Presentation from

2015 World Water Week in Stockholm

www.worldwaterweek.org

Renewable energy for strengthening resilience to climate and disaster risks

IRENA

International Renewable Energy Agency

Managing Change: Strengthening resilience to climate and disaster risks

25th August 2015

About IRENA

Mandate

To promote the widespread and sustainable use of renewable energy worldwide

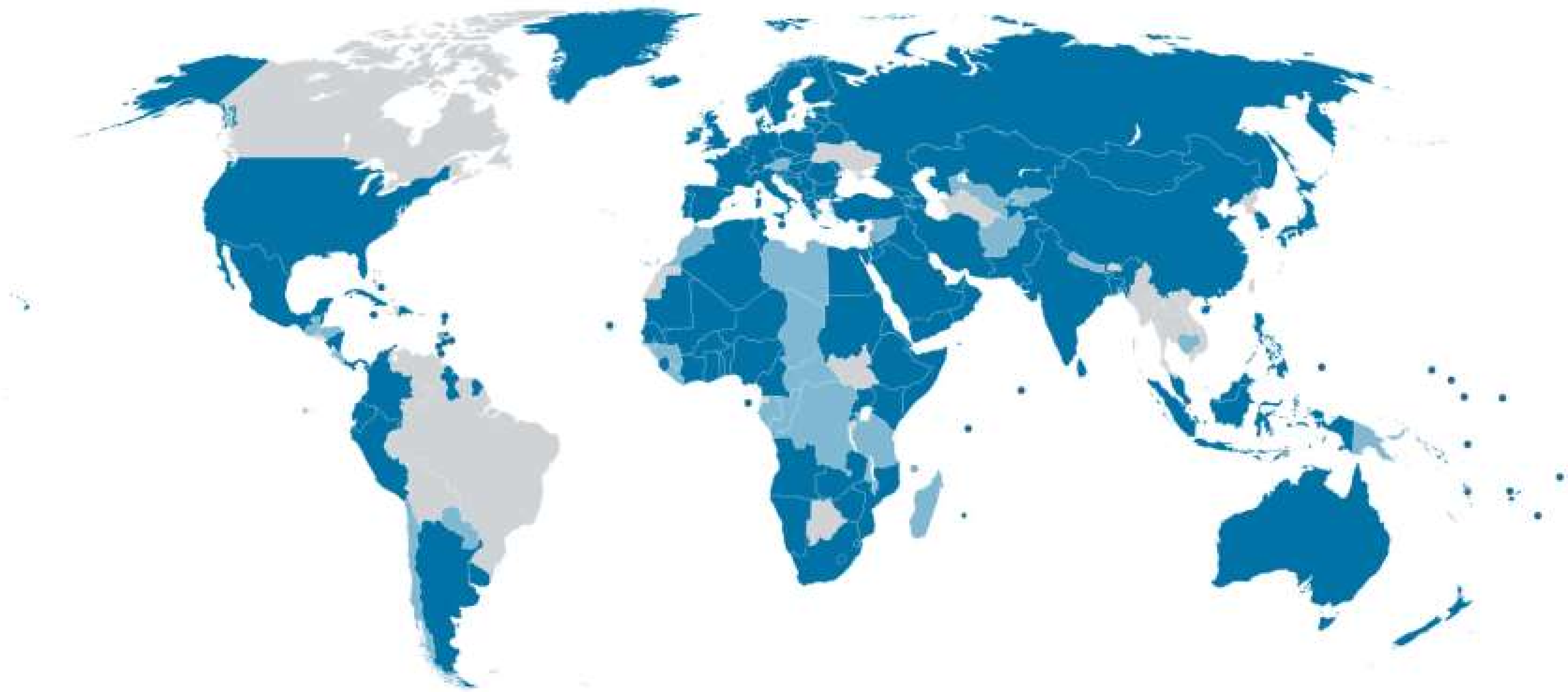
Objective

To serve as a network hub, an advisory resource and an authoritative, unified, global voice for renewable energy

Scope

All renewable energy sources produced in a sustainable manner

About IRENA



143 Members

29 Signatories/States in Accession

Renewable energy and climate change

- Renewable energy will be key for climate change mitigation together with energy efficiency. The energy sector is the single largest source of GHG emissions (about two-thirds).

- Many of the INDCs submitted towards COP21 acknowledge the role of renewable energy in climate change mitigation.

- Renewable energy represents an increasingly cost-effective option in many markets.

    - Solar PV modules in 2014 cost three-quarters less than in 2009, while wind turbine prices declined by almost a third over the same period.

- For the past four years, more new renewables capacity is being installed than new capacity in fossil and nuclear power combined.

- Benefits range from the environment, energy security, energy access and socio-economic aspects (jobs, GDP, etc.)

- Renewable energy is an important long-term carbon mitigation tool as well as a hedge against risks posed by climate change for the energy sector.

Climate change impacts on the energy sector

Climate change impacts can be felt at generation, transmission & distribution and consumption side.

Rising temperatures

- Elevated water and air temperatures reduce the efficiency of power generation.
- Transmission is less efficient with higher air temperatures.
- Demand for heat and power can fluctuate dramatically with changing climate.

Decreasing water availability

- Shifting rainfall patterns and droughts threatening water availability for energy supply.
- Thermoelectric power generation (e.g. nuclear, coal), oil and gas production, and renewables (e.g. hydro, bioenergy) are vulnerable to water supply.

Extreme weather events

- Extreme weather can limit power production and impact energy delivery infrastructure
- Risks do not exist in isolation and converging factors intensify challenges (e.g. droughts coupled with heat waves can curtail production while spurring demand).

Decoupling power generation from water use

Some renewable energy technologies are substantially less-water intensive than conventional power generation.

Water savings from wind	
257 billion litres in the United States, 2014	387 billion litres in the European Union, 2012

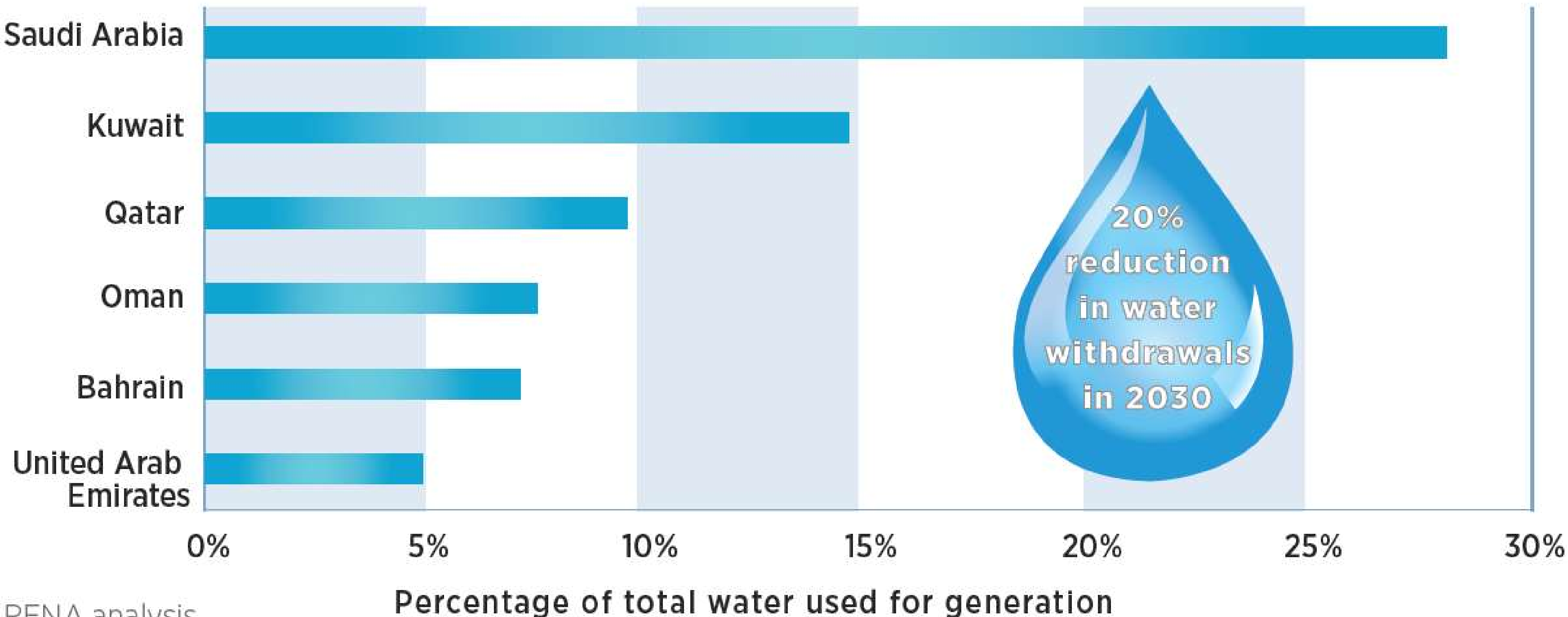
Source: American Wind Energy Association; European Wind Energy Association

IRENA REmap analysis shows that power sector water withdrawals in 2030 could decline by:

United Kingdom	United States	Australia	Germany	India
↓ 52%	↓ 37%	↓ 32%	↓ 28%	↓ 12%

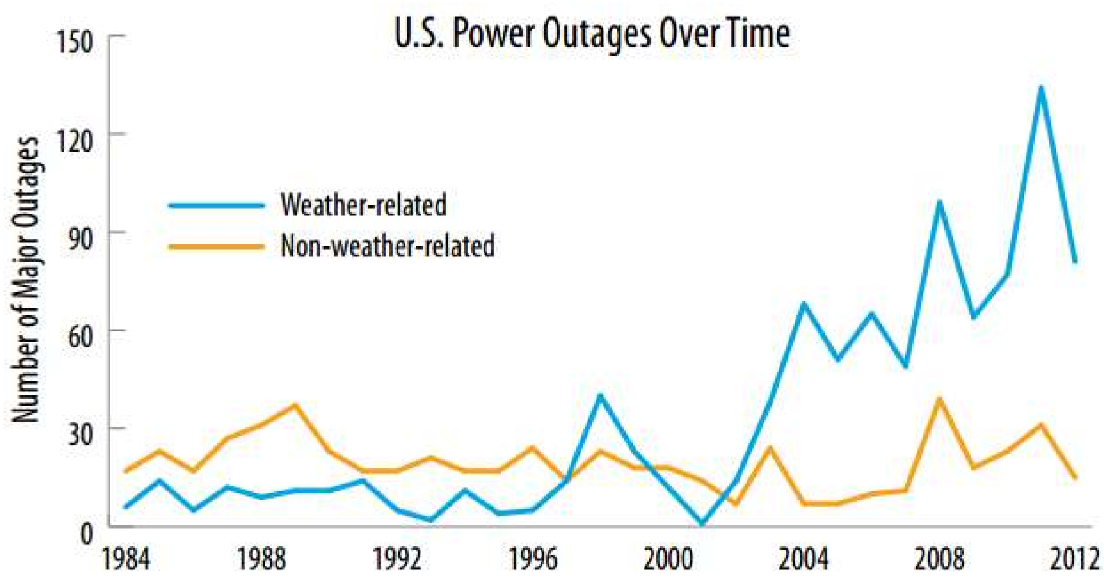
Decoupling power generation from water use

Water saving potential of renewables in the GCC region



Source: IRENA analysis

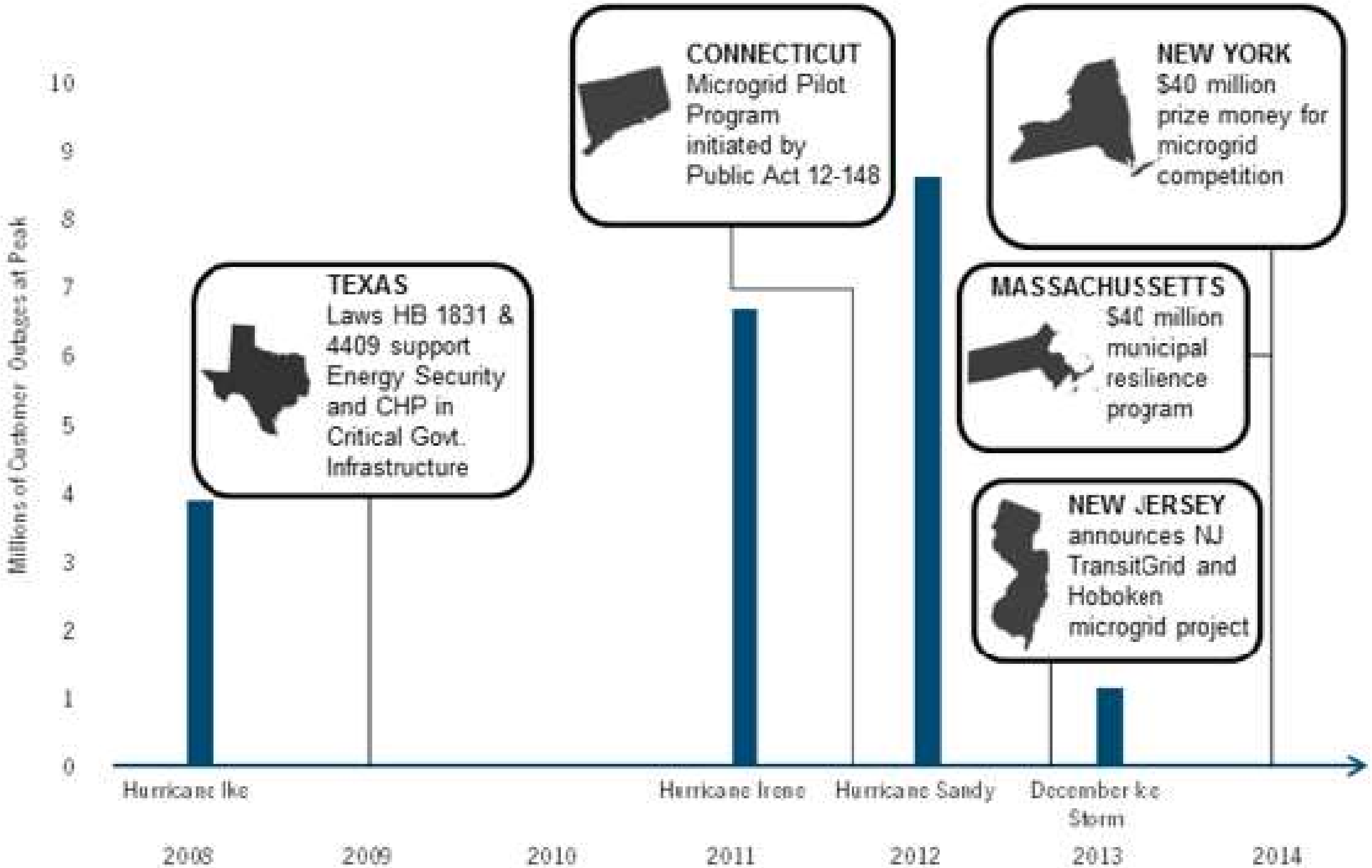
Decentralized renewable energy for enhancing resilience of the system



Source: Kenward and Raja, 2014 from NREL, 2015

- Distributed systems have the potential to supply electricity during grid outages resulting from extreme weather or other emergency situations.
- Systems must be designed with resiliency in mind and combined with other technologies, such as energy storage and auxiliary generation.
- Strengthening policy and regulatory support could encourage deployment of PV systems designed for resiliency and improve access to power during emergencies.

Decentralized renewable energy for enhancing resilience of supply



Source: GTM Research

Cumulative U.S. microgrid investments will surpass USD 3.5 billion between 2015 and 2020 with capacity reaching 2.8 GW. Renewables will make up 26 percent of this capacity.

The water, energy and food *nexus*

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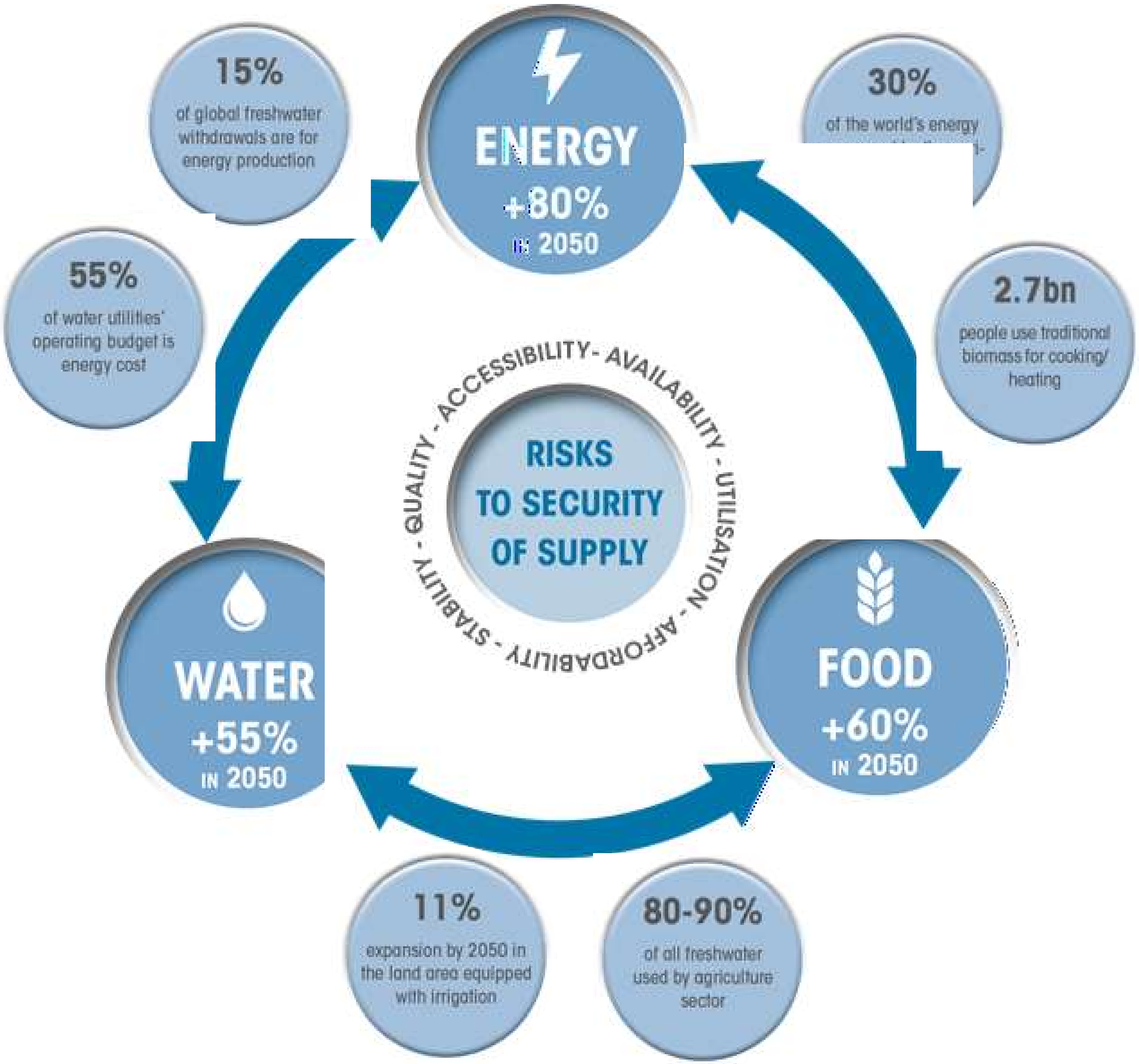
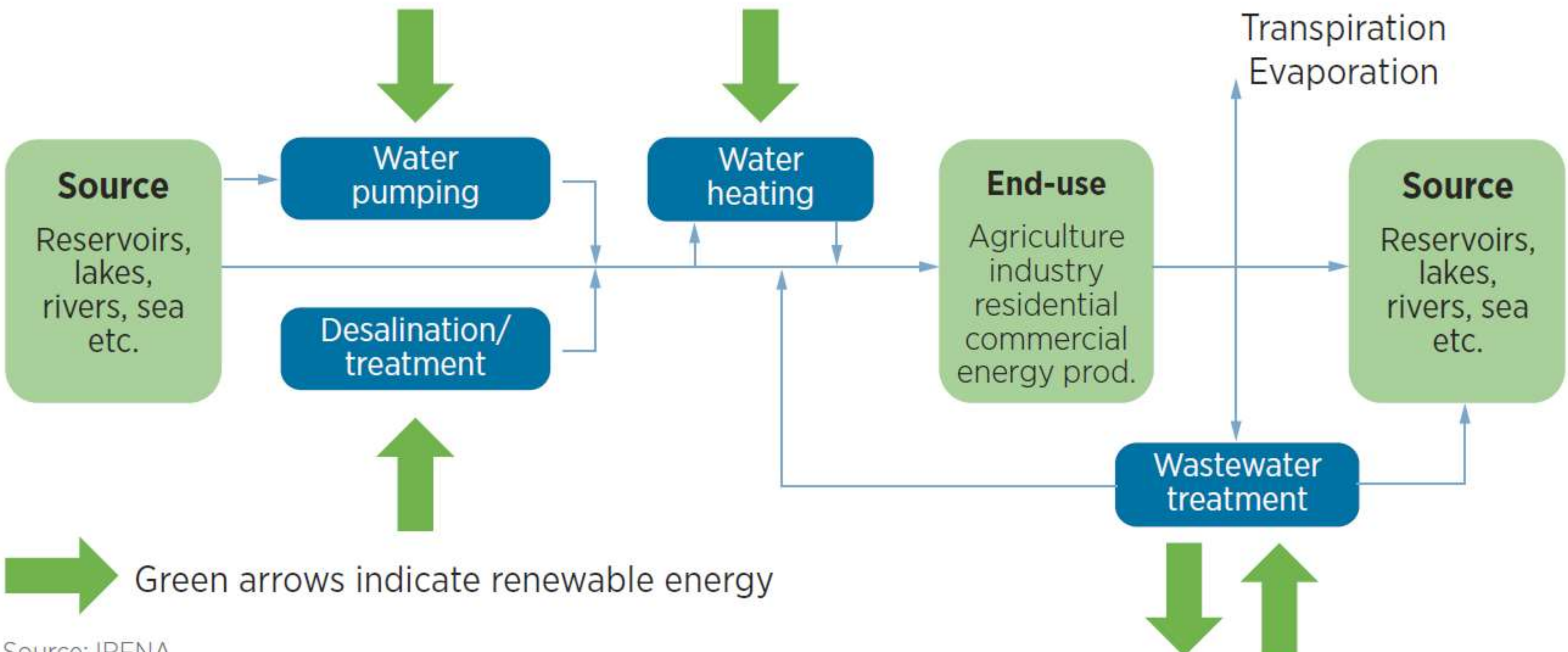


Improving the resilience of the water sector

Renewable energy technologies can boost water security by improving accessibility, affordability and safety



Source: IRENA

Improving the resilience of the agri-food sector

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Renewable energy opportunities in the food supply chain

Energy inputs (traction, electricity, mechanical, heat/cooling)

Primary Production	Post-Harvest and Storage	Transport and Distribution	Processing	Retail, Preparation and Cooking
• Solar, wind-based water pumping • Biofuels for tractors and on-farm machinery • Solar-based desalination, heating and cooling for protected cropping • Biomass residues use for on-site energy generation • Indirect renewable energy inputs for fertilisers	• Solar, geothermal food drying • Solar cooling and refrigeration	• Biofuel use for transportation and distribution • Solar cooling and refrigeration	• Solar, wind, hydro-based milling, threshing • Renewable energy-based electricity and heat applications	• Renewable energy-based water purification • Modern biomass use for cooking applications

Source: IRENA (2015) based on FAO (2011) and Practical Action (2012)

Assessing the role of RE in the Nexus

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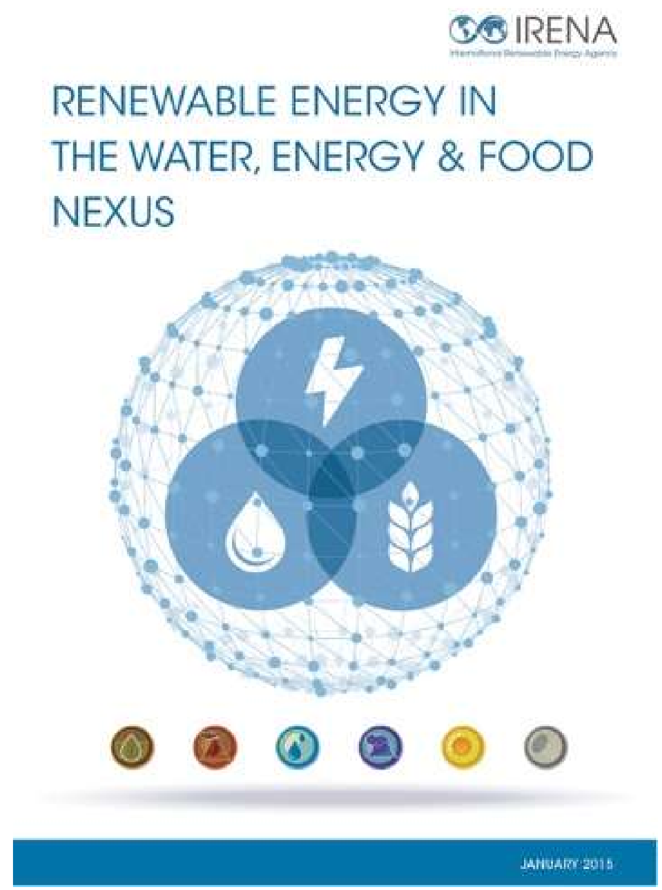
- Review of the existing knowledge on the interactions of renewable energy in the water, energy and food nexus
- Highlighting opportunities for renewables integration in the water and food sector, as well as risks to be managed
- Preliminary quantitative analysis of increased renewables penetration on water use in the power sector
- Presents a conceptual framework for a preliminary energy-centric nexus tool to empirically estimate the impact of renewable energy on water, land and emissions.



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Conclusions

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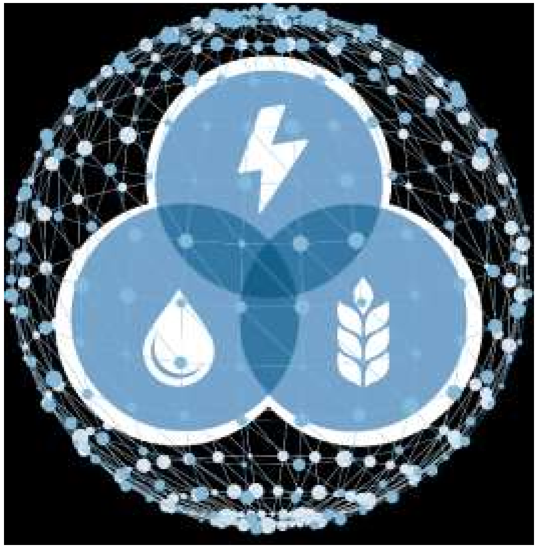
- Renewable energy will play a central role in climate change mitigation
- Mitigation through renewables goes hand-in-hand with strengthening resilience to climate and disaster risks.
- Renewable energy technologies, in particular distributed, are being deployed to enhance the resilience of the energy system.
- Realising the full potential of renewable energy requires an enabling policy and regulatory environment that maximizes the reliability effect on the energy system.
- Benefits are not restricted to the energy sector alone with substantial opportunities also in the water and food sectors.
- Integrated approach to assessing the role of renewables in increasing resilience to climate and disaster risks is necessary, while reducing emissions (e.g. efficiency improvements, micro grid development, solar pumping solutions, etc.)



"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change."

Charles Darwin

Thank you!

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