



KRAJOWA SPÓŁKA CUKROWA S.A.

**BIOENERGY AND BIOFUELS  
AS AN ALTERNATIVE FOR SUGAR  
INDUSTRY IN POLAND**

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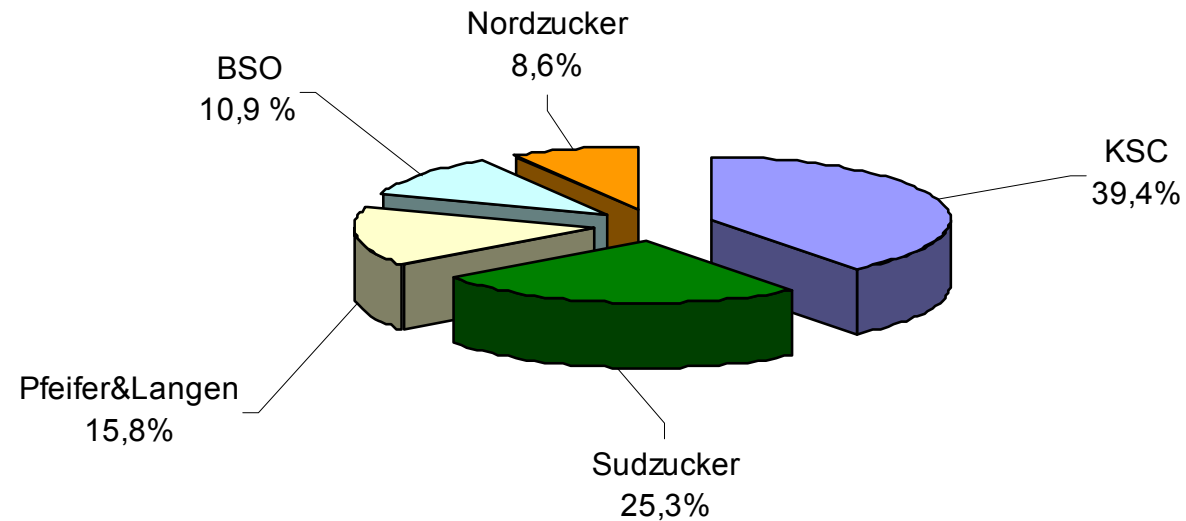
## General data on KSC S.A.

- Established 26.08.2002, including 27 sugar factories, 80,46% shares belonging to State Treasury (state for 2007).
- In the sugar campaign 2007/08 under operation was 11 factories, 16 were withdrawn from quota sugar production.
- In the campaign 2008/09 only 7 factories under operation, 19 withdrawn.



## Market position of KSC S.A.

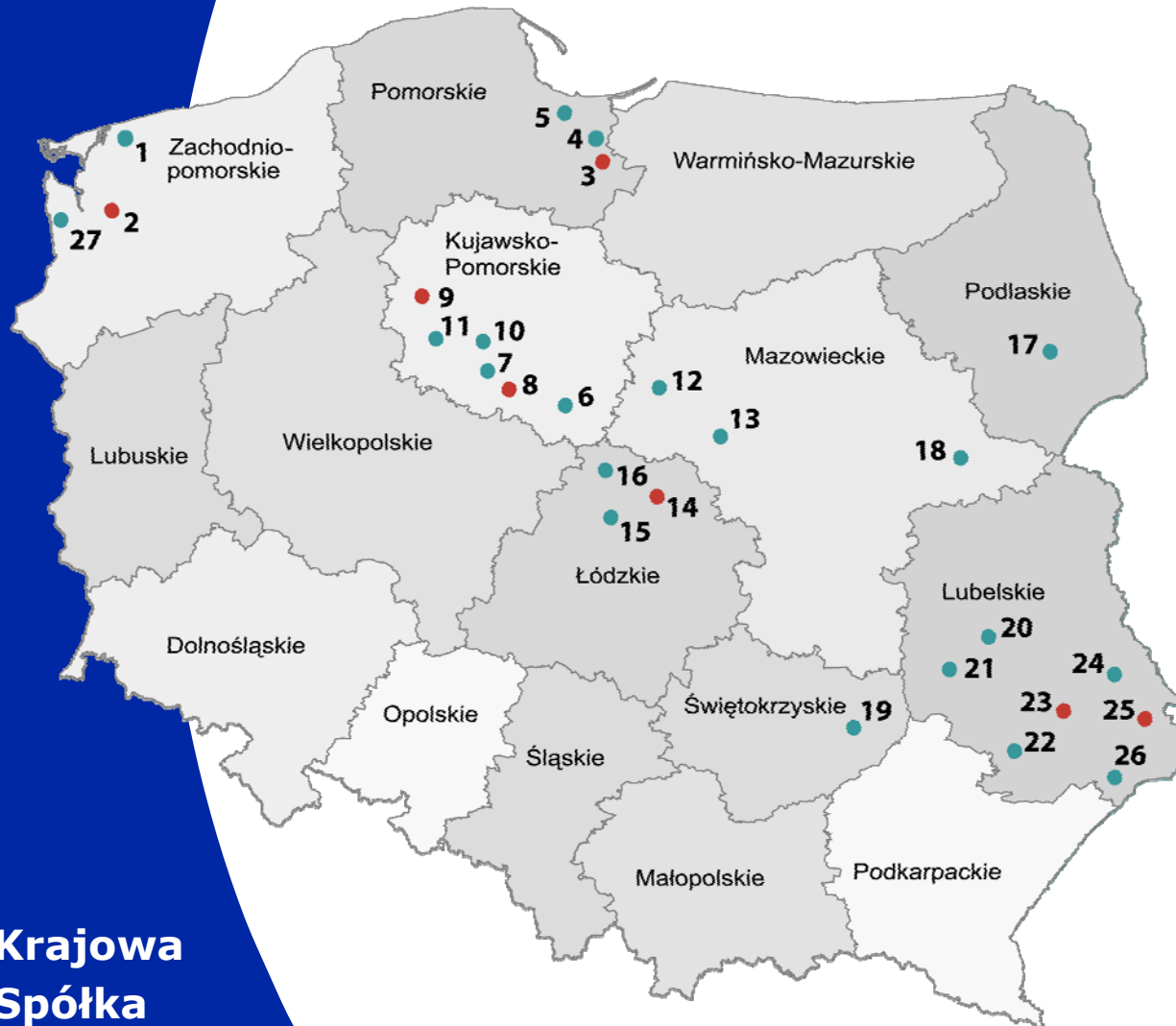
- Share in the sugar market in PL: 39,4 %
- Share in the EU sugar market: 4,0 %





# Sugar factories by KSC S.A.

State for September 2008



## Working sugar factories:

- 2. Kluczewo
- 3. Malbork
- 8. Kruszwica
- 9. Nakło
- 14. Dobrzelin
- 23. Krasnystaw
- 25. Werbkowice

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## Quota sugar production

2005/06 – 800 000 t

2006/07 – 611 000 t

2007/08 – 722 442 t

2008/09 – 549 000 t (according to quotas)



## Aims of KSC S.A

- Production and selling of sugar
- Finalizing the restructuring process
- Establishment of bioenergy production, including biofuels
  
- Maintaining the leading position on the sugar market in Poland and taking the advantage of developing opportunities



## Strong points of KSC S.A

- The first position among 5 sugar production groups in Poland
- Contracting large amounts of sugar beets – 2 leading regions:
  - lubelskie
  - kujawsko-pomorskie
- Technological infrastructure and overcapacity of production
- Employees – well qualified and experienced



## Strategy of KSC S.A.

Initially (2006) the strategy aimed at establishment of:

1. Small-scale bioethanol pilot plant of production capacity of 20 million dm<sup>3</sup>/year
2. Industrial plant of a capacity 126 million dm<sup>3</sup>/year (100,000 t/yr)

Currently, the strategy aims at establishment of  
**a network of bioenergy and biofuel regional centres based on the withdrawn sugar factories.**

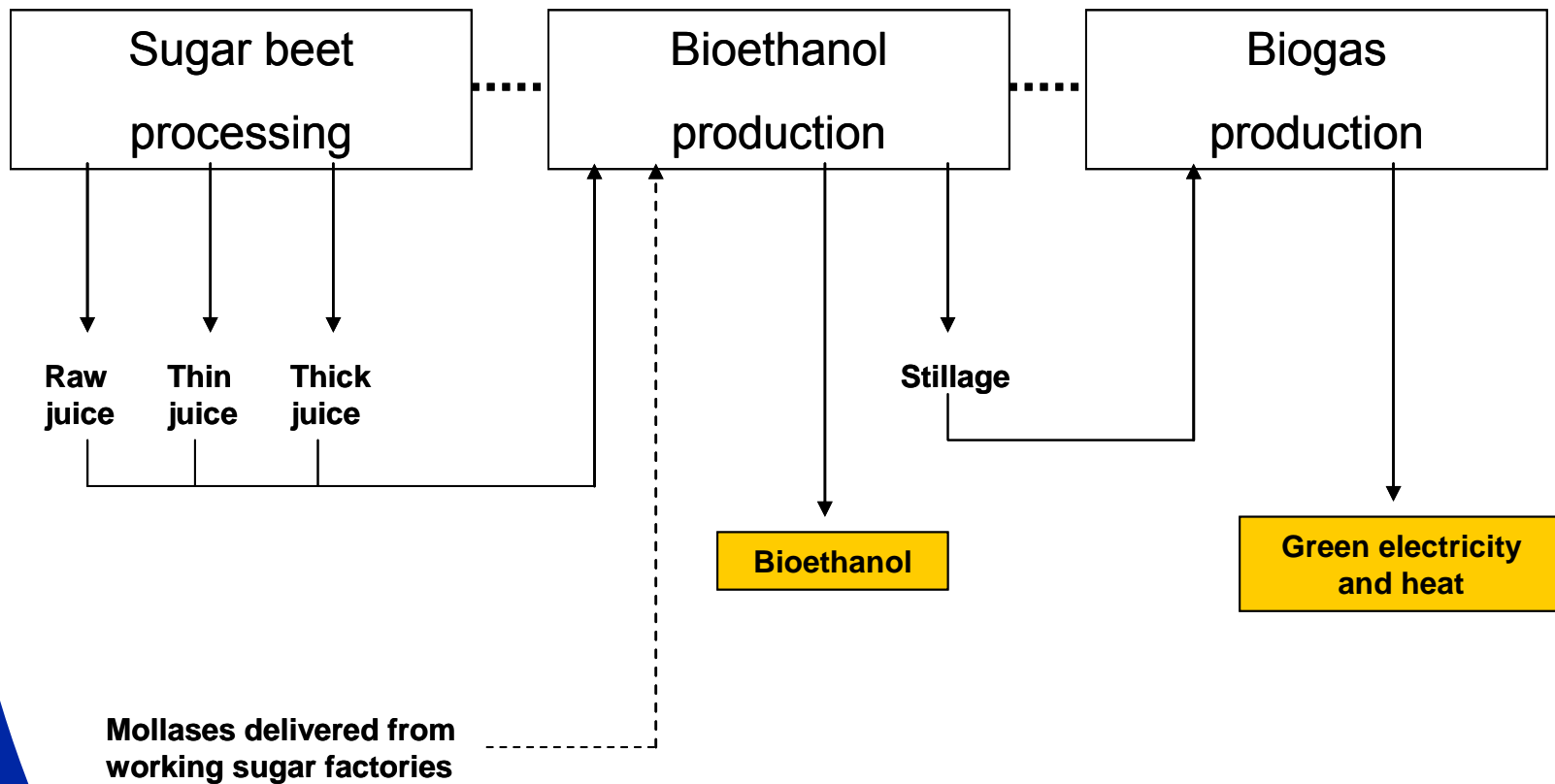
Project with cooperation with energy sector.

First plant commissioned in the campaign 2010/11



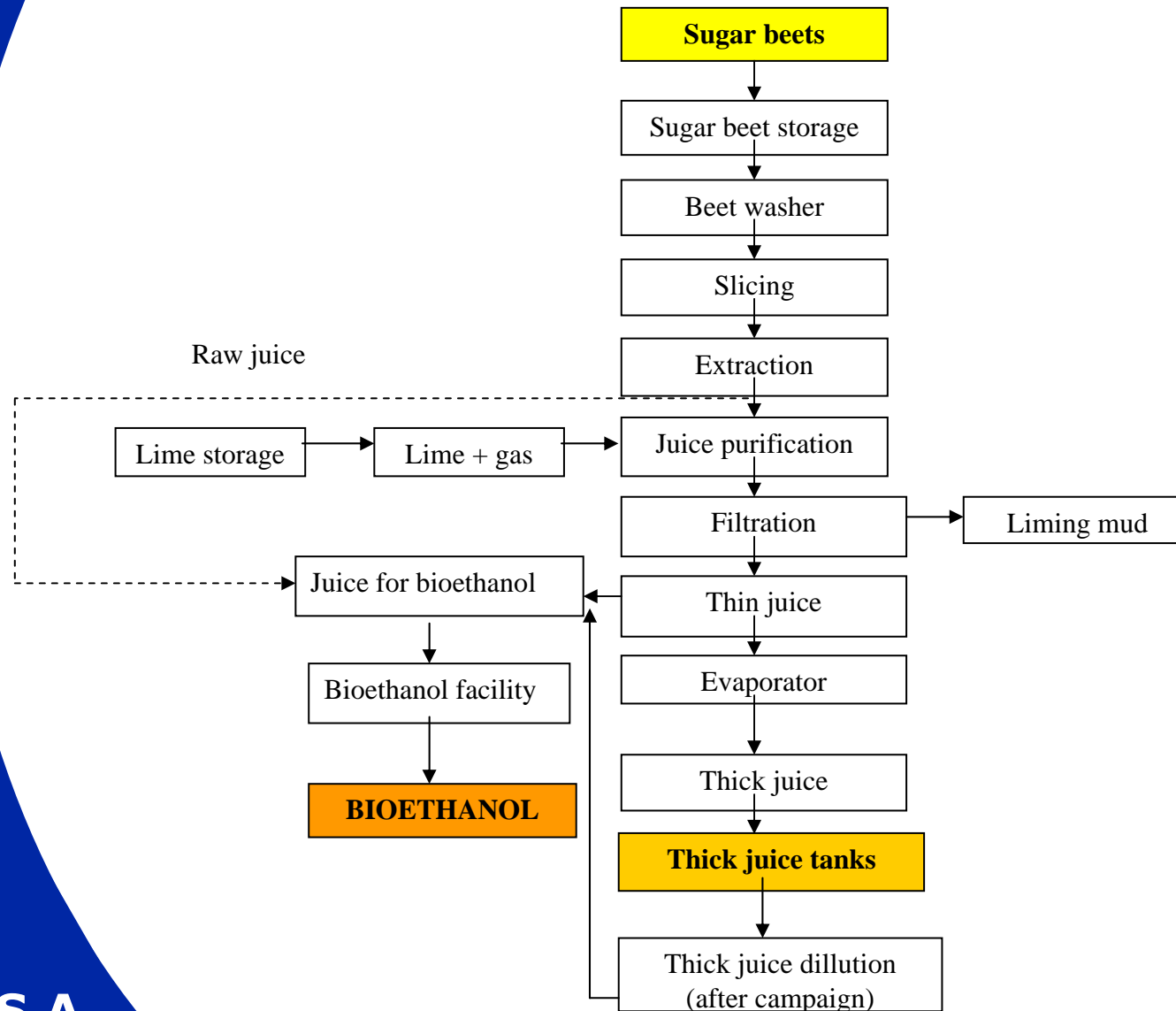


# Concept of the bioenergy-biofuel centre



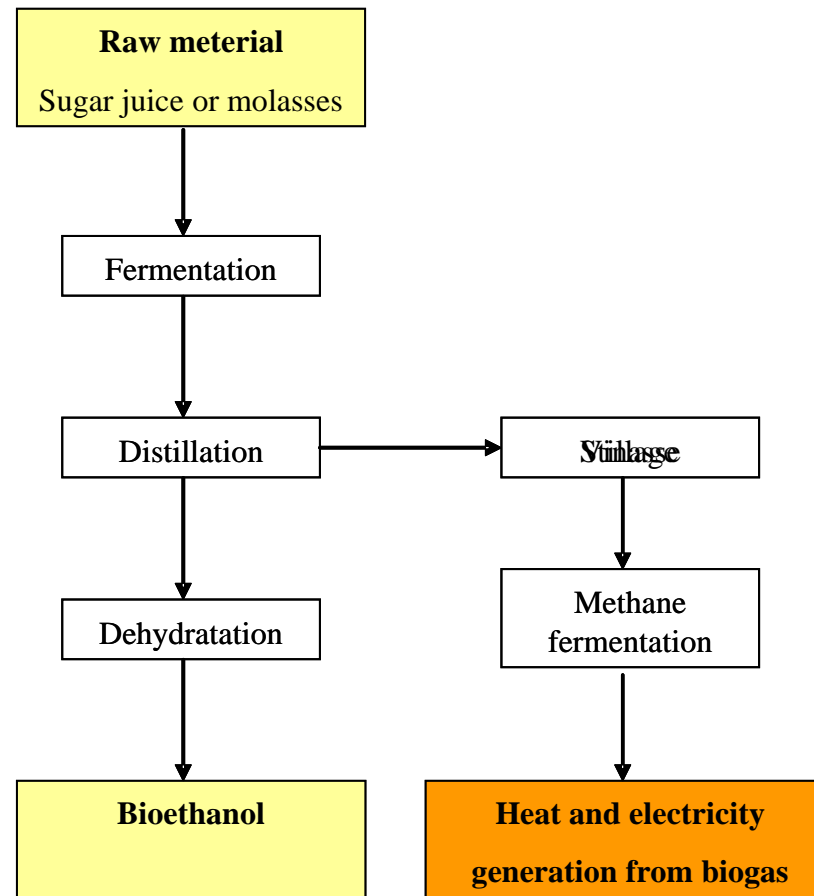


# Scheme of production of sugar juices from sugar beets





# Scheme of bioethanol production from sugar juice





# Raw material costs and bioethanol production costs

Raw material	Yield (t/ha)	Crop prices			Revenue from production		Raw material efficiency	Raw material cost in Euro/ dm3 bioethanol	Raw material cost in PLN/ dm3 bioethanol
		Year	Euro/t	PLN/t	Euro/ha	PLN/ha	ton/1000 dm3 bioethanol		
Sugar beet	48,3	2006	32,90	115	1589	5562	10,0	0,33	1,15
	55,7	2007	29,80	104	1660	5810	10,0	0,30	1,04
	50,0	2008	27,83	97	1383	4842	10,0	0,28	0,97
	50,0	2009	26,30	92	1315	4602	10,0	0,26	0,92
	50,0		17,14	60	857	3000	10,0	0,17	0,60
Rye	2,8		124,28	435	348	1218	3,0	0,24	0,96
Maize	6,0		185,71	650	1114	3900	2,7	0,40	1,41
Wheat	4,2		157,14	550	660	2310	2,4	0,28	0,97
Molasses			85,70				3,3	0,29-0,36	1,02-1,27

Remarks: exchange rate: PLN/EUR=3,50

\*) cost reduced with income from selling stillage from grain fermentation for fodder 0,35 PLN/dm3

\*\*) costs: September 2008

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## Bioenergy-biofuel centre

### Technical factors:

- Sugar beets: 170 000 t
- Thick juice prod. (68° Bx): 43 000 t
- possibly:
  - molasses supply: 56 000 t
- Bioethanol production: 17 000 000 dm<sup>3</sup>/year  
50 dm<sup>3</sup>/day
- 'Green' electricity, capacity: 1,5 MW



## Bioenergy-biofuel centre

### Economic factors:

- Investment costs: 17,70 mln €
- Operation costs:
  - raw material: 0,28
  - other operation costs: 0,21 €/dm<sup>3</sup>
- 'Green' electricity: 105,70 PLN/MWh
  - which constitutes: 0,09 €/dm<sup>3</sup>
- Bioethanol production costs: 0,40 €/dm<sup>3</sup>
- Bioethanol selling price: 0,54 €/dm<sup>3</sup>
- IRR: 12,2 %
- Simple return period: 8 years



# Conclusions

- EU, including PL: there is a must for the conversion of withdrawn sugar factories
- Target: polygeneration, biorefinery
- Bioethanol production efficiency from land unit the highest for sugar beet
- Raw material cost – key factor for the profitability of production
- Other than transportation use of bioethanol, including heat and power sector
- Future directions: bioethanol from ligno-cellulose biomass, i.e. pulp for alcohol fermentation