RENAC's international trainings on the integration of variable renewable energy in power supply systems

Topics and lessons learnt

Albrecht Tiedemann
Renewables Academy AG (RENAC), Berlin

renac
renewables academy

Agenda

1. About RENAC

2. Seminar examples:
   power system integration of variable renewable energy

3. Lessons learnt

AGENDA

About RENAC

- RENAC is a Berlin-based training specialist for renewable energy and energy efficiency

- Until now we operate with participants from over 145 countries

- We offer renewable energy (RE) and energy efficiency (EE):

  - Trainings

  - Academic education

- We support third parties to build up own capacities for EE and RE training (installation of Training Centre / lab, Train-the-Trainer)

- RENAC is independent

2   Seminar examples

- **This training suits those who**

  - Plan and operate grid, work in energy service companies or for energy traders

  - Are responsible for grid integration at regulators, energy ministries, advisors or consultancies.

- **Content**

  - Wind and photovoltaics feed-in time series

  - Residual load approach for system planning and operation

  - Wind and PV short-term power forecasts for system operation

  - Loss of load probability and reliable generation from wind/PV

  - Positive and negative balancing power calculation

  - Grid integration strategy implementation

- **Duration:** 3 – 5 days

- **This training suits those who**

  - Are engineers (prerequisite)

  - Are responsible for technical aspects at grid operators, grid system planners or energy service companies.

- **Content**

  - Photovoltaic (PV) and wind power inverter technology

  - Wind turbine generators types

  - Grid code for low, middle and high voltage grids

  - Frequency control

  - Reactive power and voltage control strategies

  - Monitoring and control of grid-connected generation units.

- **Duration**: 3 - 5 days

Online training: Certified ReGrid® Manager (CRGM) - Grid integration of wind and PV
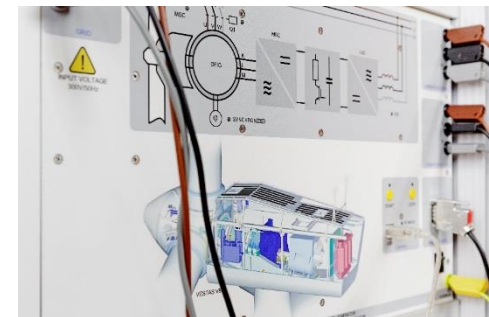
- **This training suits those who**

  - are engineers who wish to become experts planning and operation of electricity systems with large amounts of wind and solar power

  - international consultants

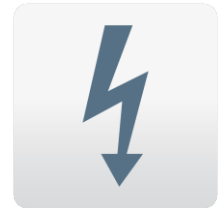 - technical leads in transmission and distribution companies

- **Content**

  - Scenario development

  - Short term prediction

  - Generation expansion planning
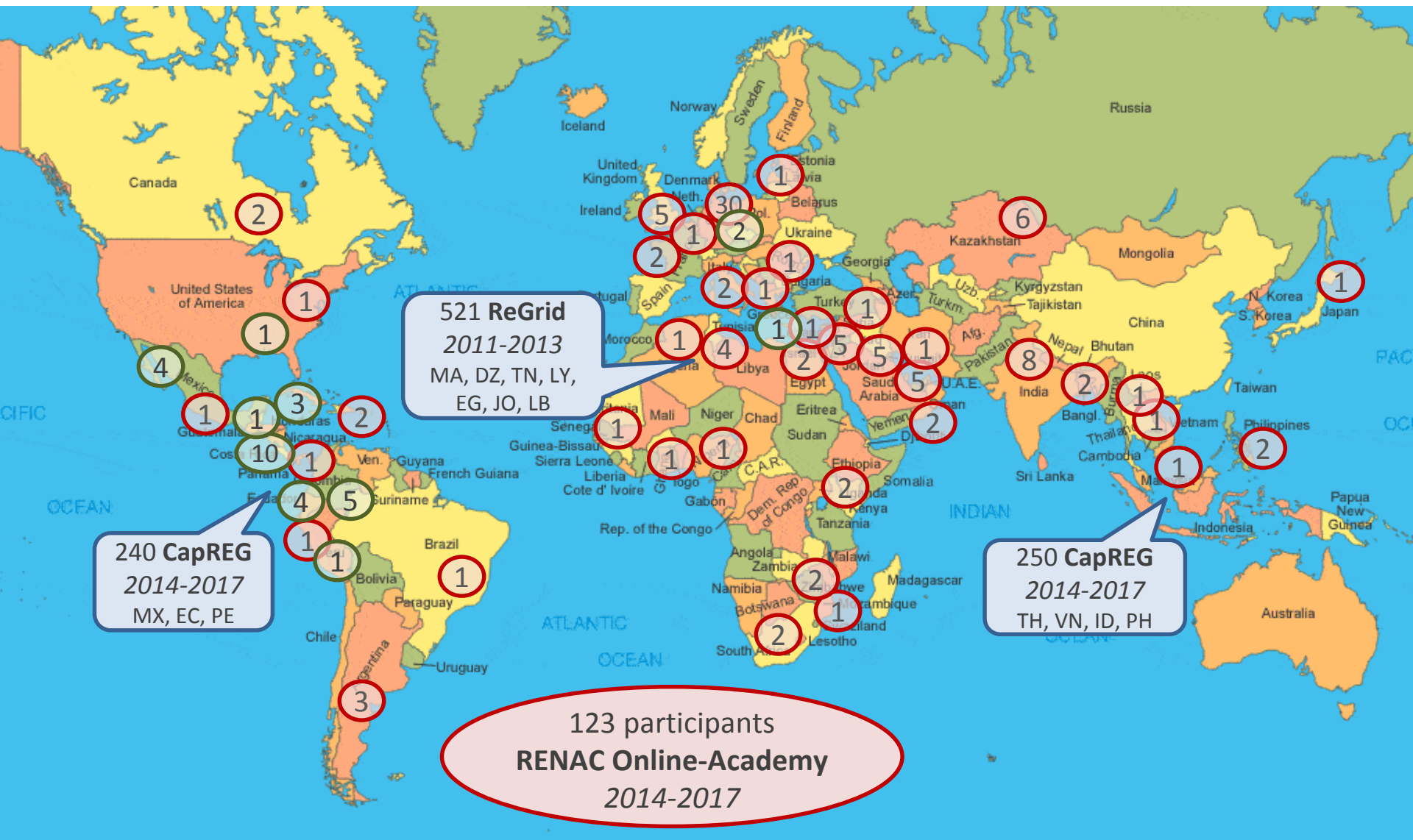
  - Balancing power

- Generator concepts

- Grid codes

- Generation expansion planning

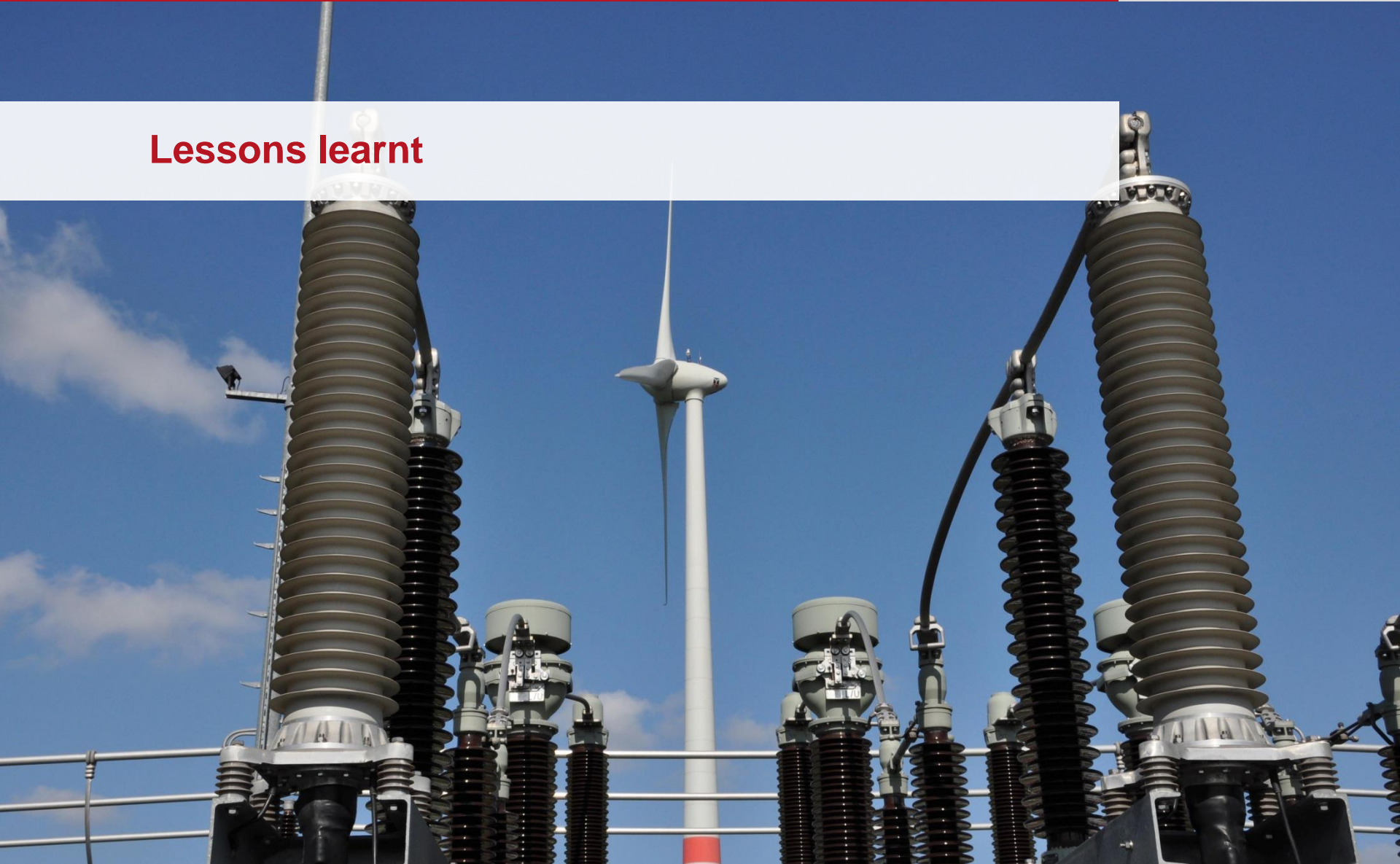- Grid and system integration studies

- Energy storage

- **Course details**

  - Duration: 6 months

  - Study time: ca. 250 hours

  - Exam

521 **ReGrid**
2011-2013
MA, DZ, TN, LY,
EG, JO, LB

240 **CapREG**
2014-2017
MX, EC, PE

250 **CapREG**
2014-2017
TH, VN, ID, PH

123 participants
RENAC Online-Academy
2014-2017

Lessons learnt

Challenges are not comparable with Germany. Solutions must be adapted to countries.

In many cases:

- Central power plant dispatch and single buyer approach are applied instead of market driven solutions.

- Importance of wind and PV is very small compared to conventional thermal generation.

- Power consumption and peak load are rising. Peak load often occurs after sunset. → Power supply systems require enormous investments in <u>reliable</u> power generation.

- Power purchase agreements for new conventional thermal generation rarely consider future flexibility needs.

- Need for long term power system flexibility strategies is underestimated.

- Grid operators have inadequate knowledge how to control frequency and voltage with wind and PV farms.

Thank you!

Albrecht Tiedemann

Renewables Academy (RENAC)

Schönhauser Allee 10-11
D-10119 Berlin
Tel: +49 30 52 689 58-71
Fax: +49 30 52 689 58-99
tiedemann@renac.de

renac
renewables academy

www.renac.de