How to shape sustainable energy systems - why proactive national vRE planning matters

Experiences from Partner Countries

IRENA Innovation Week, Bonn 2016
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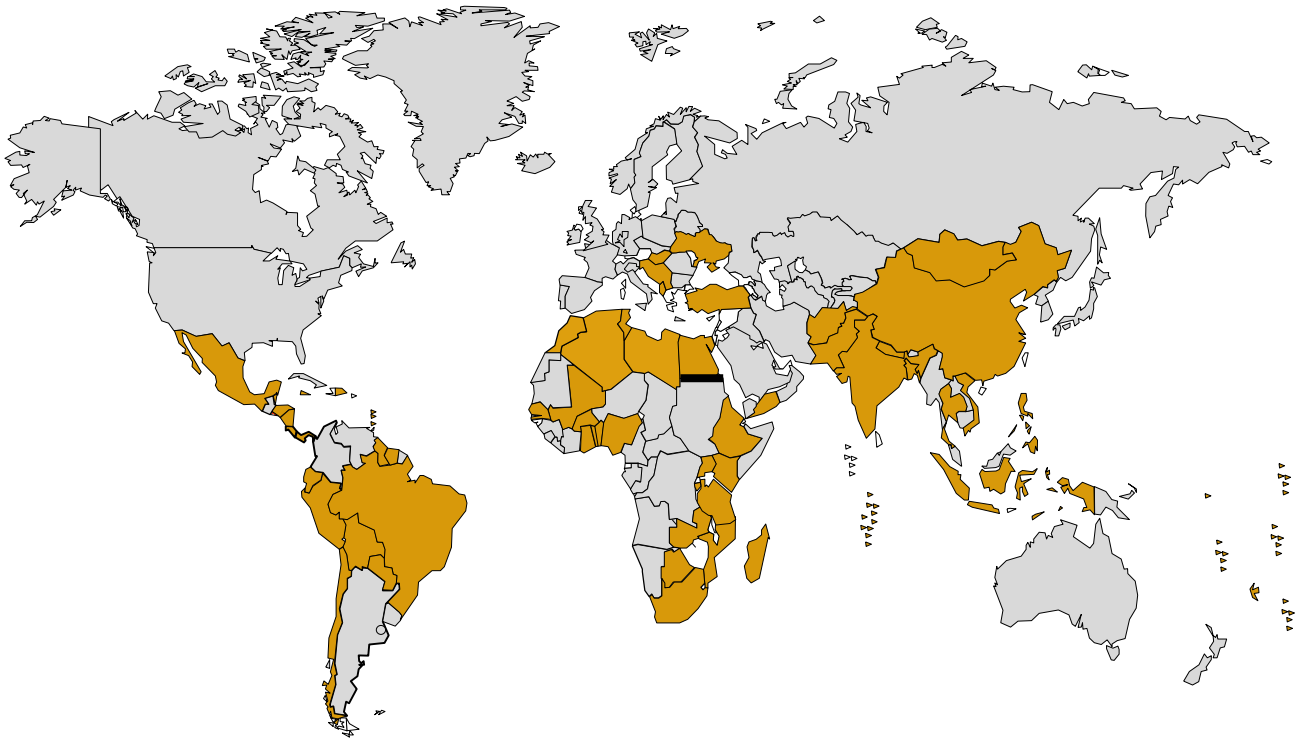
Sector Project ‚Technology Cooperation in the Energy Sector‘

GIZ Energy Projects Worldwide



About 130+ energy projects worldwide

- Africa: 30 %
- Asia: 27 %
- Europe: 12 %
- Latin America: 18 %
- MENA region: 6 %
- Trans-regional: 7 %

Current projects

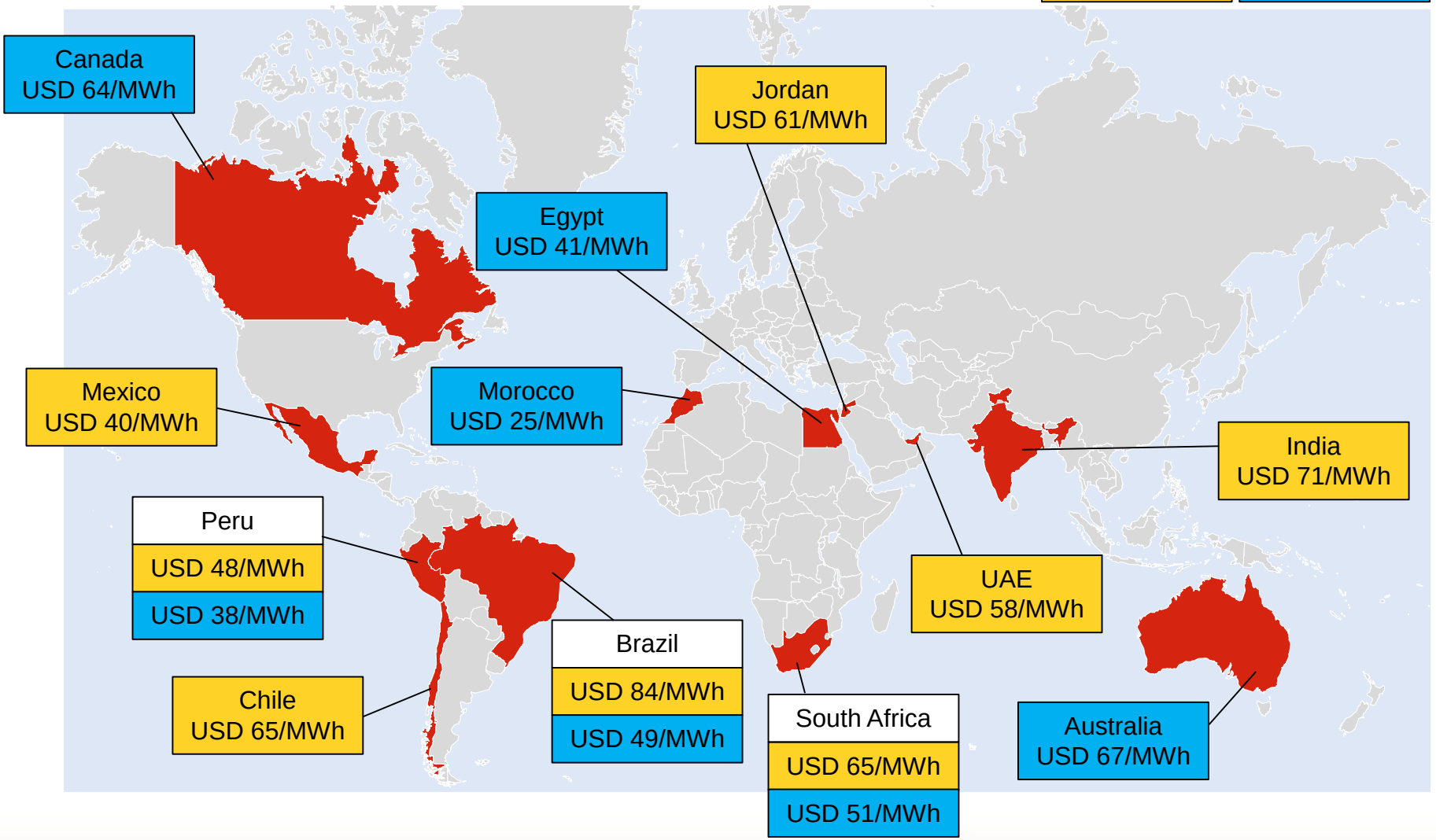
Characteristics of Power Systems
OECD vs. non-OECD

e.g. Germany	≠	Majority of giz partner countries
Stagnating demand	≠	Demand grows fast!
Highly meshed grid	≠	Weak grid and transmission system infrastructure and operation
Continuity of service	≠	Frequent blackouts and brownouts
Power exchange	≠	Different institutional set-ups
Ability to pay	≠	(Energy) poverty
Connect & forget	≠	„Where, when and how much“ power (GIZ2013), which technology?
Mediocre RE resources	≠	Excellent RE resources

Outlook - Why does vRE planning matter?

- **Global framework conditions for RE have changed** in recent years

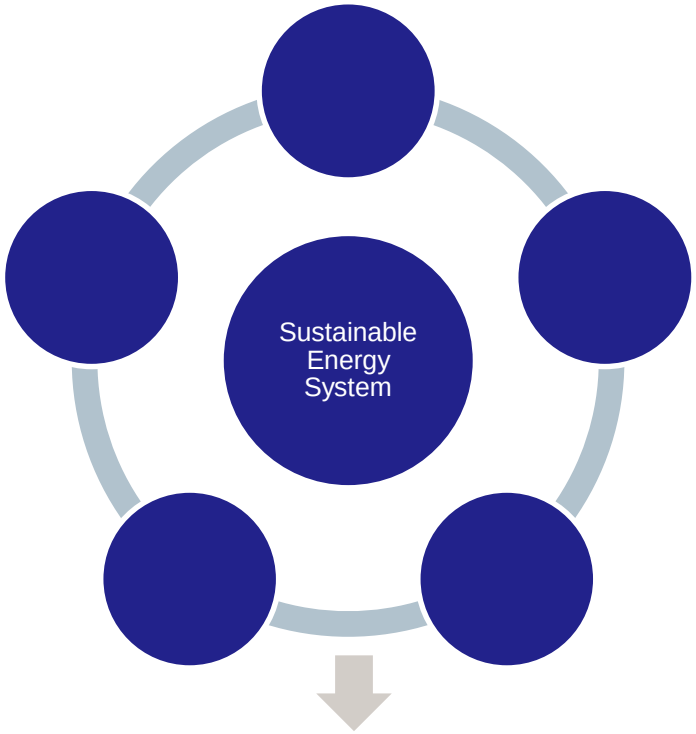
vRE auction results



Outlook - Why does vRE planning matter?

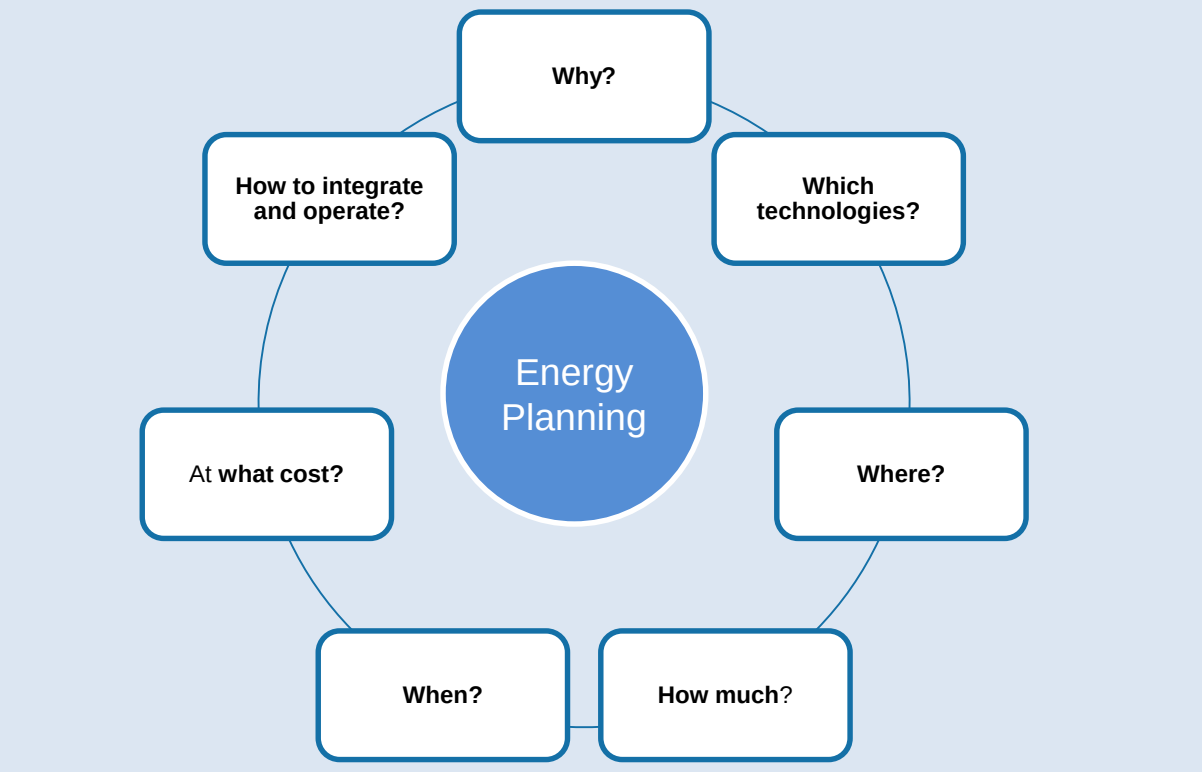
- **Global framework conditions for RE have changed** in recent years
- **Market transformation is disruptive** and causes structural changes
- Developing & emerging economies are **embarking on RE "take-off" phases**
- **Mainstream concepts and methods** used successfully in 1st and 2nd generation RE countries (GER, ES, US) **are not appropriate for next phase**
- **Value of RE to the system (not just cost)** needs to be put at the **center of the strategy**
- Countries targeting high shares of vRE require a sharp focus on:
  - (i) Country-specific boundary conditions (solutions cannot be simply copied from other markets)
  - (ii) Changing international market conditions for RE (PV Capex falling fast, wacc shifting, countries compete for investors)
  - (iii) Robust cost-benefit analysis for optimal, country specific RE pathways

The System Perspective



*Don't focus only on the **specific isolated costs and emissions** of the next technology or project per kWp or kWh,*
*but on the **total** **emissions and costs of the national power system***

Key Questions to be answered by vRE National Masterplans

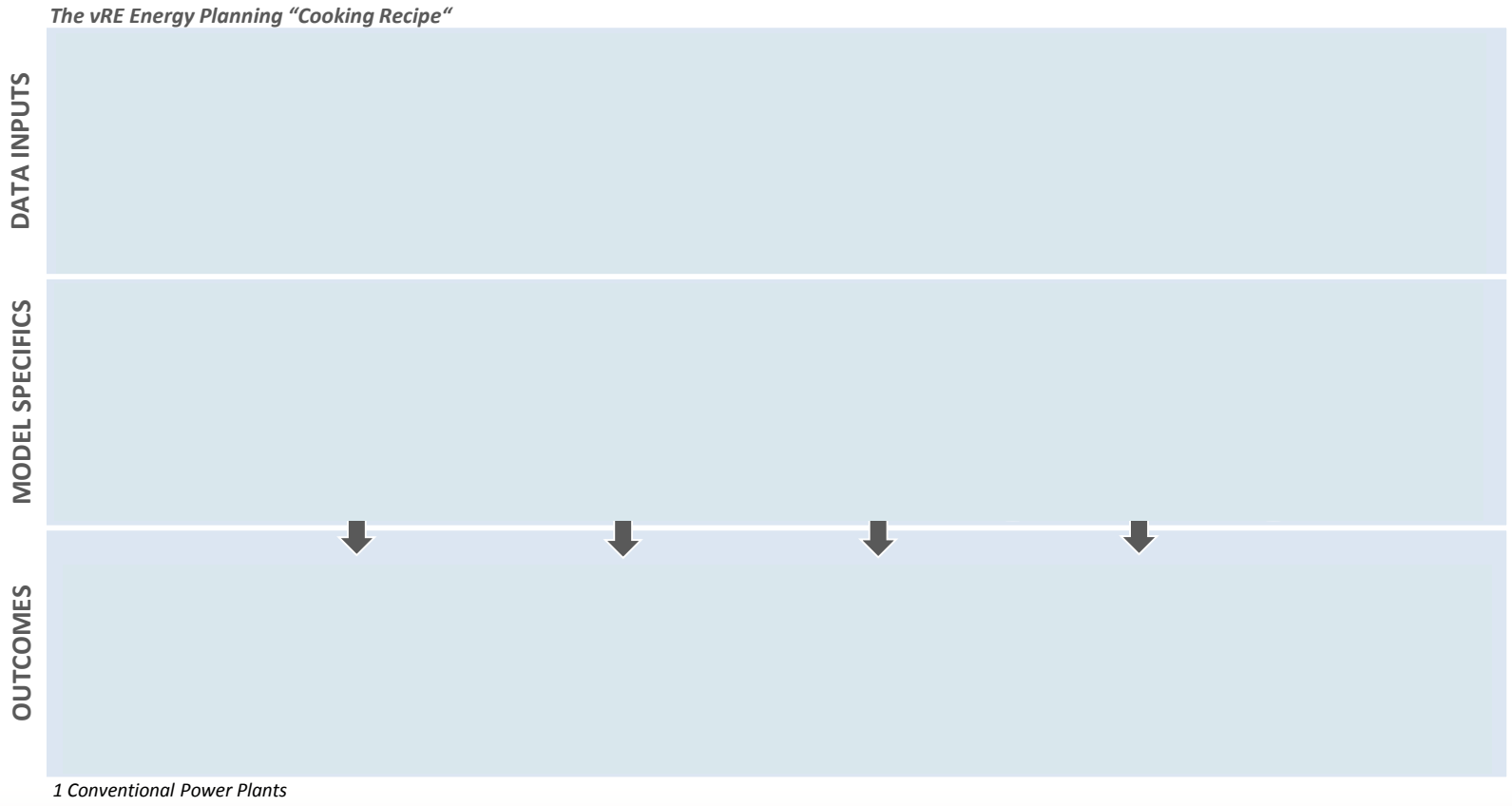


Based on giz & iiDevelopment „vRE Why, Where & How Much" – VRE Discussion Papers 2013+2016

Experiences from partner countries

- Extensive regional outreach and collaboration with GIZ partners (Ministries, Regulators, Utilities and other energy authorities) in
  - Argentina, Bolivia, Brazil, Chile, Ecuador, El Salvador, Mexico
  - Ghana, Kenya, Morocco
  - Pakistan, Philippines, Vietnam and others
- Several solid techno-economic modelling approaches successfully applied.
- Including capacity expansion pathways and system optimization (MILP dispatching routines, optimal vRE deployment over time and space, etc).
  - **However:** So far, only few modeling tools and approaches capable of solid modelling for handling optimal VRE expansion, intermittent generation and dynamic technical and economic aspects

A systematic approach to vRE modeling



Experiences from partner countries – cont‘d

- Initially (before modelling): **Discuss and establish clear & genuine vision for sector**, visualizing options and trade-offs in a palpable and transparent way (with decision support tools and a structurued process)
- **Set-up steering group with relevant partners** - sector specialists required
- **National (marco) economic view** and growing body of solid and accessible data needed for optimal (or at least incrementally improving) oversight
- **Review input data wisely** (generic databases not sufficient; e.g. real-life time series mandatory, allow for step-by-step incremental improvements by mixing methods over time)

Experiences from partner countries – cont‘d

- **Simplifications** of complex problems (e.g. unit-commitment) often **leads to inaccuracy** and false estimations, and then to flawed decisions. **Build national pathways step by step and frequently re-visit error margins & options.**
- The
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  energy pathways (under conditions changing over time).
- **Masterplans are helpful** – but **need to be updated far more frequently** and complemented by „quicker analysis“ for shorter planning horizons (2y - 5y - 10y - 15y) – **incremental planning**!
- **Building local modelling competences takes time** – ongoing capacity building essential to build grounds for assessments of models and results. Learning by doing!

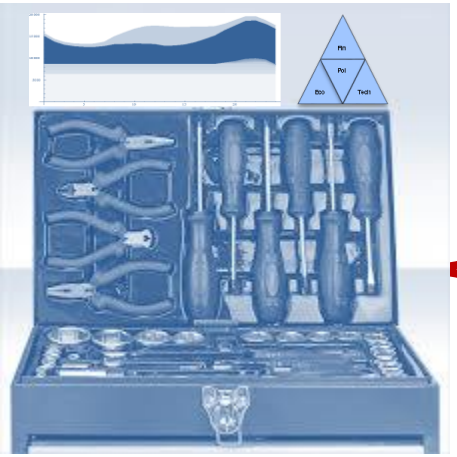
Successfully RE scale-up needs solid, evidence-based and country-specific policies!

National RE Governance for Optimal Scale-Up

- **Develop plausible and evidence-based roadmaps** to scale-up green investments
  - *How much RE should be implemented at which point in time – and where – to optimize national welfare?*
- **Formulate appropriate & transparent regulation**
  - *Clarify objectives, regulation, procedures, and responsibilities → lower WACC → lower LEC (VRE Finance Discussion Papers 2013+2016)*
- **Ensure long-term, legally enforcable contracts for investors**
  - *Best case: back decisions with government guarantees*

More proactive *public* guidance of *private* sector RE investments will be needed to avoid unnecessary welfare losses.

The vRE Toolbox: Real-Life Advice for Evidence-Based Energy Policies



1. **Technology**
   micro, meso
   - Pöller; Rüther; Siemens; 50Hz

2. **Economics**
   meso, macro
   - Teplitz/Reiche; DLR

3. **Finance**
   micro (spv)
   - Hille; Dersch

4. **Policy**
   - Heising et al

Next batch in Q2 2016!

https://energypedia.info/wiki/VRE_Discussion_Series

Thank you for your attention!

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