澜沧江-湄公河合作
Lancang-Mekong Cooperation

Sustainable Energy Development in Lancang-Mekong Cooperation: Opportunities and Challenges

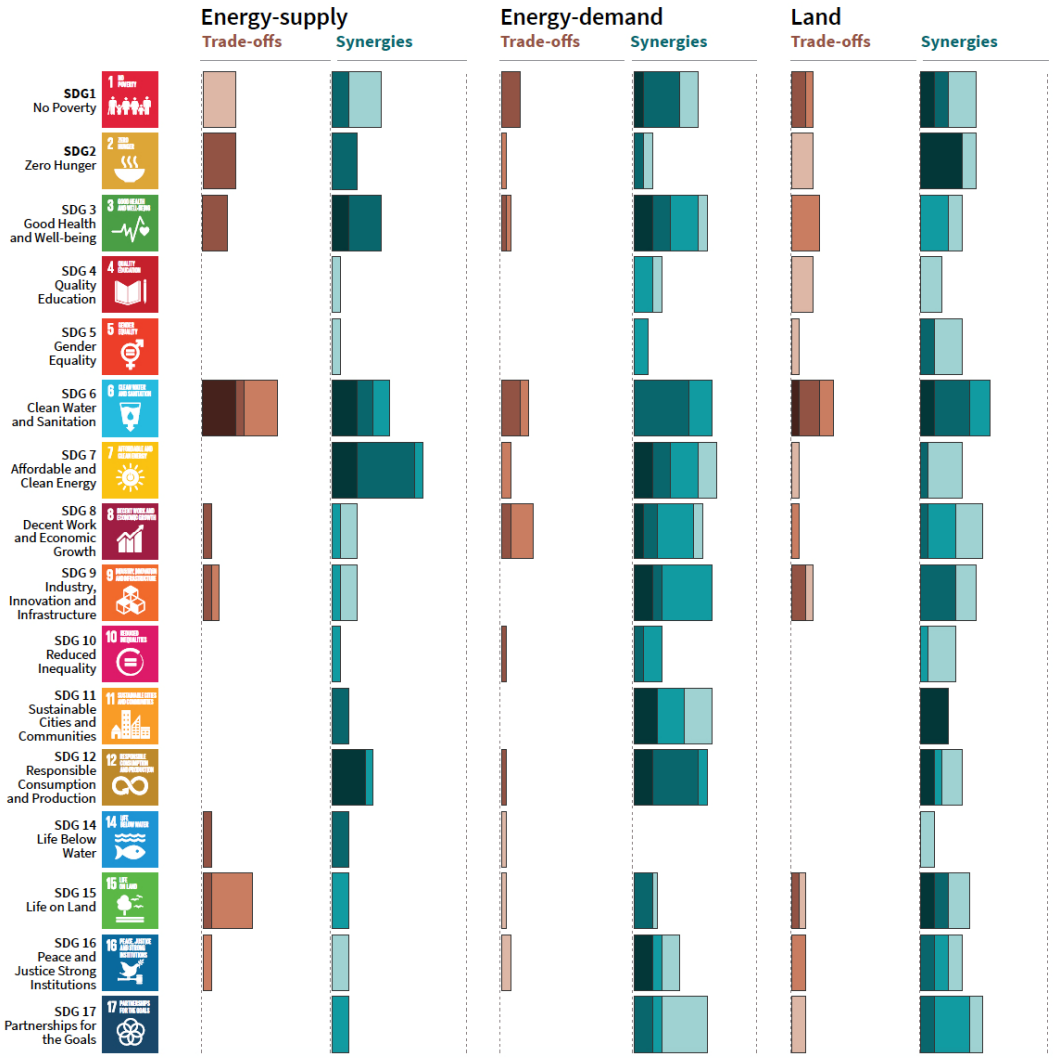
——澜湄区域可持续能源发展优势与挑战

CHAI Qimin, FU Sha, LI Weiran

2018.10.18

国家应对气候变化战略研究和国际合作中心
National Center for Climate Change Strategy and International Cooperation (NCSC)

SDGs & Energy: Synergies & Trade-offs



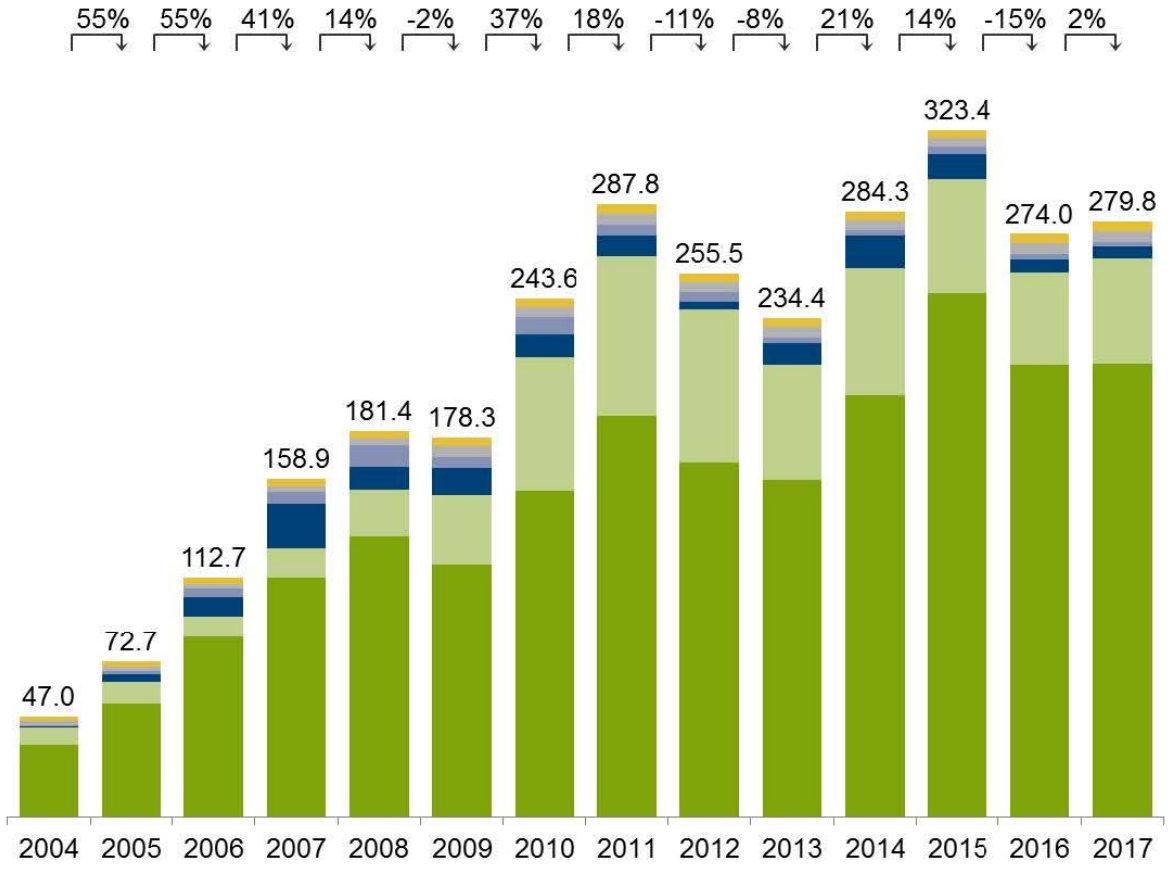
Source: IPCC special report on Global Warming of 1.5 ℃, 2018

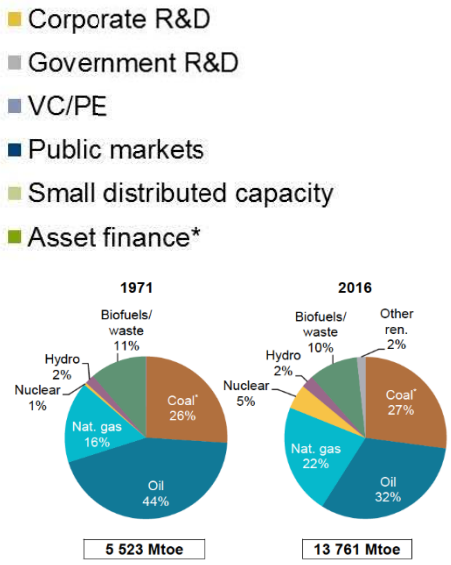
The 4th Energy Revolution for Sustainable Development:

- ✓ The clean and low-carbon transition based on the non-fossil energy sources
- ✓ The global/regional interconnection based on energy storage, power transmission and ICT infrastructure
- ✓ The supply and demand pattern shift based on market reform on pricing mechanism
- ✓ The security and efficiency improvement based on technological and institutional innovation

Global Investment in Sustainable Energy

Growth:

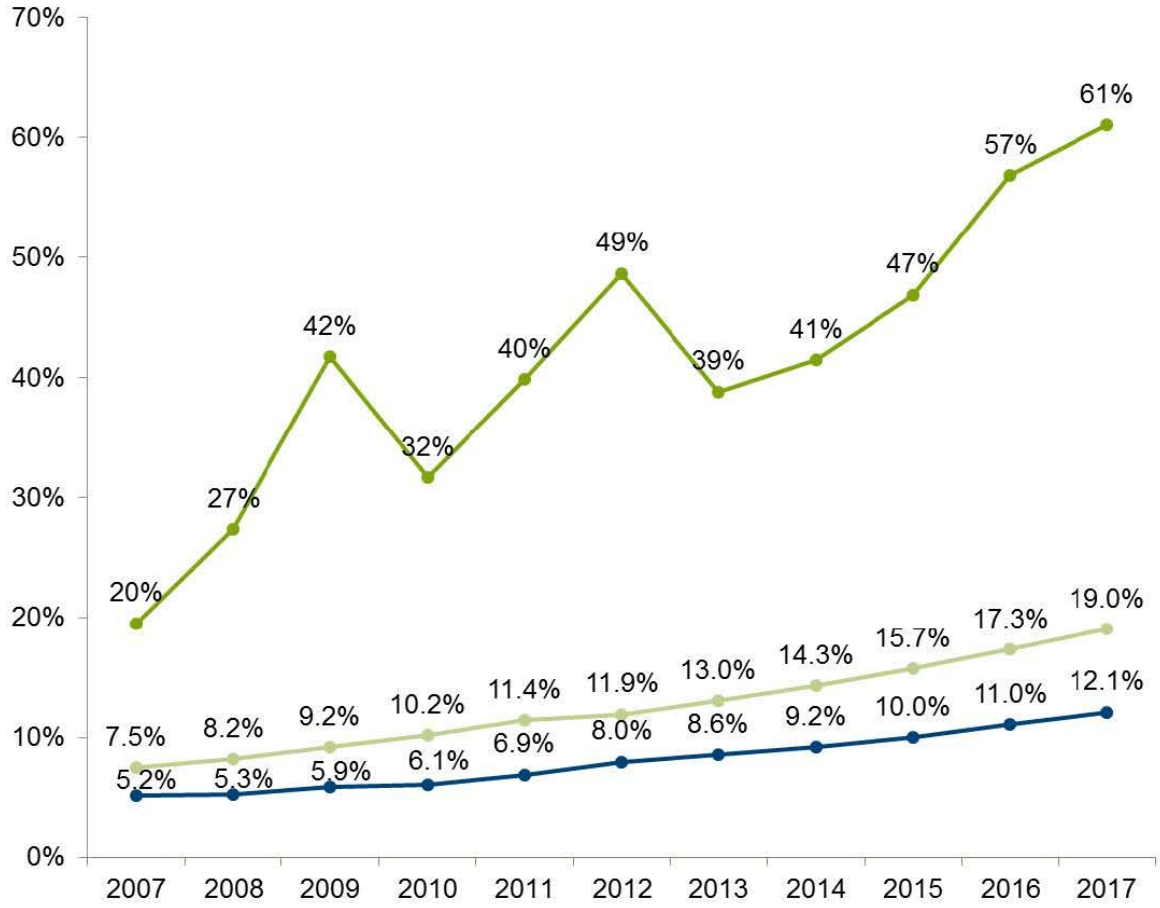


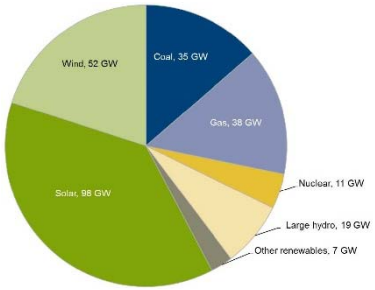


Note: *Asset finance volume adjusts for re-invested equity. Total values include estimates for undisclosed deals

Source: FS-UNEP Centre, UN Environment, Bloomberg New Energy Finance

Capacity/Generation Share of New Energy

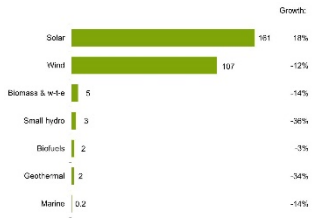




Renewable capacity change as a % of global capacity change (net)

Renewable power as a % of global power capacity

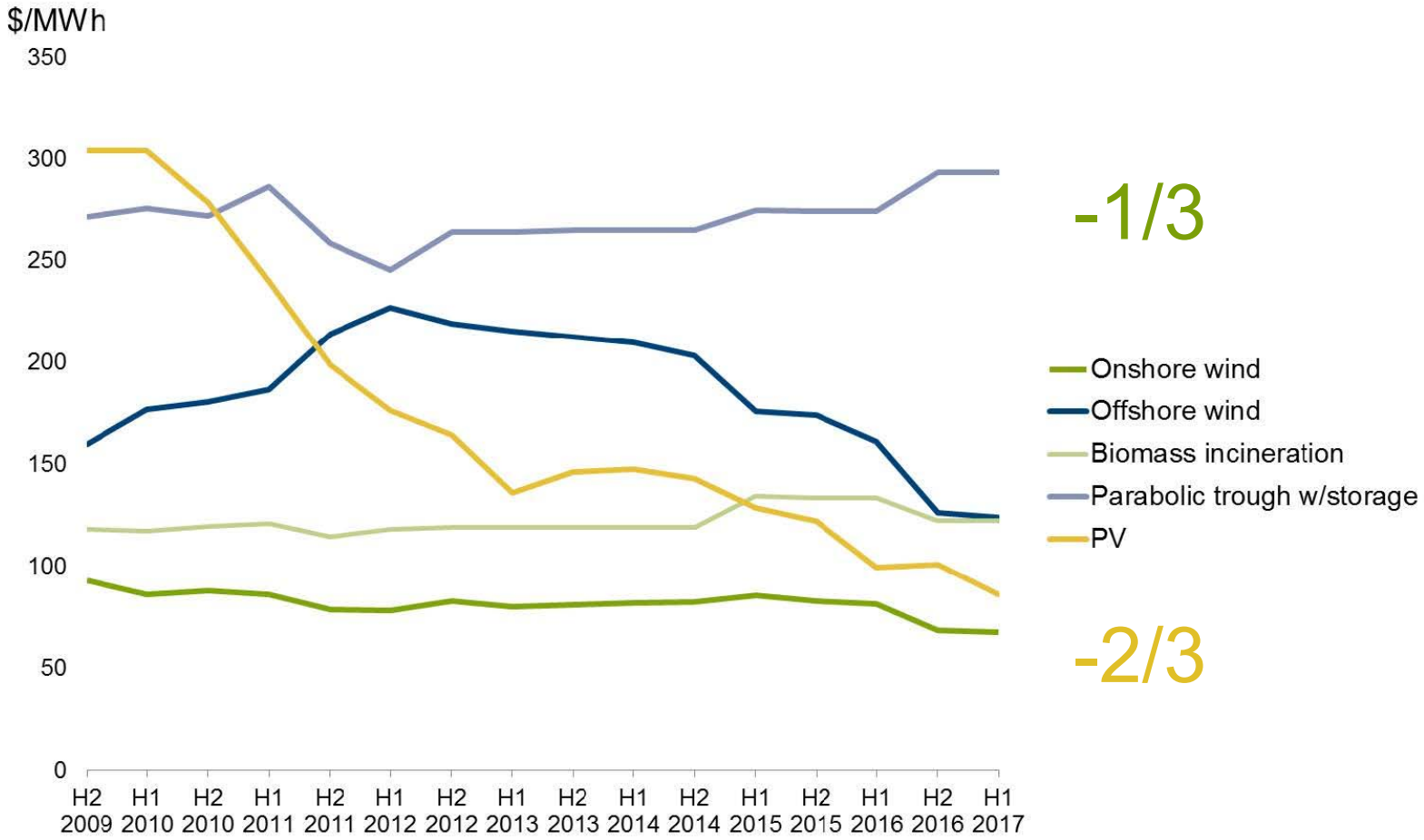
Renewable power as a % of global power generation



Note: Renewable power excludes large hydro.

Source: FS-UNEP Centre, UN Environment, Bloomberg New Energy Finance

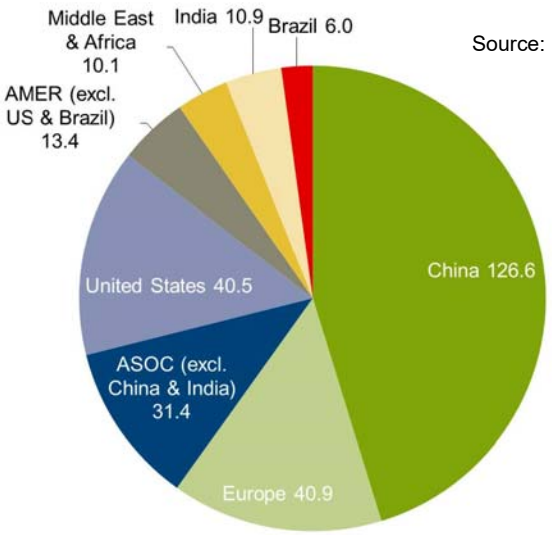
Change in Levelized Cost of New Energy



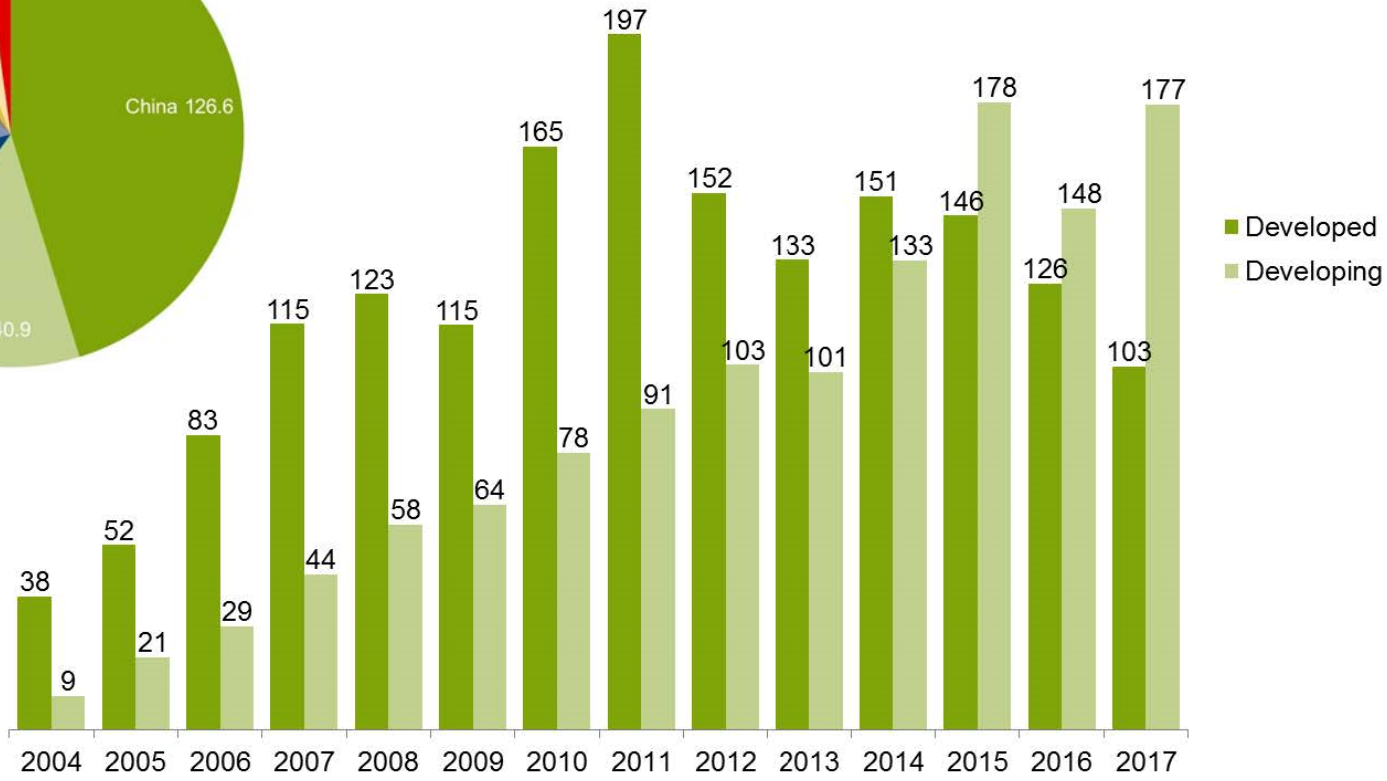
Note: PV-c-Si stands for crystalline silicon photovoltaics

Source: FS-UNEP Centre, UN Environment, Bloomberg New Energy Finance

Investment in Developed/Developing World

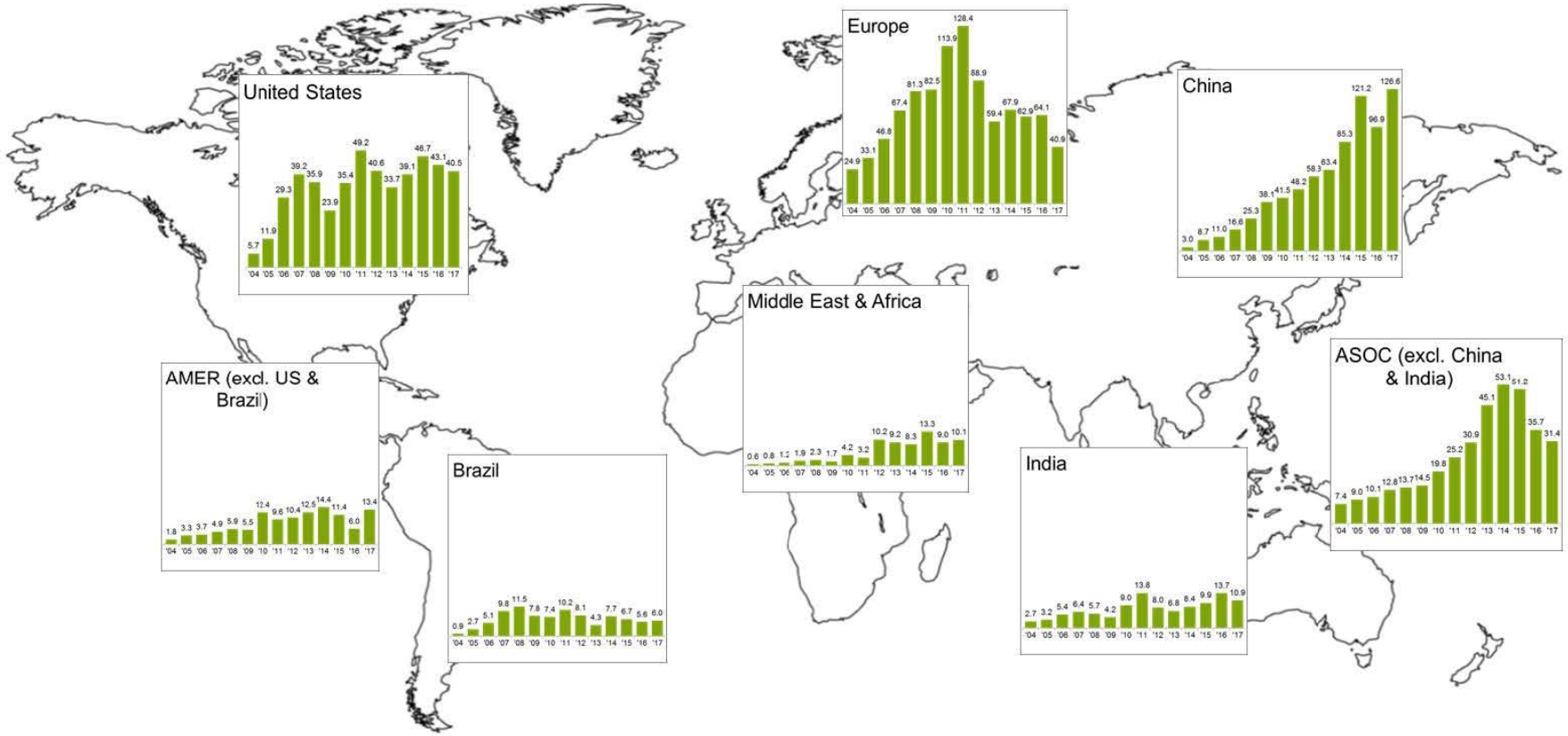


Source: FS-UNEP Centre, UN Environment, Bloomberg New Energy Finance



Note: New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals. Developed volumes are based on OECD countries excluding Mexico, Chile, and Turkey.

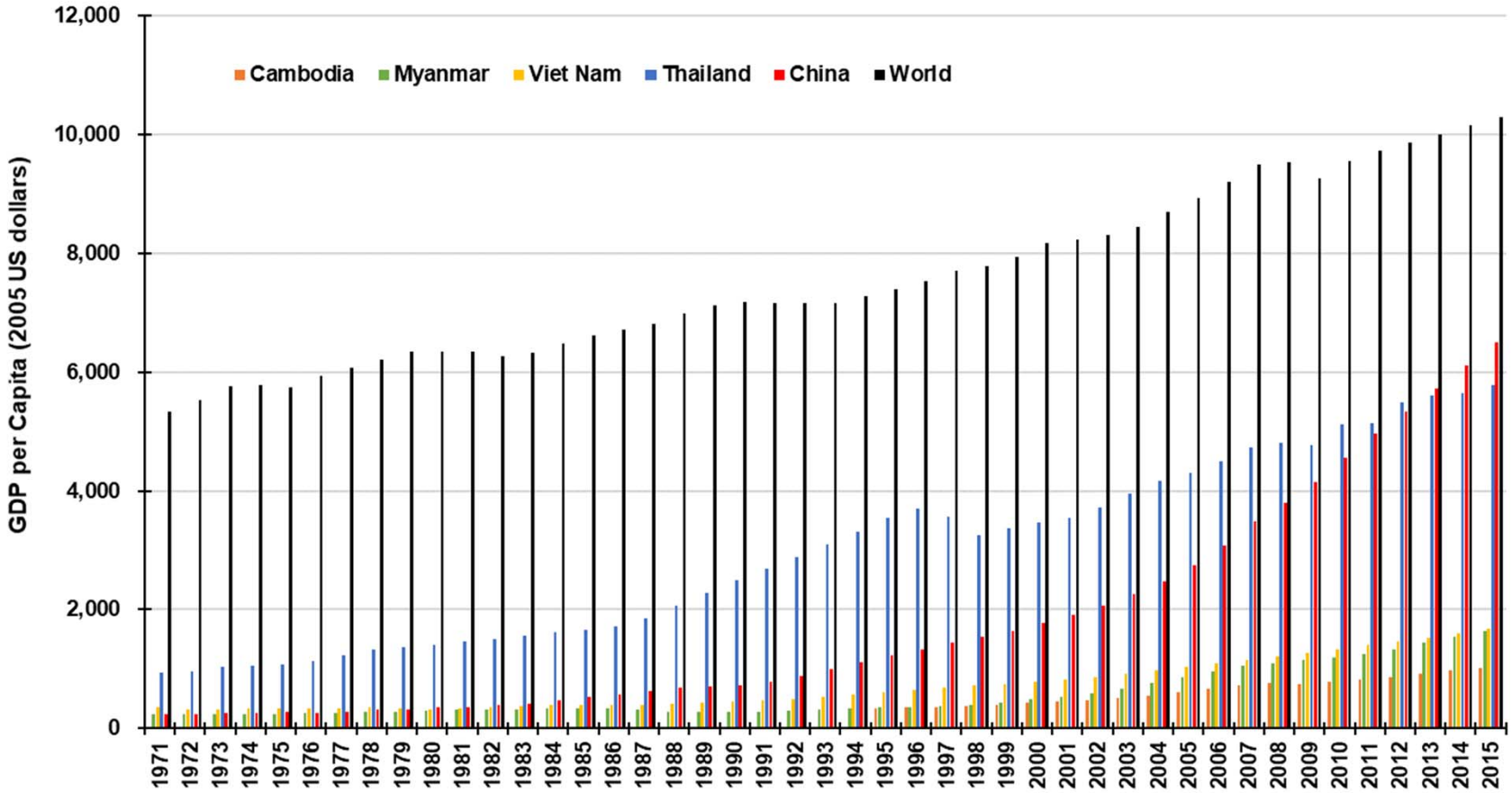
Regional Investment in Last Decades



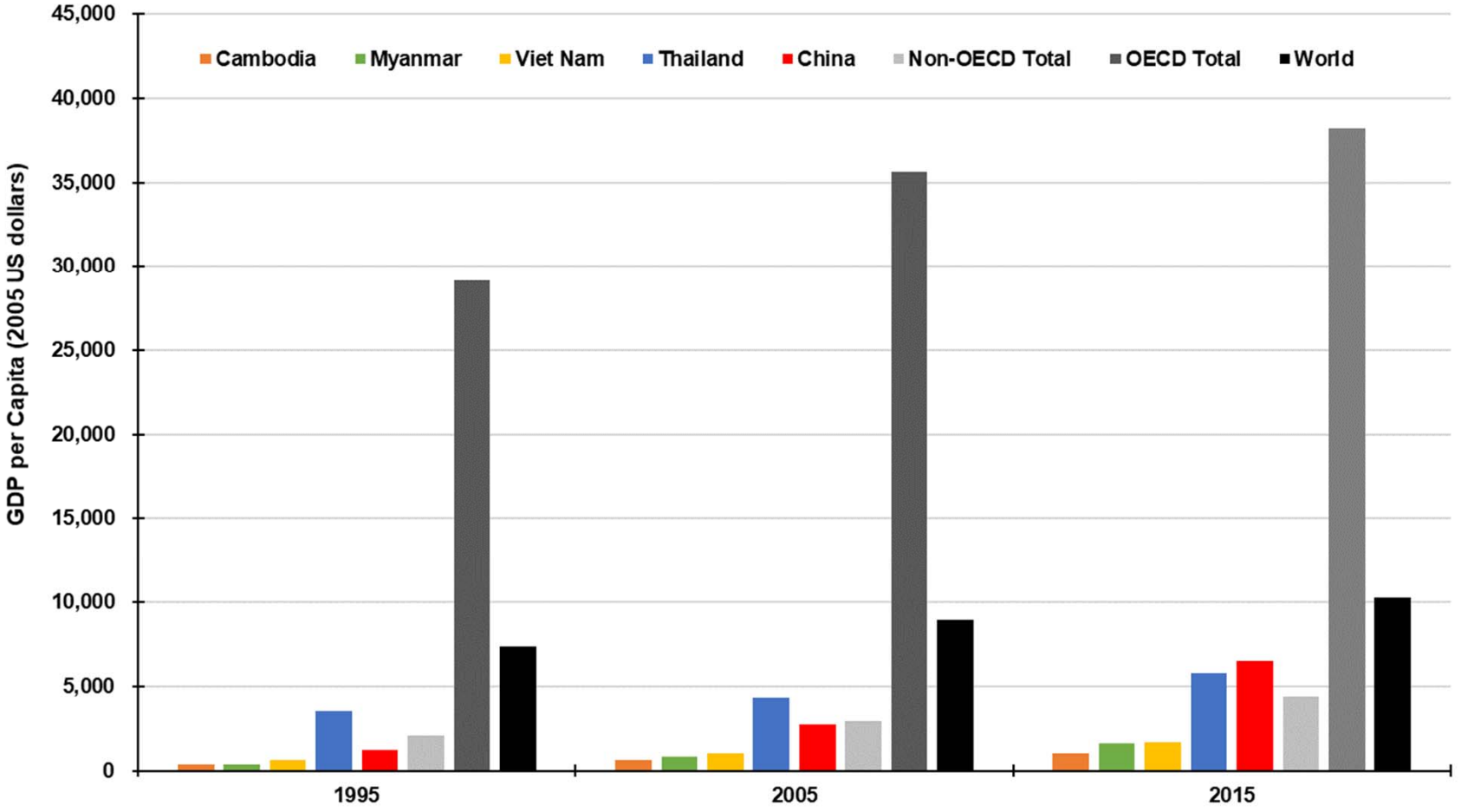
Note: New investment volume adjusts for re-invested equity. Total values include estimates for undisclosed deals.

Source: FS-UNEP Centre, UN Environment, Bloomberg New Energy Finance

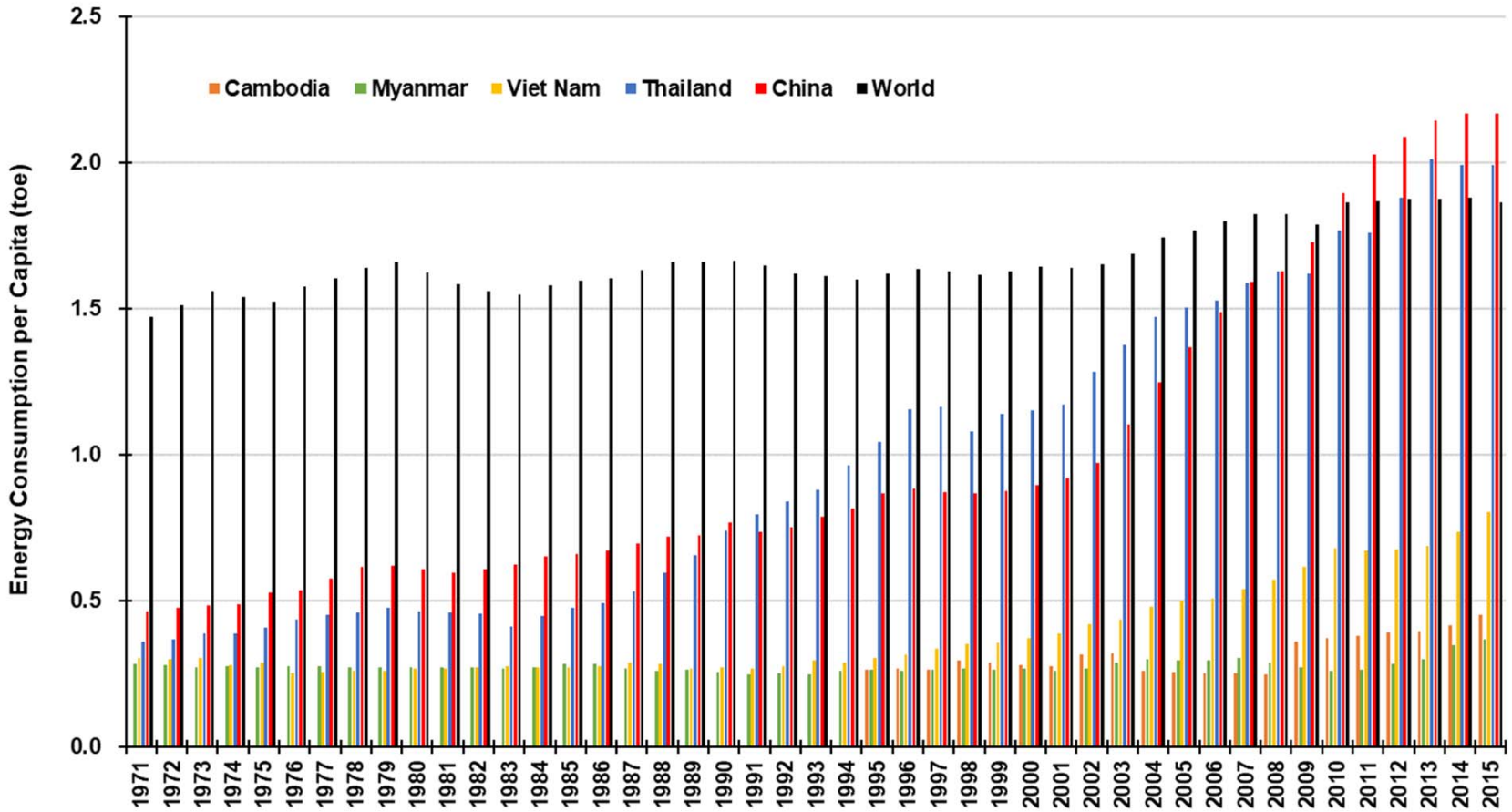
Development in Lancang-Mekong Countries



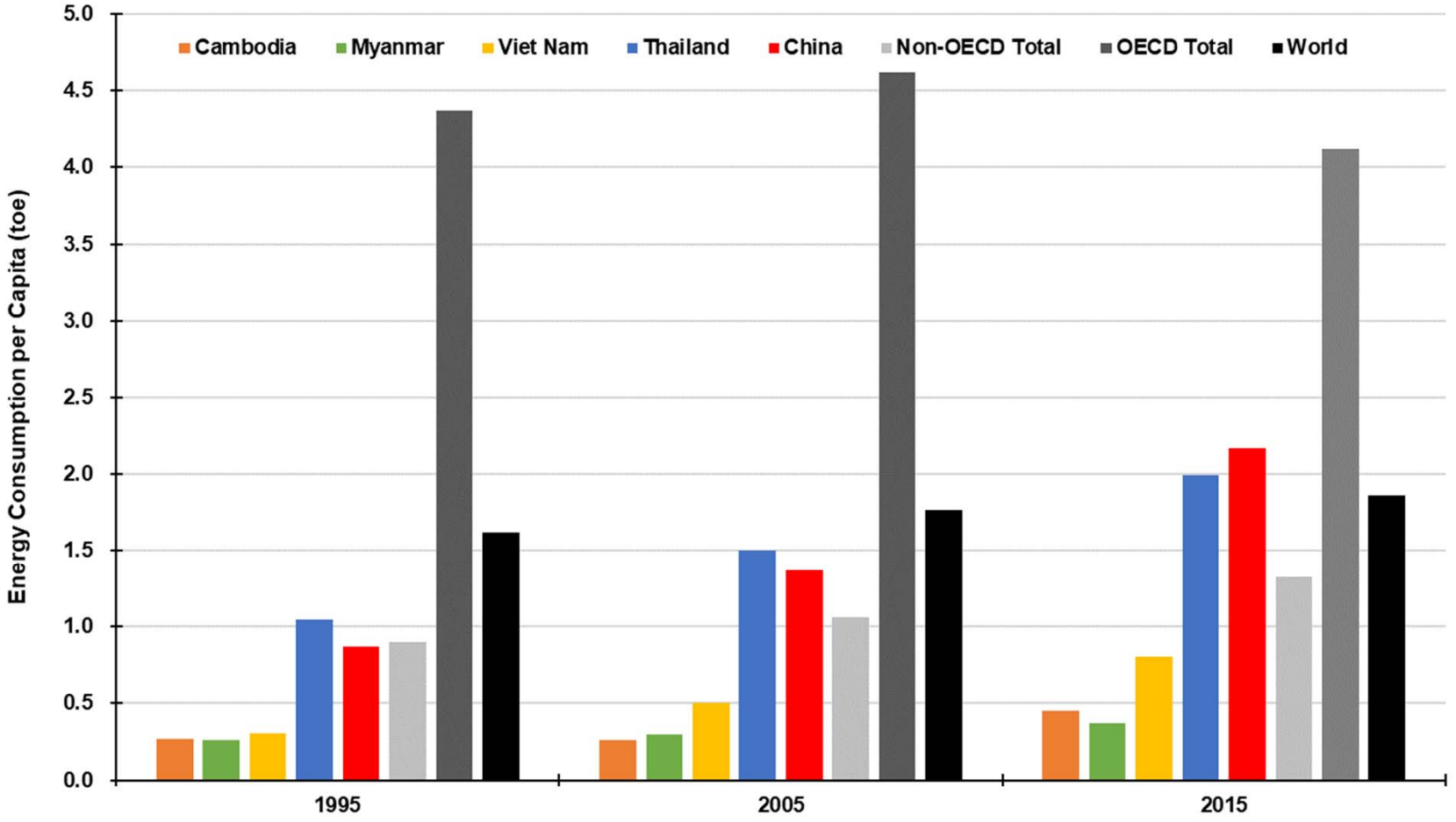
Development Gap between LMC and World



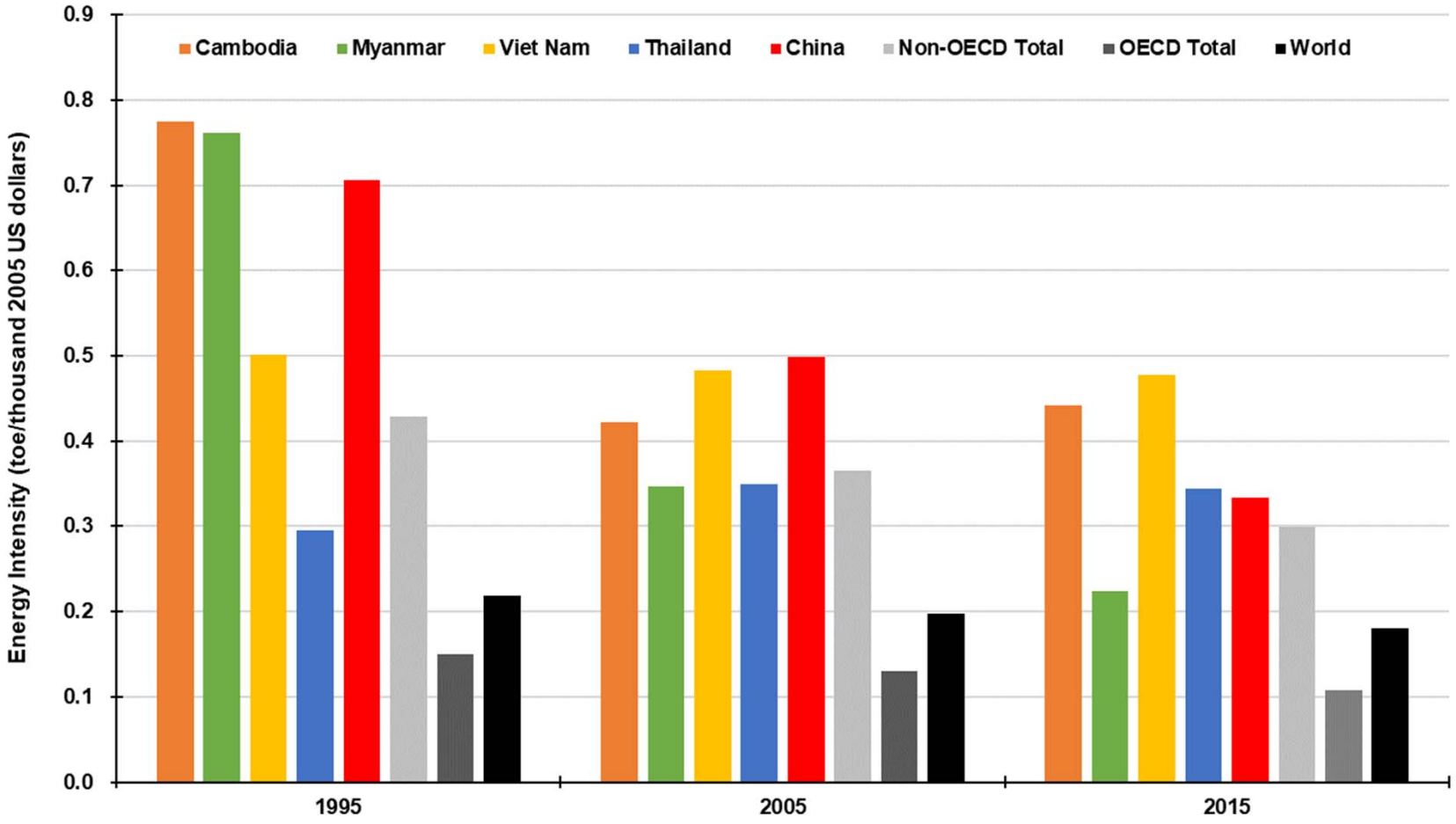
Different Story of Energy Consumption in LMC



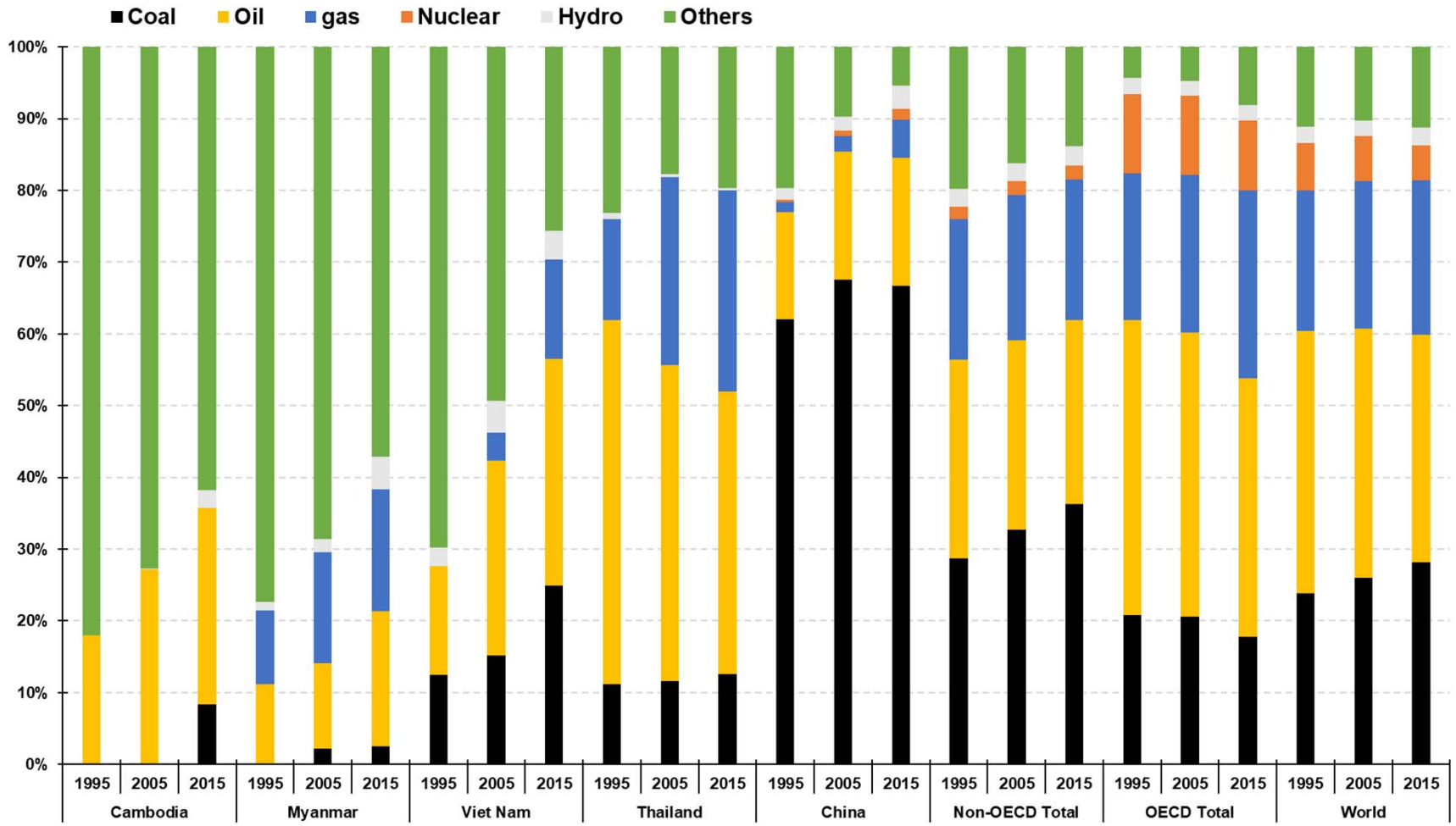
A Close-up of Energy Consumption in LMC



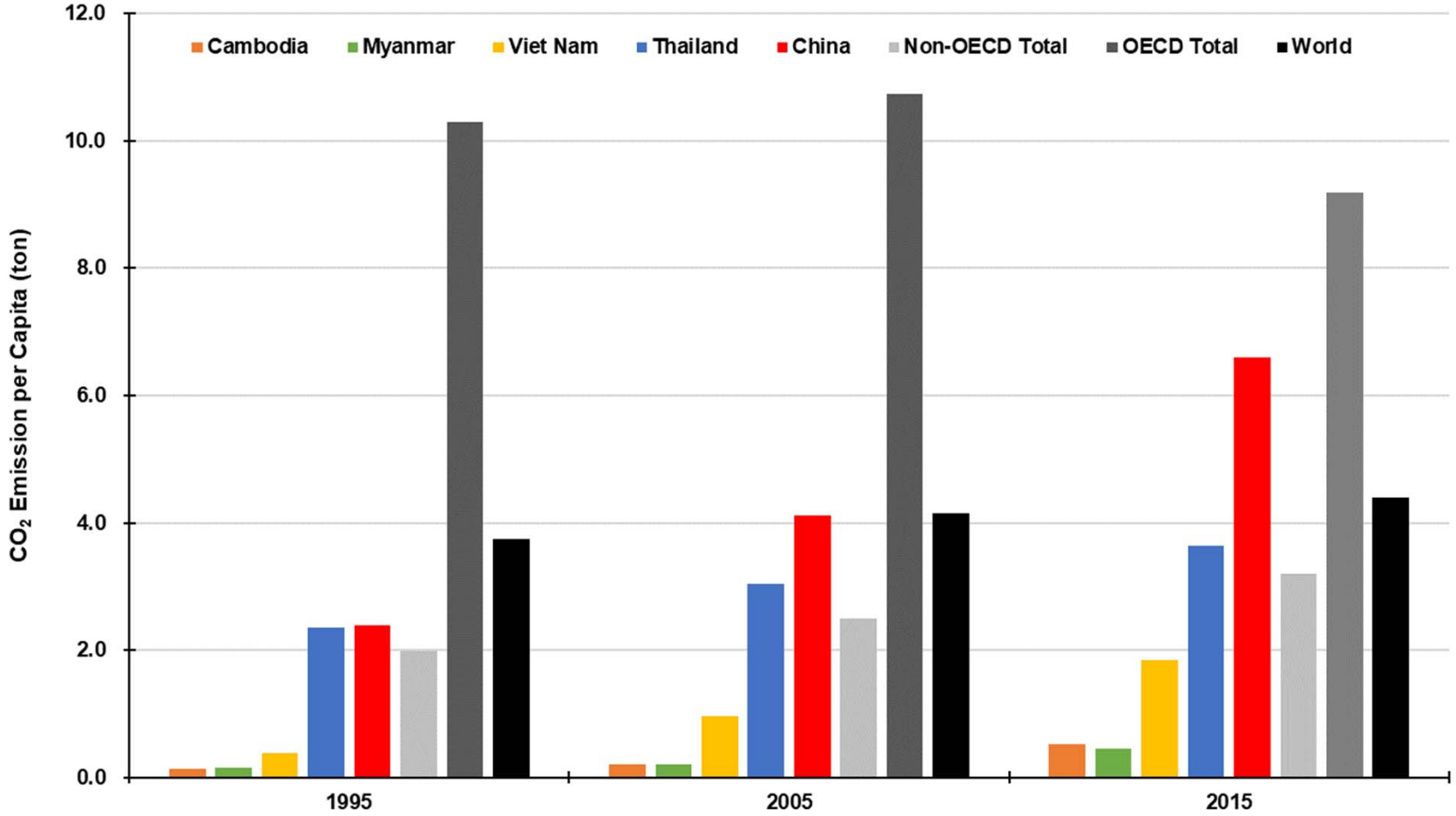
A Challenge of Energy Efficiency in LMC



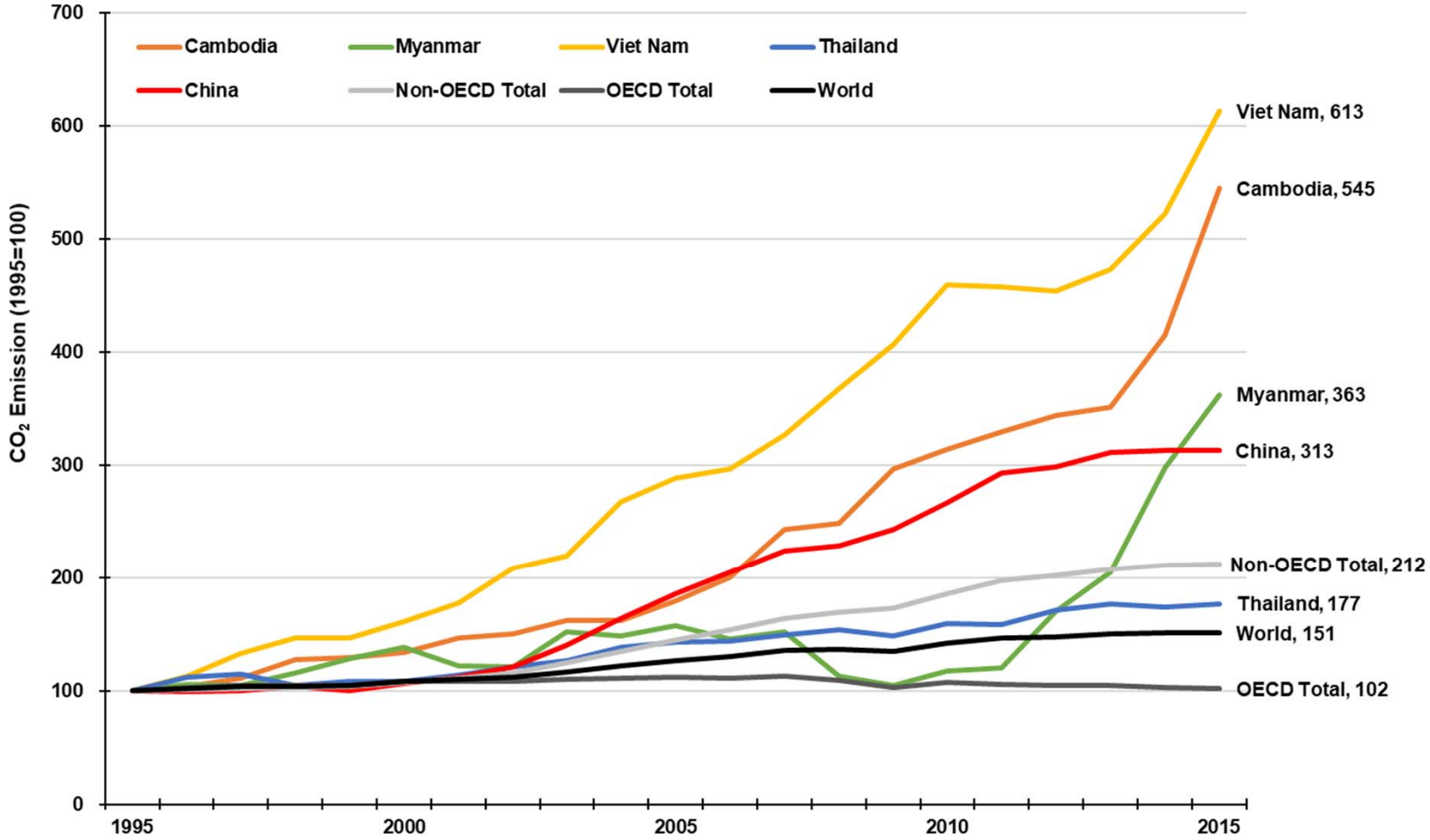
A Challenge of Energy Mix in LMC



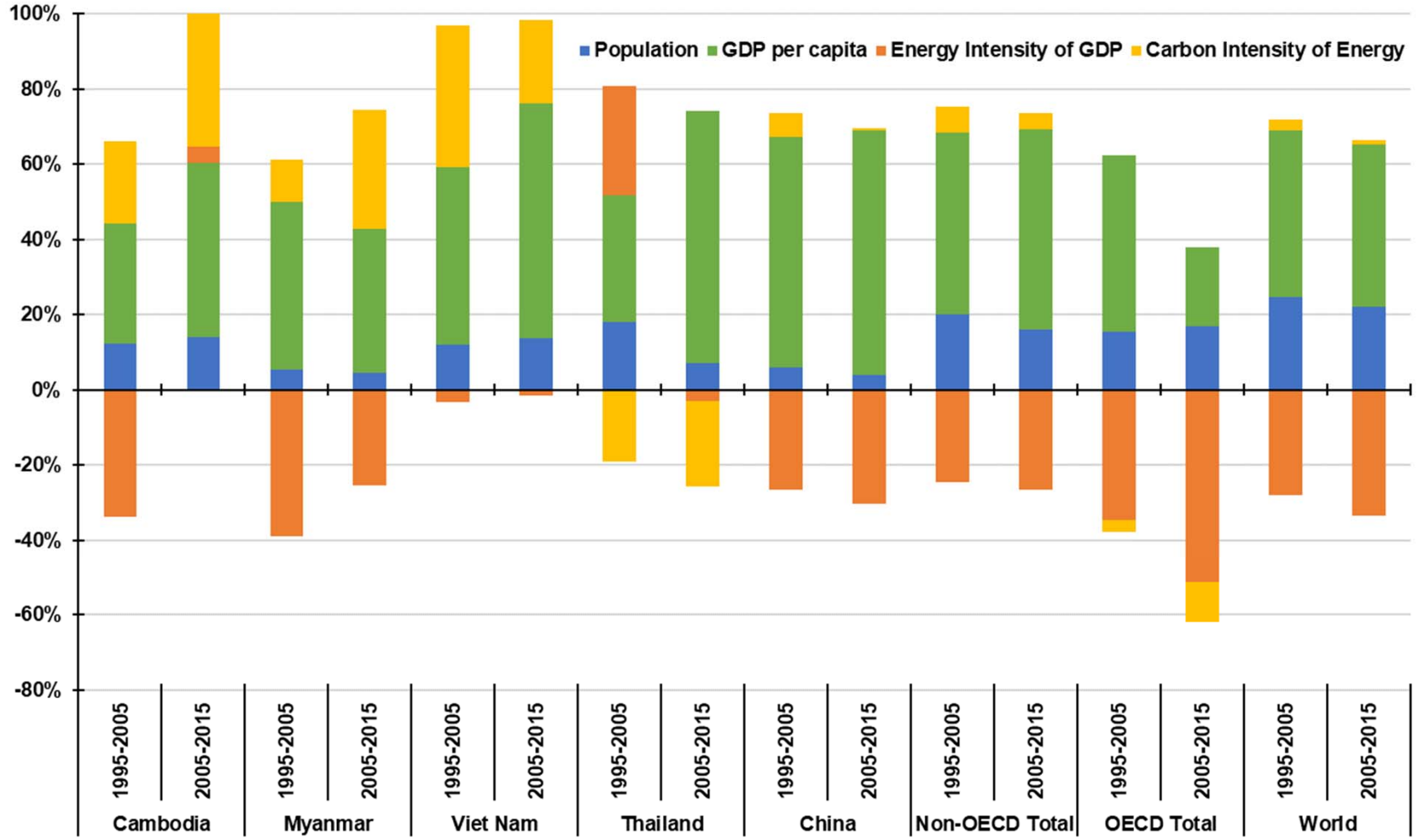
A Challenge of Carbon Emission in LMC



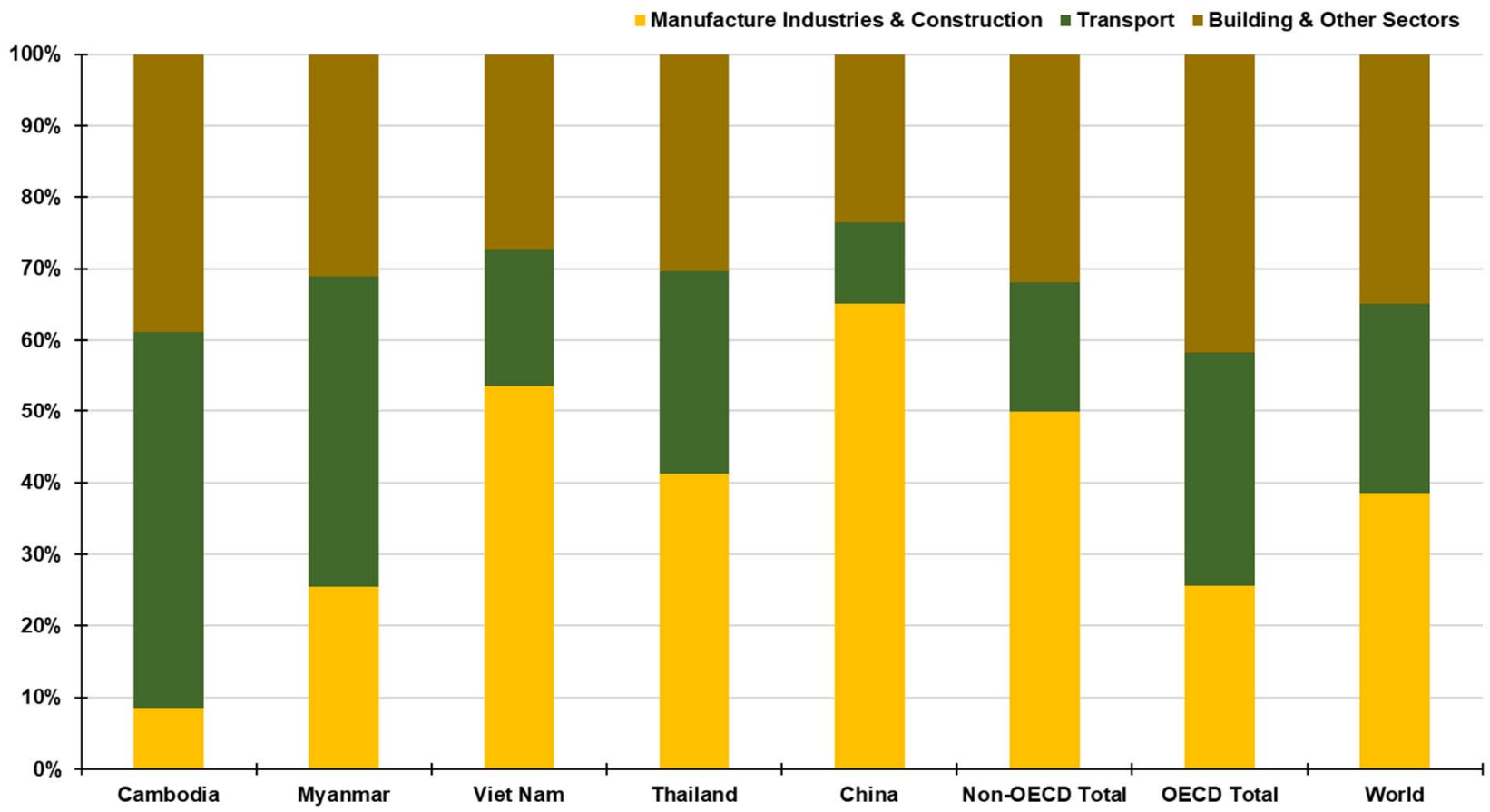
A Challenge of Emission Growth in LMC



KAYA Identity of Carbon Emission in LMC



Diversity of Emission Structure in LMC



Energy-Related Plan in LMC to 2030

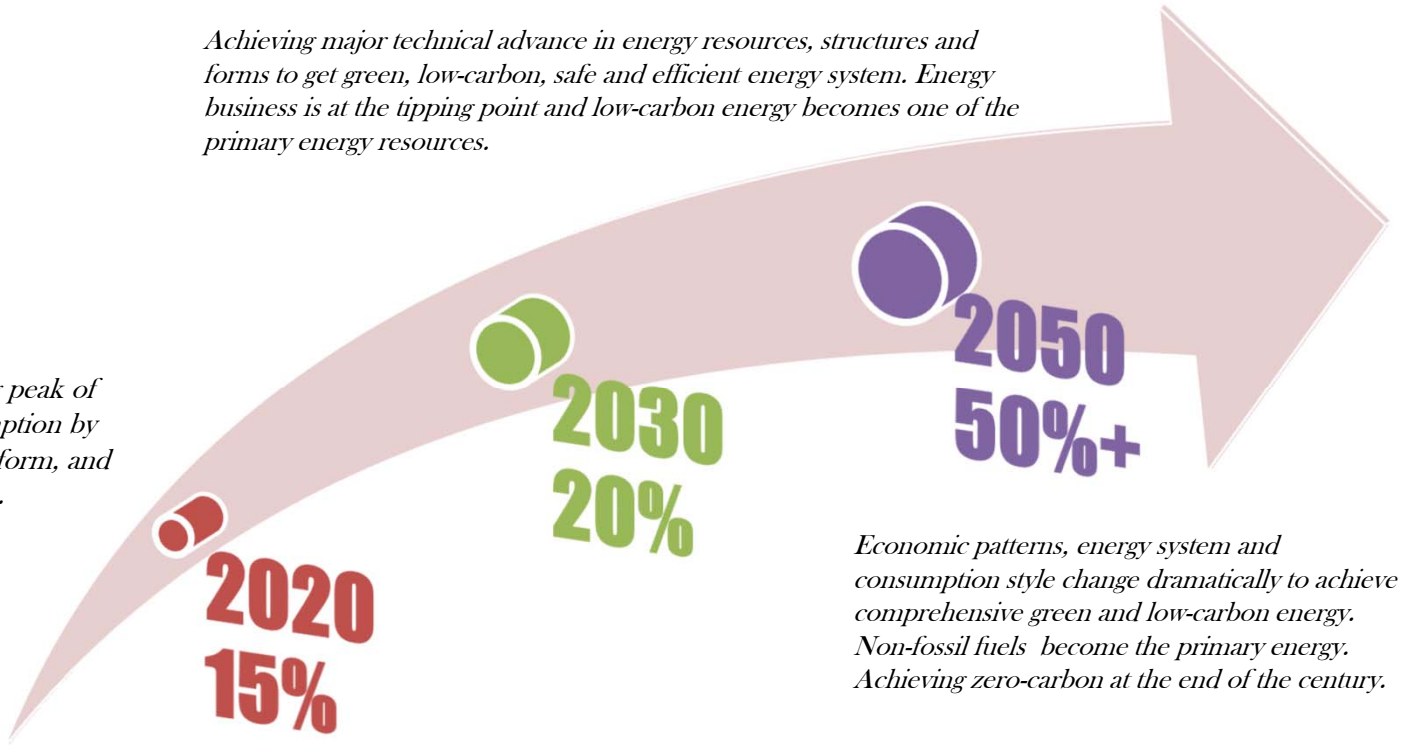
	Emission Reduction Targets	Sector Contribution	Measures
Lao PDR		· To increase the share of renewable energy to 30% of energy consumption by 2025; · To increase the share of biofuels to meet 10% of the demand for transport fuels by 2025; · To make electricity available to 90% of Households in rural area by 2020; · Total installed capacity of the hydropower plants will be 5,500 MW by 2020.	· Implementation of Renewable Energy Development Strateg · Implementation of Rural Electrification Programme; · Expansion in the use of large-scale hydroelectricity;
Cambodia	Max reduction of 3,100 Gg CO2eq compared to baseline emissions of 11,600 Gg CO2eq by 2030.	Energy Industry:16%; Maufacturing Industry: 7%;Transport: 3%.	· National grid connected renewable energy generation; · · Off-grid electricity such as solar home systems,promoting mass public transport; · Promoting use of renewable energy and adopting energy efficiency for garment factory, rice mills, and brick kilns;
Myanmar		· Increase the share of hydroelectric generation within limits of technical Hydroelectric potential: Indicative goal - 9.4 GW by 2030; · Rural electrification through the use of at least 30% renewable sources as to generate electricity supplies; · To realise a 20% electricitysaving potential by 2030 of the total forecast electricity consumption.	National Comprehensive Development Plan (2011-30); Long Term Energy Master Plan; National Electrification Master Plan; Comprehensive Village Development Plan; National Energy Efficiency and Conservation Policy
Vietnam	Domestic resources GHG emissions will be reduced by 8% by 2030 compared to the Business as Usual scenario, with emission intensity per unit of GDP will be reduced by 20% compared to the 2010 levels;	· Improve effectiveness and efficiency of energy use; · Change the fuel structure in industry and transportation; · Exploitation and increase the proportion of new and renewable energy sources in energy production and consumption; · Promote effective exploitation and increase the proportion of new and renewable energy sources in energy production and consumption.	· Change the energy structure towards a reduced share of fossil fuel, encouraging the exploitation and use of renewable and low GHG emission energy sources; · Assure national energy security by developing and exploiting different energy sources, while simultaneously using energy sources effectively; · Develop and implement financial and technical mechanisms and policies to support research and the application of appropriate advanced technologies.
Thailand	7-20% GHG emission reduction by 2020 below business-as-usual in the energy and transport sectors.	· 20% share of power generation from renewable sources in 2036; · 30% share of renewable energy in the total final energy consumption in 2036; · LoweringThailand's energy intensity by 30% below the 2010 level in 2036.	· Ambitious targets are defined in the Power Development Plan (PDP), · Alternative Energy Development Plan (AEDP) and; · Energy Efficiency Plan (EEP).

Energy Revolution to Mid-Century in China

A Modern Energy System: Clean, Low-carbon, Safe and Efficient

Achieving major technical advance in energy resources, structures and forms to get green, low-carbon, safe and efficient energy system. Energy business is at the tipping point and low-carbon energy becomes one of the primary energy resources.

Achieving or nearing peak of fossil energy consumption by system and policy reform, and market liberalization.



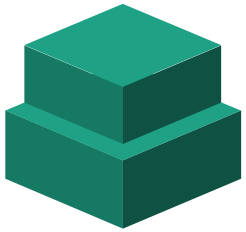
Economic patterns, energy system and consumption style change dramatically to achieve comprehensive green and low-carbon energy. Non-fossil fuels become the primary energy. Achieving zero-carbon at the end of the century.

Sustainable Energy Goals in NDC

To increase the share of non-fossil fuels in primary energy consumption to around 20%

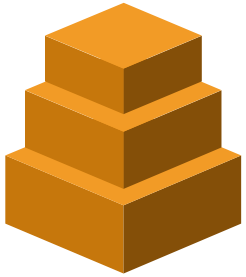
ONE ton Non-fossil Fuel per Capita Annually in China

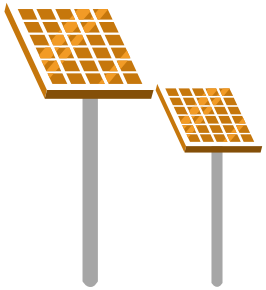
Nuclear
200GW



220 nuclear reactors
14 annually

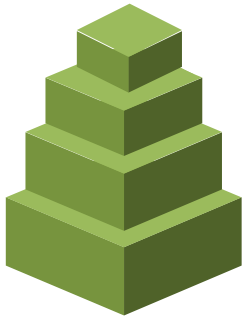
Solar
300GW

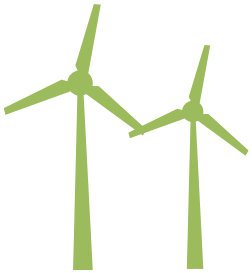




17000 solar farms
1100 annually

Wind
400GW





220000 wind turbines
14000 annually

Green Investments for NDC in China

1.6 Trillion RMB Investment Annually by 2030

12th FYP (2010-2015)

Energy Efficiency Investment: 2.7

Low Carbon Energy Investment: 3.1

Low Carbon Industry： 8.4 *(Yield)*

2005-2030

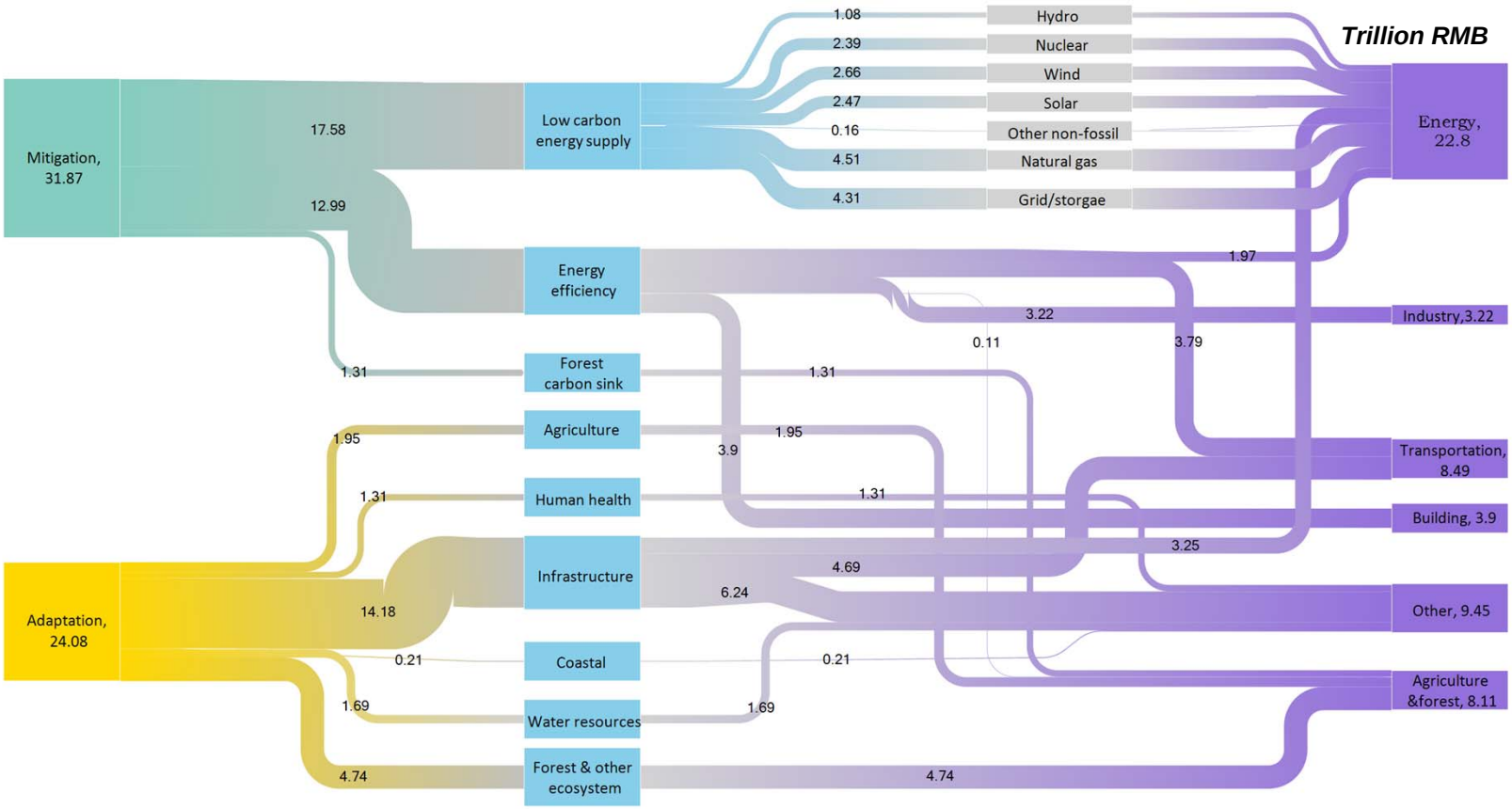
Energy Efficiency Investment: 15.2

Low Carbon Energy Investment: 25.7 *(Wind + Solar 11.3)*

Low Carbon Industry: 23 *(Yield)*

GDP Contribution: >16%

China's Climate Finance Flow for NDC



Source: CHAI Qimin, FU Sha & WEN Xinyuan, NCSC, 2018

SSC for Sustainable Energy Development

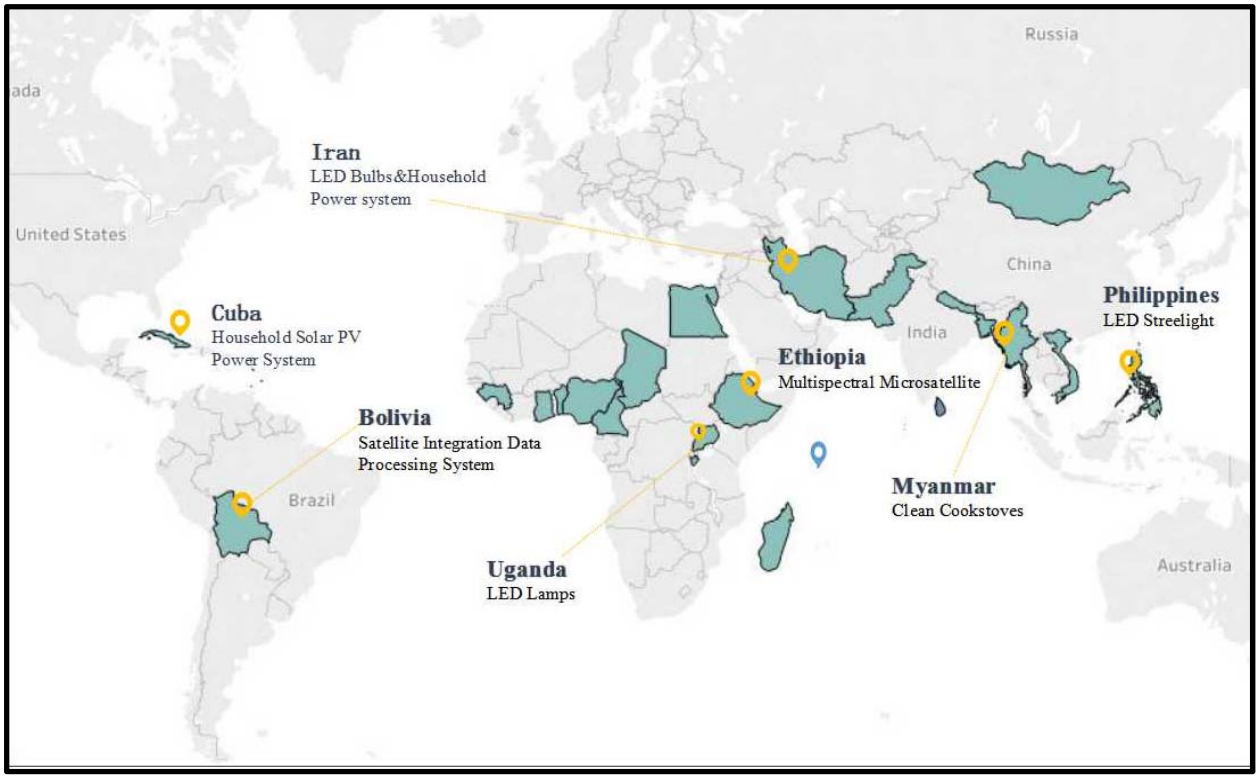
President Xi announced in the UNFCCC high-level segment in Paris that China would

Establish the **China South-South Climate Cooperation Fund** with RMB 20 Billion (US$3.1 billion)

Launch **China South-South Cooperation 10-100-1000 Program**

- ✓ Set up 10 low-carbon pilots;
- ✓ Start 100 mitigation and adaptation programs; and
- ✓ Provide 1,000 training opportunities.

Progress in South-South Cooperation



13K+ Household Solar PV

10K+ LED Street Lighting

1170K+ LED Lighters

10K+ Clean Stoves

20K+ Energy Efficient Air Conditioners

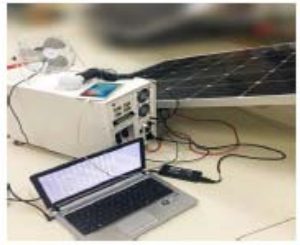
1+ Multispectral Microsatellite & Ground System

Signed MOU with 30 Developing Countries for 48 Projects in 2012-2017

Household Solar PV Case SDGs & Poverty Eradication

1.1 Household small scale power generation equipment (220rmb)

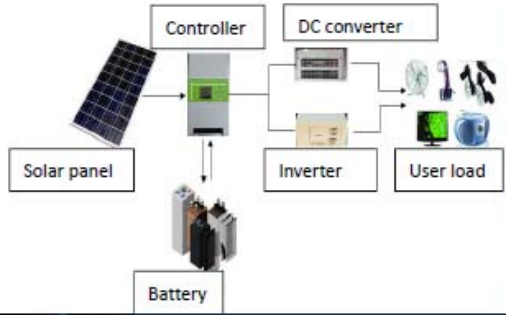
System working voltage (V): 12V;
Solar panel capacity (depending on specific scenario)(Wp)
10-60Wp;
AC 220V inverter capacity: not applicable;
Stored energy battery capacitance/kWh:
0.1KWh/0.3kWh/0.5kWh;
Applicable circumstances: family consisted of 3-8 members and small venue
Suggested load: DC lighting, mobile charging, and small home appliances of low power;



1.2 Household middle scale power generation equipment (5000rmb)

System working voltage (V): 24V
Solar panel capacity (depending on specific scenario)(Wp):
300Wp
AC 220V inverter capacity: applicable;
Stored energy battery capacitance/kWh: (kWh): 1.5kWh
Applicable circumstances: middle scale venue and school etc.
Suggested load: lighting, fan, TV and monitoring system etc.

1.3 Large scale power generation equipment (18000rmb)



Solar panel capacity (depending on specific scenario) (Wp): 1200Wp (inclusive of four pcs of support to be assembled, to be designed according to the actual place to be installed or just use common supports)
Control system: 24V30A / 24V 50A / 48V20A, in use of AC inverter with power consumption at least 1,000W;
Stored energy battery (depending on specific scenario): In use of two or four pcs of 12V150Ah or 200Ah battery and integrated enclosure (inclusive of battery, full set of control system, screen etc. It is possible to not integrate the battery inside according to the actually installed place)
Applicable circumstances: hospital, church and stadium and the like large size venue.
Suggested load: lighting, fan, TV, fridge, disinfection cabinet and monitoring system etc.

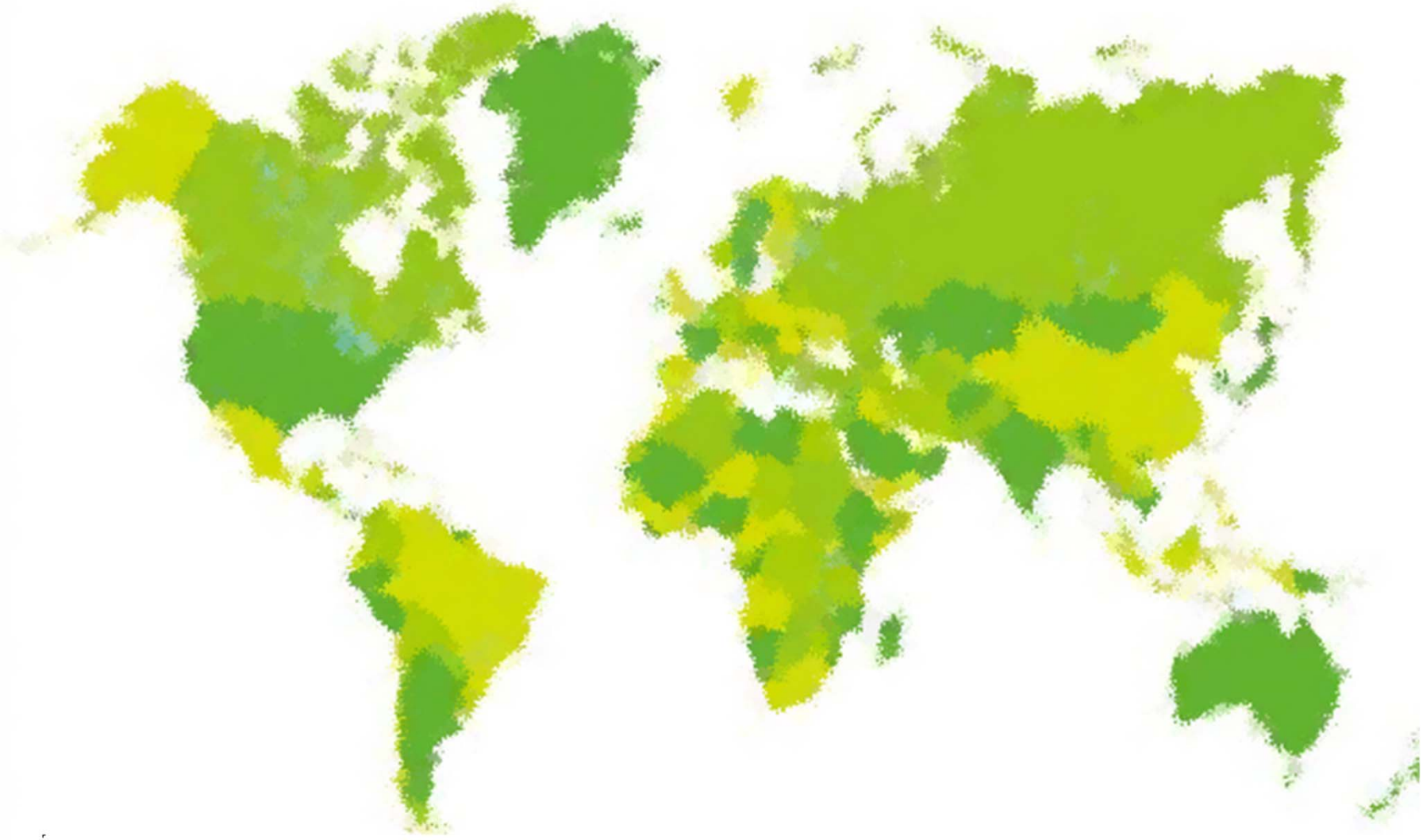
Established Programs in Asia

- ✓ Maldives
- ✓ Myanmar
- ✓ Pakistan
- ✓ Iran
- ✓ Nepal
- ✓ Mongolia
- ✓ Vietnam
- ✓ Bangladesh

Partnership with LMC- Myanmar

In Nov 2015, the MOU concerning the provision of goods for addressing climate change was signed between NDRC and The Myanmar Environmental and Forestry Protection Department

- *Clean Cook stove*
- *Household Solar System*



Thanks for Your Attention!

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