

# **IRENA Renewable Energy Islands Initiative**

**Dolf Gielen  
Director**

**IRENA Innovation and Technology Centre  
Malta, 6 September 2012**

## Why consider renewable energy for islands?

- Islands power cost are high and diesel must be imported
- Oil products are comparatively expensive; economies of scale for gas and coal plant are often lacking
- Often good RE resources: wind, geothermal, solar, hydro etc
  - RE is in many cases cheaper than diesel
  - No exposure to international fossil fuel market shocks
- Self-sufficiency
  - Access to modern forms of energy is still increasing on some islands
- Many islands with ambitious RE objectives
- RE is not only about energy, its part of sustainable island development
  - Need for jobs and economic development
  - Decentralized RE creates interesting opportunities (involvement of communities, women, etc)
  - Always in combination with energy efficiency

---

## Typical island transition barriers

### *Barriers are island and technology/sector specific*

- Resource potential data are often not of bankable quality
- Ambitious targets often lack a roadmap how to get there
- No policy framework in place that encourages investment in RE development
- Many island states are heavily indebted
  - Lack of capital access – high opportunity cost
  - Sovereign guarantees are not possible
- Land ownership problems
- Lacking economies of scale and high transaction/travel cost
  - Small market size is not attractive for leading project developers and banks
- Lacking capacity/continuity of expertise to develop and operate plant
- Lack of business case and dependence on foreign aid to sustain the power sector
- Utility is often a monopoly/state owned entity with no incentive to take risk

---

## IRENA Renewable Energy Islands Initiative iREi

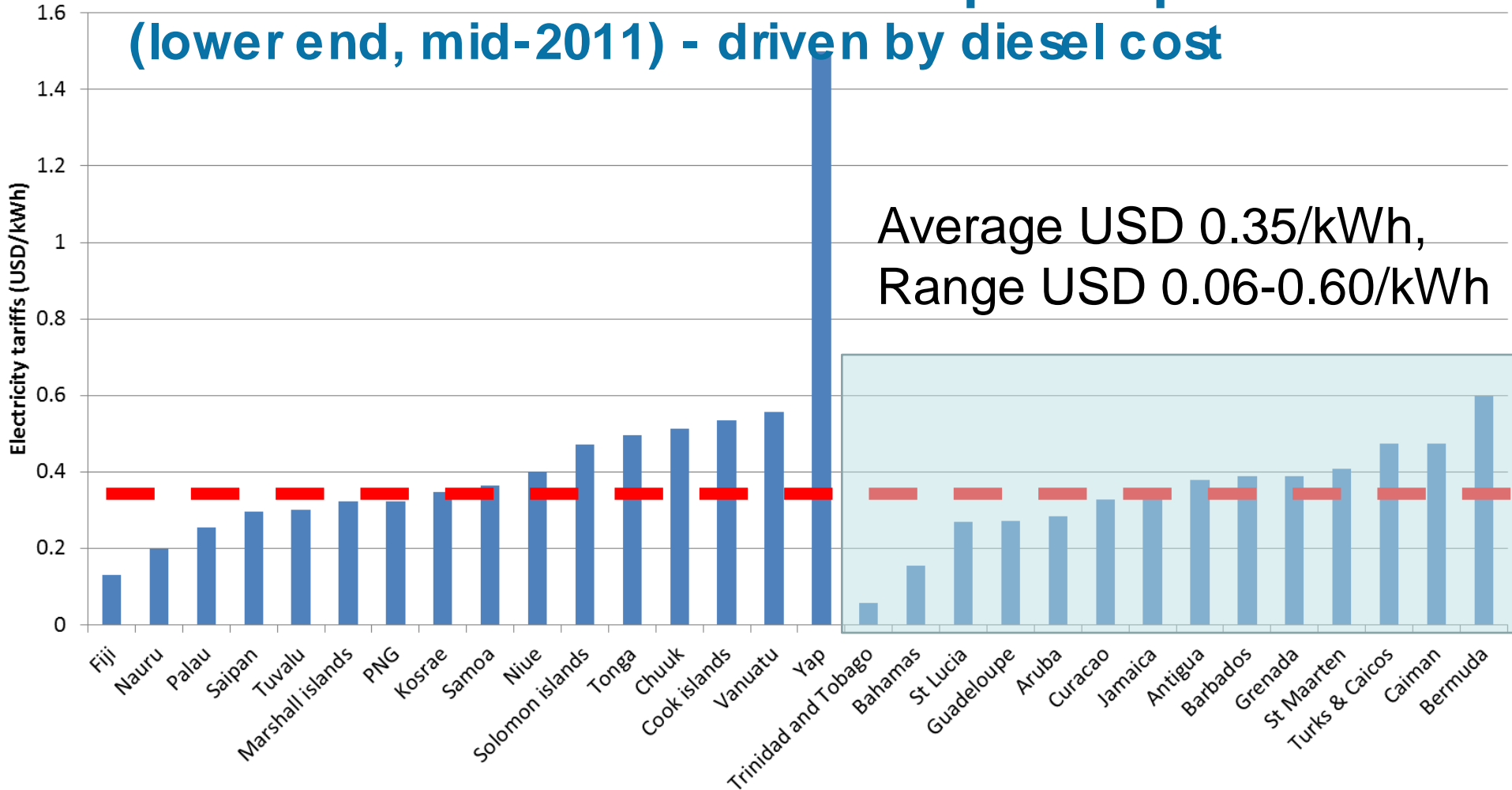
- Many Small Islands Developing States (SIDS) are IRENA members
  - Many other member countries have island territories
- Active implementation of IRENA activities for the Pacific region:
  - Power system stability assessment , PPAs and IPPs
  - One-stop-shop for RE technology information (eg OWC assessment)
  - Assess renewable energy solutions for the transportation sector
  - Land use, energy, sanitation and water nexus – optimal strategies
  - RE resource assessment
  - Renewables readiness assessment – Kiribati scheduled
  - Roadmaps: Nauru, Tonga and regional roadmaps
  - Capacity development for operation and maintenance
- Caribbean focus 2013: identify synergies among regions
  - RRA Grenada ongoing

# POWER SECTOR

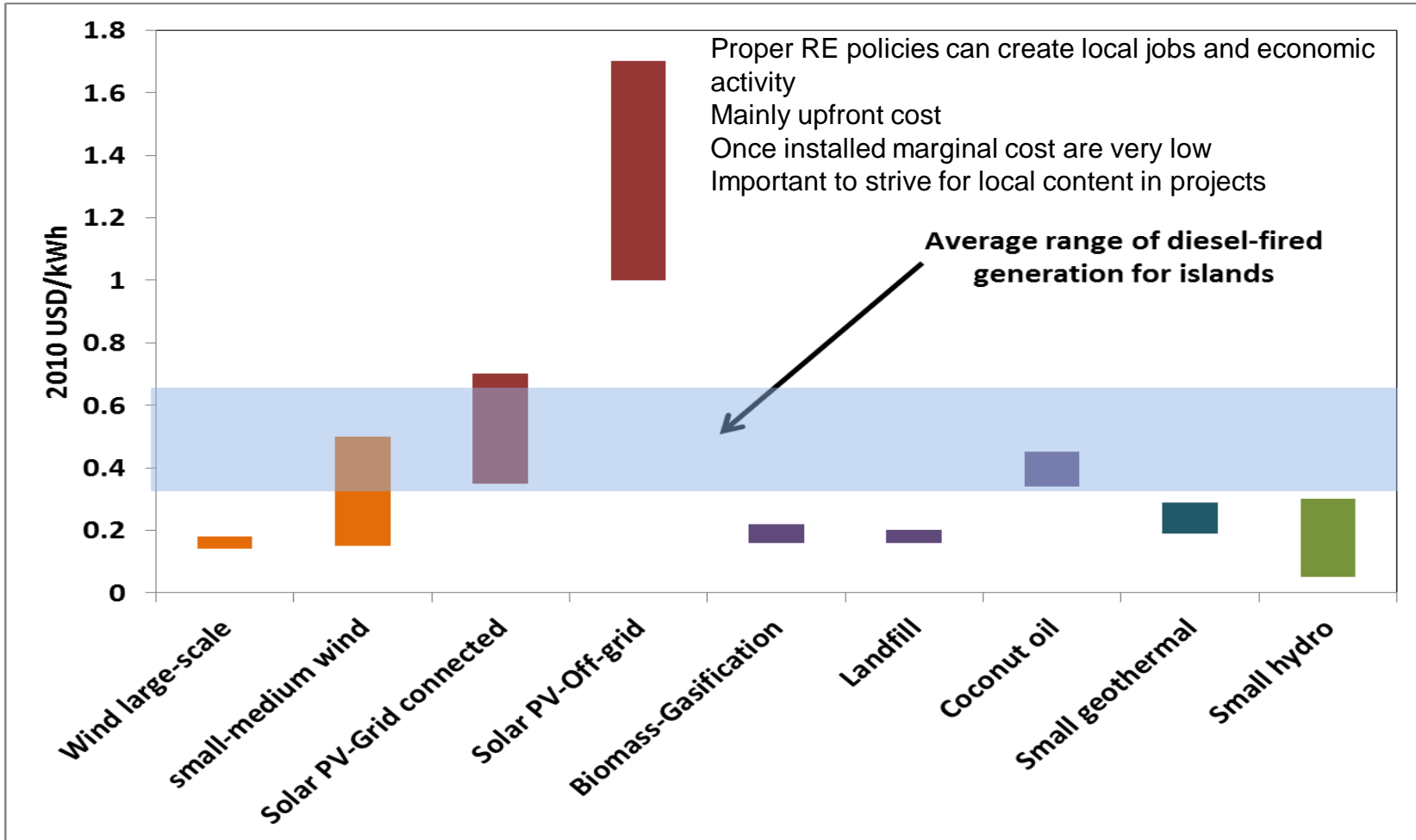
## Current situation island power sector

- Caribbean CARICOM 4.34 GW (3.16 GW excl. Trinidad & Tobago)
- Pacific PICs 1.38 GW (0.33 GW excl. PNG)
- Mediterranean ?
- Some islands have completely transitioned or are transitioning soon
  - Iceland (geothermal, hydro); Fiji (hydro, biomass, wind), Tokelau (solar, batteries); Aruba (wind); Cap Verde (wind, PV); Tonga (PV, wind, wave); Graciosa (wind, PV, batteries); El Hierro (wind, pumped hydro); other islands
  - Easier for larger islands (hydropower) and volcanic islands (pumped hydro, geothermal)
  - Coral islands have usually fewer „baseload“ opportunities
- Cost for RE solutions are decreasing
- More robust power system solutions are emerging

## Similar Caribbean and Pacific power prices (lower end, mid-2011) - driven by diesel cost

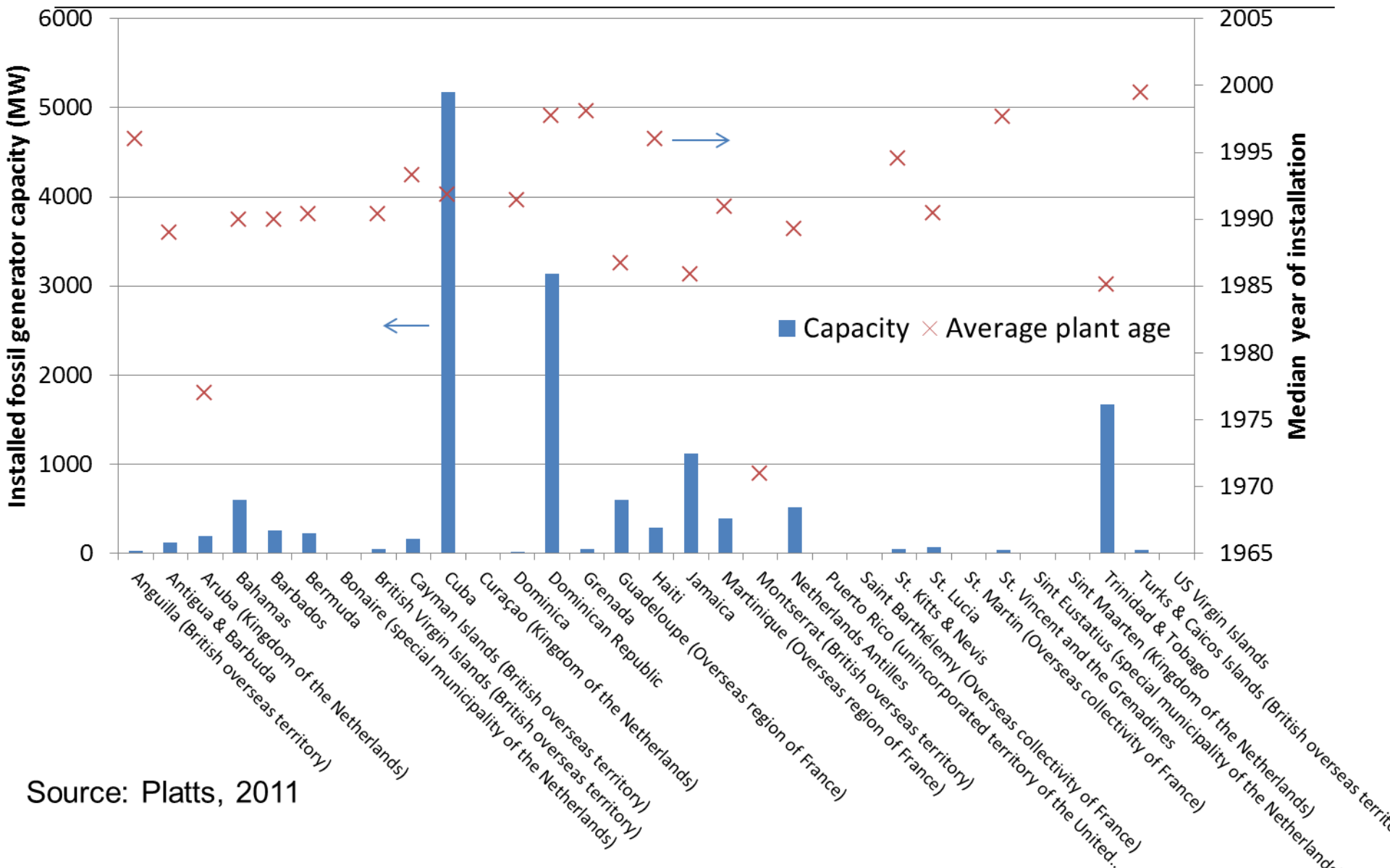


# Pacific levelized cost of RE power generation



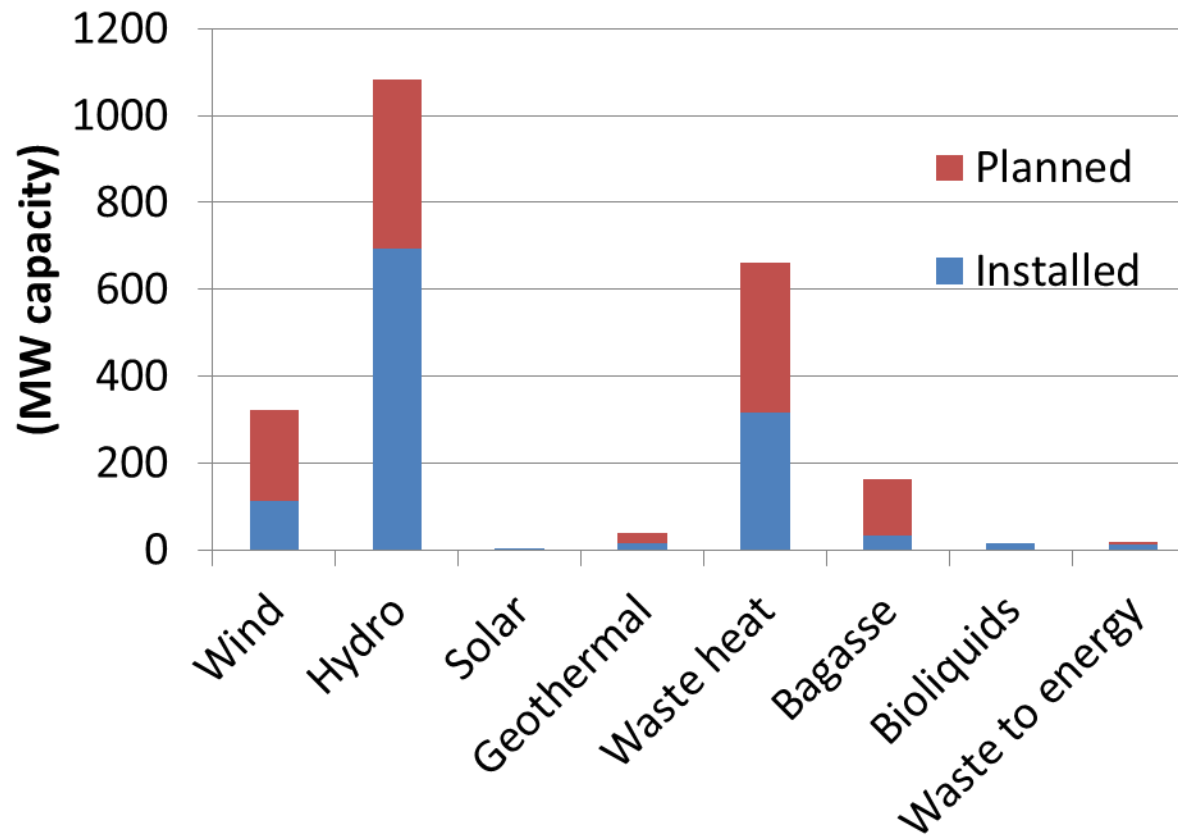


# Ageing Caribbean power generation systems



Source: Platts, 2011

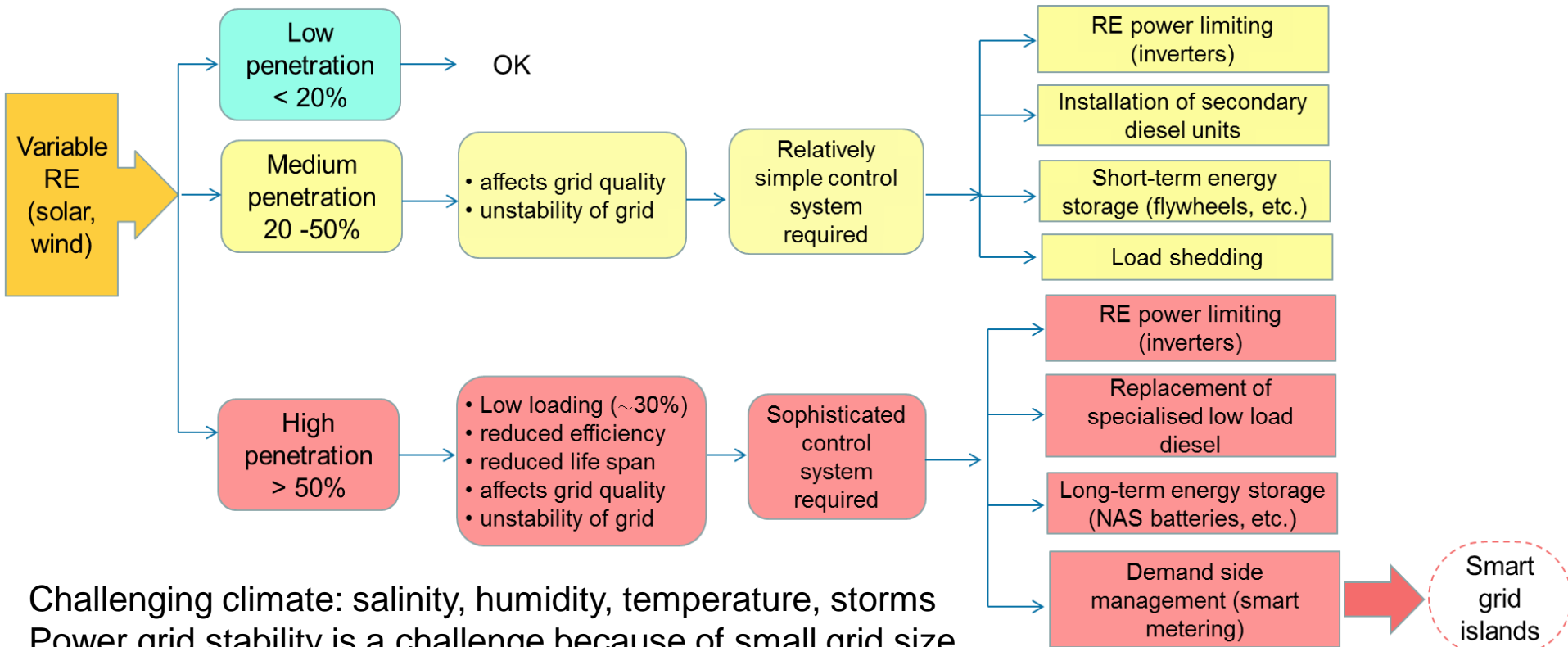
# Caribbean Installed and planned RE power capacities, 2010



Source: Platts, 2011

# Strategies depending on the level of RE integration

Technical and economic challenges rise as share of variable RE rises  
A 100% transition is technically possible but the economic viability varies



Challenging climate: salinity, humidity, temperature, storms  
Power grid stability is a challenge because of small grid size  
Reliability of power generation

# **END USE SECTORS THE OTHER HALF OF OIL USE**

## Transportation sector

- **Ongoing IRENA assessment of markets and technology opportunities**
- **Biofuels are supply constrained; other options in the demonstration stage**
- **Road vehicles**
  - Sugar cane ethanol
  - Coconut oil and other natural oil
  - Carbon free energy carriers (EVs, hydrogen)
  - Electric bicycles and tricycles ?
- **Shipping**
  - Different solutions for different types of vessels
  - Biofuels
  - Wind aided vessels (sails, kite systems, turbines)
  - Solar aided vessels (short distances, ferries, refrigeration of fish and agricultural products)
  - Total transition unlikely in the short term but emerging fleet demonstration vessels

## Buildings sector and industry

- **Electricity use (air conditioning, lighting, appliances, cooking)**
- **Cooking (biogas, ethanol etc.)**
- **Tourism industry**
  - Hot water – solar water heaters
  - Cooling – seawater cooling systems
  - Replace imported materials and goods – more local content based on renewables
  - *Proposal for an IRENA roadmap on RE in island tourist resorts*
- **Industry**
  - Few energy intensive industries
  - Opportunities in agriculture and fish processing (low temperature heat, refrigeration, electricity for operations during the day)
  - Desalination poses interesting RE opportunities
  - Renewable power often competitive for mining companies
  - Waste-to-energy/life cycle thinking



**Thank you !**

[www.irena.org](http://www.irena.org)

