Cu Copper Alliance

ECOFYS
sustainable energy for everyone

Tracking flexibility in electricity systems with increasing renewables

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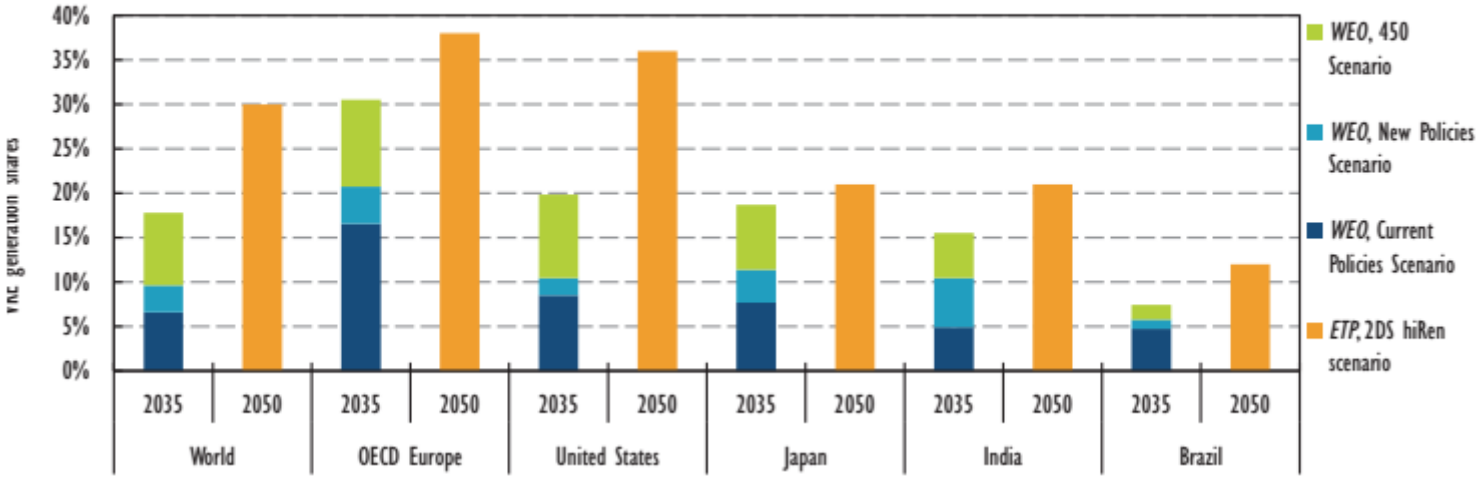
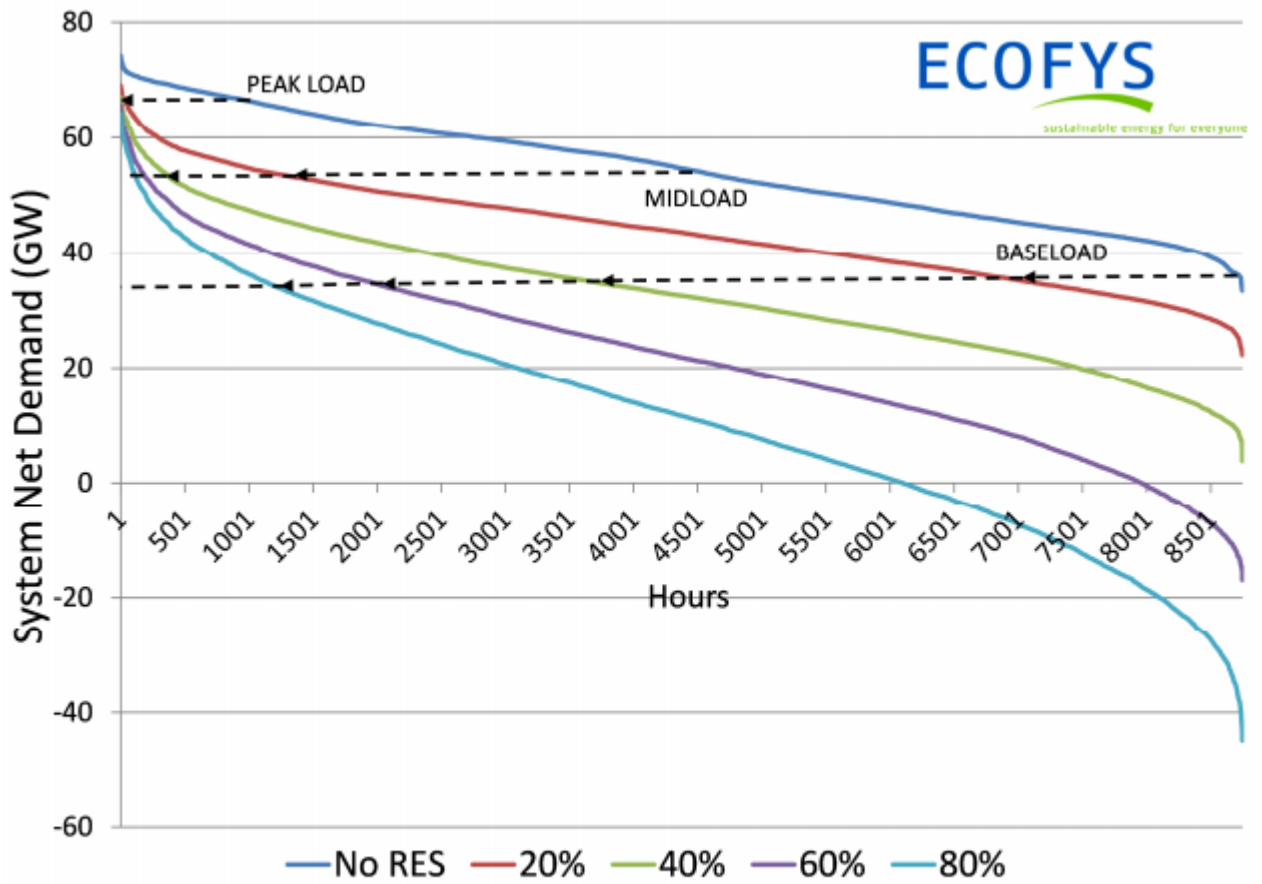
Variable Renewable Energy Projections

Figure 3.5 • Projected annual generation shares of wind power and solar PV generation, 2035 and 2050



Source: OECD/IEA. “The Power of Transformation”. 2014

VRE impact on net electricity demand



Dynamic range of electricity demand (No RES) and net electricity demand (different penetration levels).

Source: Own analysis for Germany.

A growing relevance attribute: Flexibility

“flexibility expresses the extent to which a power system can modify electricity production or consumption in response to variability, expected or otherwise.”

Source: IEA. “Harnessing Variable Renewables: A Guide to the Balancing Challenge”. 2011

Flexibility tracker towards near 100% RE

Phase 1: mapping out flexibility options ✓ http://j.mp/flexreport

Phase 2: roadmap & policy checklist ✓ http://j.mp/flexroadmap

Phase 3: peer review & testing checklist for 8 power systems

- Multiple experts completing the tool under guidance of ECOFYS
- Workshop to evaluate findings, and evaluate the tool (**April 12, 2016**)
- Communication campaign on findings once solid

Phase 4: flexibility tracker as an education tool for IEA DSM

- Build up an user community around the flexibility tracker
- Assist countries to develop their specific flexibility roadmap
- Develop a knowledge base and exchange best practices.
- Set up an education program about flexibility

Flexibility Tracker Methodology

The aim of the Flex Tracker is to assess the '100% vRES readiness' of a system, through a set of KPIs .

Approach: focus on transparency

- **Assessment** based on 63 KPIs, organised in 5 categories and 13 subcategories
- **No interpretation uncertainty**: clear questions (89 in total) on the current situation (answer based on statistics) or on compliance with policies (Y/N answers)

Goal: global awareness

- **Ranking** of the vRES readiness (flexibility) of a system
- "**Educate**" on key challenges of flexibility
- Develop a **global database** on policies on how systems comply to the flexibility challenge
- Identify **best practices**, investigate regional issues, **raise awareness**

Methodology/ Background:

- The **policy checklists** developed in the flexibility roadmap form the basis for KPIs
- **Explanatory texts** are provided for each category, subcategory and question. In the web version these texts should appear as explanations for each question. Following these explanations **one can recollect all key points from the Flex Roadmap report** and understand the key issues.

Scoring individual questions

Clear guidelines on how to interpret results

Scale Low/Medium/High = 0/0.5/1

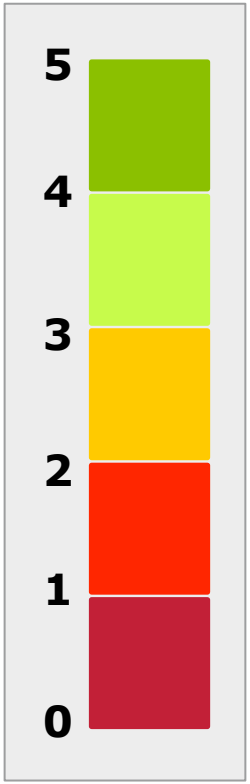
- Provision of ranges for interpretation of achieved goals
- Medium for Y/N answers where plans are not fully set in action)

Total scoring: weighted average of all answers

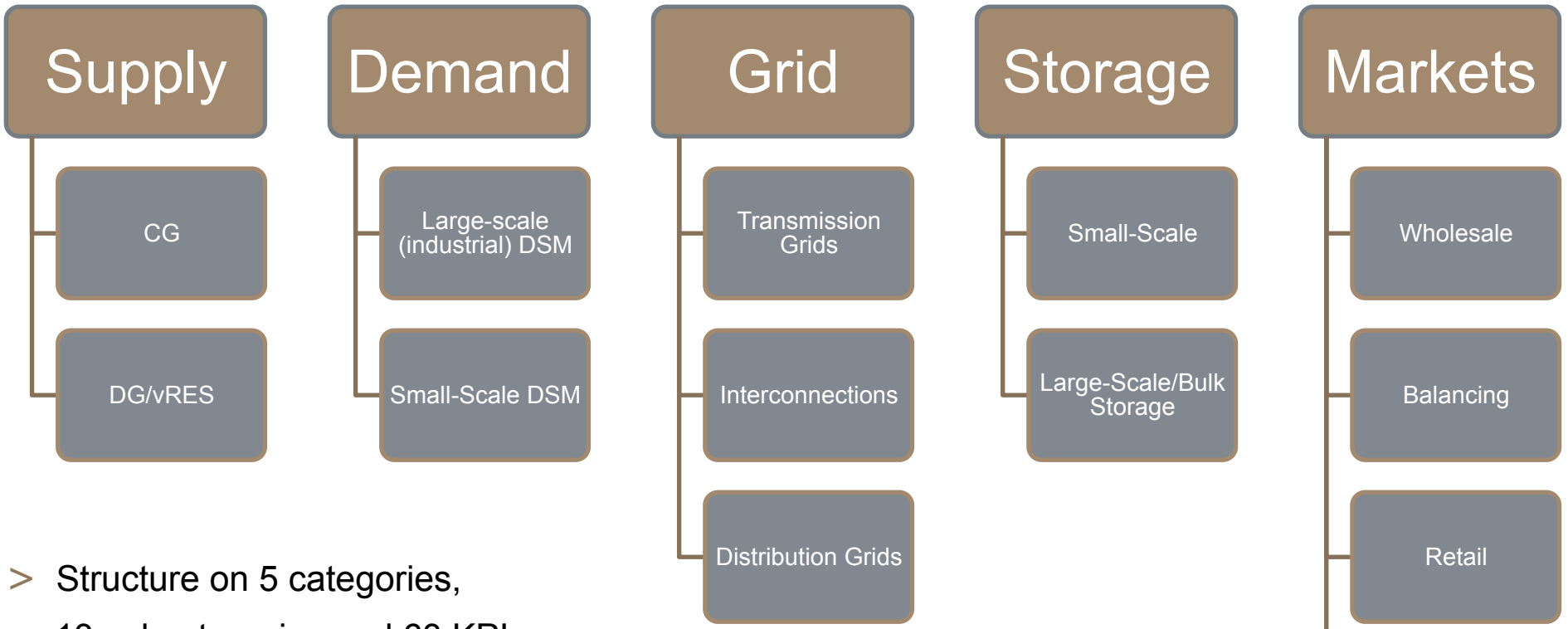
Weighting factors are applied allowing some questions to have more significance: achieved goals (e.g. vRES penetrations) rate higher than plans

Final score presented in a range 0-5 on a red-green colorcode:

- 0-1: dark red (insufficient-very low preparation)
- 1-2: red (insufficient-low preparation)
- 2-3: orange (medium preparation)
- 3-4: light green (medium-high preparation)
- 4-5: green (high preparation)



Flexibility Tracker Categorization

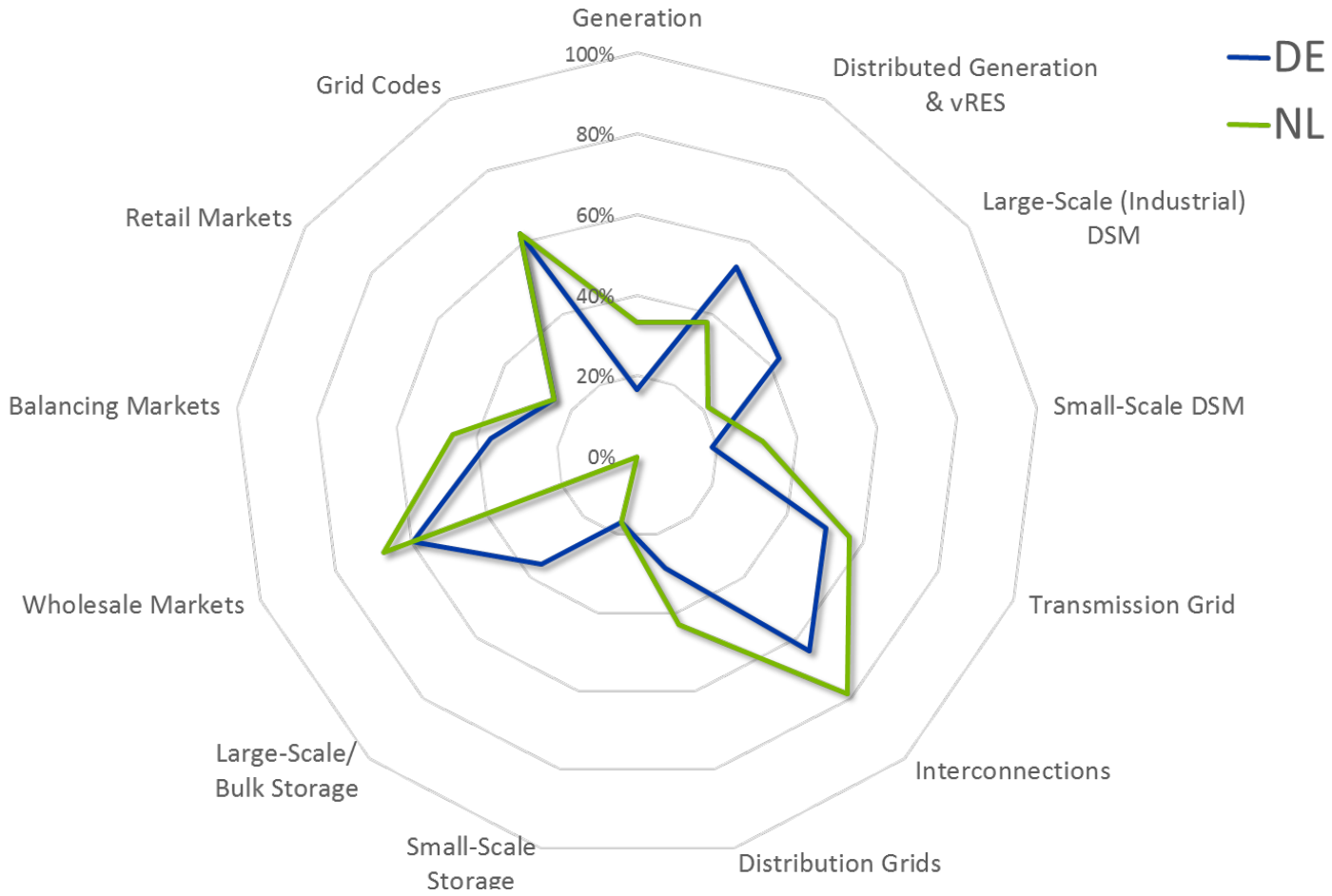


- Structure on 5 categories,
  13 subcategories and 63 KPIs
- This structure allows:
  - ranking each system per category/subcategory (flexibility 'identity')
  - obtaining comparison reports per subcategory or KPI

Flexibility Tracker Tool

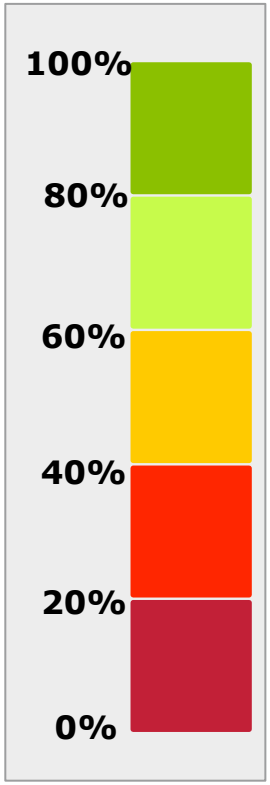
Subcategory	KPIs	Weight	Rating (1=High, 0.5=Medium, 0=Low)	Question
Large-Scale (Industrial) DSM	Industrial DSM programmes	3	Yes/Trend/No (Scoring: Yes: 1, Trend: 0.5, No: 0)	Are there significant industrial DSM programmes?
		1	Yes/No (Scoring: Yes: 1, No: 0)	Is industrial DSM participating in wholesale markets?
		1	Yes/No (Scoring: Yes: 1, No: 0)	Is industrial DSM participating in balancing markets?
	Industrial DSM potential	1	Industrial DSM potential/ peak load (Scoring: ≥5%: 1, <5% & ≥2.5%: 0.5, <2.5%: 0)	What is the theoretical potential of industrial DSM? [Industrial DSM potential / peak load]
	Industrial DSM incentives	1	Yes/No (Scoring: Yes: 1, No: 0)	Are there significant incentives to boost industrial DSM?

Output: e.g. rating per subcategory



Output: e.g. from findings to action plans

	Highlights Rating		Rating (% Max)			
Sub-category	**DE**	**NL**	**DE**	**NL**	**DE**	**NL**
Large-Scale (Industrial) DSM	**There is high (industrial) DSM potential in Germany, but its usage is still very low. However, pilot programmes have been established and balancing markets are being opened up.**	**The industrial DSM potential is enabled and participating in balancing services, but its share is not high.**	**43%**	**21%**	**30%**	**27%**
Small-Scale DSM	**Despite a significant potential for residential DSM, it is not enabled yet. However, aggregators are rising.**	**Smart meters are currently being rolled out and aggregators are active in balancing markets, however, residential DSM is not being used yet.**	**19%**	**31%**		



Functionality

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Country reports: factsheets & key factors affecting the rating.

Overview across a region or any set of countries.

Category/subcategory reports: which countries are better on a specific actions and why?

Identification of best practices, enable exchange of policies

Regular updates, tracking of developments

Task approach

Web platform / database

Support to user group for flexibility tracker

Application to national electricity systems

Quality & consistency control; codification of findings into best practices

How to apply the tracker at national level?

At national level:

- A national expert fills in the basic questions
- Advanced questions through interviews
- Internal workshop to review answers and articulate conclusions
- External workshop to communicate findings
- (Estimated 25-30 days of work per country)

Central budget required for :

- Web & database development
- Training & support of user group
- Quality & consistency check of national output; best practice program
- Adaptation of the tracker to non-EU context
- Application of the tracker to non-IEADSM countries

Thank you

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