

The Future Grid: Electric Highways

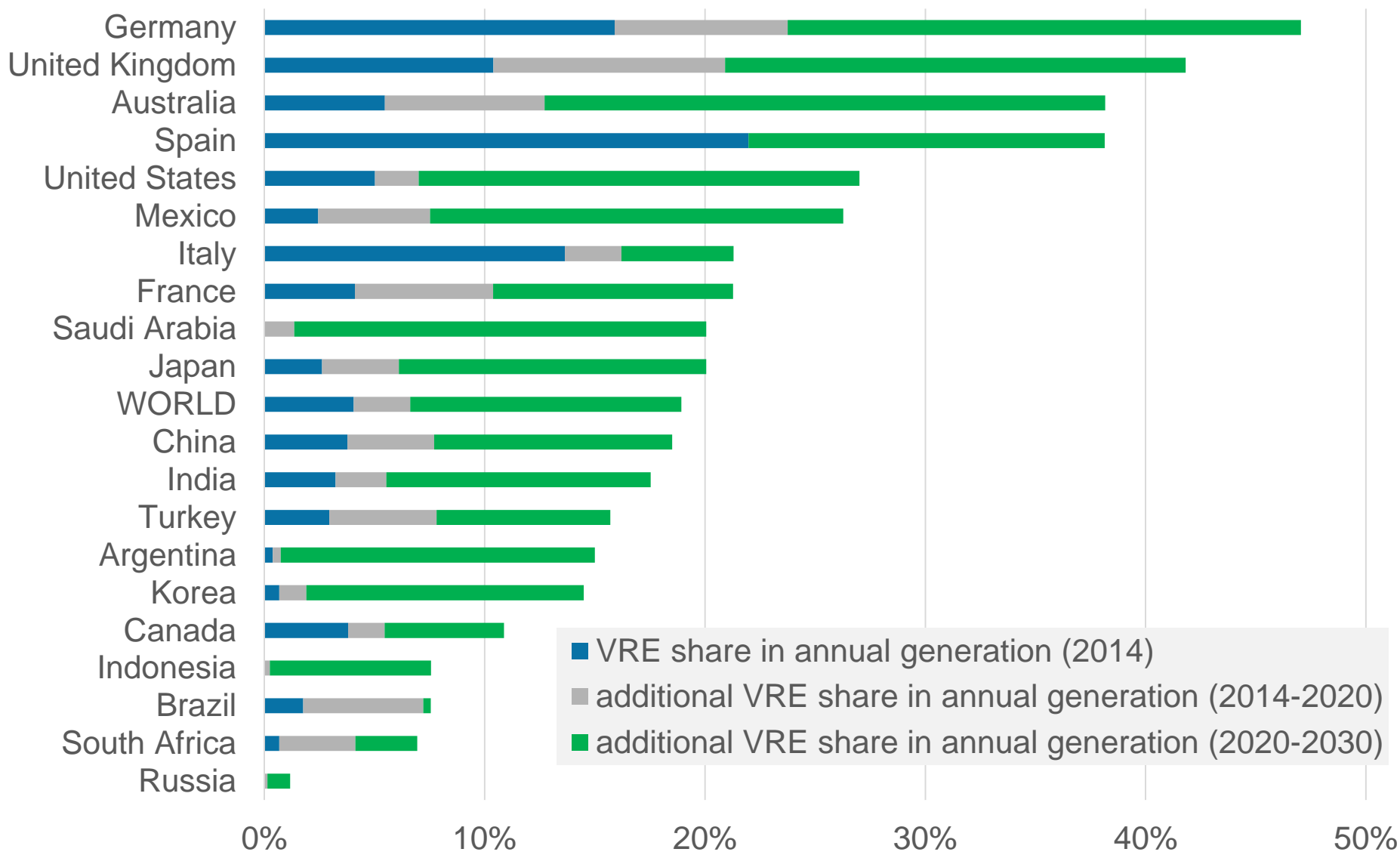


IRENA Innovation Week
Bonn, Germany
12 May 2016

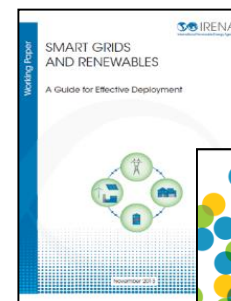
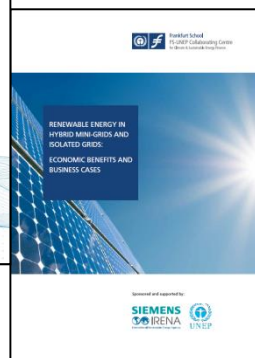
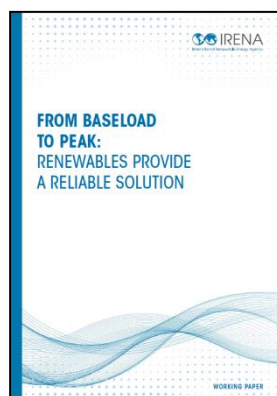
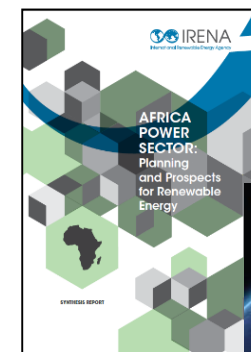
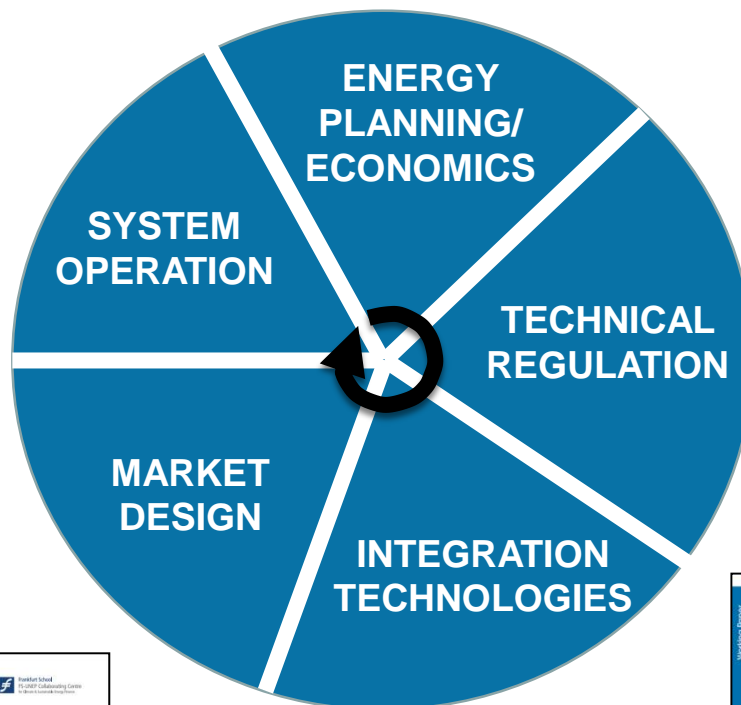
THE FUTURE GRID: ELECTRIC HIGHWAYS



ROLE OF VRE IN THE FUTURE GRID



How IRENA SUPPORTS THE FUTURE GRID



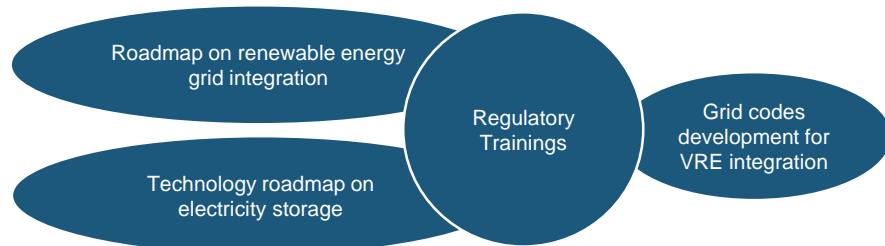
How IRENA SUPPORTS THE FUTURE GRID

Developing a long-term strategy

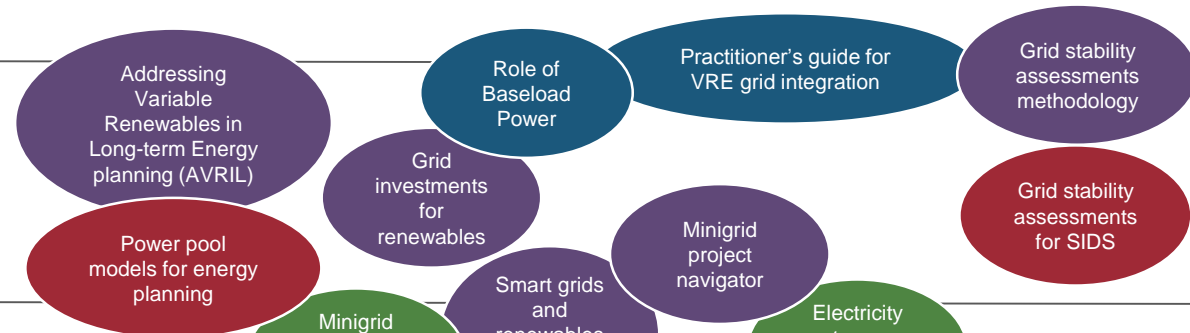
Facilitating the implementation process

Supporting operation and management

Policy & regulation

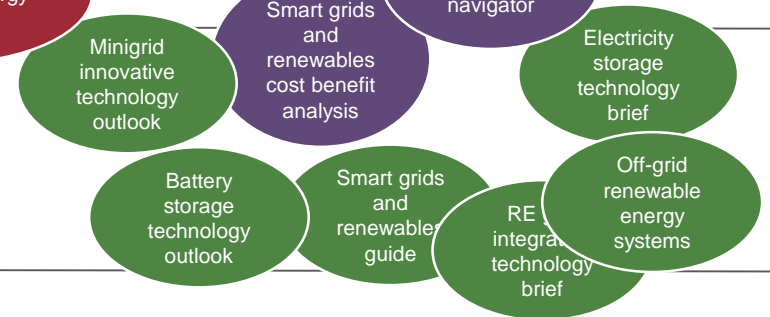


Market design



Infrastructure design

Technology components



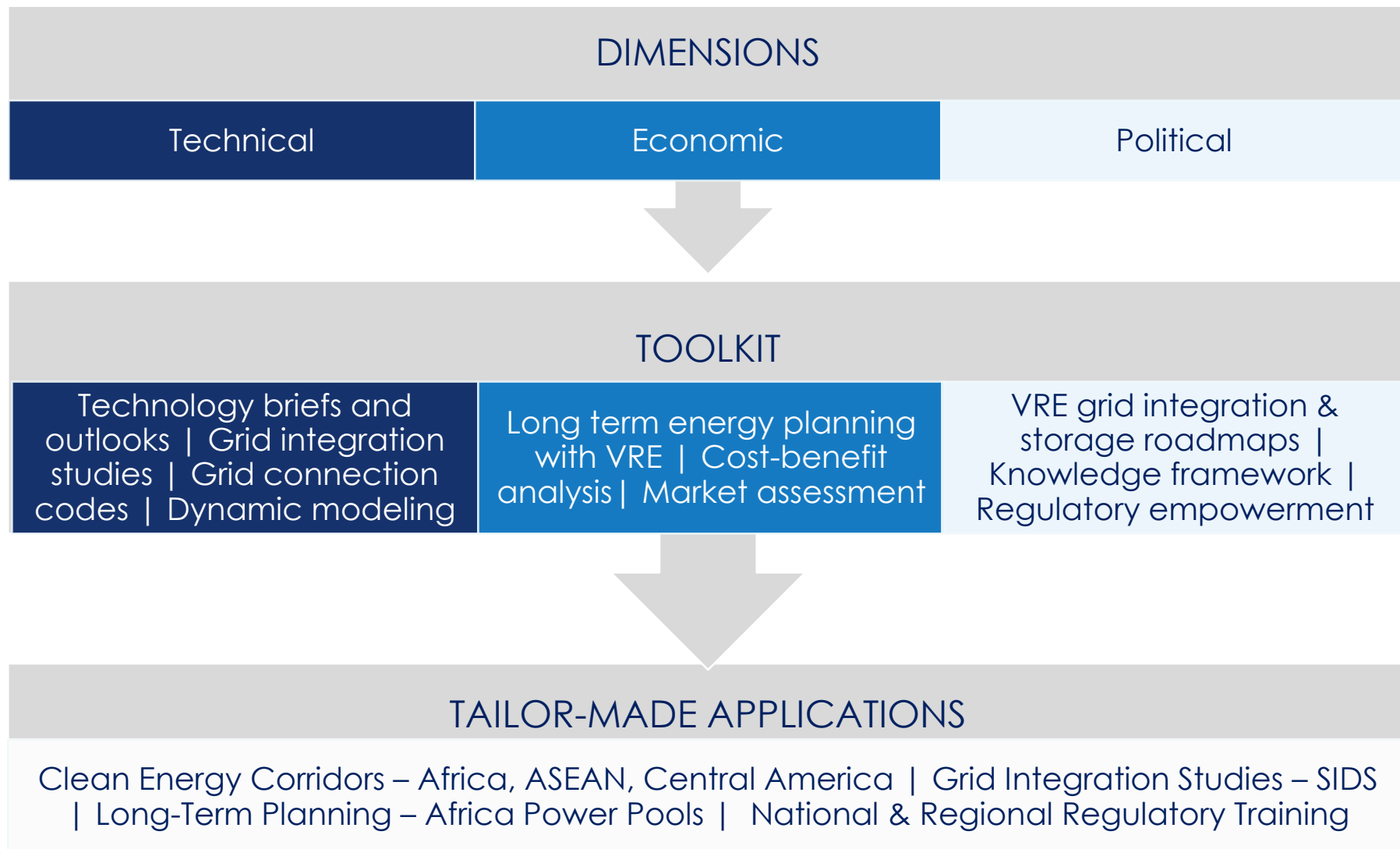
Guidelines

Methods

Model application

Technical information

Capacity building



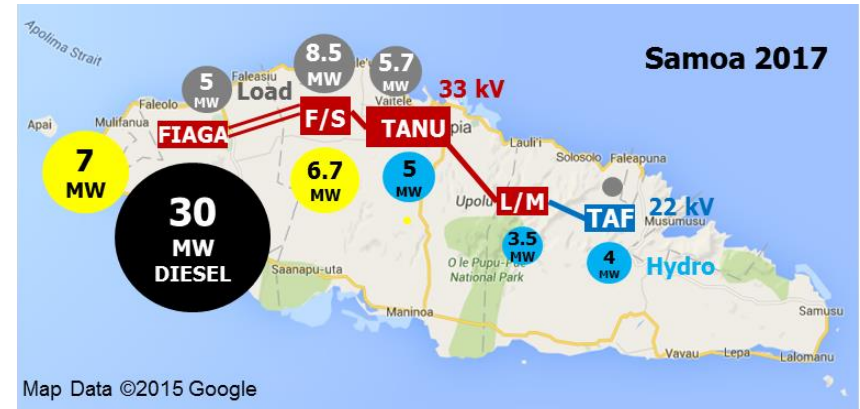
Moving towards systems with more VRE requires improvements in existing long-term planning models.

Identify best practices for long-term planning will address “how to” account for:

- Firm capacity
- Flexibility
- Stability
- Grid investments



AVRIL expert meeting in March 2015

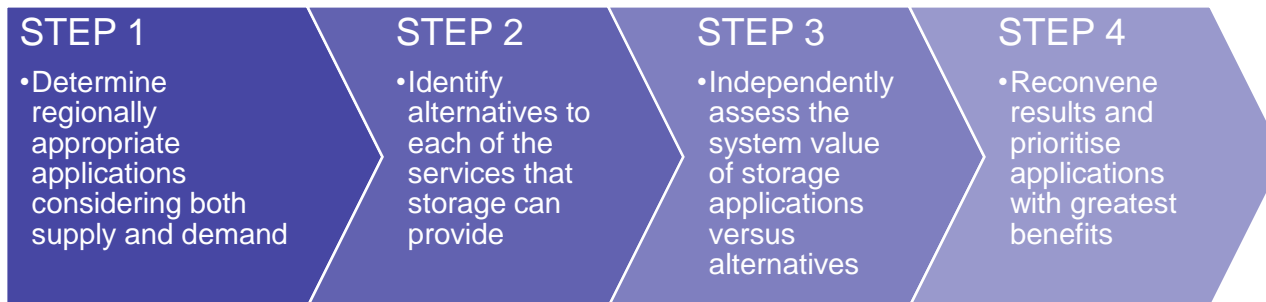


In an iterative process Grid Studies from IRENA include:

- Assessment of security and reliability of operation with VRE
- Identification and assessment of operation and expansion mitigation measures
- Estimation of RE generation shares

EXAMPLE: Evaluating the system value of energy storage in South Africa

METHODOLOGY



BENEFITS

- Address peak demand deficit: 5000 MW
- Reduce load curtailment: currently 10% of industrial electricity demand
- Load shedding reduction: 14-140 R/kWh
- Peak and off-peak rates: 64 – 28 R/kWh
- Transmission line deferral: 284k R/km
- Reduced electricity losses: 0.2 – 1.2 R/kWh

EXAMPLES OF BEST PRACTICES

Measures	Experience
Grid codes	Denmark , Japan, EC, Germany, Italy
Forecasting	Australia , Canada, Denmark, Italy
Performance reporting	Spain , Denmark, Sweden, Norway
Grid connection	Turkey , Italy, Hungary
Curtailement	Ireland , China, Germany, US
Demand side management	South Korea , China, Japan, US
Nodal pricing	New Zealand , Australia, Mexico, US
Subhourly scheduling	Germany , Australia, Denmark, Spain
Market integration	Gulf region , EC, Latin America
New tariff structures	Vanuatu , Grenada, Italy, Tonga
Data ownership rights	US



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