

NRP 70 Electricity supply

Joint project: Software-based real-time grid control

Overview

Research Challenges

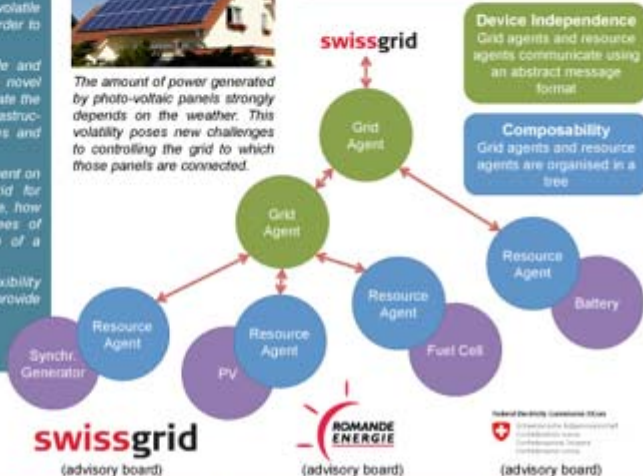
- How can we control grids that include significant fractions of renewable sources, and cope with the volatile nature of these renewables, in order to maximise their utilisation?
- How can we guarantee a stable and safe grid operation under these novel conditions, without having to update the grid's legacy electrical-power infrastructure (overhead transmission lines and underground power cables)?
- How can we exploit flexibility present on the consumer side of the grid for Demand Response? For example, how can we benefit from the degrees of freedom in a heating schedule of a building?
- How can we exploit the flexibility present in a distribution grid to provide system services to Swissgrid?
- And how can we do all this in a generic and scalable way?



The amount of power generated by photo-voltaic panels strongly depends on the weather. This volatility poses new challenges to controlling the grid to which those panels are connected.

Our Proposed Approach: COMMELEC

A Framework for Distributed and Real-Time Grid Control using Explicit Power Setpoints



Main (Industrial) partners:

 (co-supervision, industry liaison)
  (advisory board)
  (advisory board)
  (advisory board)

Subprojects

NRP70 COMMELEC Umbrella Project

(Le Boudec, Bouman, Jones)

- | | |
|---|---|
| Real-Time Control of Power Flows (project leader: Bouman) | Storage and Demand Response (project leader: Jones) |
| Redundancy and Reliability (Mohiuddin, Le Boudec) | Model Predictive Control (Fabetti, Jones) |
| Grid State Estimation (Kettner, Paoletti) | Urban Energy Systems (Stader, Maréchal) |
| Performance Evaluation (Scolan, Oudakov) | Energy Storage (Tran, Barade, Dujc) |
| Rigorous Software Design (Saab, Bludze, Sifakis) | |

Energy Turnaround

COMMELEC orchestrates power sources, loads and storage units to maximise utilisation of renewable-energy sources, while keeping the grid safe.

Contact

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