EVS32
A world of E MOTION
2019 MAY 19·22

INTERNATIONAL
ELECTRIC VEHICLE SYMPOSIUM & EXHIBITION

EVS
50th anniversary
1969-2019

Using a Second-Life Battery to Optimize the Levelized Cost of Electricity in CO$_2$ Neutral Microgrid

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energy storage

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Introduction

Electric vehicule sales are increasing.

Problem:

- What to do with the already used batteries.

Common Solution:
- **Stationary second life application**.

Renovable energy generation is increasing.

Problem:

- Higher inbalance of the consumed/generated energy.

Context

Green Energy Campus project.

- Electric Grid
- Thermal Grid
- Electric Mobility: battery2grid, vehicle2grid
- Data Center Connected to the Hospital
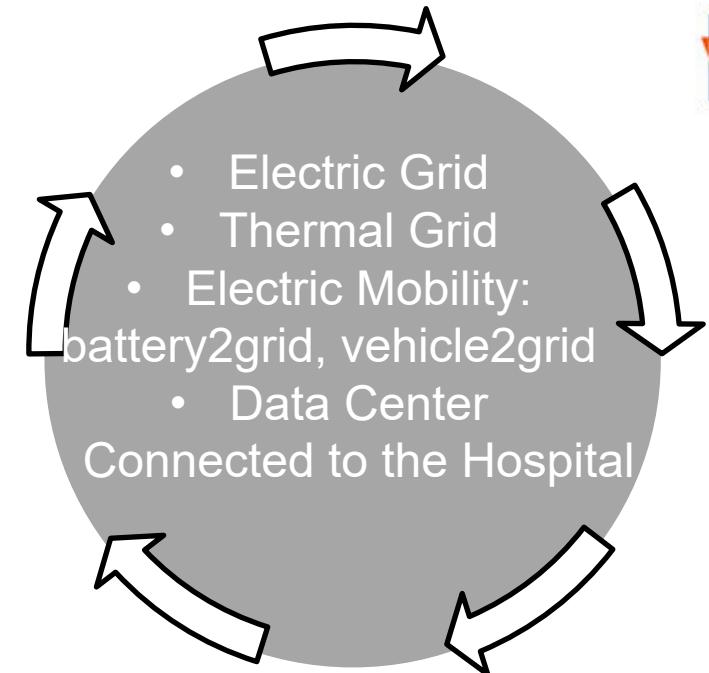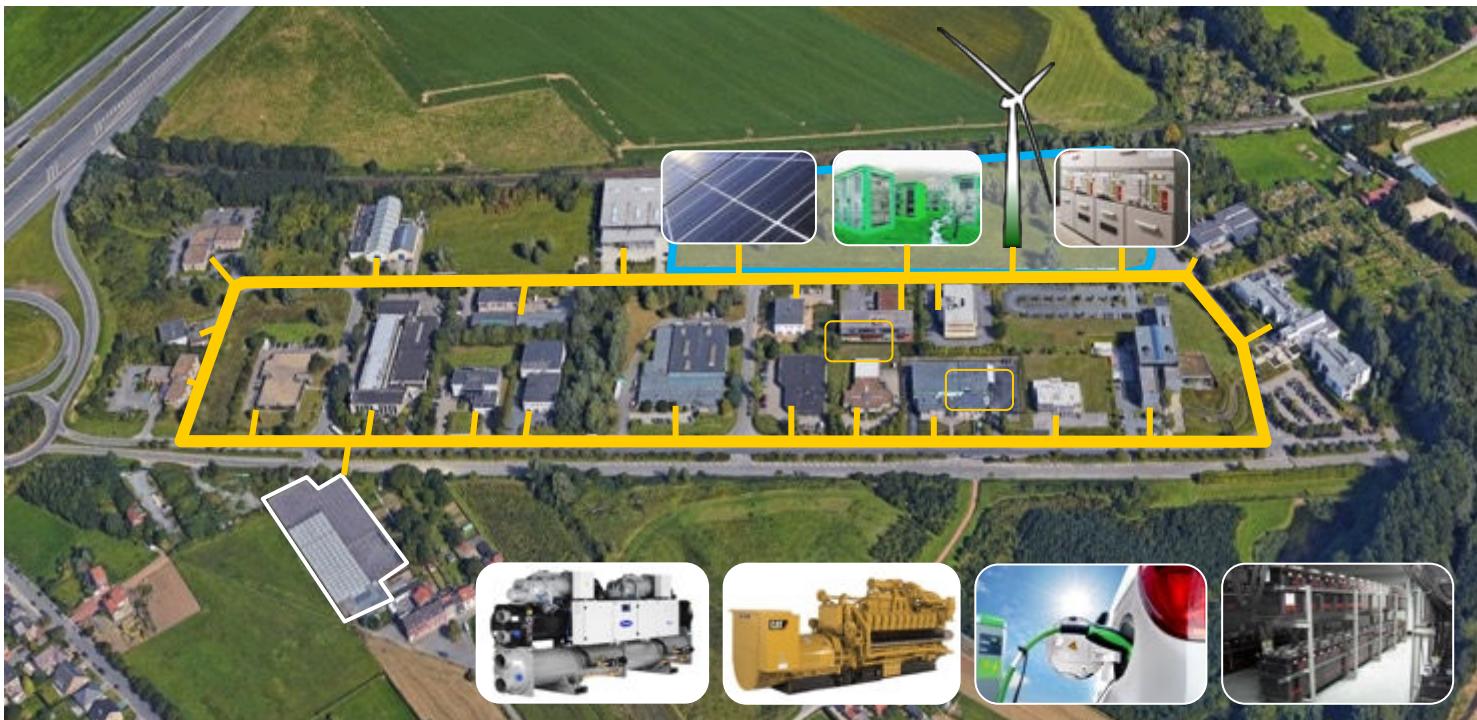
A microgrid in Zellik (Belgium):
- CO_2 neutral.
- Island mode 50% of the year.
- Living lab for stationary.
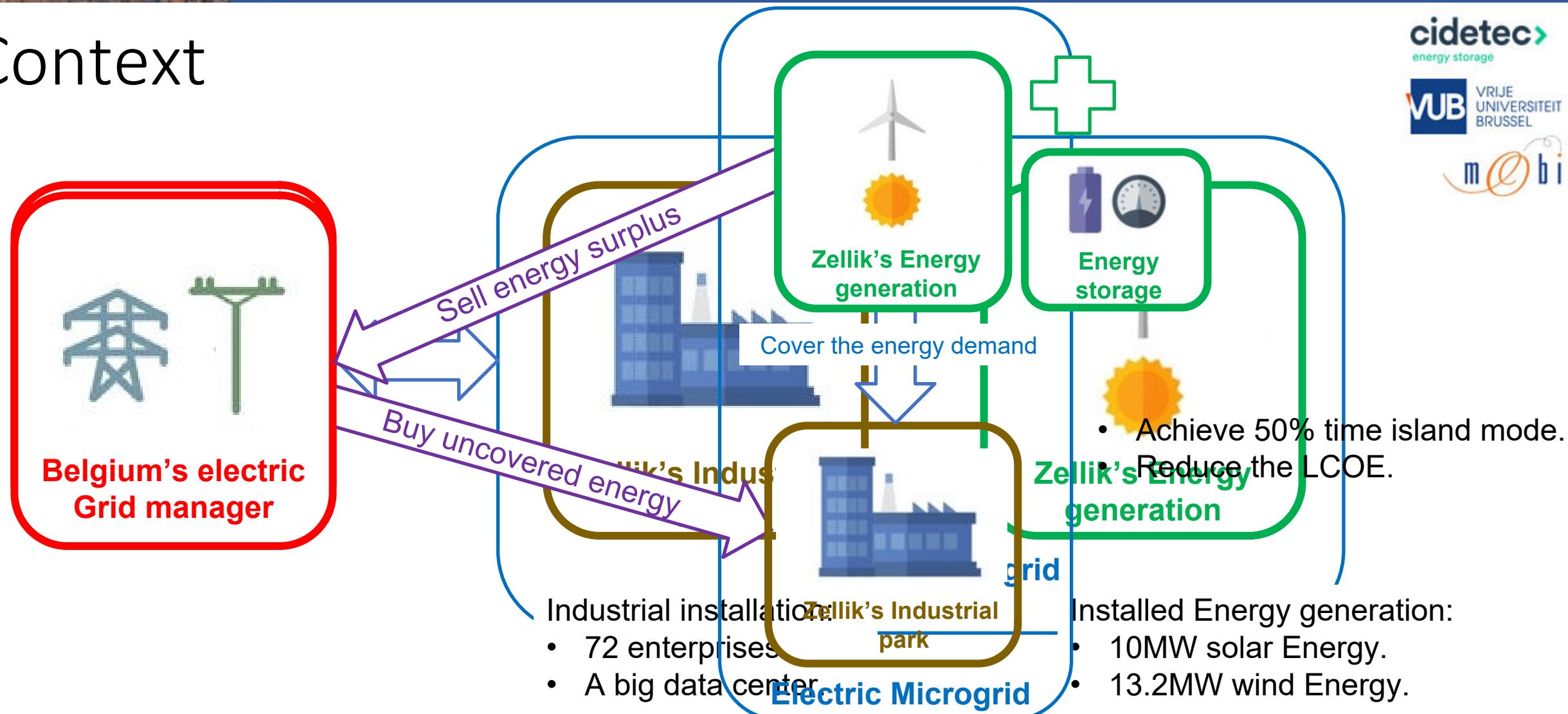
Context

Sell energy surplus

Buy uncovered energy

Belgium's electric Grid manager

Zellik's Energy generation

Energy storage

Cover the energy demand

Zellik's Industrial

Zellik's Energy generation

Zellik's Industrial park

Electric Microgrid

- Achieve 50% time island mode.
- Reduce the LCOE.

Industrial installation:
- 72 enterprises
- A big data center

Installed Energy generation:
- 10MW solar Energy.
- 13.2MW wind Energy.

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Optimal LCOE calculation

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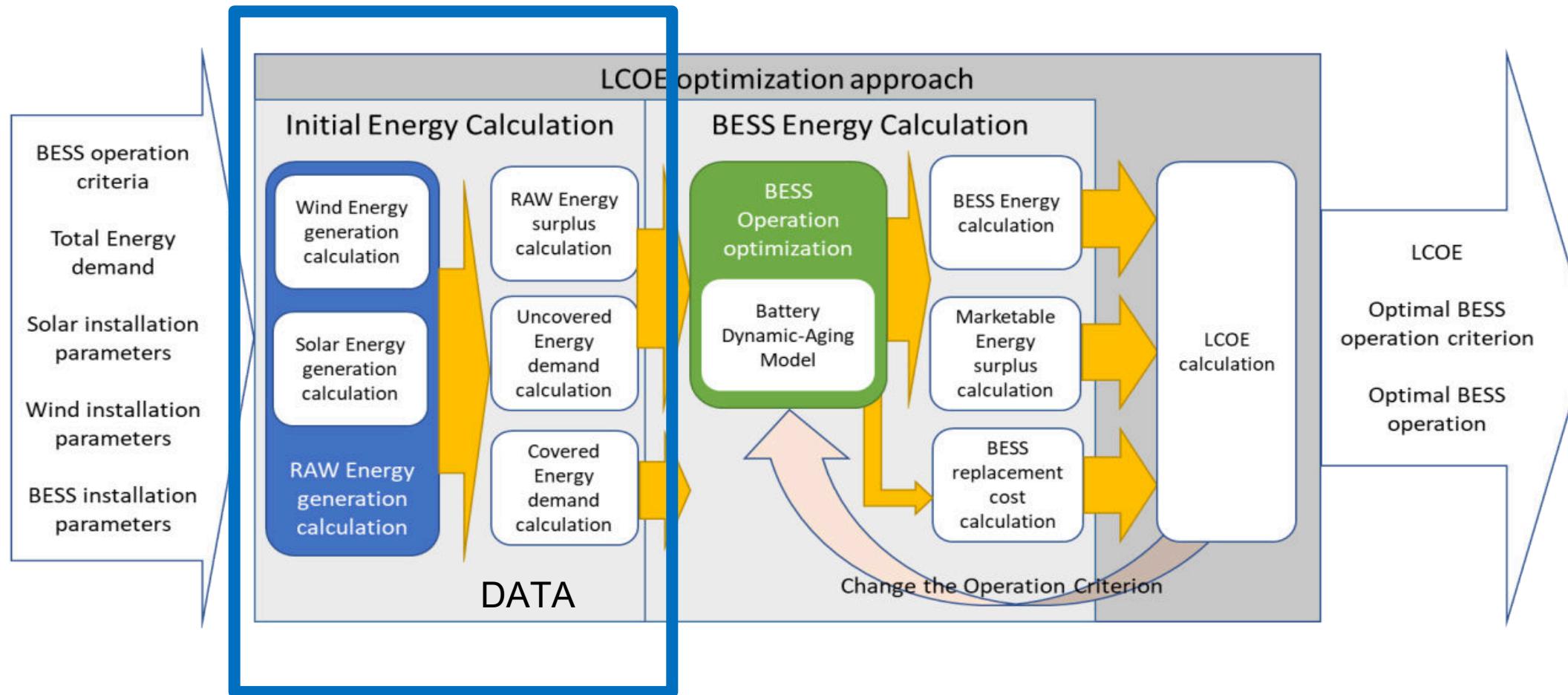
Initial Energy Calculation

* Data from:

Green Energy Campus project.
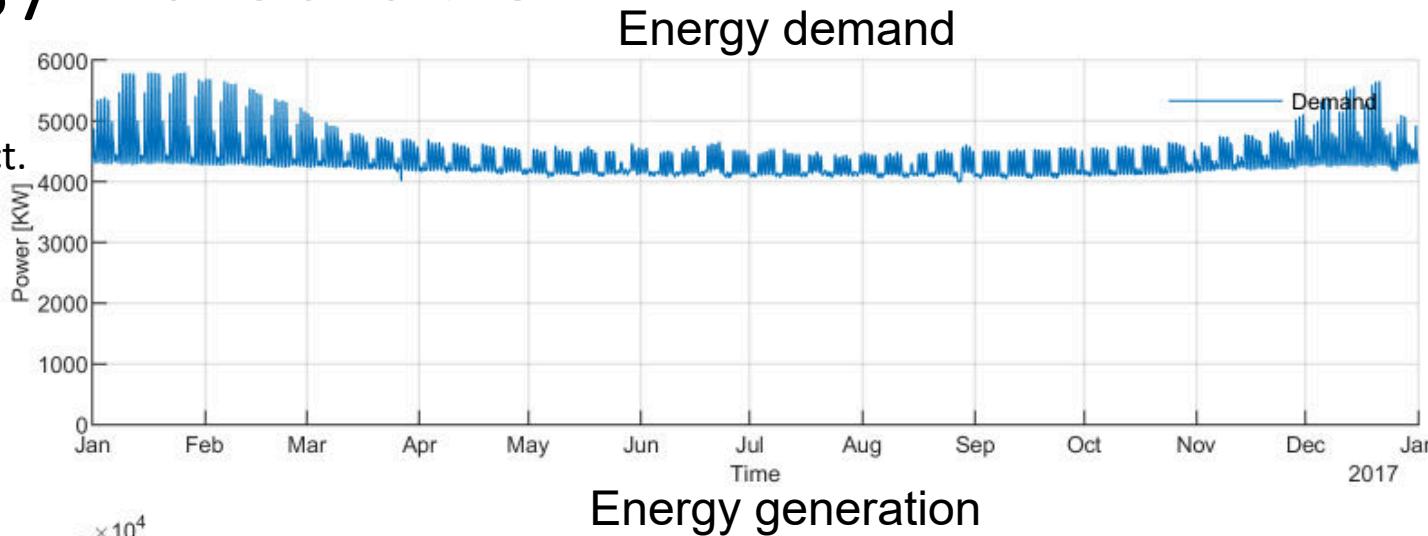
** Fixed values from 2017.
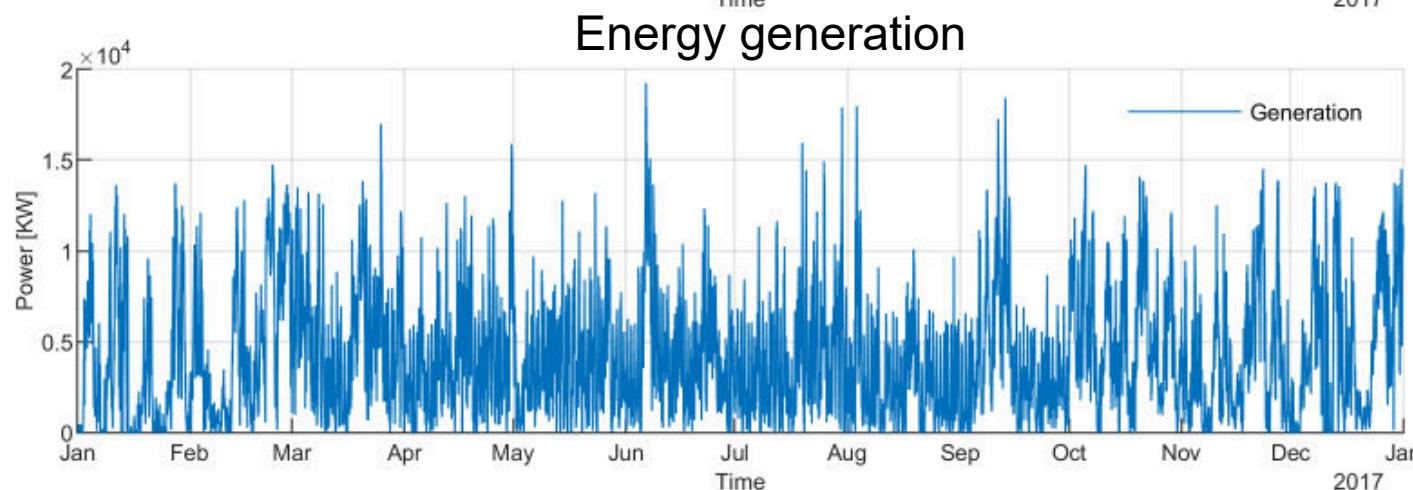
Energy demand

Mean:
Max:
Min: 3.990

Energy generation


Mean: 4.234
Max: 19.255
Min: 0

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Optimal LCOE calculation

BESS Operation

BESS operation

BESS energy evolution

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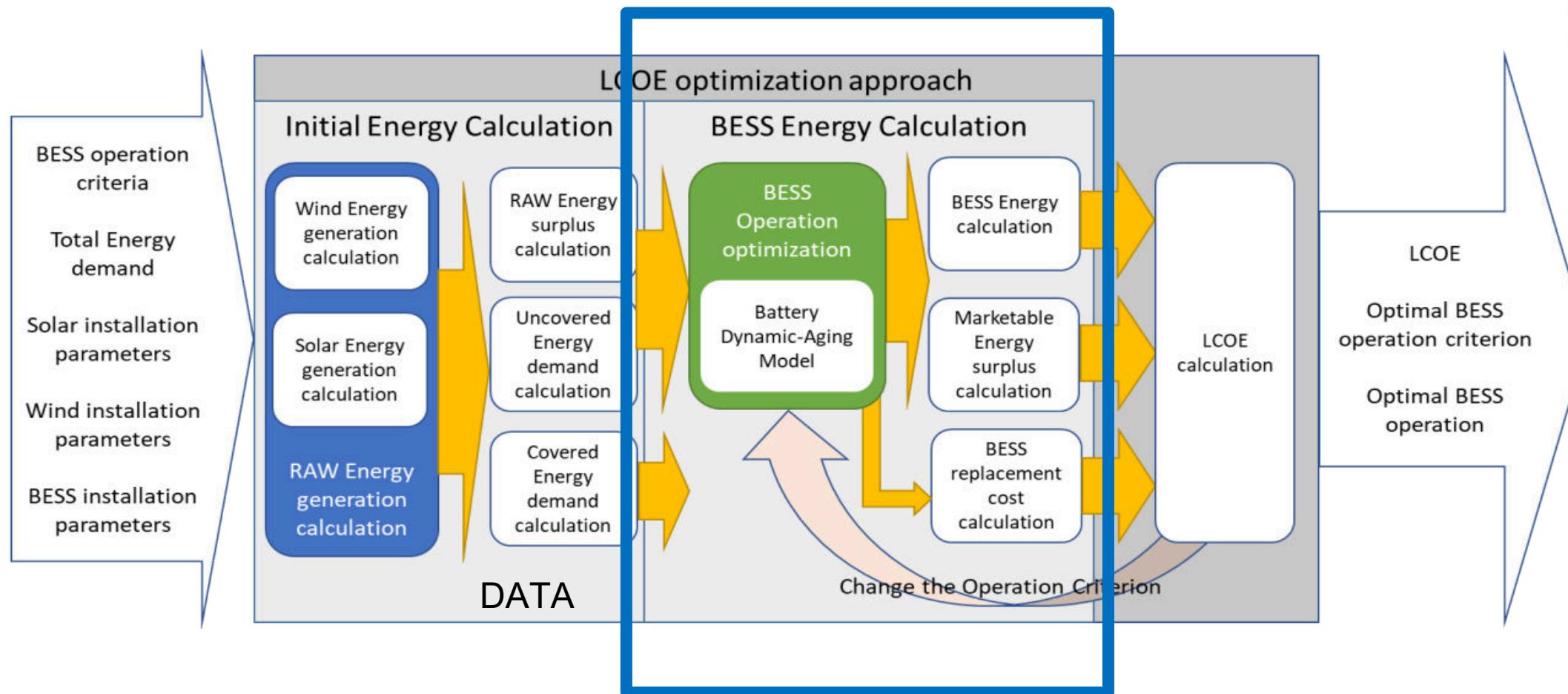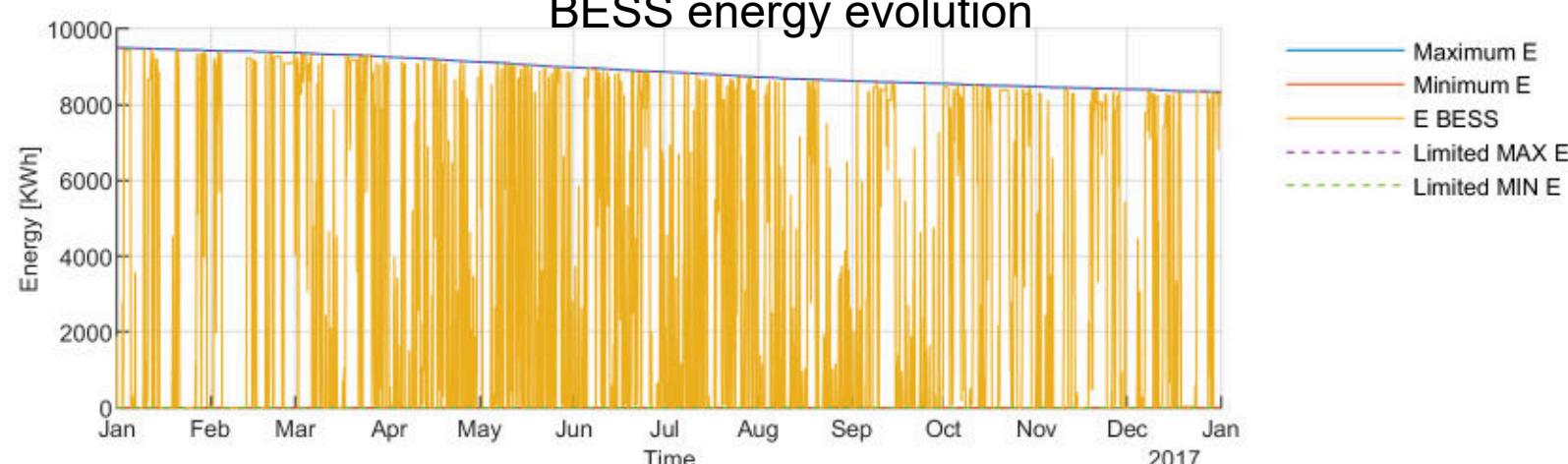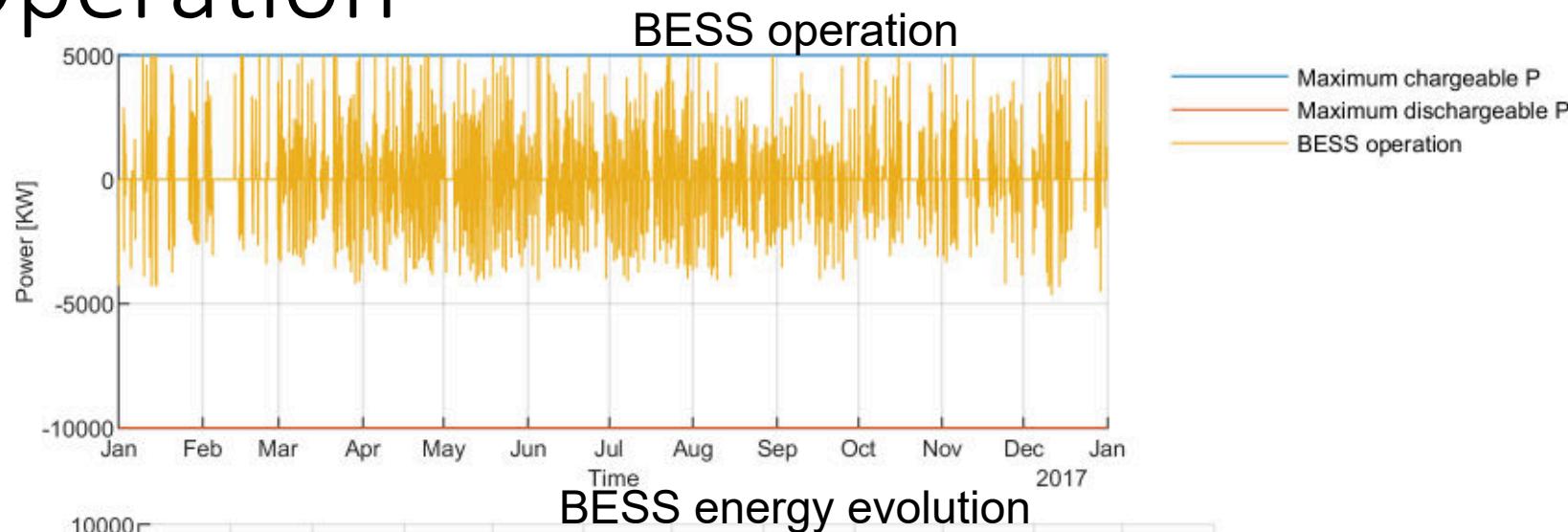
Optimal LCOE calculation
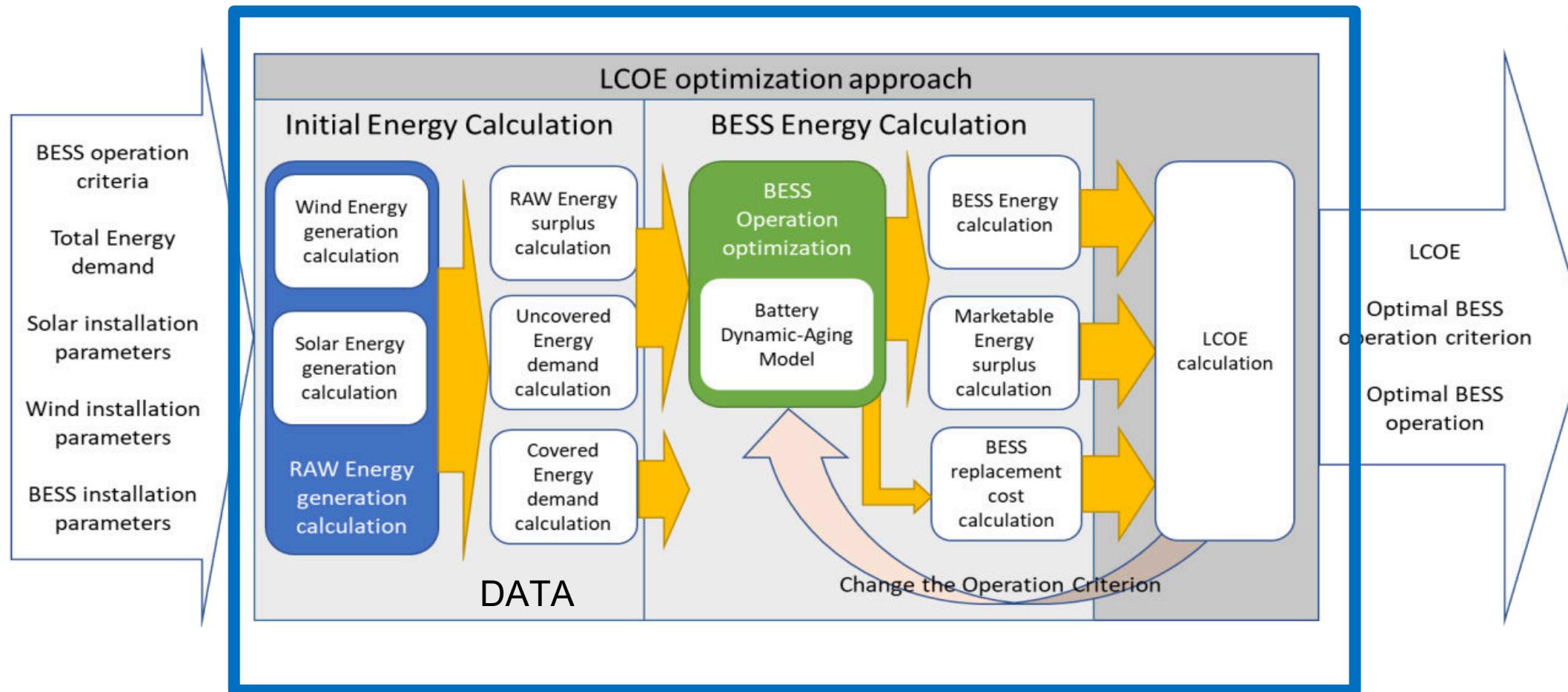
BESS operation criteria effect

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LCOE values

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Results

LCOE NO BESS: 114,3 €/MWh
LCOE OPC 1:   €/MWh
LCOE OPC 2:   €/MWh
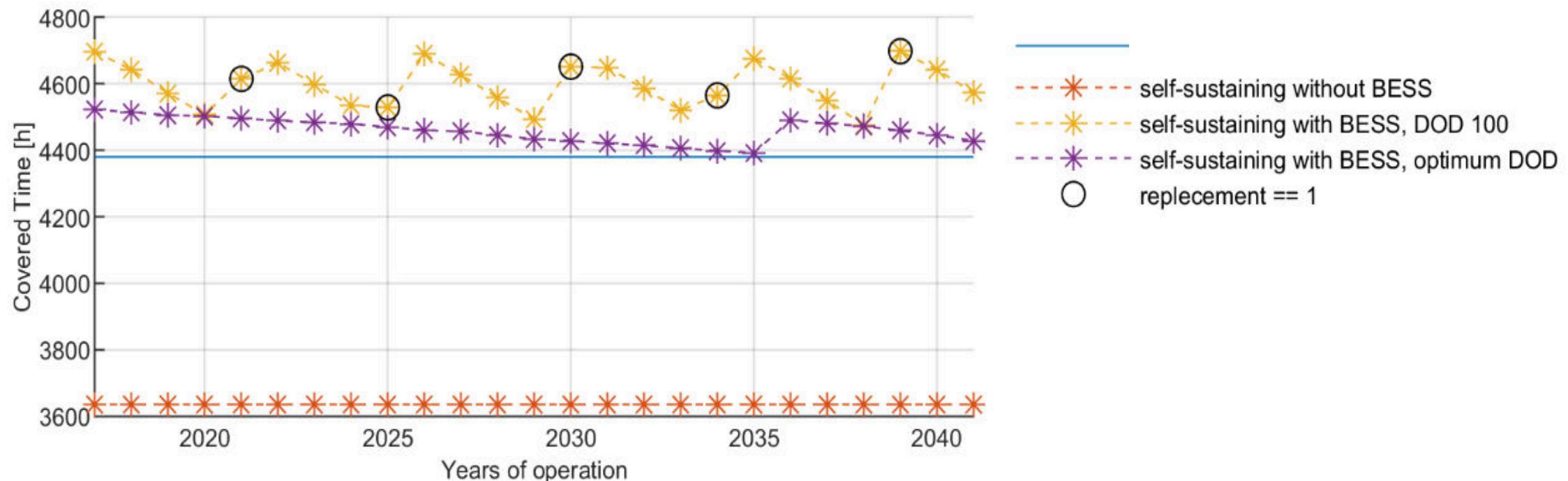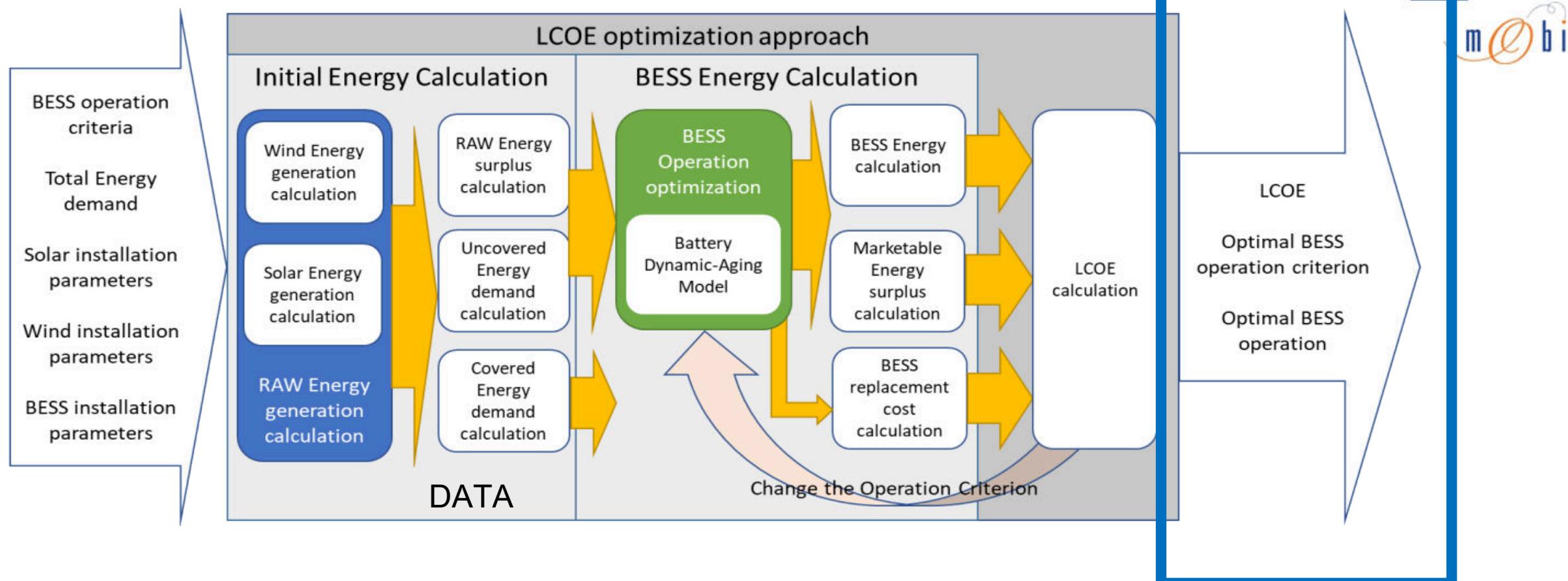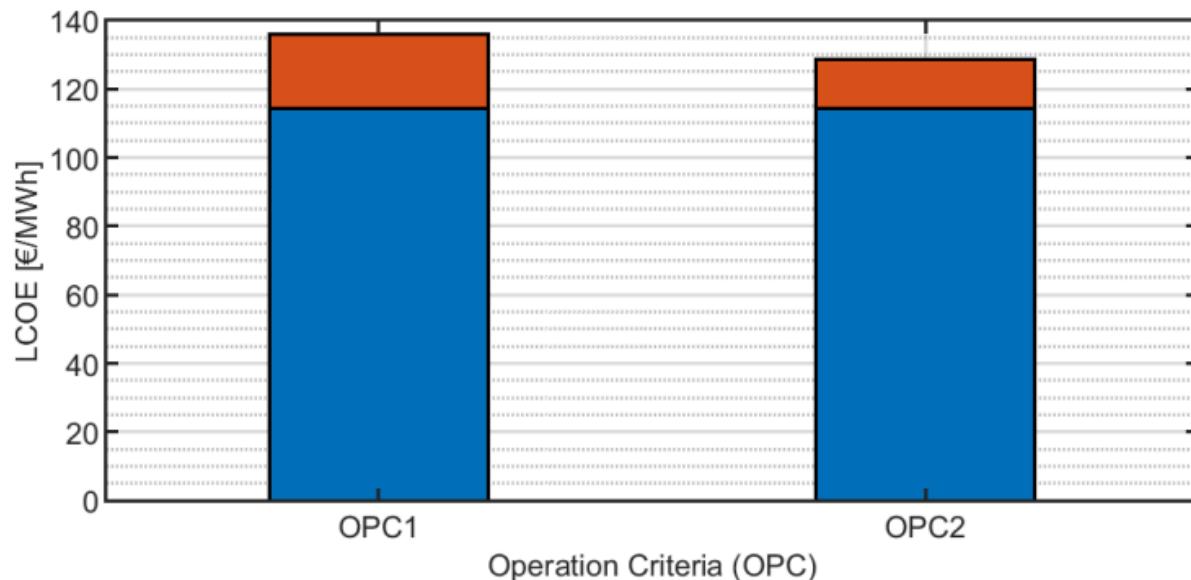
- OPC1: A realistic BESS, charging discharging whenever is possible (full use of the safety op. window).
- OPC2: A realistic BESS, optimizing the charging and discharging in terms of aging (restraining op. window).

Conclusions

- Achieved **realistic LCOE calculation** framework when added **BESS**.
- The **LCOE** can be **reduced** with a **proper operation** of **BESS**.
- A **proper operation** of BESS is **not** always the **full use** of the **BESS**.

Questions ?