Sustainable Energy Vision for Lithuania

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2007 January 26, Riga

NEW IGNALINA – BENEFITS AND DANGERS

Topic of the subject:

- New nuclear NPP was pushed politically by “bulldozer principle”;
- Alternatives were not provided;
- Issue was not discussed among society (Finish experience);
- Since the beginning project looks like speculative and not transparent;

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Nuclear energy

- Dangerous (Chernobyl, Three Mile Island, Fukushima, Monju, Tokaimura);
- No major changes introduced into safety systems of III and III+ reactors generation;
- Radioactive waste problem;
- Expensive and not competitive;
- Heavily subsidized;
- Not solves climate change problems;
- Not contributes to mitigation of social issues;
- Blocking development of alternatives;
- Resources of uranium limited;

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Cases from last nuclear projects in Europe

- Olkiluoto 3, Finland:
  - Rough EPR design;
  - Low contract price (2 mill. EUR/MW);
  - Scandals on construction quality;
  - Hidden state subsidies;
  - Investigation at EC;
- K2/R4;
- Temelin;
- Mochovce;
- Kalinin;
- Belene;

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Renewable energy

- Most modern technologies;
- Stimulating business;
- Increasing occupation in agriculture;
- Generating jobs;
- Decentralized power generation;
- Local energy resources;
- Cheap (no or low fuel price);

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Energy efficiency

- Energy intensity two times higher then in EU-15;
- Possible to cover ~ 30% from total energy demand;
- “Factor Four”;

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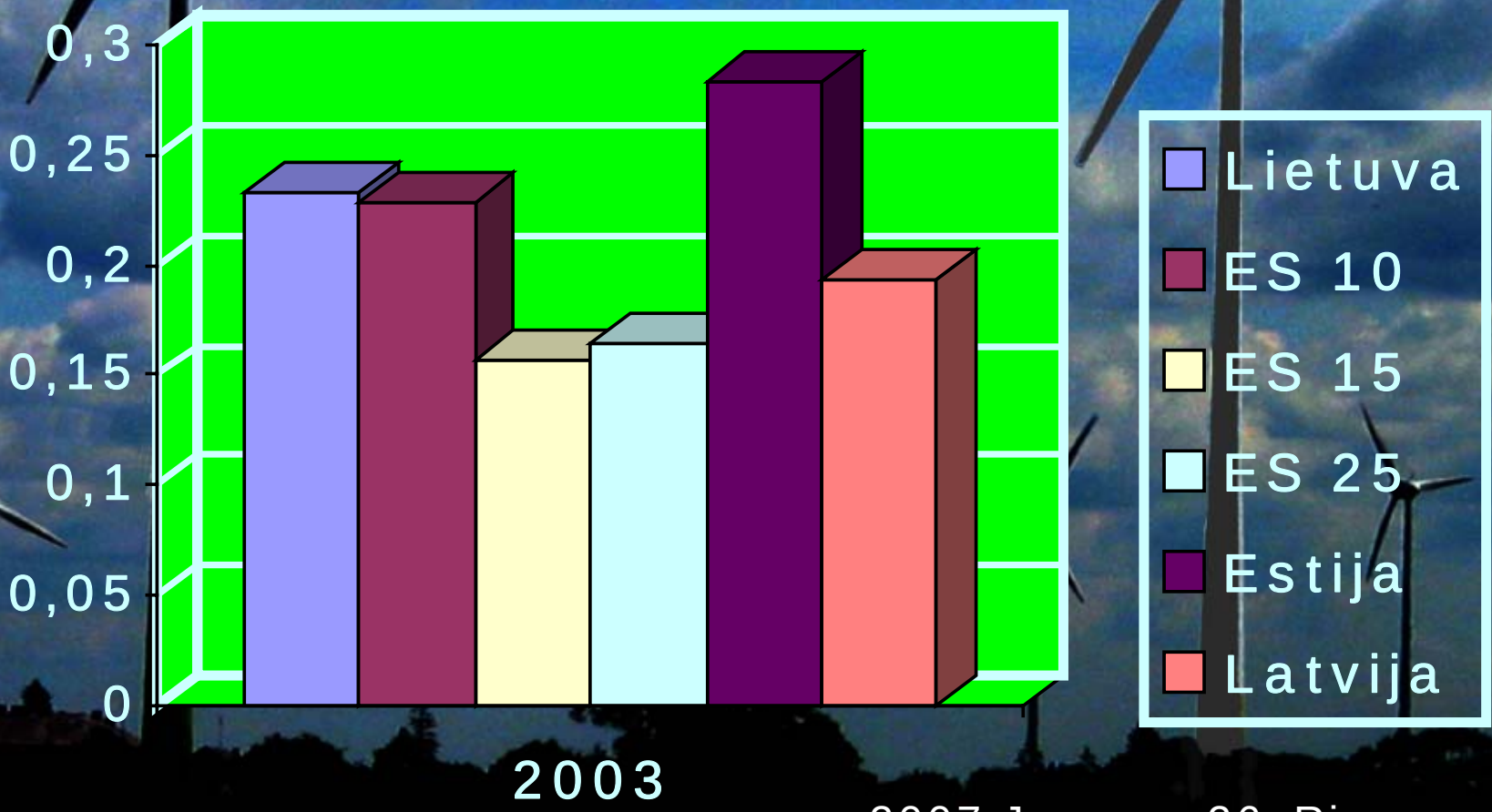
Primary energy/GDP, tne/10^3 USD(95)



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Aim of the Vision

- To demonstrate alternatives to dangerous and dirty nuclear;
- Sustainable energy development scenario is possible;
- Best way to ensure security of energy supply – use of local resources;

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Methodology used

- MS Exel based mathematical model;
- For checking was used software developed by Alborg university to evaluate hourly energy balances;
- Data for calculations was taken from existing scientific studies;
- Assumptions on future development trends was done on analysis of Governmental program's;

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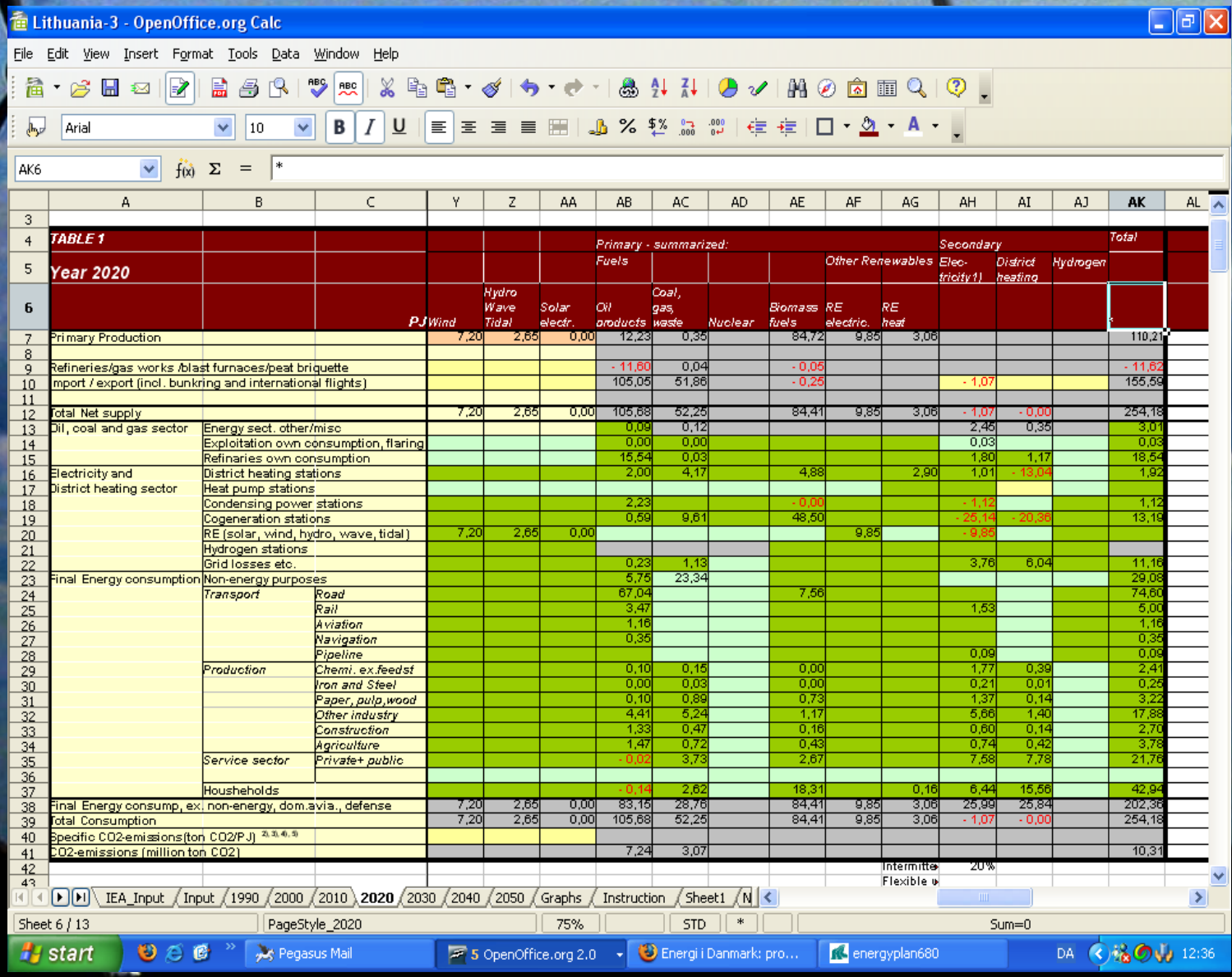

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	A	B	C	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
3																	
4	TABLE 1						Primary - summarized:						Secondary			Total	
5	Year 2020						Fuels				Other Renewables		Elec-tricity1)	District heating	Hydrogen		
6			PJ	Wind	Hydro Wave Tidal	Solar electr.	Oil products	Coal, gas, waste	Nuclear	Biomass fuels	RE electric.	RE heat					
7	Primary Production			7,20	2,65	0,00	12,23	0,35		84,72	9,85	3,06				110,21	
8																	
9	Refineries/gas works /blast furnaces/peat briquette						- 11,60	0,04		- 0,05						- 11,62	
10	Import / export (incl. bunkring and international flights)						105,05	51,86		- 0,25			- 1,07			155,59	
11																	
12	Total Net supply			7,20	2,65	0,00	105,68	52,25		84,41	9,85	3,06	- 1,07	- 0,00		254,18	
13	Oil, coal and gas sector	Energy sect. other/misc					0,09	0,12					2,45	0,35		3,01	
14		Exploitation own consumption, flaring					0,00	0,00					0,03			0,03	
15		Refinaries own consumption					15,54	0,03					1,80	1,17		18,54	
16	Electricity and	District heating stations					2,00	4,17		4,88		2,90	1,01	- 13,04		1,92	
17	District heating sector	Heat pump stations															
18		Condensing power stations					2,23			- 0,00			- 1,12			1,12	
19		Cogeneration stations					0,59	9,61		48,50			- 25,14	- 20,36		13,19	
20		RE (solar, wind, hydro, wave, tidal)		7,20	2,65	0,00					9,85		- 9,85				
21		Hydrogen stations															
22		Grid losses etc.					0,23	1,13					3,76	6,04		11,16	
23	Final Energy consumption	Non-energy purposes					5,75	23,34								29,08	
24		Transport	Road				67,04			7,56						74,60	
25			Rail				3,47						1,53			5,00	
26			Aviation				1,16									1,16	
27			Navigation				0,35									0,35	
28			Pipeline										0,09			0,09	
29		Production	Chemi. ex.feedst				0,10	0,15		0,00			1,77	0,39		2,41	
30			Iron and Steel				0,00	0,03		0,00			0,21	0,01		0,25	
31			Paper, pulp,wood				0,10	0,89		0,73			1,37	0,14		3,22	
32			Other industry				4,41	5,24		1,17			5,66	1,40		17,88	
33			Construction				1,33	0,47		0,16			0,60	0,14		2,70	
34			Agriculture				1,47	0,72		0,43			0,74	0,42		3,78	
35		Service sector	Private+ public				- 0,02	3,73		2,67			7,58	7,78		21,76	
36																	
37		Housheholds					- 0,14	2,62		18,31		0,16	6,44	15,56		42,94	
38	Final Energy consump, ex. non-energy, dom.avia., defense			7,20	2,65	0,00	83,15	28,76		84,41	9,85	3,06	25,99	25,84		202,36	
39	Total Consumption			7,20	2,65	0,00	105,68	52,25		84,41	9,85	3,06	- 1,07	- 0,00		254,18	
40	Specific CO2-emissions(ton CO2/PJ) [2),3),4),5)]																
41	CO2-emissions (million ton CO2)						7,24	3,07								10,31	
42												Intermitte	20%				
43												Flexible					

IEA_Input | Input | 1990 | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 | Graphs | Instruction | Sheet1 | N

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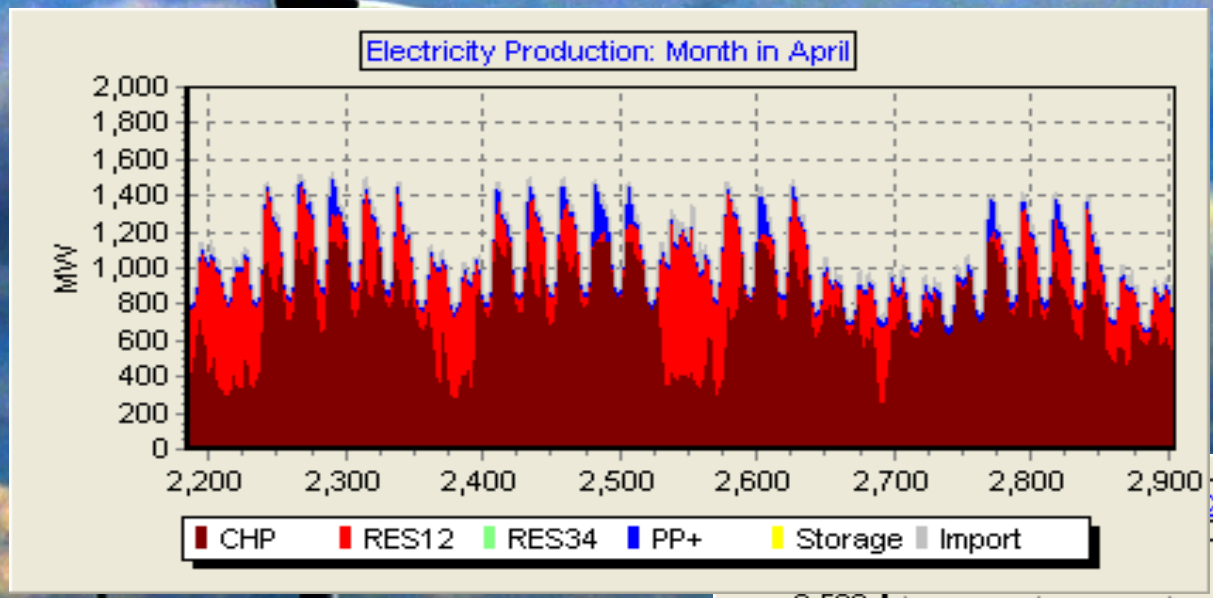
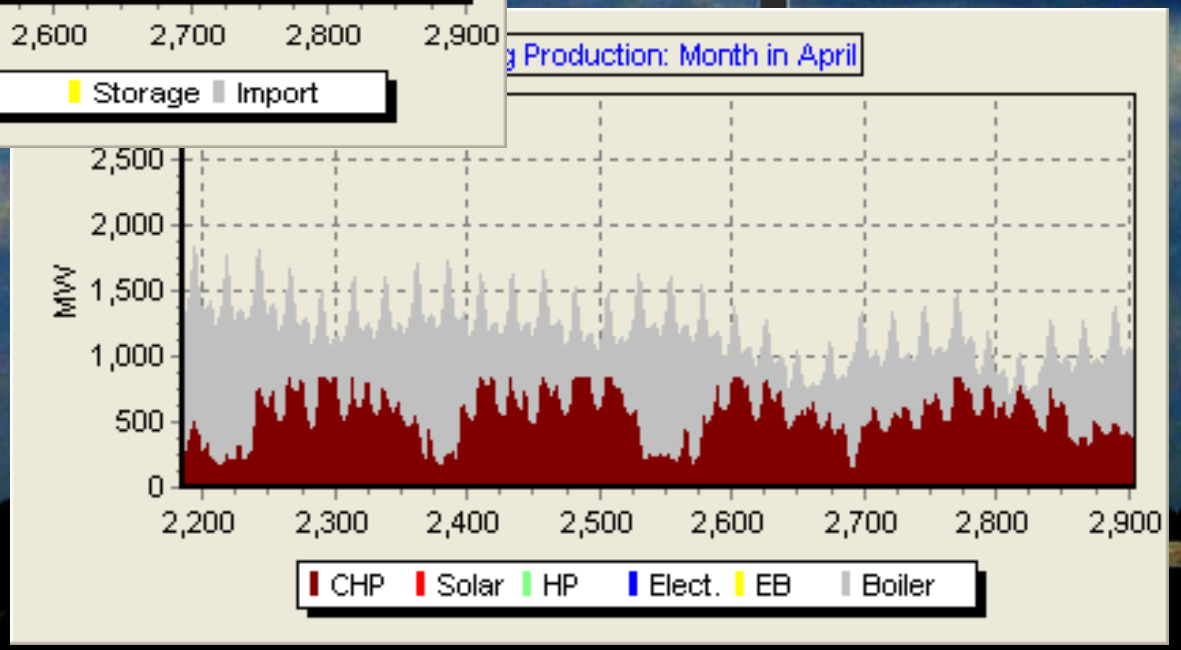
Evaluation of hourly energy balances





Elements of investigation

- Energy efficiency increase ;
- Heat savings in buildings;
- Effective transportation;
- Grow in energy services;
- Development of renewable energy sources;
- Decrease in usage of fossil fuels and nuclear;
- Usage of modern energy forms (Hydrogen engines, Heat pumps, etc.)

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Renewable energy resources in Lithuania

- Significant potential of biomass:
  - Energy forest 2200 Km^2 = 7 % from arable land;
  - Agricultural residues (straw);
  - Residues from forestry and saw-mills;
- Wind power potential 1000 MW + off shore:
  - till 2010 – 200 MW;
  - till 2020 – 800 MW;
  - till 2050 - < 1000 MW including off shore and connection with Sweden;

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- Huge theoretical geothermal potential, however was not seriously taken into account due to number of uncertainties;
- Is foreseen to use only 37 km^2 of roof covers for solar collectors since 2010);
  - 400 kWh/year for hot water;
  - 100 kWh/year PV;

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- In 2000 was produced 1,2 PJ (0,34 TWh) of electricity by hydro power;
- Potential on small rivers is 1,5 PJ (0,4 TWh);
- Potential on big rivers is 3 PJ;
- In the Vision is taken 2,7 PJ (existing and small rivers potential);

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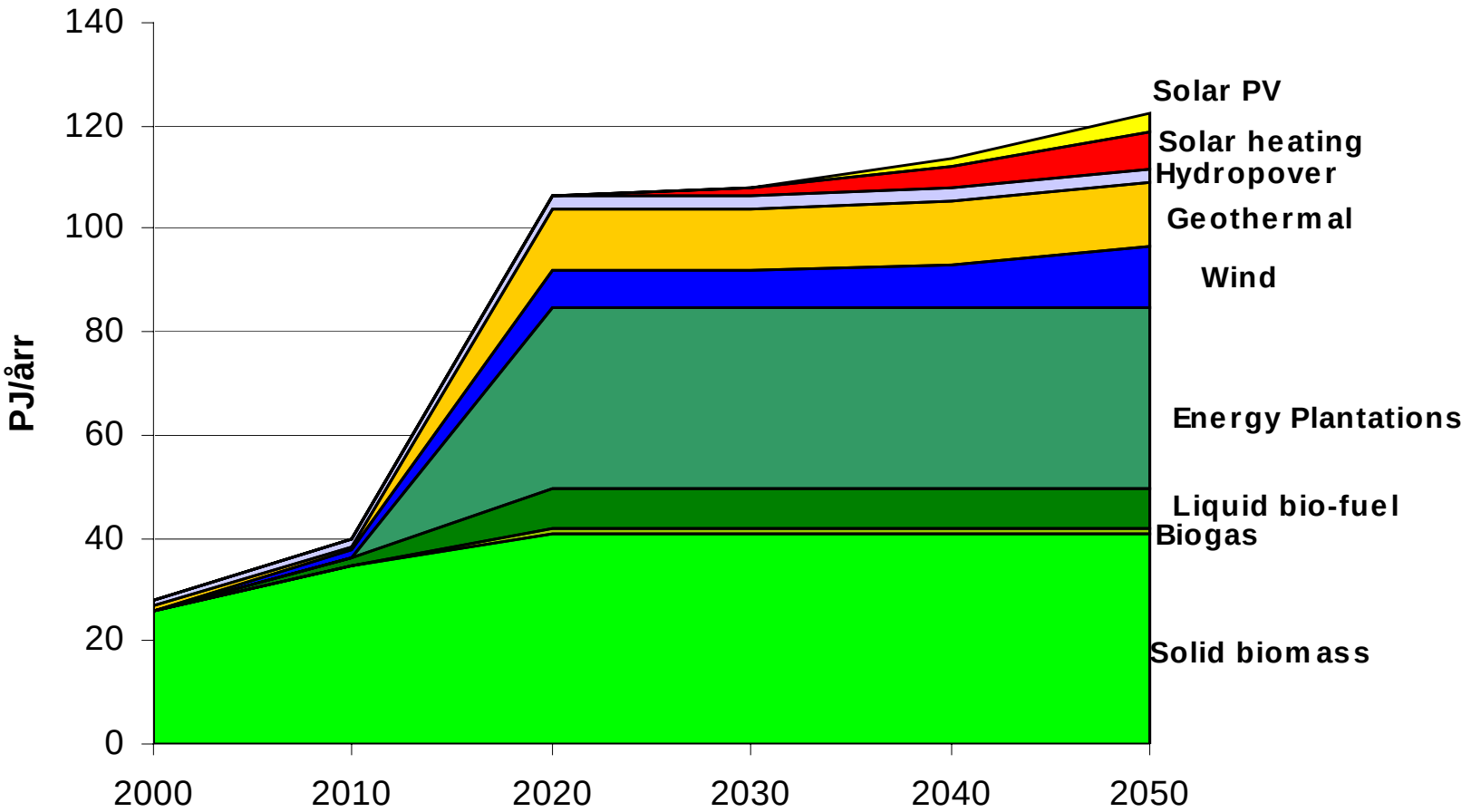
Renewable energy divided into sources



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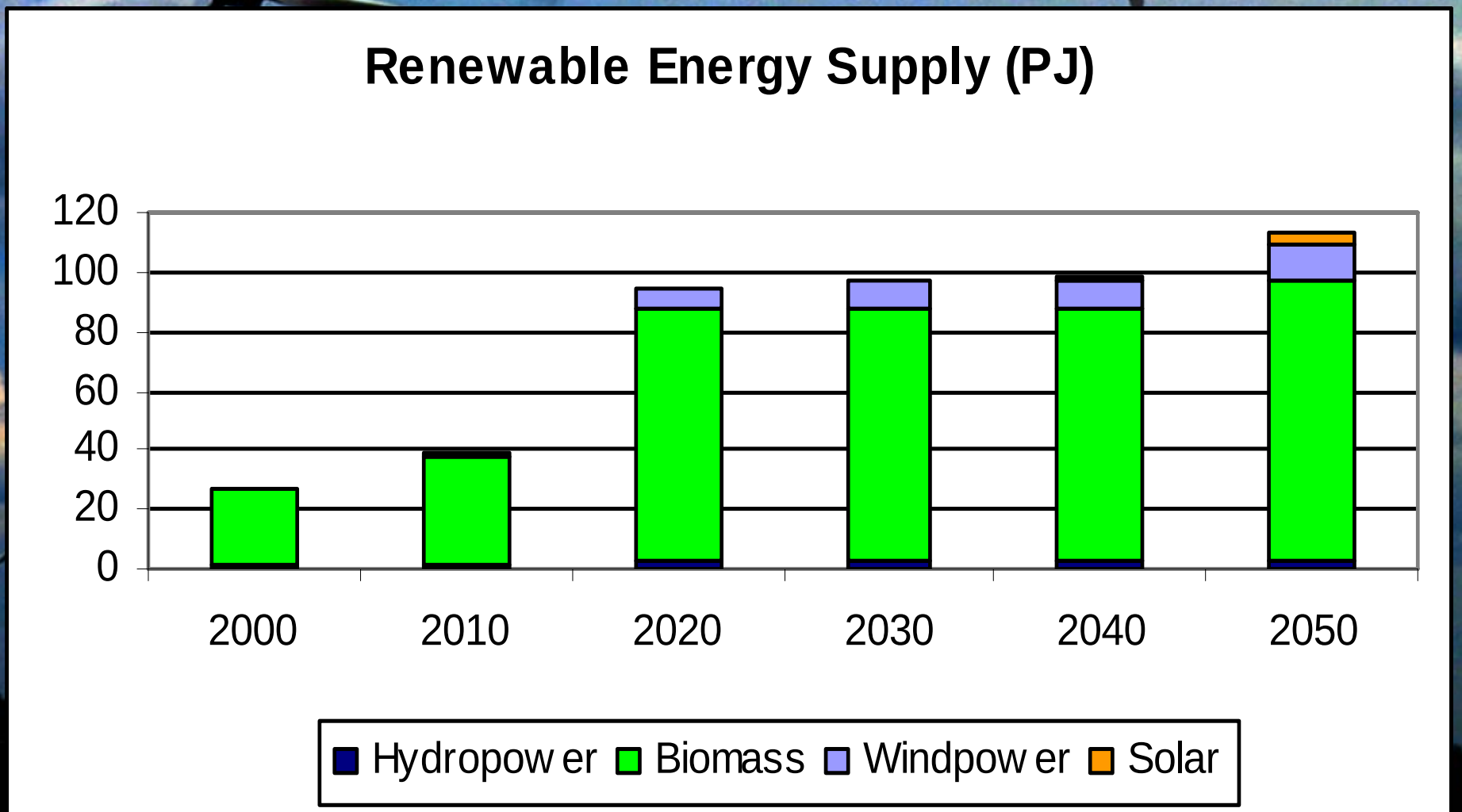

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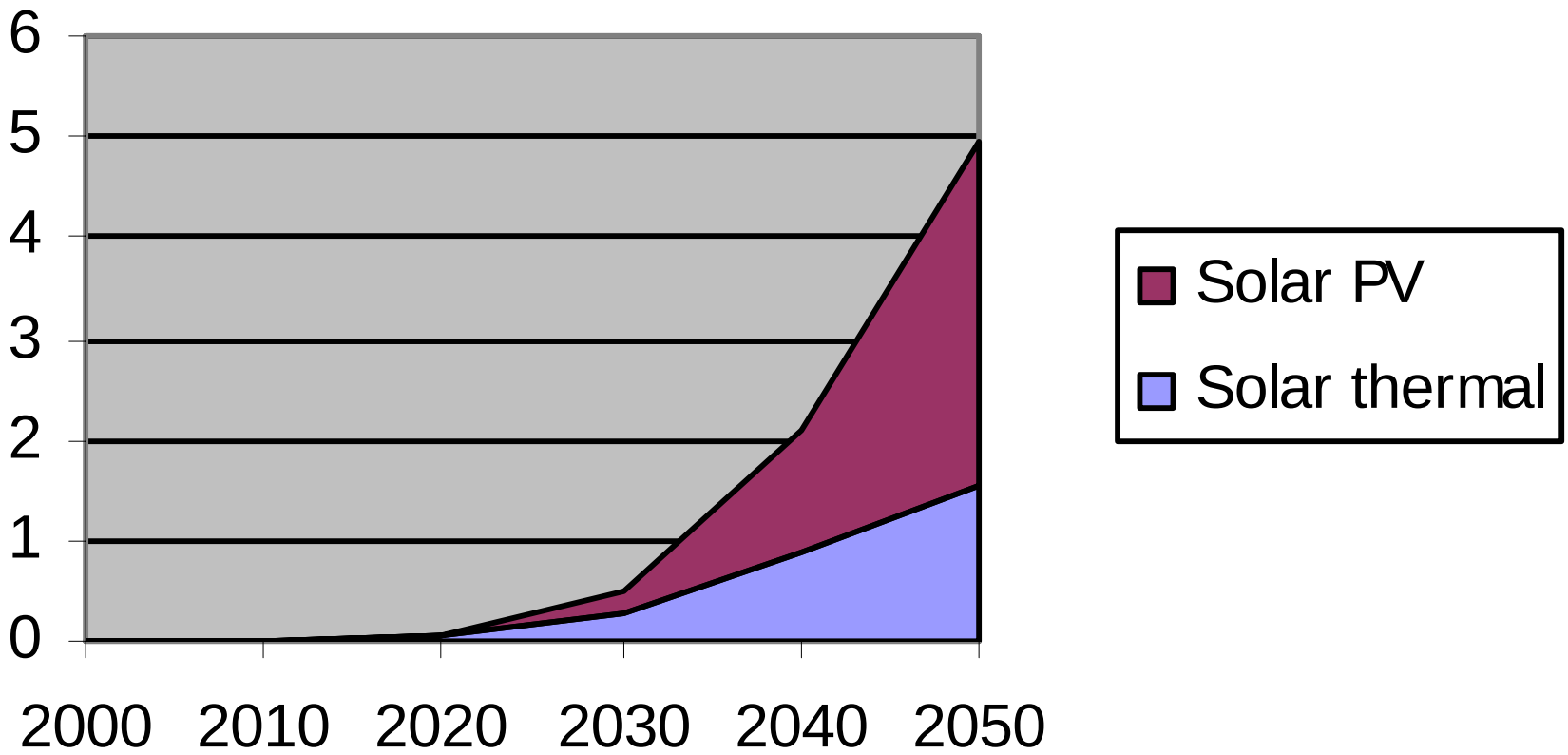

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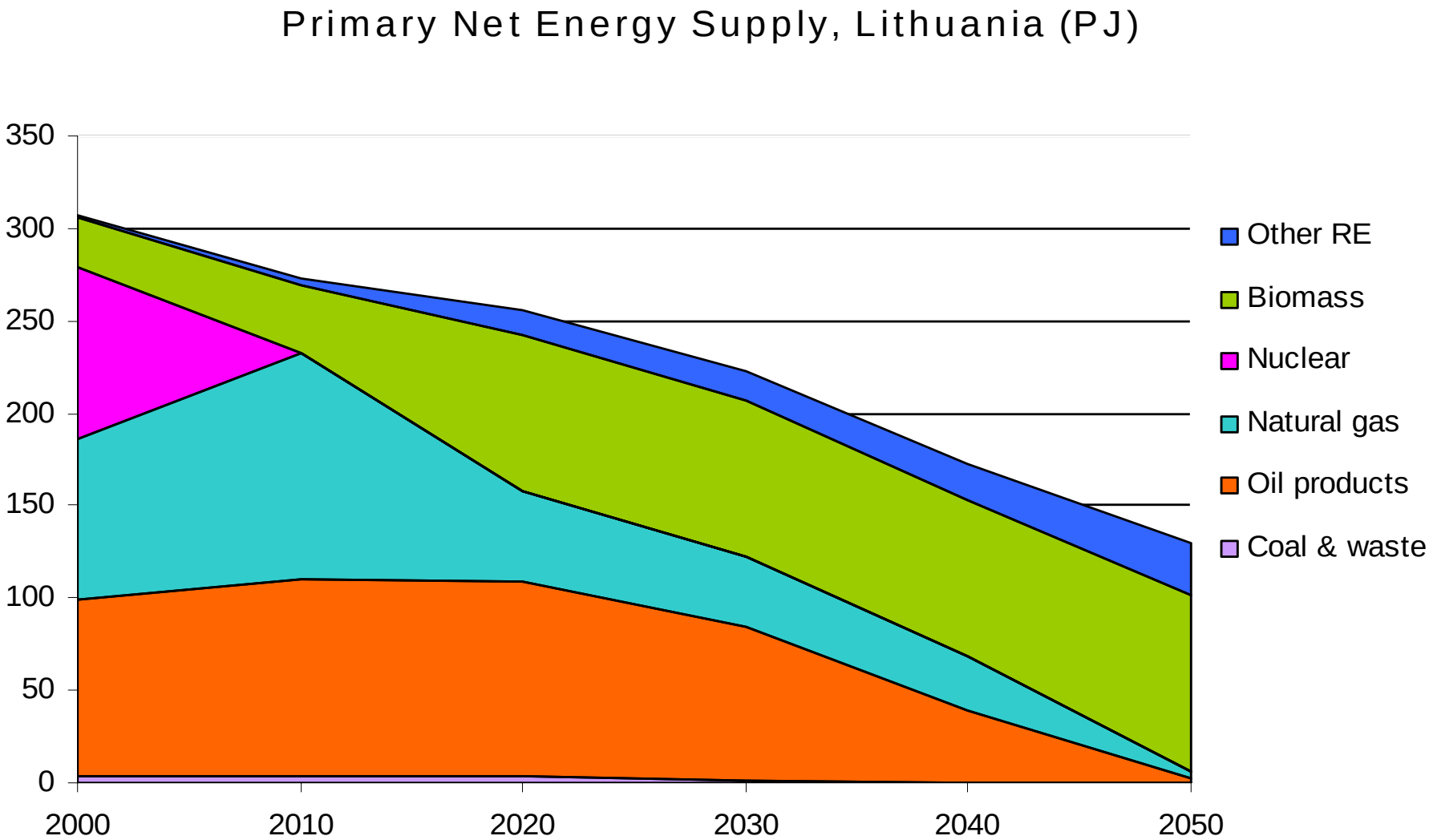

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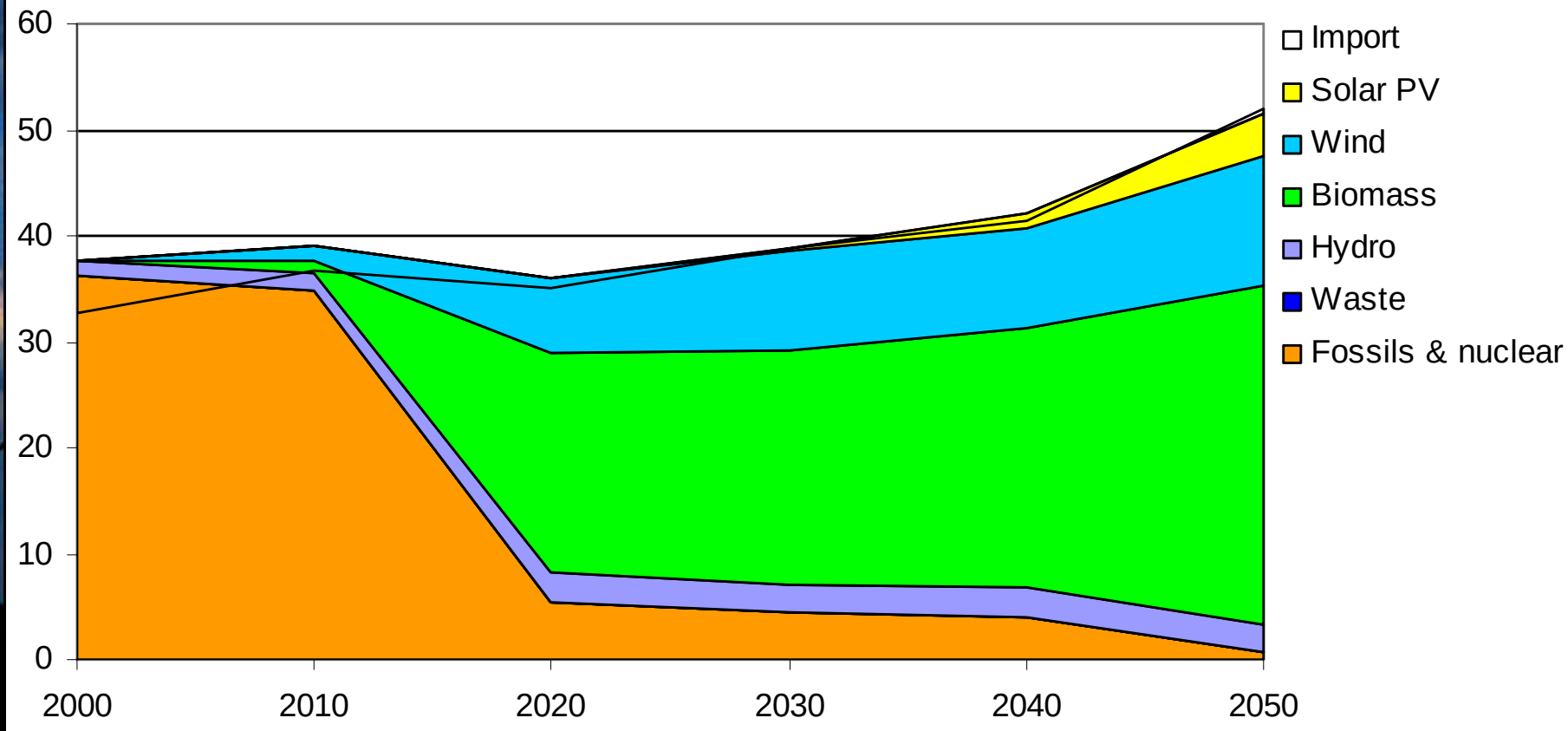
Lithuanian Electricity Supply Divided in Sources (PJ)



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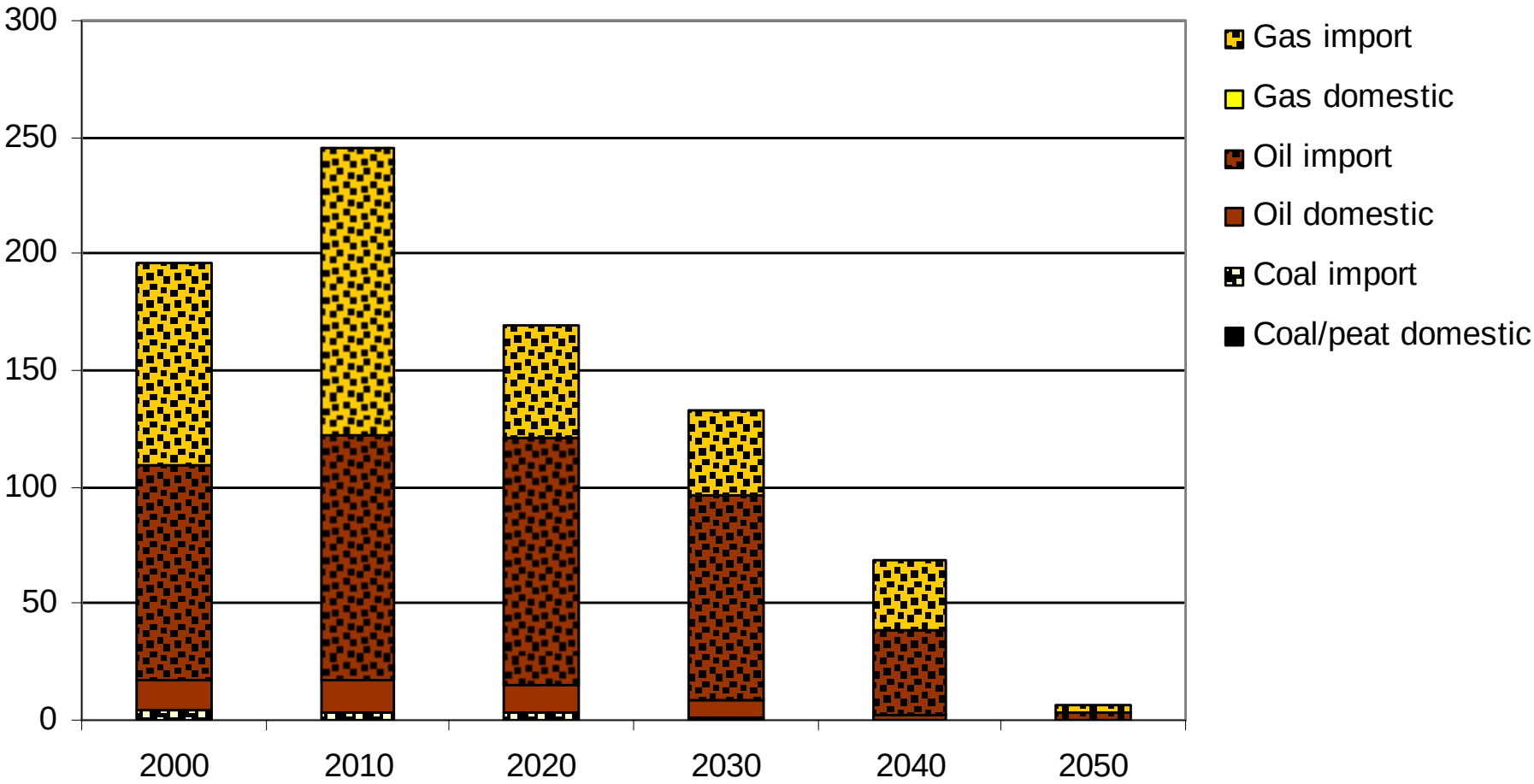

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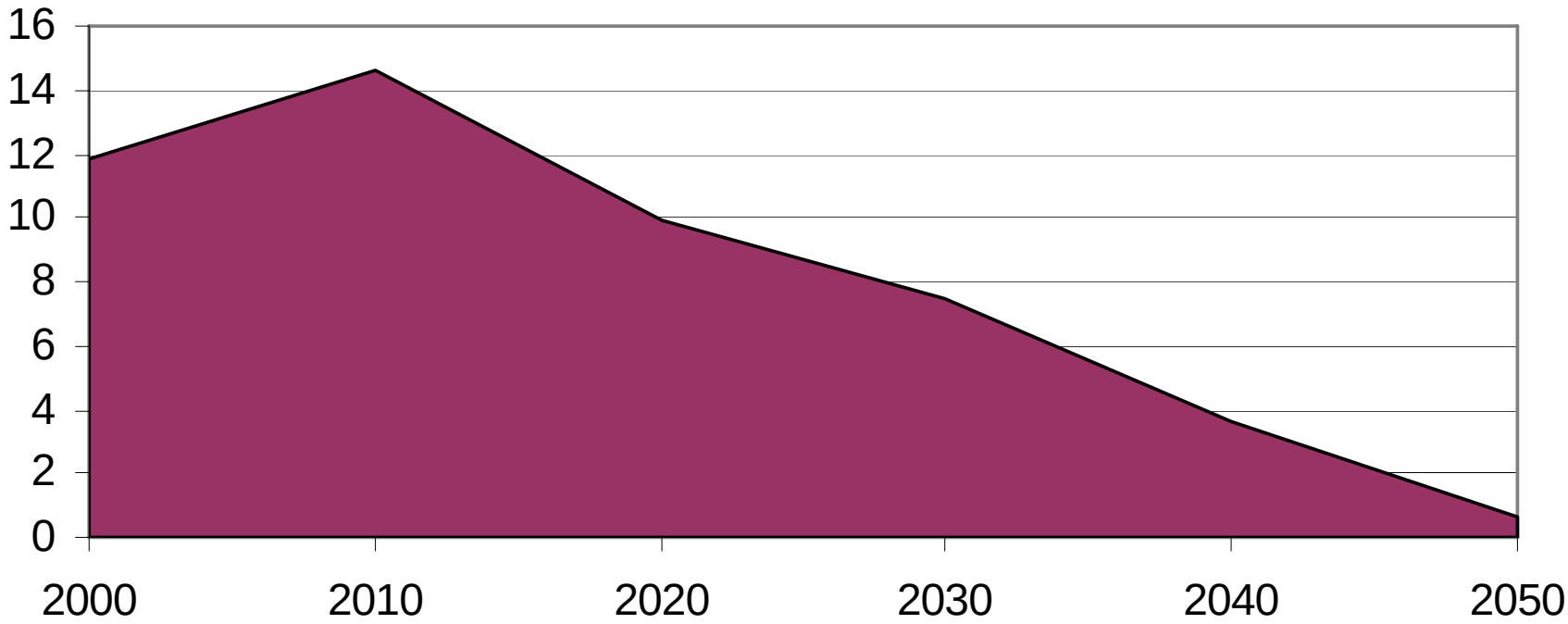
CO_2 emissions from energy consumption, million tons CO_2/year



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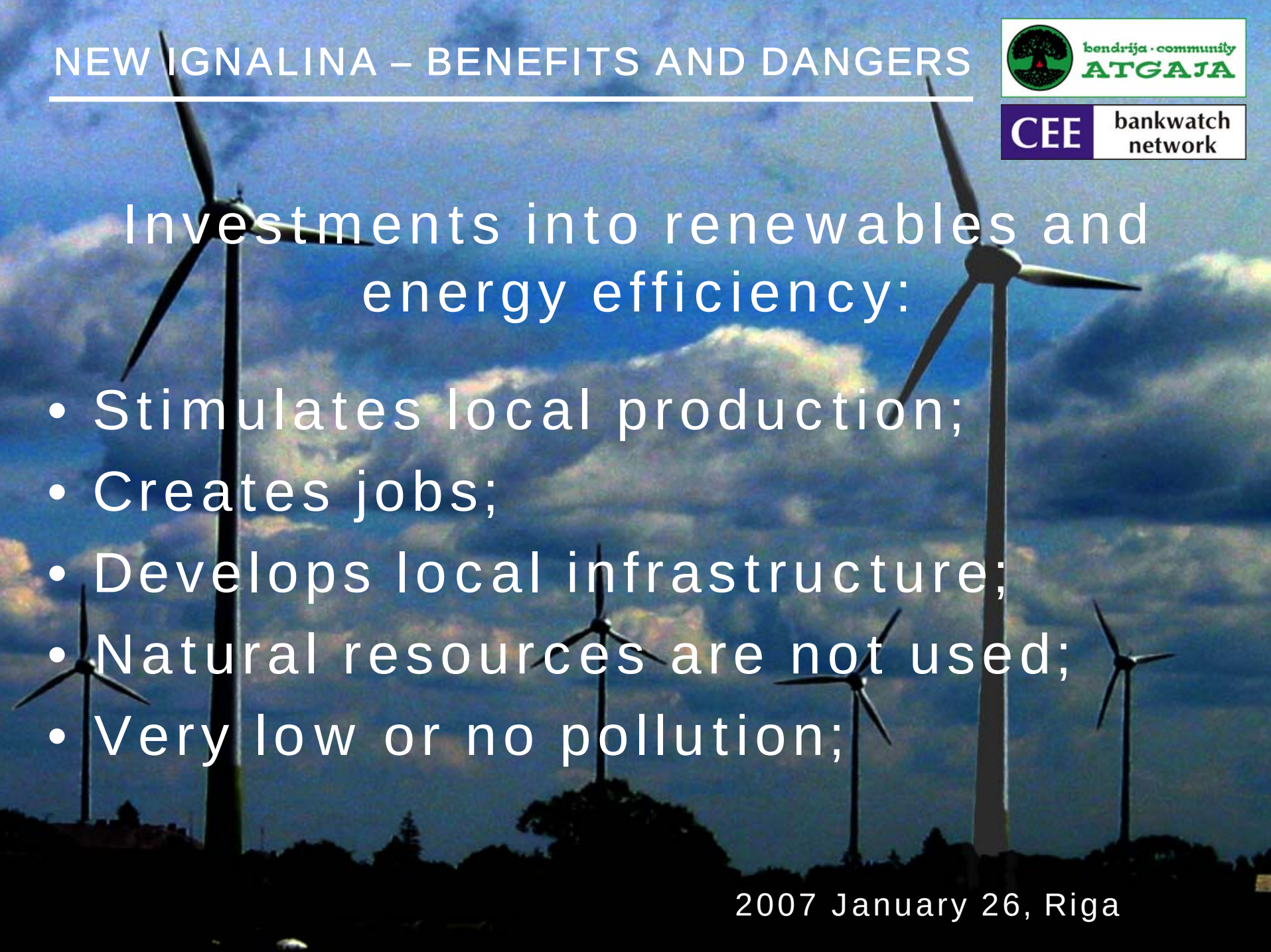

Investments into renewables and energy efficiency:

- Stimulates local production;
- Creates jobs;
- Develops local infrastructure;
- Natural resources are not used;
- Very low or no pollution;

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Thank you for your attention !

More information community ”Atgaja”

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