Renewable Energy in the GMS: Status and Drivers

by

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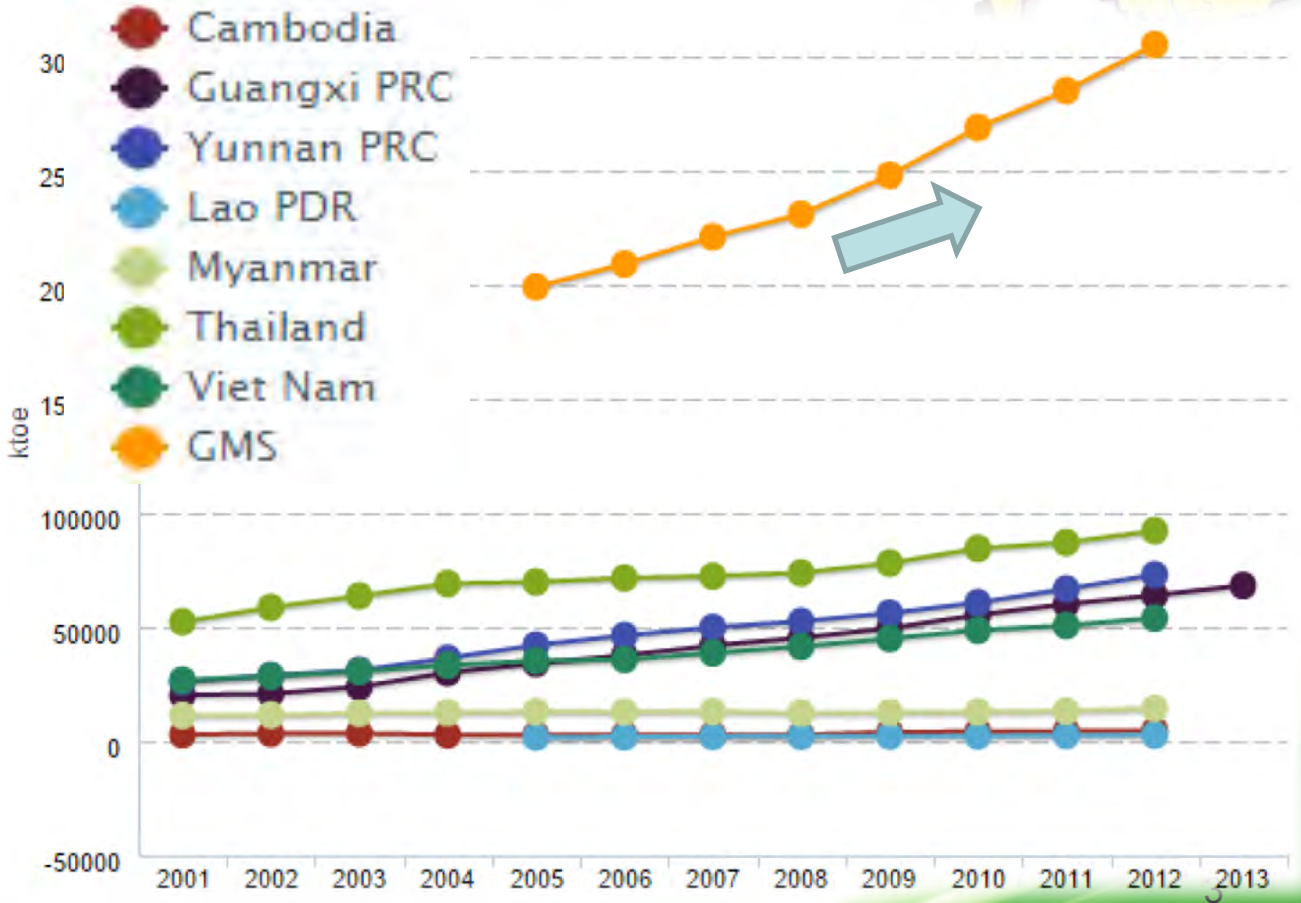
PRESENTATION OUTLINE

- Introduction
- Renewable energy potentials in GMS
- Drivers for renewable energy in the GMS
- Prospects of renewable energy in the GMS
- Conclusion

INTRODUCTION

- The world's primary energy consumption was about **13btoe**, increasing by **2.3%** every year (BP, 2015). This trend is the same for GMS

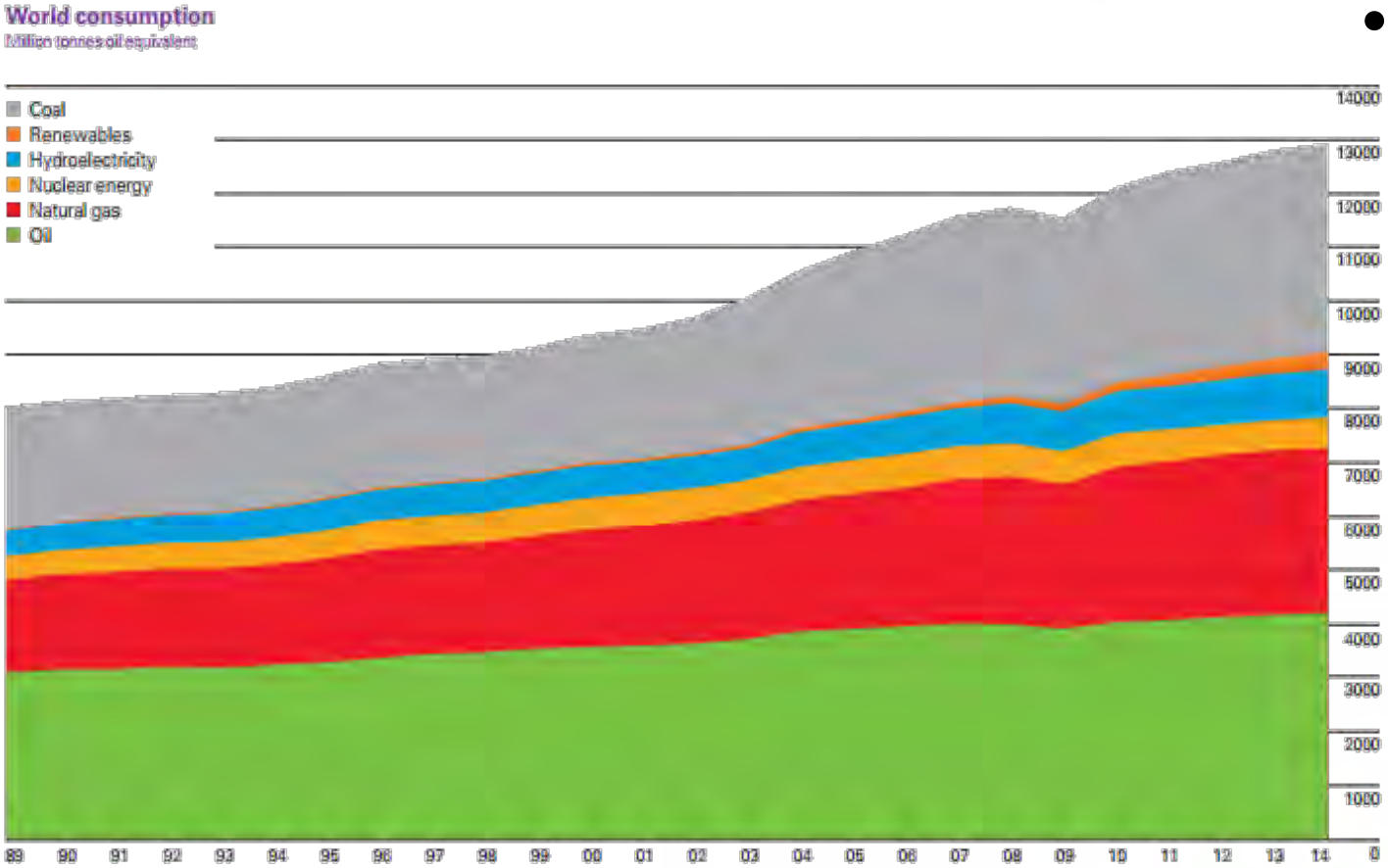
- **Economic development**
- **Population growth**
- **Increase in per capita use**



Source: IEA Energy Balances for Non-OECD countries; LAO: Ministry of Energy and Mines; PRC: Guangxi Statistical Yearbooks, Yunnan Statistical Yearbooks.

INTRODUCTION

- Most of the world still get its energy from fossils
- Fossils contribute to the GHG emissions leading to climate change, further their source is limited.



Source: BP Statistical Review, 2015

- After the 5th Assessment report by IPCC, climate change has been recognized as a dangerous threat; therefore the need to curb the use of fossils.

INTRODUCTION

- **Alternative options for fossils are the renewable energy sources like solar, wind, hydro, biomass and geothermal.**
- **The renewable energy options will have to be used all around the world, and GMS is no exception.**
- **Using renewables will help meet the rising energy demand, protect the environment, improve energy security, create local livelihoods…**

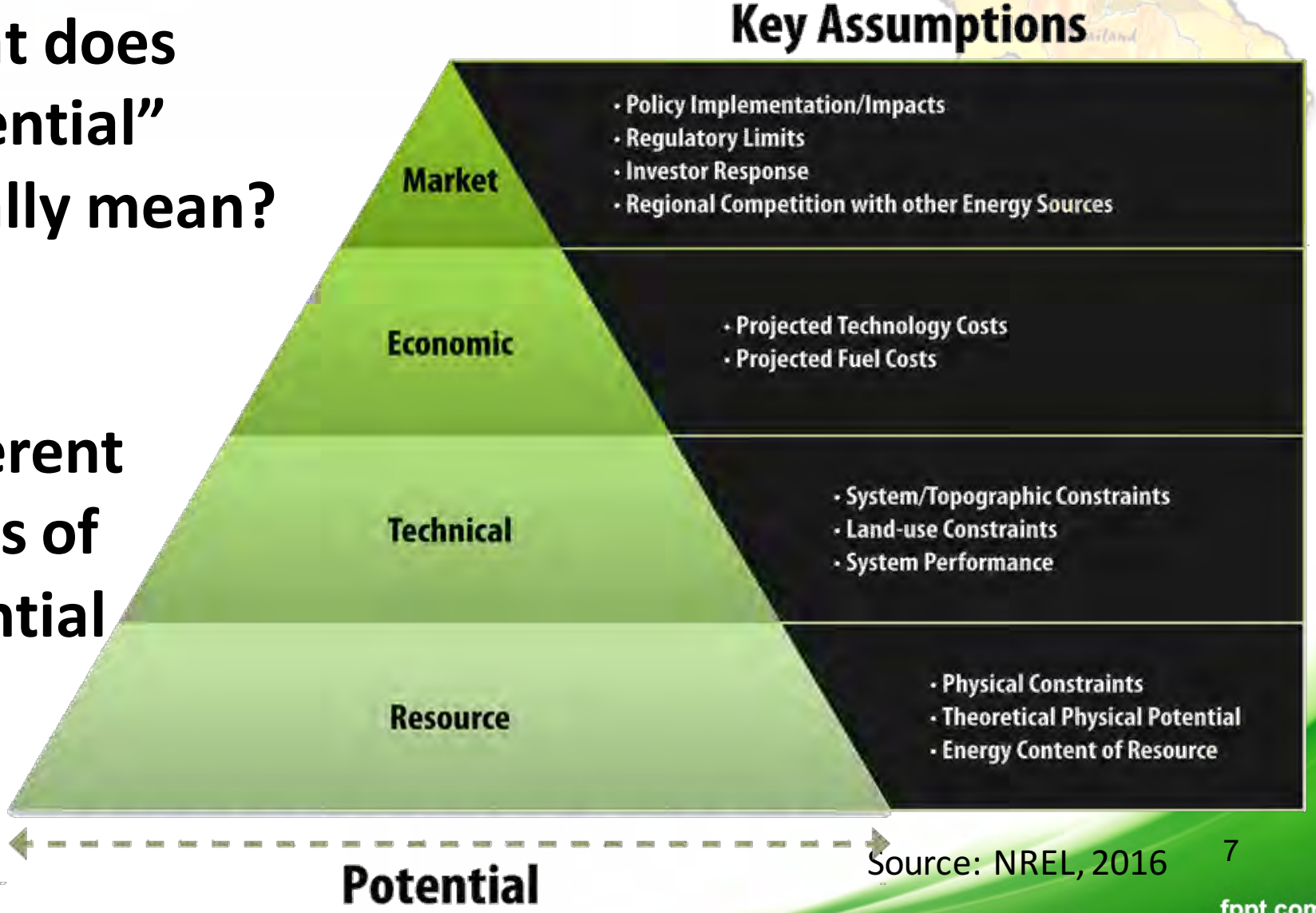
Source: BP Statistical Review, 2015

OBJECTIVES

- To investigate the potentials and status of renewable energy in the GMS.
- To examine the drivers for promoting the use of renewable energy in the GMS
- To look at the future of renewable energy in the Greater Mekong Sub-region.

"POTENTIAL" FOR RENEWABLE ENERGY

- What does "potential" actually mean?
- Different stages of potential



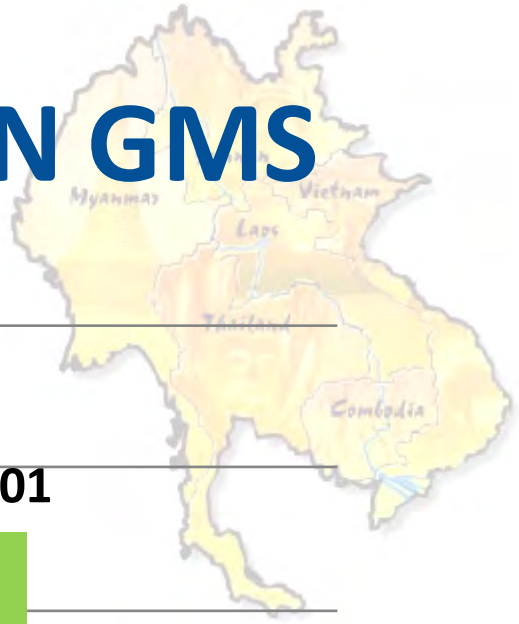
Source: NREL, 2016

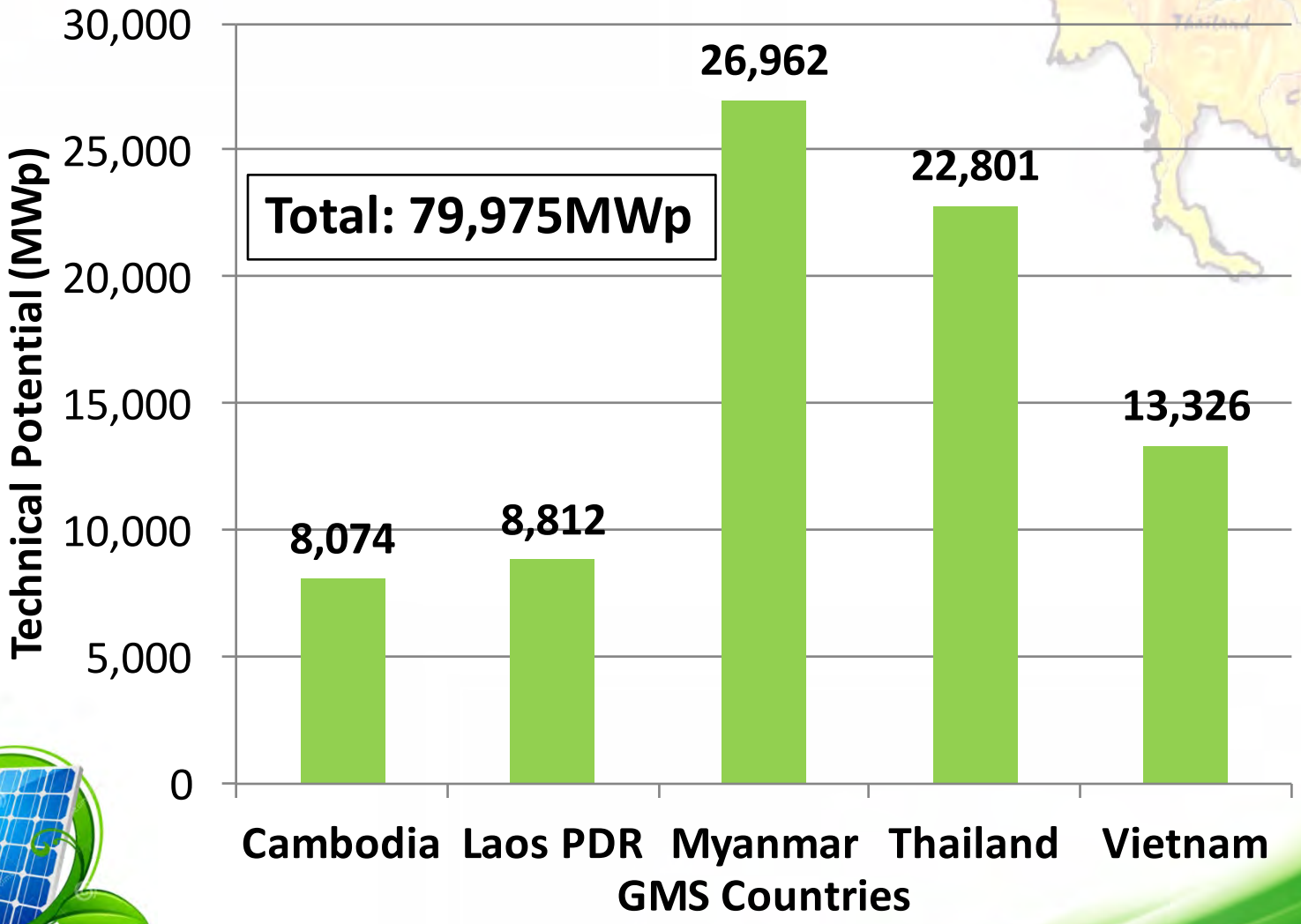
SOLAR POTENTIAL (PV) IN GMS

- The Greater Mekong Sub-region is primarily in the tropics, therefore used to high amounts of solar radiation.
- But all this radiation is not available for solar applications.
- The technical potential will determine the amount of solar energy that can be harnessed.
- Technical potential depends on the area available/collector area, the efficiency of the solar panels/ efficiency of solar collectors, capacity factor etc…

Sunny Bangchak, Thailand
Photo Credit: Dr. Hien

SOLAR POTENTIAL (PV) IN GMS





Source: United States Department of Energy, Lahmeyer International

WIND POTENTIAL IN GMS

- **Theoretical potential: Only 59.3% of the total amount of energy available is available for exploitation according to the Beltz limit.**
- **Technical potential: This depends on the rotor, blades and other parts of the wind mills used, the capacity factor etc…**

Nakhon Ratchasitma, Thailand
Photo Credit: Dr. Hien

WIND POTENTIAL IN GMS

Item	Cambodia	Lao PDR	Myanmar
Theoretical potential (MW)[a]	65,000	455,630	33,829
Installed grid capacity (MW)[b]	360	1,895	1,713
Potential share of wind energy (%)	5–20	5–20	5–20
Total technical potential (MW)	**18–72**	**95–379**	**86–343**

Item	Thailand	Viet Nam	Five Countries
Theoretical potential (MW)[a]	380,980	26,763	962,202
Installed grid capacity (MW)[b]	48,237	15,209	67,414
Potential share of wind energy (%)	5–20	5–20	5–20
Total technical potential (MW)	**2,412–9,647**	**760–3,042**	**3,371–13,483**

a: Based on 10MW/km^2 installed in areas of greater than 6m/s.
b: Installed capacity 2010

- Laos PDR has the highest theoretical wind potential, Thailand has the highest technical potential.

Source: United States Department of Energy, Lahmeyer International

BIOMASS POTENTIAL IN GMS

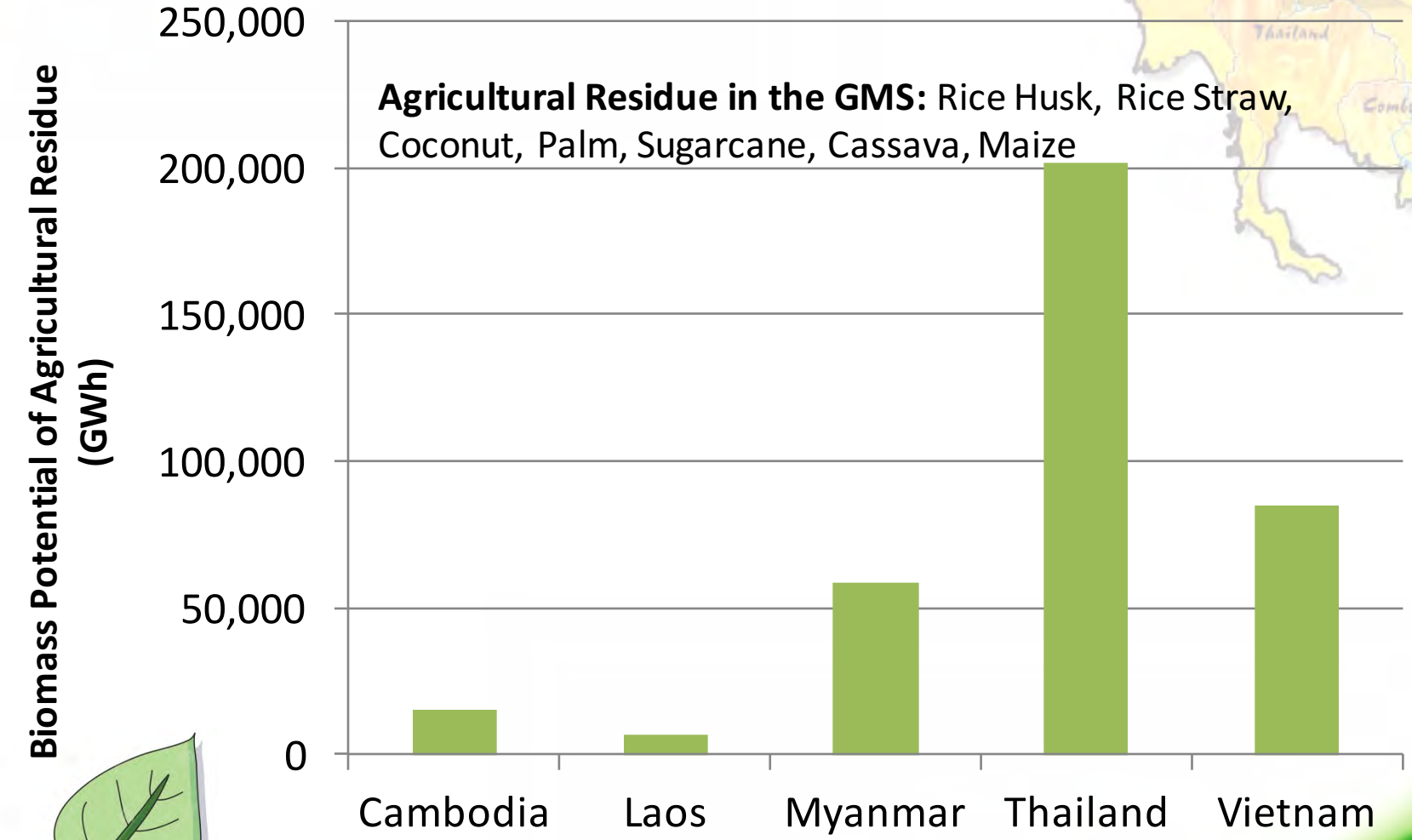
- **The Greater Mekong Sub-region consists of agricultural countries that cultivate rice, cassava etc which can be used for energy generation.**
- **Further these countries are also meat consumers, and animal residues from cows pigs etc can be used to produce biogas.**

- **Large production of palm oil and sugarcane and can be the source of bio-fuels (ethanol and bio-diesel).**

Rice Husk Power Plant, Phichit Thailand
Photo Credit: Dr. Hien

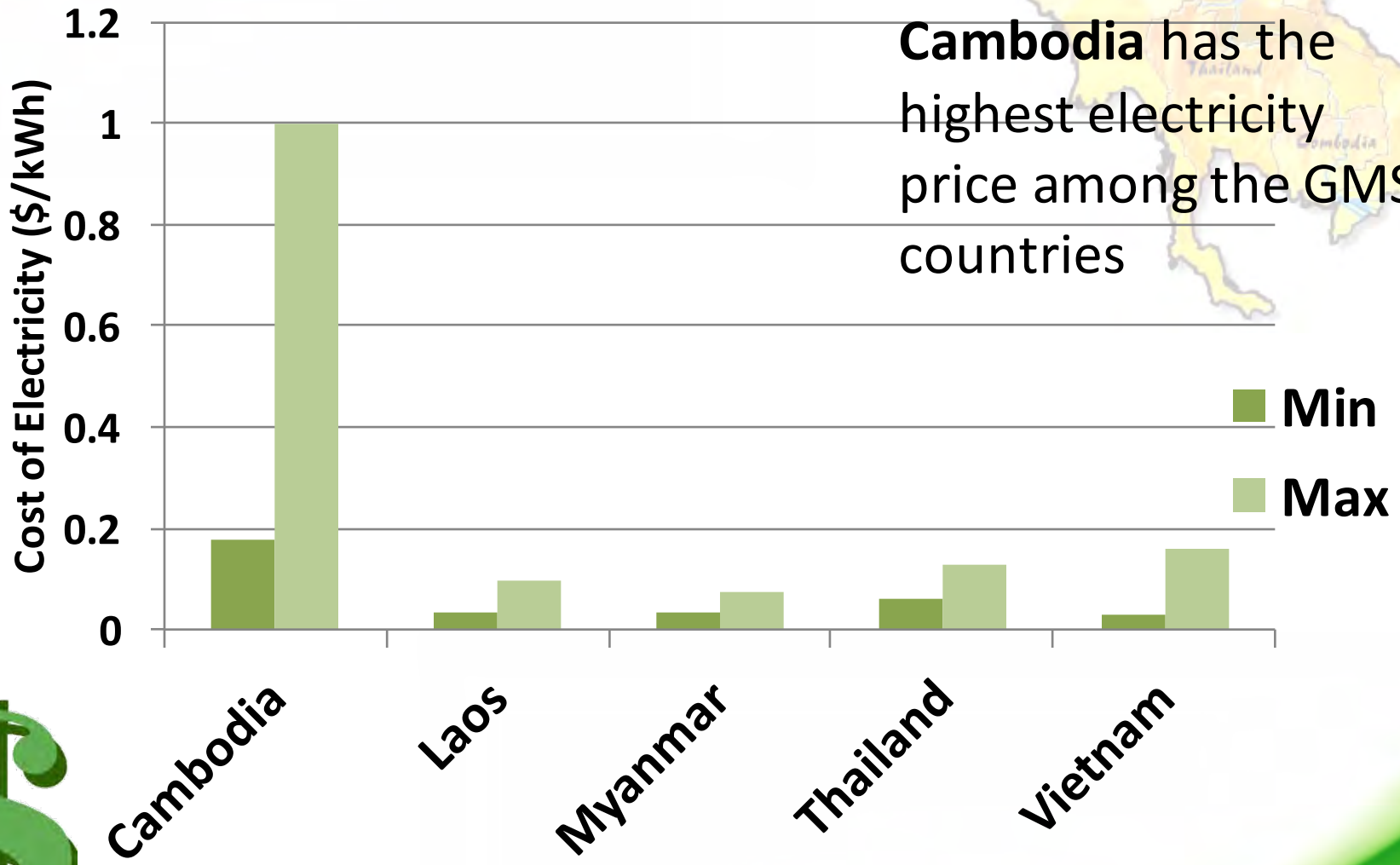
Source: Renewable Energy Developments and Potential in the Greater Mekong Sub-region, ABD 2015

BIOMASS POTENTIAL IN GMS



Source: Renewable Energy Developments and Potential in the Greater Mekong Sub-region, ABD 2015

ELECTRICITY COST IN THE GMS



Cambodia has the highest electricity price among the GMS countries

NOTE: These values have been directly obtained from Renewable Energy Developments and potential in the GMS by ADB.

Source: Renewable Energy Developments and Potential in the Greater Mekong Sub-region, ABD 2015

DRIVERS FOR RE IN THE GMS

- Policy
- Institutional
- Technology
- Financing/Cost
- Capacity
- Awareness/Others

DRIVERS FOR RE IN THE GMS

- **Policy Drivers:**
  - Laws and/or regulations
  - Target setting (eg. INDC)

- **Examples:**
  - Myanmar: Targets to install 9.4 GW of hydro by 2030.
  - Lao PDR: To increase the share of renewable energy to 30% of energy consumption by 2025.

DRIVERS FOR RE IN THE GMS

- **Institutional:**
  - Government (eg. Ministry or department for RE)
  - Financial (eg. Banks that provide support)

- **Examples:**
- Vietnam: Governments support R&D activities and help set up industries that are willing to manufacture RE related products (solar panels, wind blades etc)

DRIVERS FOR RE IN THE GMS

- **Technology:**
  - Depends on resource availability
  - Status of technology

- **Examples:**
  - Lao PDR: Hydro projects
  - Myanmar: Good renewable energy resources are yet to be tapped
  - Cambodia: Renewable resources available for exploitation

DRIVERS FOR RE IN THE GMS

- **Financing/Cost:**
  - Depends on technology
  - Depends on resource availability (wind)

- **Examples:**
  - Cambodia: Extremely high electricity costs.
  - Thailand: Tariff adder for electricity generation by RE sources
  - Myanmar: Promoting PPP

DRIVERS FOR RE IN THE GMS

- **Capacity/Awareness/others:**
  - Technical capacity in the country
  - Awareness

- **Examples:**
  - Educational institutions
  - Private sector penetration

DRIVERS FOR RE IN THE GMS

- **Others:**
  - Local situation
    - Energy security – reduce reliance on imports/fossil fuels
    - Electrification level – Thailand and Myanmar
    - Availability of resources
      - Hydro in Lao PDR; MSW in Thailand
  - Current energy prices (Cambodia and Thailand)

DRIVERS FOR RE IN THE GMS

- **Others:**
  - Government policies (export energy) – Lao PDR
  - Rural Vs Urban (type of needs – quantity differences): SHS and solar farms
  - Grid/Off grid: Quality issues
  - Resource constraints: Intermittence

Prospects of RE/SE in GMS

- The INDC targets and the COP21 commitments would be the main drivers for RE in the GMS
- The potential for small to large scale RE projects are all possible in the GMS – due to the varied stages of development and societal needs
- The reduction of technology costs and its easy availability in the market would help in promoting RE in the GMS
- The thermal applications of RE (industry and residential) have been barely tapped.

Prospects of RE/SE in GMS

- High unexploited resources and low electrification rates in the region will boost the renewable energy market.
- Improved institutional infrastructure and financial support (national and global) would assist in RE promotion

All these indicates that future use of RE in the GMS could be high, at least as projected by the countries.

CONCLUSIONS

- GMS countries have lot of RE/SE potential that have not yet been exploited.
- Governments in all the countries have set ambitions RE targets that need to be achieved in the next 1.5 decades.
- Climate change and electricity access are strong drivers for the applications of RE in GMS.
- This region has a bright future for RE.

Some RE research at the Asian Institute of Technology

- Resource and Technology:
  - Resource availability
  - Biomass utilization – pelletization; gasification; MSW
  - Solar thermal – concentrators
  - PV - grid connected; roof top systems
- Policy:
  - Analysis of options for low carbon society; ecodistricts
  - Energy access
  - Technology Needs Assessment
- Field
  - Smart grid; choice of SHS, centralised and distributed
  - Financial models for electricity access

THANK YOU!

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