

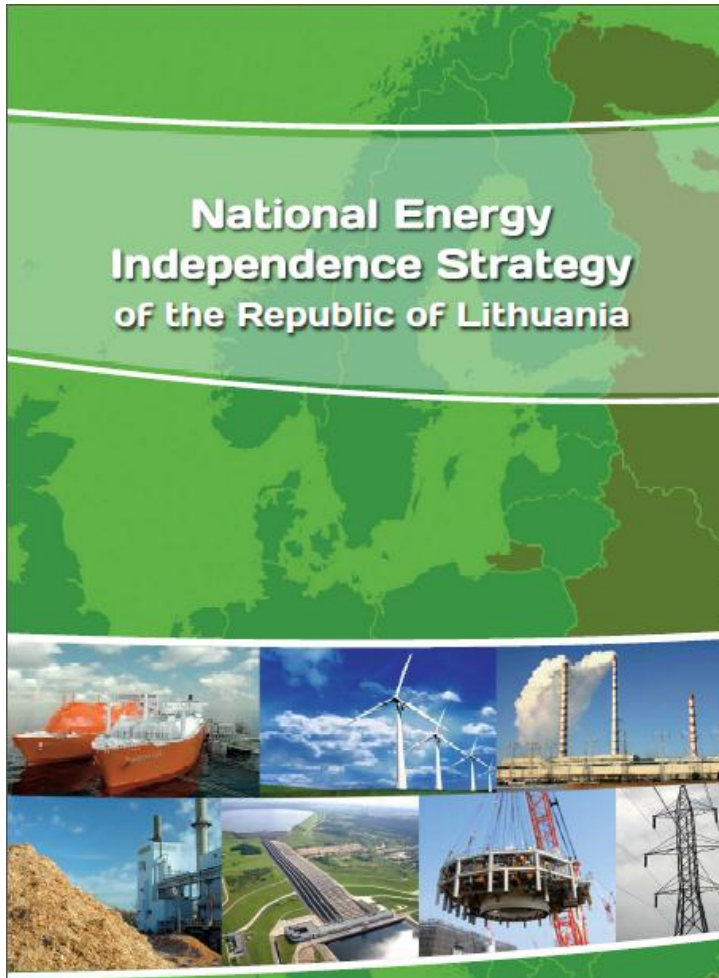
Biomass cogeneration as a key point for Lithuanian energy strategy

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Intro (I)



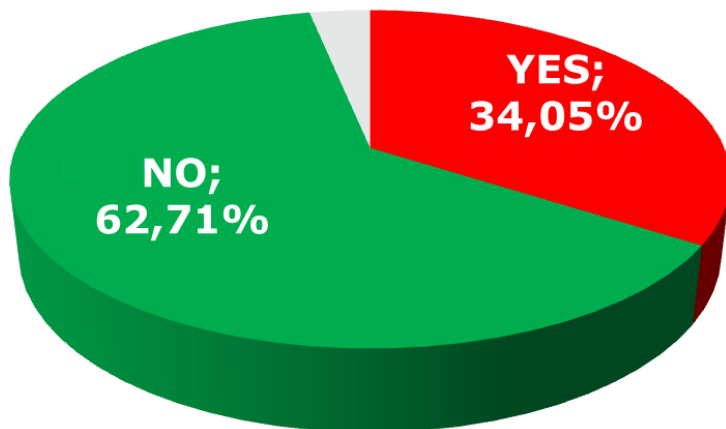
- “National Energy Independence Strategy of the Republic of Lithuania” – approved by Parliament of Lithuania on 26 June 2012
- Main directions:
 - Integration of power system of Lithuania with the EU systems (construction of power links)
 - **new regional nuclear power plant in Visaginas (1380 MW)**
 - New LNG import terminal in Klaipėda
 - **Increase of use of biomass for heating needs**
 - Energy use efficiency increase

Intro (II)

- National referendum on 14 October 2012

“Do you support the building of a new nuclear power plant in the Republic of Lithuania?”

Results of referendum



- **52,45%** of citizens participated
- The referendum is **deemed valid** (participated > 50% of citizens)

Working group was formed by new Government on 17 January 2013 to prepare proposals for the National Energy Independence Strategy

Proposal of Lithuanian RE confederation on new Lithuanian energy strategy

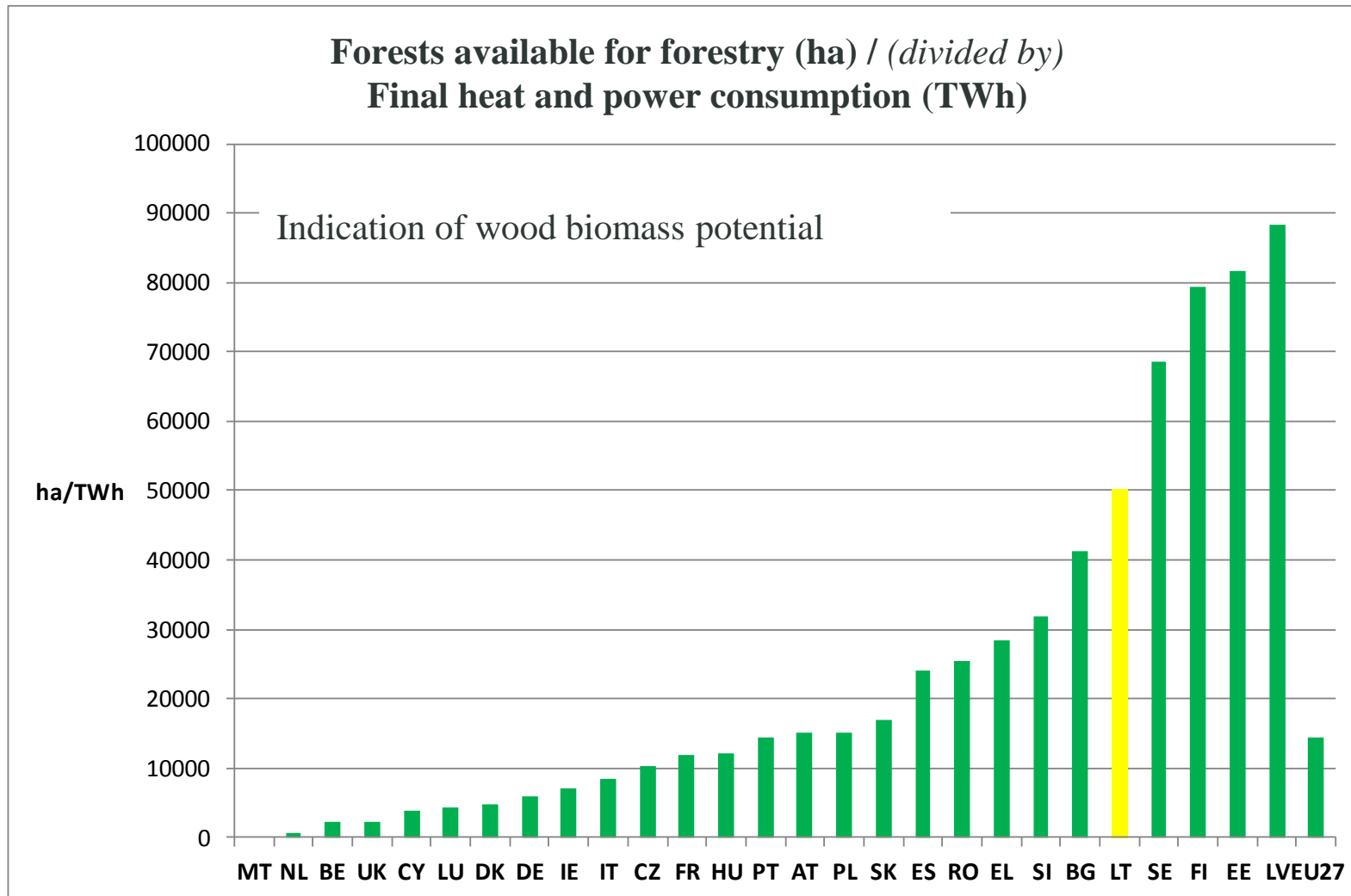


- Do we really need own power production in Lithuania?
- Do we plan increase of use of biomass for heating needs?
- Are we interested in promotion of growth and jobs?

Then BIOMASS COGENERATION IS THE ANSWER!

Why biomass cogeneration?

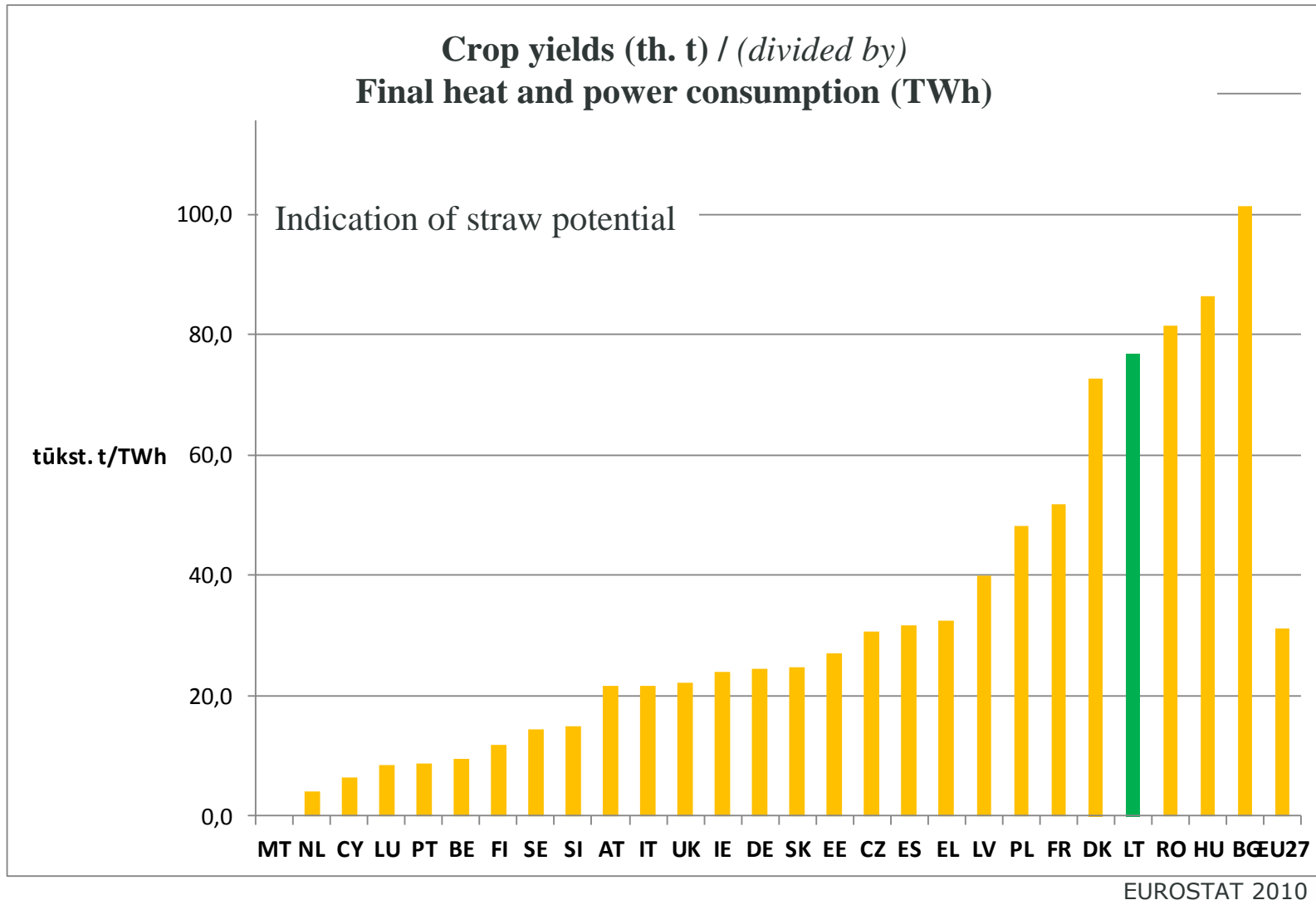
Large biomass resources available (I)



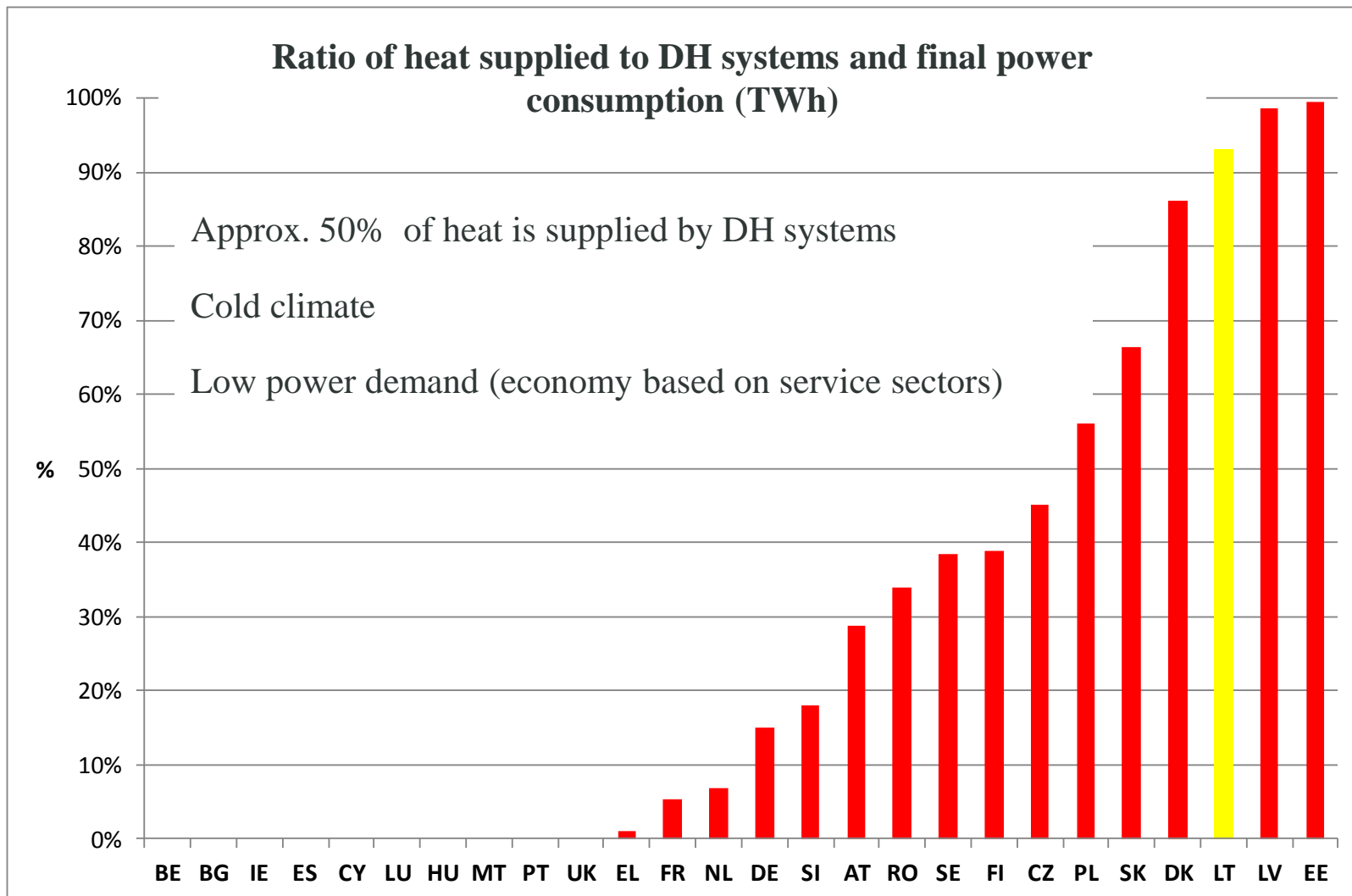
EUROSTAT 2010

Why biomass cogeneration?

Large biomass resources available (II)



Why biomass cogeneration? Favorable ratio of centralized heat and power



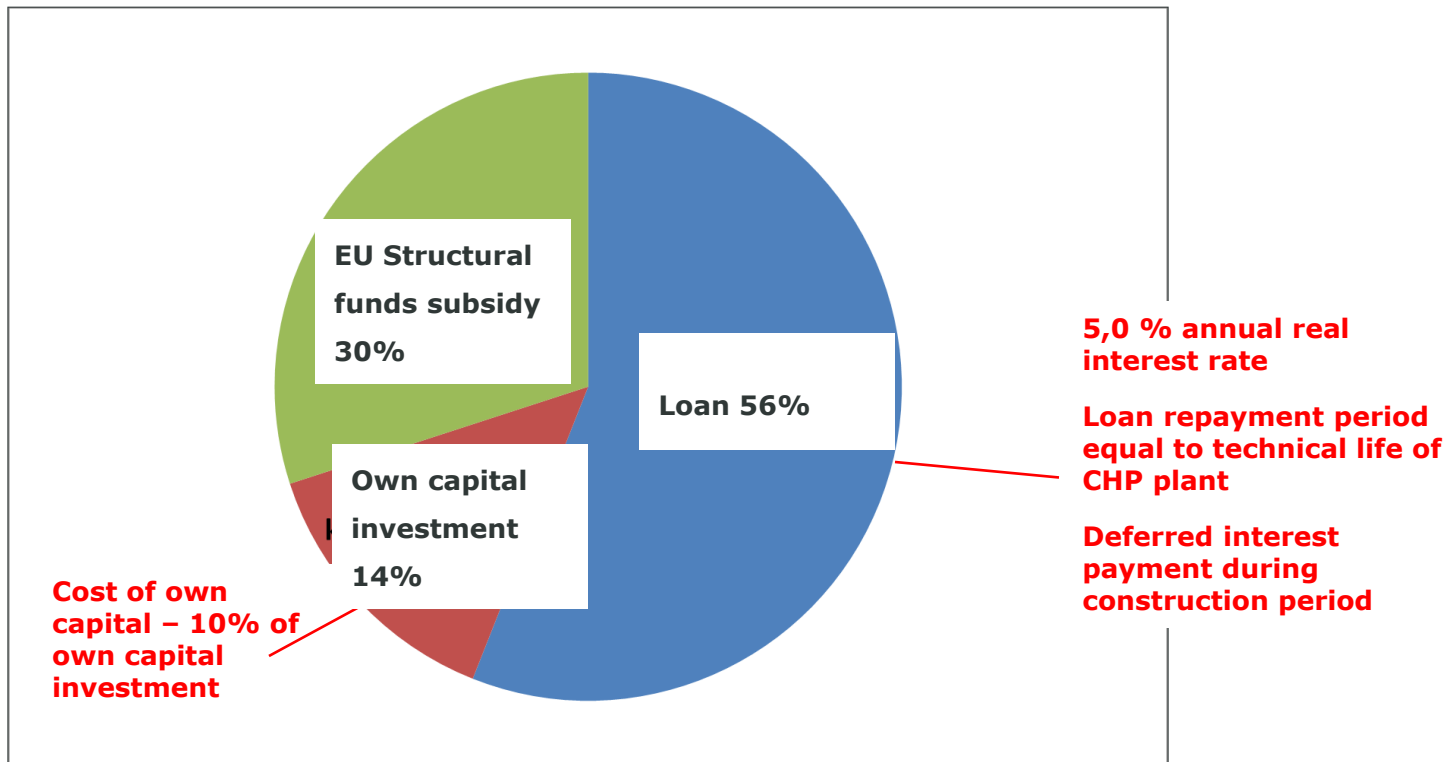
Biomass cogeneration potential in Lithuania (conservative scenario)

District heating system*	Max. heat demand (2011) [MW (h)]	Capacity of potential CHP plant [MW (h)]	Power/Heat production rate of potential CHP plant	Power generation capacity of potential CHP plant [MW (p)]
Vilnius	1000,5	400	0.75	360*
Kaunas	520,0	208	0.38	78
Klaipėda	334,3	134	0.38	50
Panevėžys	199,2	80	0.38	30
Šiauliai	179,5	72	0.38	27
Alytus	133,5	53	0.38	20
Marijampolė	93,4	37	0.38	14
Druskininkai	72,4	29	0.38	11
Mažeikiai	63,6	25	0.38	10
Utena	55,4	22	0.38	8
Jonava	45,6	18	0.38	7
Plungė	42,9	17	0.38	6
Tauragė	32,8	13	0.38	5
Šilutė	31,3	13	0.38	5
Iš viso:	2804	1121		632

* DH systems with max. heat demand over 30 MWh and total annual heat consumption over 70 GWh only,

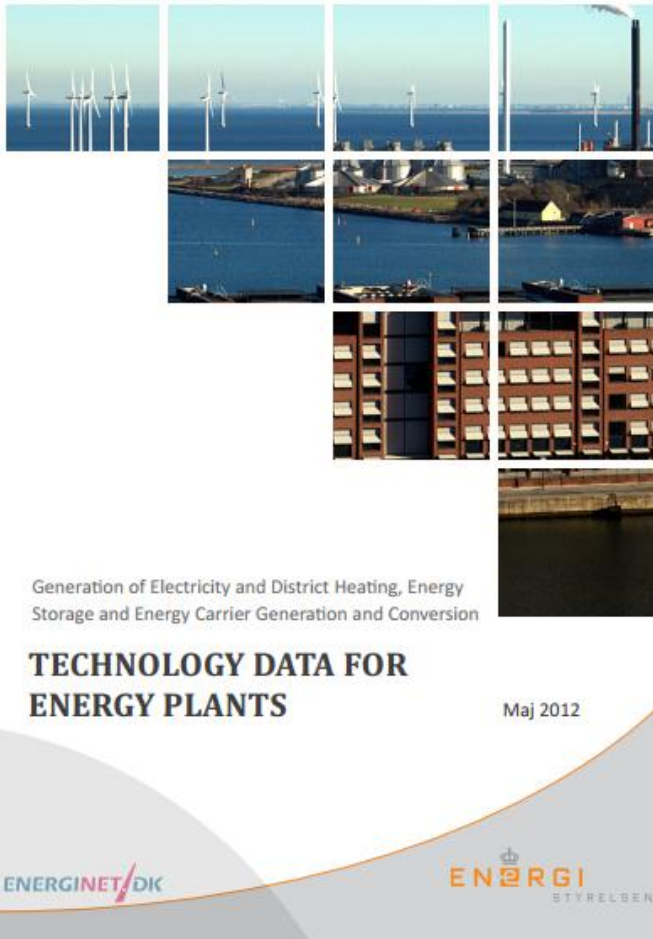
** on condensation mode. 300 MWp on cogeneration mode

Development of biomass cogeneration – financing, heat and biomass price assumptions



- Biomass prices:
 - Wood chips **150 €/toe** (official data for 2012 December in Lithuania)
 - Straw pellets **290 €/toe**
- Price of heat supplied to DH **29 €/MWh** (currently price of heat, supplied to DH from natural gas based DH boilerhouses is approx. 46-52 €/MWh)

Development of biomass cogeneration – technological and financial assumptions



	Average size (10-50 MW) biomass CHP	Large (250-400 MW) biomass CHP
	(page 69)	(page 36)
Fuel used	Wood chips	Straw pellets
Fixed O&M cost (€/MW/year)	29000	57200
Variable O&M cost (€/MWh)	3.9	2.0
Lifetime (years)	30	40
Investment (mln. €/MW)	2.6	2.04
Power generation efficiency on condensation mode	-	46%
Power generation efficiency on cogeneration mode	29%	44%
Heat generation efficiency on cogeneration mode	77%	58%
Construction time (years)	4,5	4,5
Minimal load	20%	20%

www.ens.dk/Documents/Netboghandel%20-%20publikationer/2012/Teknologikatalog_2012.pdf

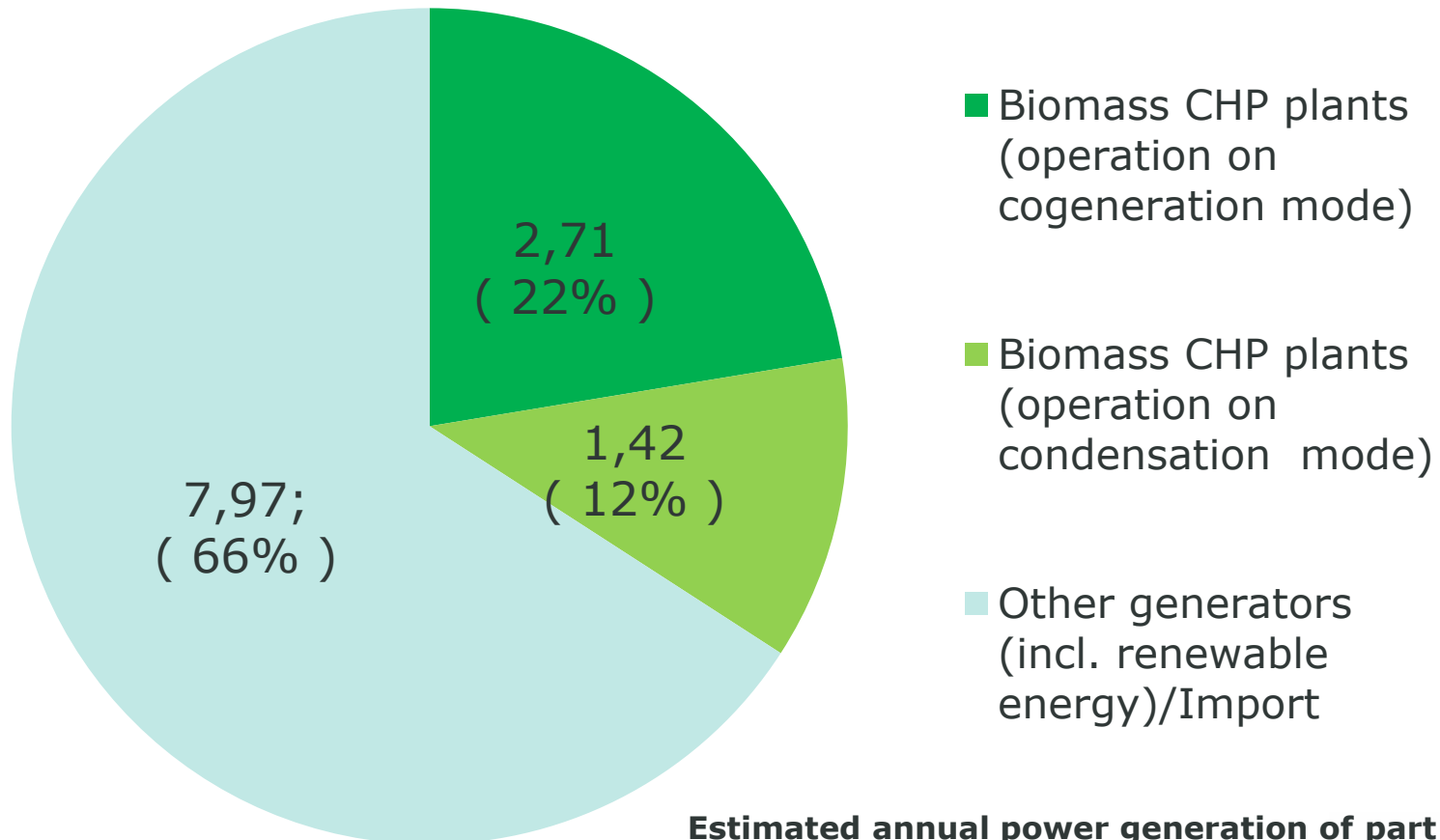
Development of biomass cogeneration - Results(I)

		Cogeneration mode	Additional – condensation mode
Technical data	Total annual heat demand of the analyzed DH systems [TWh]	7.46	
	Power generation capacity of planned CHP plants [MW (p)]	572	360
	Annual power net generation [TWh (p)]	2.71	1.42
	Annual heat net generation [TWh (h)]	5.31	0
	Coverage of annual heat demand of DH system by CHP plants	71%	
	Annual use of biomass [millions toe]	0.66	0.27
	Total efficiency	104%	46%
	Power generation efficiency	35%	46%
	Heat generation efficiency	69%	0%
	Average power generation load of CHP plants	54%	

Development of biomass cogeneration – Results (II)

		Cogeneration mode	Additional – condensation mode
Results	Total investment (billion €)	1,44	
	I.e subsidy from EU Structural funds :	0,43	
	Own capital investment:	0,20	
	Loan (including accumulated interest during construction time)	0,91	
	Fuel cost [€/MWh (p)]	50.7	54.2
	O&M cost [€/MWh (p)]	13.3	2,0
	Loan and interest payment cost [€/MWh (p)]	20.9	
	Cost reduction from heat sale [€/MWh (p)]	-56.8	
	Cost of own capital [€/MWh (p)]	7.5	
	Total cost [€/MWh (p)]	35.6	56.2

Power market of Lithuania in 2020 [TWh]

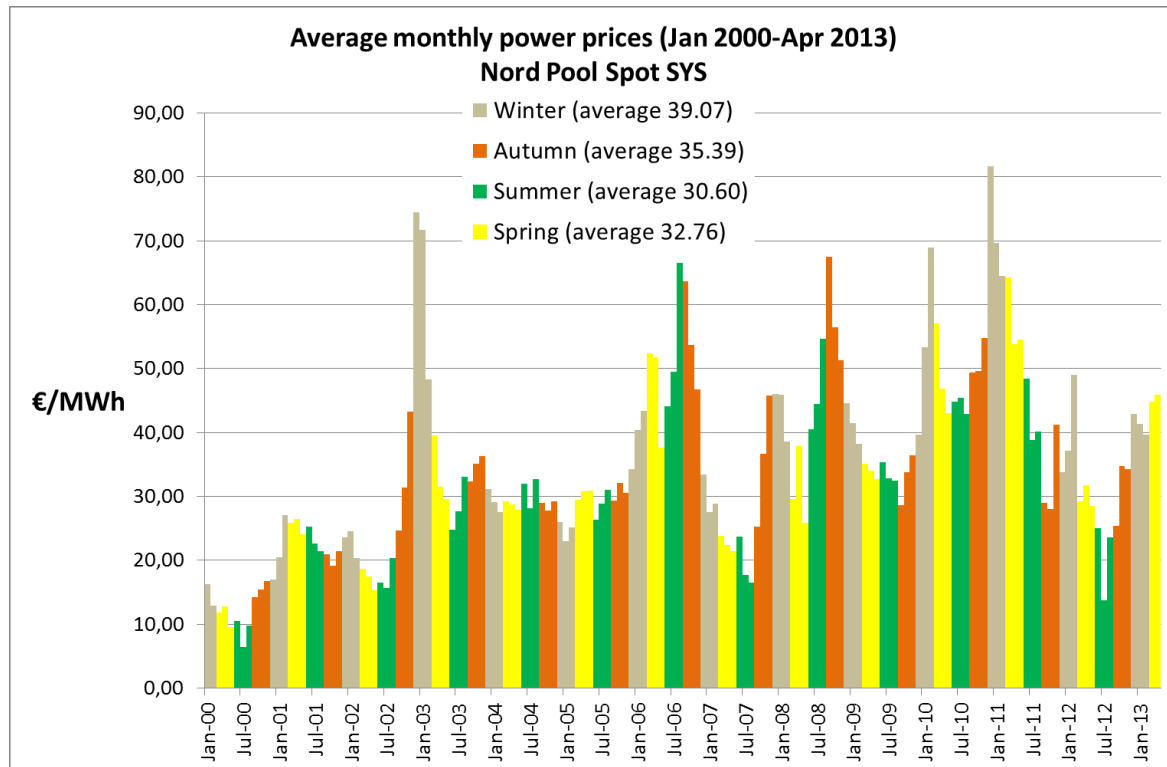


Estimated annual power generation of part of Visaginas NPP (38% - according to planned part of share of capital of Lithuania) was up to 4,0 TWh

Discussions - arguments

- Main arguments against the plan:
 1. What about power generation during the summer, when heat demand of DH systems is only 25% of heat production capacity of CHP?
 2. Increase of use of biomass will certainly increase prices of biomass
 3. Subsidy for biomass CHP is required. That means, that less funds will be available for other important needs.

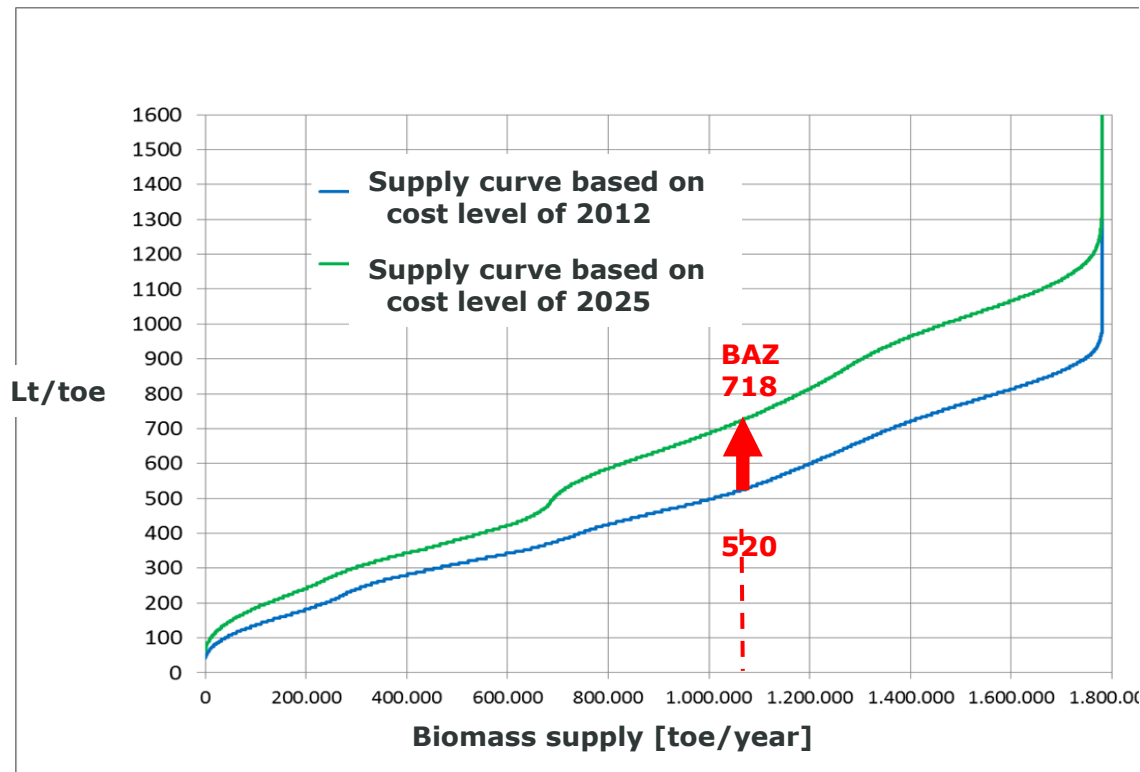
1. Cogeneration - power generation during the summer



Two options:

- Import more electricity from Nordpool (normally power prices are lower during the summer time in the region)
- Produce power working on condensation mode (in case of power import restrictions or unexpectedly high prices)

2. Cogeneration – influencing biomass price increase



1 € = 3,4528 Lt

Wood chips supply curve was elaborated (LEKA 2013) for Lithuania as separated market:

- Based on estimation of biomass potential in 2025
 - Based on existing cost and technology level
 - Based on estimation of cost increase until 2025
- Price of wood chips because of increase of cost (mainly labour) and increase of demand could rise from existing level of **150 €/toe** to **208 €/toe (39%)** until 2025

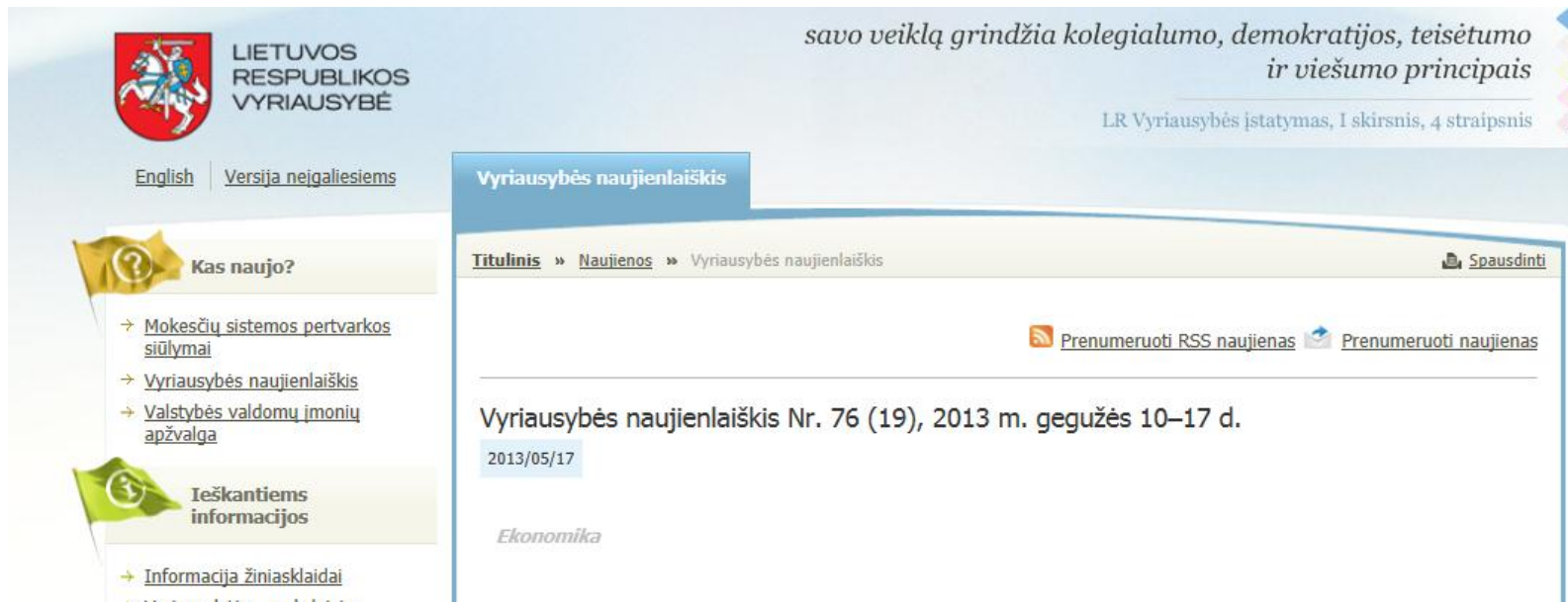
Because of fuel cost increase – cost power produced by CHP from **35,6 €/MWh** to **43,8 €/MWh** (if heat price increase of **20%** is estimated)

Still corresponds to existing (!) power price at Nordpool during winter time

Subsidies for biomass cogeneration

- Estimated subsidies: **1490 M€**
- Estimated external benefit (*Annual additional biomass supply: 0,66 Mtoe, based on forecasted prices of biomass in 2025*):
 - Amount of money collected from energy users which goes directly back to economy **through biomass supply chain** (taxes, net profit, salaries, etc.) approx. **110 M€ annually**
 - Also:
 - Effect on decrease of heat price
 - Effect on decrease of power import (merit order effect)
 - Effect on money collected from energy users which goes directly back to economy through technology suppliers and O&M service providers
 - Climate change cost reduction
 -

Latest news!



The screenshot shows the official website of the Lithuanian Government. At the top left is the Lithuanian coat of arms and the text "LIETUVOS RESPUBLIKOS VYRIAUSYBĖ". To the right, a quote reads: "savo veiklą grindžia kolegialumo, demokratijos, teisėtumo ir viešumo principais". Below this is the text "LR Vyriausybės įstatymas, I skirsnis, 4 straipsnis". The main navigation bar includes "English" and "Versija neigaliesiems". A sidebar on the left has sections: "Kas naujo?" with links to "Mokesčių sistemos pertvarkos siūlymai", "Vyriausybės naujienlaiškis", and "Valstybės valdomų įmonių apžvalga"; and "Ieškantiems informacijos" with a link to "Informacija žiniasklaidai". The main content area is titled "Vyriausybės naujienlaiškis" and shows a breadcrumb trail: "Titulinis » Naujienos » Vyriausybės naujienlaiškis". There are RSS and email subscription buttons. The main article is titled "Vyriausybės naujienlaiškis Nr. 76 (19), 2013 m. gegužės 10–17 d." with a date stamp "2013/05/17" and the category "Ekonomika".



Official position of prime minister A. Butkevičius (17 May 2012):

“We are proposing cogeneration – efficient heat and power generation at the same time. That is an opportunity to replace costly natural gas by cheaper biomass. [..] According to biomass use development program – the National heat supply plan will be established. All municipalities will have clear development plans and the plans will be implemented using funds from new 2014-2020 EU perspective. We will seek larger part of EU support for energy sector”

Thank you for your attention!

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