

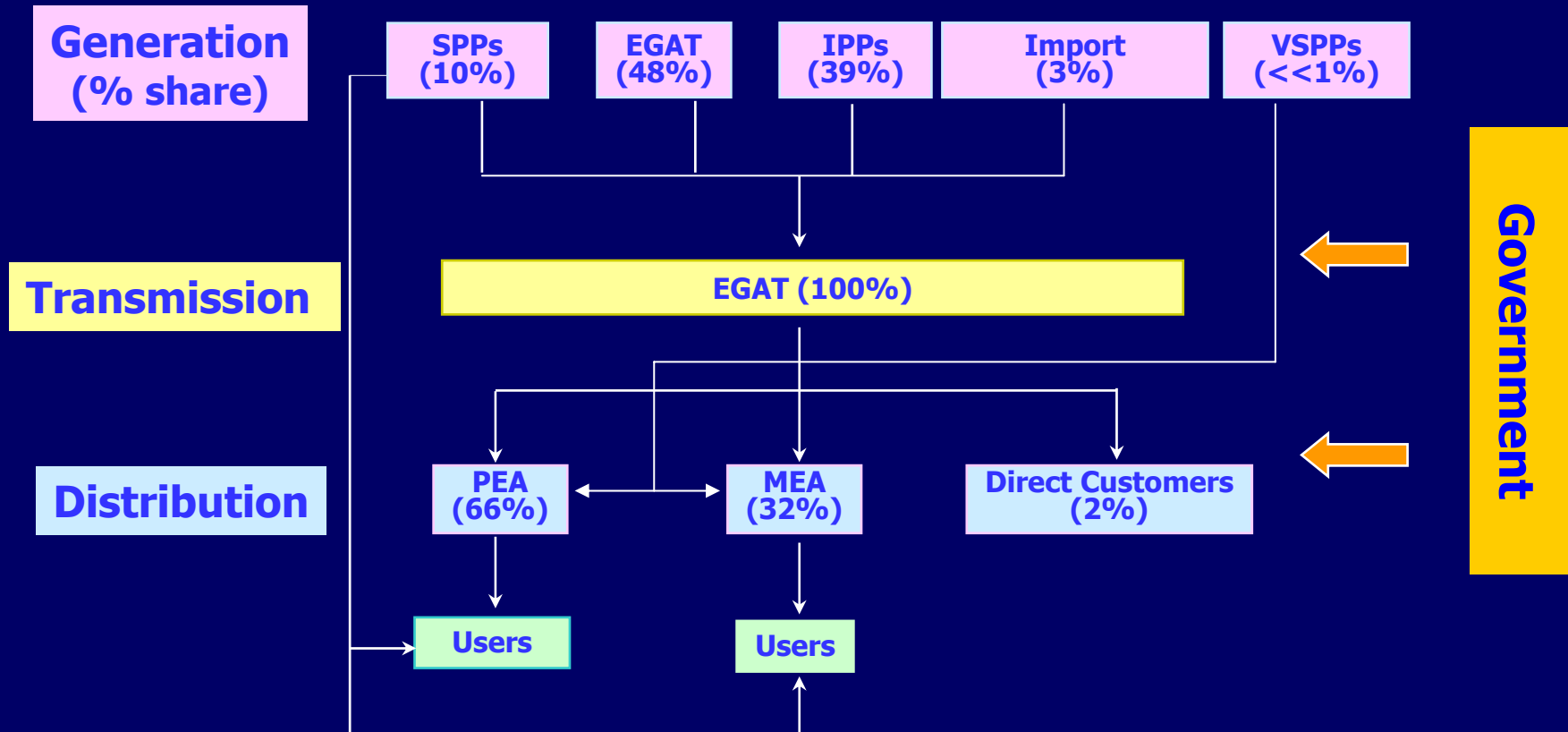


Renewable Energy Policy: Recent Policies regarding SPP / VSPP

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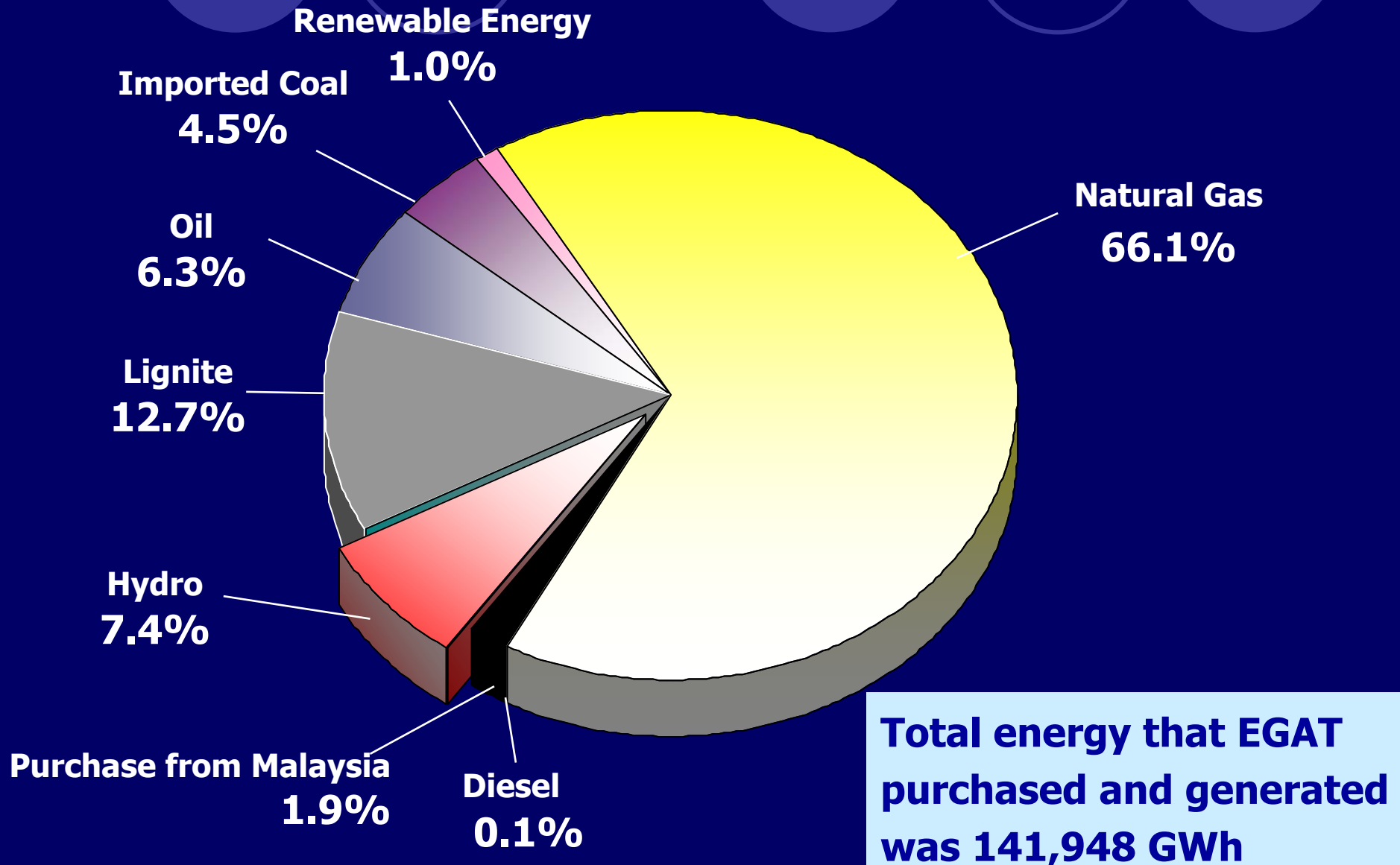
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The Current Electricity Supply Industry Structure



Remarks: Figure of % Share in Fiscal Year 2006

Share of Power Generation by Fuel Type (2006)



Target of Power Generation Using Renewable Energy in 2011

Energy Type	Current Renewable Energy Generation (MW)	Target of Renewable Energy Generation (MW)	Amount of Increased Capacity (MW)
Biomass	1,977	2,800	823
Municipal Solid Waste	4	100	96
Biogas	5	30	25
Hydro	44	156	112
Wind	1	115	114
Solar	30	45	15
Total	2,061	3,246	1,185

Promotion of Power Generation Using Renewable Energy

- 1992 :** EGAT issued Requests for Proposals from SPPs
- 2001 :** Introduction of the additional tariff for SPPs using RE as fuel via competitive bidding
- 2002 :** MEA and PEA issued Requests for Proposals for power purchase from VSPPs ≤ 1 MW
- 2006 :** MEA and PEA issued Requests for Proposals for power purchase from VSPPs ≤ 10 MW
- 2007:** MEA and PEA announced the fixed rate "Adders," categorized by RE technologies, provided in addition to the purchasing rate under the Regulations for Power Purchase from VSPPs



Power Purchase from SPPs

Power Purchase from SPPs (1)

- 17 March 1992: The Cabinet approved the Regulations for Power Purchase from SPPs
- *Objectives:*
 - To allow EGAT to purchase power from SPPs using Renewable Energy as fuel and Co-generation, with following requirements:
 - Steam utilization $\geq 10\%$
 - Power generation efficiency $\geq 45\%$
 - To promote greater use of non-conventional and by-product energy in the country
 - To promote more efficiency in power generation
 - To reduce the Government's burden of investment in the generation and distribution systems

Power Purchase from SPPs (2)

- In 1997, the Government terminated power purchase from SPPs using commercial energy as fuel due to the 1997 economic crisis, which had caused:
 - Lower Power Demand
 - Excessive Reserve Margin
- For power generation using RE, which is beneficial to the country, on 11 Aug 1997 the Cabinet approved:
 - Power purchase from SPPs using non-conventional energy, waste and residues as fuel and from Non-Firm SPPs
 - No limit of the purchase time frame and quantity
 - Subject to the capacity of the transmission and distribution systems to be connected

Regulations for the Purchase of Power from SPPs

- Co-generation & Renewable:
 - Co-generation: Efficiency $\geq 45\%$ and steam $\geq 10\%$
 - Renewable: may use up to 25% of commercial energy
- SPPs are allowed to sell excess power to direct customers in their respective vicinities.
- Each sale into the transmission system ≤ 60 MW (90 MW on a case by case basis).

SPP Tariffs

- Based on EGAT's Avoided Cost
 - Firm Contract – Long Run Avoided Cost
 - Non-Firm Contract
 - No Capacity Payment
 - Terms of Contract \leq 5 years
 - Contracted Capacity Not Specified
- Power purchasing rates for SPPs using RE as fuel will be based on the price of natural gas.

Status of Power Purchase from SPPs (as of December 2006)

	Firm	Non-Firm	Total
1. Already Submitted Proposals			
1.1 Number of Projects	86	89	175
1.2 Generating Capacity (MW)	8,281.01	1,701.46	9,982.47
1.3 Proposed sale to EGAT (MW)	4,843.30	700.10	5,543.40
2. Received Notification of Acceptance			
2.1 Number of Projects	46	73	119
2.2 Generating Capacity (MW)	3,846.11	1,435.55	5,281.66
2.3 Proposed sale to EGAT (MW)	2,243.60	577.52	2,821.12
2.4 Number of Projects categorized by Fuel Type			
• Natural Gas	20	3	23
• Coal	5	2	7
• Oil	1	-	1
• Waste Gas from Manufacturing Process	-	3	3
• Biomass	20	64	84
• Municipal Solid Waste	-	1	1
3. Signed Contracts			
3.1 Number of Projects	44	54	98
3.2 Generating Capacity (MW)	3,663.11	968.05	4,631.16
3.3 Proposed sale to EGAT (MW)	2,150.60	402.52	2,553.12
4. Currently Supplying Power to the Grid			
4.1 Number of Projects	39	43	82
4.2 Generating Capacity (MW)	3,327.41	880.74	4,208.15
4.3 Proposed sale to EGAT (MW)	2,062.30	321.30	2,383.60

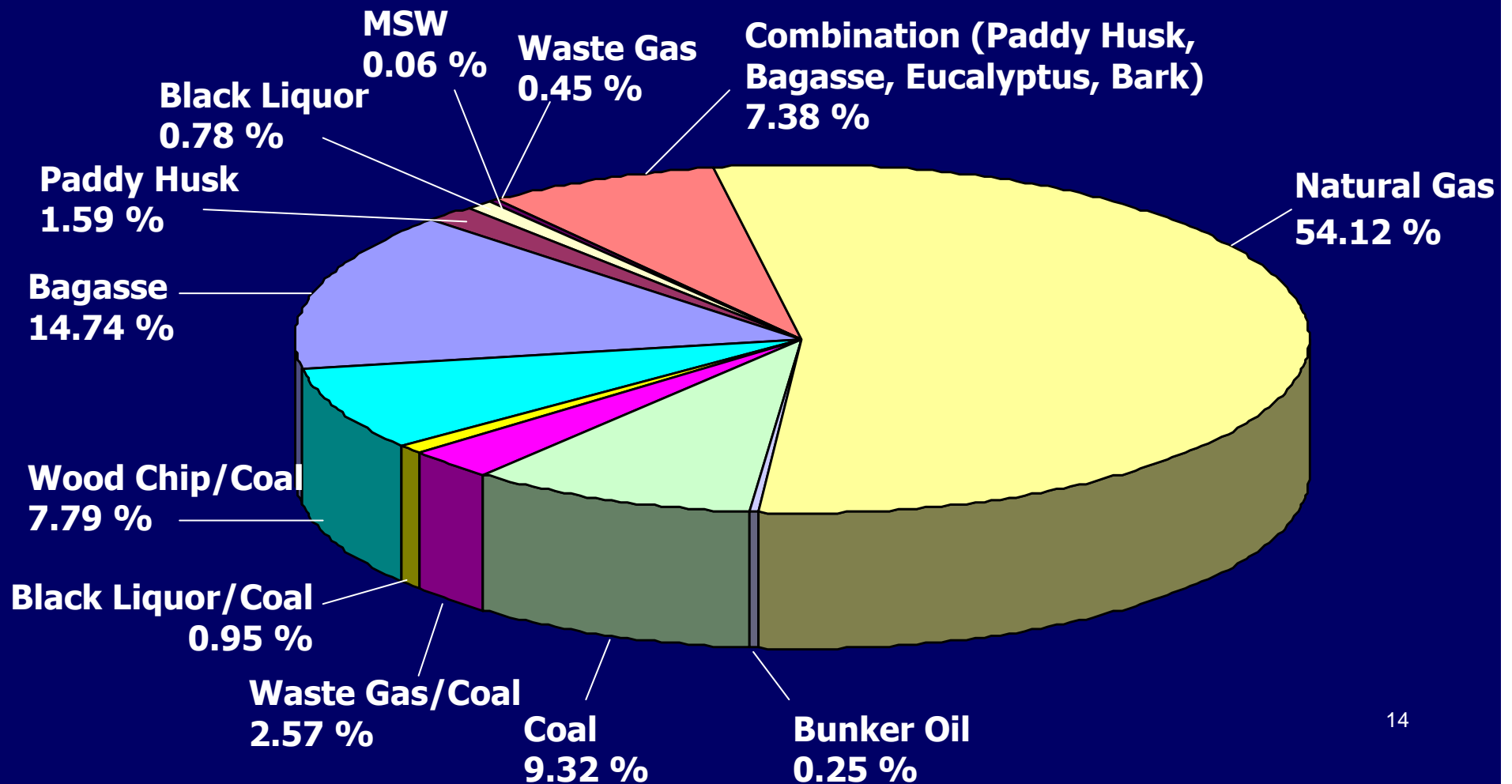
Share of SPP Supply by Fuel Type (as of December 2006)

Energy Type	Number of Projects	Installed Cap. (MW)	Proposed Sale Cap. (MW)
Non-Conventional			
- Bagasse	31	620.40	193.80
- Paddy Husk	7	66.70	51.60
- Black Liquor	1	32.90	25.00
- MSW	1	2.50	1.00
- Waste Gas	1	19.00	6.00
- Combination (Bagasse, Paddy Huak, Eucalyptus Bark, Wood Chip)	<u>11</u>	<u>310.40</u>	<u>202.5</u>
Total	52	1,051.90	479.9
Commercial Fuel			
- Natural Gas	21	2,277.61	1,464.20
- Fuel Oil	1	10.40	9.00
- Coal	<u>4</u>	<u>392.20</u>	<u>196.00</u>
Total	26	2,680.21	1,670.20
Combination			
- Waste Gas/Coal	1	108.00	45.00
- Black Liquor/Coal	1	40.00	8.00
- Eucalyptus Bark/Coal	<u>2</u>	<u>328.00</u>	<u>180.00</u>
Total	4	476.00	233.00
Grand Total	82	4,208.11	2,383.10

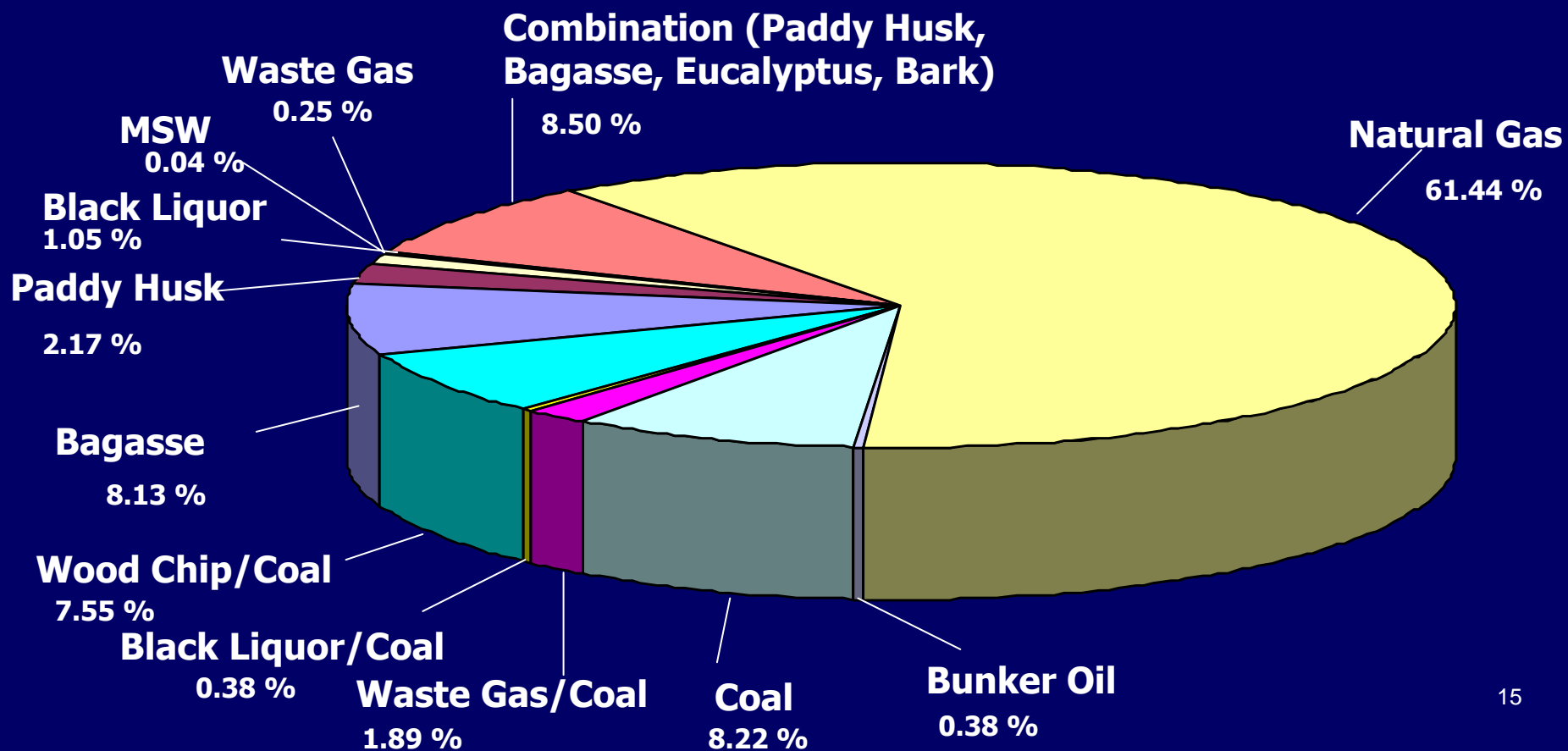
Status of Power Purchase from SPPs Using Renewable Energy as Fuel (as of December 2006)

	SPP (Already Received Notification of Acceptance)			SPP (Supplying Power to the Grid)		
	Number of Projects	Installed Cap. (MW)	Proposed Cap. (MW)	Number of Projects	Installed Cap. (MW)	Proposed Cap. (MW)
Bagasse	33	646.40	202.80	31	620.40	193.80
Paddy Husk	19	172.20	125.60	7	66.70	51.60
Paddy Husk & Wood Chip	3	67.70	498.00	2	57.80	49.00
Black Liquor	1	32.90	25.00	1	32.90	25.00
Municipal Waste Solid	1	2.50	1.00	1	2.50	1.00
Waste Gas	1	19.00	12.00	1	19.00	6.00
Bagasse, Wood Chip, Wood Chip	4	119.40	68.20	3	114.90	64.00
Palm Residues, Emptied Palm Bunches, Cassava Rhizome	5	46.30	34.60	1	12.00	8.00
Paddy Husk, Bagasse, Eucalyptus Bark	4	32.60	24.30	1	3.00	1.80
Bark, Wood Chip, Black Liquor	1	87.20	50.00	1	87.20	50.00
Rubber Chip	3	30.80	27.20	1	23.00	20.20
Bagasse, Paddy Husk , others Biomass	8	246.10	150.80	2	12.50	9.50
Natural Gas (by-product from Crude Oil Process)	1	1.95	1.72	-	-	-
Corn cob, Cassava Rhizome, Paddy Husk	3	19.50	17.70	-	-	-
Total	87	1,524.55	1,238.92	52	1,051.90	479.90

Installed Capacity of SPPs Currently Supplying Power to the Grid by Fuel Type (as of December 2006)



Proposed Sale Capacity of SPPs by Fuel Type (as of December 2006)



Increase of Power Purchase from SPPs

- **26 December 2006, NEPC resolution:**
 - Allow EGAT to purchase power from SPPs using all fuel types and increase the purchase capacity from 3,200 MW to 4,000 MW
- **EPPO is currently revising the Regulations for Power Purchase from SPPs**
 - Co-generation: to revise tariffs and conditions of efficiency (PES: Primary Energy Saving)
 - Renewable Energy: to prepare the “Adder Bidding” solicitation
- **Next step**, EPPO will propose to CEPA for approval the revised regulations prior to the official announcement.

Remarks:

NEPC = National Energy Policy Council

CEPA = Committee on Energy Policy Administration

Promotion of SPP Generation

Targeted Capacity = 4,000 MW
Already Supplied to the Grid = 2,400 MW
Remainder: 1,600 MW

Cogeneration
(>10MW - <= 90 MW)

1,250 MW

Supportive Measures

- Natural Gas-Fired Projects
- Coal-Fired Projects

Renewable
(>10 MW)

350 MW

Supportive Measure

- Adder Bidding



Power Purchase from VSPPs

Promotion of VSPPs

2002 : PEA and MEA issued Requests for Proposals for power purchase from VSPPs \leq 1 MW

2006 : PEA and MEA issued Requests for Proposals for power purchase from VSPPs \leq 10 MW

2007 : MEA and PEA announced the fixed rate adders, categorized by renewable energy technologies, to be provided in addition to the purchasing price under the VSPP Regulations

Power Purchase from VSPPs

Types of Fuel:

❖ Renewable Energy Sources:

- Wind, Photovoltaics, Mini/Micro Hydro, Sea/Ocean Waves, Geothermal Energy, Bigogas

❖ Fuels:

- Agricultural waste or residues, or residues from agricultural or industrial production processes
- Products converted from agricultural waste or residues, or residues from agricultural or industrial production processes
- Municipal Solid Waste
- Dendrothermal (Wood from fuel tree plantation)

❖ Production Process:

- Waste energy such as waste steam
- Loss energy such as heat from the engine exhaust
- By-product energy such as mechanical energy from the reduction of NG pressure

Power Purchase from VSPPs (≤ 1 MW)

- ❖ **2002** : PEA and MEA announced power purchase from VSPPs ≤ 1 MW (Capacity supplied to the grid ≤ 1 MW).
- ❖ **VSPPs must be power consumers of PEA/MEA.**
- ❖ **Objectives:**
 - ❑ To promote power generation using non-conventional energy
 - ❑ To promote efficient use of domestic energy sources
 - ❑ To reduce power generation using import/commercial fuels
 - ❑ To decrease the environmental impact
 - ❑ To distribute power generation to rural areas and encourage public participation in the power generation
- ❖ **Tariff Calculation**
 - ❑ **Tariff:** The principle of "Avoided Cost of PEA and MEA" is applied.
 - ❑ **Energy Calculation:** "Net Energy" method is applied.

VSPPs ≤ 1 MW Having Received Notification of Acceptance (as of December 2006)

Fuel Type	MEA		PEA		Total	
	No. of Projects	Max. Capacity to supply to the Grid (kW)	No. of Projects	Max. Capacity to supply to the Grid (kW)	No. of Projects	Max. Capacity to supply to the Grid (kW)
1. Solar	44	6.50	22	59.80	66	66.30
2. Wood Chip	-	-	1	400.00	1	400.00
3. Paddy Husk	-	-	5	3,235.00	5	3,235.00
4. Emptied Palm Bunches	-	-	3	3,000.00	3	3,000.00
5. Rice Straw	-	-	6	1,030.00	6	1,030.00
6. Biogas	1	950.00	15	8,180.00	16	9,130.00
Total	45	956.50	52	15,904.80	97	16,861.30

VSPPs ≤ 1 MW Currently Supplying Power to the Grid (as of December 2006)

VSPP	Max. Capacity (kW)	Fuel Type
MEA Areas		
1. Charoensompong Co., Ltd.	950	Biogas
2. Celenium (Thailand) Co., Ltd.	1.50	Solar
3. Residential : 1 Unit	5.00	Solar
Total of MEA	956.50	
PEA Areas		
1. Energy Conservation & Environment Co., Ltd.	1,000	Paddy Husk
2. Pijit Serm Thai Rice Mill Co., Ltd.	1,000	Paddy Husk
3. Thanyakit Nakornpathom (1978)	500	Paddy Husk
4. Natural Palm Oil Co., Ltd. (Suratthani)	1,000	Palm Shell
5. Natural Palm Oil Co., Ltd. (Chumporn)	1,000	Palm Shell
6. A.S.T. Palm Oil Co., Ltd.	1,000	Palm Shell
7. Asian Palm Oil Co., Ltd.	1,000	Biogas
8. S.M.P. Animal Food Co., Ltd.	150	Biogas
9. Landfill Power Generation/Bio-fertilizer Project (Rayong)	600	Biogas
10. Tachana Palm Oil Co., Ltd.	590	Biogas
11. Kitrungrueng Flour Mill Partnership Ltd.	1,000	Biogas
12-16 Residential : 5 Units	1,080	Biogas
17. Residential : 1 Unit	150	Rice Straw
18. Ou Power Plant Partnership Ltd.	482	Rice Straw
19. Nong Bua Co-generation Co., Ltd.	500	Biogas
Total of PEA	11,052.00	
Grand Total	12,008.50	

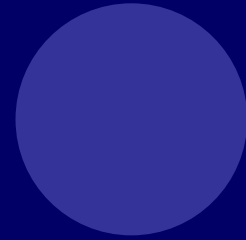
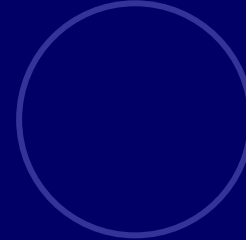
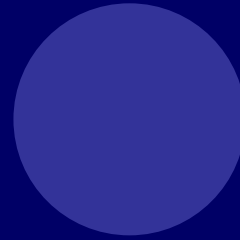
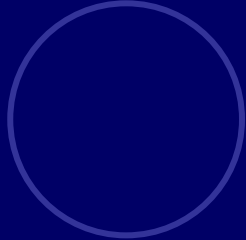
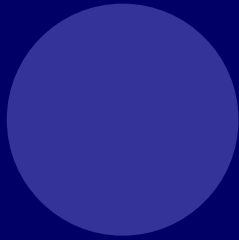
Power Purchase from VSPPs (≤ 10 MW)

- **4 September 2006:** NEPC approved the increase of capacity purchase from VSPPs up to ≤ 10 MW (formerly up to ≤ 1 MW) under 2 separated regulations:
 - For generation using Renewable Energy
 - For generation using Co-generation
- Remaining electricity from any production process or on-site consumption can be sold to the PEA/MEA grids ≤ 10 MW under the Regulations for Power Purchase from VSPPs.

Promotion of Power Generation Using Renewable Energy

Principles of “Additional Tariff (Adder)” Determination:

- To be an incentive for power producers using high-cost RE to increase their participation in power generation
- Consideration given to power generating costs
- Consideration given to power consumers' tariff burden
- The amount of Adders to be passed through via the Ft formula



“Adder”

Adder Rates for VSPPs

6 December 2006: The NEPC approved the Adder Rates for VSPPs ≤ 10 MW that are interested to supply power to the grid under the Regulations for Power Purchase from VSPPs. The adders will be provided for 7 years.

Fuel/Technology	Adder (Baht/kWh)
Biomass, Biogas	0.30
Mini Hydro (50-200 kW)	0.40
Micro Hydro (< 50 kW)	0.80
MSW	2.50
Wind	2.50
Solar	8.00

Remarks: PEA announcement issued on 1 Feb 07
MEA announcement issued on 2 Feb 07

Adder Rates for SPPs

- EPPO is currently preparing the Request for Proposals for the Adder Bidding for SPPs
- Expected Capacity under this scheme: 350 MW

Fuel Type	Maximum Adder (Baht/kWh)	Expected Capacity (MW)
MSW	2.50	50
Others	0.30	300
Total		350

Promotion of VSPP Generation

VSPP

Cogeneration
(≤ 10 MW)

Condition

- PES ≥ 10 %

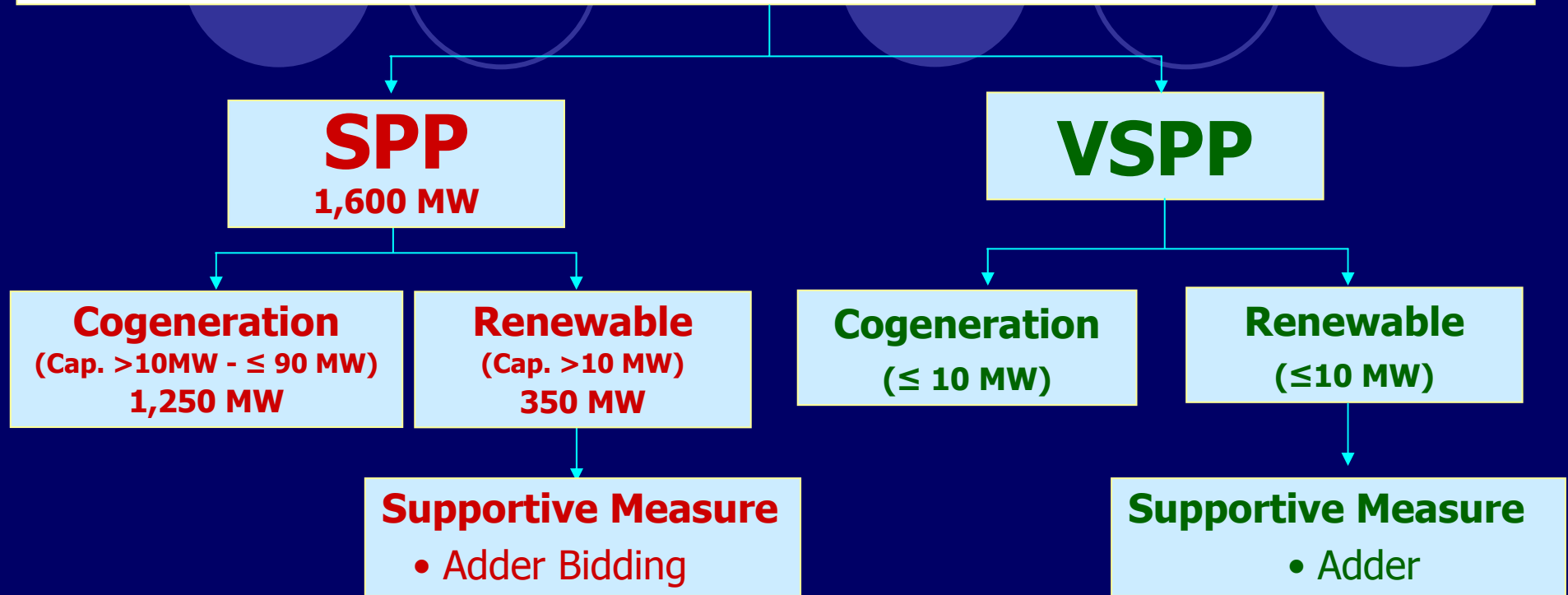
Renewable
(≤ 10 MW)

Supportive Measure

- Adder

Fuel Type	Adder (Baht/kWh)
Biomass	0.30
Biogas	0.30
Mini Hydro (50-200 kW)	0.40
Micro Hydro (< 50 kW)	0.80
MSW	2.50
Wind	2.50
Solar	8.00

Promotion of SPP/VSPP Generation



Fuel Type	Max. Adder (Baht/kWh)	Expected Cap. (MW)
MSW	2.50	50
Others	0.30	300
Total		350

Fuel Type	Adder (Baht/kWh)
Biomass	0.30
Biogas	0.30
Mini Hydro (50-200 kW)	0.40
Micro Hydro (< 50 kW)	0.80
MSW	2.50
Wind	2.50
Solar	8.00

