National Case Study on Renewable Energy For Viet Nam

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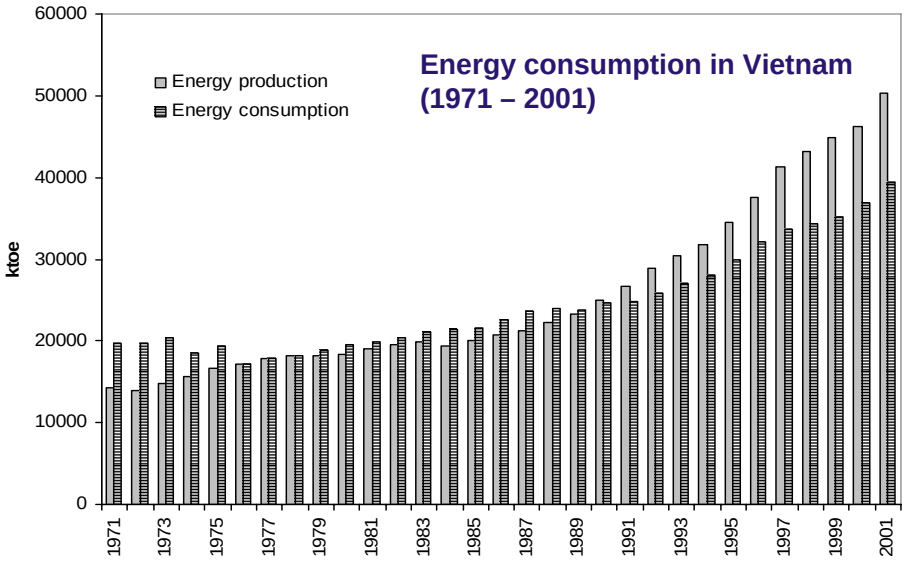
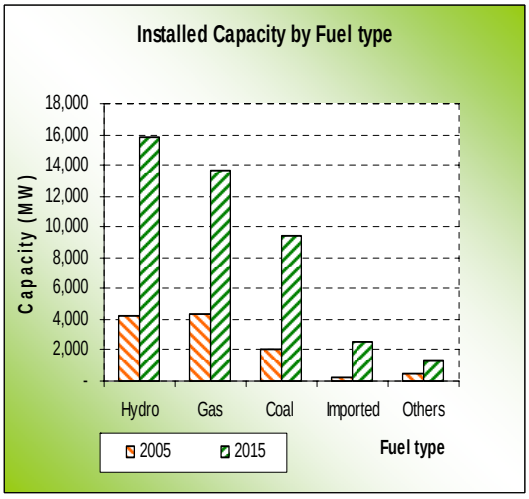
- Overview of energy sector in Vietnam
- Effects of economic integration (EI) on energy sector
- Challenges and opportunities to promote RE in Vietnam
- Proposed RE policies for Vietnam considering EI effects
- Analysis of new recommended energy policies
- Strategic policy recommendation

Macro view of energy balance



Source: World Bank, 2004



Source: EVN, 2005

- Electricity production was in balance with domestic consumption activities.

- With growth rate in electric. demand of 13.4%, a massive expansion of the power system is required over this decade.

Year	2004	2010	2020	CAGR (%/p.a) 2004-2010
Generation requi. (TWh)	46.2	98.0	228	13.4
Capacity requi. (TWh)	11,197	24,447	42,000	13.9

Source: Updated Estimates for 5th Power Master Development Plan 2000-2010

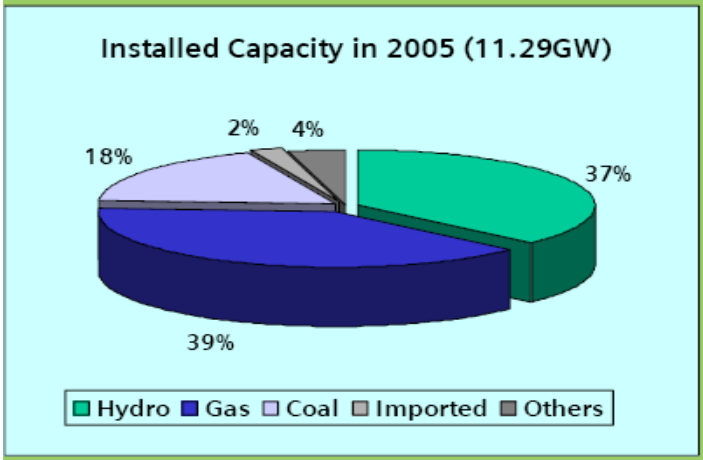
Existing status of RE & potential

RE source	Potential (MW)	Current use (MW)	Geographical potential
Hydro power •Pico Hydro •Isolated mini grid •Grid connected	1600-2000 180-300 600-1200 800-1200	220-310 60-150 40 120	Mountain areas in the North and the West (closed to Laos)
Off-grid solar PV system	2	0.2	Southern provinces (from Danang)
Biomass bagasse/rice husks. Etc.	250-400	50	South and center
Geothermal	50-200	0	Center
Wind power		0.4	Island & center coast

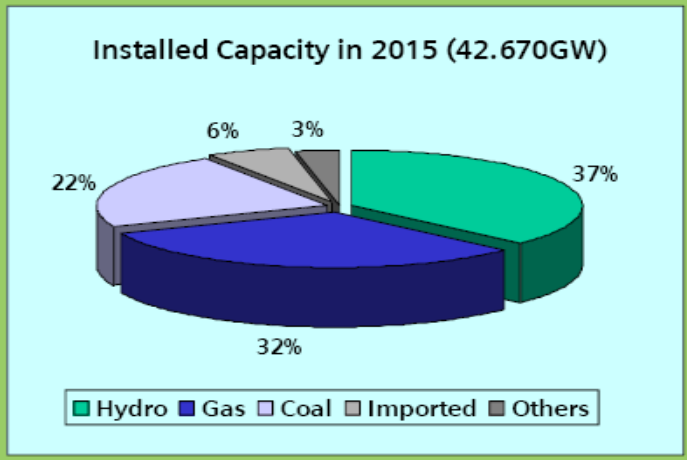
Source: - Updated Estimates for 5th Power Master Development Plan 2000-2010; and

- http://www.vncold.vn

Year 2005: 11,290 MW

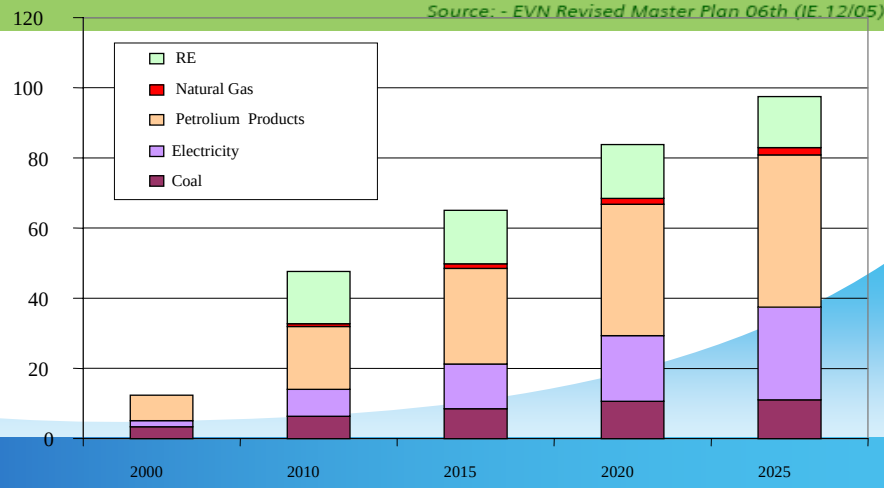


Year 2015: 42,670 MW



Future scenario of RE

Source: - EVN Revised Master Plan 06th (IE 12/05)



Analysis of existing RE policies

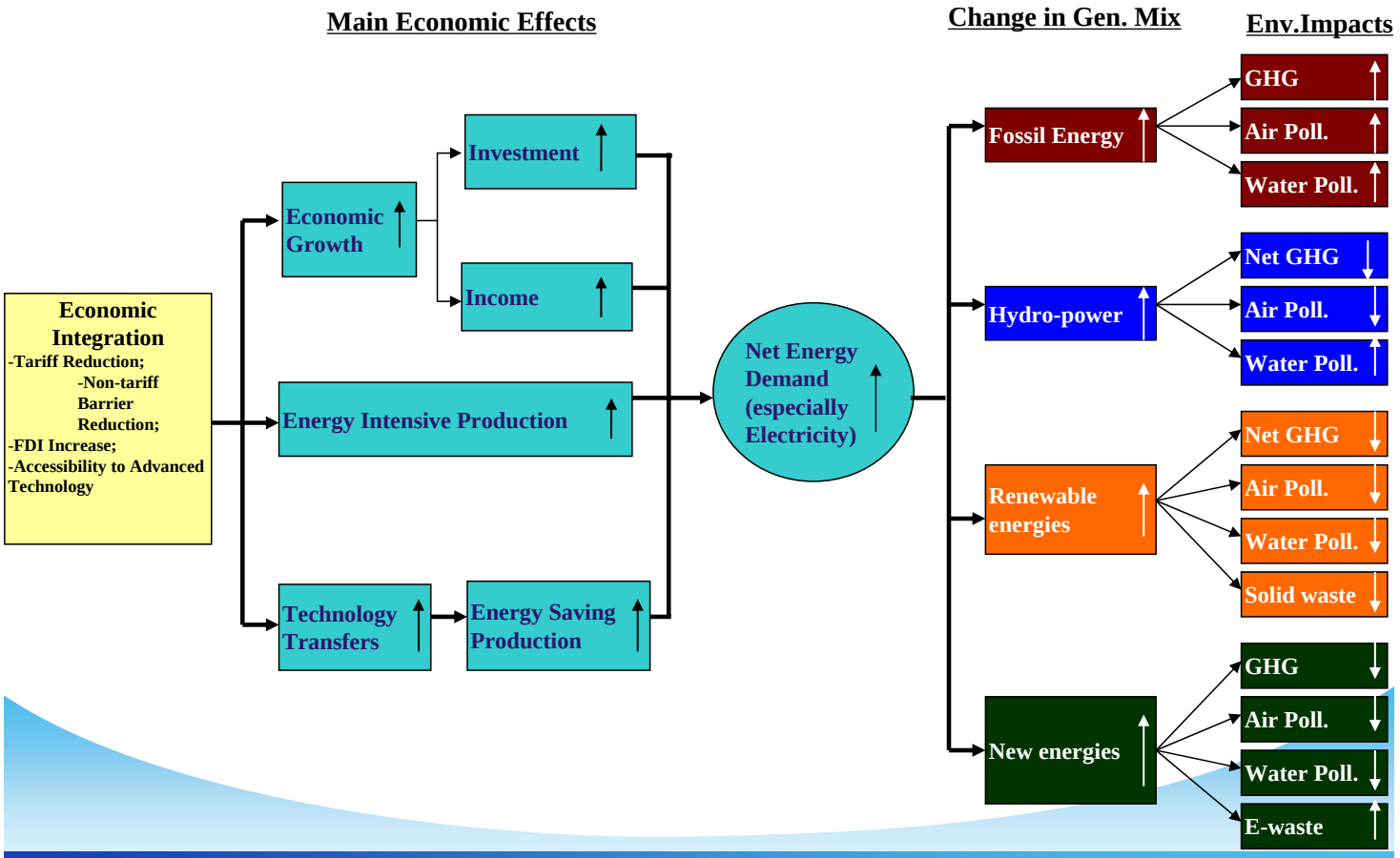
Focus of existing policies for RE development

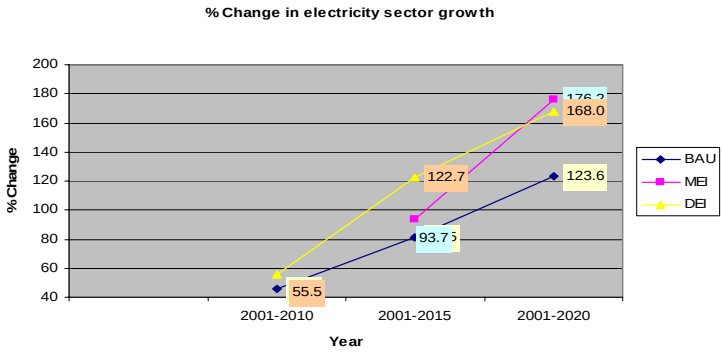
1. Policies related to private sector participation
2. Policies related to open access for the generators
3. Policies related to electrification for Off-Grid Areas
4. Policies related to preferential investment

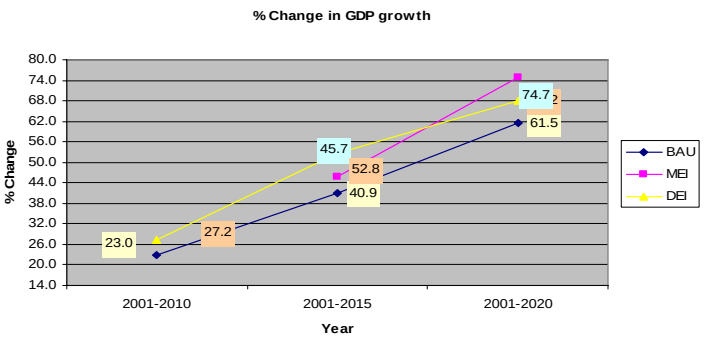
Focus of proposed new pol. for RE development

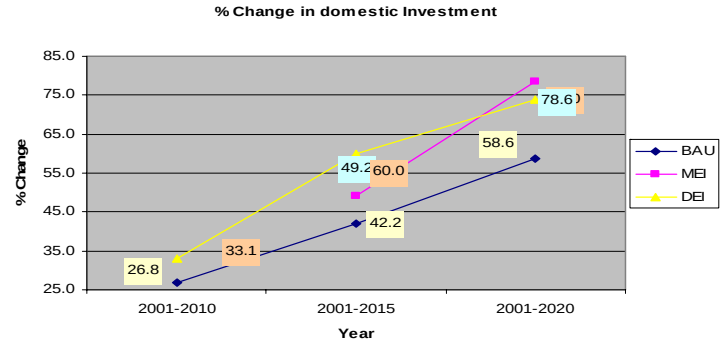
1. Preferential tariff for RE
2. Development policies for grid- connected RE project
3. Development policies for off-grid RE project
4. Target policies for mini-hydro
5. Investment and fiscal incentives
6. Power Purchase Tariff and Small Power Purchase Agreements

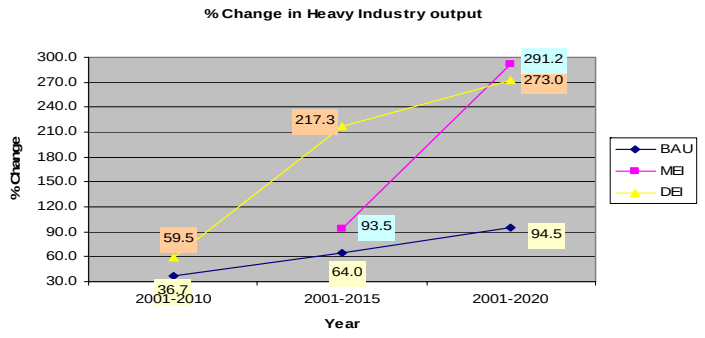
CCA of EI effects on Energy sector

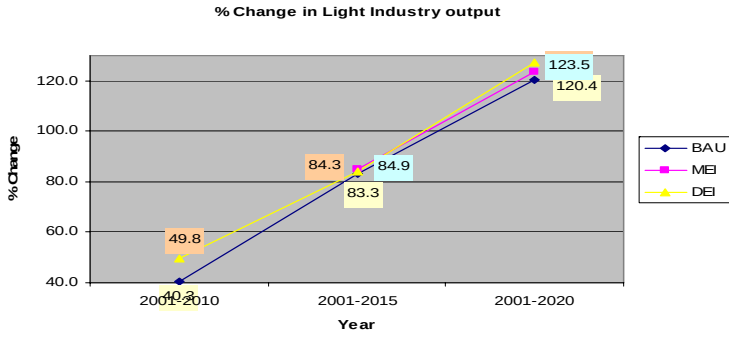


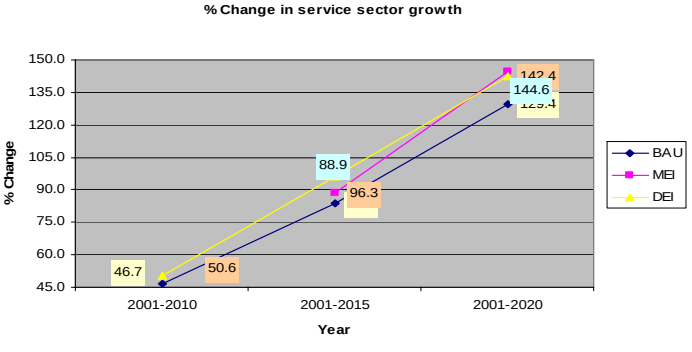




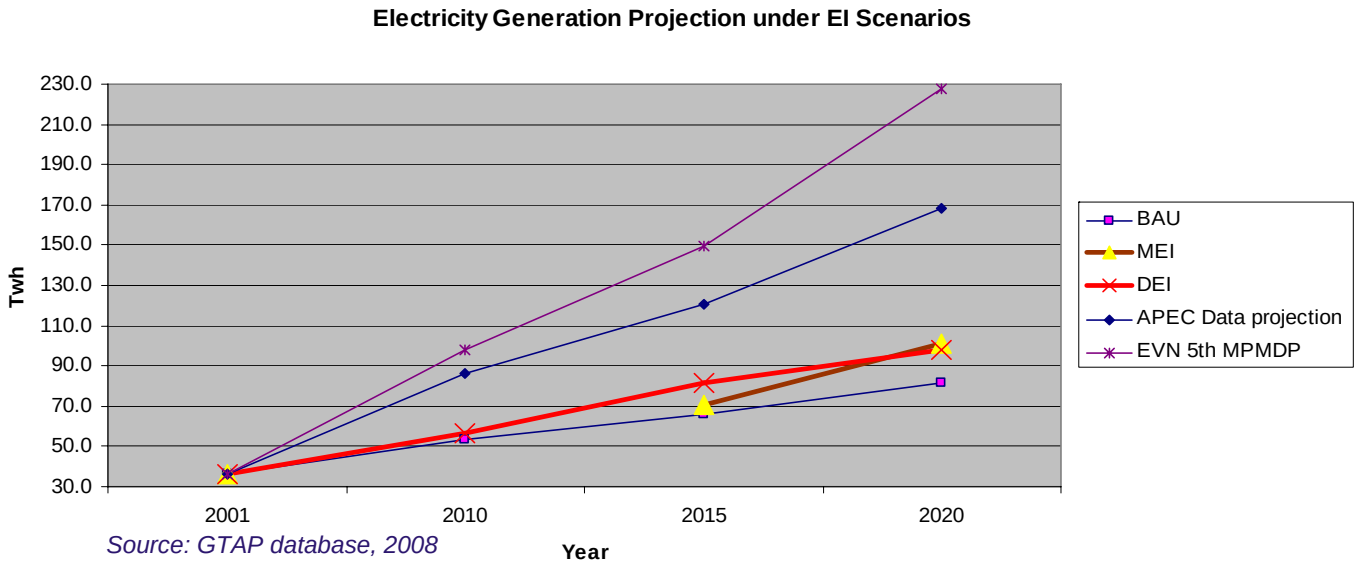








Effects of EI on Electricity generation



Source: GTAP database, 2008

	BAU-MEI by 2015	BAU-DEI by 2020
CO_2 emis. impact due to EI *(kt)*	1,533,649	5,554,477
Cost of CO_2 due to EI *(million$)*	30,672,984	111,089,546

Source: Author estimated, 2008

Major technical difficulties

- Vietnam is expected to have huge electrical power deficit by 2020 due high demand growth and low level of commissioning new power plants (15% under low case scenario, 17% under base case scenario and 20% under high growth case scenario; EVN 6th Master Plan, 2006). Hence, RE cannot meet the rapidly increasing demand in the country because of its inherent drawbacks like intermittent supply (lack of support for base load) . FF base power can immediately meet that and therefore, it has become the major technical weak points for RE to grow in Vietnam.
- Not enough information and data analysis to evaluate the real potential and RE consumption status, especially for Wind and Solar power.
- Technical knowledge and skills to implement renewable energy power project is still weak.
- Besides, the increase of using natural gas with more advanced combustion technological progress and the inclination towards nuclear power are threats for RE promotion .

Policy, regulatory and institutional barriers

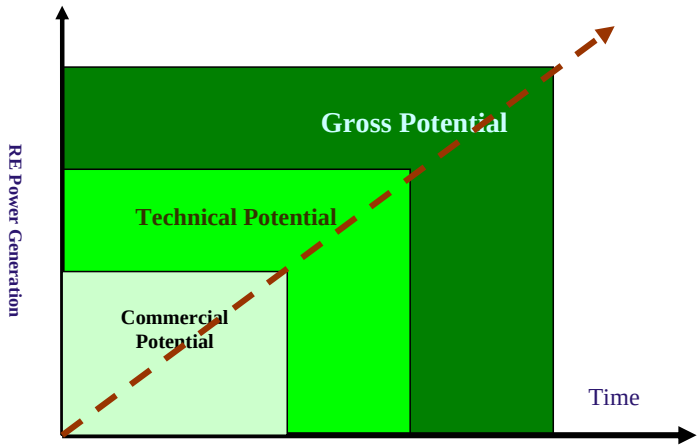
- The biggest drawback for RE power in Vietnam is the cost of generation. Currently EVN cannot buy the power from the produces @ more than $0.05/Kwh. So there is no incentive for the RE developers to generate power.
- Currently, GOV is giving fuel subsidies for fossil fuel power generation to keep the cost low. Therefore, the RE developers are facing punishments.
- Average electricity price in Vietnam is around $ 0.055/ Kwh and EVN cannot sale power more than that under the GOV regulation so RE has become uncompetitive in all aspect.
- There is no policies regarding the environmental and social cost accounting of conventional power generation, or no preferential tariff mechanism for RE generation, transmission and distribution.
- No official Decree has been approved so far to promote RE in Vietnam. In 2004 there was an attempt to pass one decree, but got rejected by the Ministry of Finance in the logic of revenue loss of the country under the provision of reduction of import duties for RE equipments from abroad.

RE sectoral SWOT analysis

Strengths	Weakness	Threat	Opportunities
1. Can reduce the dependence on imported electricity 2. Potential sources 3. Can be generated locally (supplied to rural areas)	1. Lack of policies and regulation framework for RE to be tapped for rural electrification 2. Lack of technical knowledge and RE inventory data 3. Financing needed 4. No large scale business for RE equipment/services 5. Monopolistic electricity market 6. Environmental and social costs are not included in the current fuel based power price	1.Increasing use of natural gas, and coal with more advanced combustion technological progress 2.Government inclination towards nuclear power	1. RE initiatives focused on mini-hydro 2. Demand on electricity for rural area 3. Increasing of power price 4. CDM projects

General policy Targets

1. The first target would be to achieve the 100% of the commercially viable potential within a fixed period of time.



2. Use of RE in Vietnam is very much needed to meet the electricity demand of mountainous and remotely located communes and avoid the dependence on imported electricity.
3. In general RE plays an important role in term of energy balance, and cemented with environment protection and maintaining natural resources.

Recommended Policy Packages

1. On-grid policies
   - Grid connected RE (to avoid environmental damage and Global externality)
   - Replacement of imported RE
2. Off-grid policies (to increase rural electrification)
3. Consider standard RE promotion/regulatory policies

Methodology used for policy assessment

1a- Grid connected RE policies

- If environmental damage cost (30 VND/kWh) would be used for increasing RE
- Global externality cost adds 62 VND/kWh to the avoided cost

1b- Replacement of imported RE

- Price of imported power is 675 VND/kWh → the cost difference is 1.4 UScent/kWh. If this is used for increasing Qecon., RE could be increased by 750 GWh

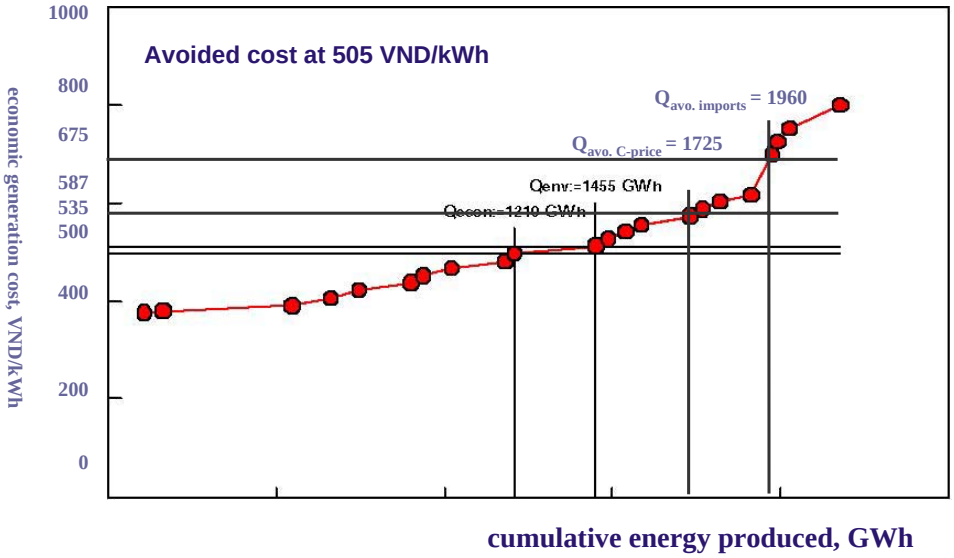


Fig. Impacts of environmental cost, avoided global externality cost and avoided imported cost
(Source: Meier P., 2006; and author estimated, INEST, 2008)

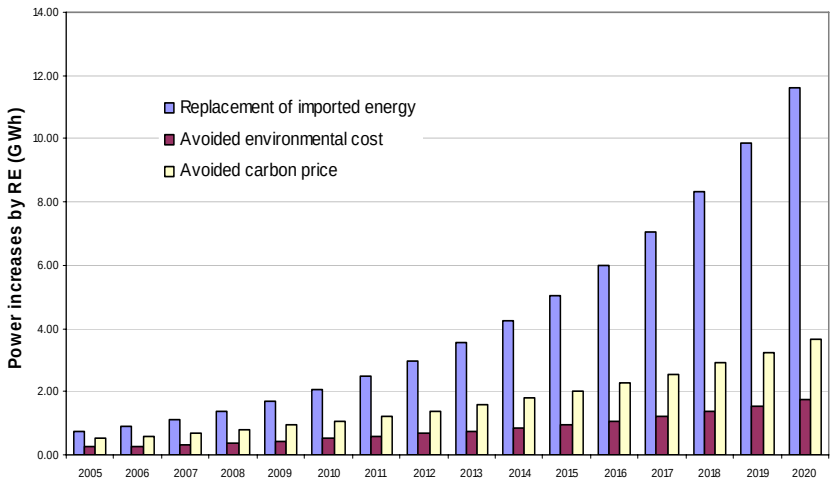
Benefit from Grid Connected RE and Replacement of Imported Energy policy, *estimated for the year 2005*

	Eco. base (Base condition)	**Grid connected RE**		**Replacement of imported energy**
		Environ. cost	*Avoided C-price*	
Q, *GWh* (RE generation)	1210	1455	1725	1960
ΔQ, *GWh* (gen. difference)	-	245	515	750
% Q increased/ % Q replaced	-	**20%**	**42%**	**70%**
p, *UScent/kWh* (current cost)	3.1	3.3	3.5	4.5
Δp, *UScent/kWh* (cost different)	-	0.2	0.4	1.4
Net benefit, *mill.US$*	-	**0.48**	**2.03**	**10.58**

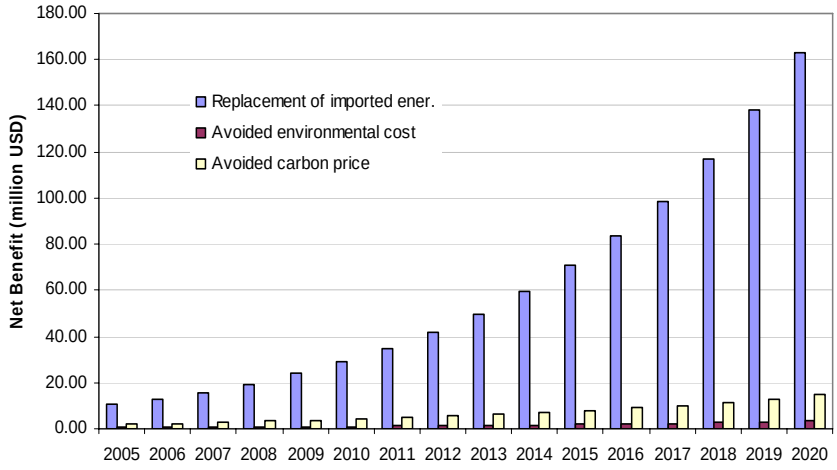
(Source: Author estimated, INEST, 2008)

MHP development scenarios proposed

Year	% RE gen.	RE gen (GWh)	Note
2005	**2.25**	**1210**	% Q increased is assumed by 20% a year in *Envi. Cost* scenario. % Q increased is assumed by 42% a year in *Avoi C-pri* scenario. % Q replaced is assumed by 70% a year in the *Replacement of Imported Energy* scenario.
2006	2.38	1409	
2007	2.52	1640	
2008	2.67	1909	
2009	2.83	2223	
2010	3.00	2587	
2011	3.18	2930	
2012	3.37	3317	
2013	3.57	3756	
2014	3.78	4253	
2015	4.00	4816	
2016	4.24	5453	
2017	4.49	6175	
2018	4.75	6992	
2019	**5.04**	**7917**	



(Source: Author estimated, INEST, 2008)



2- The requirements on electricity in remote areas up to 2020

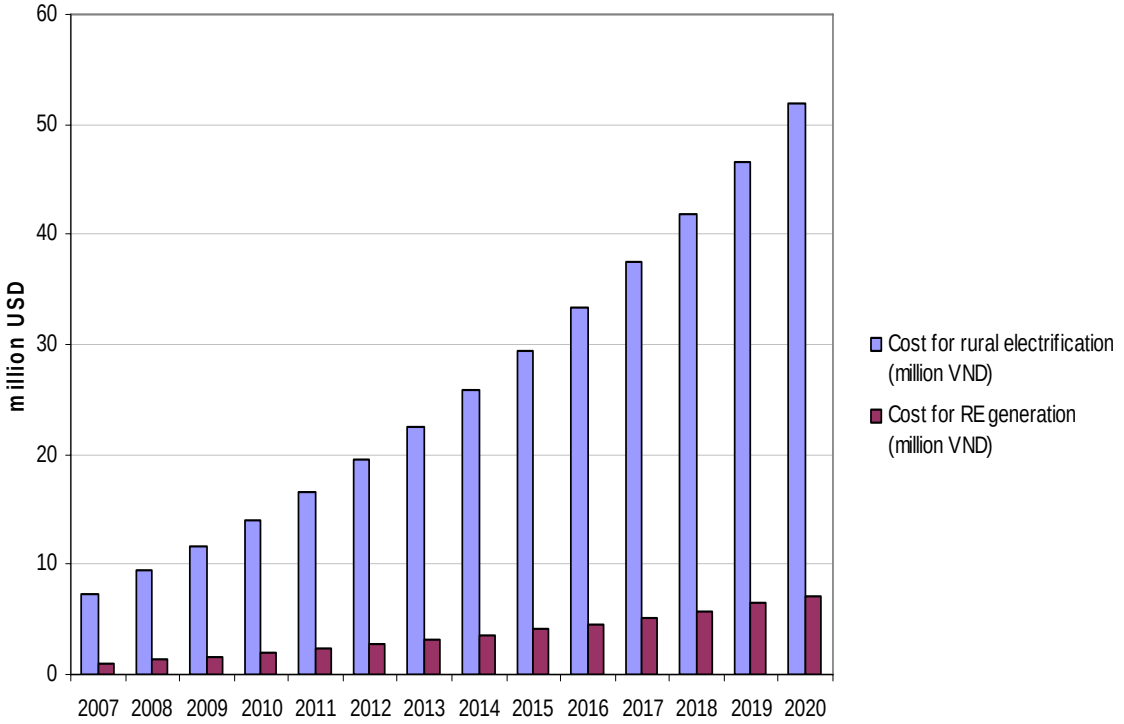
Year	No. of rural households	No. of rural households need to be electrified	Electricity use per household (kWh/household)	Electricity requirements (GWh)
2007	19,412,449	1,002,316	30.00	**30.07**
2008	19,645,398	1,235,265	31.20	**38.54**
2009	19,881,143	1,471,010	32.45	**47.74**
2010	20,119,717	1,709,584	33.75	**57.70**
2011	20,361,153	1,951,020	35.11	**68.49**
2012	20,605,487	2,195,354	36.51	**80.16**
2013	20,852,753	2,442,620	37.98	**92.76**
2014	21,102,986	2,692,853	39.50	**106.36**
2015	21,356,222	2,946,089	41.08	**121.03**
2016	21,612,497	3,202,364	42.73	**136.83**
2017	21,871,847	3,461,714	44.44	**153.84**
2018	22,134,309	3,724,176	46.22	**172.14**
2019	22,399,921	3,989,788	48.07	**191.80**
2020	22,668,720	4,258,587	50.00	**212.93**

(Source: Author estimated, INEST, 2008)

The net benefit from RE replacement in rural remote areas, estimated for period 2007- 2020

Current price of electrification for remote areas is 22.8 $c/kWh, it is 19.6 $c/kWh higher than the cost of MHP generation (3.2 $c/kWh.

If 100% of electricity requirements in those remote areas is based on MHP source, the net benefit estimated will be 44.64 million US$ by 2020.



(Source: Author estimated, INEST, 2008)

Strategic Policy Recommendations

Policy Objectives & Target	Strategic Policies
1. Grid Connected RE development (Target: 5% of RE supply by 2020)	1. Incorporation of installation cost subsidies maximum up to the level of 50% 2. Allow the fossil fuel based power generation tariff to reflect its LRMC (which is around 7.5^{C}/Kwh) 3. Relaxation of import duties for RE equipment procurement by the Vietnamese companies 4. Gradual targeted removal of cross subsidization of the supply tariff to enhance the financial strengths of the power companies to create capital for investment in RE sector. 5. Develop standardized long term PPA structure for the private sector RE developers and EVN.
2. Off Grid RE Development Policies (Targeting to reach remaining 5% of the total Vietnamese households which are not grid connected by 2020)	1. Increase the concentration of demand in a smaller area compared to the existing scattered load pattern. 2. Increase and develop continuous daily and seasonal load pattern for the region to have a better economy of power supply . Introduction of electric equipments for rural activities like rice de husking, battery recharging units, electric pumps for irrigation etc can improve the demand pattern in the rural areas which can be served better by the off grid system. 3. Government should support the cooperative activities to develop RE power gen. facilities linked to rural sustainable livelihood activities.

Specific policy guidelines

- Supply Side Policies for domestic RE generation
  - RE Linked Policy
  - Feed-in tariff mechanism
  - Introducing loss cost accounting
  - RE subsidy policy
  - R&D promoted policy
  - Awareness Raising and Capacity Building
- Demand Side Policies to promote RE
  - Subsidy policy for domestic consumers
  - Tax exemption policy
  - Improved RE installation loan policy for community services
  - Demand side management policy

Conclusions

- This study develops a set of policies that hope to provide an increasing RE contribution in the future of Vietnam.
- Renewable energy- based grid and off-grid systems would be owned and operated by commercial enterprises, such as community organizations, cooperatives and private sector.
- The small scale of the projects and the correspondingly small investment requirement are ideally suited for local investors.
- Moreover, these small operations are more efficiently and cost- effectively run by such commercially functioning enterprises rather than EVN or PCs.

Conclusions (cont.)

- The mini-hydro facilities, in particular, can provide an important source of RE to the grid. Implement a standardized PPA and a published avoided cost tariff that minimizes transaction costs of implementing RE.
- Wind power generation may also provide a small contribution in order to reduce electricity imports.
- The recommendations have focused especially on off-grid power supply in order to increase rural electrification in isolated areas.
- Besides, standard policies for the RE promotion in Viet Nam are considered.