

# **IGREENGrid experience with EEGI KPIs**



**Brussels, June 24<sup>th</sup> 2014**

**Marco Rossi (RSE)**



“This project has received funding from the European Union’s Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308864”.

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## IGREENGrid project

EEGI program encompasses research, development and demonstration activities, which can be classified as follows:

- **Research and Development** (laboratories, test facilities...)
- **Large Scale Demonstration** (real network, real customers...)
- **Deployment** (full scale implementation)



IGREENGrid project includes large scale demonstration activities which are managed by some of the most relevant **DSO** members of the EEGI.

The expected final result and output is expected to be a **set of guidelines**, consisting in a portfolio of methodologies and tools for integration of **variable renewable resources in distribution grids**.



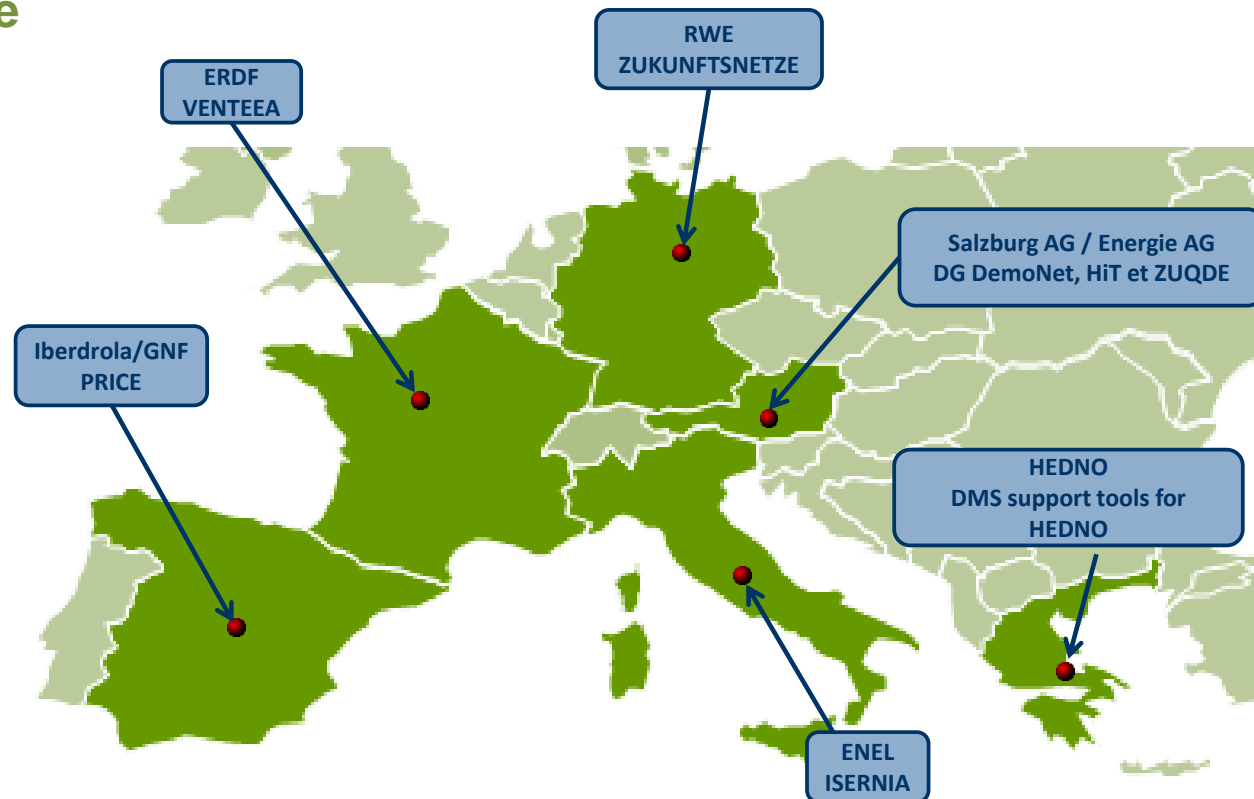
# IGREENGrid demonstration projects

IGREENGrid combines the results and the practical experience from **six large scale demonstration projects** of six different European countries.

- Complete picture of the European electrical scenario
- Different technologies and strategies for the achievement of the common goal:



**RENEWABLES  
INTEGRATION IN  
DISTRIBUTION GRIDS**

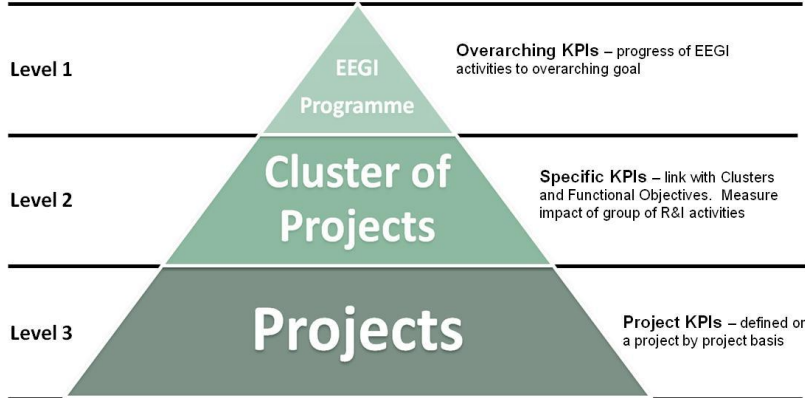


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# Renewables integration

## Selection of the most promising solution

The selection of the **most promising solutions** for renewables integration will be performed by means of a performance evaluation



Within IGREENGrid, the KPIs have been selected on the basis of:

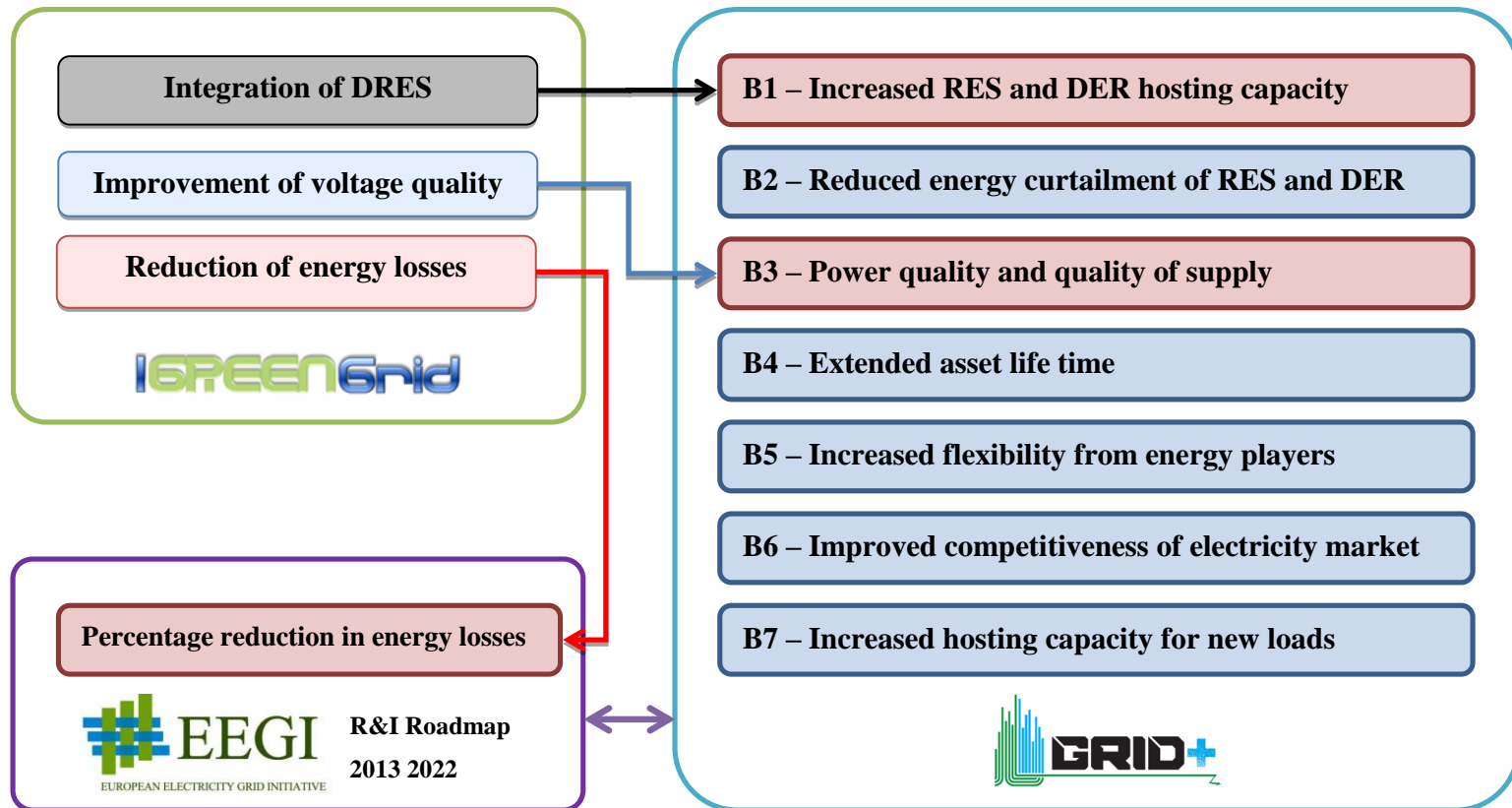
- Tested technologies
- Data availability
- Impact on renewables integration



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# IGREENGrid demonstration projects

Three technical KPIs have been selected for the performance evaluation and they have a strong connection with the EEGI indicators



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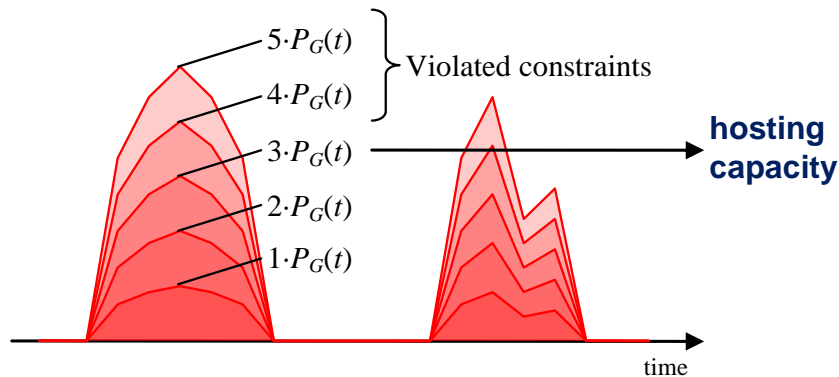
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# Renewables hosting capacity increase

The hosting capacity corresponds to the maximum amount of **power/energy** which can be injected in an electrical grid without violating the **technical (and regulatory) constraints**.



## Relevant aspects and open issues

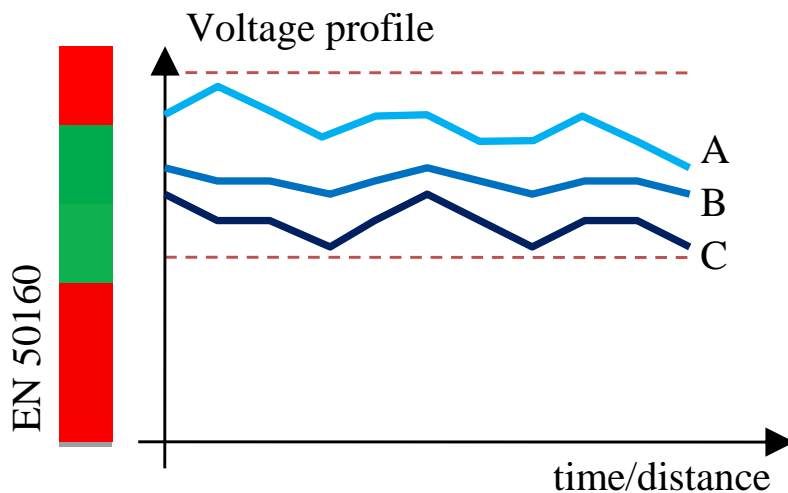
- **Time dependency**
  - generation
  - load
  - technology under test
- **Model accuracy of the network**  
(grid + customers + devices)
- **Generators position on the network**

**At the current state of the art, there are not suitable tools which can be systematically used for the hosting capacity evaluation (based on all the mentioned aspects)**



# Improvement of voltage quality

Voltage quality (quality of supply) measures the ability of the system to maintain a series of given specifications, particularly oriented to the safeguard of loads.



## Relevant aspects and open issues

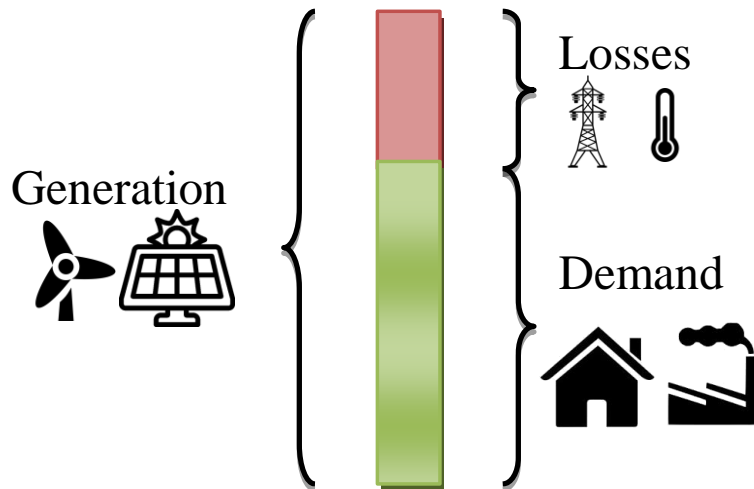
- **Measurements availability** (preferably at customers level)
- **Upper/lower limits fulfilment vs. nominal voltage proximity**
- **Voltage evolution along the time/feeder**

**IGREENGrid demonstrators, normally, are not subjected to voltage quality issues (they include real customers)**

**Grid operation at nominal voltage has low priority: some operation strategies intentionally make the voltage profile worse (but still in compliance with the standard)**

# Reduction of energy losses

Energy efficiency measures the ability of the network to deliver electrical power from generation units to loads, ensuring limited energy losses



## Relevant aspects and open issues

- **On-line vs. off-line measurement of power losses**
- **Non-technical losses handling** (Energy losses due to frauds)

From the renewables-integration point of view, the improvement of energy efficiency is a **performance indicator**:

- **Monitoring of the grid planning oriented to an efficient integration of renewables** (generators/loads position)
- **Avoiding low-efficiency network operation strategies**

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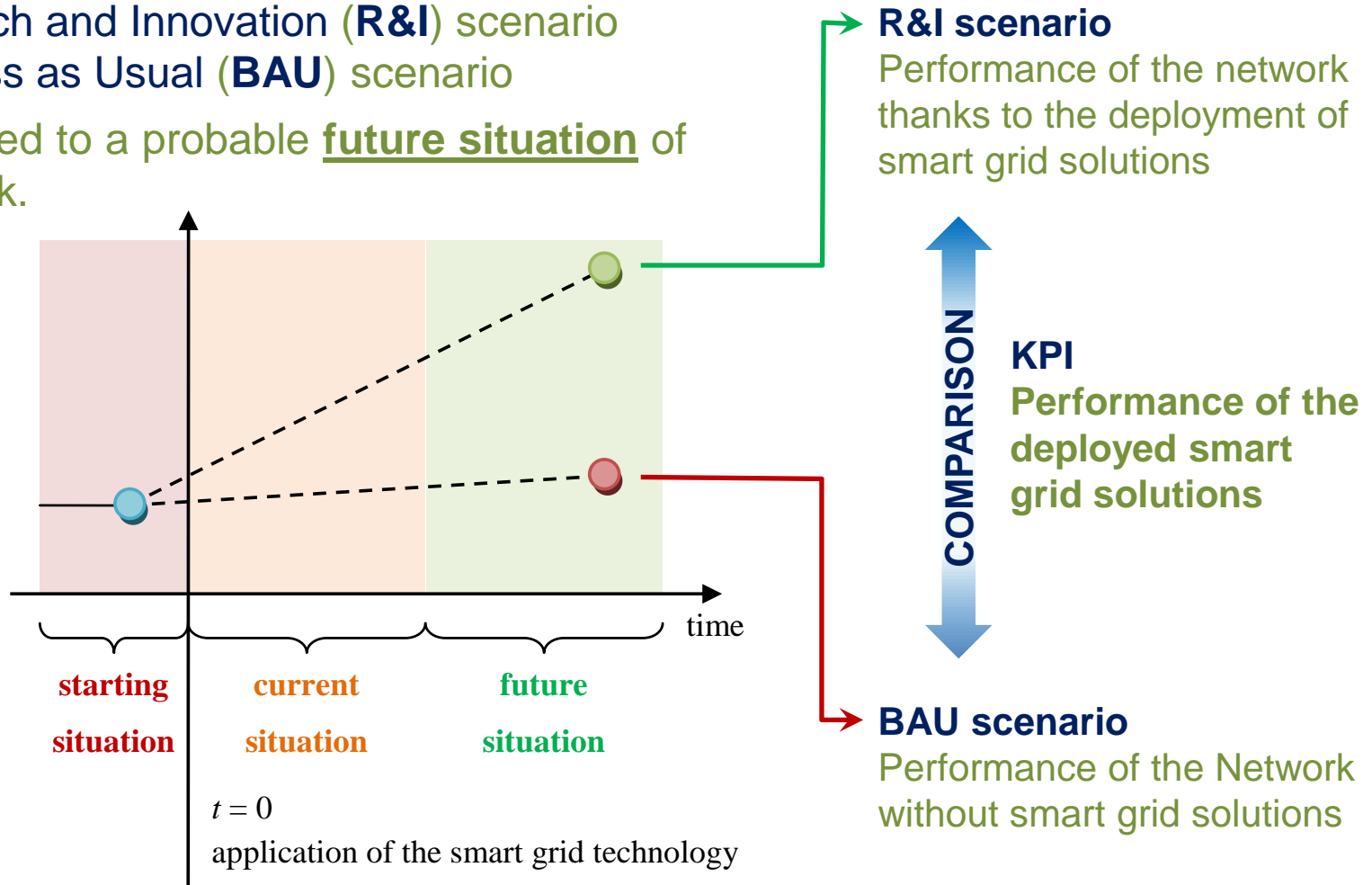


# KPI calculation procedure

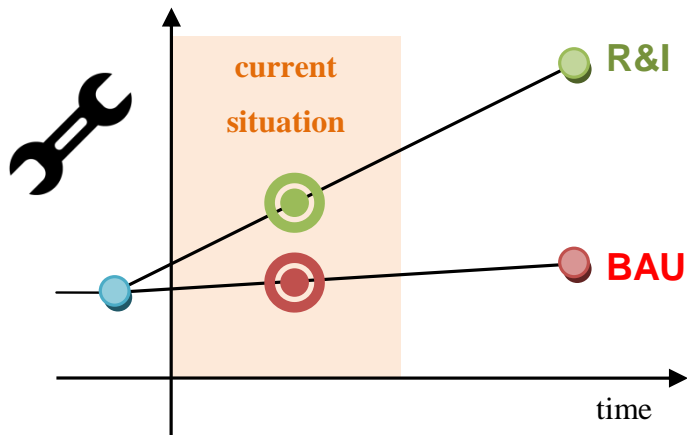
The performance of the deployed solutions is measured by comparing:

- Research and Innovation (**R&I**) scenario
- Business as Usual (**BAU**) scenario

both referred to a probable future situation of the network.

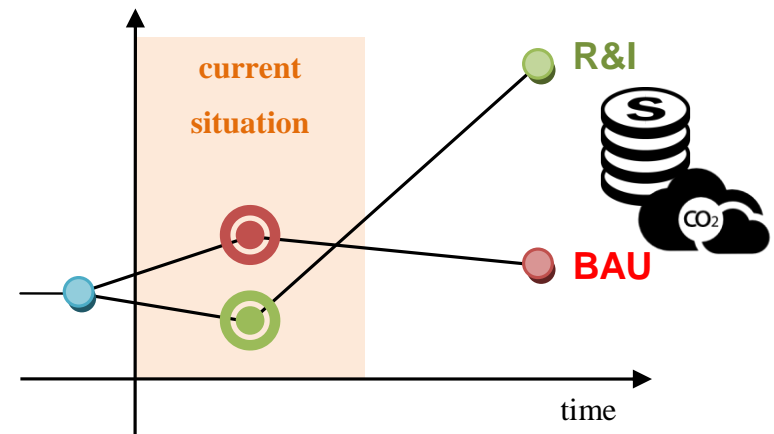


# Difference between technical, economic and environmental KPIs



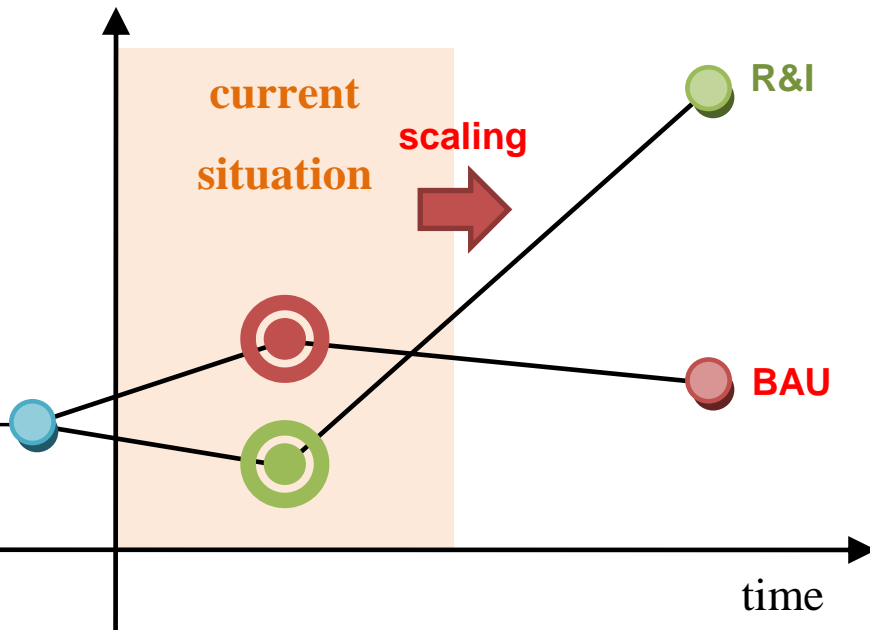
When the performance of the adopted solutions has to be evaluated from the **technical point of view**, the current scenario often can be reasonably considered comparable with the future one.

From the **economic/environmental point of view** the currently measured smart-grid impact often does not represent in an effective way the expected performance of the adopted solutions.



# IGREENGrid economic/environmental evaluation

For an effective evaluation of the economic/environmental performance, the **impact of the technologies under test** have to be scaled **opportunistically** in order to take into account:



- **Industrialized assets**
- **Large scale application**
- **Most probable future scenarios**

Within IGREENGrid, the performance evaluation of the tested solutions is in progress and it is based on:

- Cost-Benefit-Analysis  
(economic)
- Life-Cycle-Assessment  
(environmental)

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## Conclusion

The performance evaluation of smart grid strategies for renewables integration is one of the main tasks of IGREENGrid.

The IGREENGrid demonstrators represent a prolific field for KPIs application:

The evaluation of the three developed indicators (in line with the EEGI KPIs) is currently in progress.

In spite of the identified issues, the preliminary results seem very promising from the KPI applicability point of view

Particularly thanks to the strong collaboration of

- Network Operators - field experience and data
- Research Centres - KPI calculation procedures





## Next Activities

The design of economic performance evaluation is in progress and the related KPIs will be defined on the basis of its results.

Even the economic KPIs will be defined according to the structure proposed by GRID+ project and in line with the EEGI roadmap:

- EEGI step-by-step approach for KPI evaluation
- Analysis of the applicability on R&I projects

**IGREENGrid has scheduled official reports in order to provide a concrete feedback to the GRID+ project**

- Study of KPIs impacted by the expected or achieved results of the R&I projects
- Analysis on how the projects results contribute to each KPI
- Provide KPI values



# Thank You,

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