

ဆိုလာရေတင်ပန်

**Lorentz
(Germany)**

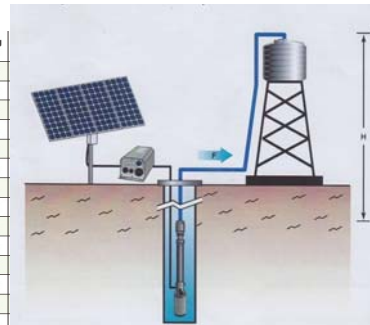


**Everexceed
(China)**

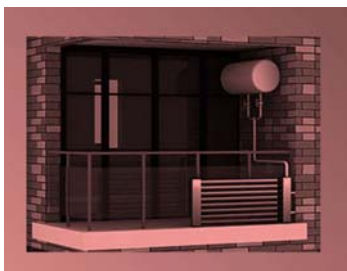
မြေအောက်ဆိုလာရေတင်ပန် (DC)

- Solar Direct Application or Battery Operation
- Vertical Lift min 30ft to max 750ft
- Daily Volume min 1600 gal: to 80000 gal:

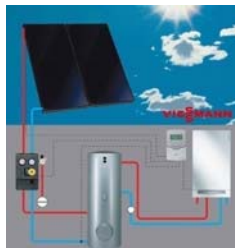
Model	Input	Adapting Water Head	Daily Water Supply	Outlet Internal Dia.	Adapting Well Dia.
PP4-370-10	3PH 220V 50Hz	47 - 32 m	1 - 10 m ³	30 mm	1 1/4"
PP4-370-20	3PH 220V 50Hz	29 - 20 m	10 - 20 m ³	30 mm	1 1/4"
PP4-550-10	3PH 220V 50Hz	70 - 48 m	1 - 10 m ³	30 mm	1 1/4"
PP4-550-20	3PH 220V 50Hz	40 - 28 m	10 - 20 m ³	30 mm	1 1/4"
PP4-550-40	3PH 220V 50Hz	23 - 15 m	20 - 40 m ³	40 mm	1 1/2"
PP4-750-10	3PH 220V 50Hz	81 - 56 m	1 - 10 m ³	30 mm	1 1/4"
PP4-750-20	3PH 220V 50Hz	60 - 41 m	10 - 20 m ³	30 mm	1 1/4"
PP4-750-40	3PH 220V 50Hz	29 - 19 m	20 - 40 m ³	40 mm	1 1/2"
PP4-750-60	3PH 220V 50Hz	15 - 8 m	40 - 60 m ³	50 mm	2"
PP4-750-100	3PH 220V 50Hz	7 - 6 m	60 - 100 m ³	50 mm	2"
PP4-1K1-10	3PH 220V 50Hz	93 - 63 m	1 - 10 m ³	30 mm	1 1/4"
PP4-1K1-20	3PH 220V 50Hz	79 - 54 m	10 - 20 m ³	30 mm	1 1/4"
PP4-1K1-40	3PH 220V 50Hz	43 - 27 m	20 - 40 m ³	40 mm	1 1/2"
PP4-1K1-60	3PH 220V 50Hz	23 - 12 m	40 - 60 m ³	50 mm	2"



ဆိုလာစနစ်သုံးအိမ်သုံးရေပူစနစ်တပ်ဆင်ခြင်း



VIESSMANN Germany



Available Capacity: - Solar Balcony System 80L
Horizontal 70mm, 8 tubes collector
- Solar Balcony System 120L
Horizontal 70mm, 12 tubes collector

High-performance vacuum tube solar collectors

The benefits at a glance:

Highly efficient heat pipe vacuum tube collector offering high operational reliability at an attractive price.

Optimized tube spacing prevents shading; tubes can be rotated up to 45° for optimum alignment with the sun to maximize energy utilization.

Highly selective coating on absorber surfaces; with vacuum tubes, absorbers are not susceptible to contamination over time.

Efficient heat transfer through fully encapsulated condensers; highly effective thermal insulation minimizes heat loss through header casing.

Universal application

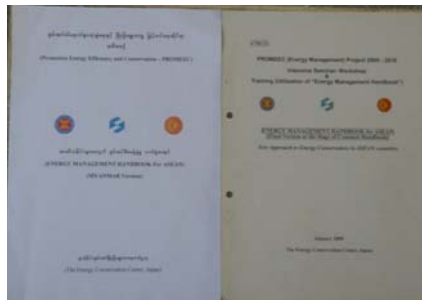
- large 4-in. diameter tubes optimized for installation on flat roofs and large arrays
- unique heat pipe design operates effectively with any tube slope greater than 3°
- vertical or horizontal installation, on sloped roofs, or flat roofs with angled frames or laid flat
- compatible with any DHW heating system
- residential, commercial or industrial systems

စွမ်းအင်အသုံးချခြင်းဆိုင်ရာ လမ်းညွှန်စာအုပ် မြန်မာဘာသာပြန်ဆို ထားခြင်း

Energy Management Handbook for ASEAN

- Translation of “Energy Management Handbook for ASEAN” which is one of the tools to promote Energy Efficiency Activities under the PROMEEC Project.

- EMHB have already been printed and distributed to Energy relevant stakeholders, institutions, factories and organizations.



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Renewable Energy Sector In Myanmar

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မြန်မာနိုင်ငံဆိုလာစွမ်းအင်ရရှိနိုင်ခန့်မှန်းခြေ

Solar Energy Potential in Myanmar

36% of the total area of the country receives annual solar radiation in the range of 18-19 MJ/m²-day,
Only a few percents of the area with less solar radiation (< 15 MJ/m²-day).

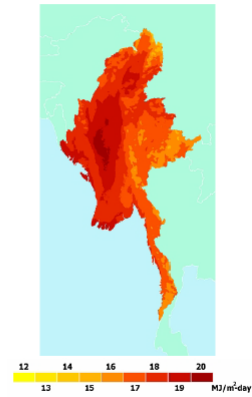
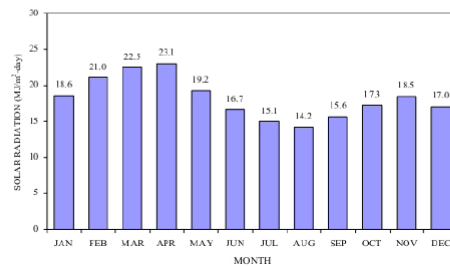
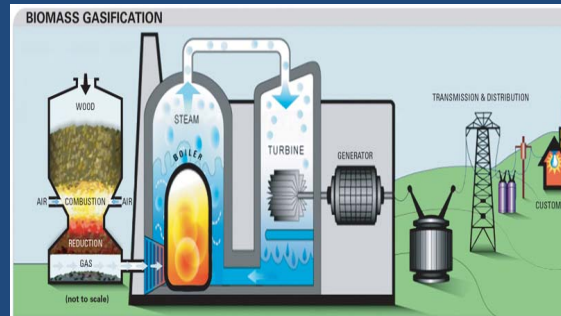


Fig. 4.29 Yearly average of daily global radiation over Myanmar

ဆိုလာစနစ်သုံးရေခဲသေတ္တာအသုံးပြုခြင်း



ပြန်ပြည့်မြဲစွမ်းအင် ဇီဝဓာတ်ငွေ့ လောင်စာအသုံးပြုခြင်း ပရိုဂျက်



Paddy
30 million
Ton/yr

Rice Husk
6 million
Ton/yr

Energy
35 GWh/yr

ကြက်ဆူဇီဝဒီဇယ် လောင်စာအသုံးပြုခြင်း ပရိုဂျက်

Diversity of Potential Biodiesel Feedstock in Myanmar



- *Jatropha curcas*
- Palm oil
- Coconut
- Rice-brand oil
- Cotton seed
- Soybean
- Sesame
- Peanut



- Rape seed
- Niger
- Neem seed
- Other Vegetable seed



Need to evaluate all oleaginous plants for bio-diesel. R & D is essential

ဇီဝဒီဇယ်ဆီလောင်စာစမ်းသပ်အသုံးပြုခြင်းရှေ့ . ပြေးပရိုဂျက်

- Ministry of Science and technology has constructed 1 pilot bio-diesel plant and conducted test run

- MICDE of MOAI has constructed 2 pilot diesel plants in experimental scale

- MICDE is planning to set up 10 more diesel plant in near future

- MAS of MOAI has 2 bio diesel plant : one is community bio-diesel plant constructed in collaboration with Kasetsart University (KU) Bio-diesel Project, Thailand. Another one was transferred from MICDE

Pilot Biodiesel plant in Myanmar

Ministry	No. of plant	Capacity (gallon/day)
Science and technology	1	100
Energy	2	150
MOAI	3	100-150

- KU machine is a batch type with capacity of 100 liters/batch



ကြက်ဆူပင်စမ်းသပ်စိုက်ပျိုးခြင်း ပရိုဂျက်

State of biodiesel production from Jatropha in Myanmar

- Government launched the plan in 2005 with full political will with the target to reach over 3.23 million ha (8 million ac) within 3 years; (**Large public campaign**)
- Main objective is for rural energy self-sufficiency;
 - Small farm machineries,
 - Domestic lighting and cooking, and
 - Income generation from surplus production
- During 2011, 2.13 million hectare has been covered.
- **Committed large scale experiment?**



ကြက်ဆူပင်စမ်းသပ်စိုက်ပျိုးခြင်း ပရိုဂျက်



Jatropha Curcus Plantation Programme



Year	Proposed area acre (hectare)	Actual cultivated area acre (hectare)
2005	-	16,197 (6555)
2006-07	2,158,559 (873522)	850,000 (343976)
2007-08	2,688,209 (1087859)	1,100,000 (445146)
2008-09	3,382,490 (1368820)	-

Jatropha Production in Myanmar (2010-11)

State /Region	Sown area (,000ha)	Harvested (,000ha)	Yield (MT/ha)	Production (MT)	State /Region	Sown area (,000ha)	Harvested (,000ha)	Yield (MT/ha)	Production (MT)
Kachin	135	1.5	0.03	40	Mandalay	217	3.0	0.07	210
Kayah	120	2.4	0.12	274	Mon	67	0.3	0.06	16
Kayin	95	1.3	0.15	203	Rakhine	43	1.2	0.06	69
Chin	81	0.2	0.05	10	Yangon	34	0.5	0.05	26
Sagaing	208	9.9	0.07	734	Shan (S)	190	9.7	0.10	998
Tanintharyi	9	1.5	0.06	81	Shan (N)	198	11.2	0.02	203
Bago (E)	113	1.8	0.04	66	Shan (E)	49	2.9	0.07	260
Bago (W)	90	0.6	0.03	16	Ayeyar-wady	188	1.4	0.06	91
Magwe	324	27.2	0.08	2201	Total	2127	78	0.07	5498

Up to 2011- Biodiesel produced from Jatropha Curcus can be used for home cooking usage and one cylinder diesel engines drive . Now one machine (superheated steam system) has been carried out in test run position with JKK Co.,Ltd.(Japan), after that it will be operated for rural electrification (at least 10-20 villages).

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ကြက်ဆူပင်စမ်းသပ်စိုက်ပျိုးခြင်း ပရိုဂျက်

State of biodiesel production from Jatropha in Myanmar (continued)

- Bio-diesel production by private sector
 - Agri: Technology Co. Ltd. --- 12,145ha Ngapudaw Township Ayeyarwady Division mainly for Jatropha
- Community bio-diesel plant at Hlaing Det farm through MAS and KU, Thailand
- Two small scale plant at Lasho, Shan State, & Magwe Division by State/Division

Future plan

- FAO TCP Project on Biofuel production will be implemented in 2008
- Biofuel villages will be established at potential township of State and Division where potential biofuel crops can be cultivated



ကြက်ဆူပင်စမ်းသပ်စိုက်ပျိုးခြင်း သုတေသနလုပ်ငန်း

On-going R&D for Jatropha

- ▶ Germplasm collection
- ▶ Varietals improvement
 - High Yield and High Oil content
- ▶ Agro-techniques
 - Propagation method
 - Fertilizer response
 - Planting arrangement
 - Pruning method
 - Irrigation
 - Pest and disease management
- ▶ Processing technology



Jatropha experiments at DAR research farm



- Characterization of 87 national collections for yield and oil content
- Varietals improvement program in term of seed yield and oil content
- 10 different clones have been evaluated in multiple environments
- Testing Rapid clone multiplication
- Study on the effect of pruning
- Effect of irrigation on early growth and development of pre-monsoon planted Jatropha

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ကြက်ဆူဆီ ခန့်မှန်း တန်ဖိုး

Expected crude oil price as per cost and revenue

Plant Age (years)	Cost (Kyats)	Revenue		Crude oil Price (Kyats / litre)
		Seed Yield (Kg/acre)	Crude Oil Yield (liter / acre)	
First	170000	112	28	6071
Second	92000	240	60	1533
Third	132000	480	120	1100

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ကြက်ဆူဆီအင်ဂျင်စမ်းသပ်မောင်းနှင်ခြင်း



- Participatory rural energy assessment is also essential
- If there is strong market force, rural bio-energy business will boom within short period.



Public awareness program for promoting use of bio-diesel in Myanmar

- Collaboration between MAS (Myanmar) and KU Thailand community based bio-diesel plant



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ဘိုင်အိုဒီဇယ်စမ်းသပ်ထုတ်လုပ်ခြင်း

- အမျိုးသားမူဝါဒတစ်ရပ်အနေဖြင့် ထောက်ပံ့ပေးလျက်ရှိသည်။
- သက်ဆိုင်ရာ နယ်ပယ်အသီးသီး မူးပေါင်းဆောင်ရွက်လျက် ရှိသည်။
- ပြည်သူလူထုနှင့်ပုဂ္ဂလိကပူးပေါင်းဆောင်ရွက်လျက်ရှိသည်။

ဇီဝဓါတ်ငွေ့

- မန္တလေး၊ မကွေး၊ စစ်ကိုင်း၊ ရှမ်းပြည်နယ်မြောက်ပိုင်းဒေသများမှာ ဇီဝဓါတ်ငွေ့ ကန်များ တည်ဆောက်အသုံးပြုလျက်ရှိသည်။

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၂၀၁၂ တိုင်းနှင့်ပြည်နယ် အလိုက် ဇီဝဓါတ်ငွေ့ ကန်များ တည်ဆောက် အသုံးပြုနေမှု

No.	States / Regions	No. of Constructed Digester		Total
		Digester for Village	Digester for Family	
1.	Nay Pyi Taw	8	15	23
2.	Mandalay	109	3	112
3.	Sagaing	23	2	25
4.	Magway	9	-	9
5.	Shan (North)	1	-	1
6.	Shan (South)	2	1	3
7.	Shan (East)	1	1	2
8.	Kayar (Loikaw)	1	-	1
9.	Ayeyarwady (Patheingyi)	-	2	2
10.	Kachin	-	3	3
11.	Rakhine	-	1	1
12.	Yangon	1	-	1
13.	Mon	-	1	1
14.	Chin	1	-	1
	Total	159	26	185

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ဧရာဝတီတိုင်း ကျိုက်လတ်မြို့နယ်ရှိ စပါးခွဲခါတ်ငွေ့ ထုတ်စက်
၏ ကုန်ကျစားရိတ်နှင့် ရရှိမည့်အကျိုးအမြတ်များ



Investment US\$ 6000



- Supply 50 households
- Lighting – US\$4/month
- 20 TV – US\$ 12/month



Profit US\$ 100/month

စပါးခွဲ ခါတ်ငွေ့ လျှပ်စစ်ခါတ်အားပေးစက်ရုံ

Gasifier for Rice Mill (300 kVA at Kyeik Latt)



Biomass Energy

Source Materials

- Agricultural Wastes
- Energy Crops
- Industrial Wastes
- Municipal Solid Wastes
- Animal Wastes

လွှစာမှုန့် . နှင့် စပါးခွံမှ စွမ်းအင်ထုတ်လုပ်ခြင်း

Gasification



Saw Dust



Gas Generator



Gasifier Units (Saw Dust)



Gasifier (Rice Husk)



Gasifier (Rice Husk)

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Bio-gas



Almost completed biogas tank in a village



Final finishing



Erecting the lighting posts

Source: Myanmar Engineering Society, Myanmar



Generator utilizing biogas



Biogas feasibility study Myanmar



Biogas feasibility study Myanmar



Biogas feasibility study Myanmar

ဇီဝဓာတ်ငွေ့ဖြင့် အင်ဂျင်မောင်း၍ မီးထွန်းခြင်း၊ ထမင်းချက်ခြင်း၊
စပါးအခြောက်ခံခြင်းဆောင်ရွက်ပုံများ

Types of Biogas Plant

- Plant with movable gasholder
- Plant with built-in (fixed dome) gasholder

Uses of Biogas

- Cooking
- Lighting
- Preservation of grains
- Preparation of fodder
- Drive internal combustion engine



စိုက်ပျိုးရေးအခြေခံတိုင်းပြည်ဖြစ်၍ တိရစ္ဆာန်အညစ်အကြေးများ
ရရှိနိုင်မှုကို တင်ပြထားပါတယ်။

- Agriculture-based country, so many cattle and goats in central Myanmar Region specially Nay Pyi Taw, Mandalay, Sagaing, Magway, Ayeyarwaddy Division, and Shan, Kayah, Kachin State.
- On the average, the dung dropping of a medium size animal is estimated at 10 kg/day capable of producing 0.5 m³ biogas
- The availability of Animal dung in Myanmar is shown in the following table.

Availability of Animal Dungs

Sr. No.	Domestic animal	Number (million)	Excreta (MT per year)
1	Cattle	11.2	20.3
2	Buffalo	2.5	4.5
3	Sheep & Goat	1.9	1.2
4	Pigs	4.2	3.8
5	Chicken	63.0	1.9
Total			31.7

သိပ္ပံနှင့် နည်းပညာဝန်ကြီးဌာနရန်ကုန်နည်းပညာတက္ကသိုလ် မှလုပ်ဆောင်သော
ဇီဝဓါတ်ငွေ့ လျှောင်ကန်

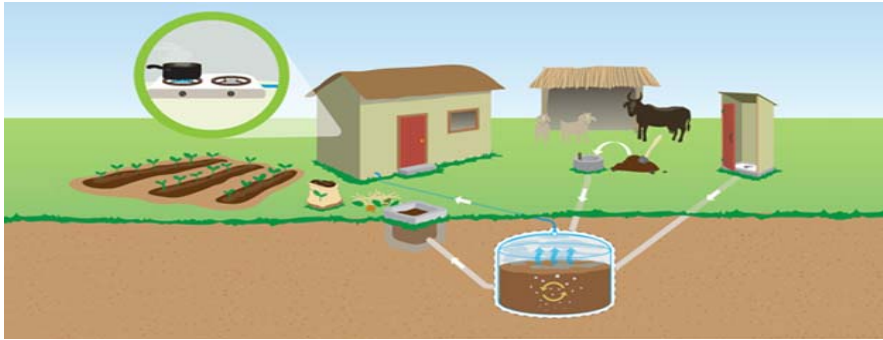


- Since **2002**, community size biogas digesters for village electrification have been constructed and utilized in **Central region** - Mandalay, Sagaing, Magway Region and Northern Shan State.
- These digesters are **25, 50, 100 cubic meter** in size, **Fixed Dome Type** electricity producing biogas plants with installed capacity of 5-15 KW, serving **177 villages** with 4 hours per day of electricity.



ဇီဝဓါတ်ငွေ့ . လှောင်ကန်တစ်ခုအလုပ်လုပ်ပုံ

- All houses, monasteries and streets (two hours in the early mornings and four hours in the evenings).
- In **2009**, 26 Nos of **6-12 cubic meter size** of family-sized, fixed dome type biogas digester has been developed by biogas project group and utilized in integrated farming system.



ဇီဝဓါတ်ငွေ့ . လှောင်ကန်တည်ဆောက်အသုံးပြုမှုကုန်ကျစားရိတ်နှင့်
ရရှိနိုင်မည့်အကျိုးအမြတ်များတင်ပြထားပါတယ်။



သဘာဝသစ်ပင်အဆွေးအမြွေများမှ ဇီဝဓါတ်ငွေ့ ထုတ်လုပ်ခြင်း

- Animal excreta, crop stalks, vegetable waste and leaves become thoroughly decomposed after fermentation when sealed airtight in these biogas pits.
- Their nitrogen content is transformed into ammonia, which is easier for plants to absorb, and therefore improve the fertilizer.



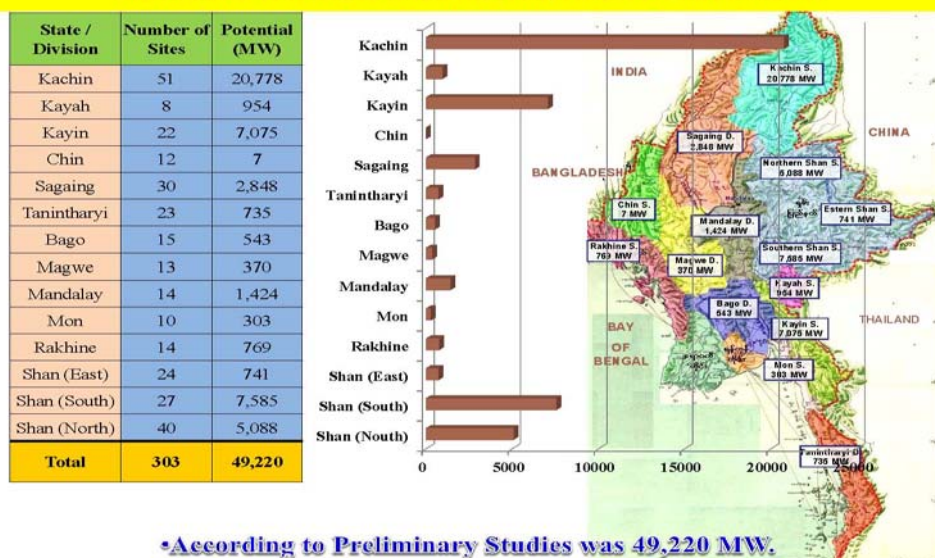
- From 50m³ in size, 420 gals (or) 8 barrels of effluent slurry (more than 75% of inorganic Nitrogen rich in digested slurry)
 - 2.87 tons of N equivalent to 125 bags of urea
 - 1.15 ton of P₂O₅ equivalent to 50 bags of superphosphate
 - 2.87 ton of K₂O equivalent to 96 bags of Potash
 are composed of effluent slurry per annum.
- approximately will be saved US\$ 1900 / year
- the literature, the yield of wheat is a 16% and rice is a 14.7% and vegetable is a 25% increase.

အသေးစားရေအားလျှပ်စစ်

- Myanmar has abundant small hydro potentials
- Turbine manufacturing and installation technology.
- The small hydro potential, nearly 60 sites suitable for small hydro (170 MW in total potential output).
- Up to 2008, 33 small hydro power projects were generating (35.97MW)
- Village Hydros (<50kW) and turbine generator installations of 1 kW or less in hilly regions.
- ၂၀၀၈ခုနှစ်အထိ အသေးစားရေအားလျှပ်စစ် ၃၃ခု ၄၃၅၉၇ MW ထုတ်လုပ်နိုင်ခဲ့သည်။

မြန်မာနိုင်ငံ၏ ရေအားလျှပ်စစ် ထုတ်လုပ်နိုင်စွမ်းခန့်မှန်းချက်

REGIONAL HYDROPOWER POTENTIALS OF MYANMAR



မြန်မာနိုင်ငံရေအားလျှပ်စစ်အရင်းအမြစ်များ

Hydropower Resources in Myanmar

Sr. No	State/Region	Numbers of Potentials		Capacity (MW)
		>10MW ≤50 MW	>50 MW	
1	Kachin State	5	14	18,744.5
2	Kayah State	2	3	954.0
3	Kayin State	1	8	7,064.0
4	Sagaing Region	2	4	2,830.0
5	Tanintharyi Region	5	1	711.0
6	Bago Region	4	4	538.0
7	Magway Region	2	3	359.0
8	Mandalay Region	3	6	1,555.0
9	Mon State	1	1	290.0
10	Rakhine State	3	3	764.5
11	Shan States			
	East	1	3	719.8
	South	3	5	7,569.5
	North	-	5	4,000.0
	>10 MW	32	60	46,099.30
12	<10MW	210		231.25
	Total	302		46330.55

ရေအားလျှပ်စစ်ပရိုဂျက် (2015-2016)

No.	Project	Location (Region/State)	Installed Capacity (MW)	Annual Energy Generation (GWh)	Completion Year	Weighted Progress
1	Chipwinge	Kachin State	99	599	2012-13	100.00%
2	Phyu Chaung	Bago Region	40	120	2013-14	89.53%
3	Nancho	Mandalay Region	40	152	2013-14	78.92%
4	Thaukyegat-2	Bago Region	120	604.7	2012-13	90.07%
5	Baluchaung-3	Kayah State	52	334	2013-14	74.13%
6	Upper Baluchaung	Shan State	29	120	2014-15	34.33%
7	Upper Paunglaung	Mandalay Region	140	454	2014-15	61.64%
	Total		520	2383.7		
<div> <div>MOE</div> <div>BOT</div> <div>JV/BO</div> </div>		Source:				

ဆောက်လုပ်ဆဲရေအားလျှပ်စစ်ပရိုဂျက် (2020-2021)

No.	Project	Location (Region/State)	Installed Capacity (MW)	Annual Energy Generation (GWh)	Completion Year	Weighted Progress
1	Ann	Rakhine State	10	44	-	18.69%
2	Thahtay	Rakhine State	111	386	2018-19	23.04%
3	Upper Kengtawng	Shan State(S)	51	267	2018-19	11.33%
4	Upper Yeywa	Shan State (N)	280	1330	2019-20	5.00%
5	Shweli-3	Shan State (N)	1050	3500	2020-21	2.32%
6	Bawgata	Bago Region	160	500	2020-21	Preliminary Works
	Total		1662	6027		

Source:

ချင်းပြည်နယ် ပလက်ဝ မိုက်ခရိုပါဝါပရိုဂျက်



လူဦးရေ စာရင်း

- ချင်းပြည်နယ် ပလက်ဝမြို့
- လူဦးရေ ၇၀၀၀ အိမ်ခြေ ၁၀၀၀၊ ကျောင်း ၂၊
- ၅၀ကီလိုဝပ်



Paletwa Mini Hydropower Project (Chin State)
Power output -25kW x 2 Nos.



ဒီရေမှစွမ်းအင်

- Myanmar has more than 2800 km of coastline with numerous small creeks suitable for harnessing the tidal energy
- available for electrification of rural remote villages

ဧရာဝတီတိုင်းဒေသကြီး ငပုတောမြို့နယ်ကမ်းဘလားကျေးရွာ
ဒီရေမှစွမ်းအင်ထုတ်လုပ်ခြင်း

Site Location

Name of Village	-	ကမ်းဘလားကျေးရွာ
Township	-	ငပုတောမြို့
		ဧရာဝတီတိုင်းဒေသကြီး
House hold /Population	-	220 / 1200
Distance from National Grid	-	150 km

ဧရာဝတီတိုင်းဒေသကြီး ငပုတောမြို့နယ်ကမ်းဘလားကျေးရွာ
ဒီရေမှစွမ်းအင်ထုတ်လုပ်ခြင်း

- Barrage style (Old Technology) was chosen to suit local conditions and facilities available in Myanmar



ဧရာဝတီတိုင်းဒေသကြီး ငပုတောမြို့နယ်ကမ်းဘလားကျေးရွာ
ဒီရေမှစွမ်းအင်ထုတ်လုပ်ခြင်း

ကုန်ကျငွေ ဒေါ်လာ ၅၀၀

- Possibility of running 10 numbers of turbine parallelly.
- The cost for turbine and accessories is only US\$ 500 (by voluntary villagers)



- ဒီရေ အတက်အကျအလိုက် တစ်နေ့ .ကို (၆)နာရီနှင့် နှစ်ကြိမ် လျှပ်စစ်ထုတ်နိုင် သည်။



အသေးစားရေအားလျှပ်စစ်
ထုတ်စက်တပ်ဆင်အသုံးပြုပုံ



အသေးစားရေအားလျှပ်စစ်
ထုတ်စက်တပ်ဆင်အသုံးပြုပုံ



တပ်ကြီးဘေးတွင် ရေအားလျှပ်စစ်ထုတ်စက်ကို တည်ဆောက်



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- ပညာရေးဝန်ကြီးဌာနနှင့် သိပ္ပံနှင့် နည်းပညာဝန်ကြီးဌာနအောက်ရှိ တက္ကသိုလ်များ တွင် ပြန်ပြည့်မြဲစွမ်းအင်သုတေသနများကို နိုင်ငံတော်၏ ထောက်ပံ့မှုဖြင့်ဆောင်ရွက်လျက်ရှိသည်။

❖ Implementation of research works. Various kinds of research concerning with renewable energy are continuously being done in universities and institutes under the Ministry of Education and Ministry of Science and Technology.

❖ These projects are mainly carried out with the tremendous support of the State and the Government.

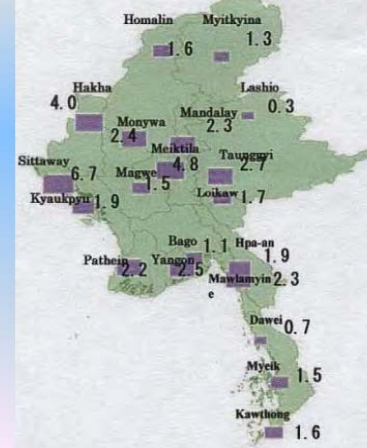
92

မြန်မာနိုင်ငံအနှံ့အပြား လေအားလျှပ်စစ်ထုတ်လုပ်နိုင်စွမ်းကို
ဖော်ပြထားပါသည်။

Wind Power

- 2832 Km costal strip facing the bay of Bengal and Andaman sea.
- Potential available wind energy- 365.10 TWh/Yr (NEDO, 1997)
- Only on R & D Phase
- Individual scale of water-pumping, wind mill & generate electricity in rural area.
- 2832 Km costal strip facing the bay of Bengal and Andaman sea.
- Potential available wind energy- 365.10 TWh/Yr (NEDO, 1997)
- Only on R & D Phase
- Individual scale of water-pumping, wind mill & generate electricity in rural area.

Yearly Average Wind Velocity (m/sec)



ချောင်းသာရေအားလျှပ်စစ်ထုတ်လုပ်သည့် အချက်အလက်များ

Chaung Thar Hybrid Power Supply System Project

- Street lighting contributing to the extension of villagers' economic and productive activities
- Clinic lighting, more vaccine refrigeration and more power for medical equipment usage.
- Approx. 98.8 ton of carbon dioxide reduction in a year

Population 6325/ 1307 households	
Public Facilities:	1 High School 2 Monasteries with 2 Community Halls 1 Hospital with 16 Beds 1 Police Station 1 MEPE office 1 Post & Telecom Office & Street Lighting

Recent Initiatives

Chaung Thar Hybrid Power Supply System Project

Objective: Demonstrative research on a grid-connected PV systems

NEWJEC, INC

Dept. of Electric Power, MOEP

US\$ 5 million



အသေးစားလေအားလျှပ်စစ်ထုတ်စက် သုတေသန တောင်ငူတက္ကသိုလ်တွင် တပ်ဆင်ထားစဉ်

Wind power research projects are under-way in the areas which have the wind - speed of 3m/s and above to be able to produce wind-energy and output power is 300W.

This is the small - scale wind turbine constructed by the renewable energy research team of Department of Physics, University of Yangon.



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အသေးစားလေအားလျှပ်စစ်ထုတ်စက် သုတေသန ရန်ကုန်အရှေ့ ပိုင်း တက္ကသိုလ်တွင် တပ်ဆင်ထားစဉ်

This is the small-scale wind turbine at East Yangon University constructed by the renewable energy research team of Department of Physics, Yangon University.



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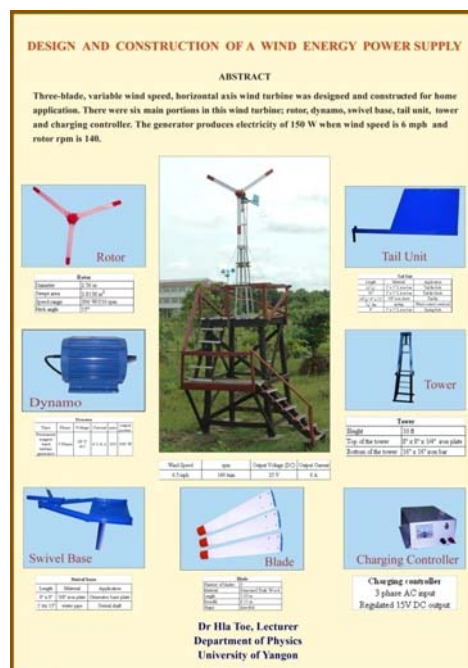
အသေးစားလေအားလျှပ်စစ်ထုတ်စက်
သုတေသနထားဝယ်တက္ကသိုလ်တွင်
တပ်ဆင်ထားစဉ်

This is the small-scale wind turbine at Dawel University constructed by the renewable energy research team of Department of Physics, University of Yangon.

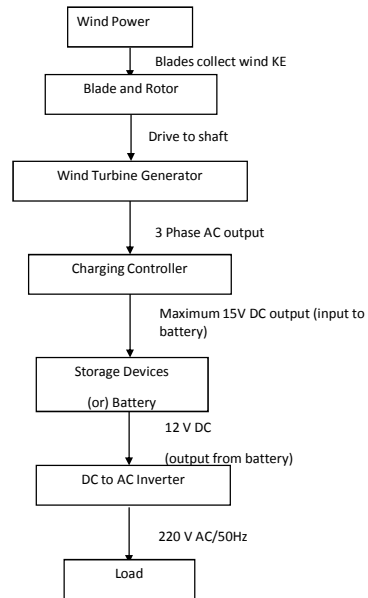


၃၀၀ W လေအား
လျှပ်စစ်ထုတ်စက်
အချက်အလက်များ

This poster show the six main parts of small - scale (300W) wind mill constructed by the renewable energy research team of Department of Physics, Yangon University.



အသေးစားလေအားလျှပ်စစ်ထုတ်စက်တစ်ခုအလုပ်လုပ်ပုံ



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လေရဟတ်နှင့်ရေတင်ခြင်း

The multi-blade Wind Turbine for water-pumping has been constructed in a farm in Bago Division, Myanmar.

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SPV/Wind Hybrid power system demonstration Wind power trial for a coastal farm



Factors for Success

- Political, legislative
 - Support, legal framework
- Financial
 - Funding, investment
- Technological
 - Research and development
- Education and Training
 - Dissemination of information

Energy Export & Import with Neighbouring Countries in Myanmar

- **Electricity Current Export Situation**

- **Shweli (1) Hydropower Plant**

- Total Capacity: 600 MW

- Export to China: 300 MW

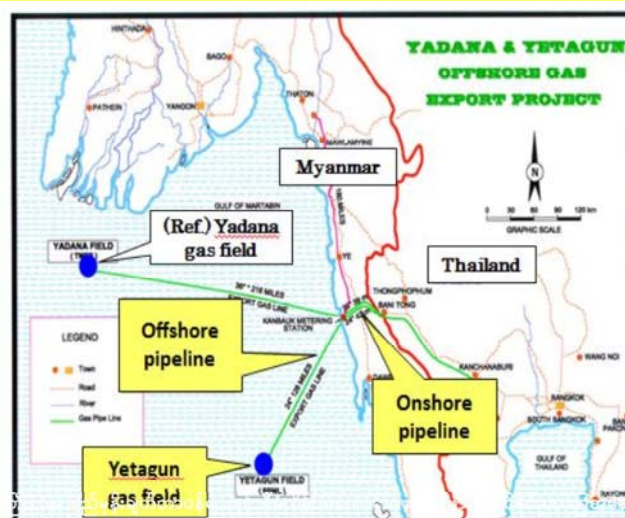
- **Tarpein (1) Hydropower Plant**

- Total Capacity: 240 MW

- Export to China: 221 MW

❑ Ranking 2 of natural gas export by pipe in Asia-Pacific region, however Ranking 16 in world wide

❖ Natural gas Exported daily by the pipe from the Yadana and Yeta Khon to Thailand is over 1100 cubic feet.



ဆောင်ရွက်ဆဲဆိုလာစွမ်းအင်ပရိုဂျက်များ

- ၃၀၀ MW ဆိုလာ ပါဝါပရောဂျက်များကို မြင်းခြံနှင့် မိတ္ထီလာ မြို့နယ်များတွင် တည်ဆောက်လျက်ရှိပြီး ၂၀၁၆တွင် ပြီးစီးမည်ဖြစ်သည်။

မြန်မာနိုင်ငံအကြီးစားလေအားလျှပ်စစ်စီမံကိန်း

- Gunkul Engineering Public Company (Thai) is making feasibility study for Wind Power Plants (2,930 MW) in Eastern, South-East, and Southern parts of Myanmar.
- China Three Gorges Company (China) is also making feasibility study for Wind Power Plants (1,102 MW) in Western parts and Delta regions of Myanmar.
 - တရုတ်နှင့် ထိုင်းနိုင်ငံများမှ ကုမ္ပဏီများမှ လေအားလျှပ်စစ်စီမံကိန်း များ ဆောင်ရွက်ရန် စမ်းသပ်လျက်ရှိသည်။

Development of RE and off-grid Power Supply

No.	Region (State or Division)	Number of Plant	Number of Machine	Installed Capacity (kW)
1.	Kachin State	3	8	6,420
2.	Kayah State	1	2	118
3.	Kayin State	1	2	62
4.	Chin State	8	16	2,953
5.	Sagaing Division	2	3	1,310
6.	Taninthayi Division	2	6	342
7.	Bago Division	1	2	2,000
8.	Mandalay Division	2	4	4,450
9.	Mon State	1	3	192
10.	Yangon Division	1	23	4713.6
11.	Shan State	11	24	15,255

နိုင်ငံတကာမှာ အောင်မြင်နေသော ပြန်ပြည့်မြဲစွမ်းအင်စီမံကိန်းများ

- National policies to support climate and environmental protection
- Policies design to support RE
- Attractive price for PV electricity production
- Subsidies for production cost for PV
- Well established R&D in PV technology
- Funding support for R&D
- High environmental awareness among local community level
- Strong local partnership in PV installation

နိုင်ငံတကာမှာ အောင်မြင်နေသော ပြန်ပြည့်မြဲစွမ်းအင်စီမံကိန်းများ ကို တင်ပြထားပါသည်။

Biomass in Sweden

- Now 50% of fuel supply for domestic heating is from Biomass
- Policy aim to replace electricity heating by using biomass fuel
- Biomass is exempted from energy tax
- Funding for biomass research eur 35 millions per year from government

Summary of the principal support mechanisms identified in the case studies for renewable energy power developments (1993–99)

Member State	Legislative support	Fiscal initiatives	Financial support
Austria	Guaranteed prices	Energy taxes on gas and electricity; revenue partly recycled to support renewable energy	Public grants, subsidies and loans
Denmark	Purchase obligation + premium guaranteed prices	Energy/carbon dioxide taxes on fossil fuel; revenue partly 'recycled' to support renewable energy	Subsidies provided historically for research, development and demonstration (R,D&D), especially in wind Subsidies (capital grants — biomass)
Finland	Transmission costs are fixed; grid access is open to all producers	Energy/carbon dioxide taxes on fossil fuel; revenue partly 'recycled' to support renewable energy	Subsidies on investments and equipment (capital grants)
France	Competitive tendering (Eole 2005)	—	Subsidies (capital grants — biomass)
Germany	Purchase obligation + premium guaranteed prices	Tax benefits for investing in renewable energy	Subsidies and low-interest loans for all renewable energy projects provided by local banks Direct financial support: PV roofs programme; subsidies for biomass installations

Greece	Purchase obligation + premium guaranteed prices	Tax benefits for investing in renewable energy	Subsidies (capital grants — solar thermal)
Ireland	Competitive tendering (Alternative Energy Requirement, AER)	Tax benefits for investing in renewable energy	Subsidies (capital grants)
Italy	Purchase obligation + premium guaranteed prices	Energy/carbon dioxide taxes on fossil fuel; revenue recycled to support renewable energy	—
Netherlands	Purchase obligation	Energy/carbon dioxide taxation favourable towards renewable energy Tax benefits for investing in renewable energy	Government subsidies Obligation for utilities to invest in renewable energy projects
Portugal	Purchase obligation + premium guaranteed prices	—	Interest-free loans Support for grid connection
Spain	Purchase obligation + premium guaranteed prices	Tax benefits for investing in renewable energy	Capital grants (biomass)
Sweden	Purchase obligation	Renewable energy pays lower or no energy tax or nitrous oxide levy Tax benefits for investing in renewable energy	Investment grants

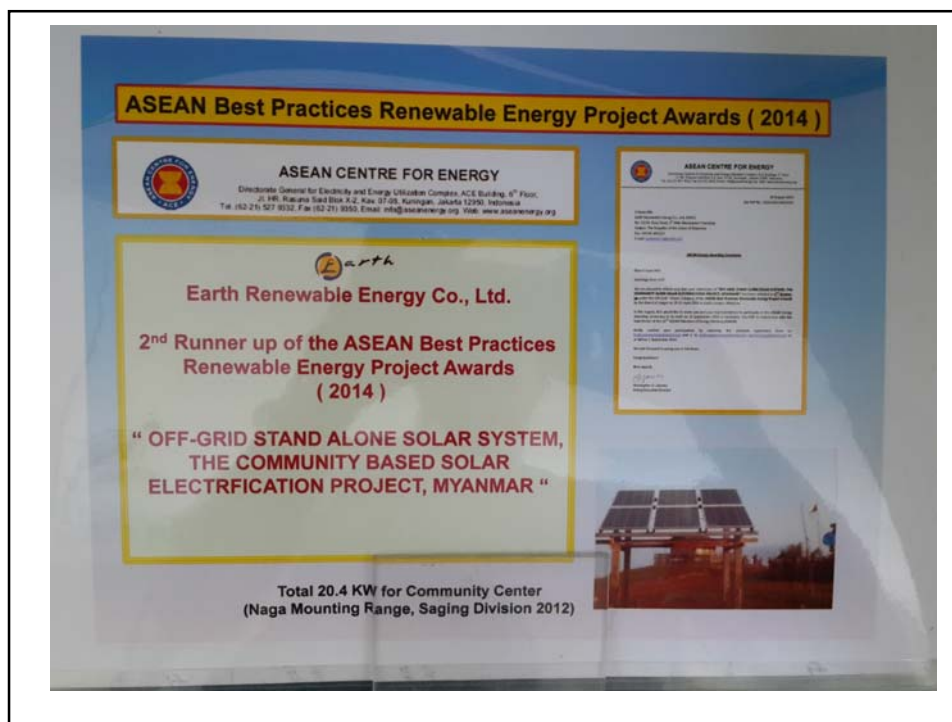
ASEAN Energy Awards

မြန်မာနိုင်ငံနေဖြင့် အာဆီယံဒေသတွင်းစွမ်းအင်ဆိုင်ရာဆုများ ကို နှစ်အလိုက် တင်ပြထားပါသည်။

- ❖ Renewable Energy Project Competition
 - On-grid Category
 - Off-grid Category
 - Cogeneration Category
- ❖ Best Practices Competition for Energy Management
 - Industrial Category
 - Building Category
 - Special Submission Category (Industry)
 - Special Submission Category (Building)
- ❖ Best Practices Competition for Energy Efficient Buildings
 - Tropical Building Category
 - Retrofitted Building Category
 - New and Existing Building Category
 - Special Submission Category
- ❖ Green Building (New category for 2014)



	Description	Competition	Level	Prized Awarded
1	Kanbawza Bank (Head Office) (2002)	EEB (Sp.Sub)	ASEAN	Winner
2	Popa Mountain Resort Woodland Hotel (2005)	EEB (Tropical)	ASEAN	Winner
3	Rural Electrification with Rice Husk Gasifier (Linn Tha) (2006)	RE Project (Off grid)	ASEAN	2 nd Runner Up
4	Mingalar Garden Resort (Pyay) (2007)	EEB (tropical)	ASEAN	Winner
5	Bay of Bengal Resort (Ngwe Saung) (2008)	EEB (Tropical)	ASEAN	1 st Runner Up
6	Shwe Inn Tha Floating Resort (Inle) (2009)	EEB (Tropical)	ASEAN	Winner
7	Belle Resort (Chaung Tha) (2009)	EEB (Tropical)	ASEAN	2 nd Runner Up
8	Mamya Dam (2009)	RE Project (Off Grid)	ASEAN	Winner
9	Multi-Purpose Biomass Gasifier (Kaung Kyaw Sae Co., Ltd) (2010)	RE Project (Off Grid)	ASEAN	1 st Runner Up
10	Solar Lighting & Solar Water Pumping Project at Auk Pyun Wa Village (FMI Cons) (2010)	RE Project (Off Grid)	ASEAN	2 nd Runner Up
11	Community Based Bio Gas Electrification Project (MOST) (2013)	RE Project (On Grid) Community Based	ASEAN	1 st Runner up
12	FAME Pharmaceuticals (2013)	EM (Sp,Sub)(Industry)	ASEAN	Winner
13	No.8 Spinning Factory (Pywe Bwe) (2013)	EM (Industry) (SMI)	ASEAN	Winner
14	Bamboo High School / Storm Shelter, Akare Chaung Wa Village, Ayeyawady Delta (2013)	EEB (Sp: Sub)	ASEAN	2 nd Runner up
15	Off grid stand alone solar system , Community Solar Electrification Project (2014)	RE Project (Off Grid)	ASEAN	2 nd Runner up





Off grid stand alone solar system ,
Community Solar Electrification Project (2014)

ASEAN Energy Award 2013

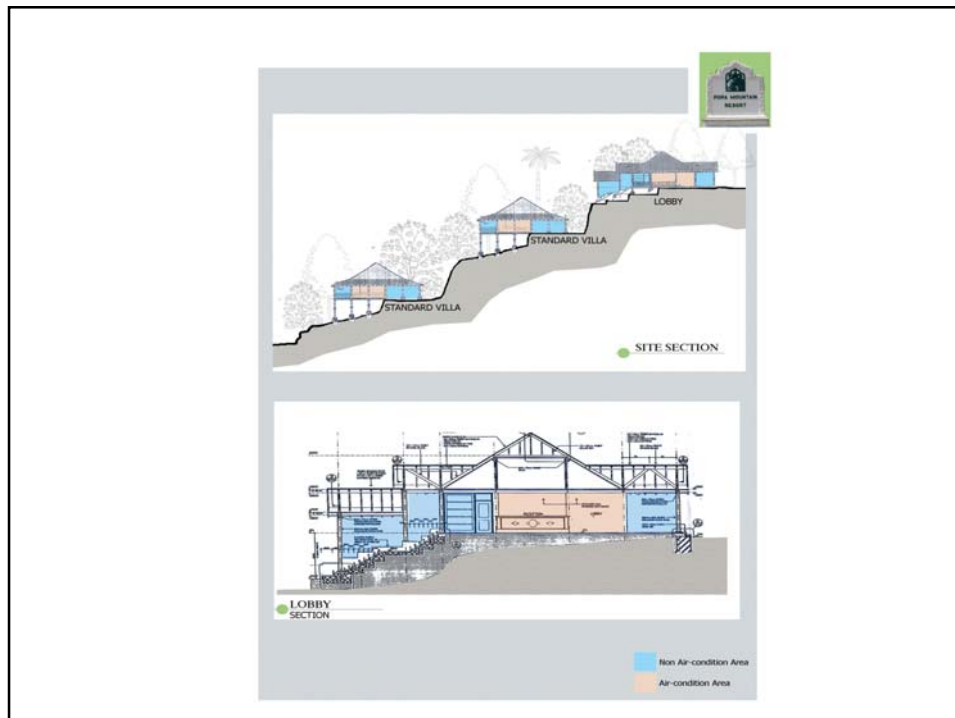
၂၀၁၃ ခုနှစ် အတွက် အာဆီယံစွမ်းအင်စီမံခန့်ခွဲမှုဆုကို အမှတ်(၈)
ချည်ထည်စက်ရုံပျော်ဘွယ်နှင့် ဆိုလာအခြောက်ခံစနစ် ဆုကို Fame
ဆေးဝါးထုတ်လုပ်ရေးလုပ်ငန်းတို့ ကရရှိပါတယ်။

31st ASEAN Ministers on Energy and its Associated Meetings

- **ASEAN Best Practice Competition for Energy Management in Buildings and Industries 2013**
- Energy Conservation in No.8 Textile Factory (Pyaw Bwe), Myanmar
- Solar Thermal Drying Rooms of Fame Pharmaceuticals, Myanmar

၂၀၀၅ခုနှစ် အတွက် စွမ်းအင်အကျိုးရှိ အသုံးချအဆောက်အဦးကို
ပုပ္ပါးအပန်းဖြေစခန်းမှရရှိပါသည်။

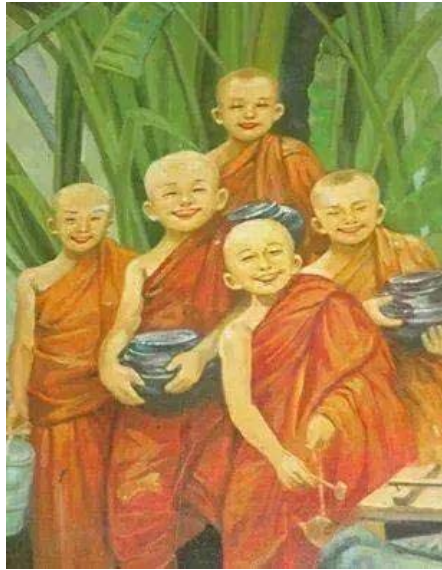




RE Technology in University of Yangon

ရန်ကုန်တက္ကသိုလ်ဌာနအသီးသီးမှ ပြန်ပြည့်မြဲစွမ်းအင်ဆိုင်ရာ
သုတေသနလုပ်ငန်းများကို ဆောင်ရွက်လျက်ရှိပါသည်။

1. *Research on Solar Cell Technology, Wind Turbine Technology, Biomass Technology and Geo-themal Technology in respective Departments*
1. **ODA-UNESCO Project (2014-2015) for Promotion of Energy Science Education for Sustainable Development led by Kyoto University**
 - Theme 1. Understanding Sustainable Development
 - Theme 2. Current Energy Situation and Needs to Transform toward sustainable system
 - Theme 3: Current Energy Technology
 - Theme 4: Energy Efficiency
 - Theme 5: Renewable Energy
 - Theme 6: Sustainable Energy Policy and Development
 - Theme 7: Good Practice Biogas



**THANKS FOR YOUR
KIND ATTENTION**