

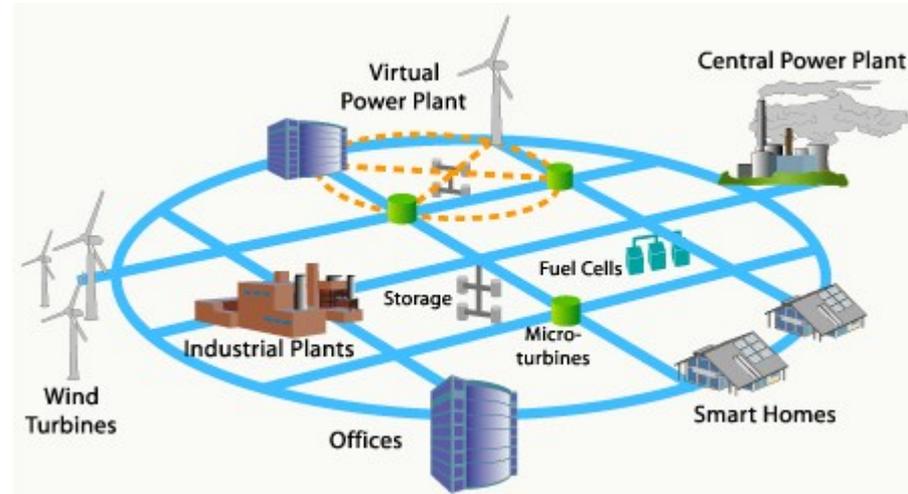
Real-time Business Intelligence in the MIRABEL Smart Grid System

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- What is MIRABEL project about?
- System architecture
 - Typical queries
 - MIRABEL use case
 - Individual components
- Future challenges
- Conclusions

- Smart grids = electricity network + ICT
 - Efficiency
 - Reliability
 - Economics
 - Sustainability



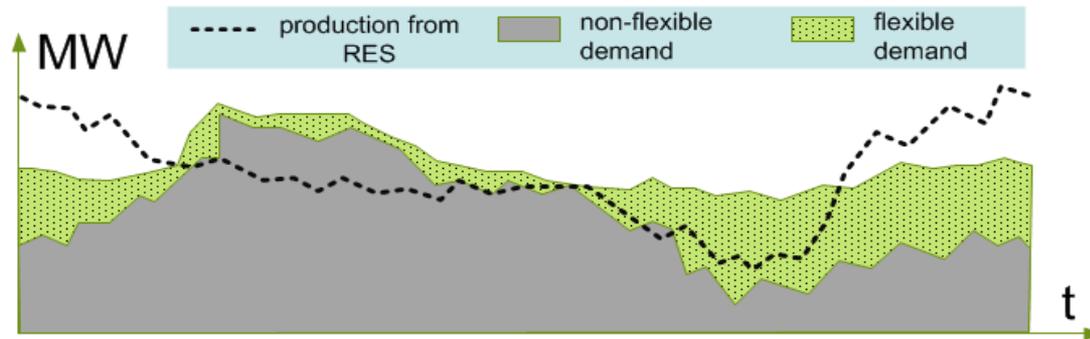
- Active consumers in electricity market

Image from: <http://www.osii.com/es-la/solutions/initiatives/smartgrid.asp>

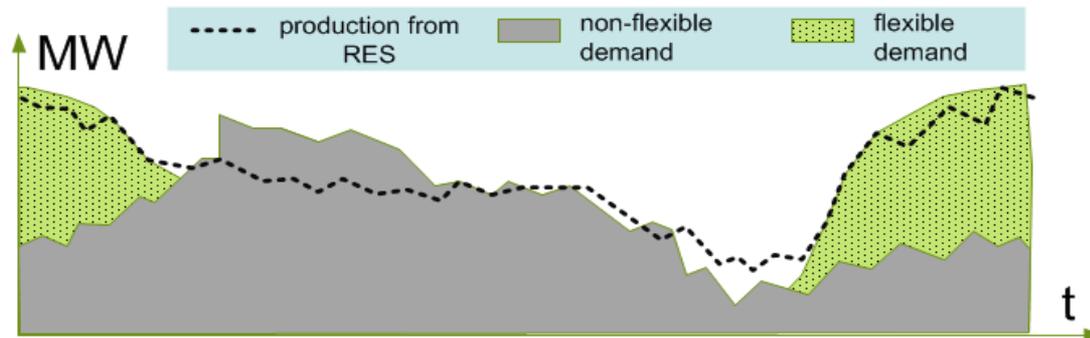
- **Goal:** Consume more RES
- **Problem:** RES not planned
- **Solution:** Shift demand!

- EU FP7 project
- 8 partners
- Duration:
1/1/2010 –
31/12/2012

Before

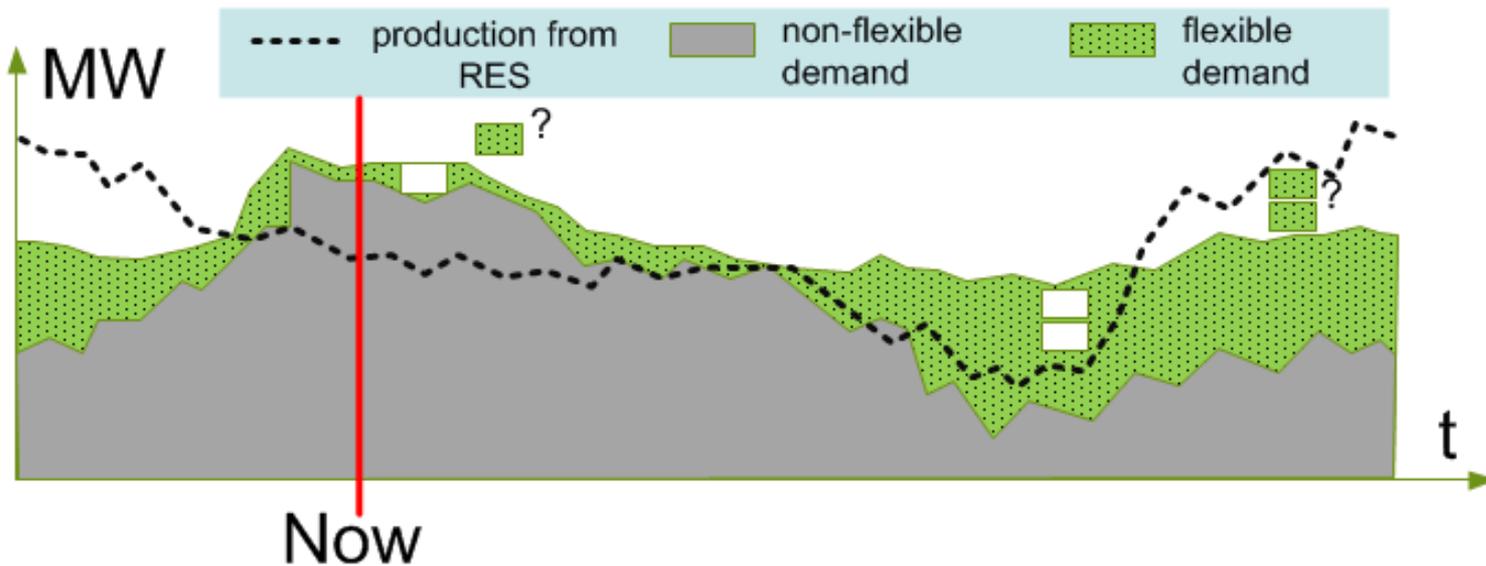


After

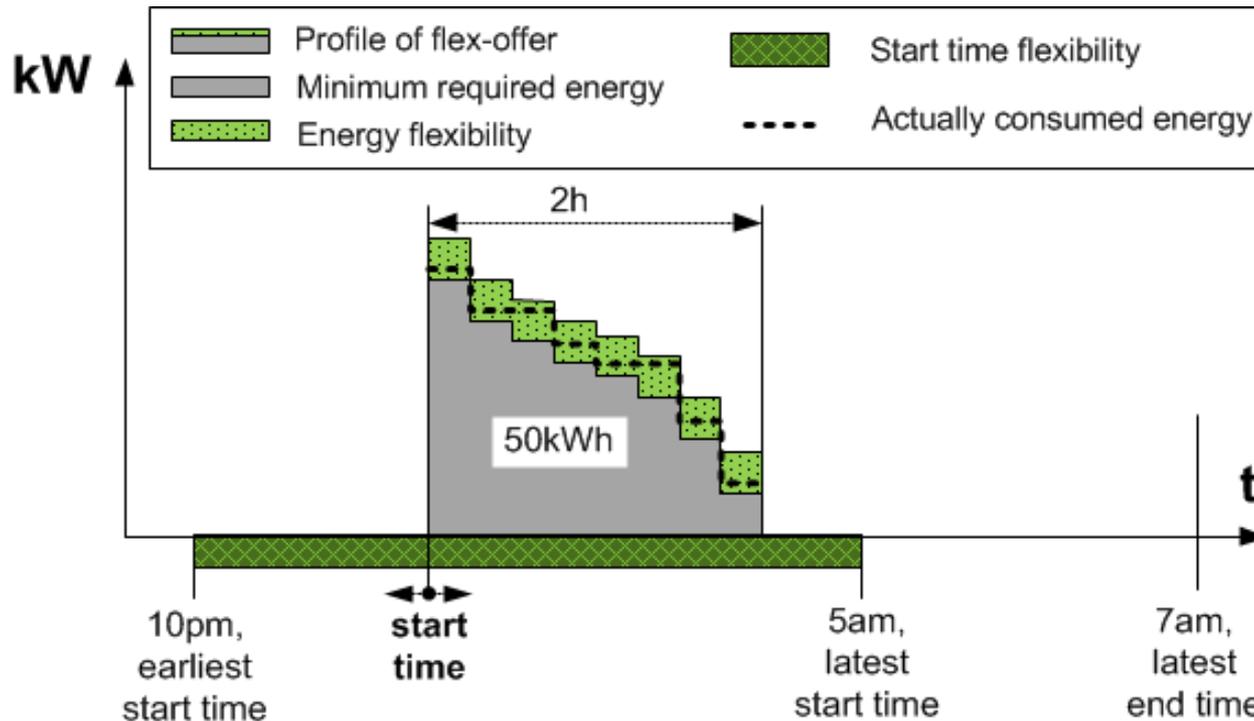


<http://mirabel-project.eu/>

- Shift flexible demand:
 - Production from RES is known few hours ahead
 - Schedule the demand from millions of users!
 - React quickly to changes in the grid

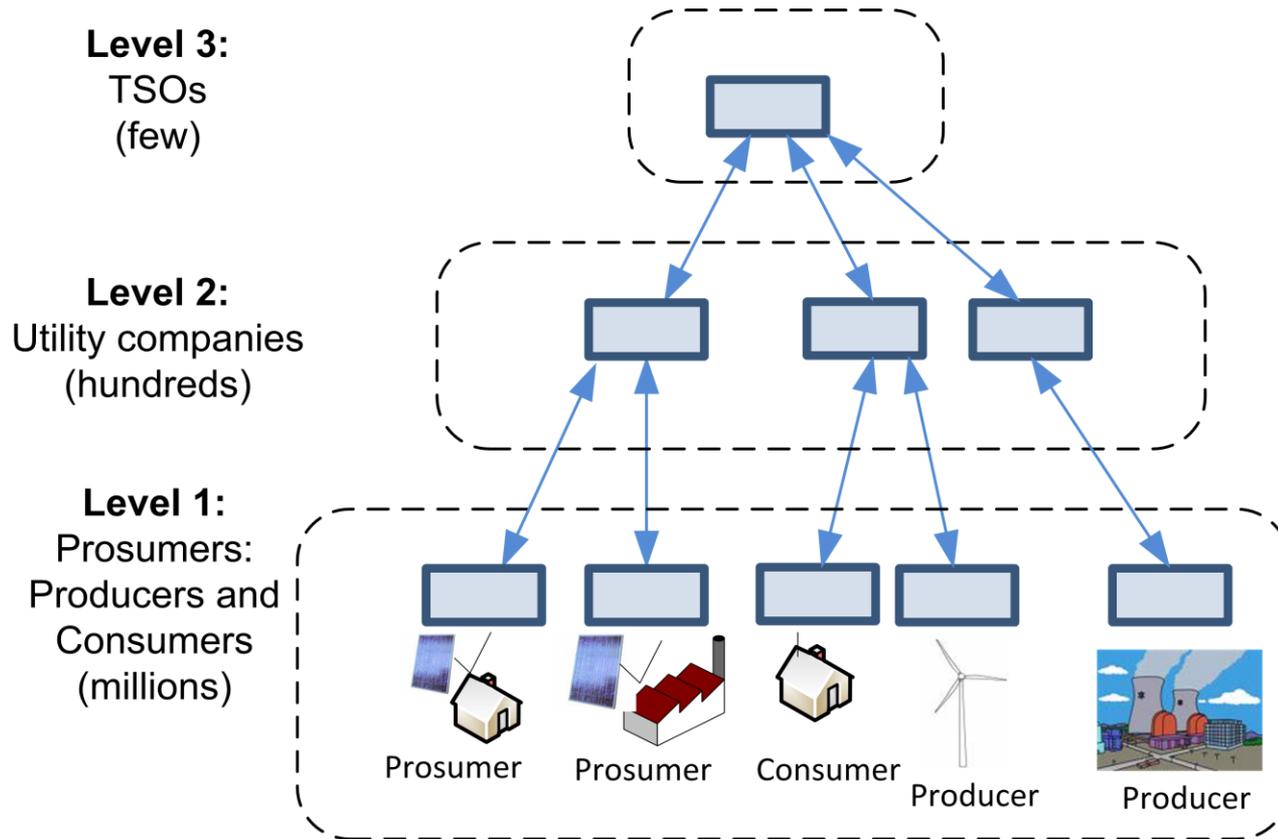


- Operates on energy-related data
 - Time Series
 - Flex-offers

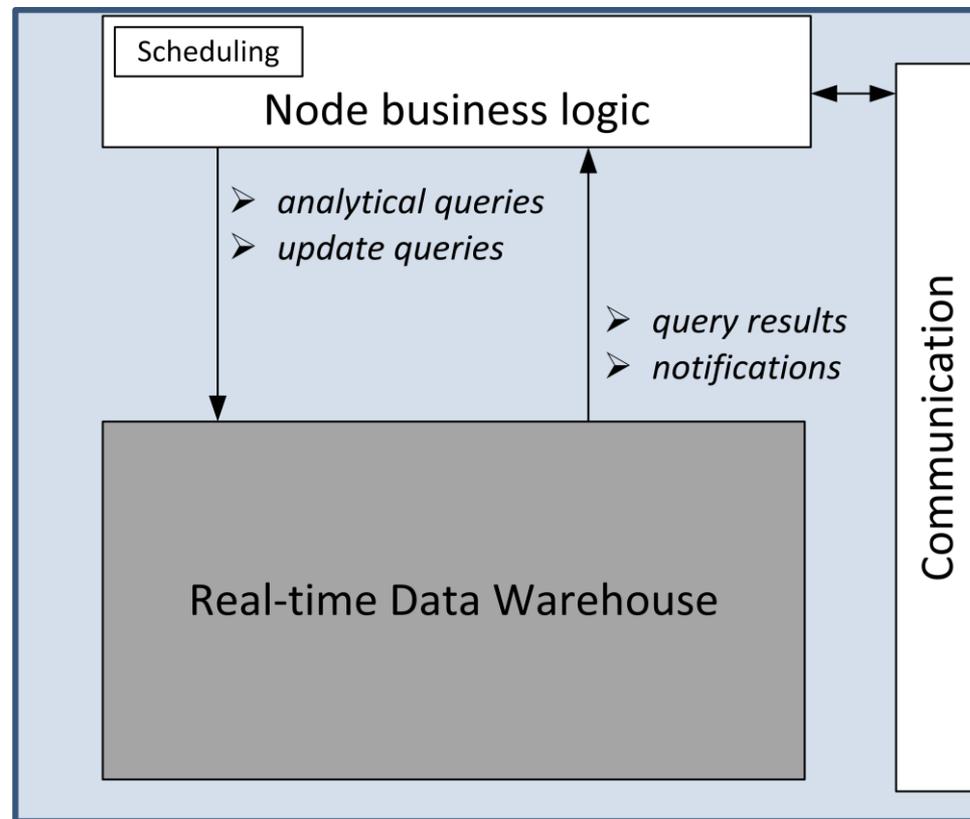


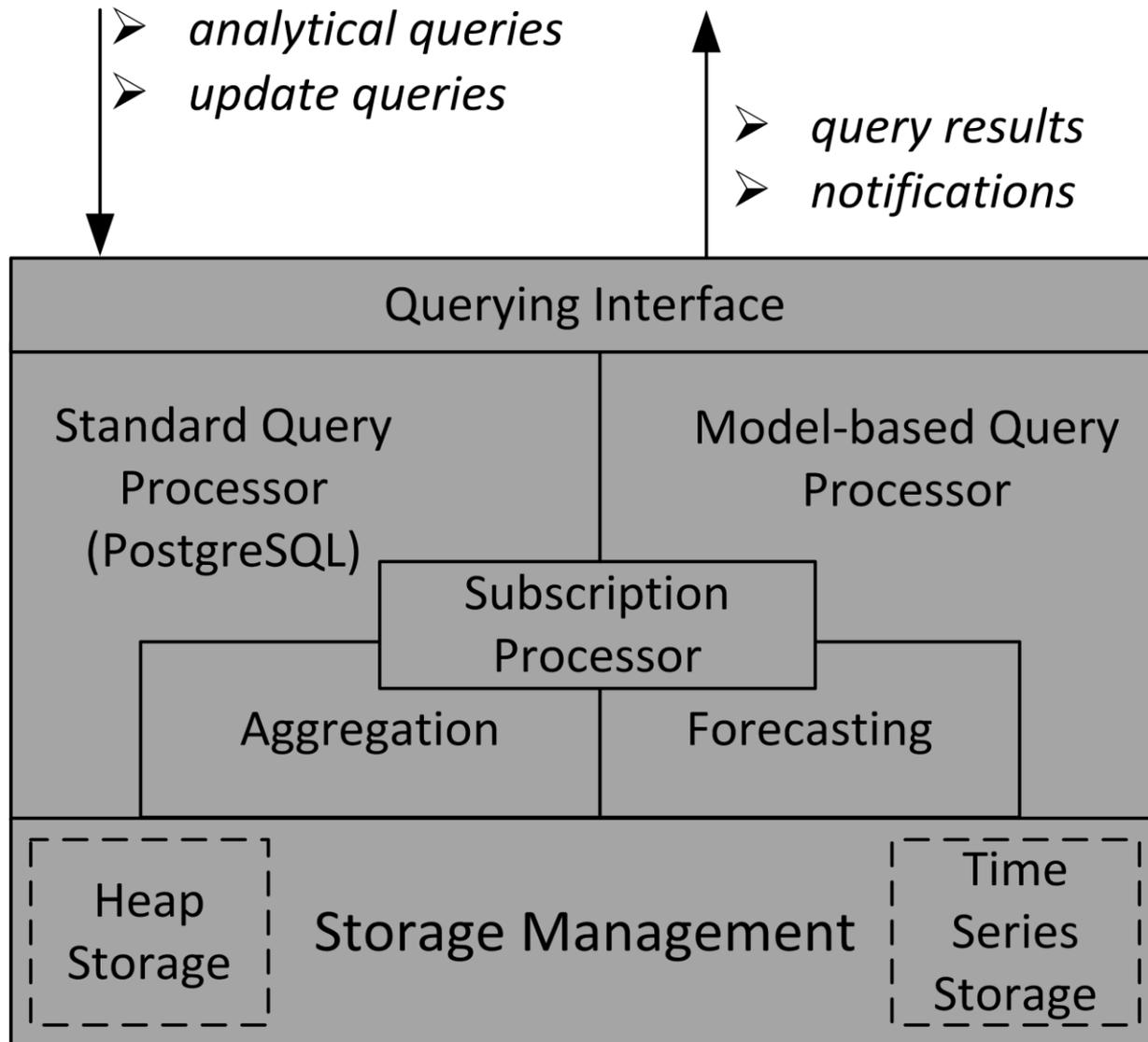
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- Hierarchically distributed nodes



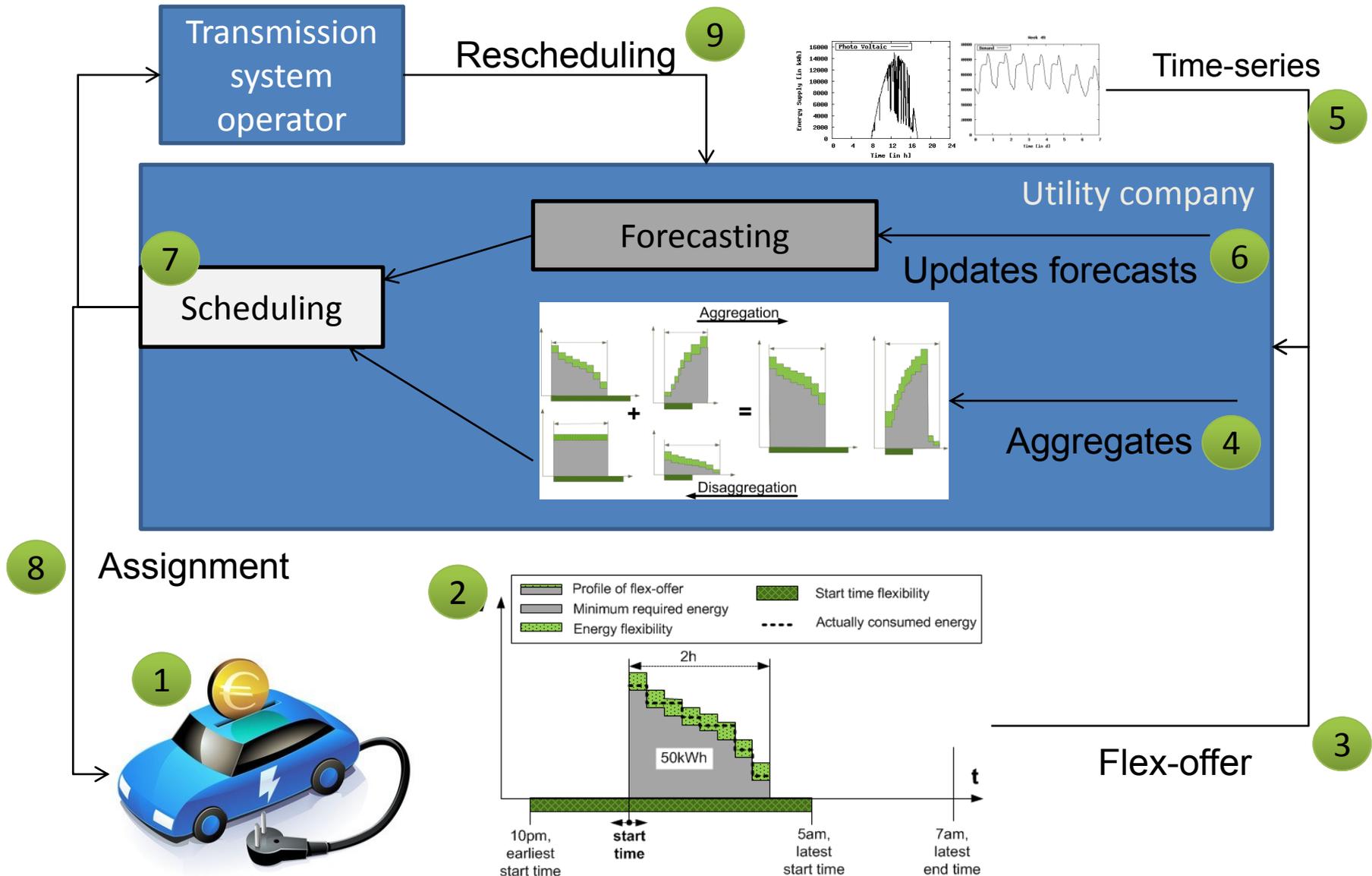
- 1 Node:
 - Communication
 - Business logic
 - Real-time DW





- Update queries:
 - Time series & flex-offers
 - Add, remove, change
 - “**A new flex-offer was added to unscheduled flex-offer list**”
- Analytical queries:
 - Subscriptions
 - “**Notify me if unscheduled flex-offers list changes by 10MWh**”
 - Exact analytical queries
 - Approximate analytical queries
 - “**Show balance for last 2 hours and next 2 hours**”

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- Scheduling is NP-complete problem!

