

Scaling up Clean Energy:

Early Actions to facilitate integration of Variable Renewable Energy into existing power systems

Experiences from Partner Countries

Deep Dive Workshop, ADB Clean Energy Forum 2016

Frank Seidel

Sector Project ,Technology Cooperation in the Energy Sector‘



Characteristics of Power Systems

OECD

versus

non-OECD

e.g. Germany, Spain, US



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



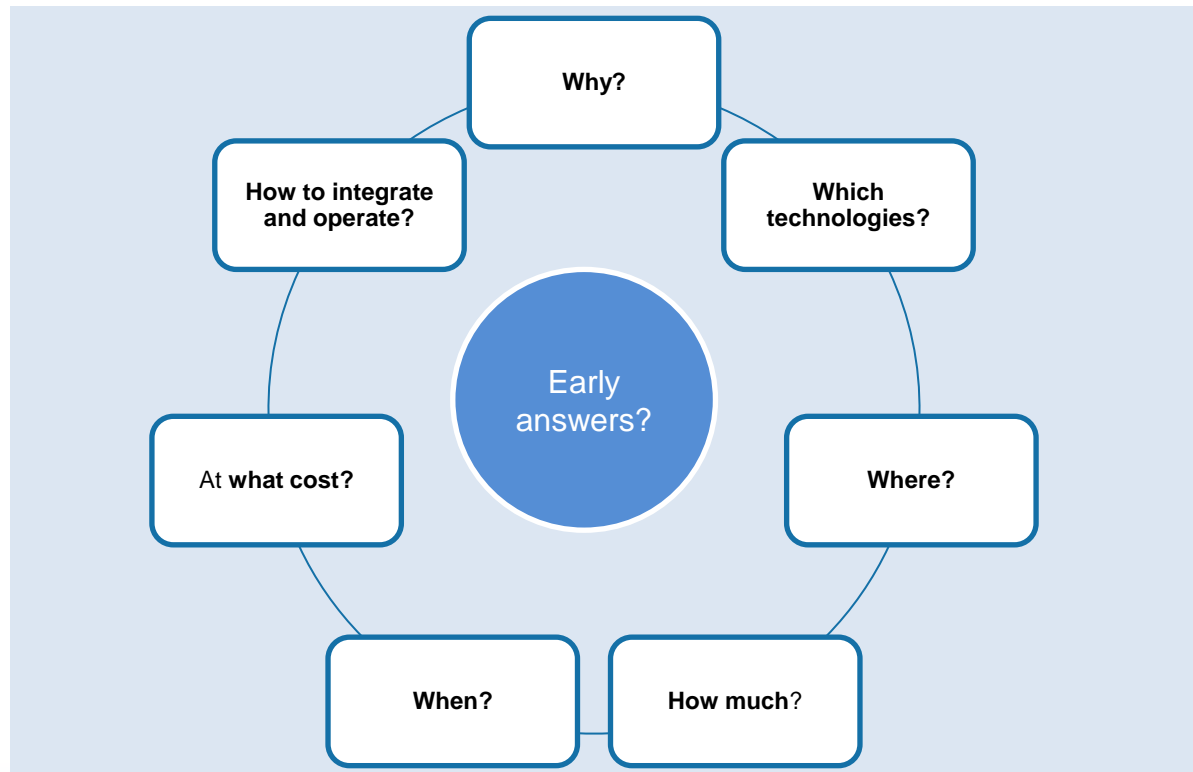
Problem - Why do early actions matter?

- Developing & emerging economies are **embarking on RE “take-off” phases**
- **Value of RE to the system (not just cost)** needs to be put at the **center of the strategy**
- **Challenges for new generation scale-up plans:**
 - **Existing boundary conditions difficult to change:** PPAs, pre-negotiated deals, import/export contracts.
 - Incumbent PPIs and other actors may fear to be „losers“ from change.
 - Recent good practice on how to „do VRE scale-up right“ not widely spread yet



National vRE questions....

...to be answered – not only in the long-run – to allow for optimized dispatch in non-OECD power systems.



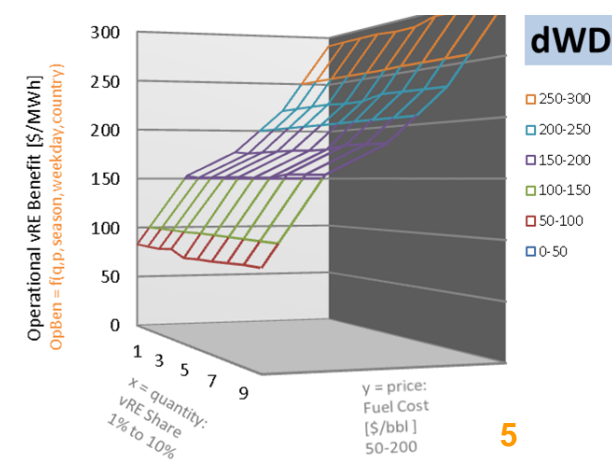
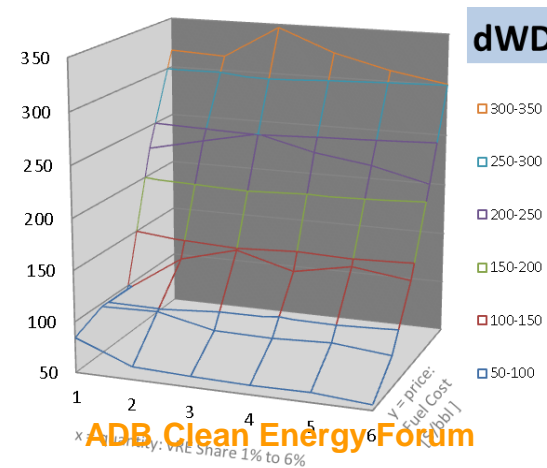
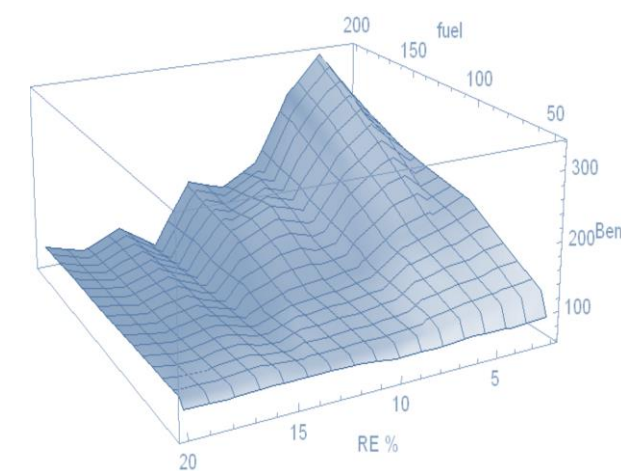
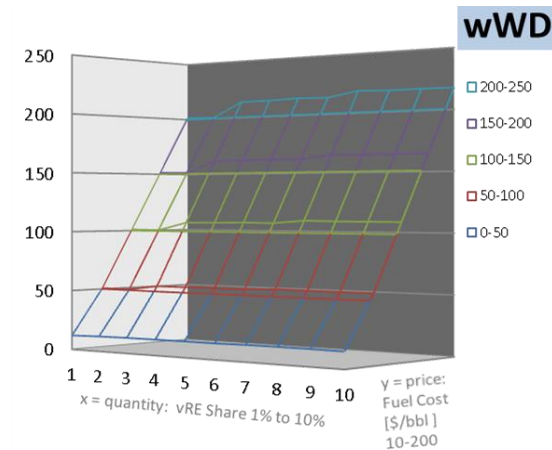
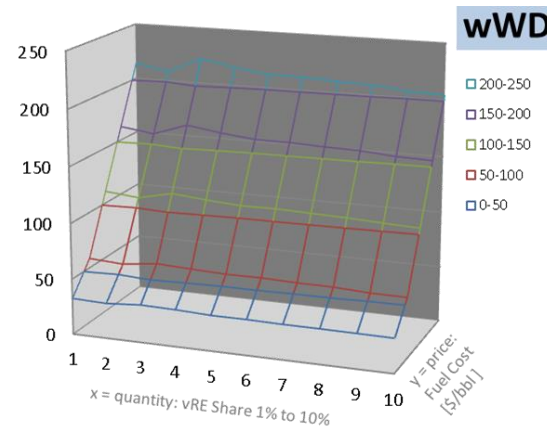
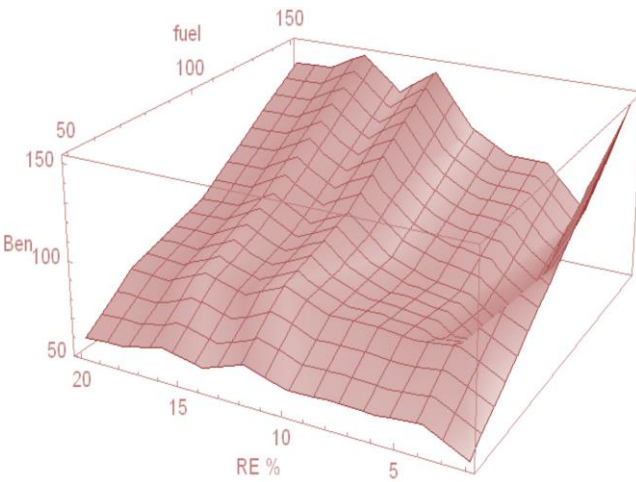
Based on „vRE Why, Where & How Much“ – VRE Discussion Papers 2013+2016

Case 1: Operational Benefits in >10 countries: When & How much?

Main Question: **HOW MUCH** VRE per country & Substation **BY WHEN?**

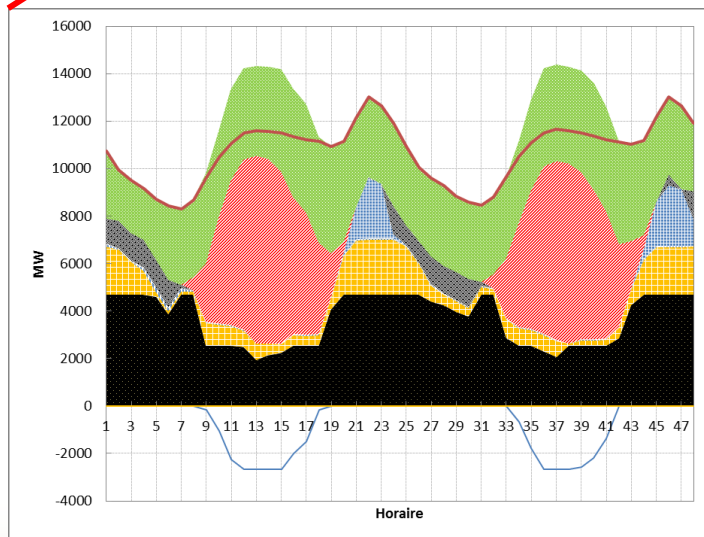
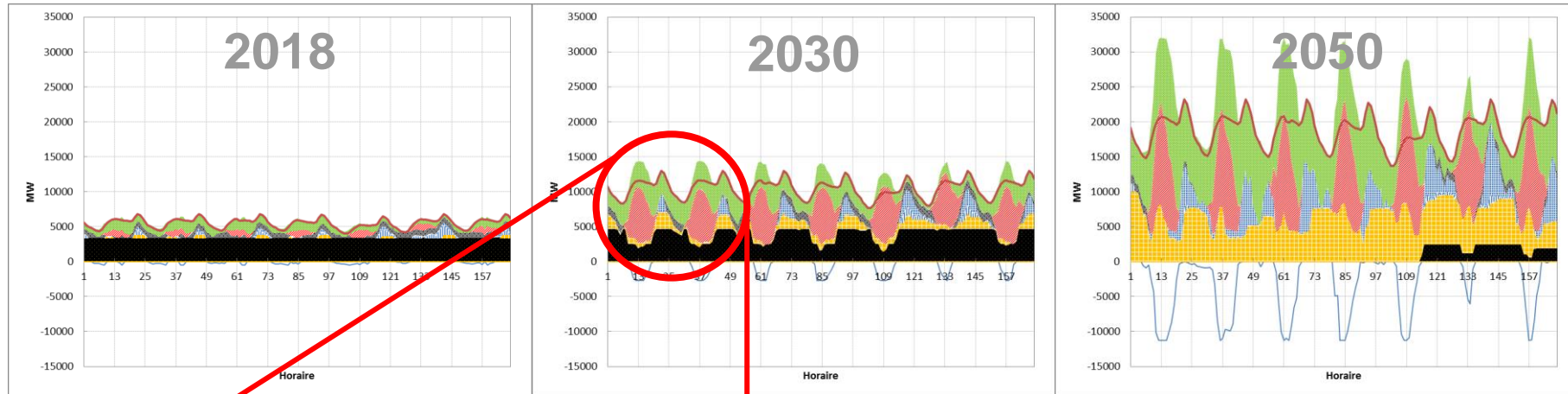
Answer : Optimal vRE Mix **varies** with country, space, time: **5-30 cents/kWh**

Operational Benefit **Scenario Surfaces** for 6 of 10 countries

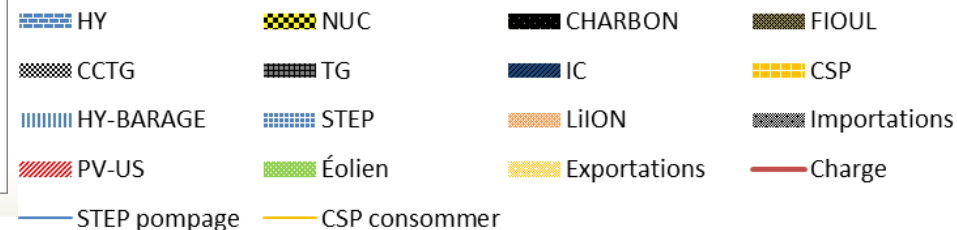


Case 2: Masterplan cum vRE: How to integrate?

Exemplary dispatch of a summer week in 2018, 2030, 2050

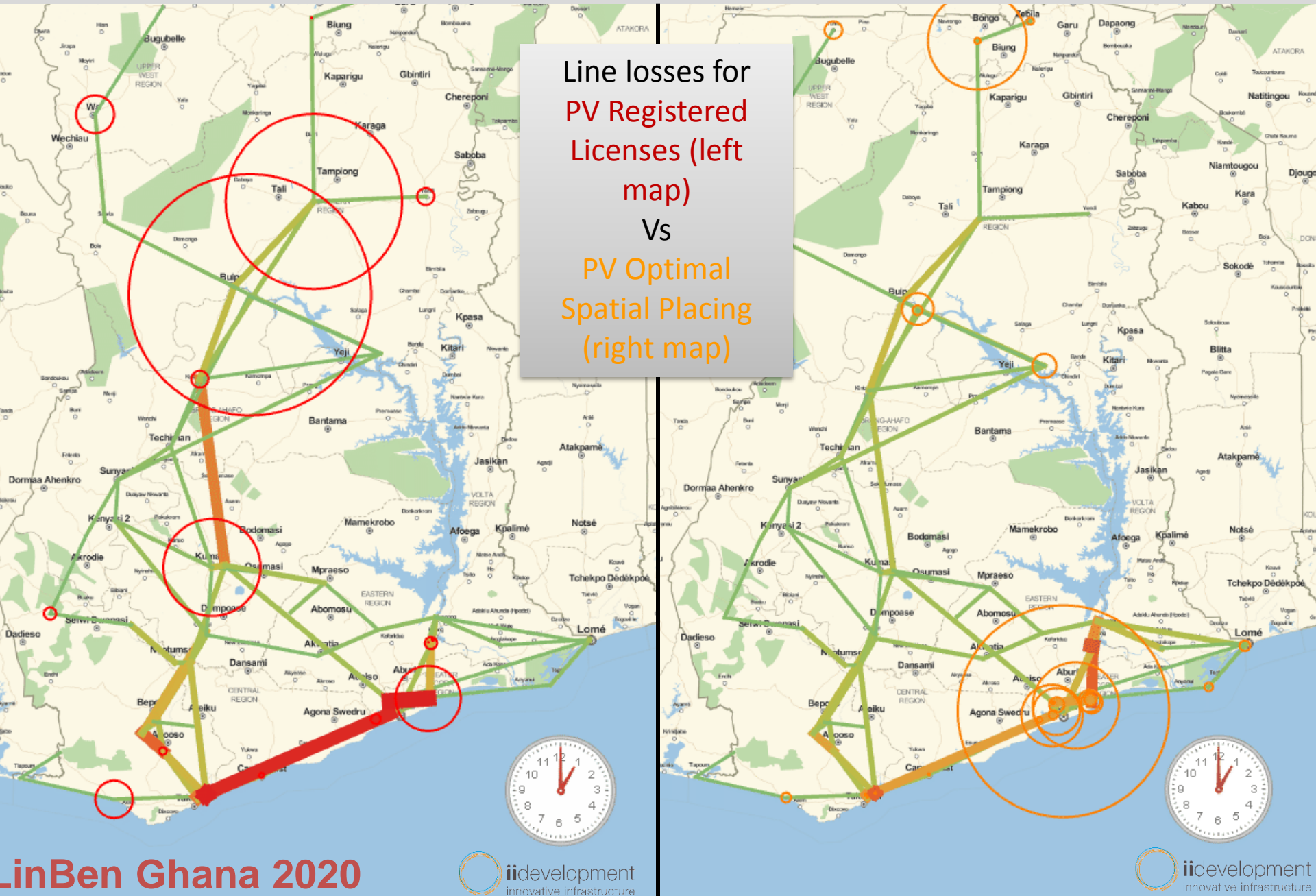


- “optimal dispatching solution” will require increased cycling from thermal generators
- Important to assess contractual arrangements



Based on research by DLR, ADB Clean Energy Forum

Case 3: Line losses & benefits for 75 substations: Where?





Experiences from partner countries

- Dispatching routines, balancing and planning of reserve capacities need more **(1) accuracy (2) flexibility, but also (3) more smart responses** ➔ regulations need to allow for grid management options
- Little consolidation regarding regional reserve sharing & balancing yet
- Fast changing boundary conditions (fuel price indices, PV CAPEX etc) call for **incremental actions and adoptions**
- Method mix allows to **start with early „no regret options“** while preparing more complex solutions (avoid lock-in)
- **Scale-up plans need frequent updates** and „quicker analysis“ (< few months) for shorter planning horizons (t) ➔ consent with dispatchers/planners needed to react quickly!
- More proactive foresight needed than re-active (panic) actions to **avoid unnecessary welfare losses and to allow for smooth vRE integration.**



Thank you for your attention!



Frank Seidel (frank.seidel@giz.de)

Advisor

Technology Cooperation in the Energy Sector