DREAM KPIs overview

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The DREAM project aims to build and demonstrate an industry-quality reference solution for DER aggregation-level control and coordination, based on commonly available ICT components, standards, and platforms for all actors (DER owners, grid operators, etc...) of the Smart Grids.
DREAM develops new algorithms for heterarchical grid management and implements them in the field

**Smart Grid Drivers**
- Market-based approach for flexibilities at distribution level needed
- Novel, robust, and economical solutions

**DREAM Concepts**
- Autonomous, agent-based system ("heterarchical management")
- Works with different grid operation modes

**DREAM Benefits**
- Allow larger amounts of DER with minimum structural investments
- Tested hardware and software

[http://www.dream-smartgrid.eu](http://www.dream-smartgrid.eu)
We test and evaluate the DREAM framework and the field trial applications with a KPI-based approach.

Use case & algorithm development

- Day-ahead & intraday scheduling
- Short-term balancing
- Real-time operation

DREAM software framework:
IT services collection

Real-world application
in field trials

“DREAM framework”

WP 2 - 4

WP 5

WP 7 - 9

Performance metric (PM) and KPI development and industrial viability evaluation

“PM and KPI framework”

WP 6
KPIs in DREAM
KPIs in DREAM help to define objectives for the solutions and to measure their success

We need KPIs as an objective and predefined evaluation tool
- Input for test execution
- Standardize and normalize test outputs

**How to get exportable, comparable and industry relevant results?**

DREAM goals = same EEGI KPIs goals plus more actor-specific (mainly DSO)
- “Smartness” of the grid ➔ “DREAM works”
- Economic interests ➔ “DREAM is worth the effort”
- Asset life management
- Market competitiveness
The DREAM evaluation roadmap uses internal goals and reference sources for KPIs

### DREAM project vision
- DREAM as presented in the DoW

### DREAM trial site leaders
- Specific goals & improvement expectations using DREAM solutions on site

### DREAM use case developers
- Goals of new algorithms and DREAM solutions

### Evaluation and results
- Check against EEGI roadmap
- Consolidate and finalize pre-test goals and metrics
- Identify barriers that may hamper the industrial deployment of DREAM solutions
- Conduct tests and collect $P\%$ $benefit$ values
- Contribution to DREAM goals and to EEGI roadmap
- Barriers and other lessons learned

<table>
<thead>
<tr>
<th>Trial Site (TS)</th>
<th>Use case (UC)</th>
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<tbody>
<tr>
<td></td>
<td>UC 1</td>
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<td>UC 3</td>
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<tr>
<td>TS 1</td>
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## DREAM builds on the EEGI KPIs and extends them

### EEGI Lvl 2 KPIs

**Enable...**

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<tbody>
<tr>
<td>B.1</td>
<td>Increased RES and DER hosting capacity</td>
<td><strong>DREAM additions in blue font</strong></td>
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<tr>
<td>B.2</td>
<td>Reduced energy curtailment</td>
<td><strong>Enable...</strong></td>
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<td>B.3</td>
<td>Power quality and quality of supply</td>
<td><strong>Enable...</strong></td>
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<td>B.4</td>
<td>Reduced total costs of future grid investments and extended asset life time</td>
<td><strong>Enable...</strong></td>
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<tr>
<td>B.5</td>
<td>Increased flexibility from energy players for diverse grid levels /situations</td>
<td><strong>Enable...</strong></td>
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<tr>
<td>B.6</td>
<td>Improved competitiveness &amp; efficiency of el. market and its players</td>
<td><strong>Enable...</strong></td>
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<tr>
<td>B.7</td>
<td>Non intrusiveness for DSO operations</td>
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### General, overarching DREAM project goals

- **D_g.1** Allow larger amounts of DER that enable the grid to constantly adjust to operational conditions and make it robust to external disturbances
- **D_g.2** Enable distributed intelligence with limited structural modifications
- **D_g.3** Make flexibility from grid reconfiguration and from consumers usable
- **D_g.4** Support changing DSO role to market enabler / facilitator + market participant

### Trial-site specific goals

- **DREAM as decision-support tool for fewer grid reinforcements**
- **Flexibility for real-time congestion management / grid contingencies on LV and MV levels**
- **Flexibility from loads and the network („self-healing“)**
- **Flexibility for frequency regulation**
- **Flexibility offerable on day-ahead markets**
- **Efficiency improvements for the daily operating distribution network topology**
Challenges and lessons learned
Challenges and lessons learned from the DREAM KPI approach (project still ongoing)

Approach- & content-related challenges

- How to choose between two possible approaches for KPI development:
  1) begin with use case goals (=university partners), then move to trial sites/demo site goals (implementation partners)
  2) the other way around: begin with trial sites/demo site goals and develop KPIs and use case solutions accordingly?

- At the beginning of research-driven projects, not all information about the final use cases tested in trials is available
  - Use cases naturally evolve after closer interaction with the trial sites
    - KPIs thus difficult to be planned early in a one-time effort

- Demo site leaders have difficulties specifying what they want to achieve / what they need, especially early on in the project

Best practices and solutions

- Use both approaches in an iterative process:
  - 1st: use-case oriented KPI determination;
  - 2nd: trial-site oriented KPI determination
  - discuss and repeat these two iteratively.
    - Only then you can ensure getting a complete KPI list that emerges with the project

- Especially later on in the project: discuss goals and KPIs in one-on-one sessions per demo site (moderated by KPI development leaders)
  - Often more effective than meetings across use cases
  - Then check across cases and harmonize

- Propose a good set to start with from a reference list → many similar KPIs exist across projects!

- Emphasize importance of KPI definition and collection not only for the partners, but also for the advertisement of the entire project towards EC!

Other organizational challenges

- How to engage stakeholders to contribute to the KPI definition process: For both developers and trial site owners, other things often have a higher priority!
Thank you

Market benefits for customers

Smarter Distribution Grids

Better use of renewable sources

Dream: 12