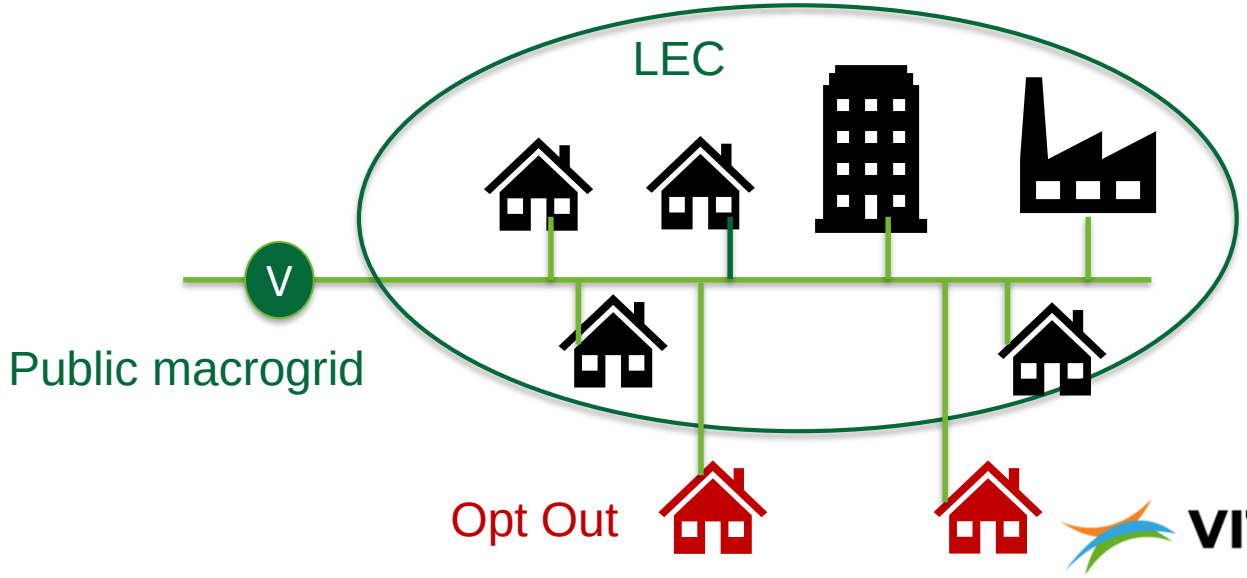
- Local grid in community: members + opt outs
- Connection between local grid and macrogrid
- Virtual Metering



- Possible components for grid fee LECs:
  - LEC-fee: fix tariff that reflects cost of LEC-grid
    - stimulate: sharing local energy, manage peak loads => capacity based
  - LEC as client of the distribution grid
    - Peak load => grid
    - Energy exchange => markets and levies

Distribution System Operator

- Free choice of energy supplier should be secured (Opt Out LEC)
- Minimize CAPEX, avoid parallel grid and metering
- Provider is mainly interested in management and settlement



Distribution System Operator

- Free choice of energy supplier should be secured (Opt Out LEC)
- Minimize CAPEX, avoid parallel grid and metering
- Provider is mainly interested in management and settlement
- Monitoring
  - EAN-meter via P1/S1
  - Submetering (ABB) for controls
  - Validated EAN-data for settlements

	network installation	monitoring	management	settlement	Link to the Regulated market
Scenario 1	Regulated task	Regulated task	Regulated task	Regulated task	Allocation of clients in groups - Sharing of Energy
Scenario 2	Regulated task	Regulated task	Regulated task	Non Regulated Task	One EAN for one group
Scenario 3	Regulated task	Regulated task	Non Regulated Task	Non Regulated Task	Public network in function of private use inclusive public meters
Scenario 4	Regulated task	Non Regulated Task	Non Regulated Task	Non Regulated Task	Public network in function of private use exclusive public meters
Scenario 5	Non Regulated Task	Non Regulated Task	Non Regulated Task	Non Regulated Task	Privately owned network

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Lessons Learned

- Relationship with end user in order to get control on heating, charging and smart appliances in order to get control on flexibility
- LEC as new customer segment for DSO

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ROLECs

Needs for further Research and Innovation

- Modelling LECs
  - Key Performance Indicators
  - Legal Aspects: roles, GDPR, …
  - Dimensioning
  - Optimization Total Cost of Ownership
  - Impact on Energy System
- Tariff structures
- End User Involvement and Behavior

ROLECs

Roll out of Local Energy Communities

- Flux50 cooperation project
  - 5 research
  - 1 DSO
  - 4 legal
  - 5 engineering
  - 5 controls, components, IoT
  - 4 ESCO
  - 5 operational services

- Submitted
- Approval 2018-12 ?
- Execution 2019-01 => 2020-12
- Budget 10M€
- 10 pilot sites:
  - Residential + Industry
  - Existing sites + site development

Publication

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ORGANISATION OF THE COMMERCIAL AND PUBLIC SERVICES FOR THE INSTALLATION OF LOCAL AND RENEWABLE ENERGY COMMUNITIES (LEC/REC)

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https://flux50.com/media/1883/Paper%20presented%20at%20the%20CIRED%20Workshop%202018%20by%20Ruth%20van%20Caenegem%20(Eandis).pdf

Questions?

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