Business prospects in South East Asia for European cogeneration Equipment

Seminar and round table discussion

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Cogeneration Situation in Vietnam

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Vietnam Cogen 3 - RCEE

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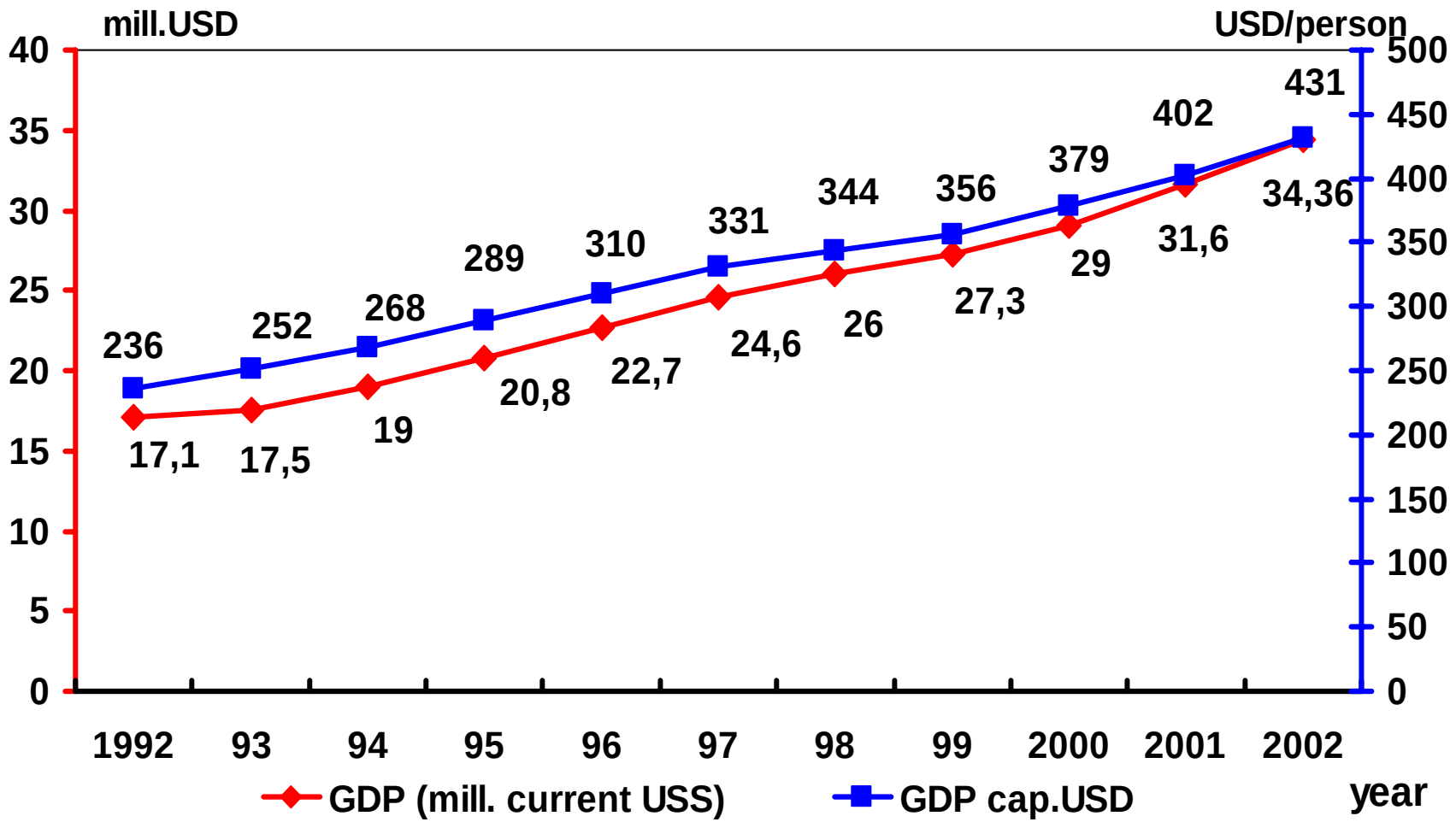
Part I - Energy sector in Vietnam

A. State of Vietnam energy sector

A.1. Economical development of Vietnam in last ten year

Year	1992	93	94	95	96	97	98	99	2000	2001	2002
POP (mill.per)	68.2	69.5	70.8	72.0	73.2	74.3	75.5	76.6	77.7	78.68	79.72
GDP (mill. current USS)	17.1	17.5	19.0	20.8	22.7	24.6	26.0	27.3	29.0	31.6	34.36
Growth rate (%)	8.6	8.1	8.8	9.5	9.3	8.2	5.8	4.8	6.8	6.84	7.04
GDP cap.USD	236	252	268	289	310	331	344	356	379	402	431

Figure 1. GDP and GDP per cap. of Vietnam in last ten years



A.2. Commercial primary energy production

Year / Type	1992	93	94	95	96	97	98	99	2000	2001	2002
Coal (Mt)	5.31	5.74	6.37	8.35	9.74	11.3	11.6	9.6	11.6	13.0	15
Oil (Mt)	5.50	6.30	7.07	7.67	8.80	10.1	12.6	15.2	16.3	16.8	16.6
Gas, Bill m^3	-	-	-	0.18	0.27	0.53	0.83	1.20	1.35	1.40	1.70
Hydro (TWh)	7.23	7.97	9.25	10.6	12.0	11.7	11.1	13.8	14.7	18.2	18.2

A.3. Structure of final energy consumption (%)

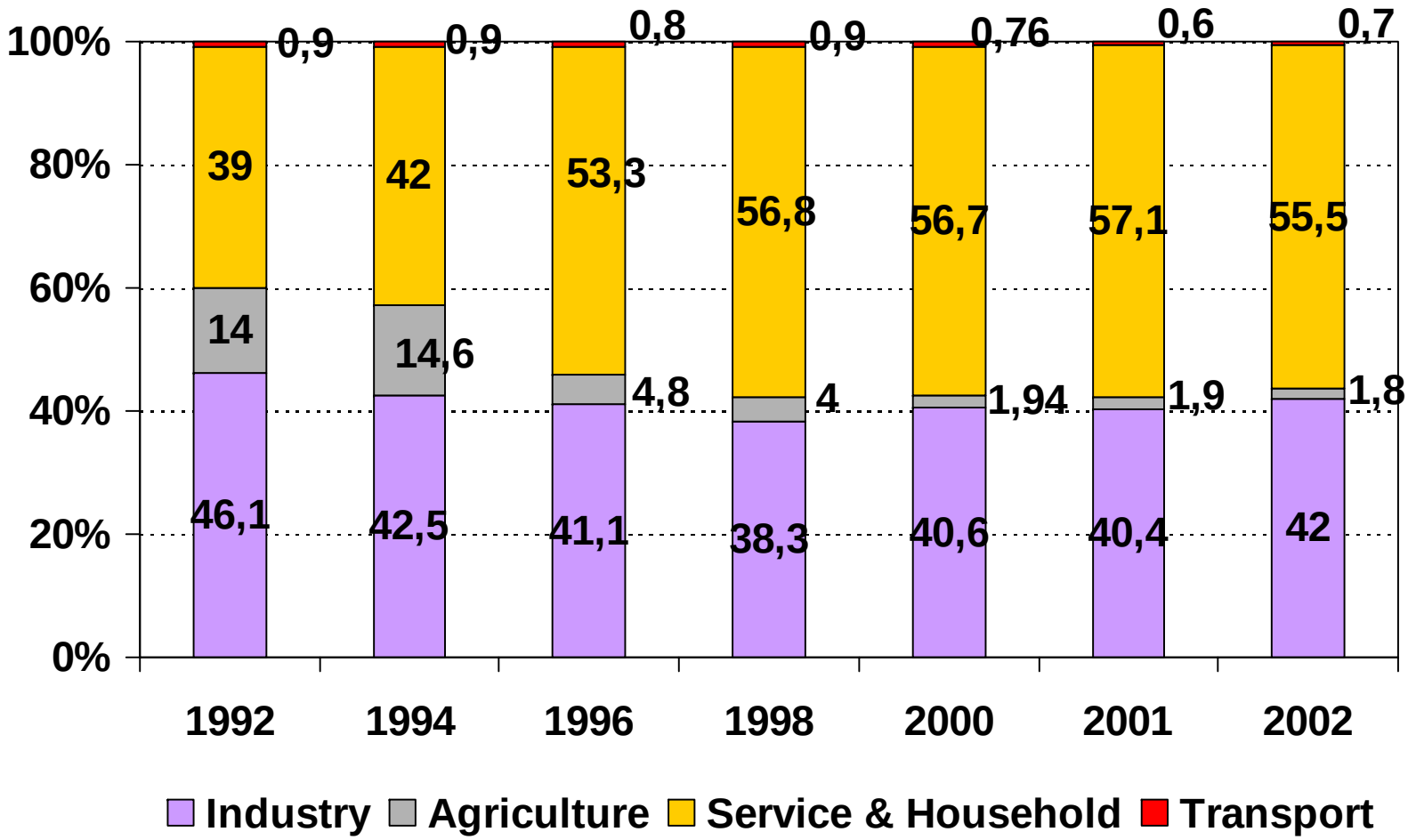
	1993	94	95	96	97	98	99	2000	2001	2002
Industry	51.6	51.9	47.5	49.5	50.2	47.4	53.4	55.2	54.5	51.5
Agricul	5.9	5.9	5.8	5.7	5.8	5.6	4.1	4.0	3.5	3.0
Service	15.1	15.6	17.0	16.8	16.8	20.8	19.7	18.5	19	20.5
Transpo	18.8	17.8	16.3	15.2	14.8	14.0	13.7	15.6	17	20
Other	8.6	8.8	13.4	12.8	12.3	12.2	9.1	6.7	6.0	5.0
Total	100	100	100	100	100	100	100	100	100	100

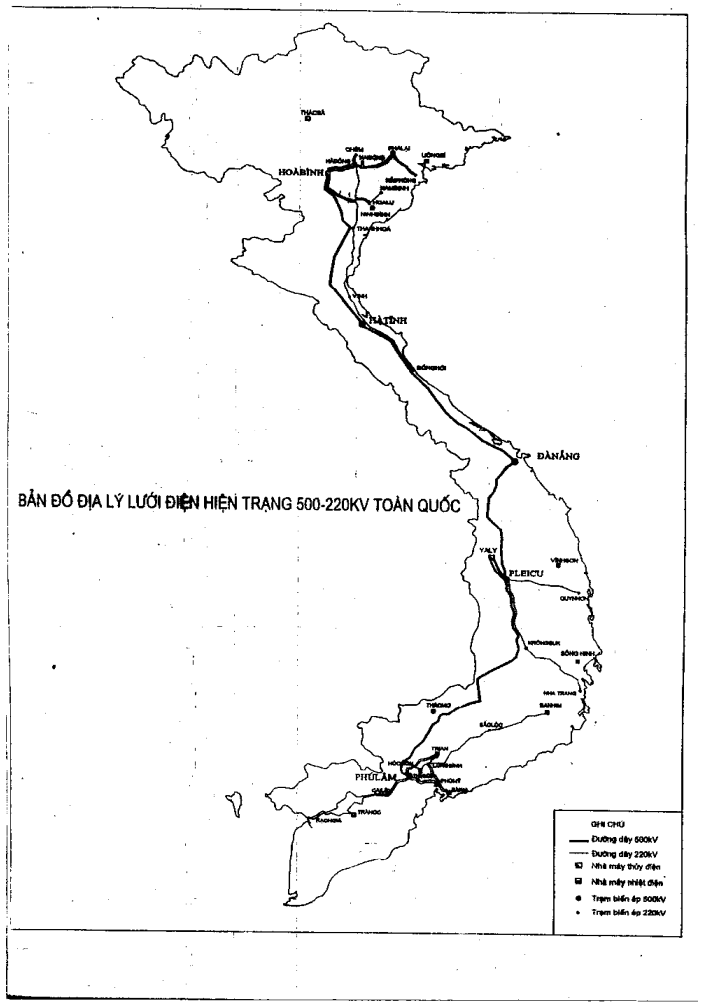
A.4. Electricity production

Electricity production is increased very quickly in past 10 years

Year / Type	95	96	97	98	99	2000	2001	2002	2003
Total (TWh)	14.65	16.94	19.21	21.69	23.56	26.68	30.61	35.79	40.93
Growth rate, %	19.3	15.7	13.4	12.9	8.6	12.7	14.7	16.9	14.3
In which, %									
-Hydro	72.2	70.9	60.7	52.9	58.5	54.8	58.5	50.8	46.4
-Coal	20.0	14.0	17.3	16.2	12.4	13.7	10.3	13.8	15
-Oil	7.8	8.6	11.4	11.4	8.1	4.3	10.0	6.1	4.0
- Gas		6.5	10.6	15.9	15.3	19.0	14.5	23.3	29
- Other				3.6	5.7	8.2	6.7	6.0	5.6
Losses,%	-	-	-	15.6	15.0	14.03	14.01	14.0	13.6

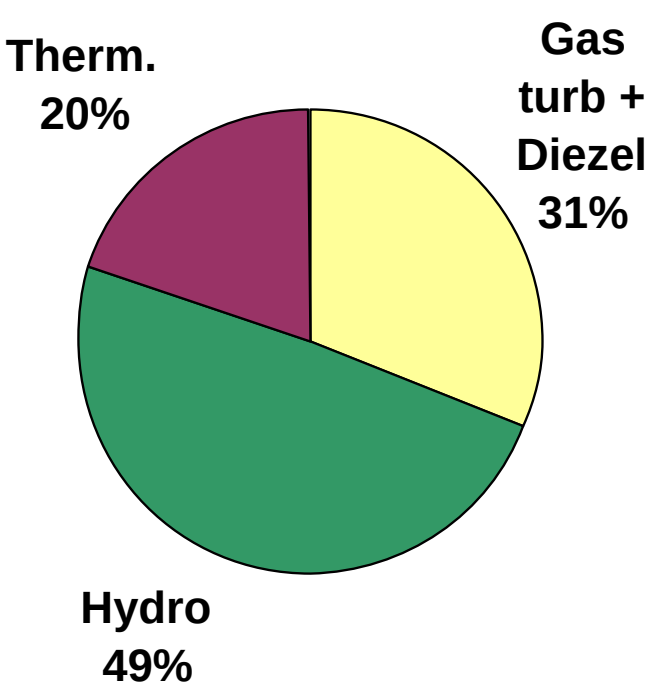
Figure 2. Electricity consumption by sectors in %



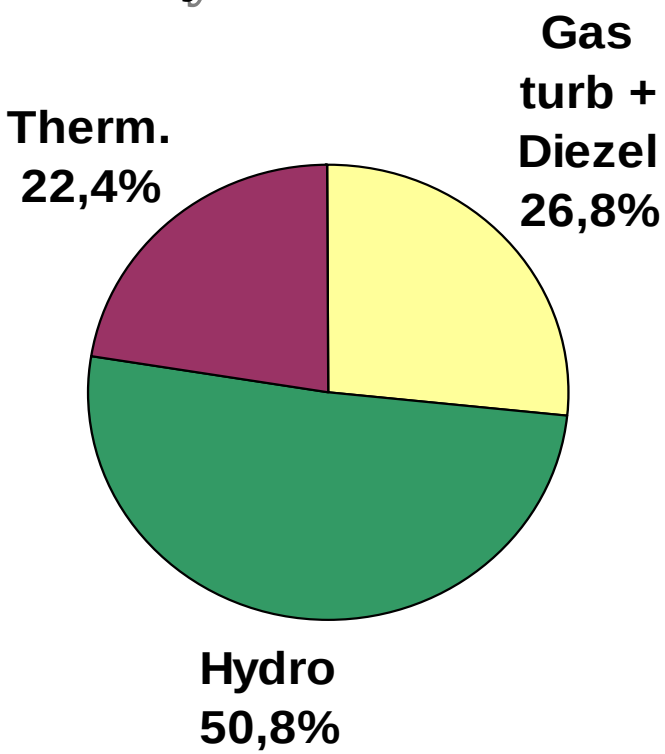


Map of 220kV – 500kV electricity grid

Figure 3. Electricity production structure by kinds of power plant in 2002 year

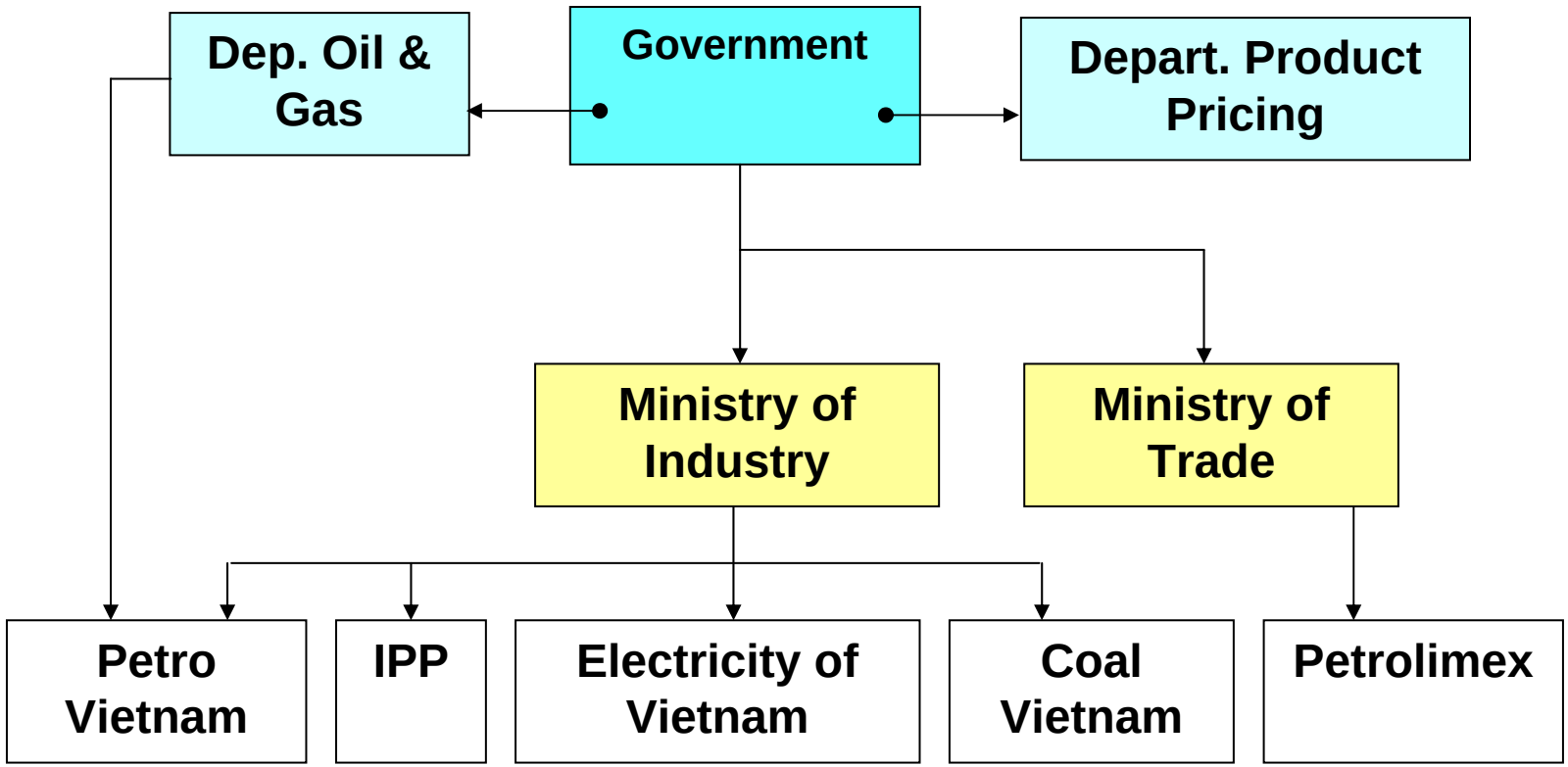


Structure by capacity



Structure by electrical energy

A.5. Schema - Existing Institutional system of energy sector



A.6. Conclusions of Vietnam energy system

- **Energy resources of Vietnam are diversified but are not fully explored;**
- **In the last 10 years, energy consumption increased fast, especially electricity, the energy system has been developed fast to meet the demand;**
- **Electrical system is developing with many supply sources, but no synchronous yet between the supply sources and transport grid so to make big losses and lack of securities;**
- **Energy technology and management are at still low level, so the energy saving and efficiency use need to be improved;**

  It creates a good opportunities for advanced technology transfer, including cogeneration;
- **Legal framework in sector has been reformed to meet development requirements.**

B. Scenarios of energy development in future

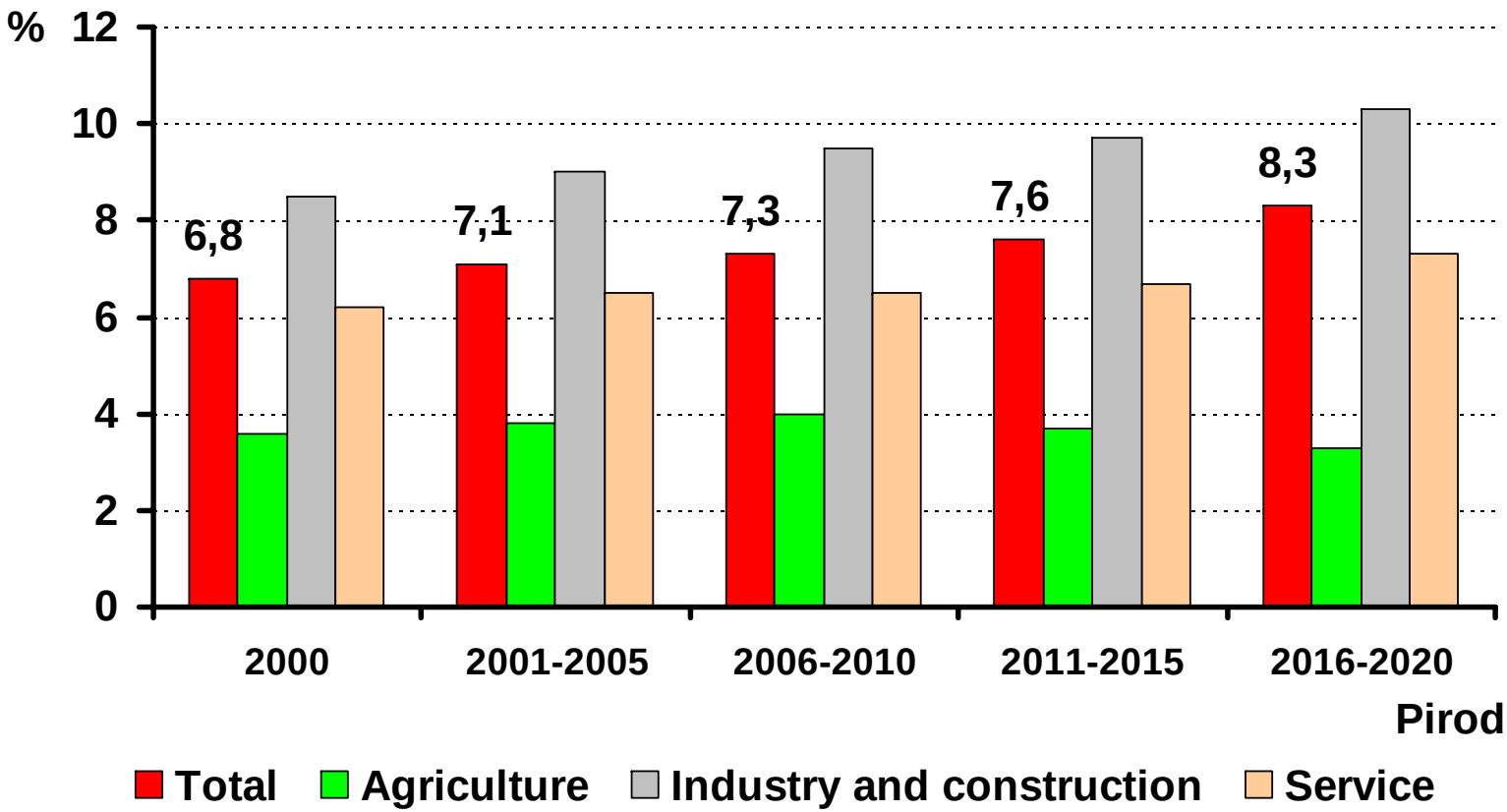
B.1. Population and GDP cap. forecasting

Year In duet	2000	2005	2010	2015	2020
POP (mill.per)	77.63	82.8	87.9	93.3	97.9
Growth rate of POP (%)	-	1.07	1.07	1.06	1.05
GDP cap (USD/ current price)	379	572	869	1296	2117

B.2. Basic Scenario - Growth rate in %

	2000	2001-2005	2006-2010	2011-2015	2016-2020
Total	6.8	7.1	7.3	7.6	8.3
- Agriculture	3.6	3.8	4.0	3.7	3.3
- Industry and construction	8.5	9.0	9.5	9.7	10.3
- Service	6.2	6.5	6.5	6.7	7.3

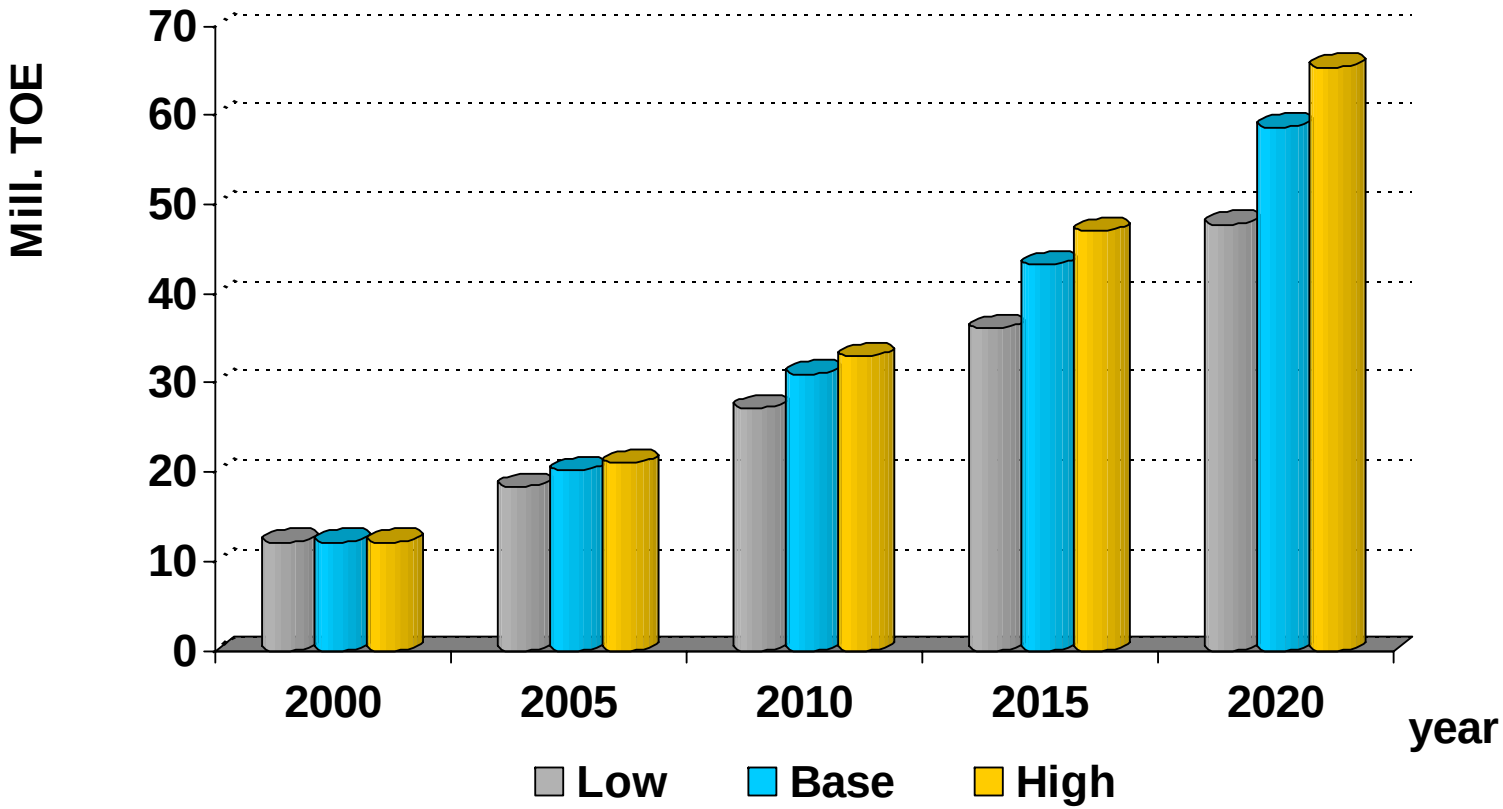
Figure 4. Economy growth rate (basic scenario)



B.3. Final commercial energy demand total of Vietnam to 2020 year in Mill.TOE

Year / Scenario	2000	2005	2010	2015	2020
Low	12.12	18.39	27.14	36.10	47.82
Base	12.12	20.20	31.04	43.24	58.69
High	12.12	21.0	33.0	47.0	65.4

Figure 5. Final commercial energy demand total of Vietnam to 2020 year in mill.TOE



B.4. Electricity production demand of Vietnam up to 2020 in TWh

	2000	2005	2010	2015	2020
Low	26.68	52.0	88.7	131.4	176.9
Base	26.68	53.0	93.0	142.8	201.3
High	26.68	55.0	99.0	157.8	222.0
Average cap. (Basic Scenario) kWh/cap.year	343	642	1060	1530	2058

b. Capacity total estimated of power plants in Vietnam

Year	2000	2005	2010	2015	2020
Total (GW)	**7.1**	**10**	**17**	**27.5**	**42**
a. EVN, %	**91.2**	**83.6**	**68.7**	**65.7**	**74.9**
In which:					
+ Hydro	60.0	48	53.0	52	40
+ Fired coal	8	14	16.0	12	24
+ Fired oil	5	4	3	2	1
+ Fired gas	27	34	28.0	34.0	23
+ Coal/nuclear/new energy	-	-	-	-	12
b. IPP+BOT+JV, %	**8.8**	**16.4**	**31.3**	**34.3**	**25.1**

c. Other capacities addition

- **Exchange electricity with next door countries such as China, Cambodia, Laos, etc;**
- **Using new and renewable energy: solar, wind, biogas, biomass, geothermal, etc;**
- **Prefeasibility study of nuclear power plant is been preparing;**
- **Implementing saving and efficiency energy use, using cogeneration;**
- **Searching new energy resources such as Coal in Red river delta, new oil wells, etc.**

Part II. Cogeneration situation in Vietnam

2.1. Introduction

The cogeneration is one of the most preferable energy systems in order to utilize the limited resources of valuable fossil fuels in the most efficient manner.

The cogeneration systems, therefore, have been utilized for a long time, especially in EU. However in the past, the cogeneration systems were used mainly in power plants with extraction steam turbines or backpressure steam turbines. Last decades due to technology progresses, energy technology with high quality and low price, especially to gas turbine is available. The combination of gas turbine and extraction condensing steam turbine is the most promising cogeneration system.

Cogeneration systems have been used since sixties of last century in Vietnam.

- **The Viet Tri power plant was built since 1960;**
- **The Van Dien sugar factory was equipped in 1960;**
- **The Bai Bang paper factory has build since 1980;**
- **The Cogido paper factory was built since 1959.**

2.2. Cogeneration potential

- Number of energy consumers with average daily electricity demand more than 500KW and average annual thermal demand more than 500TOE is presented in table 2.1.
- Sugar sector: There are about 40 big factories in Vietnam, power potential is sugar factories is about 150MW. In the near future it is expected to be bigger if the government plan of 2 millions sugar tons by coming some years.
- Paper factories are big consumers of power and heat, but up to now there is no cogeneration system installed, except the Cogido paper mill, but it was damaged.
- The textile sector uses also a lot of energy in the kinds of electricity, heat, cooling. Many factories have installed diesels. This situation can create an adequate condition to use cogeneration systems, but up to now there is only one cogeneration system installed with capacity of 150 MW.

2.2. Cogeneration potential (cont.)

- Chemical factories, especially rubber factories are big electricity and heat consumers with outdated technologies. There is still no factory practicing cogeneration.
- The food sector, especially due to tropical climate condition, consumes much power, thermal, cool. Technology renovations including the cogeneration are strongly recommended.
- In service sector, there are big power, thermal, cool consumers such as hotels, supermarkets, etc. They may be a cogeneration potential customers.
- Presently, a number of industrial zones are under planning stages (Haiphong, Quangninh, Dungquat, Camau, etc.). The new thermal power plants are planned to be built to supply electricity and heat for theses zones. Therefore, there is o good opportunity for cogeneration technology.

Table 2.1. Intensive energy consumers in industrial sector by subsector (servey data in 1997 year, now is more)

N^0	Subsector	Number of consumers with average daily power demand more than 500KW	Number of consumers with average annual thermal demand more than 500TOE
	All consumers	338	141
1	Electricity	-	-
2	Fuel production	6	-
3	Ferrous metallurgy	10	4
4	Non-ferrous metallurgy	4	4
5	Manufacture of machinery and equipment	24	8
6	Electric or electronic products	9	3
7	Other metal products	-	-

Table 2.1. Intensive energy consumers (cont.)

8	Chemical and products, fertilizers and rubber	24	18
9	Construction and materials	38	48
10	Wood and wood products	8	-
11	Paper and paper products	6	15
12	Glass, earth ware and porcelain	1	8
13	Food processing	9	-
14	Food stuff	34	17
15	Textile products	21	16
16	Serving products	1	-
17	Leather and leather products	4	-
18	Printing	1	-
19	Other industries	38	-

Table 2.2. Cogen existing capacity and cogen potential estimated by sectors in Vietnam - MW

	Existing	Potential to 2010
Sugar sector	125	20
Paper sector	35	200
Cement sector	2.5	20
Textile, fibre	150	300
Chemical	-	600
Other	-	15
Total	312.5	1160

2.3. Existing cogen systems in Vietnam

Table 2.3. Existing cogen systems

Name/status	Year in operation and zone	Total capacity (KW)	Technology	Status operating
1. Viet Tri power plan	1958 North	10.000	Coal fired boilers backpressure and extraction condensing	No
2. Cogido paper	1959 Dong Nai Pro.	9.100	Wastes and oil fired backpressure	No
3. Van Dien sugar	1960 Ha Tay Pro.	2.000	Boiler using bagasse & backpressure steam turbine	No
4. Ha Bac fertilize	1966 Bac Giang Pro	12000	Coal fired boilers and extraction steam turbine	Yes
5. Bai Bang paper	1980 Phu Tho Pro.	32.000	Wastes and coal fired boilers and extraction steam turbines	Yes
6. Ha Tien II cement	2000 Ha Tien Pro.	3.000	HRSG and steam turbine	Yes
7. CORA supermarket	1998 Dong Nai Pro.	1.500		Yes
8. 35 cogen systems in sugar sector	1992 - now	125.000	Boilers using bagasse and steam turbines	Yes

2.4. Remark on Cogen situation

- Cogeneration technology was introduced into Vietnam early, but has been developed very slowly, due to the out of dated technology, lack of manpower and finance;
- Due to technology progress, cogeneration technology attracts the business circle and the interest in cogeneration investment is increasing. But there are still only few projects realized. There is a need to improve the awareness and to develop manpower;
- Cogen potential in Vietnam industries is relatively large. There a need of adequate strategy and roadmap for realization of that potential.

2.5. Cogeneration barriers in Vietnam

1. Lack of policy guidelines to promote cogeneration;
2. Market barriers
   - Electricity market is not formated yet ;
   - Electricity selling price of cogen systems is slow because of unfair competition rules.
3. Lack of financial resources for developing cogeneration;
4. Lack of local technology and technology transfer from developed countries;
5. Lack of local equipment suppliers.

Part III. Software infrastructure to guarantee energy development

Vietnam is process of opening its policies for economical development, so have to build development programmers, mend and make new laws, reform institutions and administration, etc.

3.1. Legal framework

- **Master plan of power development in period of 2001-2010 and toward 2020 was approved by the Government in 2002 year.**
- **Development strategy of power sector in stage of 2001-2010 and toward 2020 was approved by the Government in October 2004.**

3.1. Legal framework (cont.)

- **Draft of National energy development policy is preparing.**
- **Draft of Electricity law is submitting the Government in 2003 and may be ratified by National Assemble in 2004 year.**
- **Added and mended petroleum law, foreign investment law, etc.**
- **The Government decision on saving and efficiency energy use is issued in September 2003.**

Draft of National Policy of sustainable energy development for period of 2001-2020

- Policy for management of energy resources in order to meet socio-economic development objectives;
- Policy for energy conversation and efficiency;
  - There is a point of promoting to use cogen technology.
- Energy price policy;
- Energy development investment policy;
- Rural energy policy;
- Policy for energy technology development;
  - There is a point of cogen technology transfer.
- Policy for environment protection in energy activities.

3.2. Institutional structure

- **Considered and issued government decisions on functions, duties and institutional structure of almost government agencies in 2003 year.**
- **Make clear responsibilities of state management and business in local, central government agencies.**
- **Reforming step by step for electricity subsector toward market economy.**

3.3. Manpower development

- It is an important to guarantee achievements.
- In many technical Institutes there are faculties related to electricity specialization.
- Professional school of EVN was improved to become electricity college.
- A lot of training and retraining programmes are frequently implemented.
- Laboratories being poorly equipped are being improved in professional schools, colleges, research institutes.

Thank you !

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