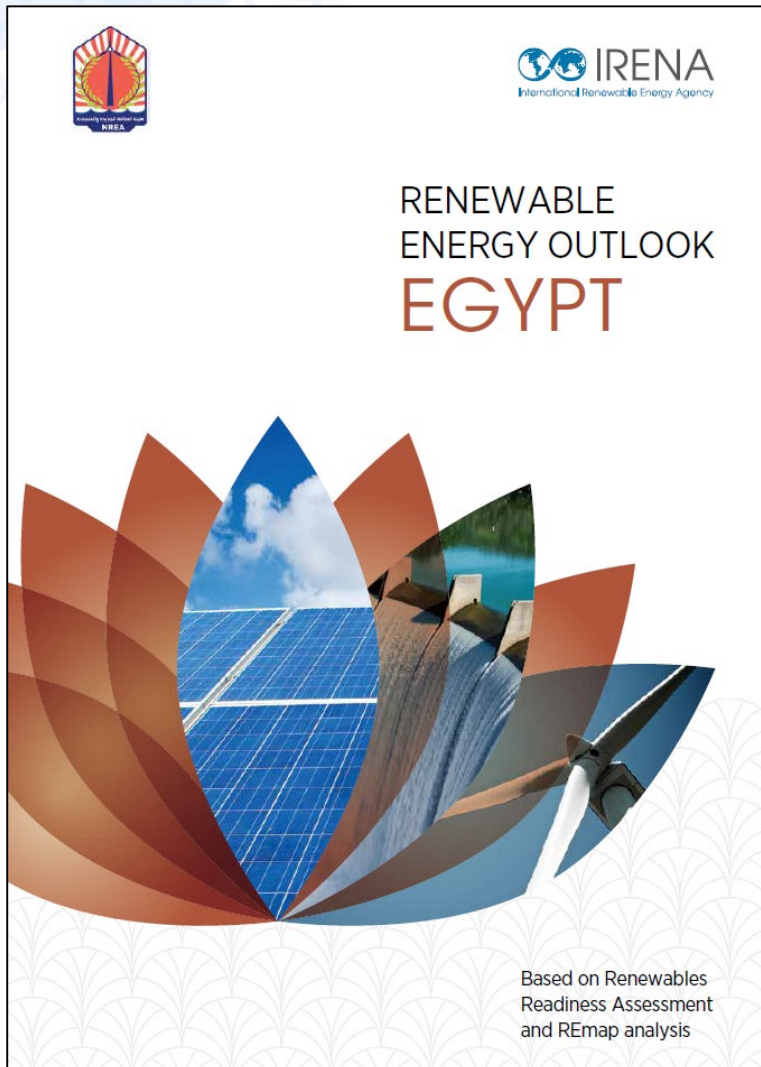


Renewable Energy Outlook Egypt

Key Findings and Recommendations

Egypt Renewable Energy Conference
Cairo, Egypt
October 9, 2018



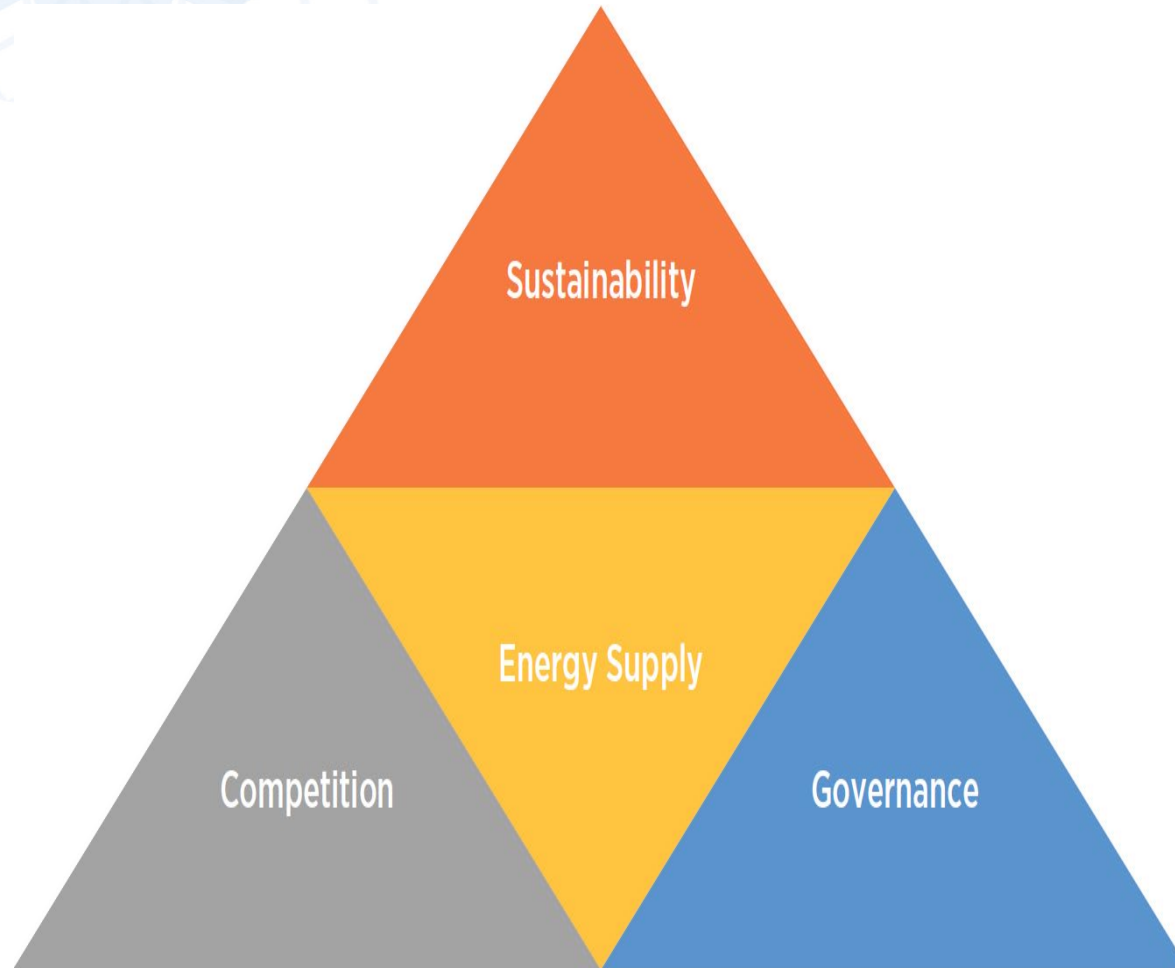


Objectives are twofold:

- » Identify policy, regulatory and institutional challenges hindering accelerated deployment of renewables and highlight key actions to overcome them.
- » Determine technology pathways to meet or even surpass the targets of the Integrated Sustainable Energy Strategy to 2035

Based on **Renewable Readiness Assessment** and **REmap** analysis

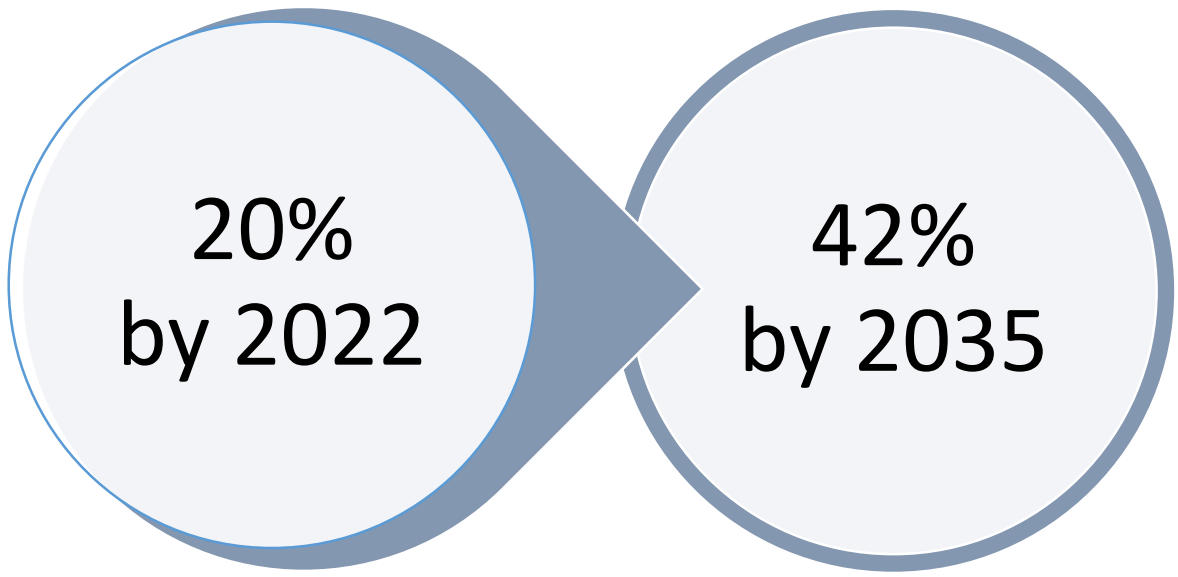
Joint analysis by the Ministry of Electricity and Renewable Energy, the National Renewable Energy Authority (NREA) and the International Renewable Energy Agency (IRENA)



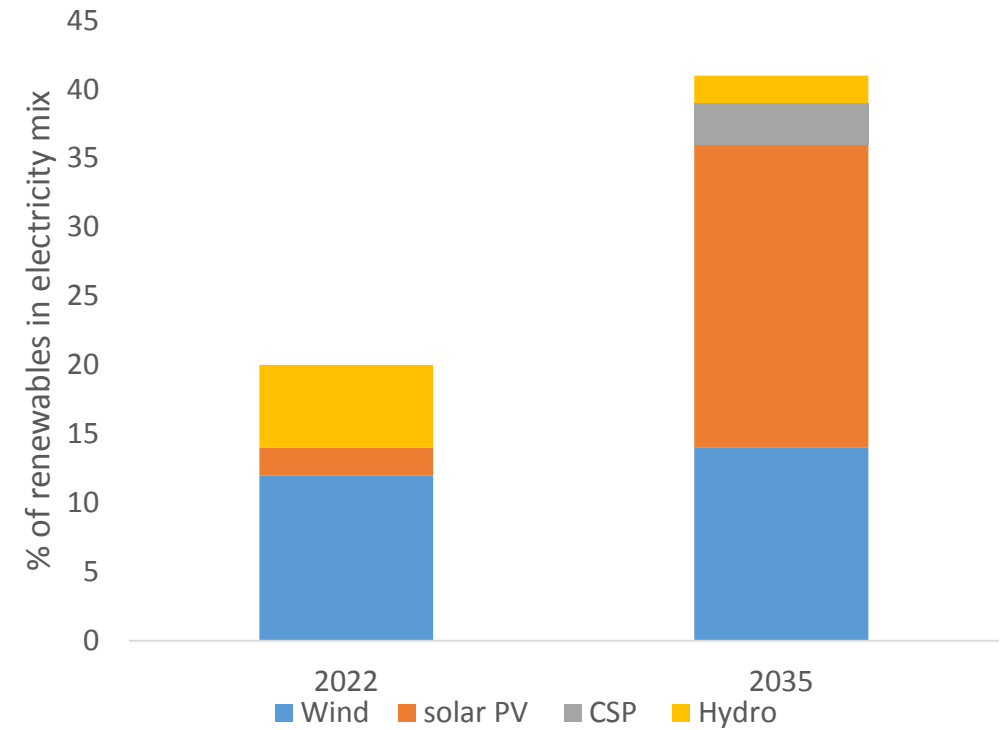
- I. Ensure security of supply
- II. Ensuring sustainability
- III. Improving institutional and corporate governance
- IV. Strengthen competitive markets and regulation

Ambitious Renewable Energy Targets

Renewable Energy in Electricity Generation Mix



Renewable Energy Technology Mix



REmap Findings

RE share in Reference Case vs. REmap - 2030

Robust RE growth in both Reference Case & REmap despite more than doubling of energy demand

Type of energy use		Modern renewable energy share		
		2014 actual	2030 expected in Reference Case	REmap 2030
Electricity generation		9%	25%	53%
End-use sectors	Industry (fuels and direct uses, excluding electricity)	11%	10%	12%
	Transport (fuels, excluding electricity)	<1%	2%	10%
	Buildings (modern fuels and direct uses, excluding electricity)	<1%	1.5%	9%
Total final energy consumption (TFEC)		5%	11%	22%
Total primary energy supply (TPES)		4%	8%	22%

RE in Power Generation

- 25% in Reference Case
- more than doubles to 53% in REmap

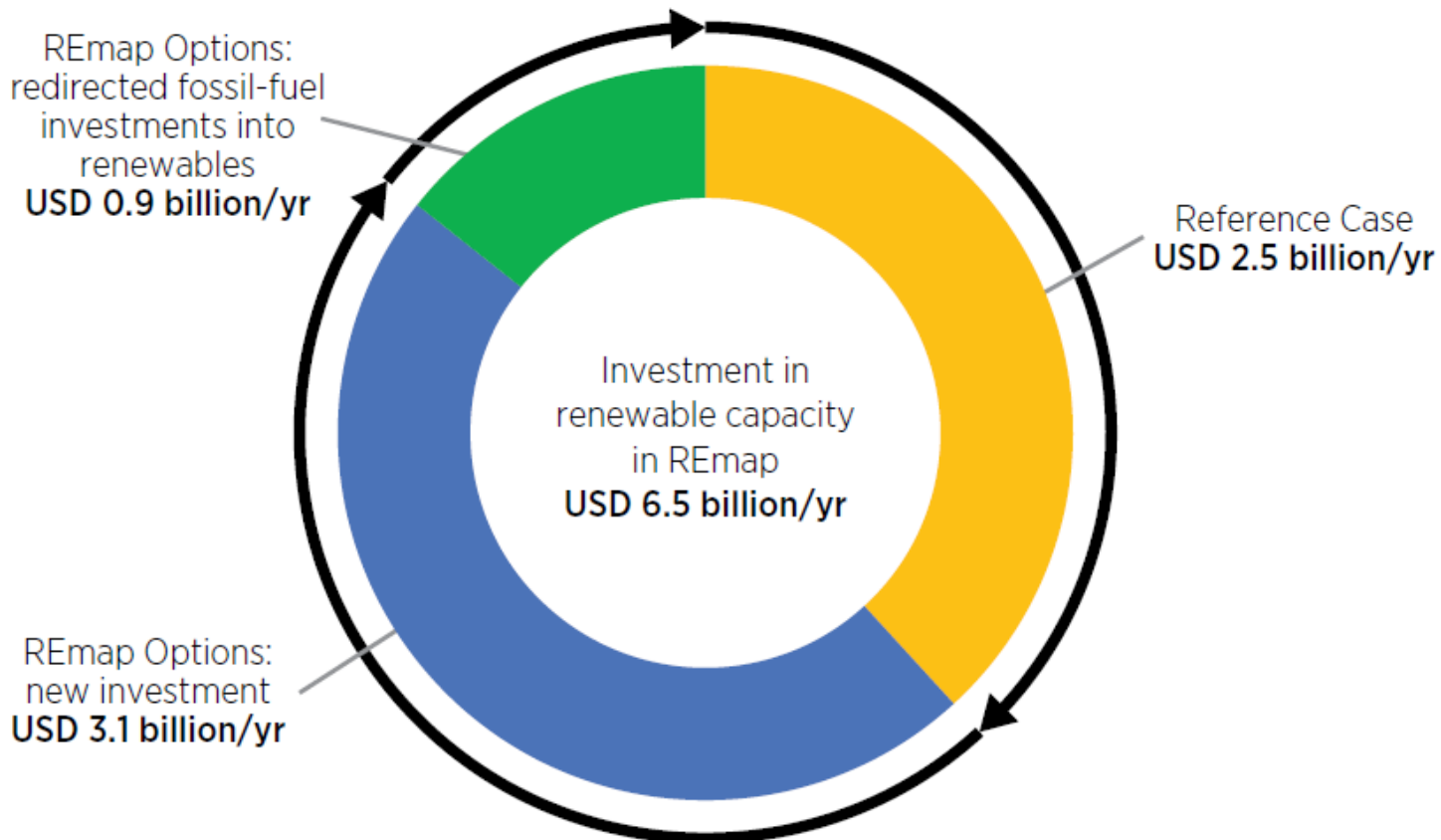
RE in End-Use Sectors

- almost flat in Reference Case
- increase to 9-12% in REmap

REmap Findings

RE investment needs and costs

More than doubling of annual RE investment needed but total costs, including energy, environmental and health-related costs, to be reduced by USD 9 billion per year by 2030



Reduction in energy system costs

- USD 0.9 billion per year
(equivalent to a reduction of USD 7.0 per MWh)

Reductions in external costs (due to reduced externalities)

- USD 8.1 billion per year
(based on average estimate)

Integrated Sustainable Energy Strategy (ISES)

- Envisages 16% coal, 3.3% nuclear & 42% RE in electricity mix by 2035.
- Developed at the time of 2014 electricity shortages → search for a rapid solution to reduce the dependency on imported gas.
- Different setting today → falling RE costs, coupled with rising environmental concerns and the recent gas discoveries.
- Biomass potential not taken into consideration.



- Update energy and power strategy to reflect the growing cost advantages and other benefits of renewables in light of REmap potential of 53% RE share by 2030



- Reflect the potential for biomass in future updates of the Strategy

- Complex administrative procedures discouraging project developers (unavailability of contractual documents for projects and multiple focal points for RE deployment).
- EETC facing difficulties addressing its financial obligations and securing bankable PPAs.
- Renewables still perceived as high risk investments by local financial institutions; small scale projects subject to unfavorable financing conditions from local financiers.

Establish NREA as national RE coordinator along the project lifetime & “one-stop shop” to expedite project implementation

Review the current RE PPAs; develop standardized RE project document templates

Bundle small scale RE projects to the required scale

Improve access to affordable financing

- Wind and solar resource assessments earlier conducted not supplemented with sufficient detail to ensure bankability of projects.
- The planned large scale deployment of renewable energy to 2035 requires careful planning of electricity grid expansion and operations, taking into account the effects of VRE on system stability and efficiency.

Carry out comprehensive measurement campaigns for solar and wind potential → Zoning of cost-effective areas with high RE potential

Align grid operation and dispatch practices to accommodate the supply variability, with increasing solar and wind in the system

Identify viable options for improved power system flexibility

Maximizing Benefits of Renewables Deployment

- The current phase of RE deployment provided 6,000 direct and indirect jobs, with solar PV alone providing half of the jobs created.
- Egypt's comparative advantage in different segments of the RE value chain, particularly in project development and O&M.
- Potential for RE equipment manufacturing & service sector development not tackled by ISES to 2035.
- Constrained skilled workforce and inadequate standards.



- Elaborate a national master plan for the development of local manufacturing capabilities**

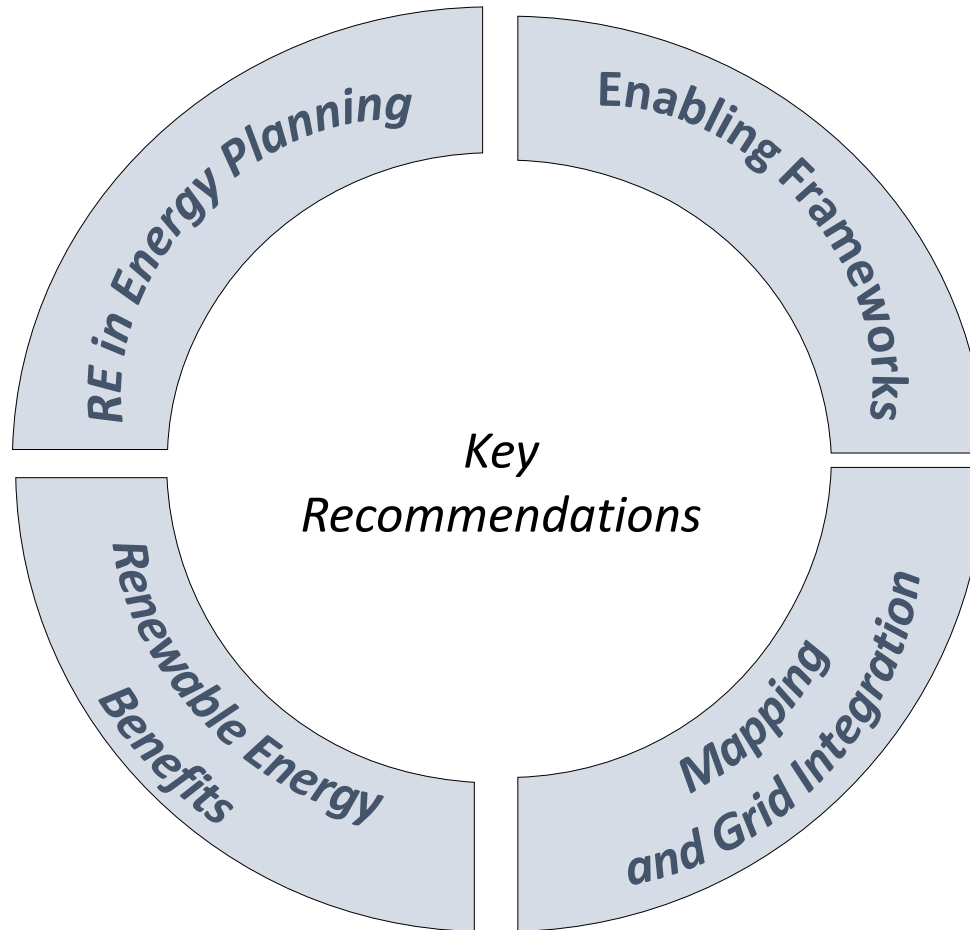


- Encourage the establishment of joint ventures to promote local jobs and knowledge and technology transfer across solar and wind technologies**



- Education and training for skills development; RE equipment quality standards and certification of services**

Key Recommendations



Integrating Renewables into Long-term Energy Planning

- ✓ Regular update of the energy strategy
- ✓ Biomass potential incorporated in the strategy

Maximising Benefits of Renewables Deployment

- ✓ RE manufacturing master plan
- ✓ Skill development, quality standards and certification

Enabling Frameworks for RE Deployment

- ✓ Clarified institutional roles
- ✓ Standardized PPAs
- ✓ Bundling of small projects

Mapping and Grid Integration of Renewables

- ✓ Measurement campaigns
- ✓ Align dispatch and grid operations with RE variability
- ✓ Enhanced power system flexibility



IRENA

International Renewable Energy Agency

Thank you!