

# IRENA's Electricity Storage Roadmap

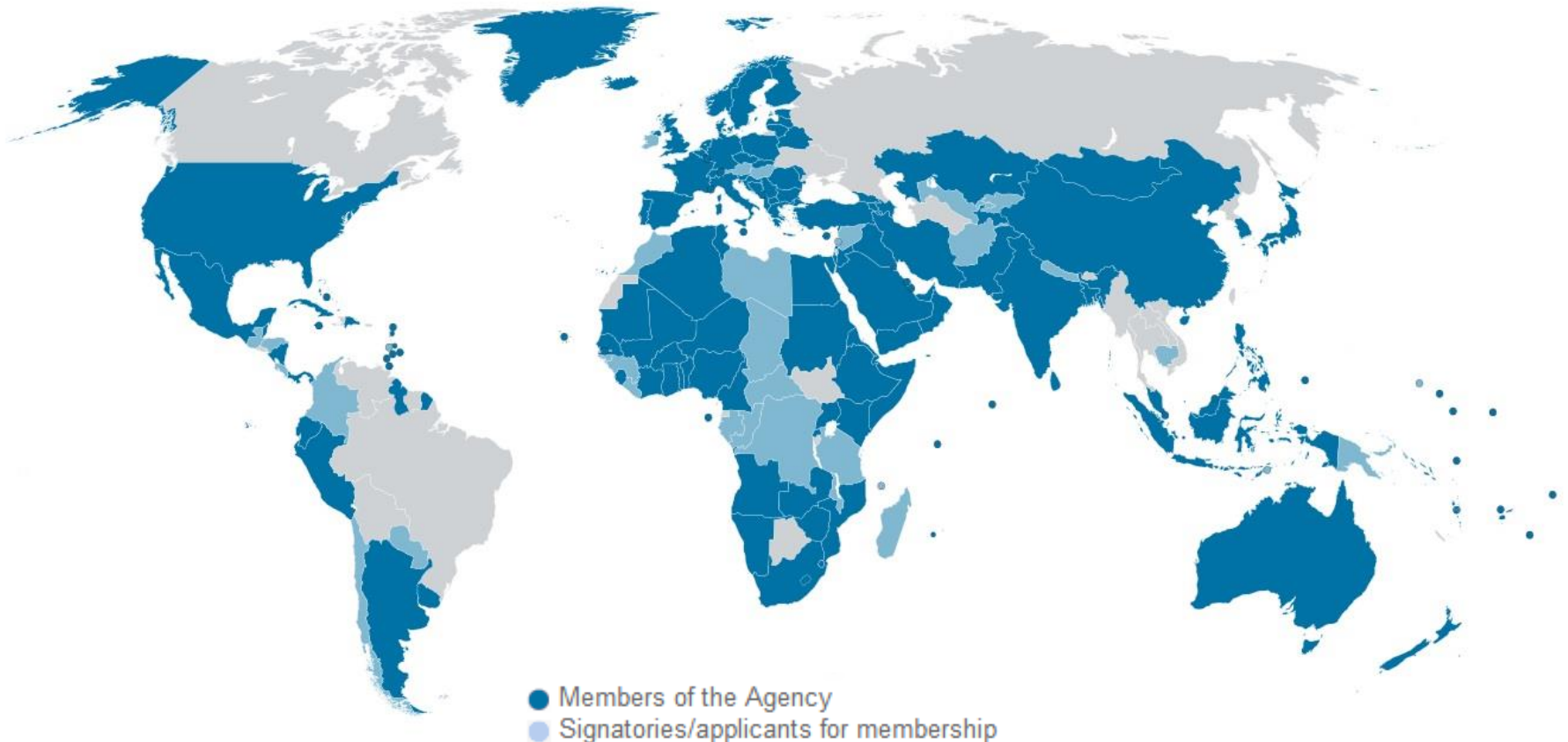
**Mr. Gurbuz Gonul**  
**Act. Director, Country Support and Partnership**

**IRENA Workshop, 3 December 2014**



# IRENA country membership is rapidly growing

- **Established:** April 2011
- **Membership:** 138 Members; 35 Signatories/States in accession



## Headquarters

Abu Dhabi, United Arab Emirates

## Three Programmatic Divisions

- Innovation and Technology Centre (Bonn)
- Knowledge, Finance and Policy Centre (Abu Dhabi)
- Country Support Programme (Abu Dhabi)

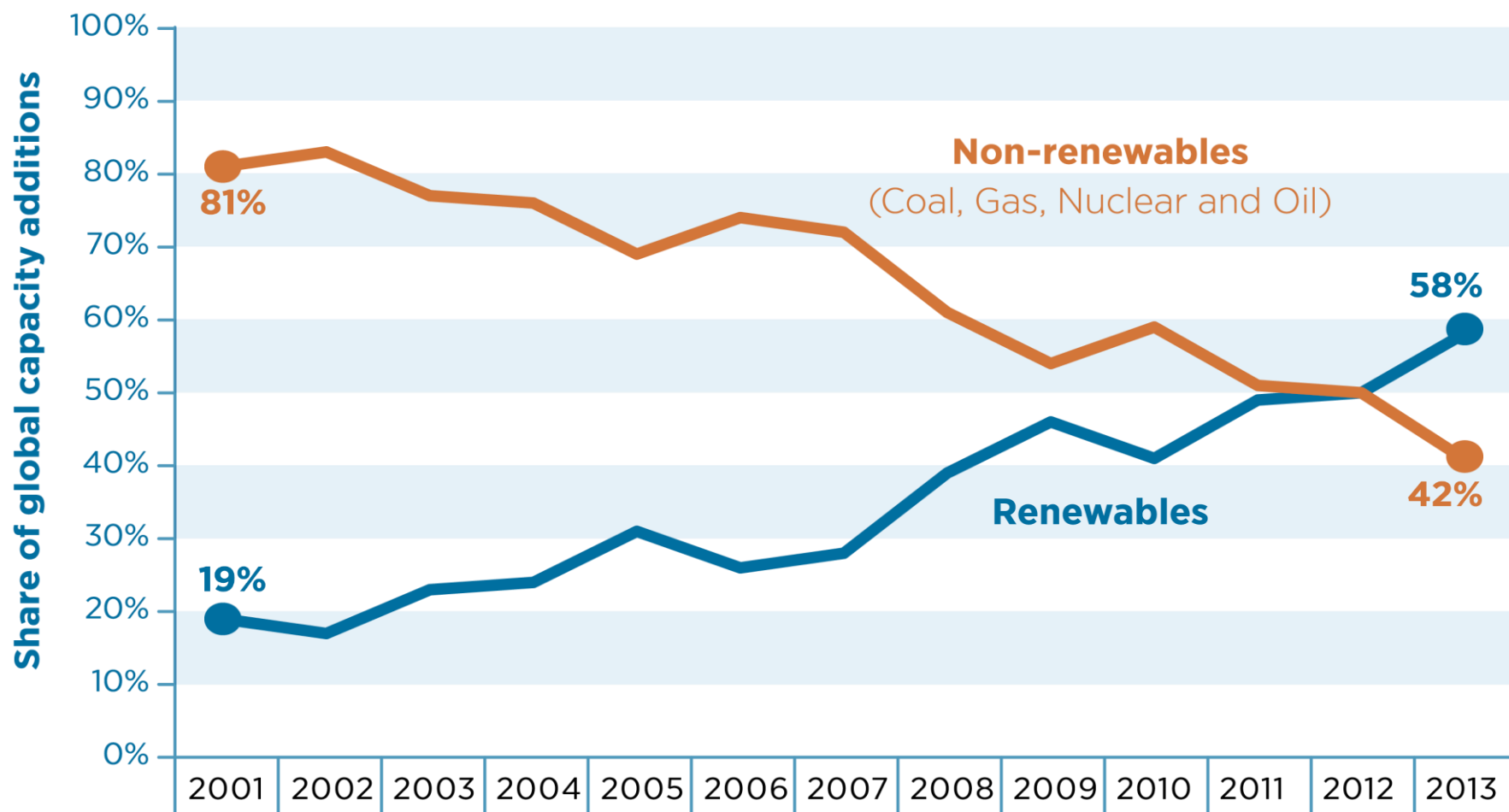
## Mission

Accelerate deployment of renewable energy  
(Biomass, Geothermal, Hydro, Ocean, Solar, Wind)

# 1

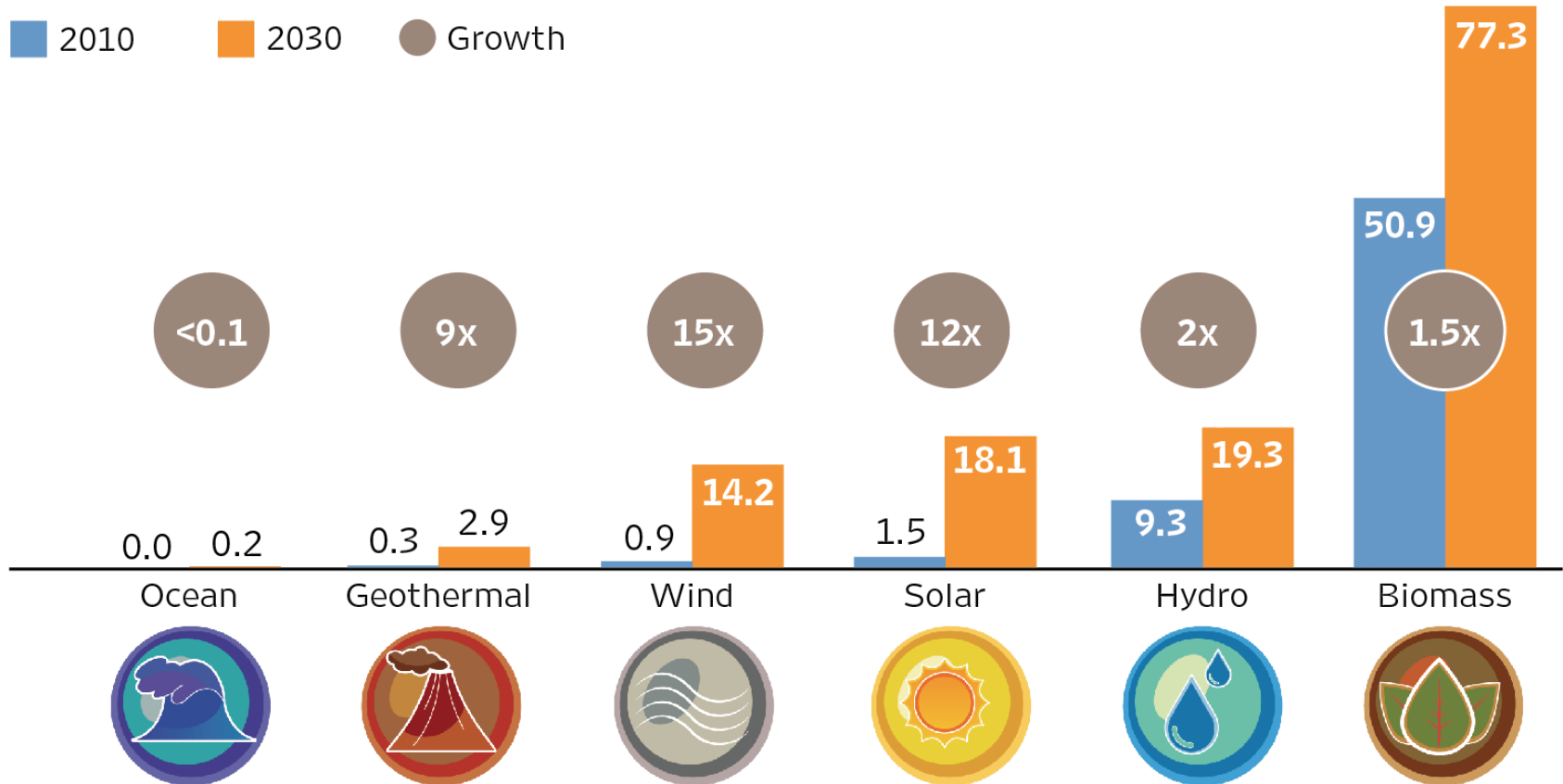
## **THE POWER SECTOR AT A CROSSROAD**

# Capacity Additions in Renewables



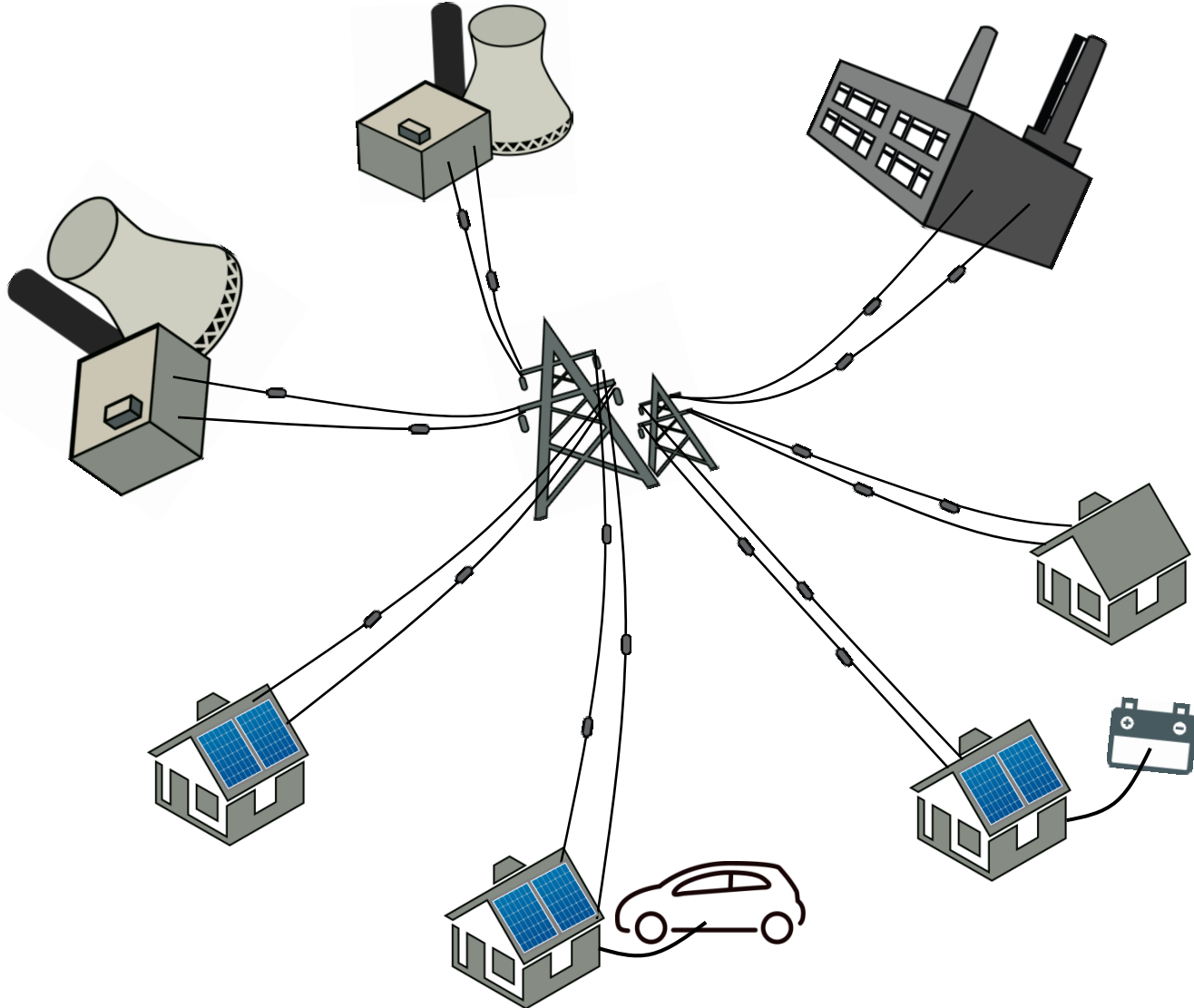
# Scaling-up all renewable energy sources

Global renewable energy use by resource (EJ/year)



**Total global RE use in REmap 2030: 132 EJ/yr**

# Changing power supply model



1. Technology briefs on thermal and electricity storage
2. Guide on Smart Grids and Renewables
3. Storage for Islands: Guide for Decision Makers
4. Grid Stability Studies for Renewables on Islands
5. International Off-Grid RE Conference (IOREC)
6. Battery Storage for Renewables: Market Status and Technology Outlook – **NEW!**





# 2 ELECTRICITY STORAGE ROADMAP



**PLANNING  
FOR INTEGRATION**

# Electricity Storage Studies

## 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 RE and the transition of power infrastructures

### **Objectives:**

- Address key techno-economic questions by policy makers
- Explain relationship btw policy & technology deployment
- Provide platform for interaction btw multiple stakeholders
- Allow for prioritization of activities

### **Methodology:**

- Literature review
- Stakeholder workshops

# IRENA Electricity Storage Workshop

March 2014, Dusseldorf – Germany



# Conclusions of Dusseldorf Workshop:

## Key areas for international cooperation

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- **Storage for self-consumption**
  - In countries with high retail prices
  - In countries with black-outs
  - For SMEs
- **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
- **Grid stability services**
  - Economically not viable yet in the short-term
  - Ancillary services markets and grid codes would be needed

# IRENA Electricity Storage Workshop

## November 2014, Tokyo – Japan

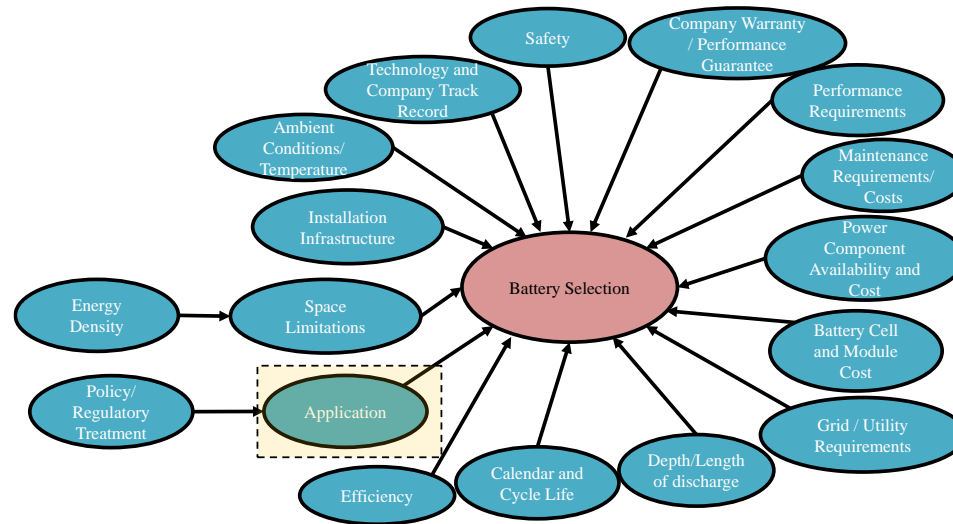






# Conclusions of Tokyo Workshop: : Residential Battery Usage

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- More technology development is needed
- Integrate the residential sector into grid operations
- Share best experiments (not practices yet)
- Educate and engage new stakeholders
- Develop new analytical tools for policy makers

- 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	



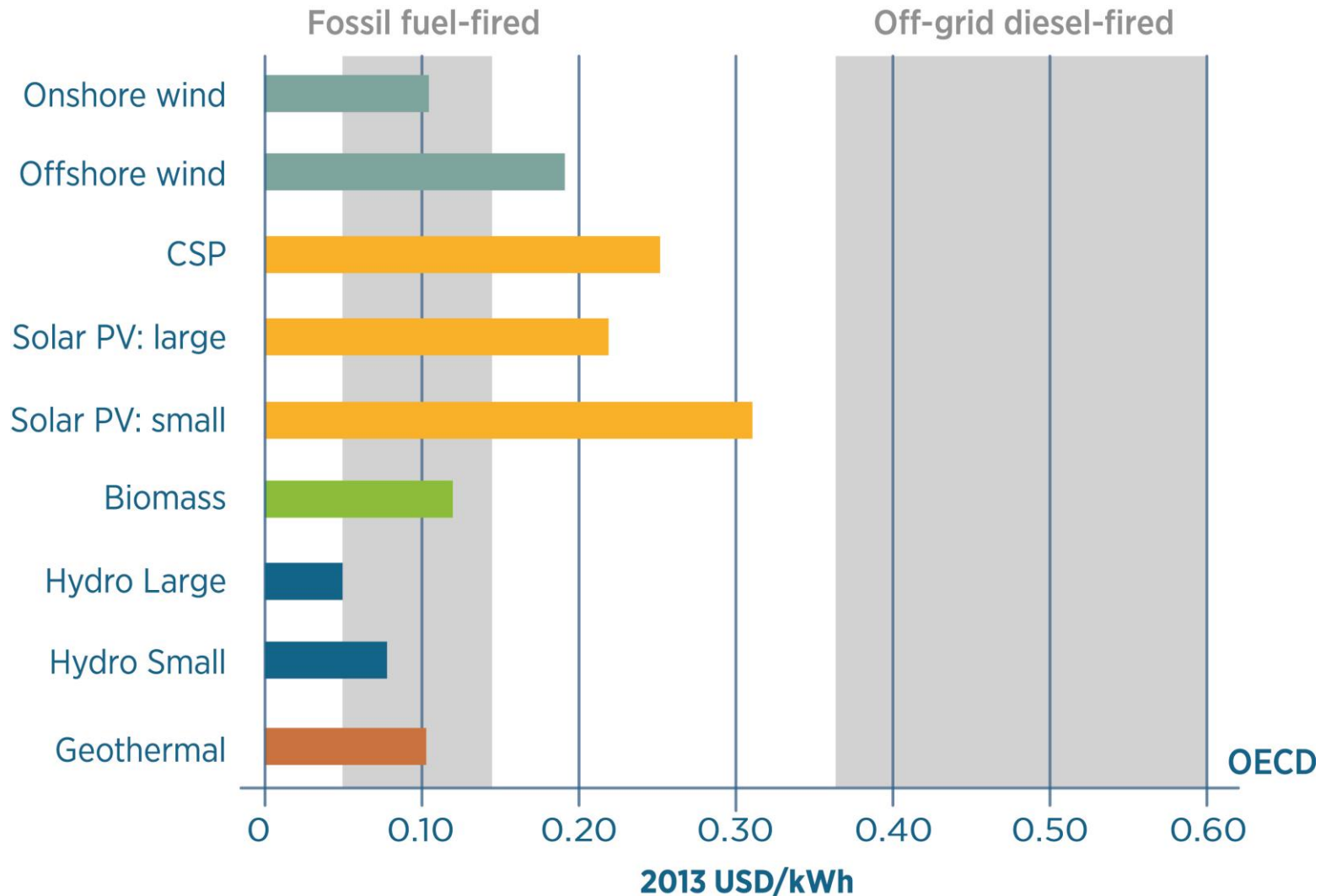
## Key questions for this workshop

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- Which **technology developments** are available/needed for off-grid and grid-connected renewables?
- How should **policies and regulations** for electricity storage differentiate between renewable utility-scale and renewable off-grid systems?
- What are the **current experiences and developments in India**, and how are they similar/different to other countries?
- Based on the answer above, what are the key areas where IRENA can support **international cooperation activities on electricity storage** for off-grid and grid-connected renewables?

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

# Renewables are Increasingly Cost-Competitive



Note: The weighted average in OECD is at 10% WACC