

# Off Grid Power Forum-Inter Solar Europe 2014

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Off Grid Solar PV Status & Its Potential in Myanmar



**Htun Naing Aung**

**Chairman (Energy & Environmental Group of Myanmar Industries Association)  
Working Committee Member of Myanmar Engineering Society  
Joint Secretary General of Myanmar Industries Association**

**Chairman/CEO (Kaung Kyaw Say Group of Companies)**



EEnG





Status



Opportunities



Policy



Tarriff



Challenges



Conclusion

# Location Map of Myanmar



## Location

□ Latitudes = 9° 58' to 28° 29' N

□ Longitudes = 92° 10' to 101° 10' E

## Area

□ Total land area = 676,577 km<sup>2</sup>  
(67.7 mil ha)

## Mean Temperature range

□ 25° C ~ 33° C (Rainy Season)

□ 10° C ~ 25° C (Cold Season)

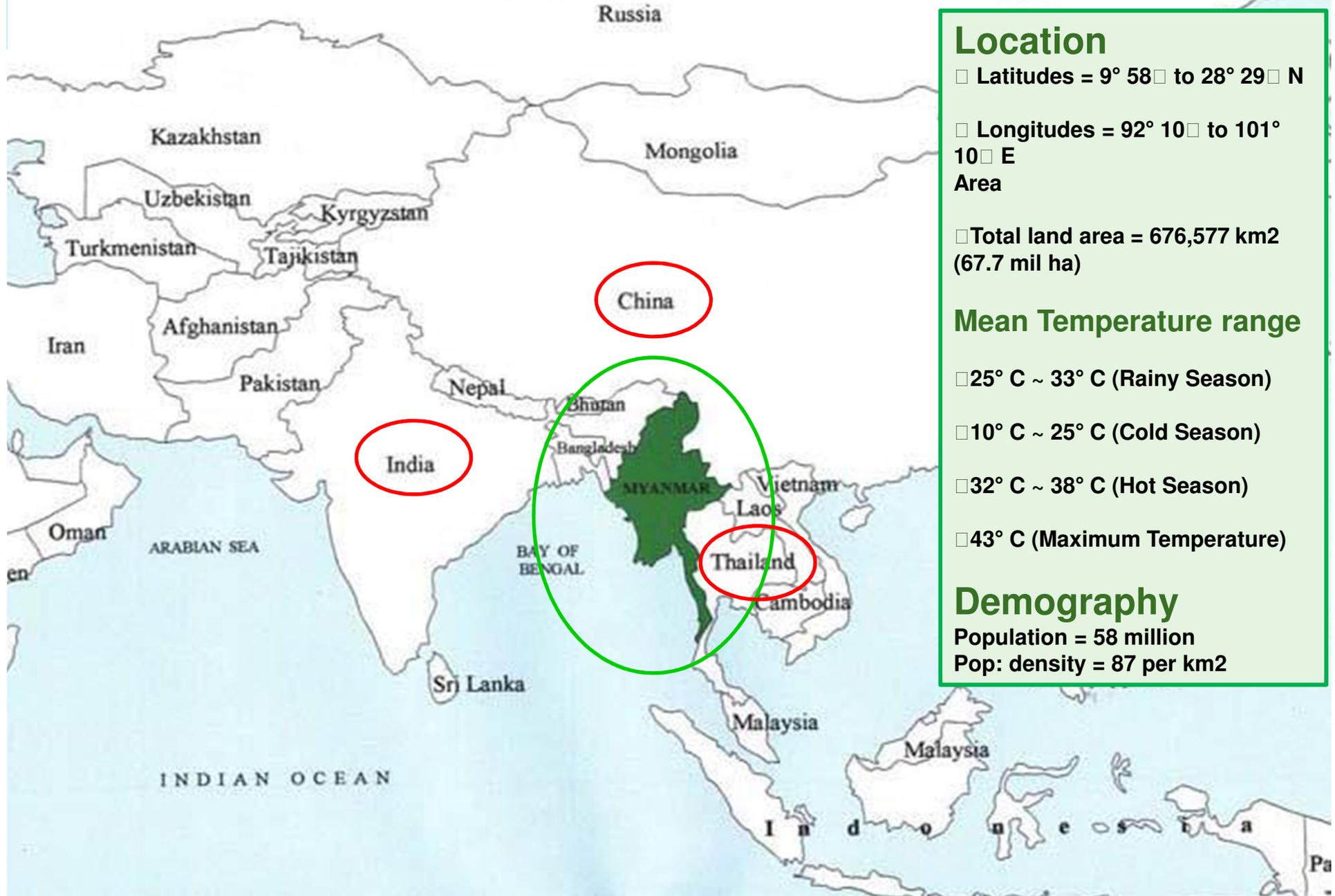
□ 32° C ~ 38° C (Hot Season)

□ 43° C (Maximum Temperature)

## Demography

Population = 58 million

Pop: density = 87 per km<sup>2</sup>





# The Republic of the Union of Myanmar

**Total land area: 676,577 sq. km**

➔ 50% mountains and forests  
(northern and eastern)

**Total coastline: 2,832 km**

Population: 60 millions (2010 est;)

Growth Rate: 1.84%

**GDP: USD 76.5 Billion**  
**GDP per capita: USD 650**



## Current Electrification Ratio

|                          |               |
|--------------------------|---------------|
| ➡ Population             | 60 million    |
| ➡ Number of Households   | 8.92 million  |
| ➡ Electrified Households | 2.575 million |
| ➡ Electrified Percentage | 28.86%        |

Source: Department of Hydropower Planning , 2013



# Opportunities



## Back ground history of Electricity in Myanmar

- Electric power generation started in 1908 at Ruby mine (Moe Gote)
- Yangon and Mandalay consumed Direct Current (D.C) distribution system in 1910.
  - Alternative Current (A.C) system started in 1922.

By 2013

Electrified Percentage

**28.86%**

# Myanmar Energy Situation

## MYANMAR [BAU]

| Primary energy consumption | Mtoe        |             |             |             |             | Share, %     |              |              |              |
|----------------------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
|                            | 1990        | 2005        | 2007        | 2020        | 2030        | 1990         | 2005         | 2007         | 2020         |
| <b>Total</b>               | <b>10.7</b> | <b>16.0</b> | <b>15.7</b> | <b>23.8</b> | <b>35.2</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> |
| Coal                       | 0.1         | 0.1         | 0.1         | 0.4         | 0.7         | 0.6          | 0.7          | 0.8          | 1.8          |
| Oil                        | 0.7         | 2.0         | 1.8         | 4.8         | 9.7         | 6.9          | 12.5         | 11.7         | 20.0         |
| Natural gas                | 0.8         | 3.5         | 3.1         | 5.5         | 9.4         | 7.1          | 21.6         | 19.5         | 23.3         |
| Nuclear                    | -           | -           | -           | -           | -           | -            | -            | -            | -            |
| Hydro                      | 0.1         | 0.3         | 0.3         | 6.1         | 13.4        | 1.0          | 1.6          | 1.9          | 25.8         |
| Geothermal                 | -           | -           | -           | -           | -           | -            | -            | -            | -            |
| Others                     | 9.0         | 10.2        | 10.4        | 6.9         | 2.0         | 84.5         | 63.6         | 66.0         | 29.1         |

| Final energy demand | Mtoe       |             |             |             |             | Share, %     |              |              |              |
|---------------------|------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
|                     | 1990       | 2005        | 2007        | 2020        | 2030        | 1990         | 2005         | 2007         | 2020         |
| <b>Total</b>        | <b>9.4</b> | <b>14.2</b> | <b>14.0</b> | <b>21.6</b> | <b>32.6</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> |
| Industry            | 0.4        | 1.4         | 1.4         | 2.8         | 5.0         | 4.2          | 10.1         | 9.9          | 12.8         |
| Transportation      | 0.5        | 1.3         | 1.4         | 3.9         | 8.5         | 4.8          | 9.4          | 9.8          | 18.2         |
| Others              | 8.5        | 11.2        | 11.0        | 14.4        | 18.0        | 90.0         | 78.7         | 78.7         | 66.4         |
| Non-energy          | 0.1        | 0.3         | 0.2         | 0.6         | 1.1         | 1.0          | 1.9          | 1.7          | 2.6          |

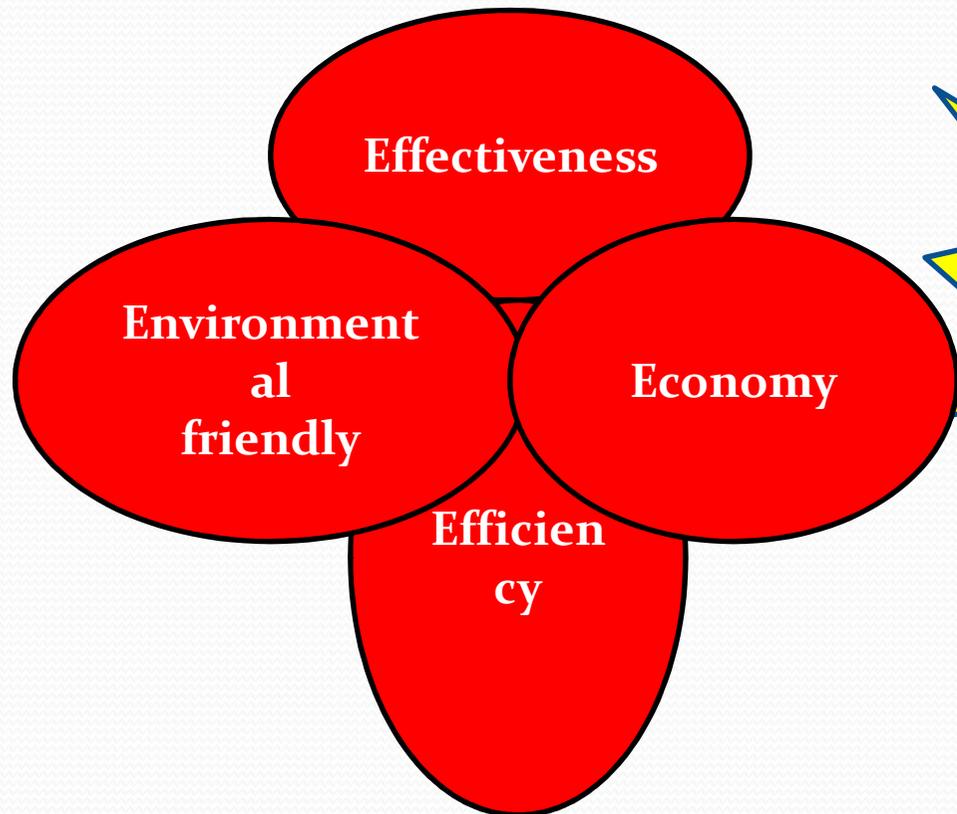
|              |            |             |             |             |             |              |              |              |              |
|--------------|------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|
| <b>Total</b> | <b>9.4</b> | <b>14.2</b> | <b>14.0</b> | <b>21.6</b> | <b>32.6</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> | <b>100.0</b> |
| Coal         | 0.0        | 0.1         | 0.1         | 0.3         | 0.6         | 0.5          | 0.8          | 0.9          | 1.3          |
| Oil          | 0.6        | 1.8         | 1.7         | 4.5         | 9.5         | 6.3          | 12.3         | 12.5         | 21.0         |
| Natural gas  | 0.2        | 2.2         | 1.8         | 4.4         | 8.3         | 2.4          | 15.6         | 12.5         | 20.3         |
| Electricity  | 0.1        | 0.3         | 0.4         | 0.8         | 1.4         | 1.6          | 2.2          | 2.8          | 3.7          |
| Heat         | -          | -           | -           | -           | -           | -            | -            | -            | -            |
| Others       | 8.4        | 9.8         | 10.0        | 11.6        | 12.9        | 89.2         | 69.1         | 71.3         | 53.8         |

- Per capita electricity consumption was about 105 kWh per year
- Electricity consumption increased by **15%** annually
- The largest end-use of electricity in the country is for “general purpose,” representing households, accounting for approximately 42% of total end-use in 2011, followed by industry at 36% and commerce at 20%.
- Government targeted GDP growth rate **7.81 %** annually on MCDP

# Stance for Qualified Power

## Industry

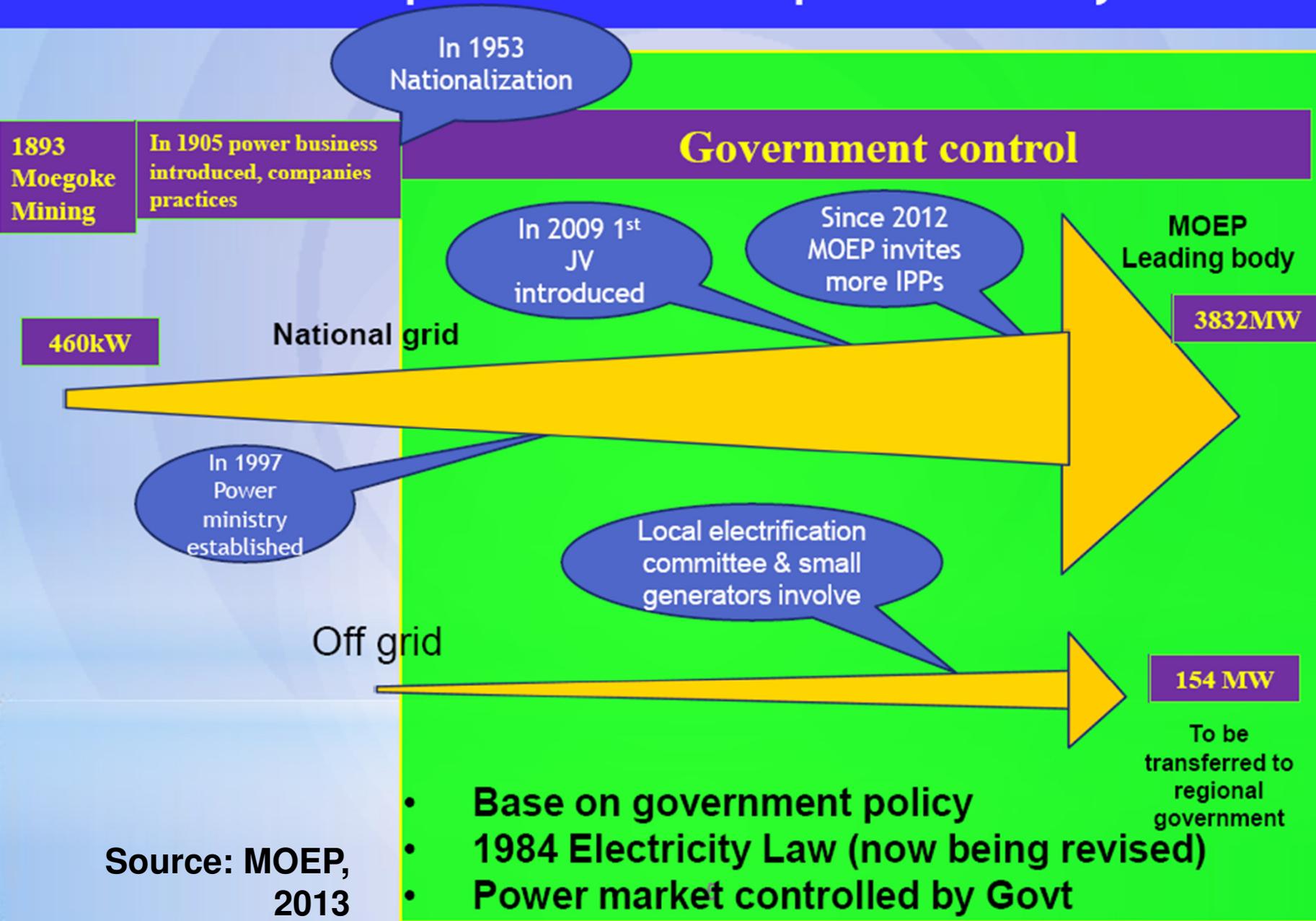
Gov commitment  
Strong legal framework  
Innovation Tech  
Investment



*Sustainable development*

Source: MOEP, 2013

# Development of Electric power Industry



Source: MOEP, 2013

## Involvement of Local companies in Distribution

### Operation

| <u>Location</u> | <u>Permitted companies</u> | <u>Permitted township</u> |
|-----------------|----------------------------|---------------------------|
| Yangon          | 1                          | 1                         |
| Mandalay        | 4                          | 8                         |
| Shan State      | 4                          | 8                         |
| Tanithari       | 1                          | 1                         |
| <b>Total</b>    | <b>10</b>                  | <b>18</b>                 |

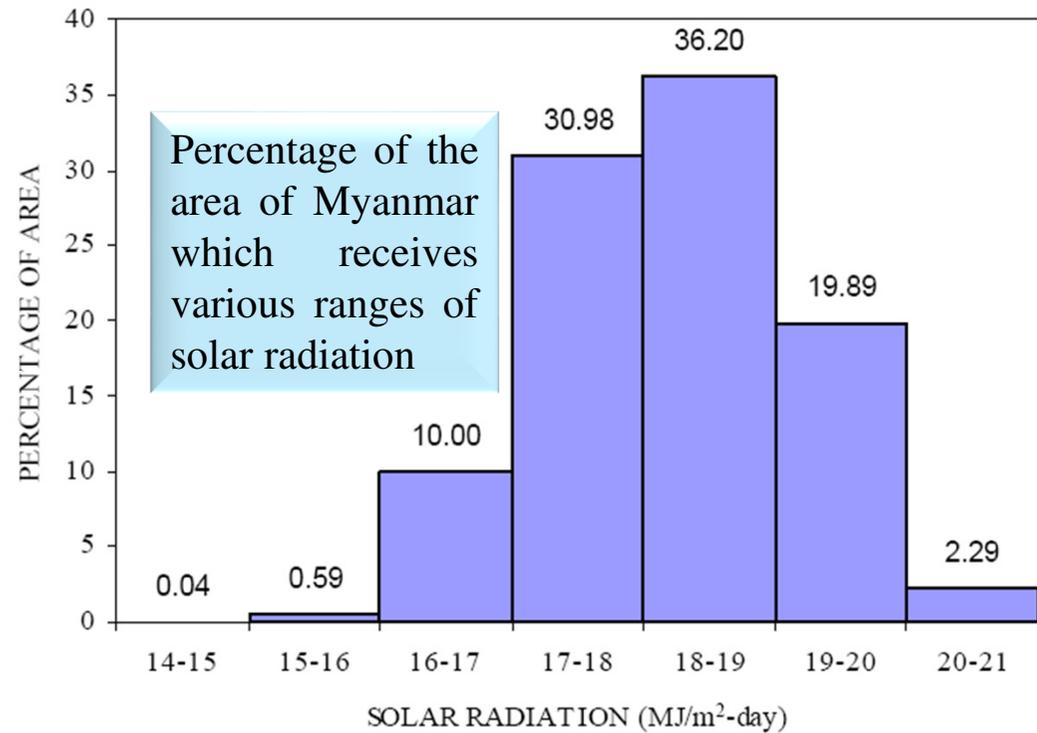
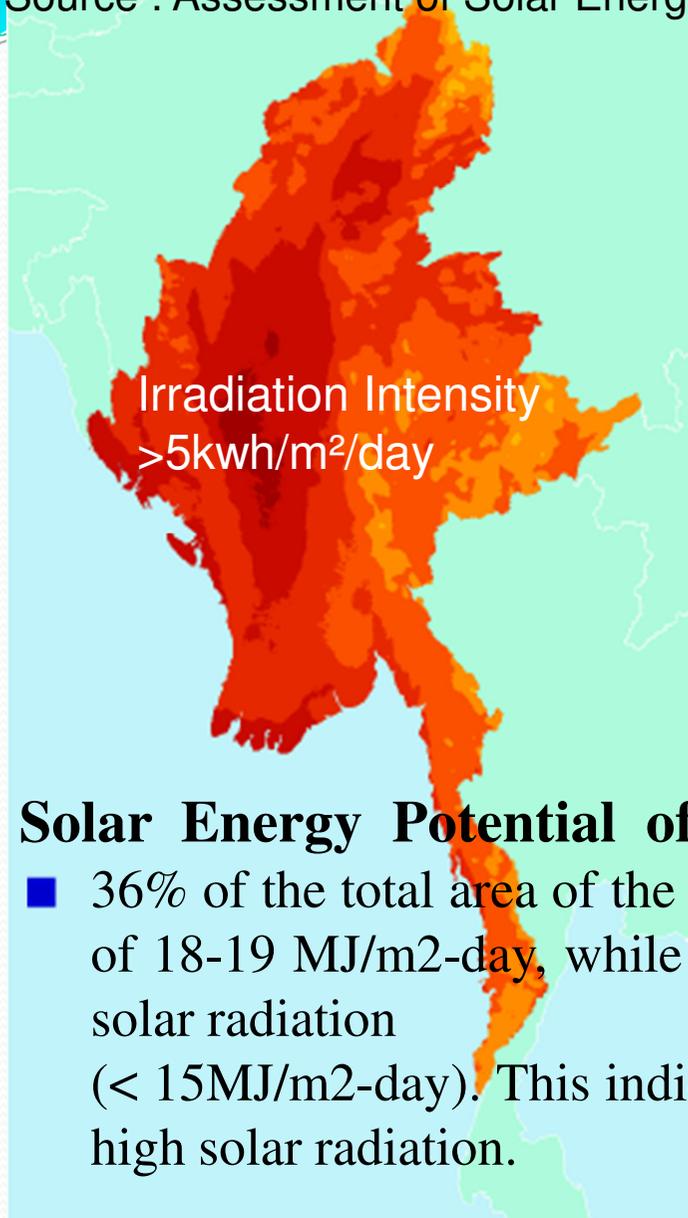
- ( 32 ) companies for (95 ) townships will be permitted soon depend on their FSR
  - Purchase power from MEPE grid and sell end users
  - Local grid operation in permitted area, system improvement and upgrade
    - Reduction of Energy loss for more profit
  - Innovation of Tech and effective effort are essential for them

Source: MOEP, 2013

## Yearly average of daily global radiation over Myanmar



Source : Assessment of Solar Energy Potentials for the Union of Myanmar, Sep, 2009



## Solar Energy Potential of Myanmar

- 36% of the total area of the country receives annual solar radiation in the range of 18-19 MJ/m<sup>2</sup>-day, while there are only a few percents of the area with less solar radiation (< 15MJ/m<sup>2</sup>-day). This indicates that most parts of Myanmar receive relatively high solar radiation.

## SPV Home Lighting System launched at Township Authority Office



## SPV Home Lighting System launched at Village Authority Office





Photo Credit: Renewable Energy  
Association of Myanmar





Policy



# The Policy Driver

The NEMC was formed by  
Presidential Notification No 12/ 2013  
on 9 Jan 2013

President

Vice  
President

NEMC

EDC

- National Energy Management  
Committee

- Energy Development Committee

## Formation of National Energy Management Committee (NEMC)

### The duties of NEMC are as follows:

- ✦ formulate national energy policy and energy security strategy
- ✦ to draft necessary law, rules and regulations to implement the policy and strategy
- ✦ privatization of state owned energy sectors
- ✦ development of electricity sector in short and long term plans
- ✦ utilization of coal and CCT technologies for power generation
- ✦ generating electricity using renewable resources( for off grid rural electrification)

## Formation of National Energy Management Committee (Cont.)

- providing adequate power for industries
  - to prioritize oil and gas for domestic demands
- to promote foreign direct investment for energy development
- to adopt convenient pricing policy for consumers and investors
  - to promote energy efficiency and conservation in industry, transport and household sectors
  - to participate in ASEAN civilian nuclear power activities

# Energy Policy

- Ensure energy security for sustainable economic development;
- Provide affordable and reliable energy supply to all categories of consumers; especially to those without electricity in remote areas;
- Achieve government's overarching objective of poverty reduction;
- Increase foreign exchange earnings through energy exports after meeting the national demand;
- Expand community-based renewable energy projects, with women participation, that are based on fuel that is free and self-renewing: the sun, the wind, biomass, hydro, geothermal, and others;
- Gradually reduce fossil fuel based energy supply that continuously rises in price, is dirty, dangerous, causes global warming, and destroys the habitat of this planet.



# Tarriff

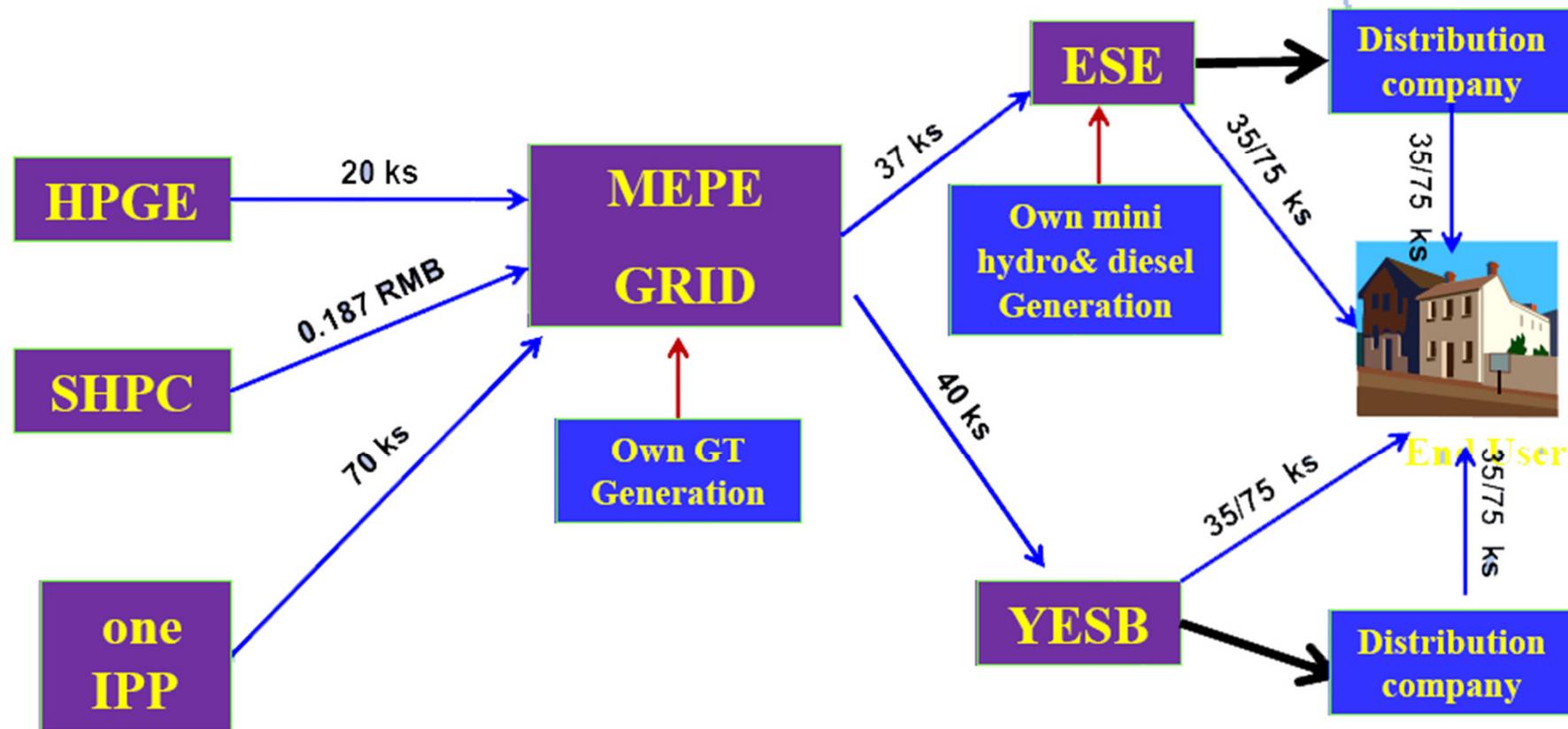




## TARIFF

- Government Increase TARIFF as following from April 1,2014.
- Households  
(from US\$0.035/kwh to US\$0.05/kwh)
- Industry from  
(US\$0.075/kwh to US\$0.150/kwh)

# Electricity transaction in National Grid (From Generator to consumer)



All the prices are for 1 unit (1kWh)  
For IPP/JV Project, transaction price depends on their own investment and operation cost of the power station and PPA system

Source: MOEP, 2013



# Challenges

## Region wise electrification

| State/Region              | Percent Electrified | No of Villages       |          |                |
|---------------------------|---------------------|----------------------|----------|----------------|
|                           |                     | Grid electrification | Off-grid | Un-electrified |
| <b>Kayar State</b>        | 41                  | 53                   | 42       | 416            |
| <b>Mandalay Region</b>    | 35                  | 738                  | 189      | 2313           |
| <b>Mon State</b>          | 31                  | 254                  | 318      | 628            |
| <b>Kachin State</b>       | 26                  | 1                    | 283      | 2295           |
| <b>Bago Region</b>        | 23                  | 309                  | 2070     | 2416           |
| <b>Kayin State</b>        | 23                  | 46                   | 79       | 1938           |
| <b>Sagaing Region</b>     | 22                  | 624                  | 3060     | 2295           |
| <b>Chin State</b>         | 16                  | -                    | 326      | 1026           |
| <b>Ayarwadi Region</b>    | 10                  | 343                  | 2992     | 8602           |
| <b>Shan State</b>         | 9                   | 374                  | 786      | 13424          |
| <b>Tanintharyi Region</b> | 9                   | 573                  | 1611     | 2588           |
| <b>Rakhine State</b>      | 6                   | -                    | 1033     | 2827           |

Source: MOEP,  
2013

## Issues and Challenges

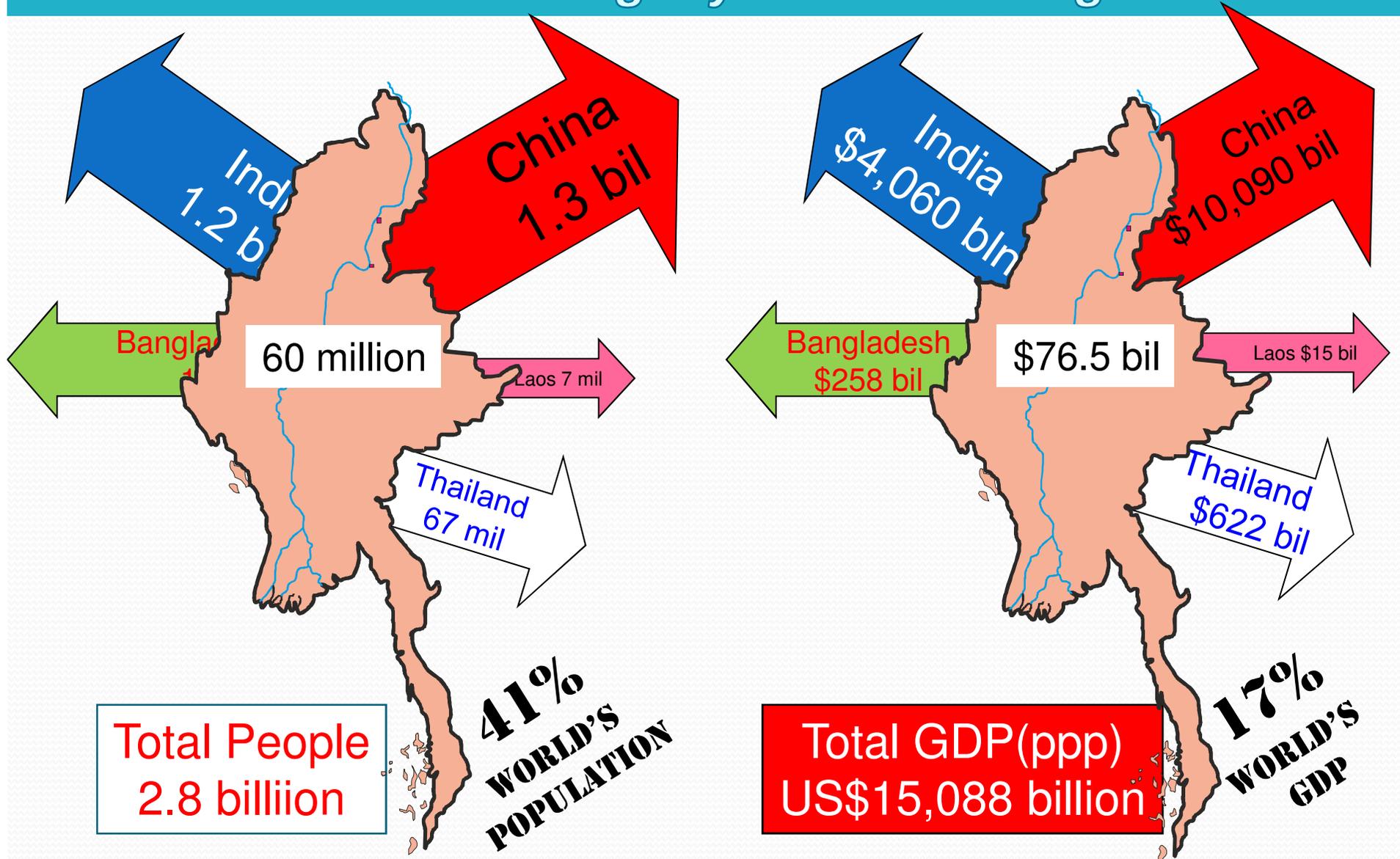
- While long term target for grid extension and installed capacity exist, Only short term target for off-grid electrification
  - Tariff imparity – this may slow the process of off-grid electrification
    - **Technical:**
      - ✓Lack of regulations, codes, standards etc.
    - **Financial:**
      - ✓Limited funds
      - ✓Lack of proper financing mechanisms/rural energy financing market do not exist
    - **Institutional:**
      - ✓Private Sector Participation
      - ✓Communication & coordination
- Lack of adequate financing resources and capacity to develop investment projects
- Government subsidies for energy use in the industrial sector



Conclusion

28<sup>th</sup> Most Populated, 40<sup>th</sup> Largest in the world and 2<sup>nd</sup> Largest in ASEAN

## Reviewing Myanmar Strategic Potential



Source : The World Factbook 2011

# Local Project Partners

The Key Player

## NGO & Private Enterprise

- Myanmar Industries Association (Energy & Environmental Group ) (MIA-EEnG)
  - 5<sup>th</sup> Fl, UMFCCI Bldg, No.29, Minye Kyaw Swa Road, Lanmadaw Township, Yangon, Myanmar (e.mail [mia@mptmail.net.mm](mailto:mia@mptmail.net.mm); [eengmia@gmail.com](mailto:eengmia@gmail.com))
- KKS Group (Kaung Kyaw Say Group of Companies)
  - No.31 Pinlone Yeikmon 5<sup>th</sup> Street, Pinlone Yeikmon, Thingungyun Tsp, Yagon , Myanmar (e.mail, [mgy@myanmar.com.mm](mailto:mgy@myanmar.com.mm); [kaungkyawsaymdoffice@gmail.com](mailto:kaungkyawsaymdoffice@gmail.com))



**KAUNG KYAW SAY  
GROUP OF COMPANIES**

**What is REBF?**

**Renewable Energy, Energy Efficiency  
Business & Finance Forum**

**Since 2009**

**Yearly Held Business Forum**

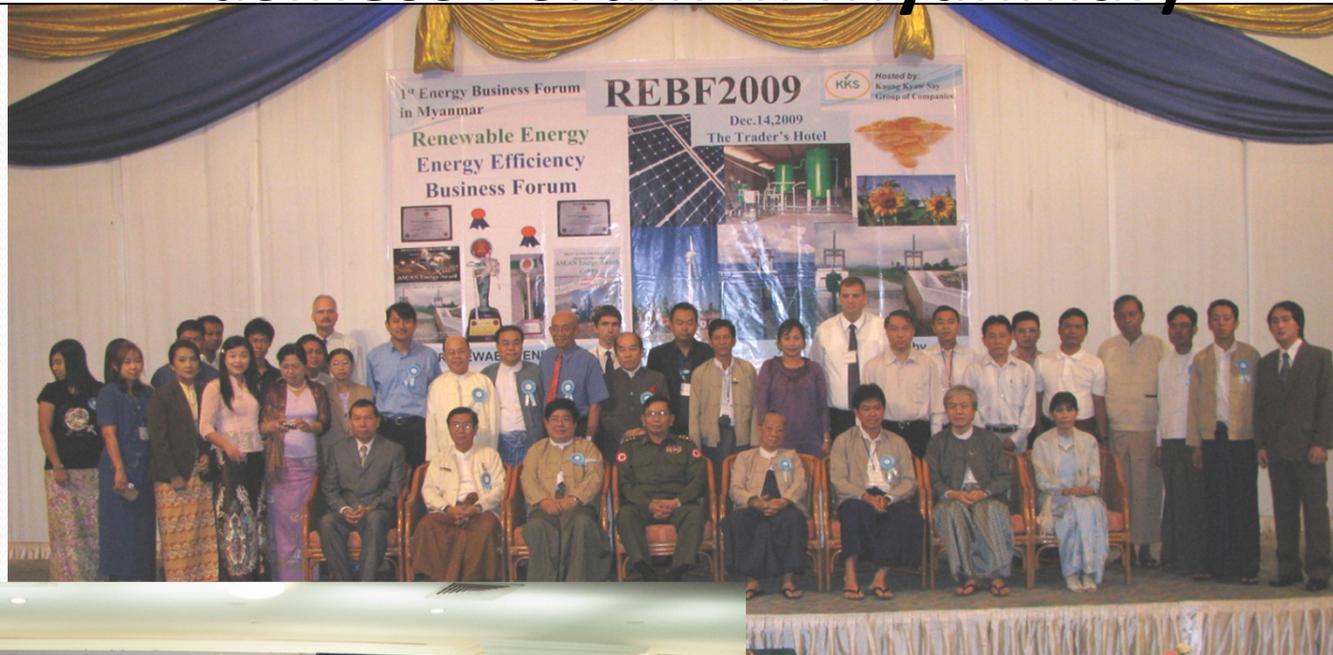
**The Platform Between Private & Public Sector**

**The Stake Holders Meeting**

**Technology Sharing**

6

# REBF 2009 (The 1<sup>st</sup> Energy , Energy Efficiency Business Forum in Myanmar)







- 2 Regional Governments has already approved verbely to act as IPP & ESCO to Kaung Kyaw Say Group of Companies
- The legal documentation is in progress



## KKS's future Plan with financing assistant

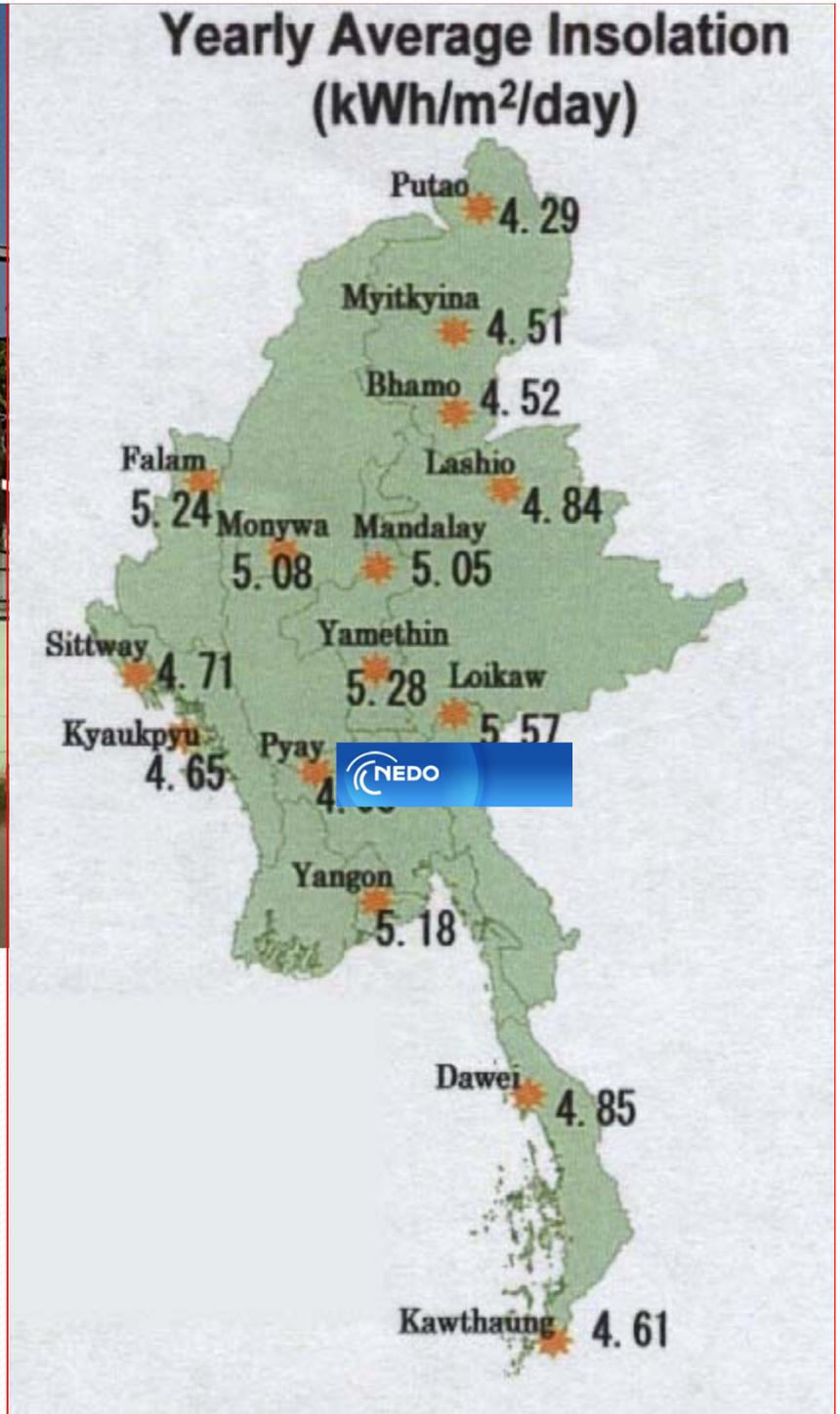
- IPP with Renewable Energy (5MW) Project.
- ESCO (to solve the energy losses with free investment scheme)

## **3KW Solar PV System implemented by KKS**





Solar ?  
Photovoltaic?



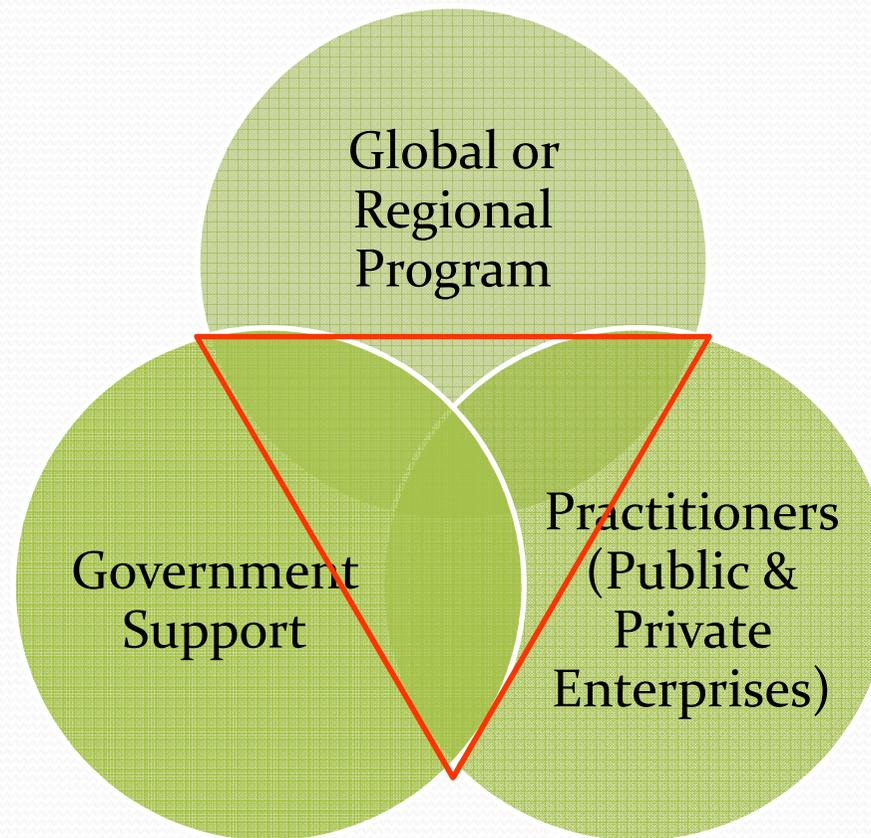


## Financing Proposal Received by KKS

| Financing                            | Options                                                                              | Terms                                  |
|--------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------|
| EPC + F<br>(financing)               | Concessional loans or commercial loans                                               | Rate at 2-8% for all types of projects |
| EMC (Energy Performance Contracting) | Uses the Expenses of energy reduced to Pay the costs of energy Conservation projects | 3-5 year payback period                |
| Export Credits                       | Preferential buyer's credit or supplier credit                                       |                                        |
| Project loan with LC                 | Loans provided by EPC contractors w/ LC. Allow project owner to refinance w/ bank    | Pay in full upon completion.           |
| BOT/ BOO                             | Direct investment & operation                                                        | Investment plan                        |
| Biz Recruitment                      | Recruit investor consortium for a project                                            |                                        |

# Conclusion

- Energy is one of the priority area for the development process like in Myanmar and it is not only the developing process but also fighting for the poverty reduction.



*Thank you for your kind  
attention*



## **HTUN NAING AUNG**

Office: +95-1-571284

Mobile: +95 -9-5183517

No.31 Pinlone Yeikmon 5<sup>th</sup> Street, Pinlone Yeikmon, Thingungyun Tsp, Yangon,  
MYANMAR 11071

[www.kaungkyawsay.com](http://www.kaungkyawsay.com)



[mgymyanmar.com.mm](mailto:mgymyanmar.com.mm)

[kaungkyawsaymdoffice@gmail.com](mailto:kaungkyawsaymdoffice@gmail.com)