

DCM centric Solution Architecture

Workshop on FHP wind curtailment mitigation solution

Davy Geysen – VITO N.V. / EnergyVille

FHP project is funded by European Union under the grant agreement no. 731231.





Overview

- ✓ *Dynamic Coalition Manager: what and why?*
- ✓ *DCM multi-agent platform*
- ✓ *DCM building blocks & services*
- ✓ *DCM activity flow*
- ✓ *Summary*





Dynamic Coalition Manager (DCM)

What?

- ✓ *Central actor/agent in the FHP flex trading concept*
- ✓ *Collecting and aggregation of prosumption forecasts and flexibility*
- ✓ *Specialization of (local) aggregator or local community manager*



FHP project is funded by European Union under the grant agreement no. 731231.

Wind Europe Conference and Exhibition
Bilbao, 2-4 April 2019

3/29/2019

3



Dynamic Coalition Manager (DCM)

Why?

- ✓ ***Empowering flexibility providers***
 - ✓ *Prosumers, buildings, Ecovat,...*
 - ✓ *Flex providers decide*

- ✓ ***Better forecasts***
 - ✓ *More flexibility*
 - ✓ *Less uncertainty*

- ✓ ***Bottom up aggregations***
 - ✓ *Location aware*



FHP project is funded by European Union under the grant agreement no. 731231.

Wind Europe Conference and Exhibition
Bilbao, 2-4 April 2019

3/29/2019

4



Overview

- ✓ *Dynamic Coalition Manager: what and why?*
- ✓ *DCM multi-agent platform*
- ✓ *DCM building blocks & services*
- ✓ *DCM activity flow*
- ✓ *Summary*



DCM

Multi-agent platform

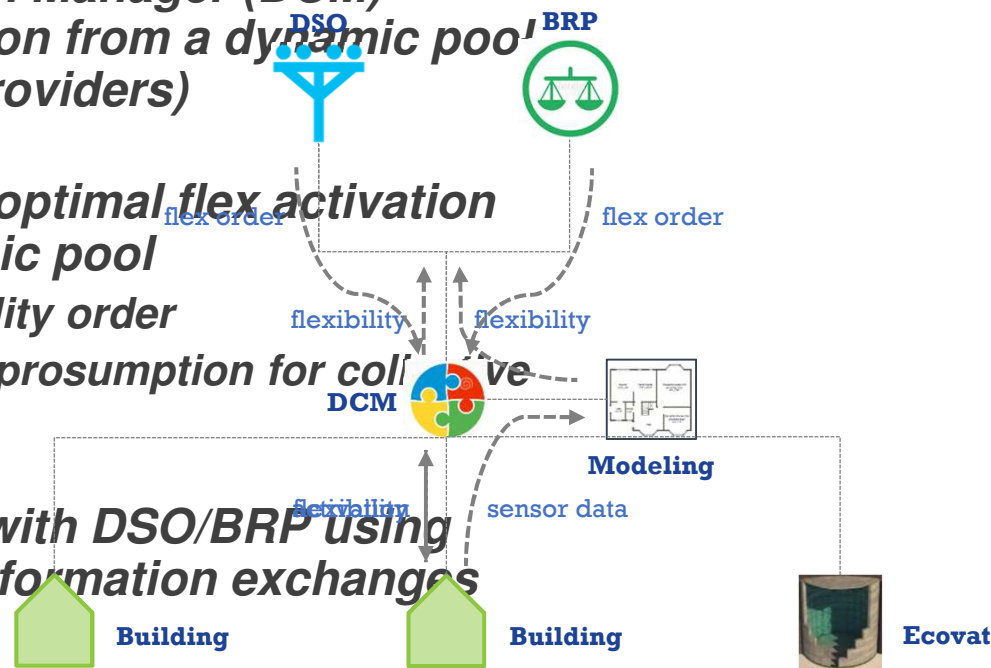
✓ **Dynamic Coalition Manager (DCM)**
collects information from a dynamic pool
of Flex Owners/Providers)

✓ **DCM determines optimal flex activation**
within this dynamic pool

✓ Based on flexibility order

✓ Coordination of prosumption for collective
objective

✓ **DCM interacting with DSO/BRP using**
USEF¹ inspired information exchanges



1: <https://www.usef.energy/>



Overview

- ✓ *Dynamic Coalition Manager: what and why?*
- ✓ *DCM multi-agent platform*
- ✓ *DCM building blocks & services*
- ✓ *DCM activity flow*
- ✓ *Summary*



DCM

Building blocks & services

✓ *Collector*

- ✓ *Baseline consumption & flexibility*
- ✓ *Aggregates forecasts*



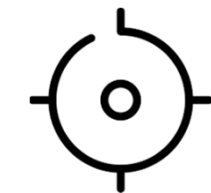
✓ *Planner*

- ✓ *Determines optimal flex activation*
- ✓ *Cluster optimization*
- ✓ *Offering service to grid or market*



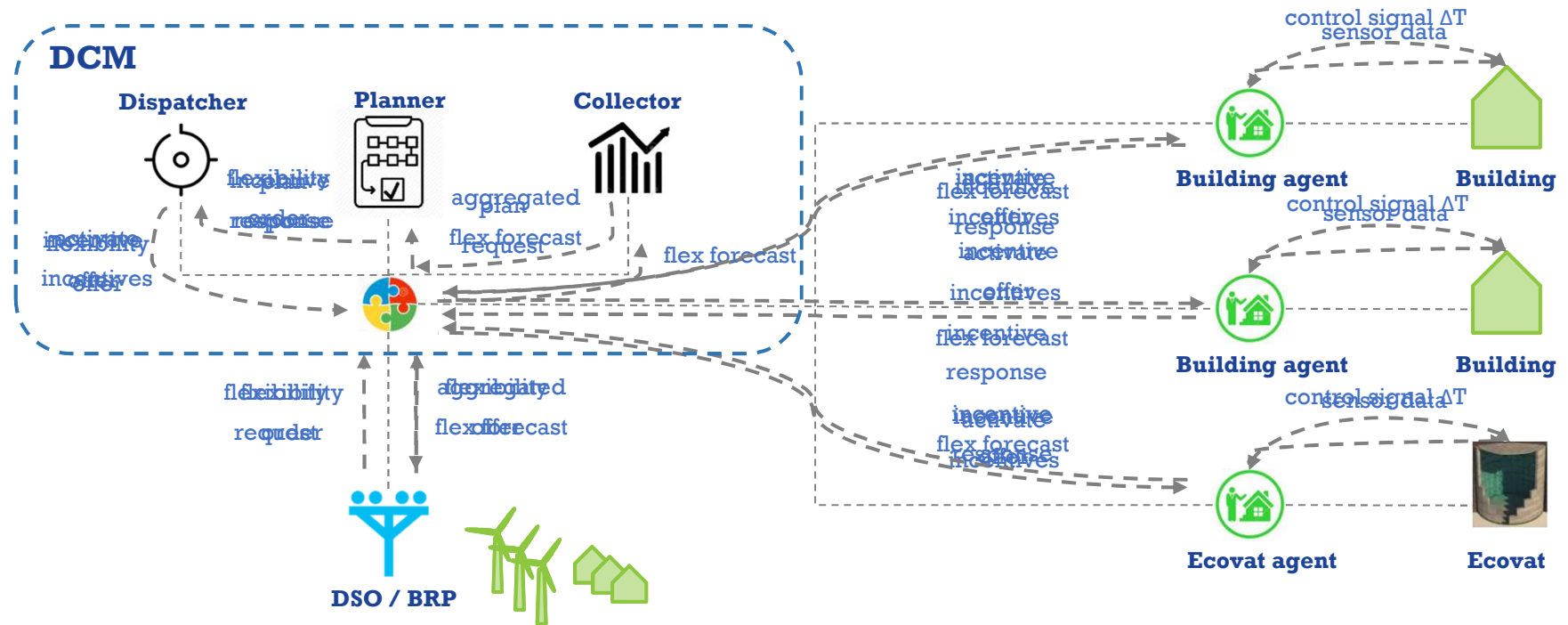
✓ *Dispatcher*

- ✓ *Disaggregate flexibility*
- ✓ *Distributed optimization (ADMM¹)*



1: Stephen Boyd, Neal Parikh, Eric Chu, Borja Peleato and Jonathan Eckstein (2011), "Distributed Optimization and Statistical Learning via the Alternating Direction Method of Multipliers", Foundations and Trends® in Machine Learning: Vol. 3: No. 1, pp 1-122. <http://dx.doi.org/10.1561/22000000016>

DCM-centric Multi-agent activity flow



Summary



- ✓ *Automated way of flexibility negotiation*
- ✓ *Dynamic cluster of flexibility providers*
- ✓ *Flexibility providers are in control*
- ✓ *Location-aware aggregation/disaggregation*





Thanks for your attention

davy.geysen@vito.be



FHP project is funded by European Union under the grant agreement no. 731231.

