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BIOENERGY

Naypyidaw Energy Consultations

III. BIOENERGY

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Japan Fund for Poverty Reduction

JAPAN

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Objective

- Assessment, Strategy, and Roadmap (ASR)
- **Renewable EnergyPolicy**
- RE part of long-term **Energy Master Plan**

Cooperation NEMC - ADB

- **Planning, Policy ,** Strategy, and Roadmap
- **Pilot installations** (1 MW PV grid connection)
- **Pilot development** (25 villages Energy4all)

- **Planning Security** needed by public Administration, private Enterprise, Investors, Developers, Donors
- Develop progressive, simple, liberal support

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BioEnergy – Myanmar biomass for sustainable growth

- Resources and available technologies
- Project development,construction, operation
- Cost, barriers, opportunities

Stoves Biogas Gasification Biofuel

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Three Generations Renewable Energy

1st Generation - **established**

Hydropower, Biomass Burning, Geothermal

2nd Generation - **mature**

Biomass for Gas, Fuel

Small Hydro

Solar-Power

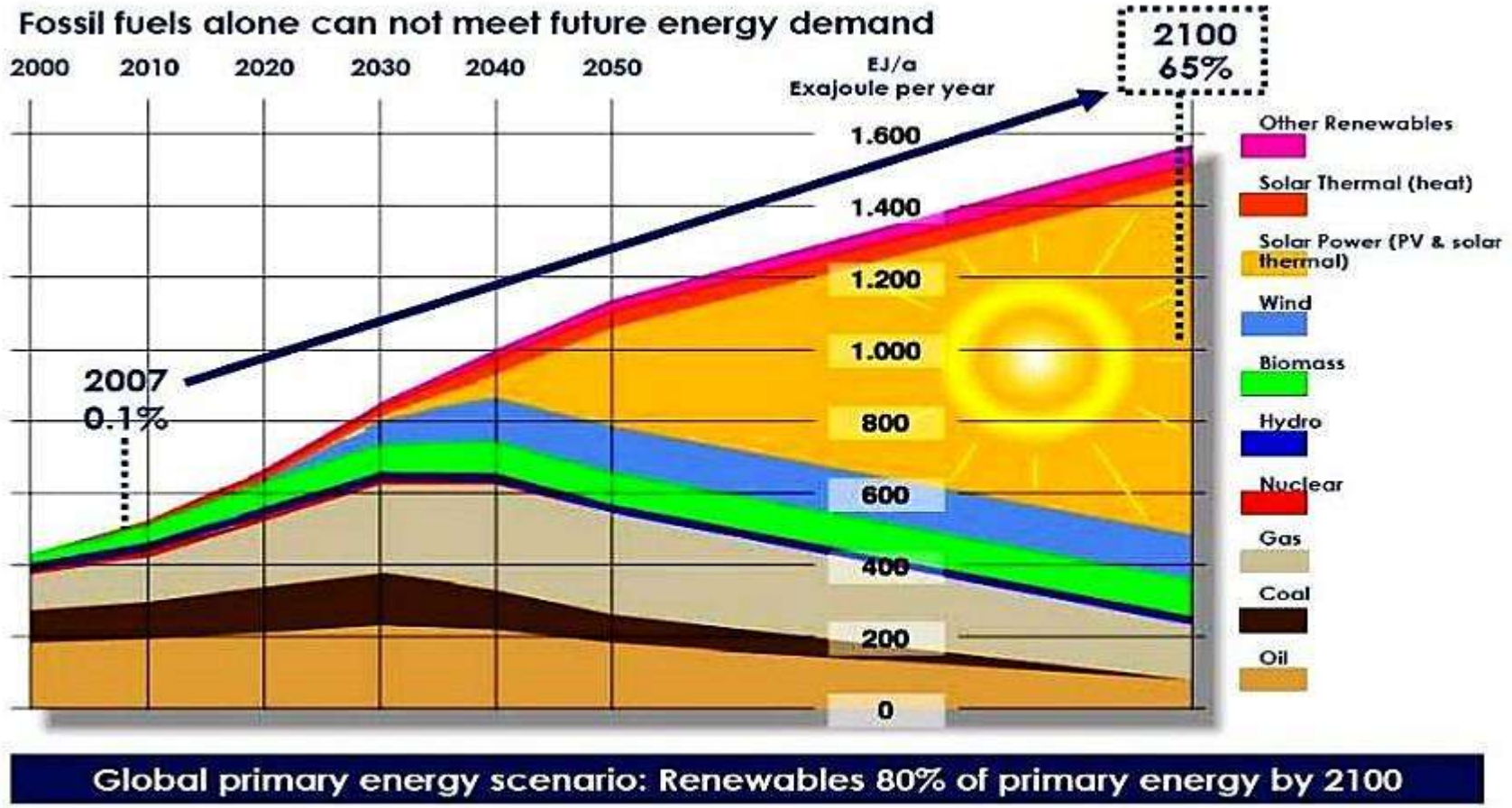
Wind-Power

3rd Generation - **developing**

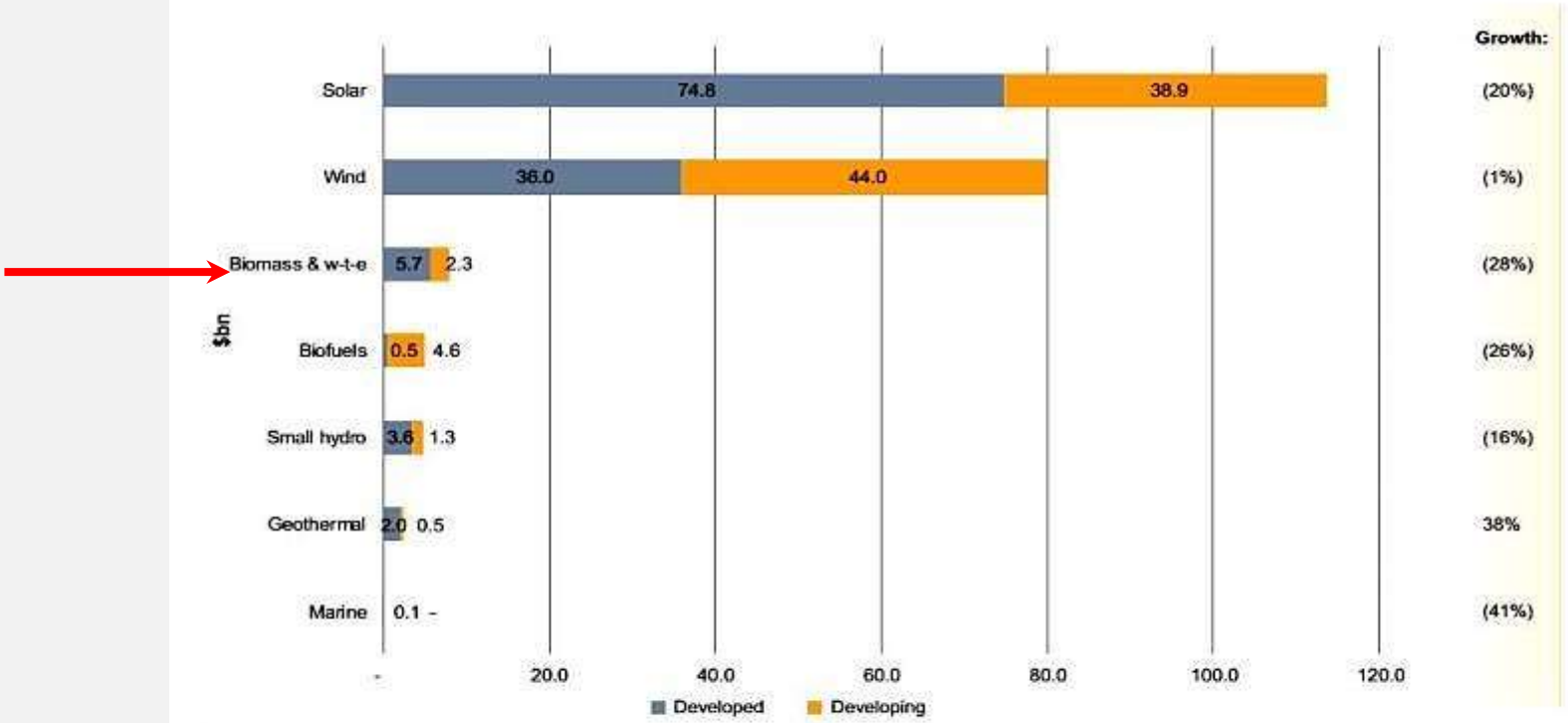
Wind-Offgrid, advanced Biomass, Biorefinery, Marinepower

IRENA Roadmap 2030: **Double** Renewable Energy

Fossil fuels are limited , some Renewables also



Global new investment in renewable energy: Developed vs. developing countries 2013

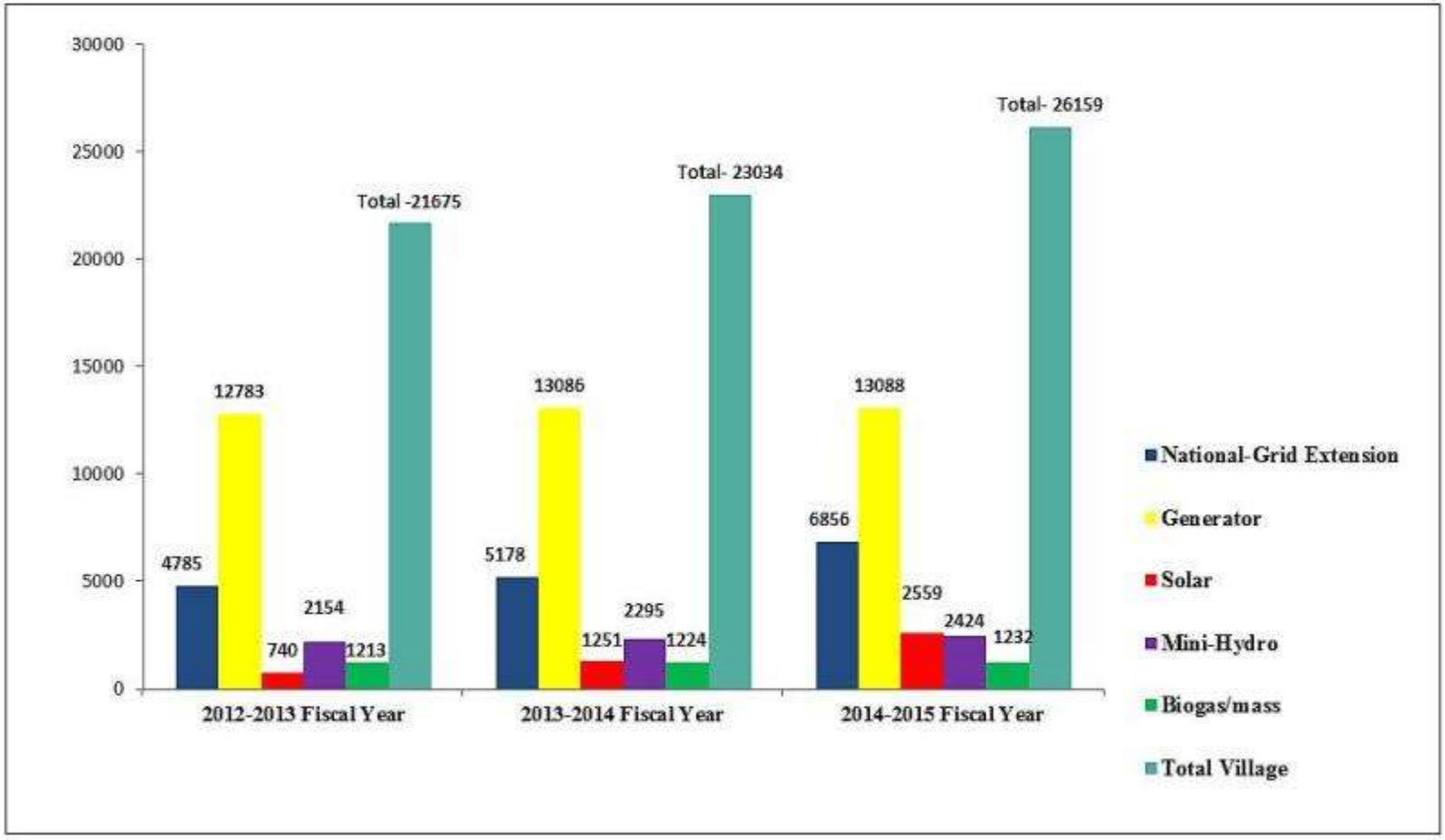


Note
Total values include estimates for undisclosed deals. New investment volume adjusts for reinvested equity. Includes estimates for small distributed capacity, corporate and government R&D. Developed volumes are based on OECD countries excluding Mexico, Chile, and Turkey.

Source UNEP, Bloomberg New Energy Finance

DRD

Annual Progress of Implemented Villages for Rural Electrification



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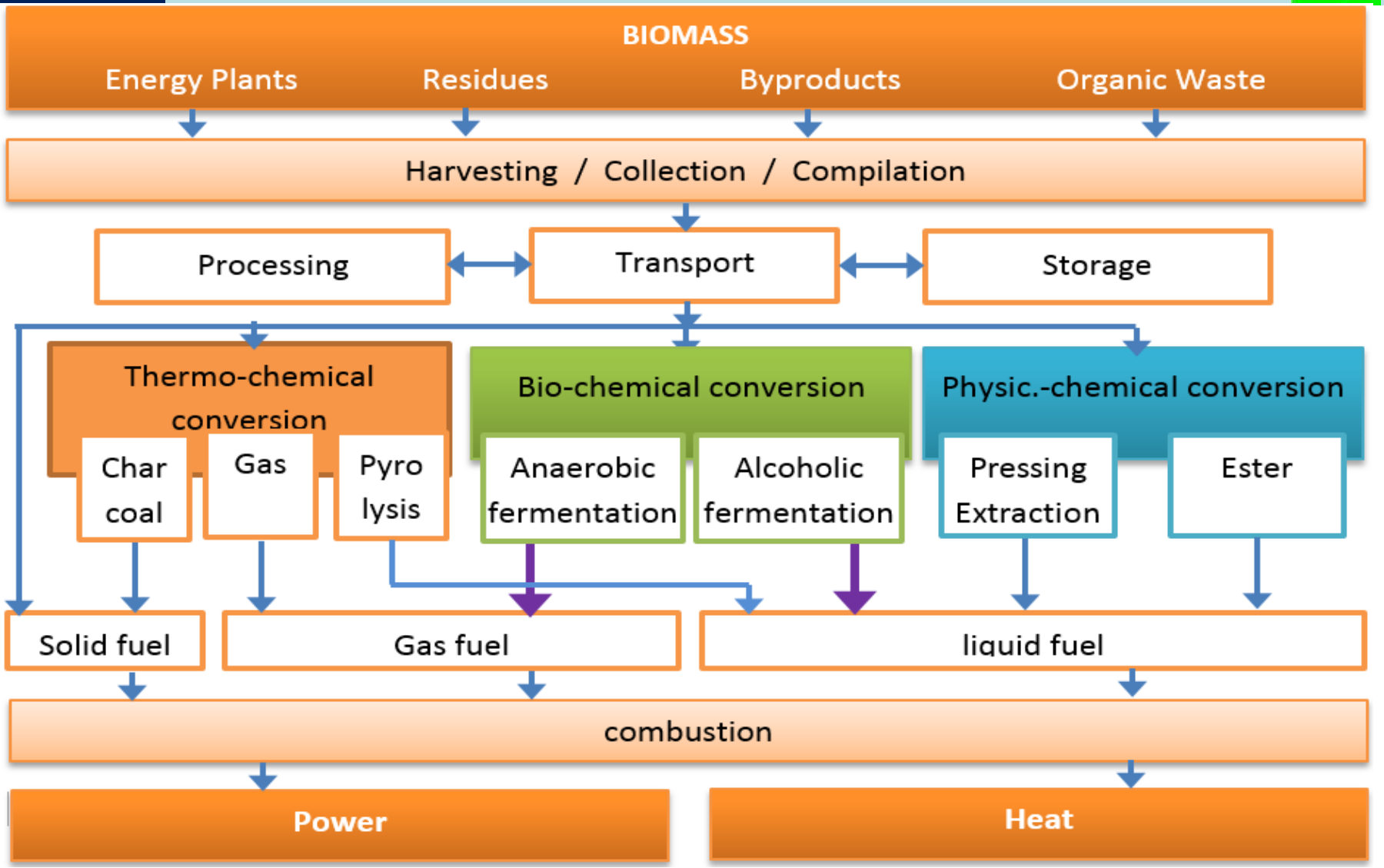
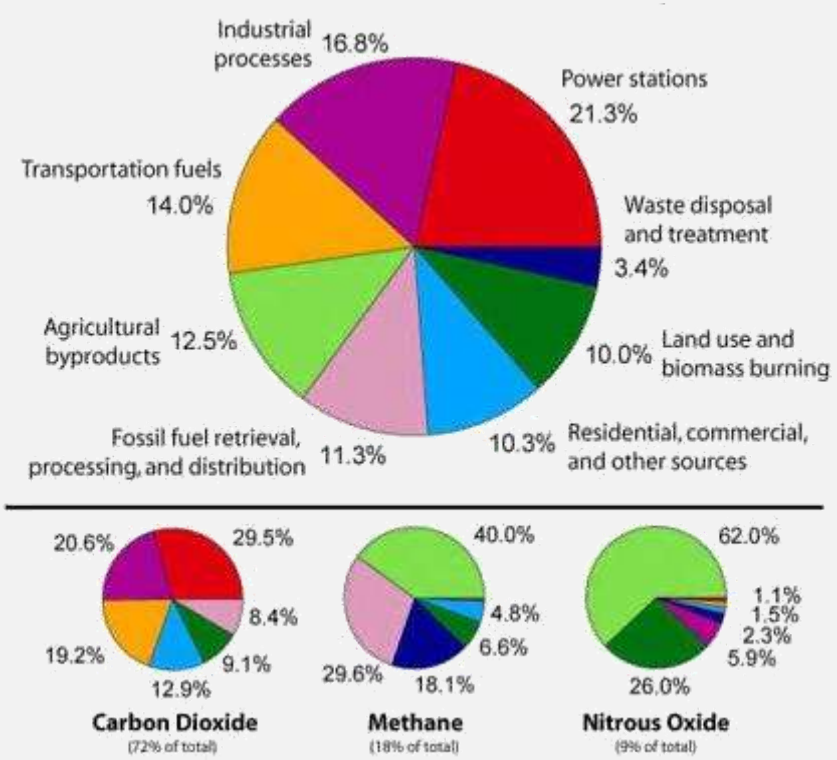


Greenhouse-Gas abatement

Methane / NOx / CO_2

- Wood Stove neutral no harm to Forest
- Woodfuel industry affects Forest, CO_2
- Bioenergy addition raises CO_2



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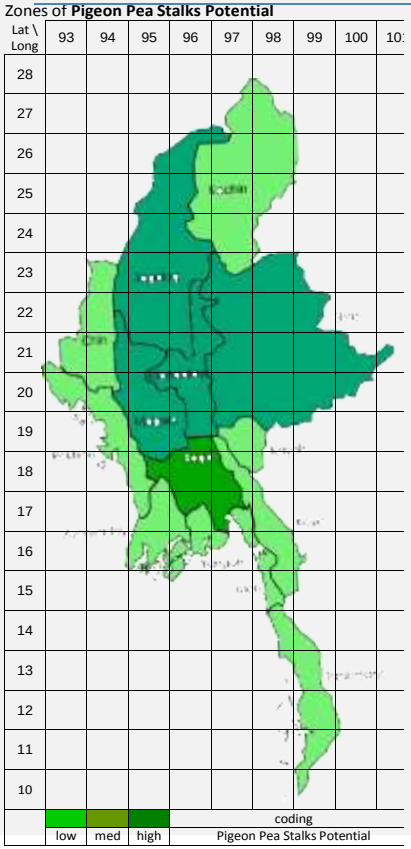
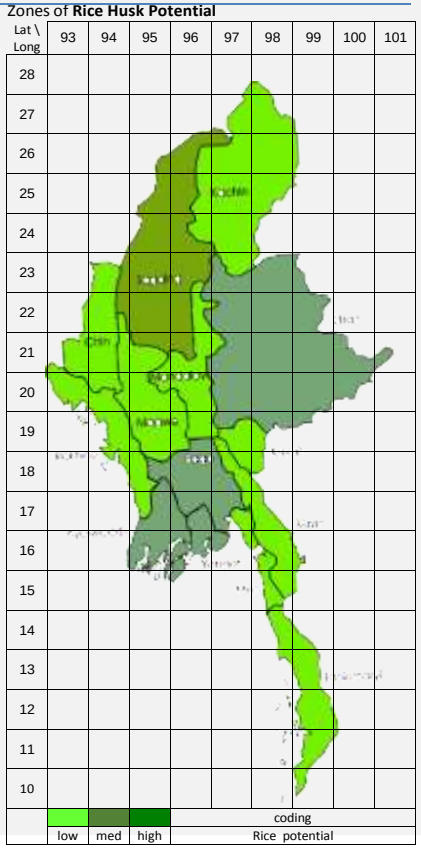
Myanmar **Biomass resources**

Type	Quantity
Rice husk	4.4 M ton/ year
Lumber waste	1.5 M ton/ year
Bagasse	2.1 M ton/ year
Livestock waste	34.4 M ton/year





Wood Stoves – a tradition with limited future

- What is the best Fuel Efficient Alternative
- Which fuel offers the best options
- Who can be the best actor

Fuel Efficient Stove

Gas Stove

Gel Fuel Stove

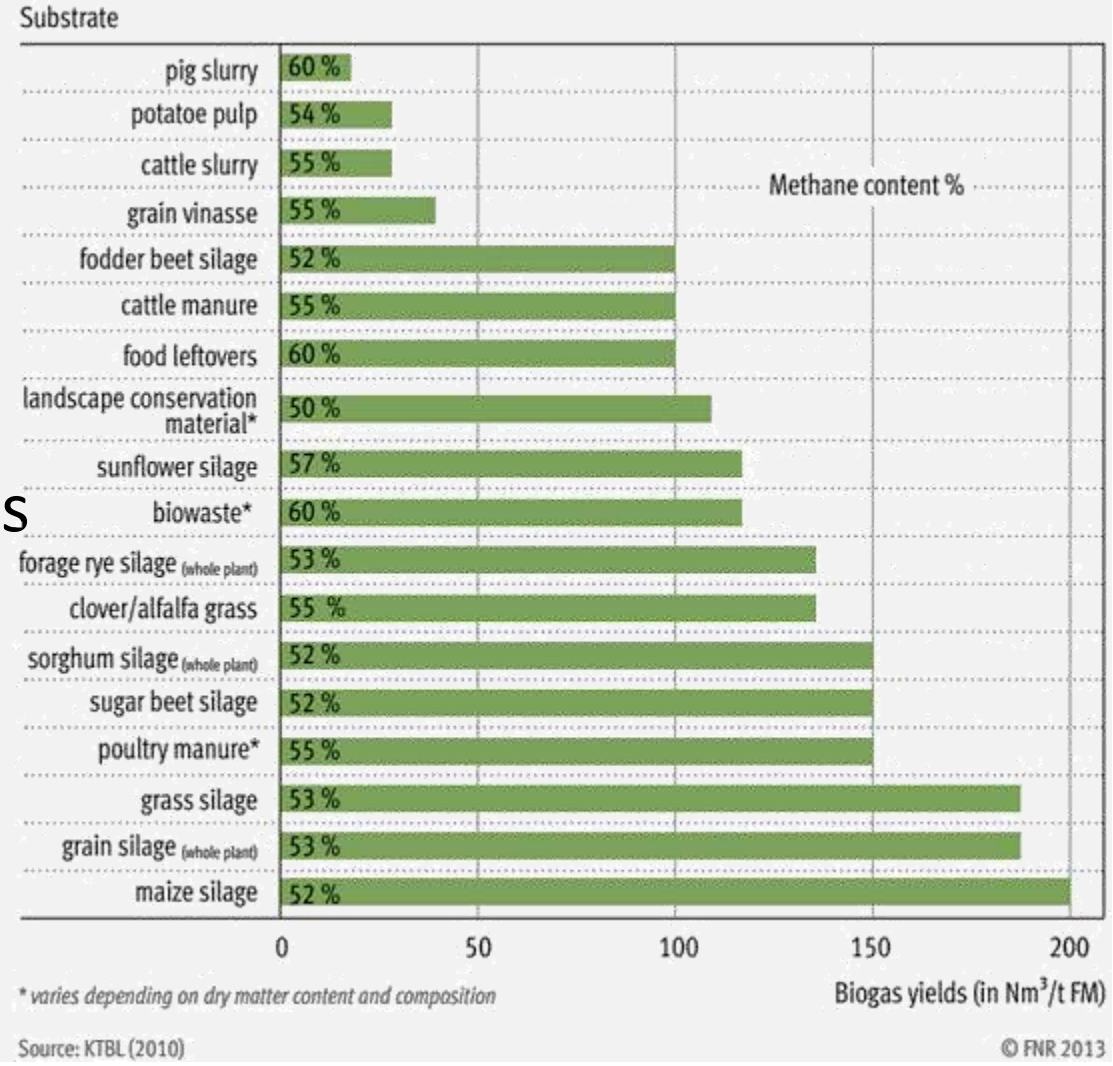
Gasifier

- Village Installations
- Grid Installations
- Thermal use
- Barriers and options

30 kW electricity needs 90 Nm^3/h
specific wood consumption
1.6 kg/kWh

BioGas

- Village Installations
- Grid Installations
- Thermal use
- Barriers and options



BioFuel

- What happened to Jatropha
- Which alternatives are available
- What are the barriers, opportunities
- Which are helpful next steps, actors

Projected biofuel production cost $2004		Projected production cost $/l	Spot market price for fossil fuel	difference
india	bioethanol	0.65 - 0.7	0.44	0.21-0.26
	biodiesel	0.41 -1.27	0.47	0.06-0.8
tanzania	bioethanol	0.6 - 0.7	0.44	0.16-0.26
	biodiesel	0.7 - 0.8	0.47	0.23-0.33

BioEnergy	
Status	Mature, plus emerging
Cost, risk	50 !-8000 $/kW, supply risk Private developers
Grid Power	Biogas MW range, despatchable!
Rural Electrification	kW range installations, distributed, small industry
Training	Design, project development, operation, maintenance, monitoring, evaluation
Restriction	Environmental concerns, restricted biomass supply
Requirements	Policy, regulations, development training, market support

Rural Energy

8,262,324 of 10,937,500 rural Households are still **unelectrified = 76 %**

Grid extension will electrify up to 60 % by 2025

388,732 new connections/a

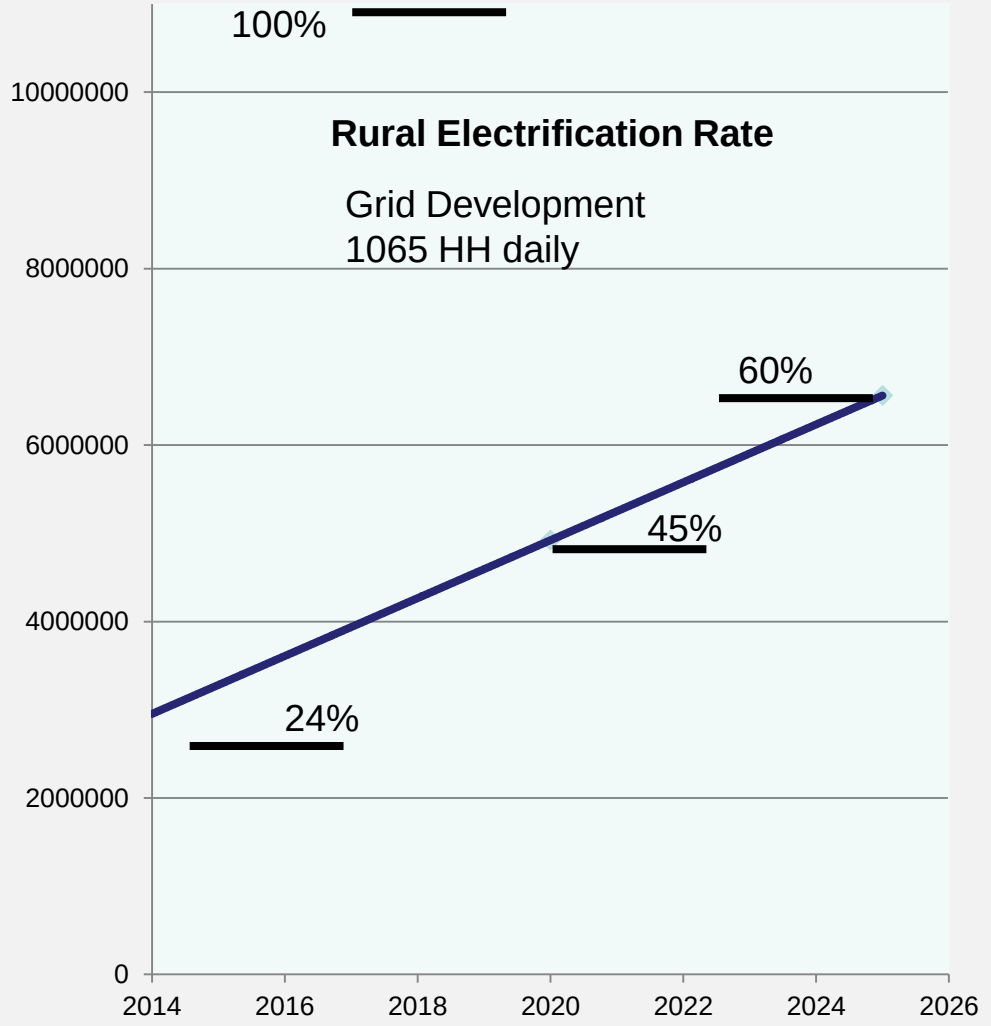
1065 new connections daily

Complement with

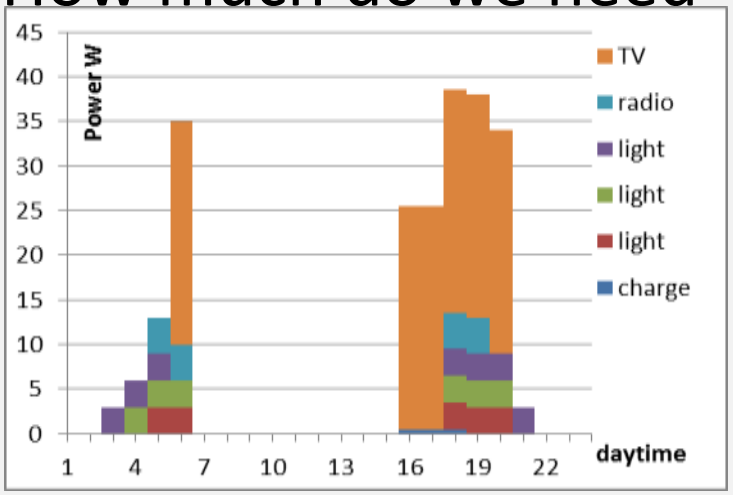
Micro-Hydro

Biomass

Solar



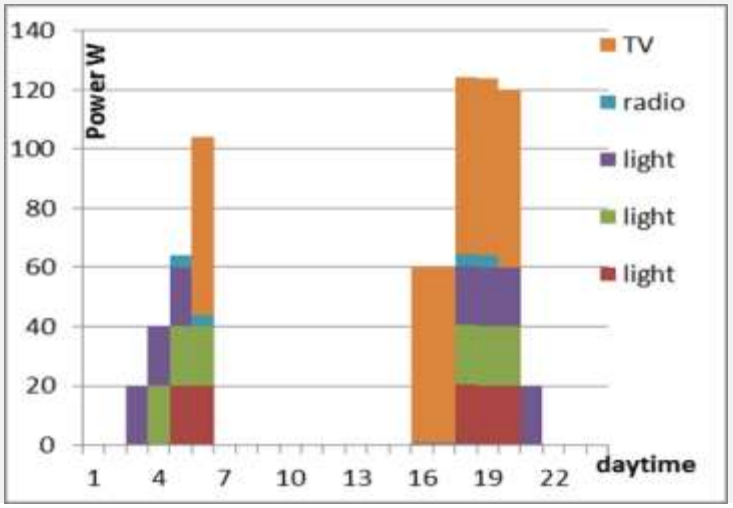
How much do we need



Consumption **Energy Saving Appliances**
255 Wh/d = **93 kWh/a**

3 Low-LED lighting morning and evening
radio or similar, TV/DVD set 25 W
option for charging

Power rate for 100 homes: **3.8 kW**



Consumption **Standard Appliances**
876 Wh/d = **320 kWh/a**

each home 3x20W FL lighting
radio or similar,TV/DVD set 60 W

Power rate for 100 homes: **12.5 kW**

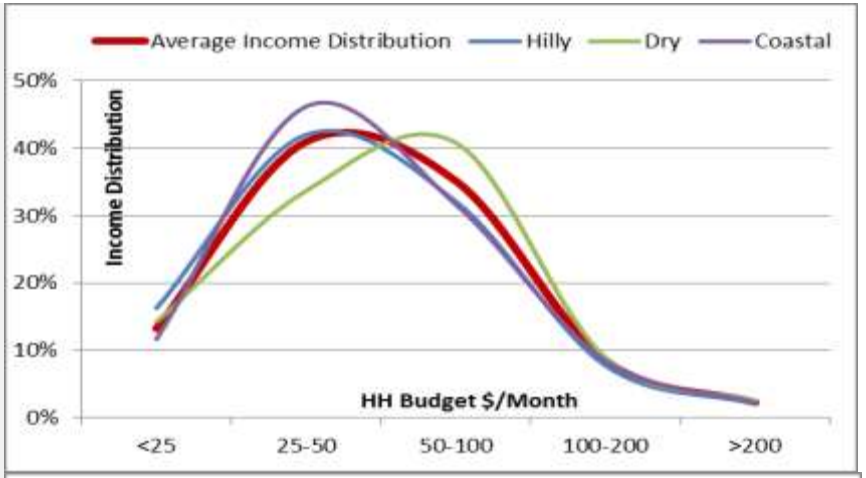
Rural Load Assessment

5 off-grid load classes were identifed

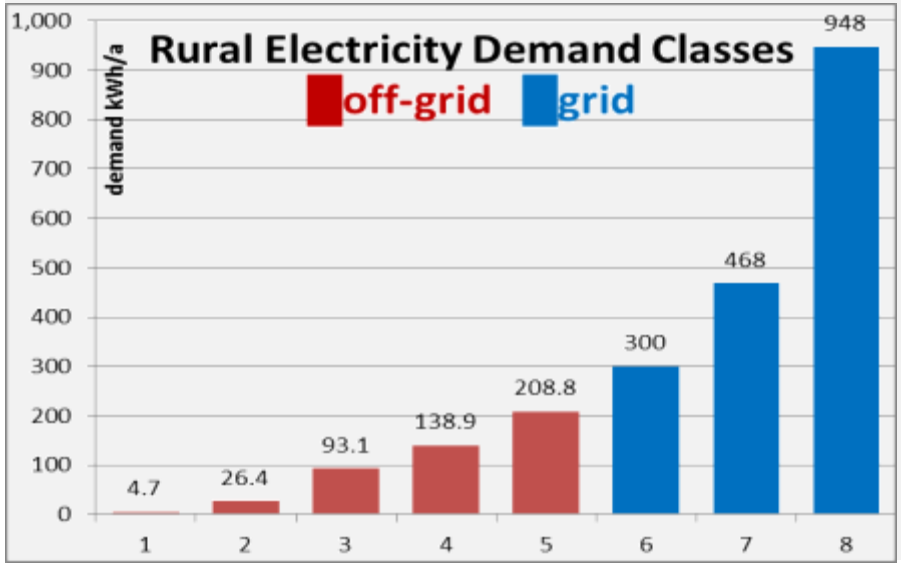
1. 13 Wh/d : light
2. 72 Wh/d : lights
3. 255 Wh/d : lights TV
4. 381 Wh/d : lights TV AC
5. 572 Wh/d : lights TV fan AC

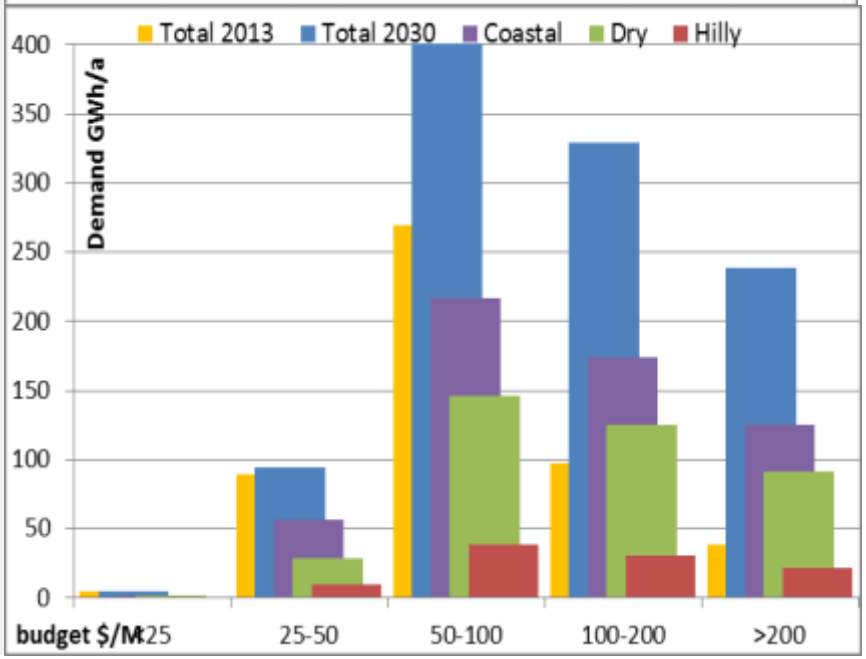
followed by **3 on-grid classes**

When correlated with **income brackets** >



Result shows Demand Distribution >





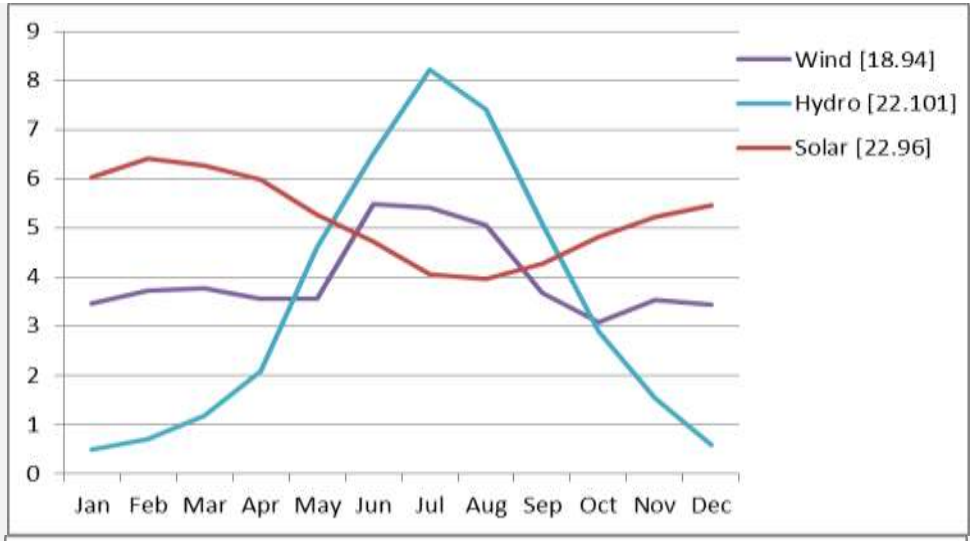
Hydro Hybrid :

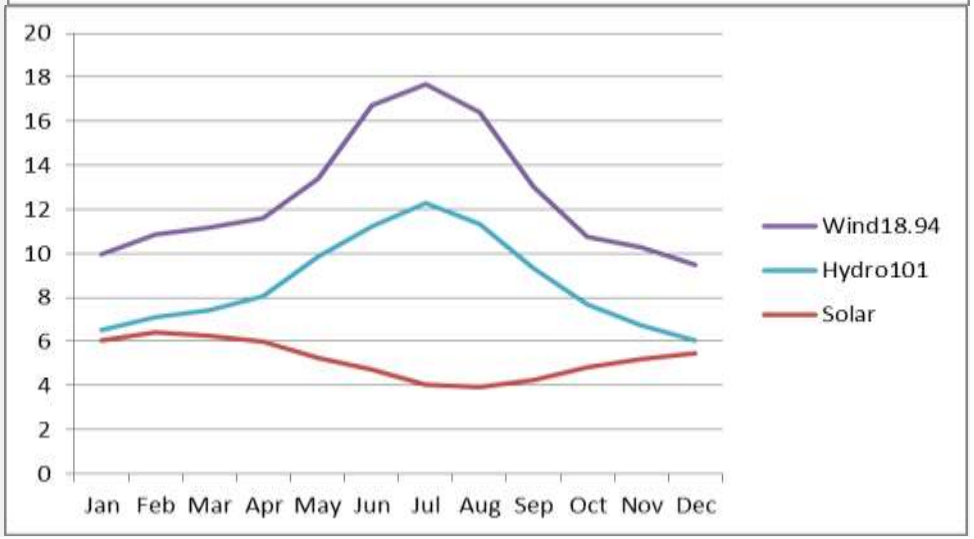
Power Balancing :

Wind + Solar - ok

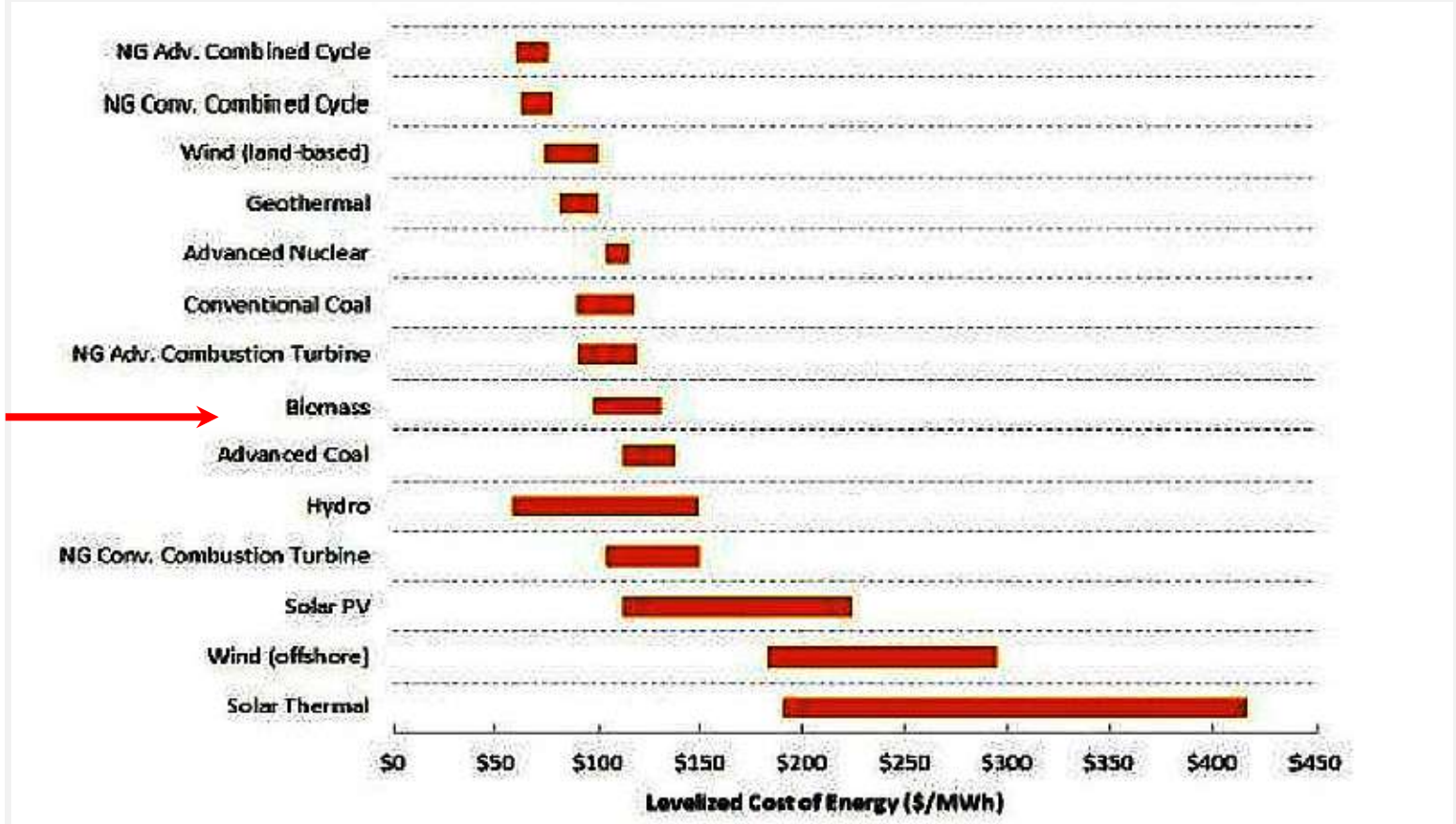
Hydro + Solar - ok

Hydro + Wind - no





Levelized Cost of New Generation Resources



Data Source: EIA, Levelized Cost of New Generation Resources in the Annual Energy Outlook 2013

Project development

- **Select** village (transparent)
- **Information** drive on terms
- Arrange **Downpayment**
- Buy, transport **material**
- **Install**, commission
- **Train** users, operators
- Arrange **Service**
- Collect **fees** for service, repair
- Provide service, repair, **monitoring**
- Provide **expansion**

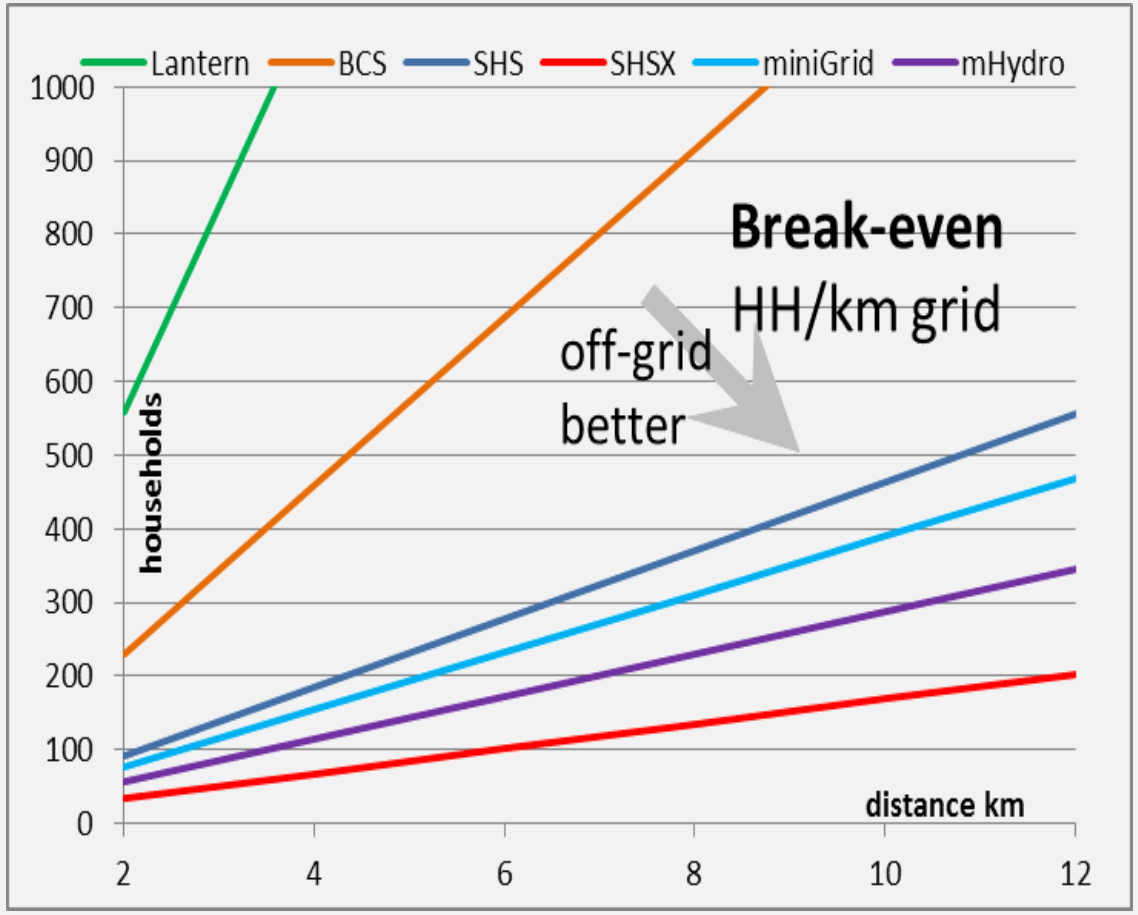
Supply Options

RE Technologies economically compare with grid expansion

Small, remote villages : RET
Large, close village : Grid

RET service is limited,

- Match Design
- Scale up to Demand
- Allow rapid roll-out
- Allot less expense
- Prepare for grid



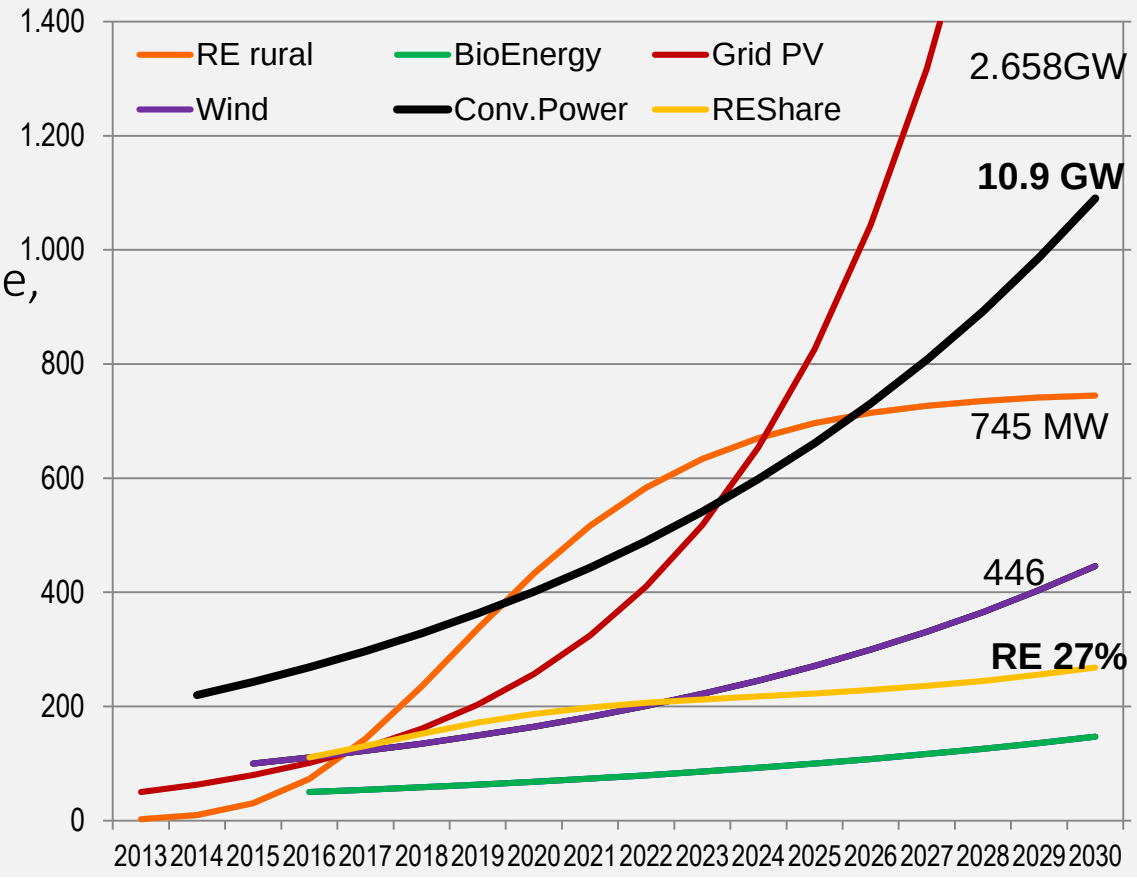
RE Share and Cost

RE rural electrification est.
1.24 GW cost at **3,105 Mio$**
= 58 $ per citizen
745 MW (60%) at 1,862 Mio$
RE grows fast in build-up phase, slower in saturation

Grid PV grows strongest :
2.6 GW no GoM investment

Wind 446 MW, **Bio 147** MW later, slower, no GoM invest.

RE to reach 27% of added power generation



Renewable Energy Agency

- Apply policy, regulations
- Collect **data** (resources, material, regulations)
- **Train** (installer, technician, designer)
- **Plan** development, expansion
- Select, **prioritize** locations
- Secure **Financing**
- **Organize**, supervise installations
- Provide **Standards** and tendering
- Develop **Quality** Assurance
- **Monitor** progress, service
- **Coordinate** regional, national activities

Action Plan	Renewable Energy Development Myanmar
Assess	Which resources are available How can we use them Do we have the capacity What are training, cost, time needed
Plan	Identify demand Compute supply options
Policy	Define targets, priorities Support, actors and incentives Activities and Responsibilities
Strategy	What is the most efficient way to reach targets How can sufficient capacity, finance be secured
Roadmap	How much can be done over time Define Stages, Milestones, Indicators

Issues

BioEnergy offers self-sufficient village electrification, development

Village BioEnergy is not popular -limited projects implemented -environment, safety concerns -few developers, installers -enthusiasm getting lost -lost guidance, financing	-Good, profitable projects can be demonstrated -Technical barriers are addressed -Existing knowledge and experience -Willingness to contribute labour, time, payment, care -Mobilize village organization

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Private Sector

-Has experience, knowledge

-Can provide local value

-Can be fast, efficient

-Can deal with people

-Needs to survive – earn

-Needs to prioritize resources

-Needs financing, answer banks

-Needs to economize on indirect cost (red tape)

Framework

Capacity Building / Rules&Regulations / Funding

Inputs

- Consolidated data
- Training (for Trainers)
- Survey, Design

- Finance, Grants
- Information
- Standards, Specifications
- Quality (Certification)

Government -Wants progress, growth, -Prefers local resources, benefits, employment -Can create framework : regulations, laws, standards, financing	-Will not implement scale projects -Needs to observe environment, safety -Needs to balance interest, politics -Needs to set priorities
States -Want autonomy, regional development -Are responsible to their people -Accept tasks and duties	-Have limited resources -Have less access to information, resources -Have differing background, experience -Depend on national policy, regulations

We want to develop Village Bio

What Do we need	What can we Do
From whom, when, Important / urgent	
Government Enabling Framework Tariff, Incentives, Rules	**Government** Tasks of RE Agency Data, Guide, Government
States Develop Villages	**Private Sector** Develop Projects

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Five Guidelines for Renewable Energy

- Provide citizens **sufficient** energy at **sustainable** cost
- Encourage citizens to **contribute** to electricity **service**, help the **Weak**
- Give **priority** to viable **distributed generation** from Renewable Energy Sources
- **Prefer private** to public development in Renewable Energy generation
- Ensure proper **standards**, attractive financing and continuous **training**

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Find the documents: http://1drv.ms/1rtNPat

Questions:
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Think BIG - Start small - Scale Fast