

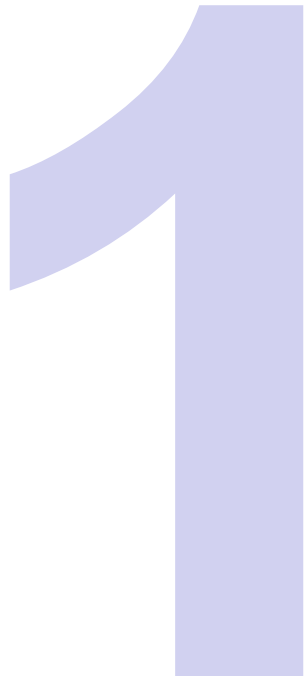
# IRENA's electricity storage roadmap

Masaomi Koyama  
Senior Programme Officer  
International Renewable Energy Agency

IRENA workshop, 7 November 2014

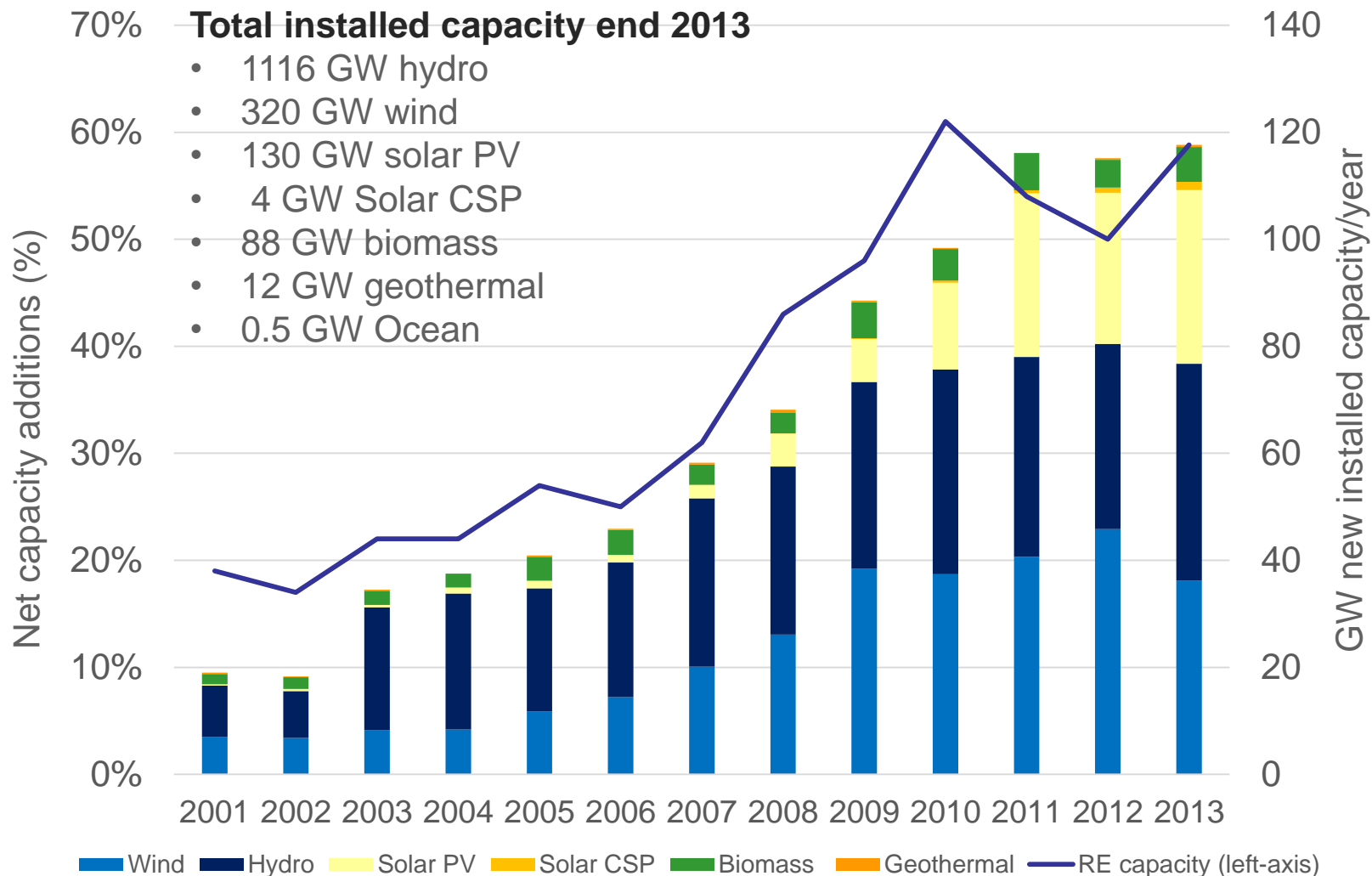




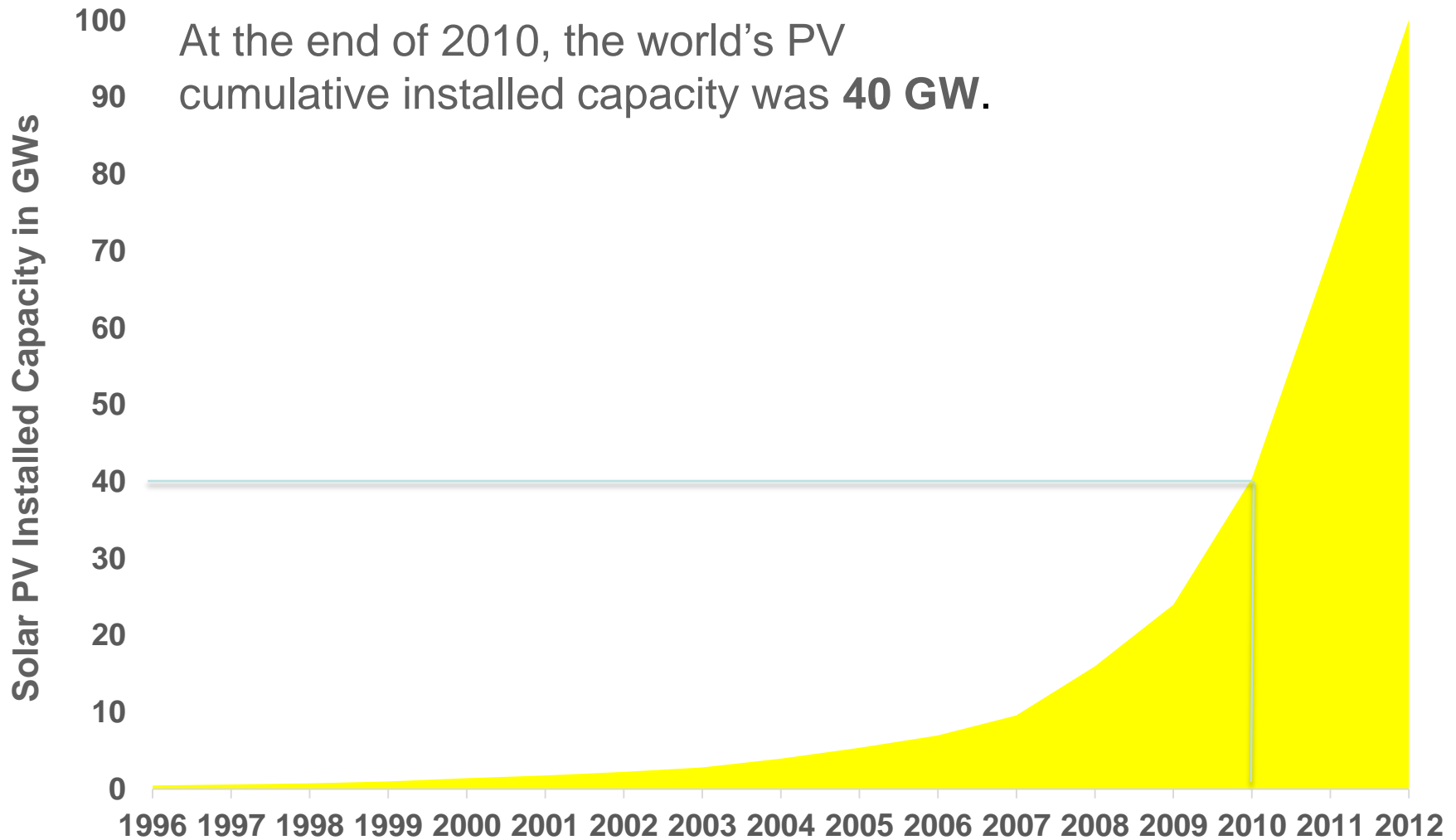


# **THE POWER SECTOR AT A CROSSROAD**

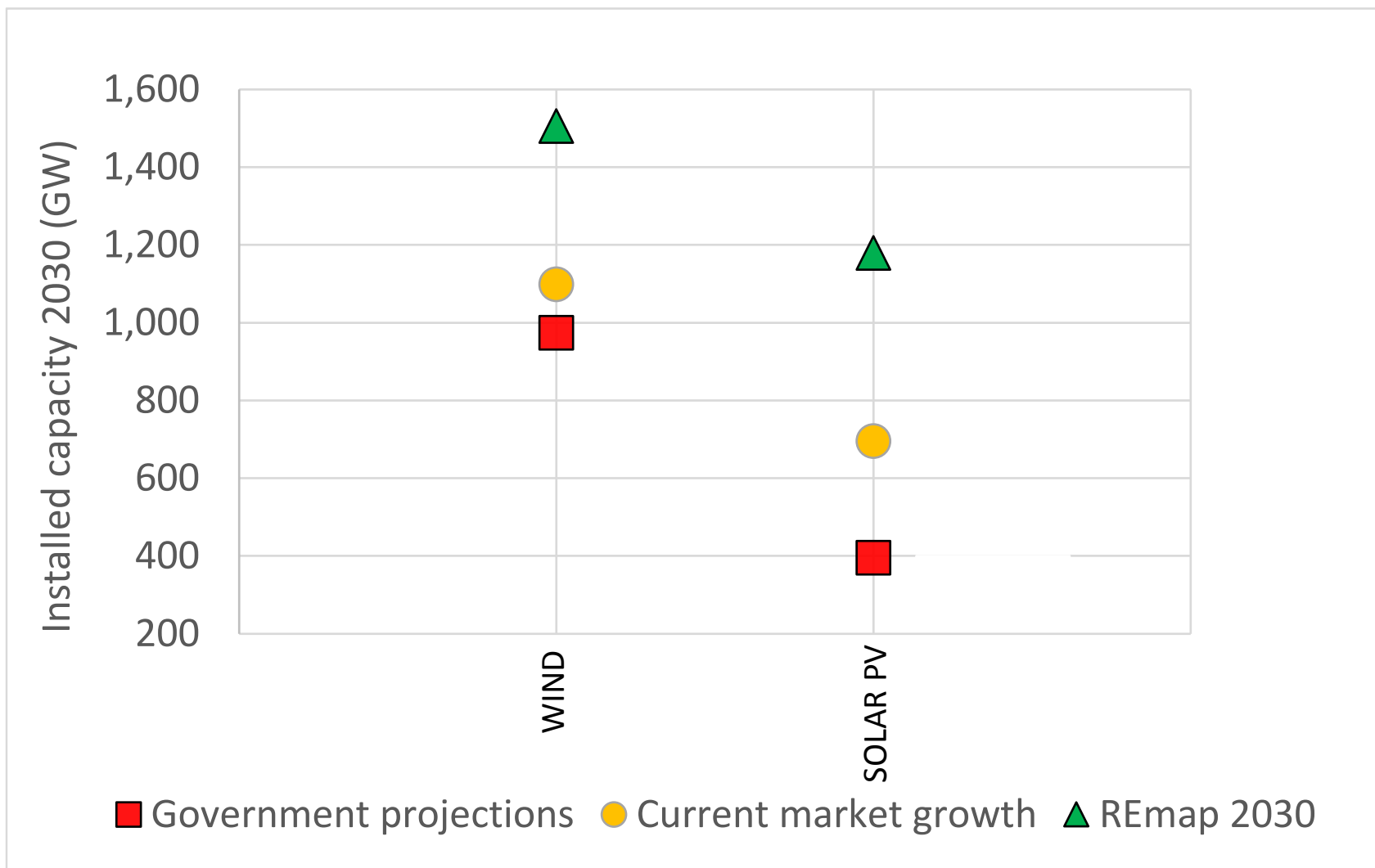
# About half of the new electricity generation capacity worldwide is based on renewable energy



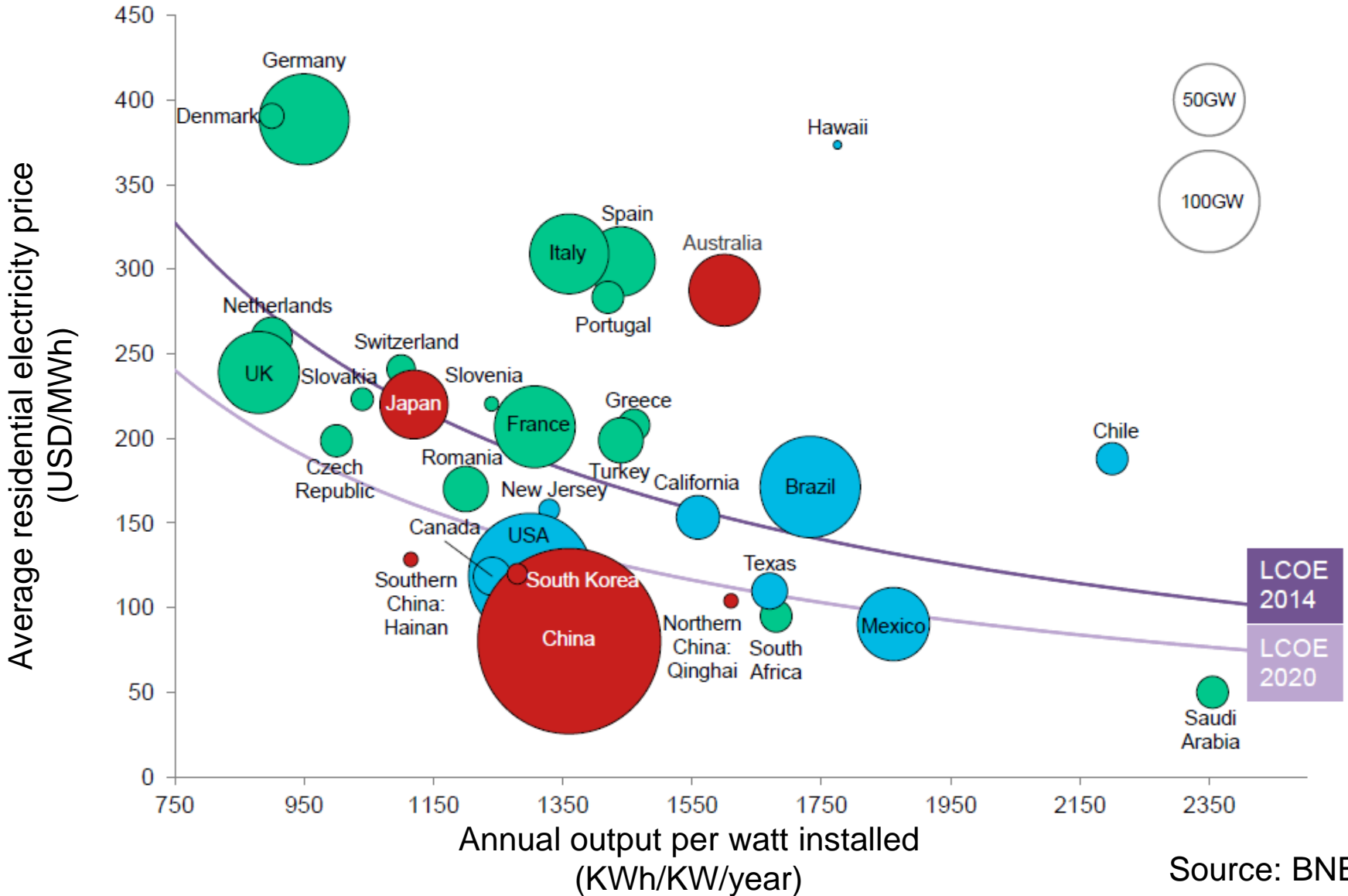
# Solar in 2010

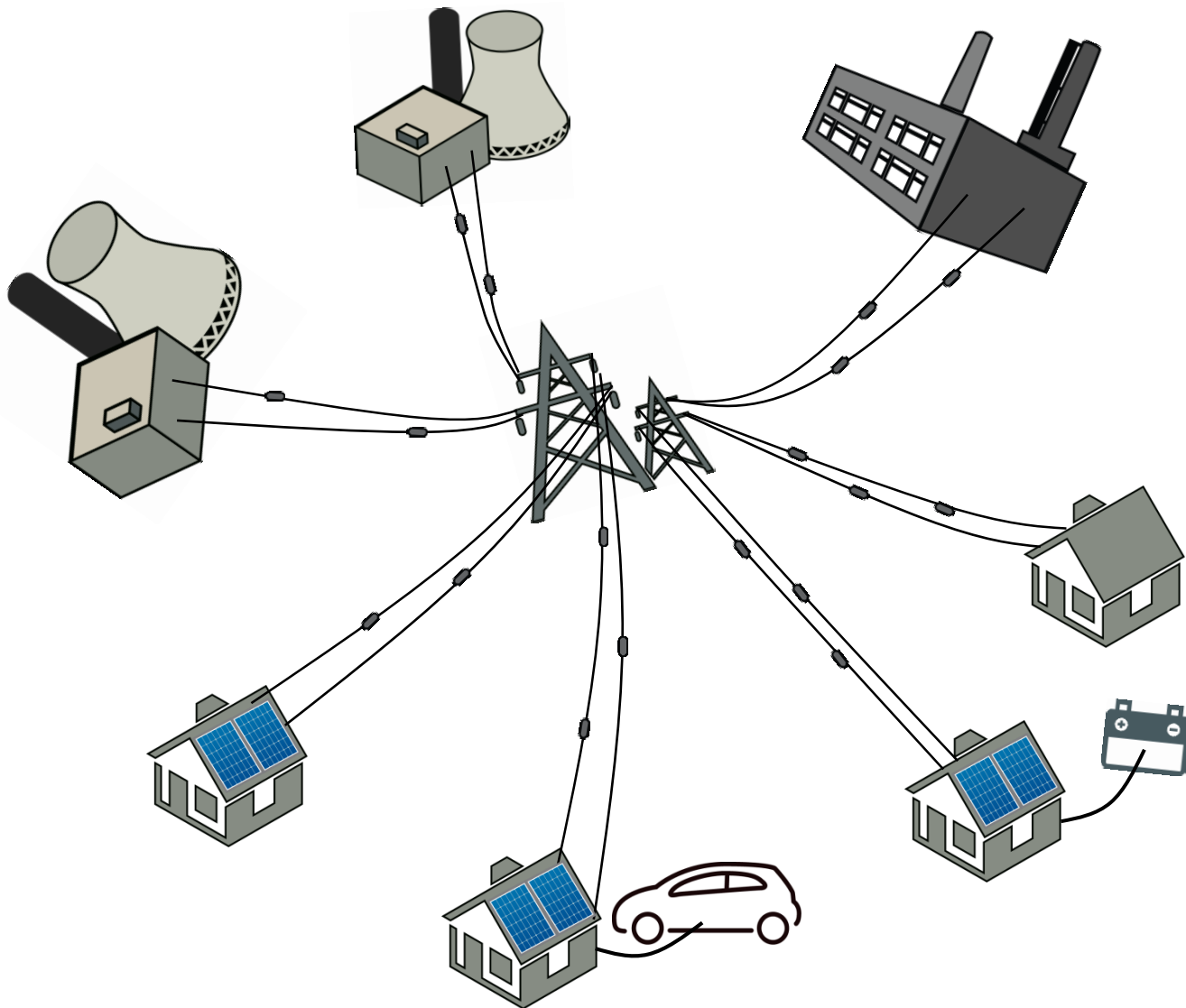


# Governments underestimate growth of renewables



# Solar in the residential sector





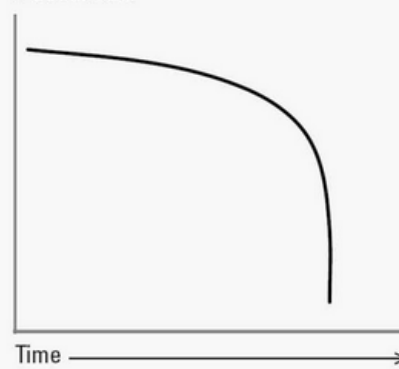




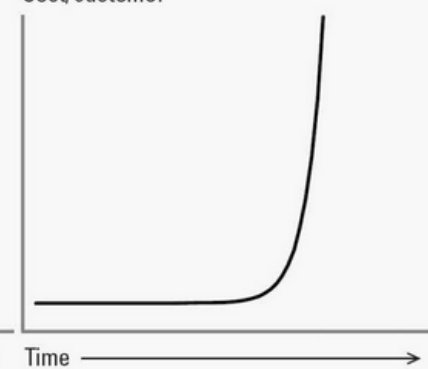
## NEGATIVE NETWORK EFFECTS »

(SCHEMATIC OVERVIEW)

# Customers



Cost/customer



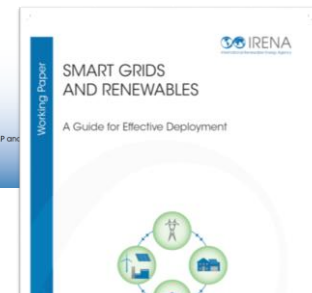
source: Michael Rogol, PHOTON Consulting, LLC.  
NOTE: All data are rough estimates

**KEY TAKE AWAY »** Negative network effects: On left, an exponentially decreasing number of customers or units in a network with a fixed cost leads to, on right, an exponentially increasing fixed cost per customer or per unit.

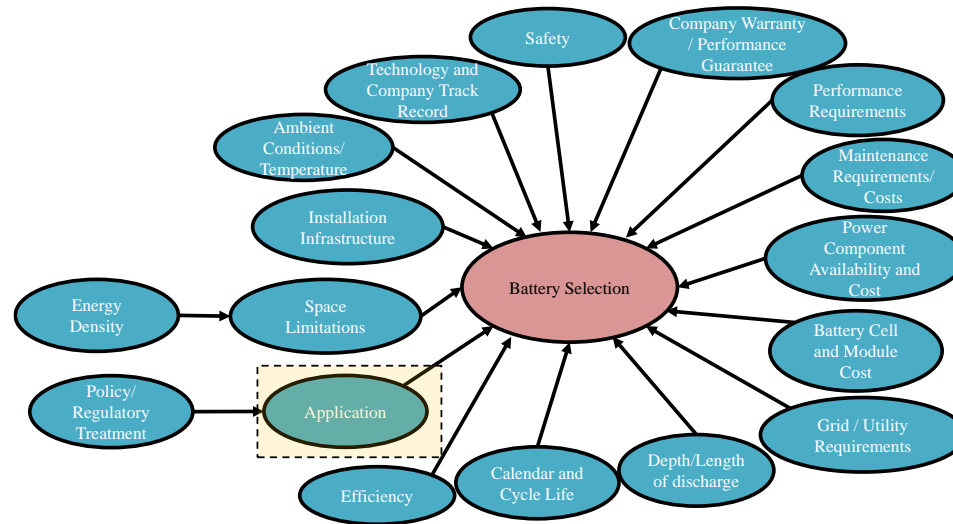
and the impacts on traditional energy markets. The core message is that negative network effects appear to be on a course to destroy the economics and operations of our energy infrastructure within 1,000 days, particularly in the world's wealthy zip codes. In some places, it is plausible that this may occur within 1 year. This is not a


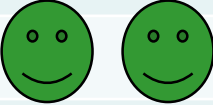


# 2 IRENA & STORAGE

1. Technology briefs on thermal and electricity storage
2. Smart grids and renewables
3. Storage for Islands: Guide for Decision Makers
4. Grid stability methodology for renewables on islands
5. Battery Storage for Renewables: Market Status and Technology Outlook (NEW!)



- 12 case studies with data on technical/economic specifications



Application	Outlook
Islands and Off-grid Applications	
Household Solar PV	
RE Smoothing and Supply Shift	
Fast Regulation	

## 2<sup>nd</sup> International Off-grid Renewable Energy Conference and Exhibition (IOREC)

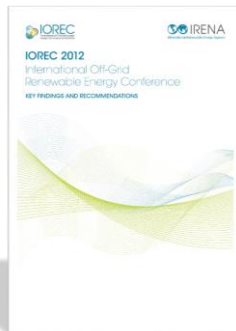
**16-17 June 2014, Manila, Philippines**

A biannual event on scaling up rural electrification through off-grid RE (mini-grids and stand-alone). The event is co-organised by IRENA, Asian Development Bank and Alliance for Rural Electrification.

The conference marks the beginning of the **Asia Clean Energy Forum 2014**.

### IOREC 2012

- 350+ participants from more than 80 countries
- Representatives from 30 Rural Electrification Agencies and Ministries in charge of RE
- Speakers from 23 Countries



### Objectives

- Global platform to share experiences, lessons learned and best practices
- Discuss key barriers for stand-alone and mini-grid RE system deployment
- Connect stakeholders across the off-grid RE value chain

### Topics to be covered

- Policy frameworks for off-grid RE scale-up
- Financing and business models for off-grid RE
- **Technology innovation, including storage**

For more information, visit: [www.iorec.org](http://www.iorec.org)

# Grid stability studies for islands transitioning to renewable power

- Some islands have completely transitioned or are transitioning soon:
  - Aruba (wind)
  - Cap Verde (wind, PV)
  - El Hierro (wind, pumped hydro)
  - Fiji (hydro, biomass, wind)
  - Graciosa (wind, PV, batteries)
  - Iceland (geothermal, hydro)
  - Tokelau (solar, batteries)
  - Tonga (PV, wind, wave)
- Transition is easier for larger islands (which may have hydropower) and volcanic islands (which can develop pumped hydro and geothermal)
- Coral islands have usually fewer „baseload“ opportunities



# 3

# ELECTRICITY STORAGE ROADMAP

# Electricity Storage roadmap (1)

## *Largely technology oriented*

Organisation	Focus	Output
IEA	Global	Recommendations for action; IC
EASE/EERA	EU	RD&D priorities
NEDO	Japan	Performance indicators
ADEME	France	R&D priorities, barriers
CFLCF	UK	R&D priorities, barriers
NAATBatt	US	Survey
NY_BEST	New York	Policy proposals
Fraunhofer ISI	Electric Mobility	Performance indicators, R&D
U.S. DRIVE	Electric Mobility	Performance indicators, capacity
RECHARGE	Electric Mobility	Policy proposals



- **Aim:** Identify *key areas for international cooperation* to support the integration of variable renewables and the transition of the power infrastructures
- **Objectives:**
  - Address key techno-economic questions by policy makers
  - Explain relationship between policy and technology deployment
  - Provide platform for interaction between multiple stakeholders
  - Allow for prioritization of activities
- **Methodology:**
  - **Literature Review:** Bringing together existing roadmaps and studies from different countries
  - **Stakeholder workshops:** Understanding the needs from policy makers and other stakeholders

# IRENA Electricity Storage Workshop

## 27 March 2014



- **Storage for renewable off-grid solutions**
  - Near commercial viability
  - Need for standards and innovative financing
- **Storage for dispatchability**
  - Located at generation side
  - Value and price storage services and contracting mechanisms key
- **Storage for self-consumption**
  - In countries with high retail prices
  - In countries with black-outs
  - For SMEs
- **Grid stability services**
  - Not economical in the short-term
  - Ancillary services markets and grid codes would be needed

# Key questions for this workshop

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- *Which **technology developments** are available/needed for self-consumption of renewables?*
- *What will be the **key drivers for commercialization** of electricity storage technologies for renewables deployment?*
- *Which **policies and regulations** for electricity storage are needed to support the accelerated deployment of renewables?*
- *Based on the answer above, what are the three key areas where IRENA members can support self-consumption of renewables through **international cooperation** activities?*

**THANK YOU !**  
**WWW.IRENA.ORG**