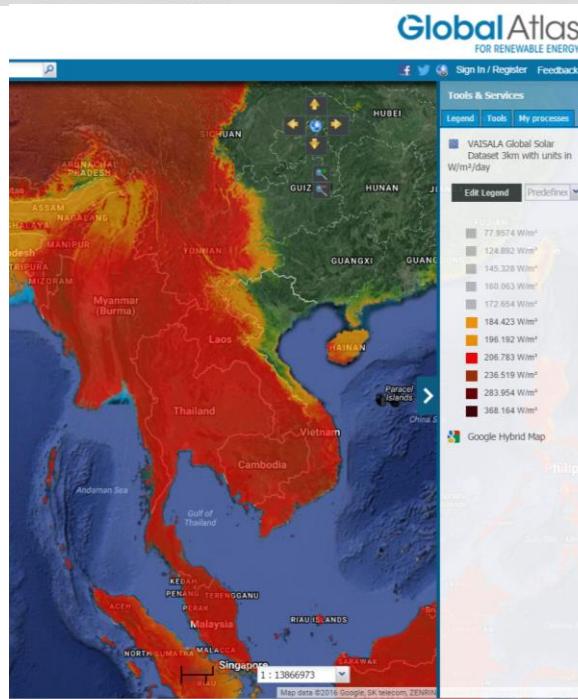
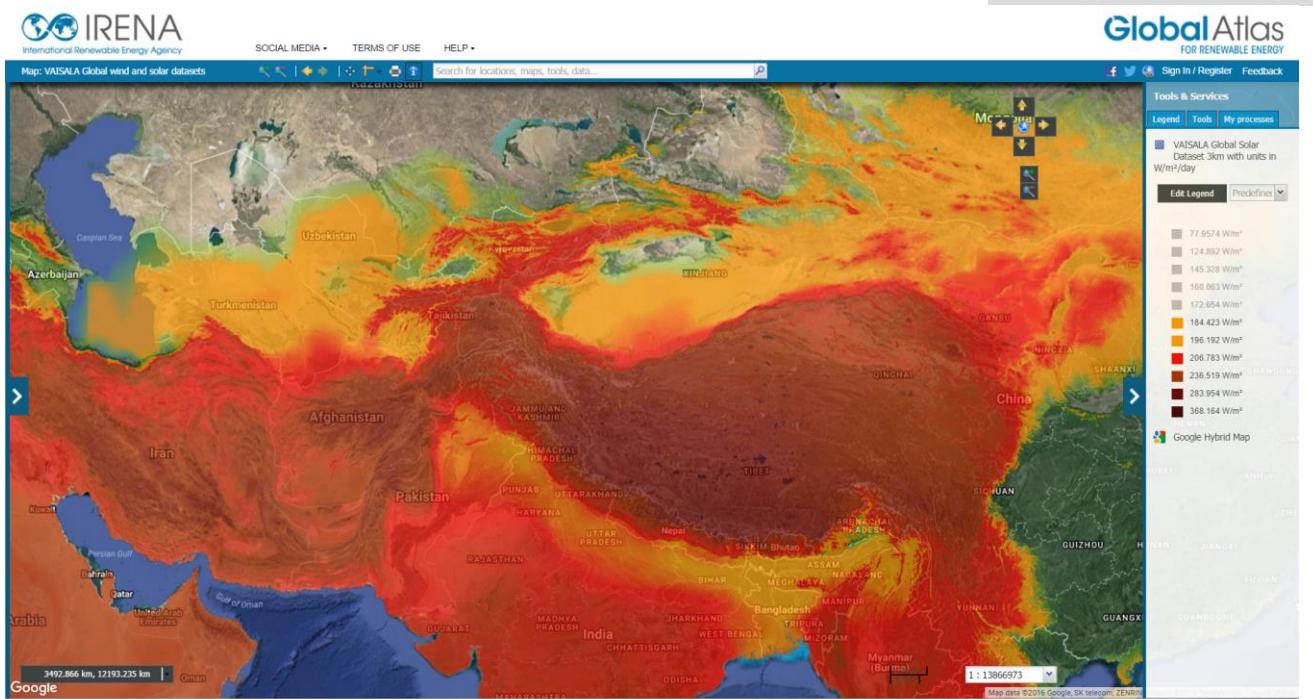
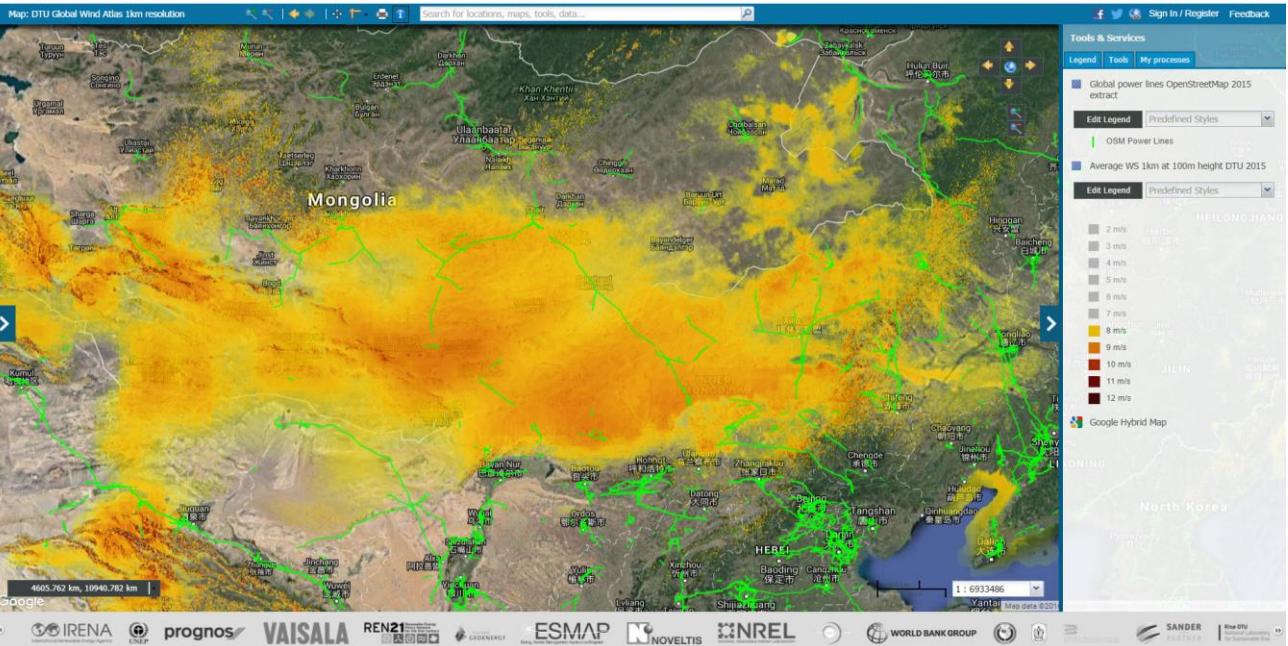


IRENA

Region in Focus: Asia

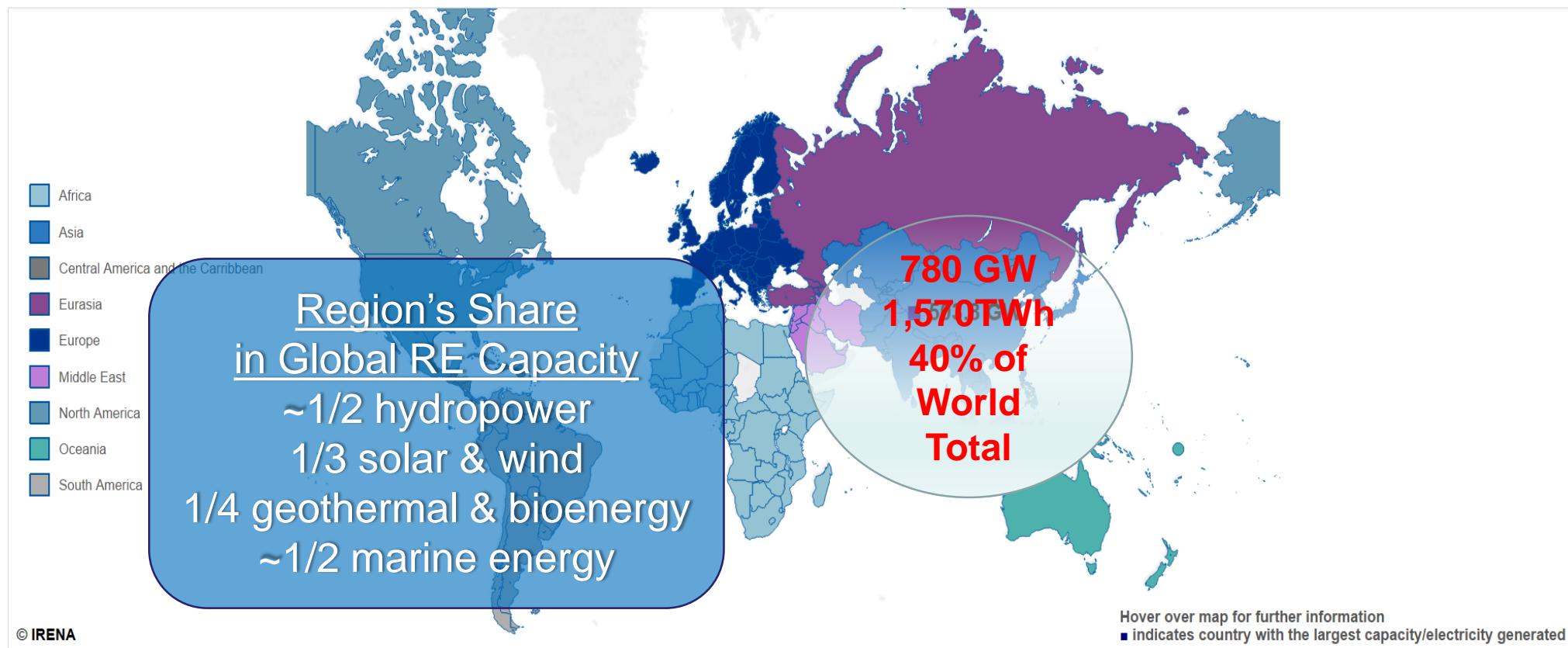
ASIA: Vast Renewables Potential



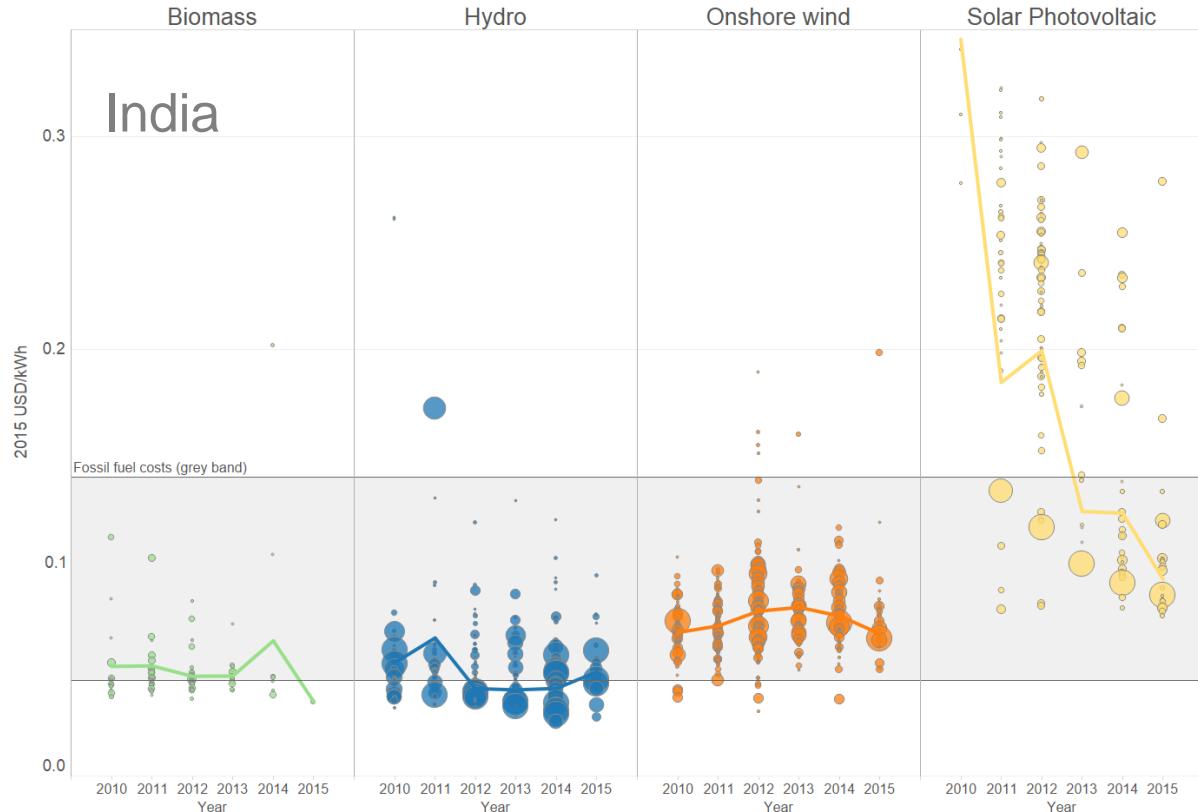
Renewable Energy Deployment

Global Overview on Renewable Energy Capacity & Electricity Generation

		Installed Capacity
Africa	36,447 MW 1.9% of World Total	Flow
Asia	779,947 MW 39.7% of World Total	Year 2015
Central America and the Caribbean	11,580 MW 0.6% of World Total	All
Eurasia	90,081 MW 4.6% of World Total	Technology
Europe	493,329 MW 25.1% of World Total	Sub Technology All
North America	326,707 MW 16.6% of World Total	
Middle East	17,487 MW 0.9% of World Total	
Oceania	25,926 MW 1.3% of World Total	
South America	183,185 MW 9.3% of World Total	

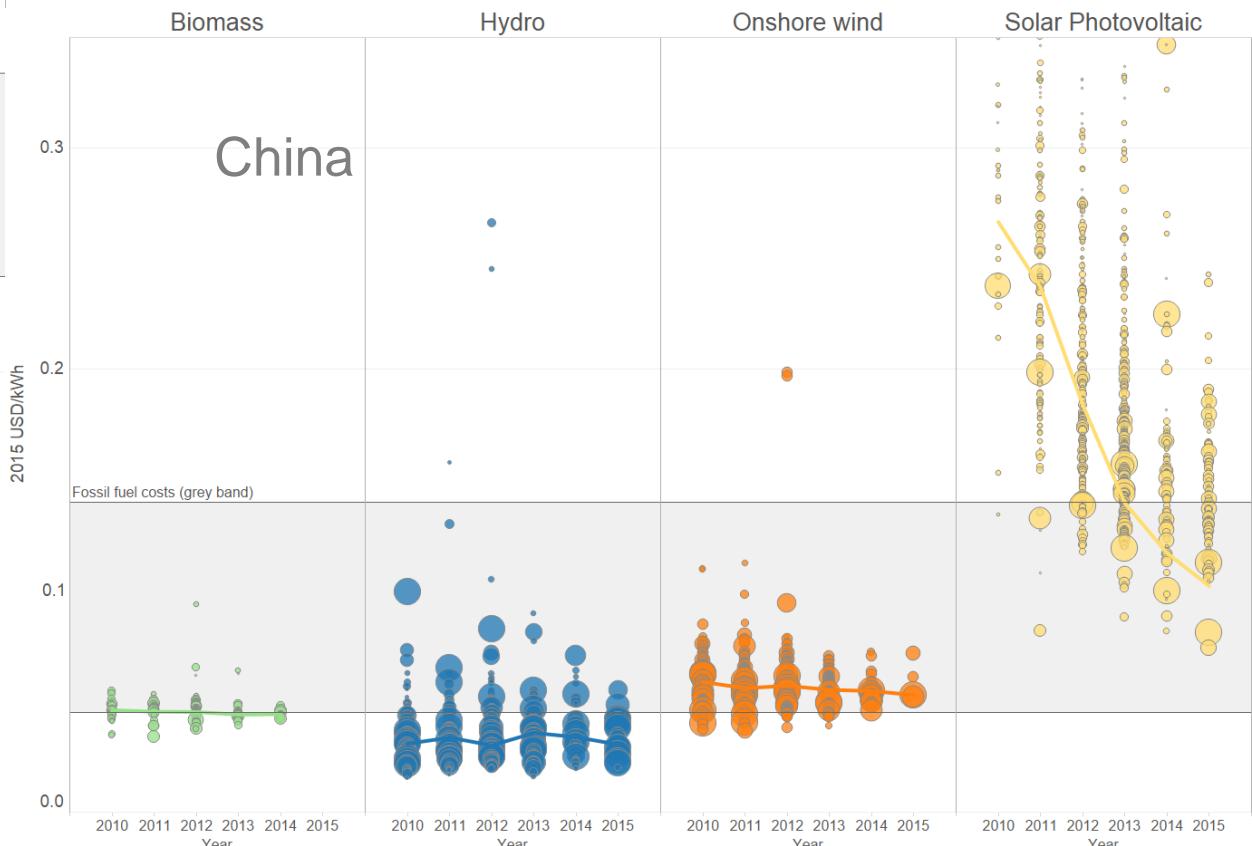


Renewables Power Generation Costs in Asia

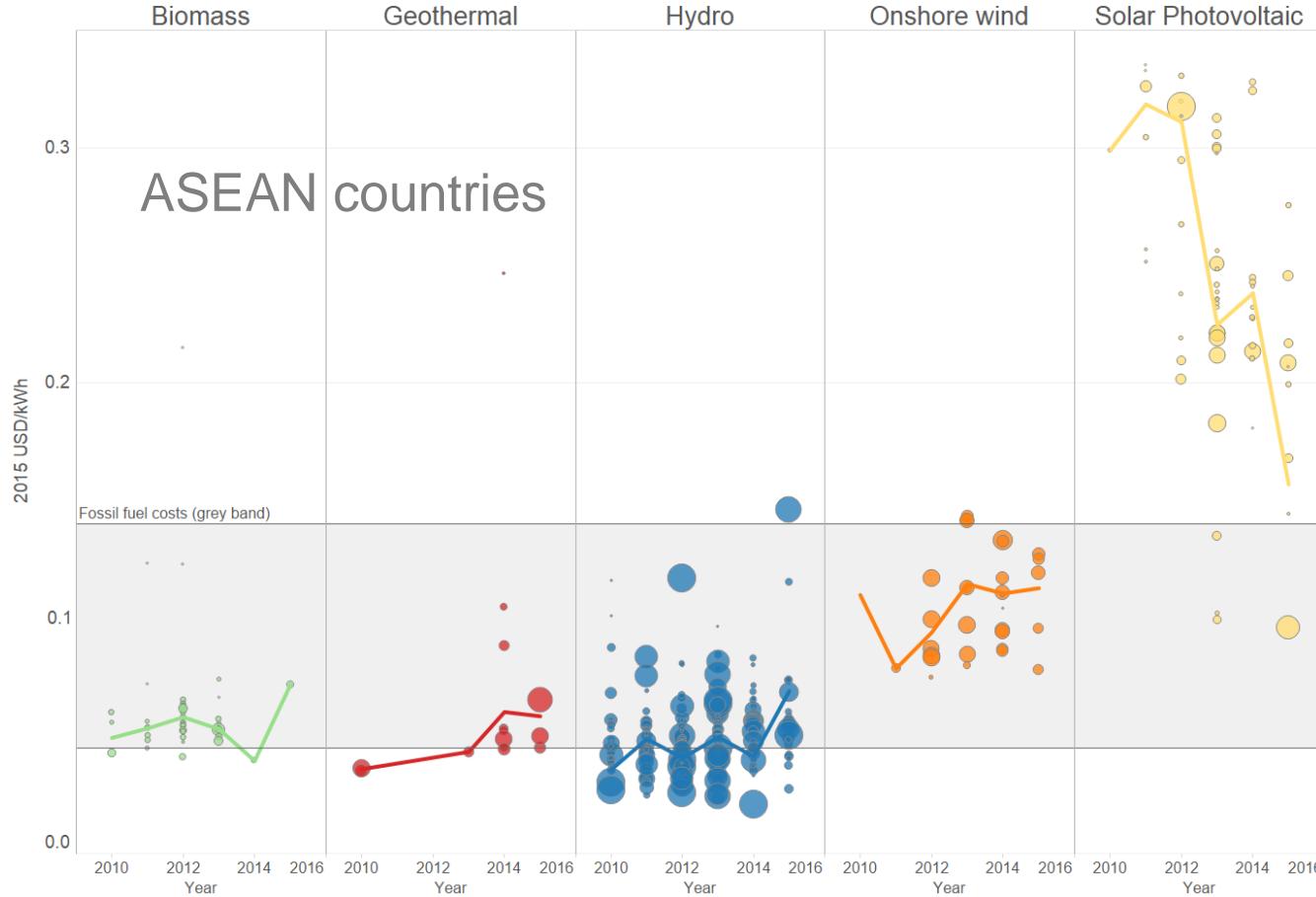


Resulting in highly competitive onshore wind electricity costs, in addition to biomass and hydro

China and India have lower installed cost structures than rest of Asia



Renewables Power Generation Costs in ASEAN countries



ASEAN markets for onshore wind and solar PV smaller, higher cost structures

Results in higher cost of electricity for wind and solar today

Significant opportunities to reduce costs

Improved Visibility in Asia



2nd INTERNATIONAL
OFF-GRID
RENEWABLE ENERGY
CONFERENCE
& EXHIBITION

Manila - Philippines
16-17 June 2014

Suzhou International Forum on Energy Transitions

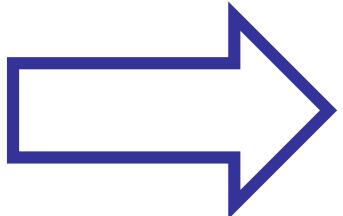
Nov 2015 – Oct 2016



EXPO 2017
• Future Energy •
Astana Kazakhstan

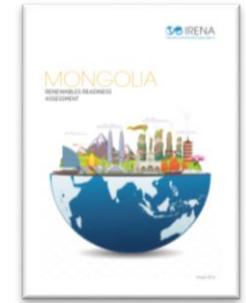
IRENA's Engagement in Asia

Country Support



Regional Engagement

RENEWABLES READINESS ASSESSMENT
DESIGN TO ACTION



Philippines
Pakistan

Post-RRA
Support

Philippines:
RE Mini Grids

Mongolia:
Project Navigator

Pakistan:
Policy & Technical

REmap 2030
A Renewable Energy Roadmap



IRENA
REmap 2030



India
Indonesia

Thailand

Pilot
Implementation

RENEWABLES READINESS ASSESSMENT
DESIGN TO ACTION

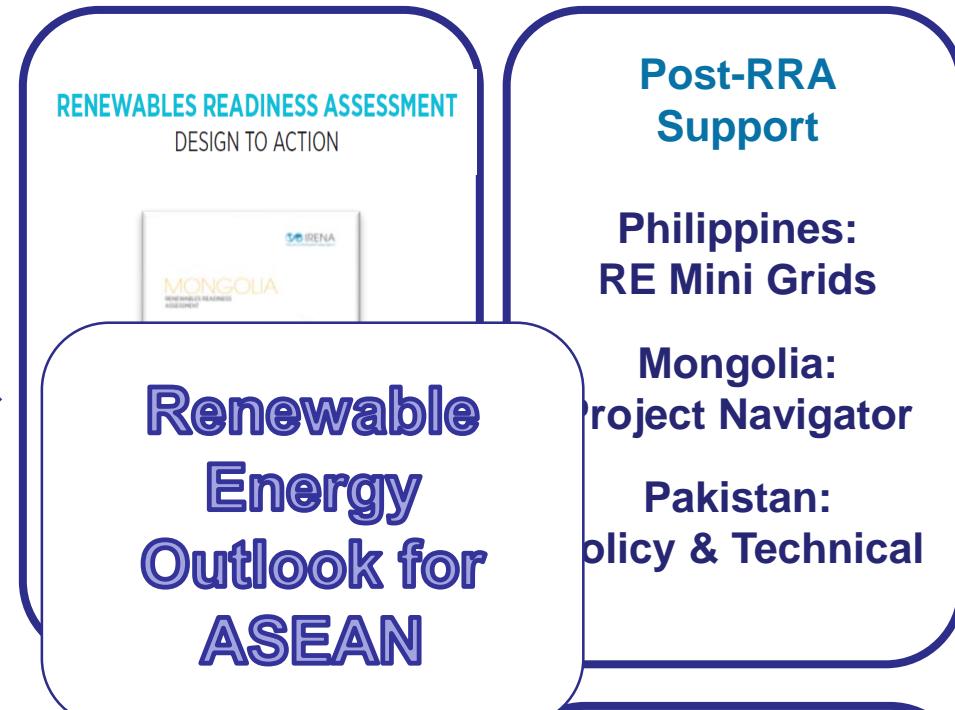
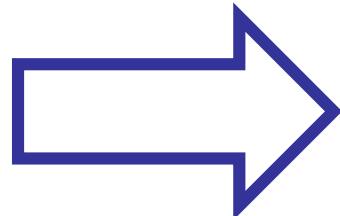


REmap 2030
A Renewable Energy Roadmap

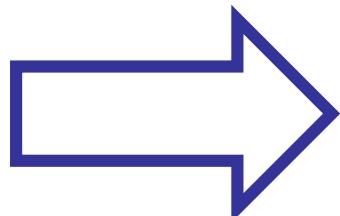


IRENA's Engagement in Asia

Country Support



Regional Engagement



Greening the ASEAN Power Grid



Green light from the ASEAN
SOME (Oct-2015)

Two rounds of multi-stakeholder consultations:
- Malaysia (Nov-2015)
- Thailand (Jun- 2016)

Implementation strategy
under preparation



IRENA's Clean Energy Corridor Concept in ASEAN

Accelerated development of utility-scale, renewables-based electricity that can be integrated into national systems and the evolving ASEAN APG

Building on and benefits from other CEC experiences

A solid framework for IRENA's engagement at the country and ASEAN sub-region levels

IRENA tools support the regional engagement in Asia



IRENA
SUSTAINABLE
ENERGY MARKETPLACE



IDENTIFY FUNDING OPTIONS BY USING THE
FINANCIAL NAVIGATOR

Learning section

Learn more about project development

Start a project

Learn more about the tools



Login

Username / email address:

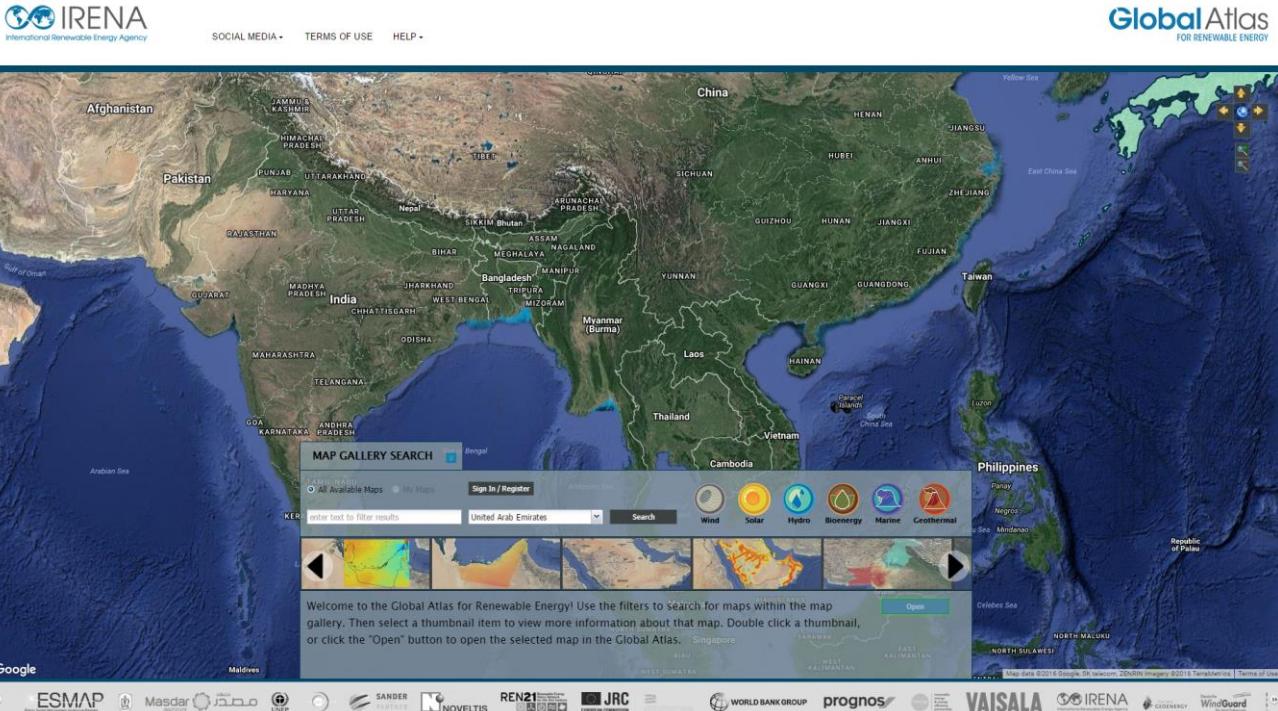
Password:

[Forgot password?](#) [Login](#)

[Don't have an account?](#) [Register](#)

Financial Navigator

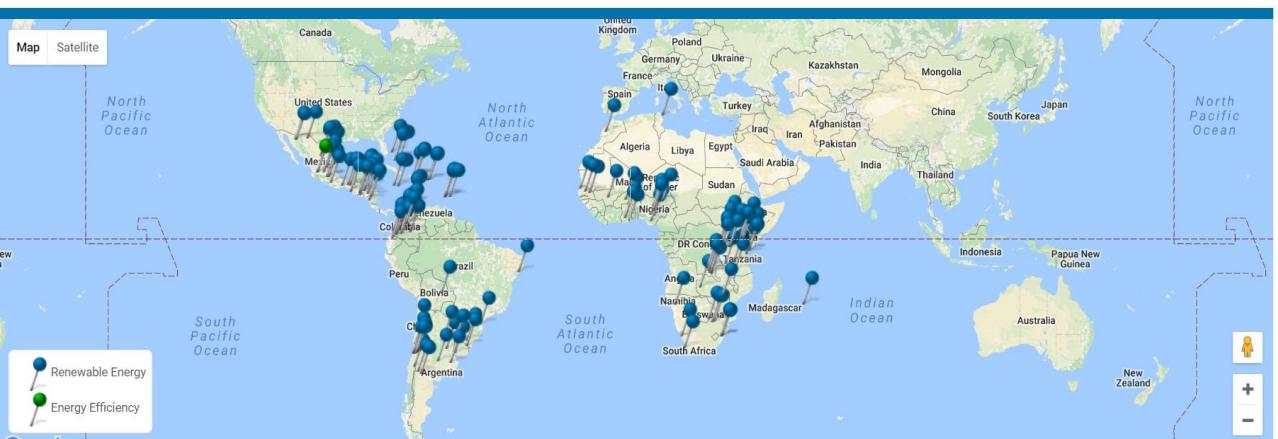
Learn more about Financial Navigator



[About the Marketplace](#) | [Benefits for Users](#) | [About IRENA](#)

" We have real evidence of the increasing worldwide consensus that a sustainable energy future powered by renewables is within reach. "

Adnan Z. Amin - Director General





ASEAN Centre for Energy
One Community for Sustainable Energy

REmap
A Renewable Energy Roadmap

IRENA
International Renewable Energy Agency

RENEWABLE ENERGY OUTLOOK **FOR ASEAN**

A REMAP ANALYSIS



With financial support from

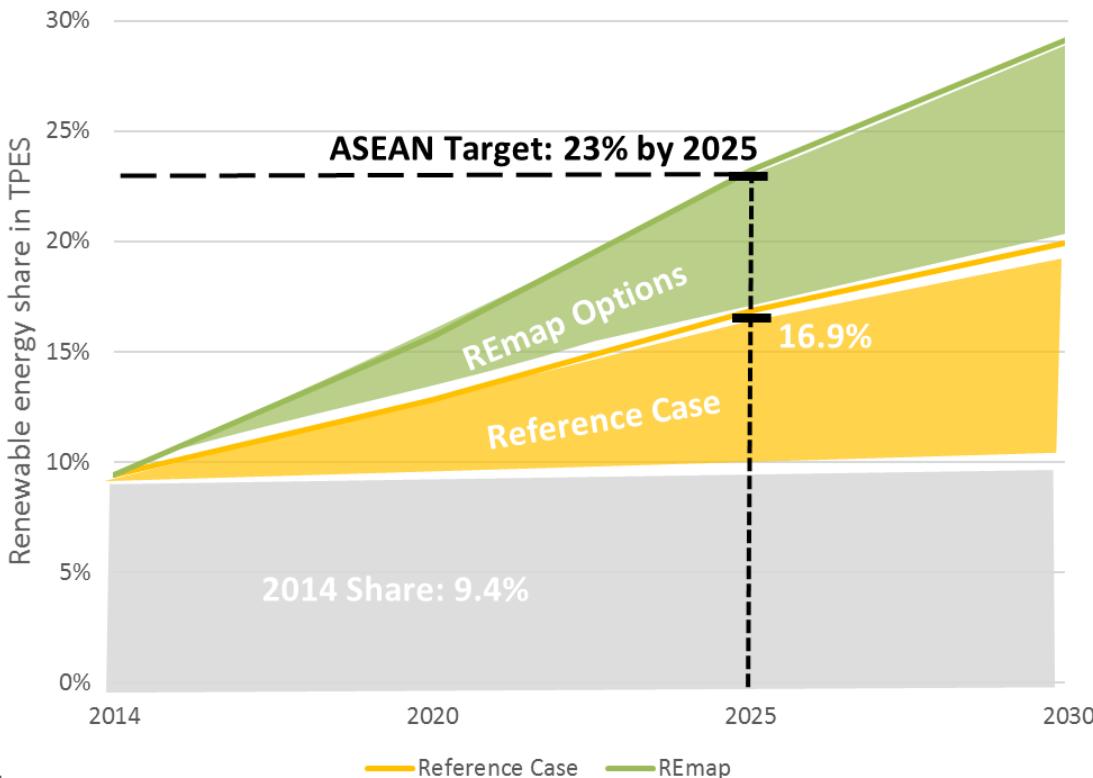
giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



ASEAN's 23% aspirational renewables target

October 2015 as part of ASEAN Plan of Action for Energy Cooperation

- 23% renewable energy share¹⁾ in total primary energy supply (TPES) by 2025
- ACE Energy Outlook (2015):
 - 2014 – 9.4%
 - 2025 BAU – 10%
 - 2025 Advanced Policy Scenario (APS) – 15.4%
- IRENA Reference Case – 16.9% (APS + latest country updates)
- 6% point gap to the 23% target



1) excluding traditional uses of bioenergy, including all hydropower

Approach and country engagement

- IRENA's REmap renewable energy technology assessment tool and approach
- ACE's close working relationship with the 10 ASEAN Member States

Country engagement as the cornerstone of REmap

IRENA and ACE have engaged all ASEAN countries and +60 experts throughout 2016

- Two in-depth **technical workshops**:
 - March workshop in Manila
 - June workshop in Bangkok
- Three review **webinars** (April, May, September)
- 34th AMEM final **Ministerial consultative meeting**
- Report finalized by end of 2016



Ministerial Engagements at the 34th AMEM



REmap ASEAN Roundtable event and report launch, 27 October, Singapore

- Co-organized event with the ASEAN Centre for Energy (ACE)
- Launch with IRENA's Deputy Director-General and ACE Executive Director
- Country presenters from Singapore, Indonesia, Thailand
- 200 attendees and 70 registered media

Renewable Energy Outlook for ASEAN – REMAP 2030 Analysis

- The 34th ASEAN Ministers on Energy Meeting (AMEM) took place 21-23 September in Myanmar
- The key messages were presented to the 10 ASEAN Energy Ministers
- A detailed presentation was made at the Minister-CEO Dialogue, followed by interactive discussion and feedback

Joint Ministerial Statement of the 34th AMEM

- Recalling ASEAN's 23% renewable energy targets
- The Ministers recognised and commended development of ASEAN Renewable Energy Outlook



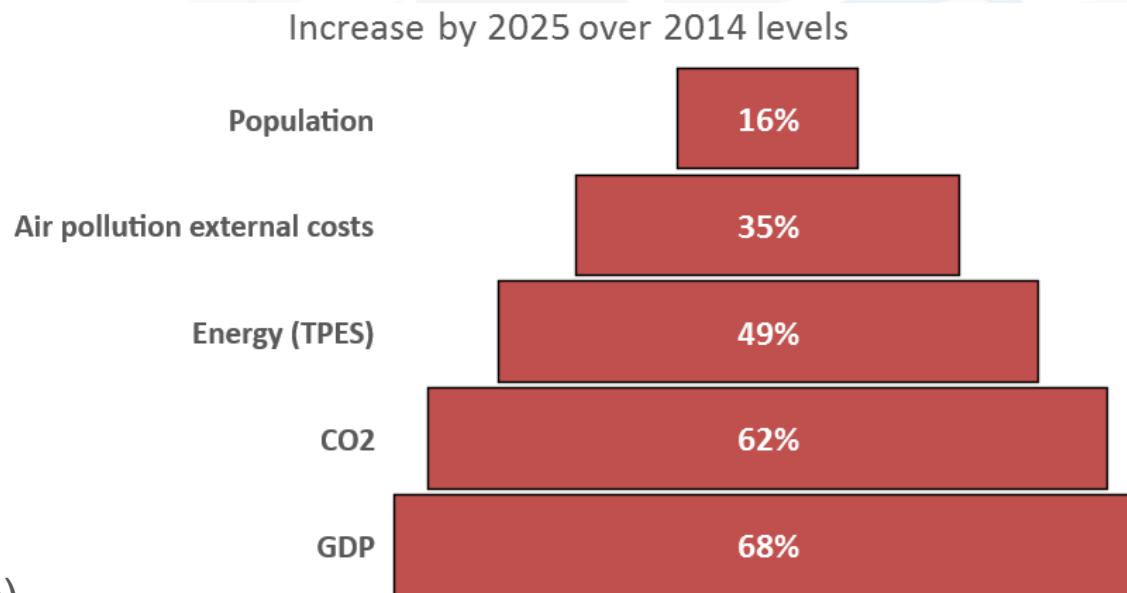
Rapid growth, pollution, CO₂ and imports

The effects of rapid economic and industrialized growth result in the largest growth in GDP with almost a 70% increase

Energy demand soars 50%, with most demand covered by fossil fuels

With this growth comes the impacts of increasing use of fossil fuels:

- **USD 225 billion per year** air pollution associated health and environmental costs
- **Energy-related CO₂ emissions 2.2 Gt/yr** (~5% of all global emissions)
- **Rising imports of oil and gas**



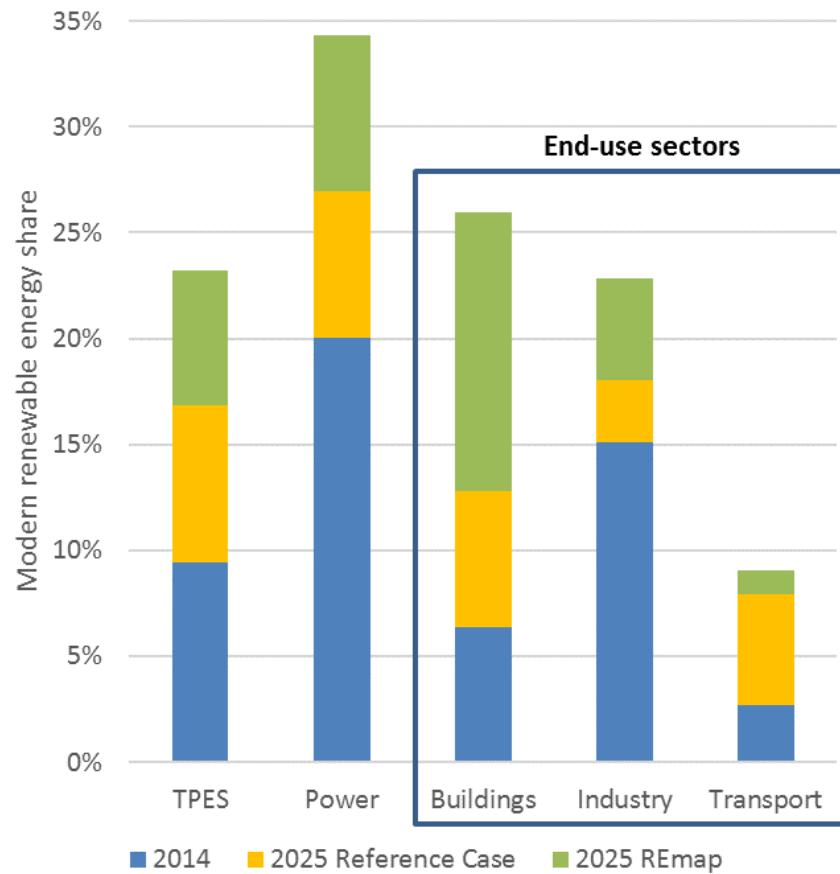
Note: For ASEAN region, based on the Reference Case in 2025

Note: Energy efficiency improvements are only assumed to take place in the Reference Case. REMAP did not assess additional options to improve energy efficiency which would result in lower overall energy demand.

Renewable energy share by sector 2014-2025

Renewable shares increase in all sectors, but mostly in end-use sectors

- Power sector – highest share of renewable energy at 34%
- Buildings – largest increase in share due to the substitution of traditional uses of bioenergy
- Industry – large untapped potential compared to the Reference Case
- Transport – largest growth in renewable energy use according to the Reference Case



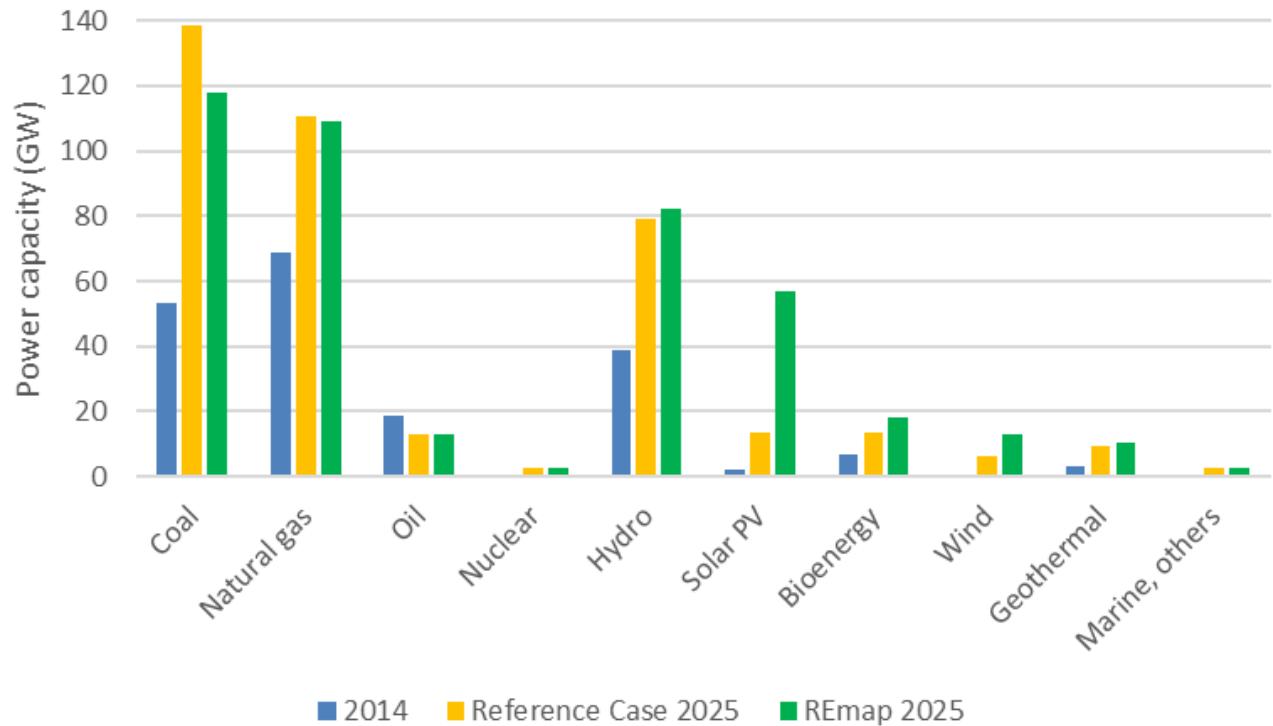
Note: End-use sectors include the consumption of electricity sourced from renewables. Shares presented in figure exclude traditional uses of bioenergy.



Closing the gap: power sector

In REmap, power generation capacity grows almost by 240 GW to more than 400 GW, from 20% in 2014 to 34% of generation in 2025

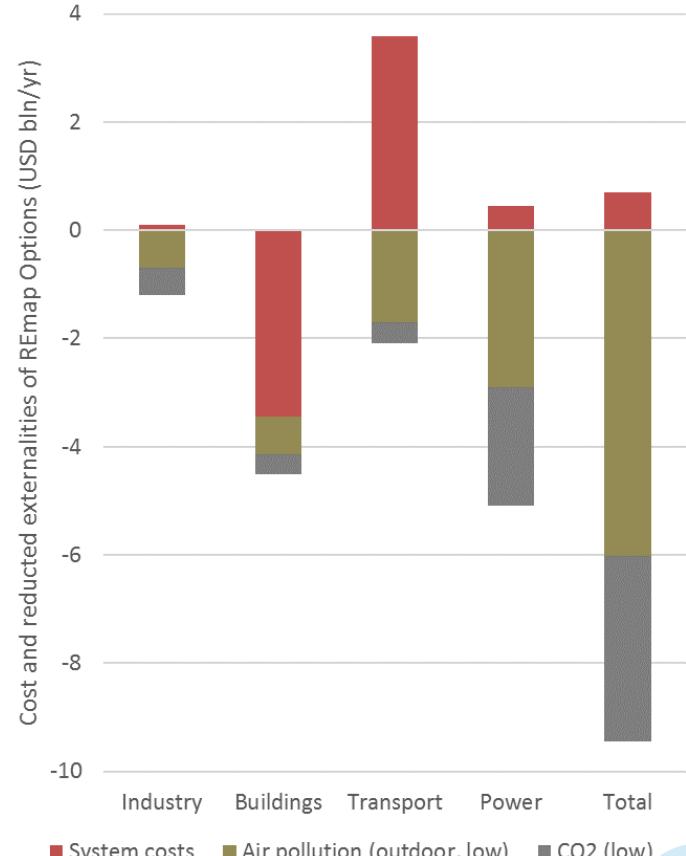
- Coal and natural gas will have the largest installed capacity
- Hydropower increases significantly in the Reference Case
- Largest growth in REmap is for solar PV- REmap Options:
 - 50% solar PV
 - 20% biopower
 - 12% wind



Costs and savings of closing the gap

The REmap Options for closing the gap to 23% are represented by an incremental cost of USD 1.9 per MWh by 2025

- The REmap Options would result in slight incremental costs of USD 1.9/MWh or USD 0.7 billion per year in absolute terms
- Reduced externalities would outweigh costs. Savings exceed the cost:
 - 10x for outdoor air pollution
 - 6x for climate change
 - 38x for indoor air pollution (not shown in figure)
- ASEAN's fossil fuel expenditures would be lowered by USD 40 billion per year by 2025

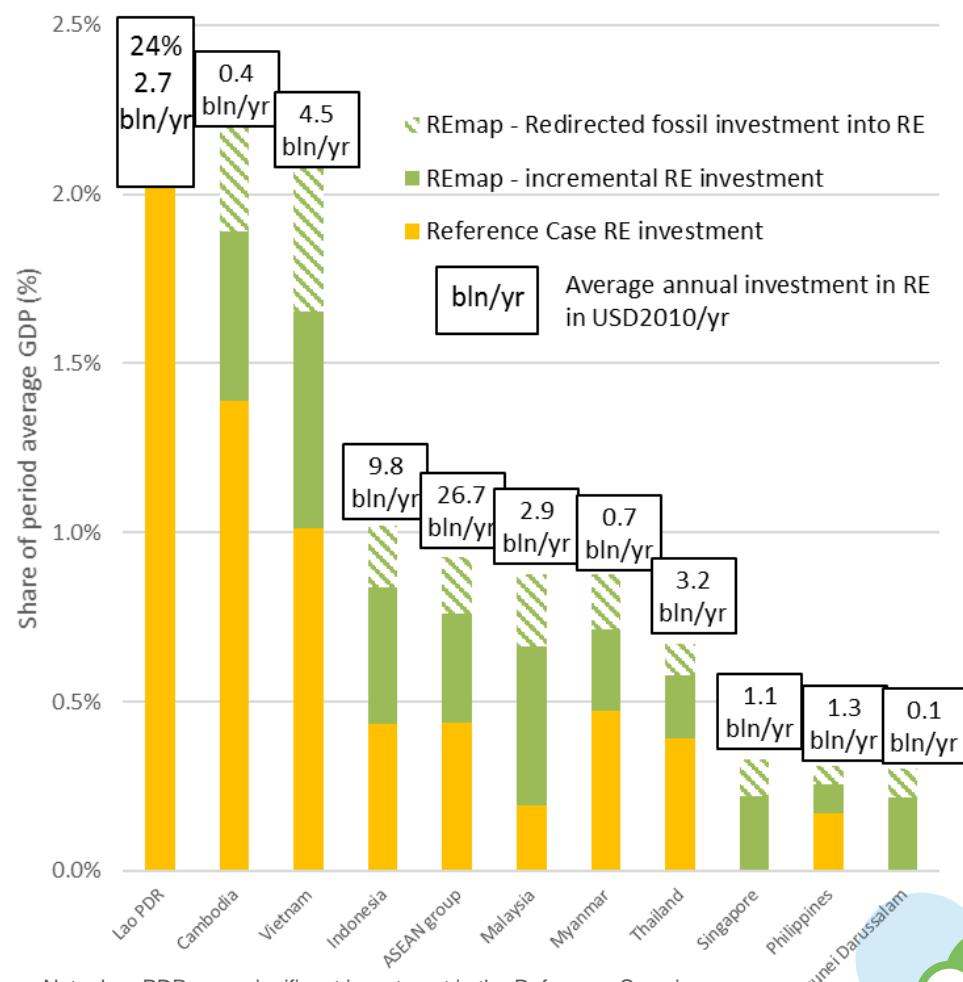


Note: Reduced externalities resulting from lower levels of indoor air pollution are excluded from the figure.

Investment needs for realizing the target

The region will need to invest 1% of its GDP annually into renewable energy capacity to reach its 23% target

- Average annual investment would total USD 27 billion
- This is split equally between the Reference Case and REmap Options for closing the gap
- One-third of the additional investment needed for REmap Options will be redirected from fossil fuels
- Three-quarters of all renewable energy investment is for power sector





Key Conclusions and areas for further work

- The regional target of 23% renewable energy is achievable **with concerted efforts by all ASEAN countries**
- Savings related to reduced externalities far exceed additional costs
 - Energy-related CO2 emissions will rise by 60% in the Reference Case. With the renewable energy target reached, growth is restrained to 47%
- **Investment in renewable capacity will need to double**, and mobilizing finance will be key to achieving the target
- Synergies between strengthened energy efficiency and renewable energy efforts should be explored further
- Transmission and distribution grids across the region must be **expanded and strengthened**
- Efforts need to be expanded for **renewable energy uptake in the heating, cooking and transport sectors**, with special attention for the potential of bioenergy and solar thermal
- On-going discussion on integration of REMAP analysis for ASEAN into the 5th ASEAN Energy Outlook (5th AEO)

Partnerships



ASIAN DEVELOPMENT BANK



QUESTIONS FOR DISCUSSION

- The region is progressing rapidly in terms of RE technology deployment. In light of various RE programmes and initiatives implemented by development partners in the region, what should be the priority areas and the most effective modalities to channel the Agency's support to the region and maximise its impact?
- The region is massive in terms of geographical coverage and population, which not only offers vast energy potential but also suggests huge diversity in energy dynamics bringing in rich knowledge and experience in renewables development.
 - How can IRENA's engagement be effectively customized to address the specific needs and priorities of the different sub-regions or countries?
 - What lessons from Asia can be of relevance to other regions and vice-versa? How can the Agency effectively facilitate and strengthen intra-regional knowledge sharing?

IRENA

Thank you