

Small Hydro: Big Potential



**APEC
Small Hydro and Renewable
Grid Integration Workshop
Hanoi, Vietnam
April 3-5, 2013**

International Renewable Energy Agency (IRENA)

Established: April 2011

Mission: Accelerate deployment of renewable energy

Mid-term strategy: Hub, voice and objective information source for renewable energy

Members: 158 countries engaged; 109 ratified member countries and EU

Mandate: Sustainable deployment of the six RE resources
(Biomass, Geothermal, Hydro, Ocean, Solar, Wind)

Location: Headquarters in Abu Dhabi, United Arab Emirates
Innovation and Technology Centre - IITC, Bonn, Germany

Director-General: Adnan Amin

Focus of Presentation: Small Hydro Costs, Potential

- How do the costs of electricity from small hydro plants compare with the costs of other renewable power options?
 - *Renewable Power Generation Costs in 2012: An Overview* (IRENA Innovation and Technology Centre)

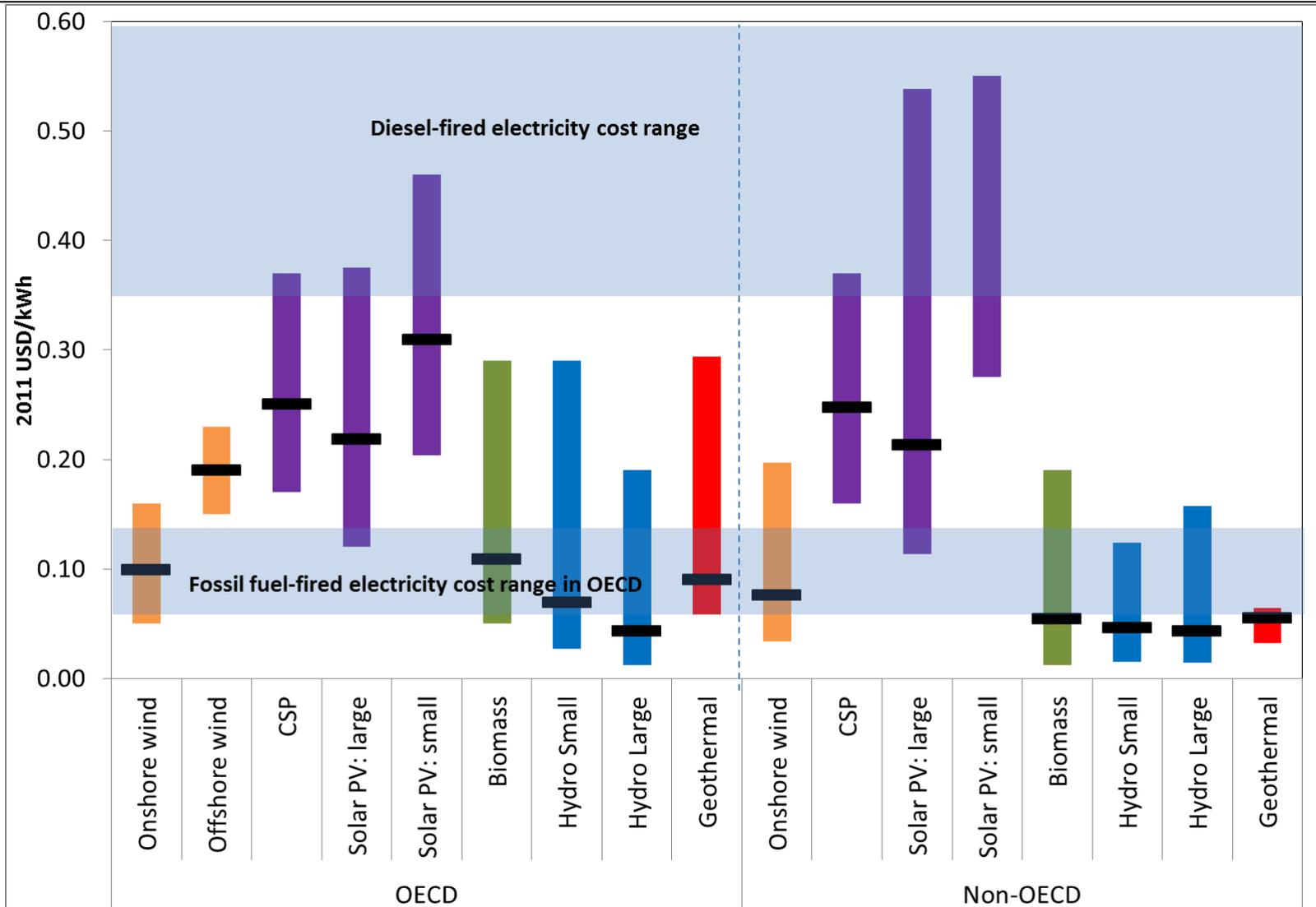
Context for the Renewable Generation Costs Study

- Renewables now account for roughly half of all new electricity capacity installed around the world each year.
- Analysis of 8,000 projects shows that rapid deployment and high learning rates are leading to significant cost declines that encourage further capacity additions.
- Hydro on different scales has major potential for expansion, with 25 GW of new plants installed worldwide in 2011, as compared with 41 GW of wind, 30 GW of PV, 6 GW of bio-power, 0.5 GW of CSP, and 0.1 GW of geothermal power.

Hydropower Advantages

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- Mature technology, flexible design in many cases
 - Unrivalled ability to provide ancillary grid services
 - Lowest cost electricity where good resources available
 - Importance will grow with market penetration of variable renewable energy resources like wind and solar power.

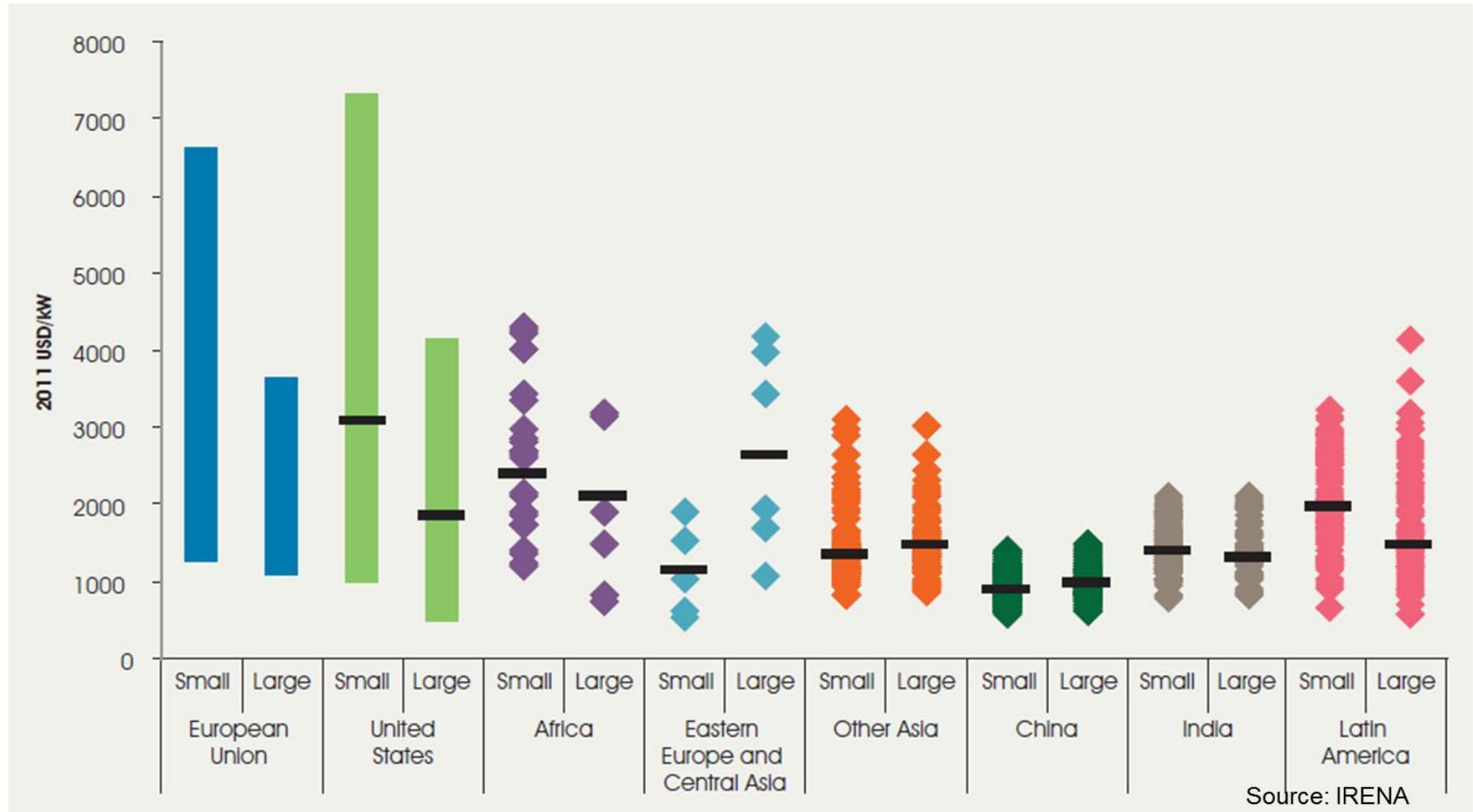
Generating Costs for Hydro and Other Renewable Power Options



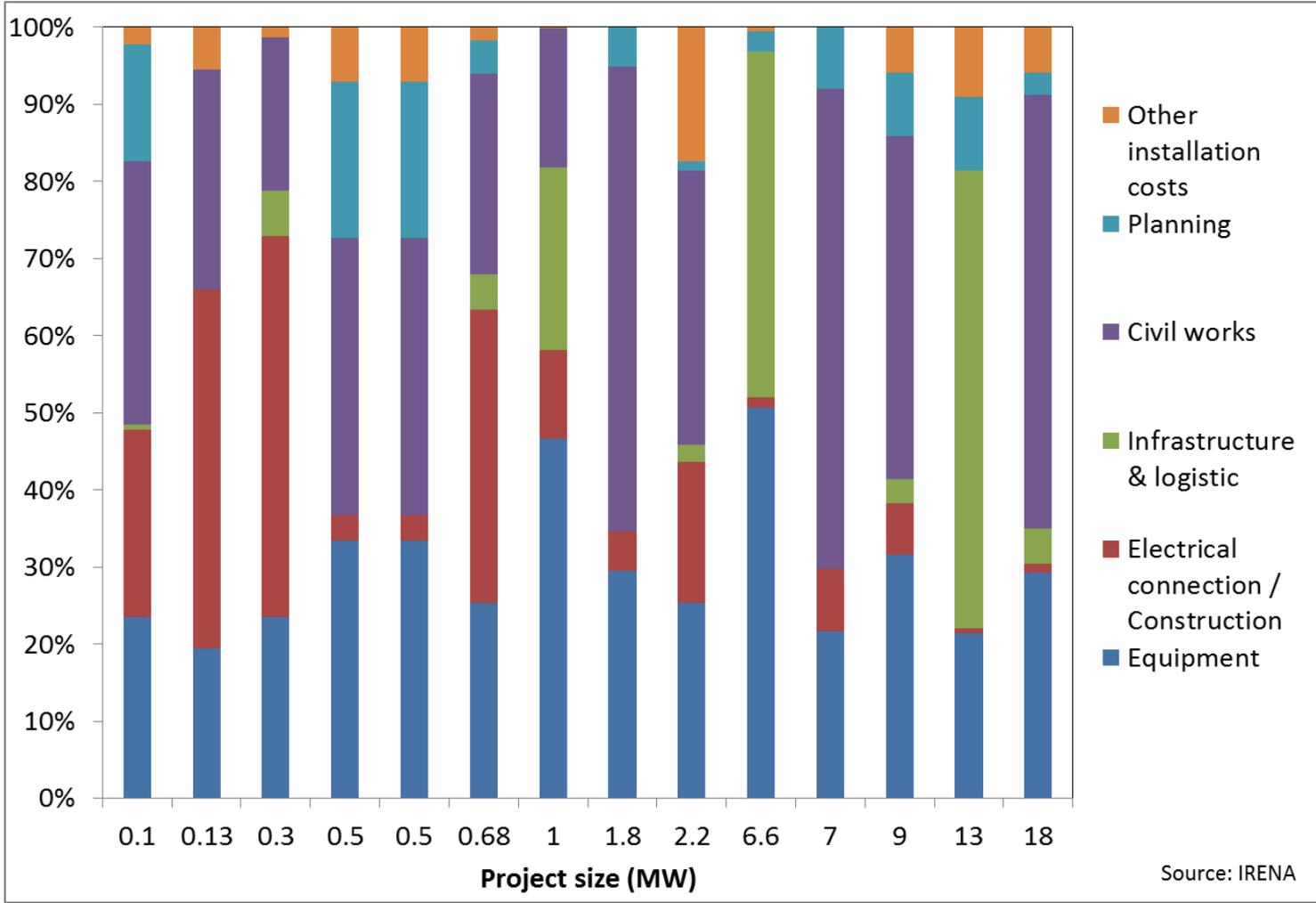
Note: assumes a 10% cost of capital

Source: IRENA

Cost of Hydropower Capacity by Country or Region and Size

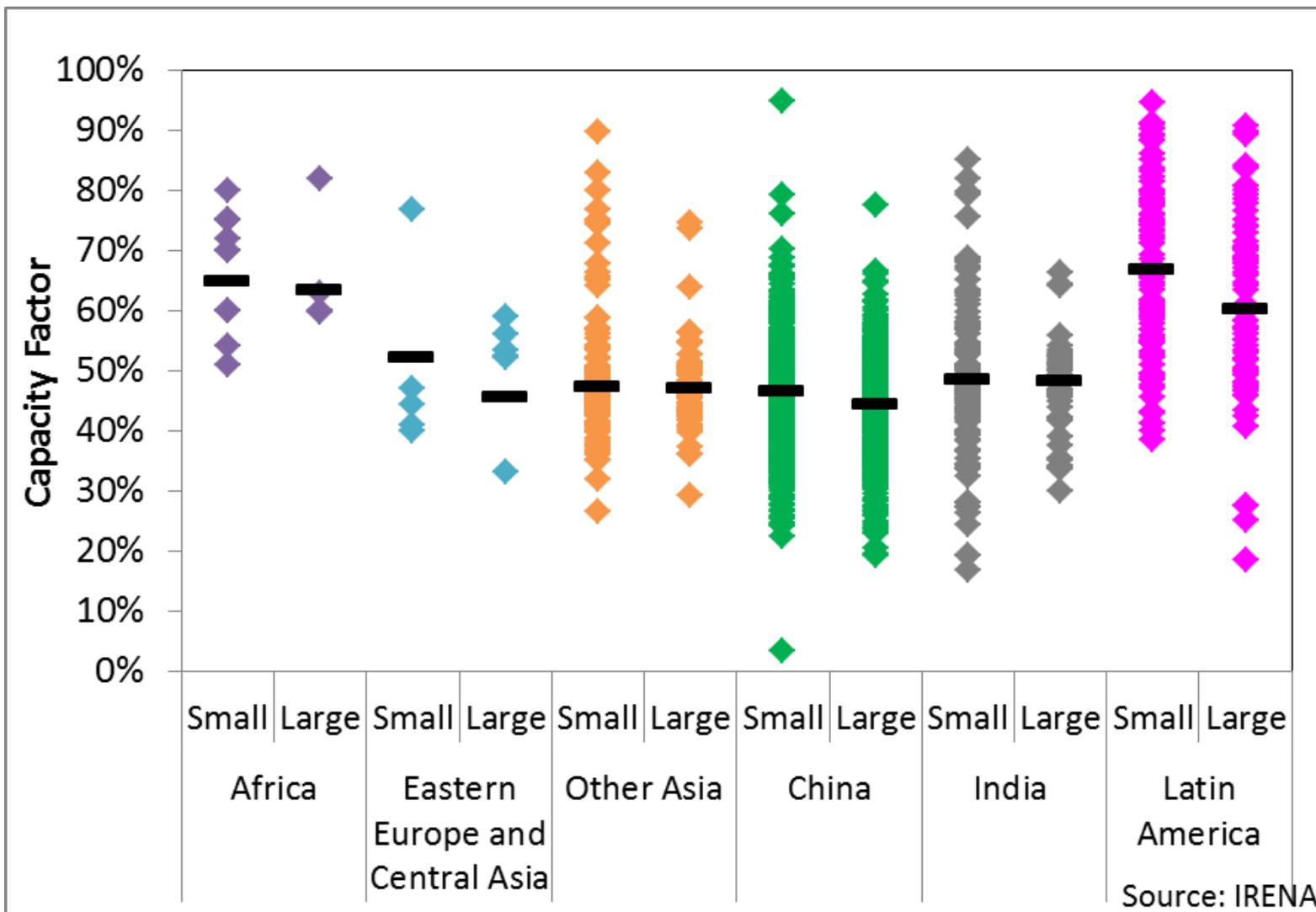


Small Hydropower Capital Cost Shares in Developing Countries

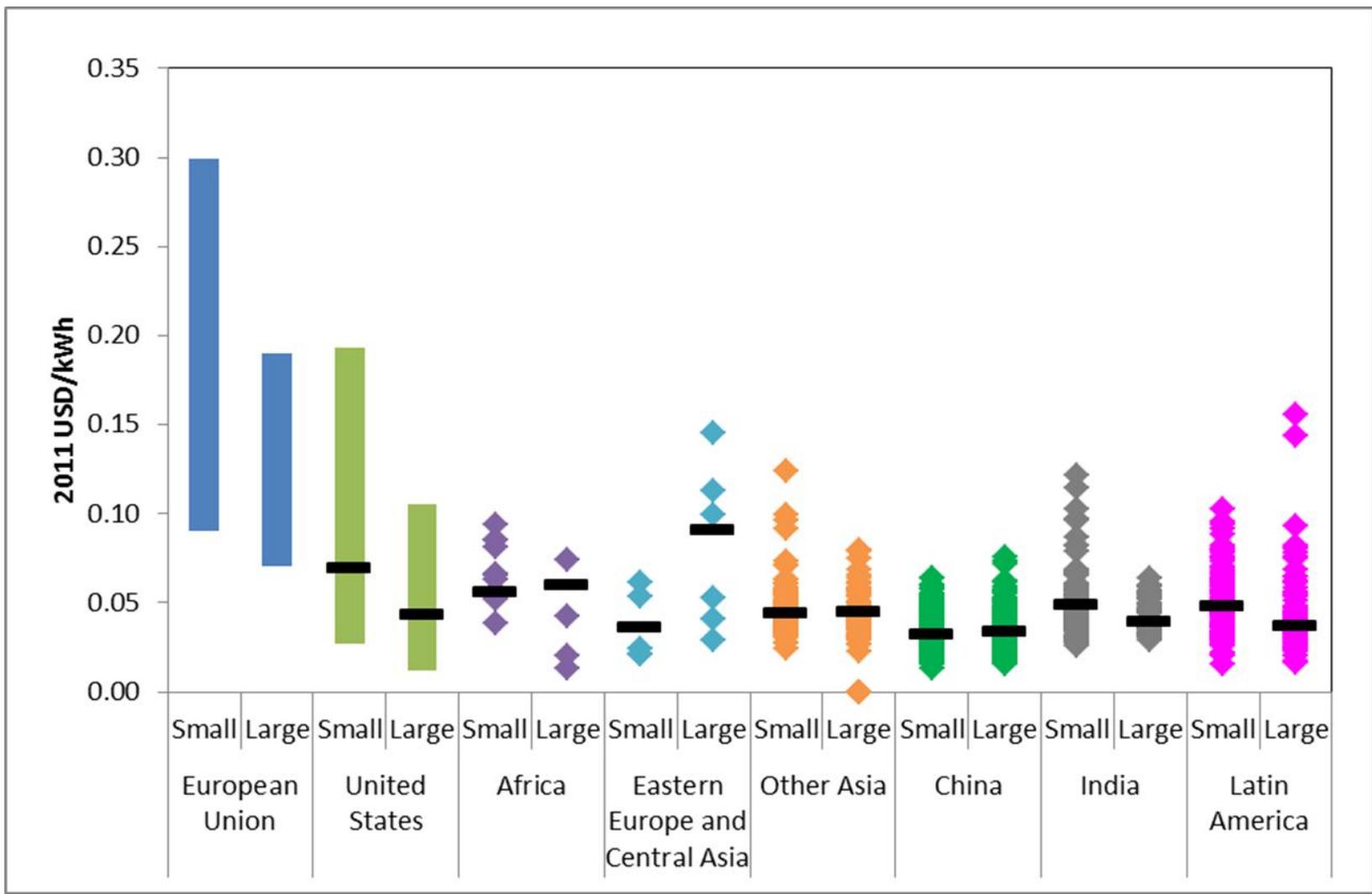


Source: IRENA

Hydropower Capacity Factors by Size and Country or Region



Hydropower Costs per kWh by Size and Country or Region



Assumes a 10% cost of capital

Thanks for listening!

