Alternative visions for the Mekong Delta and the basin – national and regional energy development

Forum "*The Mekong Under Threat: Protecting People and Ecosystems in a Fast-Changing Basin*"

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GreenID is a menber of Vietnam Suistainable Energy Alliance.

CONTENT

1. Vietnam Power Development Plan VII revised (PDP VII revised).
2. Scenarios of sustainable resources development.
3. Power import from Lao and Cambodia
4. Challenges of power development at Mekong Delta and mitigation measures.
5. Power supply for remote and mountainous off-grid areas with renewable energy.
6. Recommendations for Vietnam and Mekong Delta area.

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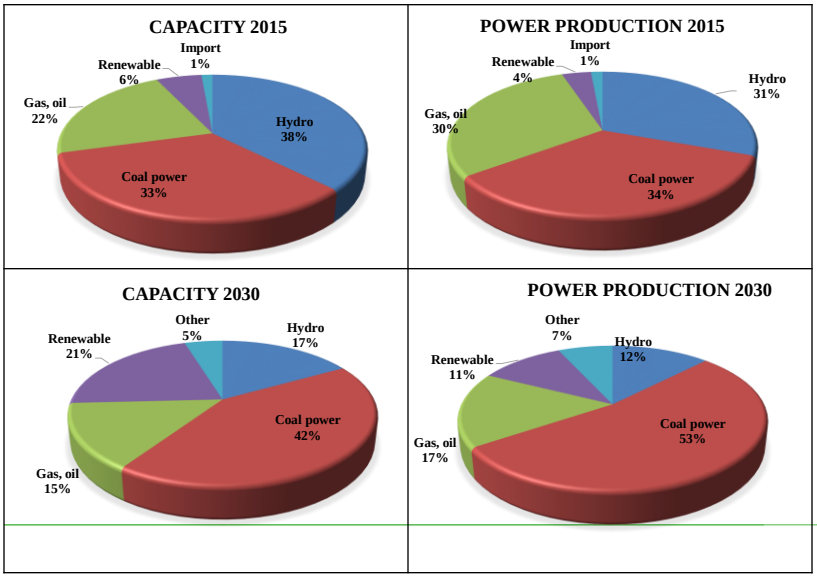
POWER DEVELOPMENT POWER VII REVISED (PDP VII revised)

- Power demand based on coal-fired power development.
- From 2011-2030 some 60 coal power plants of a total capacity of 55,300MW were planned of which at Mekong Delta there would be 14 plants of capacity of 18,000MW.

Year	2015		2030	
I. Capacity	**%**	**MW**	**%**	**MW**
Hydropower	37.5	14845	16.9	21886
Coal power	33.2	13157	42.6	55167
Gas, oil	22.2	8781	14.7	19037
Renewable	5.7	2277	21	27195
Import	1.4	550	4.8	6216
Total	100.0	39610		129500
II. Production power	**%**	**Bil. kWh**	**%**	**Bil. kWh**
Hydropower	30.6	50.2	12.4	70.9
Coal power	34.4	56.5	53.2	304.3
Gas, oil	29.9	49.2	16.8	96.1
Renewable	3.7	6.0	10.7	61.2
Import	1.5	2.4	6.9	39.5
Total	**100.0**	**164.3**	**100.0**	**572.0**

POWER DEVELOPMENT POWER VII REVISED (PDP VII revised)



CHALLENGES OF PDP VII REVISED

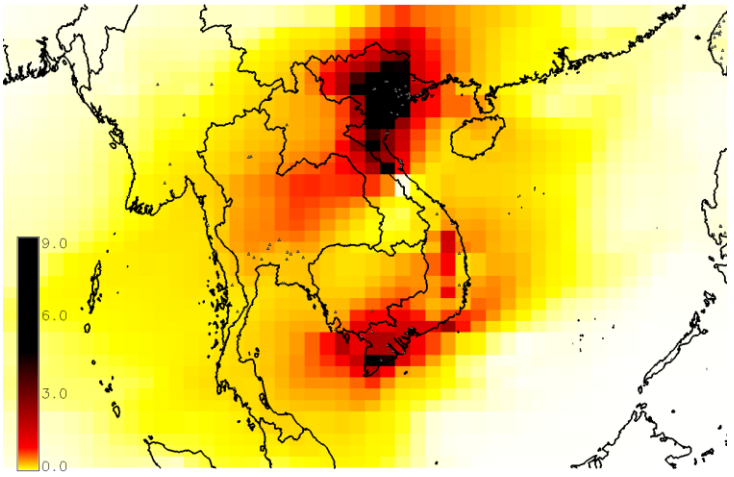
1. Challenges of PDP VII revised

- Coal power share in power mix is too big (53% at 2030).
- Environmental, social and health impacts costs (external cost) are not included in power cost.
- Renewable power is not taken into account at rational rate.
- Potential of Energy Efficiency is not taken into account.

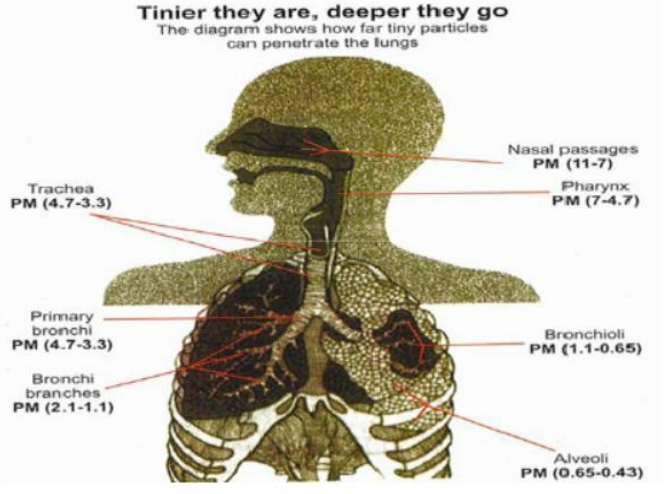
2. Option: A study by GreenID on power mix, based on economic analysis.

- External cost is taken into account in power cost.
- Potential of Energy Efficiency is taken into account.

AIR POLLUTION IMPACTS OF PM2.5 FROM COAL POWER AT 2030



AIR POLLUTION: IMPACTS OF PM TO HEALTH



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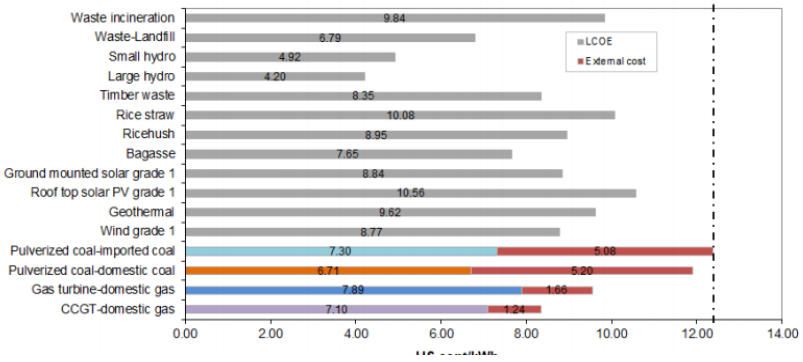
RESULT OF POWER MIX STUDY BY GREENID

1. LCOE and external costs at 2017



2. Potential of EE: 16,000 MW

RESULT OF POWER MIX STUDY BY GREENID

Study scenarios: 6 scenarios were carried out, in which scenario of renewable energy and energy efficiency (RE&EE) is the most feasible. Power mix is follows:

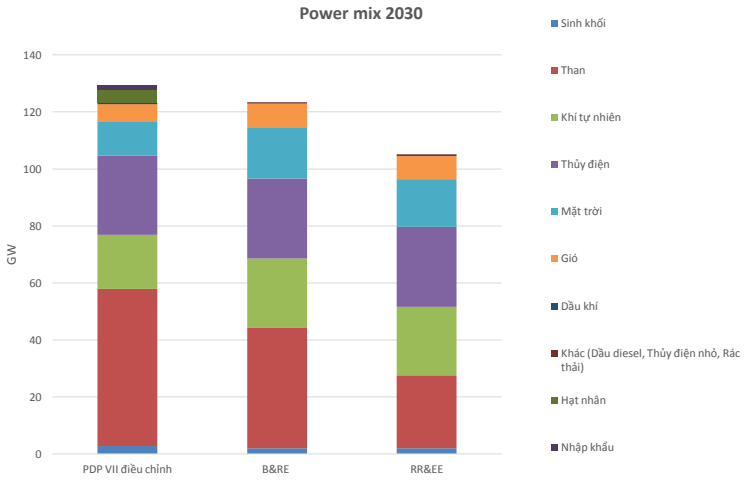
Resource	Installed Capacity (GW)			
	2015	2020	2025	2030
Biomass	0.38	0.63	1.22	1.95
Coal	13.07	25.97	25.64	25.64
Gas	7.45	7.69	10.60	23.98
Hydro	16.57	21.84	24.88	28.07
Solar	-	0.03	6.70	16.75
Wind	0.09	0.15	2.35	8.14
Oil	1.34	0.77	0.62	0.40
Other	-	0.05	0.15	0.20
Total	38.90	57.13	72.16	105.13

RESULT OF POWER MIX STUDY BY GREENID

Comparison between PDP VII revised and scenario RE&EE at 2030

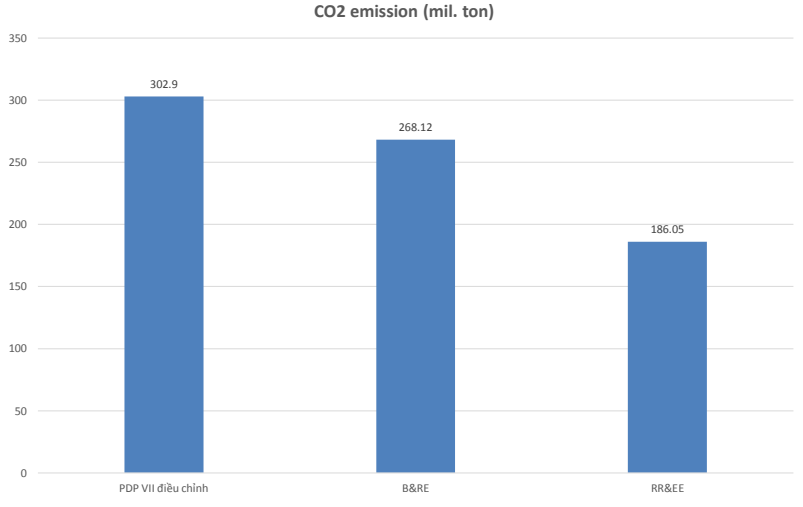
Scenario	PDP VII revised	RE&EE
Total capacity	129,500 MW	105,130 MW
Coal power rate	42.6%	24.4%
Coal power capacity	55,300 MW	25,640 MW (reduced 29,500 MW)

ALTERNATIVE OPTION BY GREENID



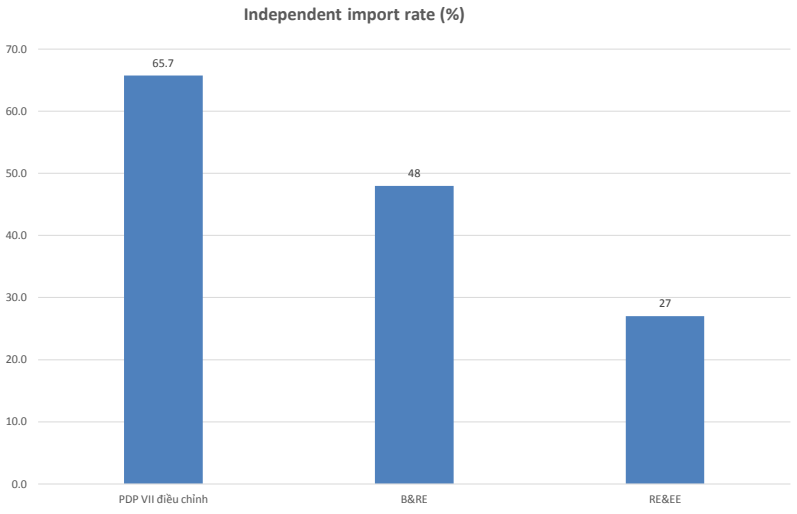
Nguni: GreenID 2017

POSITIVE IMPACTS OF ALTERNATIVE SCENARIO BY GREENID



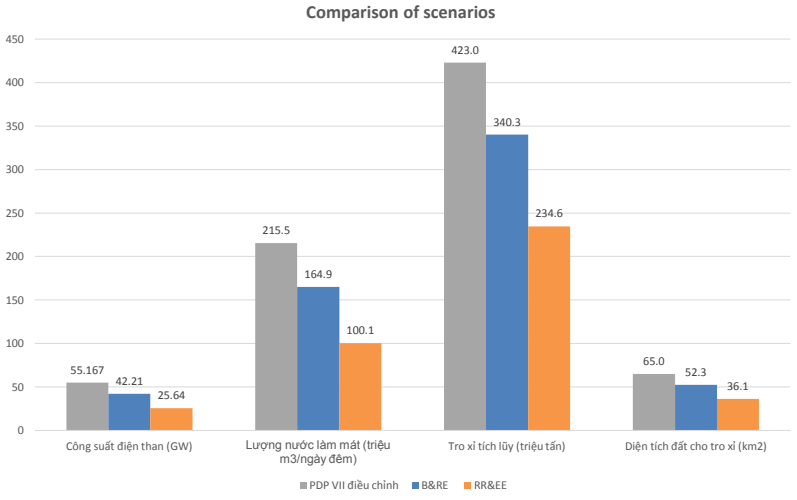
Nguồn: GreenID 2017

POSITIVE IMPACTS OF ALTERNATIVE SCENARIO BY GREENID



Nguồn: GreenID 2017

COMPARISON OF IMPACTS TO WATER, LAND AND COAL ASH



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POWER IMPORT FROM LAO PDR ?

According to PDP VII revised:

- Some Vietnamese experts believe that power should be imported from Laos for Vietnam demand.
- Lao's policy: 20% capacity is used for domestic demand, only 80% capacity is exportable.
- According to PDP VII revised, the total capacity is 850 MW, almost from dams at Sekong river, that are under operation and under construction.
- Importable total capacity from Lao is 850MW*80%=680MW, equal to 1 unit of coal power plant.
- Total power production is estimated at 2.7 bil. kWh, at 0,5% total power production at 2030 of 572 bil. kWh, too small.

POWER IMPORT FROM DAMS ON MEKONG MAINSTREAM RIVER ?

Power import from Mekong mainstream river ?

- Total capacity of 11 hydro dams at Mekong mainstream is of 11,000MWW to13,000MW. 80% of importable capacity is at 8,700 MW to 10,400MW and annual power production is 34.7 bil. kWh to 41.5 bil. kWh.
- If import 100% (?), compared to PDP VII revised power demand at 2030 of 572 bil. kWh, power from these dams is of 6% to 7%.
- Impacts of these dams to Mekong Delta are very serious. Should Vietnam import power from Mekong mainstream river ?

IMPORT OF POWER GENERATED FROM SOLA AND WIND FROM LAO AND CAMBODIA ?

- According to ADB, technical potentials of solar power of Cambodia is 5,100 MW, from wind at 520 MW, annual production estimated at 77 bil. kWh.
- Technical potentials of solar power of Laos is 511 MW, small hydro 2,000 MW, total power production is estimated at 10 bil. kWh.
- Why the import of wind and solar power from Laos and Cambodia is not considered in PDP ?

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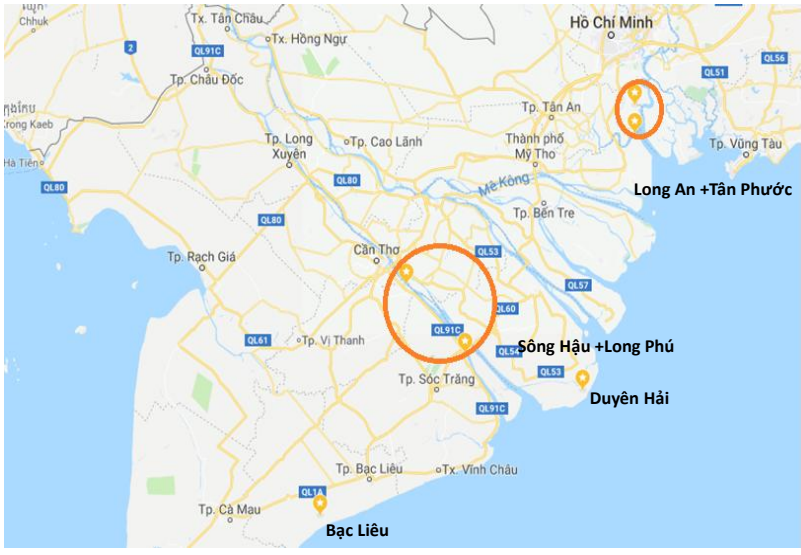
COAL-FIRED POWER PLANTS AT MEKONG DELTA

At the Mekong Delta of Vietnam, 6 coal-fired power centers, 14 power plants with total capacity of 18,224 MW are proposed. Coal is imported from outside (except of Duyen Hai 1 plant using coal from Quang Ninh).

	I. Duyên Hải Power Centre (Trà Vinh)	No Unit	Capacity of 1 unit	Total Capacity 4304	Note
1	Power plant Duyên Hải I	2	622	1244	In operation
2	Power plant Duyên Hải II	2	600	1200	
3	Power plant Duyên Hải III	2	600	1200	In operation
4	Power plant Duyên Hải III extension	1	660	660	Under construction
	II. Sông Hậu Power Centre (Hậu Giang)			**3200**	
1	Power plant Sông Hậu I	2	600	1200	Under construction
2	Power plant Sông Hậu II	2	1000	2000	
	III. Long Phú Power Centre (Sóc Trăng)			**4320**	
1	Power plant Long Phú I	2	600	1200	Under construction
2	Power plant Long Phú II	2	660	1320	
3	Power plant Long Phú III	3	600	1800	
	IV. Long An Power Centre (Long An)			**2800**	
1	Power plant Long An I	2	600	1200	
2	Power plant Long An II	2	800	1600	
	V. Tân Phước Power Centre (Tiền Giang)			**2400**	
1	Power plant Tân Phước I	2	600	1200	
2	Power plant Tân Phước II	2	600	1200	
	VI. Bạc Liêu Power Centre (Bạc Liêu)			**1200**	
1	Power plant Bạc Liêu I	2	600	1200	Not to be built

Souce: PDP VII revised

6 COAL-FIRED POWER CENTRES AT THE MEKONG DELTA



Soùce: PDP VII revised

ENVIRONMENTAL & SOCIAL IMPACTS OF COAL-FIRED PLANTS AT MEKONG DELTA

1. **Cooling water**: These 14 plants release 70 mil. m3 of hot water of nearly 40^0C, destroying aquatic ecosystem. That's reason Bac Lieu plant is proposed by local authorities not to be built.

- At Hau river, 2 centers Song Hau +Long Phu are planned, releasing 30 mil. m3/day. At Vam Co + Soai Rap rivers, 2 centers Long An + Tan Phuoc: releasing 20 mil. m3/day.
- Centers Duyen Hai+Bac Lieu: 20 mil. m3/day releasing to the sea.

2. **Coal ash** : It is estimated at 8 mil ton coal ash per year, 100 ha/year needed for ash ponds.

3. Emission gases, particular matter: PM2.5, CO2, NOx, SOx,….

4. Other toxic chemicals: heavy metals as arsenic, lead, bismuth, … cause cancer, respiratory and cardiovascular diseases,…

These expenditures are not included in power cost.

ALTERNATIVE OPTION FOR COAL POWER AT MEKONG DELTA

Alternative option:

- Plants in operation (2,440MW): going on
- Plants under construction (3,060MW): going on.
- Plants planned, not yet constructed (12,720MW, 75 bil. KWh): to be reconsidered.
- Consider alternative with solar and wind:
  - Solar: capacity 50,000MW, power production 75 bil. kWh.
  - Wind: capacity 1,170MW, power production 2.3 bil. kWh.
  - Other renewable resources: biomass, offshore wind and ocean energies.
  - Hydro power import from Laos and/or Cambodia or solar power development for national grid ?

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POWER SUPPLY FOR REMOTE OFFGRID AREAS WITH RENEWABLE ENERGY

General:

- According to EVN, at the end 2015, there are 11 communes and 280,000 households of over 1 mil. people not accessing to national grid countrywide. At Mekong Delta there are 50,000 households with 250,000 people not accessing national grid.
- Households are scattered, power supply from national grid is not economically faceable. At An Giang, power company only supply if number of households is higher than 40 per 1km distribution line of 22V/380V.
- Power supply with renewable energy (solar) is the best option for remote off-grid area.
- There are many models of power supply from solar energy for lighting, drying, irrigation pumping,…
- GreenID has carried out 2 models of power supply:

- Off-grid community scale power system + clean water supply at Ea Rot, Cu Pui commune, Krong Bong district, Dac lak province.

- Power supply system for 165 households at Tinh Bien district, An Giang province with household-scale model.

OFF-GRID POWER SUPPLY +CLEAN WATER SUPPLY SYSTEM AT EA ROT

Off-grid power supply system integrated with clean water supply system at Ea Rot consists:

1. Off-grid power system 6.24kW supplying 22 households +1 church.

- Solar panels of 6.24 kW and accessory (2 inverter 12V/220, 2 charge controller).
- Distribution line 220V of 300m long
- Operation from 7/2017
- Power prize of 2,000 VND/1kWh

2. Clean water system of 360 liters/hour

- Operation from 11/2017
- Water prize of 7,000 VND/1kettle of 20 litters at market 20,00VND)

3. Operation procedure:

- Operation group nominated by people.
- Monthly financial disclosure for people to monitor.

GREEN ENERGRY MODEL AT DAK LAK

INTERGRATED POWER & CLEAN WATER SUPPLY

- Capacity of 6.24kWp
- Power supply for 22 households + 1 church at Ea Rot village

30

INTERGRATED POWER & CLEAN WATER SUPPLY

- Power supply to clean water filer RO of 360 liters/hour for Ea Rot village at standard of Public Health Ministry

INTERGRATED POWER & CLEAN WATER SUPPLY

- This system can be extended when power demand is increased, can be connected to national grid.
- This system is suitable to remote area with affordable price.
- The system is managed by the people.

HOUSEHOLD-SCALE POWER SUPPLY AT AN GIANG

- At Tinh Bien, An Giang province there are 2,300 households off-grid.
- At project area of 3 communes An Hao, Vinh Loi and Vinh trung there are 1,200 households off-grid.
- GreenID has supported 165 households with solar panel and training how to manage and use their solar power system.
- Household itself manage and operate their system.

POWER SUPPLY TO OFF-GRID HOUSEHOLDS AT AN GIANG

ACCESSMENT OF 2 MODEL

Model	Community scale	Household scale
Advantage	- Power voltage of 220V, common equipment at the market can be used. - Good power quality. - Can be connected to national grid without any further adjustments. - Can be extended when power demand increased.	- Homeowners self-managed, easily difficult to reach a consensus.
Dis advantage	- It is difficult to reach a consensus between power-supply households and non-supply households.	- Voltage only 12V, equipment is not common. - Knowledge of people at different levels, management is not good.

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RECOMMENDATION FOR VIETNAM AND MEKONG DELTA.

1. For forthcoming PDP (PDP VIII)

- Reduce coal-fired power and promotion of renewable energy as much as possible
- Apply energy efficiency.
- Consider import of solar and wind power from Cambodia and Laos into the forthcoming Electricity Planning VIII.

2. For power development plan at Mekong Delta

- Stop construction of planned plants to reconsider
- Maximize power from renewable energy (wind, wind, biomass, etc.)

3. Power supply for remote area

- apply renewable energy (solar, wind, ...) to power supply.
- Policies should be prioritized to renewable energy development in these areas.

Thank you for listening !

For more information, please contact: Trần Đình Sính// tdsinh@greenidvietnam.org.vn

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