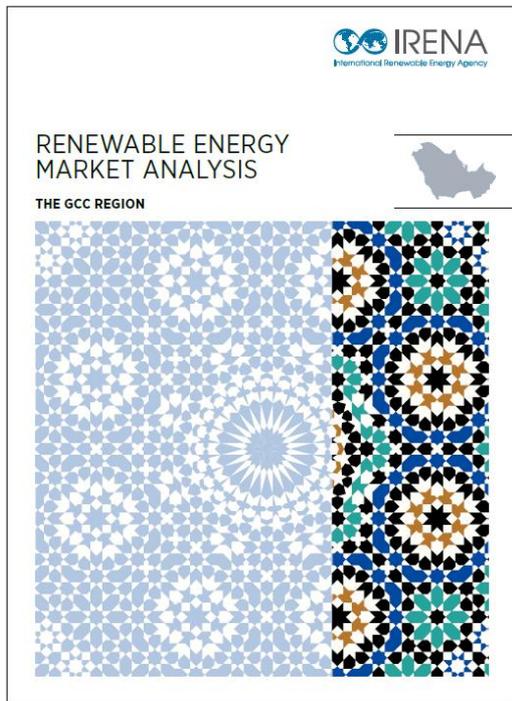


# Renewable Energy Project Development and Finance in South East Asia

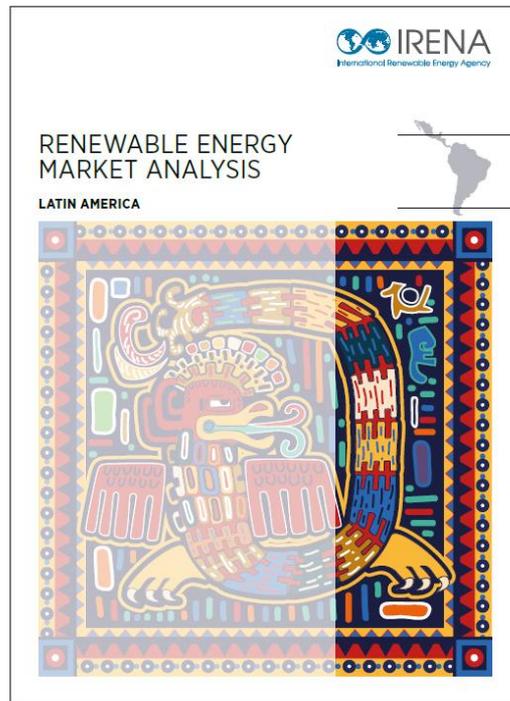


**Arjun Guha**  
Knowledge, Policy and Finance Centre  
IRENA

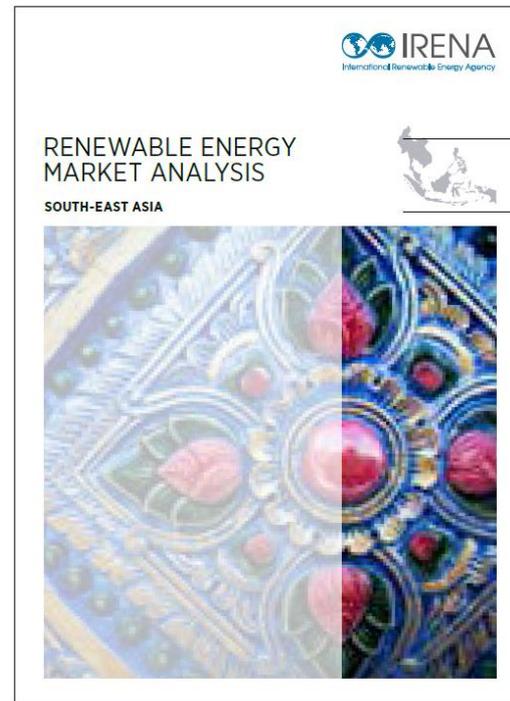
# IRENA Renewable Energy Market Analysis Series



IRENA © 2015



IRENA © 2016



IRENA © 2018

Macro-economic overview

Energy sector landscape

Renewable energy landscape

Policy framework

Investment framework

In-focus discussion

All IRENA publications can be downloaded from [www.irena.org/publications](http://www.irena.org/publications)



# Rising energy demand to sustain development in Southeast Asia

 <p><b>GDP reached USD 2.5 trillion in 2016</b> – triple what it was in 2005</p> <ul style="list-style-type: none"><li>• Estimated to reach <b>USD 3.5 trillion in 2020</b> and <b>USD 5.4 trillion in 2030</b></li></ul>	 <p>Economies undergoing structural transformations, rising share of <b>industry</b> and <b>services</b> in GDP</p> <ul style="list-style-type: none"><li>• Important differences within the region between countries</li></ul>	 <p><b>Poverty rate</b> has fallen from <b>47% in 1990</b> to <b>14% in 2015</b></p> <ul style="list-style-type: none"><li>• <b>Population</b> expected to increase by <b>25% by 2050</b></li><li>• <b>Urbanisation</b> rate likely to increase from <b>48% to 64% in 2050</b></li></ul>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

## Drivers for Renewable Energy

**Energy security** - with rising domestic energy demand and decreasing domestic resources, the self-sufficiency is expected to decline over the next decades.

**Socio Economic** - Scaling-up renewables would have a positive impact on the region's GDP (up to +0.03% by 2030) Could increase direct and indirect employment in the sector to 2.2 million by 2030

**Cost competitiveness** - Electricity from hydro, geothermal and bioenergy in range of fossil-fuel costs. Solar PV and wind seeing rapid reductions.

**Energy Access** – 65-70 Million people in South East Asia without access to electricity. Significant potential to being reliable energy services to unserved populations.

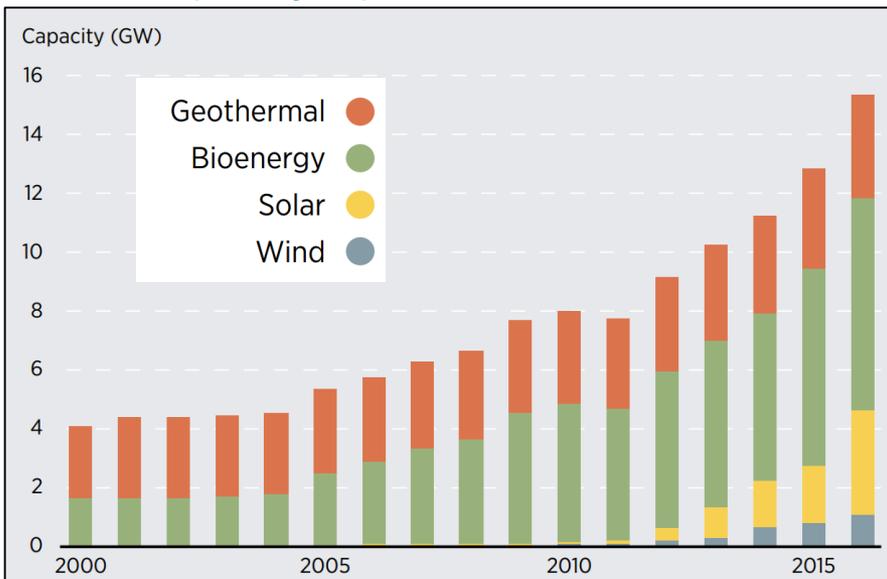


# Growing renewable energy deployment

Non hydro RE capacity in South East Asia has grown from around 4 GW in 2000 to over 15 GW in 2016 ~ 18-19% growth rate

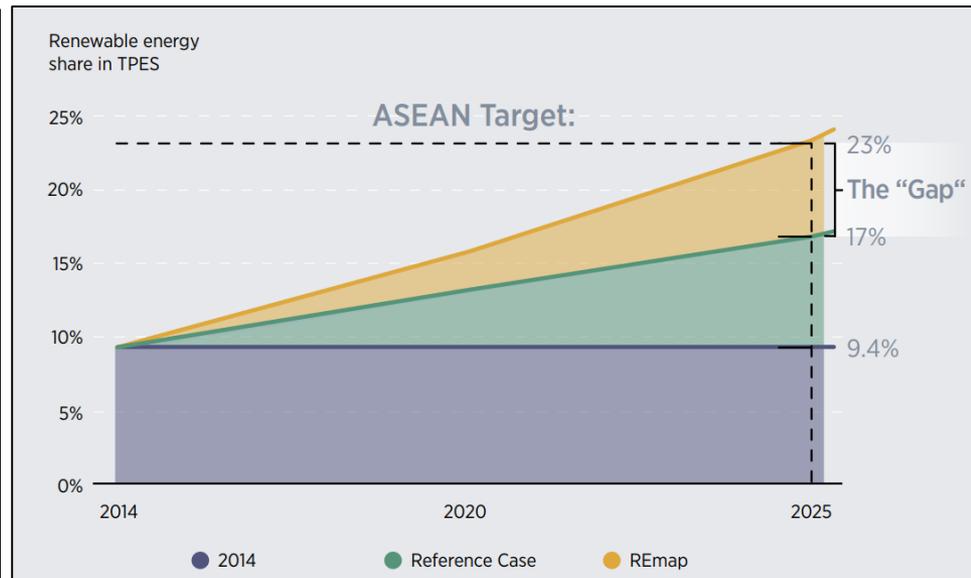
Based on current plans and policies the share of renewables in TPES will increase to 17% in 2025 – open opportunity of 6%.

Renewable energy capacity by source in Southeast Asia, 2000–2016 (non hydro)



Source: IRENA, 2018

Renewable energy share in ASEAN primary energy mix in 2025 and 2030



Source: IRENA and ACE, 2018

# Drivers for renewable energy deployment - costs

Electricity from hydro, geothermal and bioenergy in range of fossil-fuel costs. Solar PV and wind seeing rapid reductions.

## Cost competitiveness

Investment costs of selected renewable energy technologies, 2016



Source: IRENA, 2018

- **Solar PV** most significant cost reduction - **45% decline in four years**, in line with the global average
- **Onshore wind** also decreased – an **11% difference** also in line with the global average
- **Geothermal** only technology that has seen a **slight increase** in weighted average investment costs - **8%** most likely because of the **quality of sites** being developed in 2014 and 2016
- **Hydro** costs virtually **stayed the same** from 2011 to 2016
- **Bioenergy** projects capital costs **vary significantly depending on size and location**. Cost for 53 projects commissioned between 2010 and 2016 ranged between USD 900/kW and USD 2 433/kW with a weighted average of USD 1 660/kW.



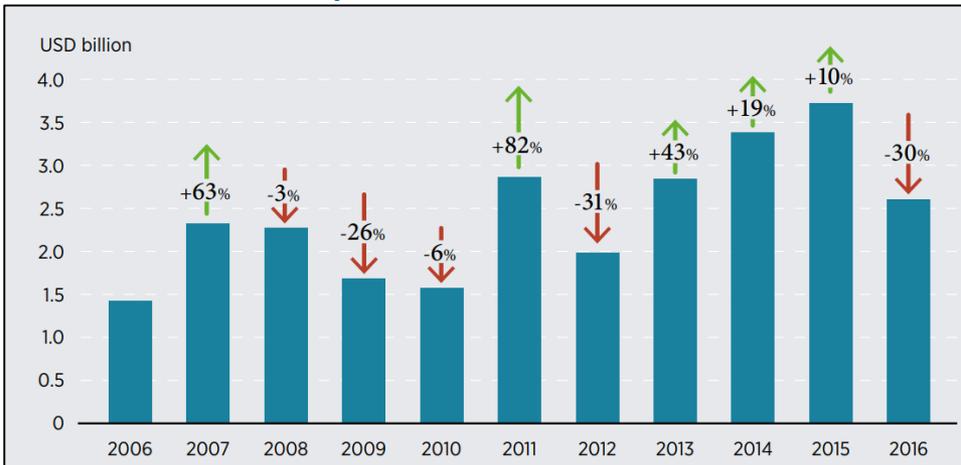
# Enhancing investments through policy frameworks

Between 2006 and 2016, over USD 27 billion has been invested in the (non-large hydro) renewable power sector.

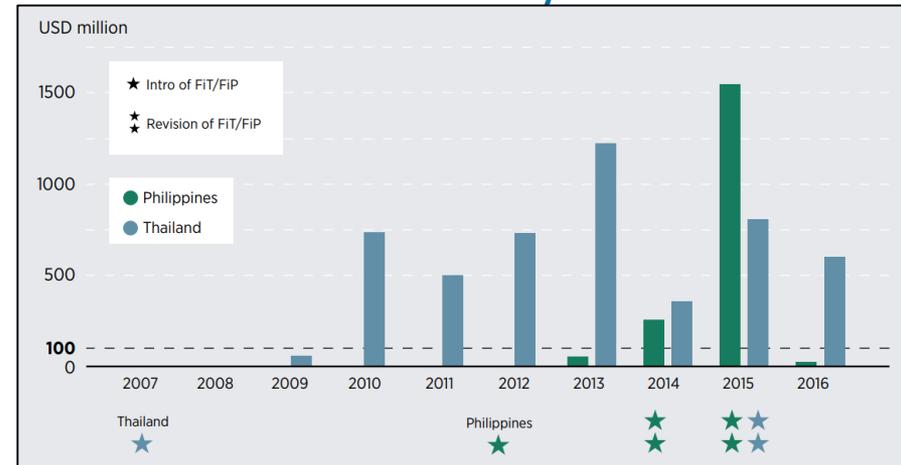
- The capital mix and the variety of financing institutions has evolved. Changing role for development finance with greater private sector investment.
- Most countries have introduced feed-in tariffs. Mechanisms, such as the auctions, are being introduced.

**Strong correlation between policy and regulatory environment and investment flows.**

### Investment in renewable energy in the power sector, 2006–16



### Investment in solar PV in selected countries driven by FIT





# Investment in RE by development banks

Between 2009 and 2016, over USD 5.9 billion has been invested in renewable energy by the development banks.

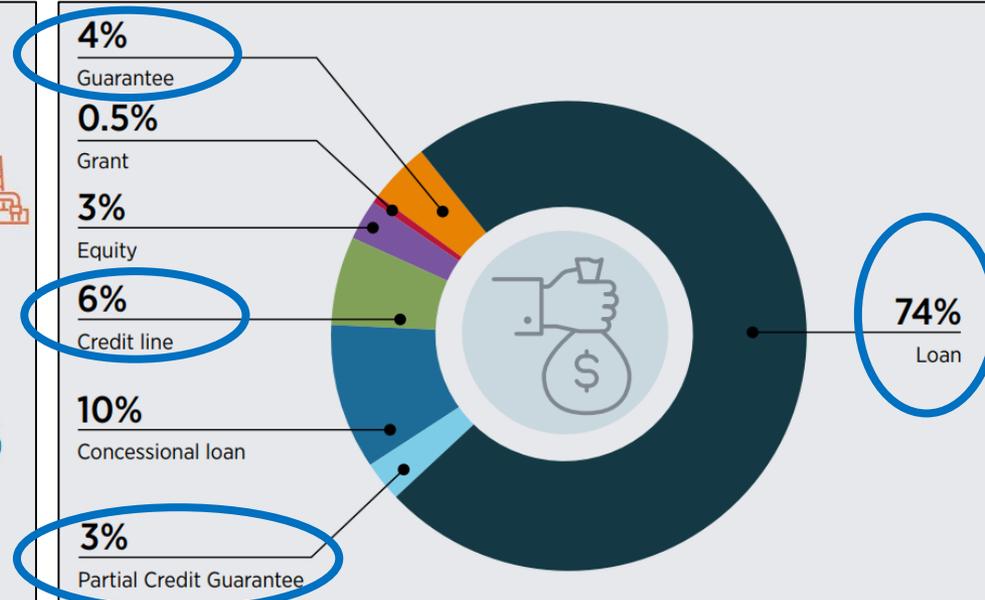
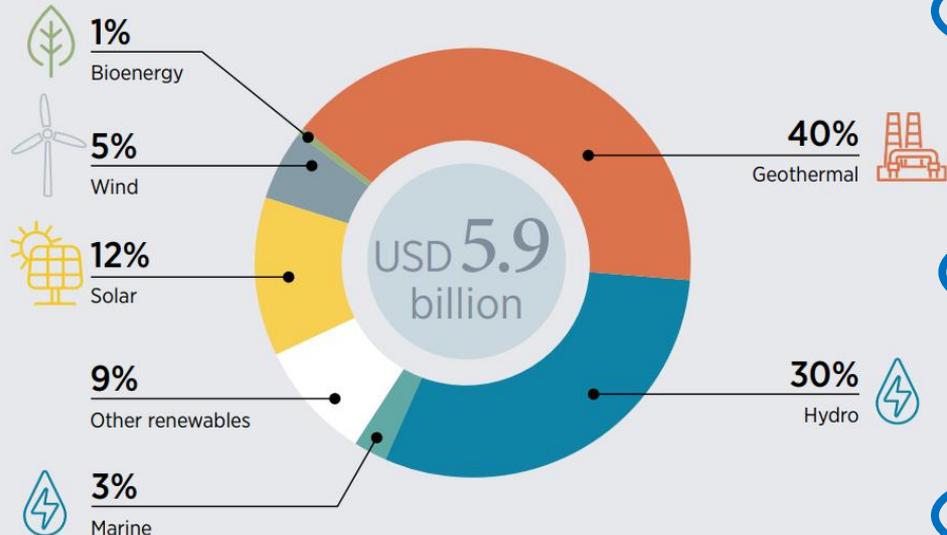
- **Technology** - Largest share for geothermal and hydro, with increasing investments in solar.
- **Financial instrument** - Largest share for loans (the capital allocation for guarantees is lower).

## Significant opportunity for on-lending credit lines, risk mitigation instruments and guarantees

Development banks' investments in renewable energy in South East Asia by technology \*, 2009–16

Development banks' cumulative investments in renewable energy in South East Asia by type of instrument, 2009–16

\*Due to lack of available data, KfW is not included





# Enhancing impact through national financing vehicles

Engaging national financial systems can leverage public and development capital to drive national policies.

- Public funds for equity, co-financing and risk mitigation can crowd in private funds.
- Structures for on-lending development finance exist but the defining phase will be the move from piloting RE finance towards scale-up and diffusion to other local banks.

**A focus on improving project readiness and attractiveness, improving access to capital at the local level, and mitigation of investment risks needed.**

Country	Name of agency
 Thailand	Office of Natural Resource and Environmental Policy and Planning (ONEP)
 Indonesia	PT Sarana Multi Infrastruktur (SMI) and Indonesia Climate Change Trust Fund (ICCTF)
 Lao PDR	Laos Energy Promotion Fund (LEPF) and Energy Access Solar-Home-Systems (SHS) Fund Environment Protection Fund (EPF)
 Malaysia	The Malaysia Green Technology Corporation (GreenTech Malaysia)
 Cambodia	National Council for Sustainable Development (NCSD)
 Viet Nam	Vietnam Development Bank (VDB)

**Examples of national financing vehicles for renewable energy**



## Regional Examples



- Community-financed mini/micro hydro and biomass gasifiers
- **6000+ mini-grids**
- Indigenous technology
- 20 – 30 years experience
- Productive end uses



- Commercial cluster with hotel, commercial offices, cold storage
- Roof lease agreement and PPA signed with client
- Zero-investment model for customers



- Home Biogas package
- Biodigester, cookstove, installation, after sales.
- LPG supply unreliable, 20 hours/wk wood gathering avoided.



20kW Htan Hla Pin Micro Hydro  
Courtesy: Loïs Sevestre



1.8 MW on Robinsons Mall, Quezon City  
Courtesy – SunSource Philippines

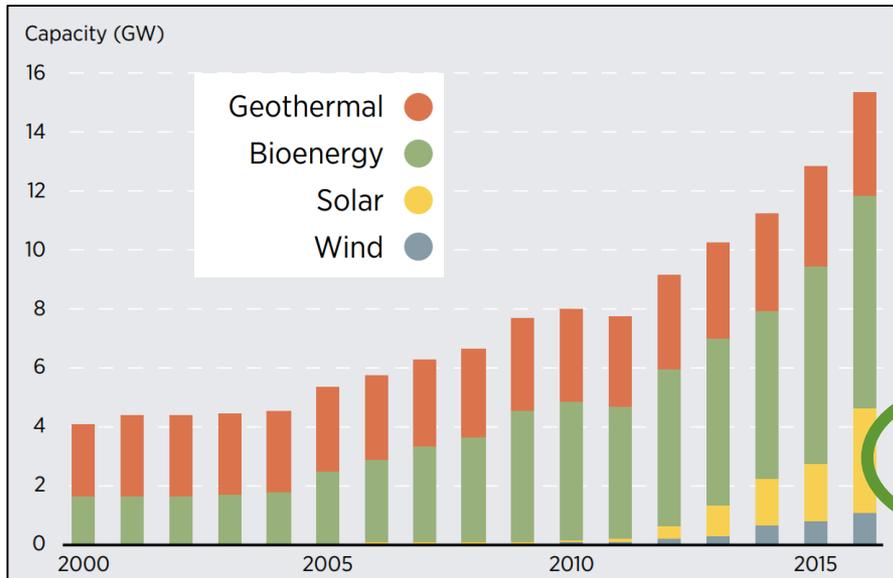


Installing a portable biodigester in Cambodia  
Courtesy ATEC\* biodigesters



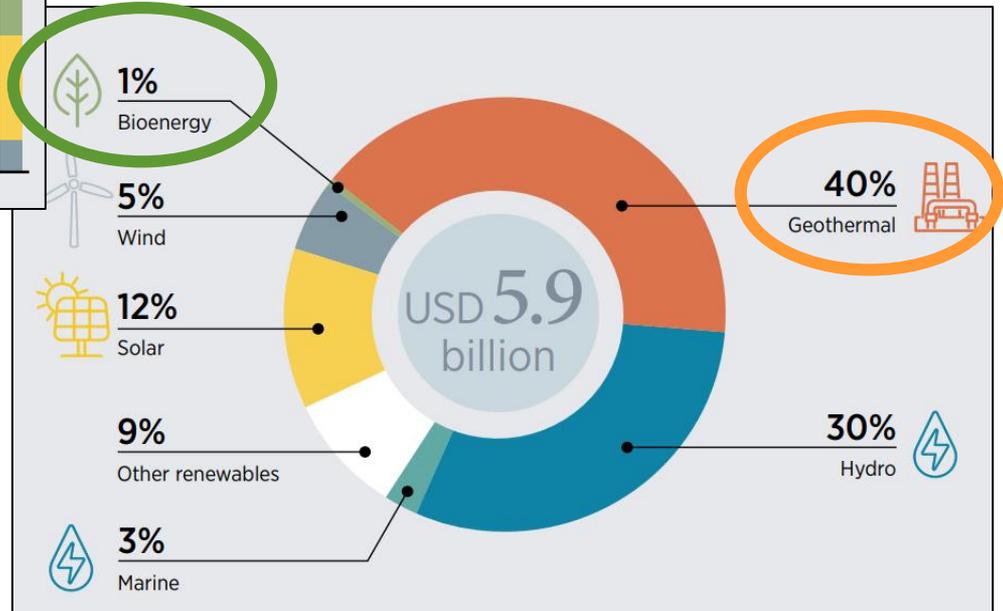
# Growth Sectors and Development Finance

## Renewable energy capacity by source in Southeast Asia, 2000–2016 (non hydro)



Source: IRENA, 2018

## Development banks' investments in renewable energy in South East Asia by technology \*, 2009–16



---



## Issues for discussion

---

What are the key challenges in developing local RE projects?

What are the main challenges for financiers when originating and appraising RE projects?





International Renewable Energy Agency



**Arjun Guha**

Programme Officer - RE Project  
Development and Finance  
Knowledge, Policy and Finance  
Center

IRENA Headquarters, Masdar City  
Abu Dhabi, United Arab Emirates

[AGuha@irena.org](mailto:AGuha@irena.org)

[www.irena.org](http://www.irena.org)