Economics of short rotation forests

Promoting sustainable bioenergy production and use

policies, showcases and business solutions

in the Baltic Sea Region

Kaunas, 25th - 26th of November, 2010

Andis Lazdiņš, Dagnija Lazdiņa
LSFRI Silava, Riga street 111, Salaspils LV-2169
Phone: +37126595586, Fax: +37167901359
E-mail: andis.lazdins@silava.lv

Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)

Baltic Sea Region Programme 2007-2013

ERAF

Background of forestry sector

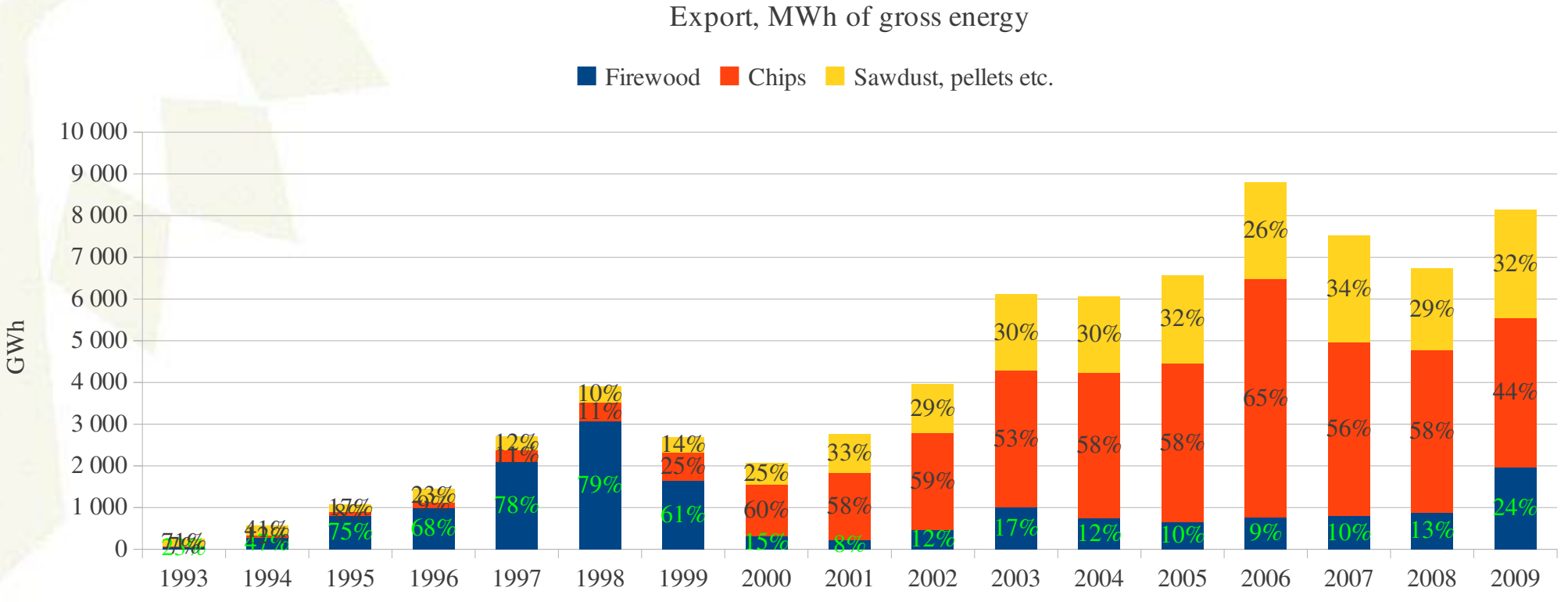
- Forest resources in Latvia:
  - forest area and growing stock;
    - private and municipal forests – 1,35 mill. ha, 266 mill. m^3 (197 m^3 ha^{-1}) ,
    - state forests – 1,46 mill. ha, 305 mill. m^3 (209 m^3 ha^{-1}),
  - harvesting stock in 2009;
    - state forests – 47 kha (7,7 mill. m^3) in total, 24 kha clear cuts,
    - private and municipal forests – 37 kha (3,0 mill. m^3) in total, 12 kha clear cuts.
- Potential of biofuel production in forest operations:
  - total potential – 21 mill. MWh of gross energy annually;
  - accessible resources in stand – 18 mill. MWh of gross energy annually;
  - technically available resources in terminal – 13 mill. MWh of gross energy.
- Weighted average cost of forest biofuel – 14,6 EUR MWh.
- Potential to increase utilization of forest biomass for energy:
  - 73 % of technically available resources;
  - stumps, harvesting residues, small trees and tops from pre-commercial and commercial thinning.

Background of energy sector

- Utilization of forest biofuel in Latvia:
  - wood contributes to 28 % of gross energy consumption (*hydro and wind energy together – only 4,5 %*);
  - district heating (*62 % of gross energy consumption*) – biomass contributes to 2,6 mill. MWh of gross energy consumption;
  - industrial consumption – 0,7 mill. MWh of gross energy consumption;
  - private heating – no reliable statistics available, might be more than 2,5 mill. MWh annually.
- Constantly growing consumption in pellet industry:
  - in 2009 installed capacity corresponds to consumption of 4 mill. MWh (*5 mill. LV m^3*) of biomass;
  - in 2010 installed capacity corresponds to consumption of 8 mill. MWh (*10 mill. LV m^3*) of biomass, including about 2,4 mill. MWh of low quality biofuel (harvesting residues, bark etc.) and 5,6 mill. MWh of high quality biofuel (*sawdust, paper-wood, firewood assortment*).
- Some increase is planned in district heating sector, large systems are *slowly* switching from high quality biofuel to harvesting residues.

Background of export of forest biofuel

- 7,2 mill. MWh in 2009, continuous trend of increase of export of biofuels with higher added value.
- 140 mill. EUR, or 15 % of the total forest sector export in 2009. Turnover of biofuel export is by 42 % bigger than turnover of roundwood export.



History of bioenergy targeted research about short rotation woody crops

- **Willow** plantations was established for scientific research purposes (2000), for energy wood production (2004).
- Breeding program of **hybrid aspen** restarted (2005) (*first experimental plantations in 1998*).
- State research program of deciduous trees **– grey alder** (2007).
- Adapted **informative booklets** for farmers and other concerned (2008).
- Dissertation "Using of wastewater sludge in short rotation willow coppice" (*presented for public criticism at 17 April*).
- International cooperation initiated on testing of commercial clones of **hybrid poplar** (2010).

Existing willows' plantations for biofuel and other purposes

Potentials of production *technical limitations*

- Hybrid aspen – Joint stock company “Latvia state forests”:
  - yearly production of 0,5 mill. seedlings = *200 ha (5 year rotation cycle).*

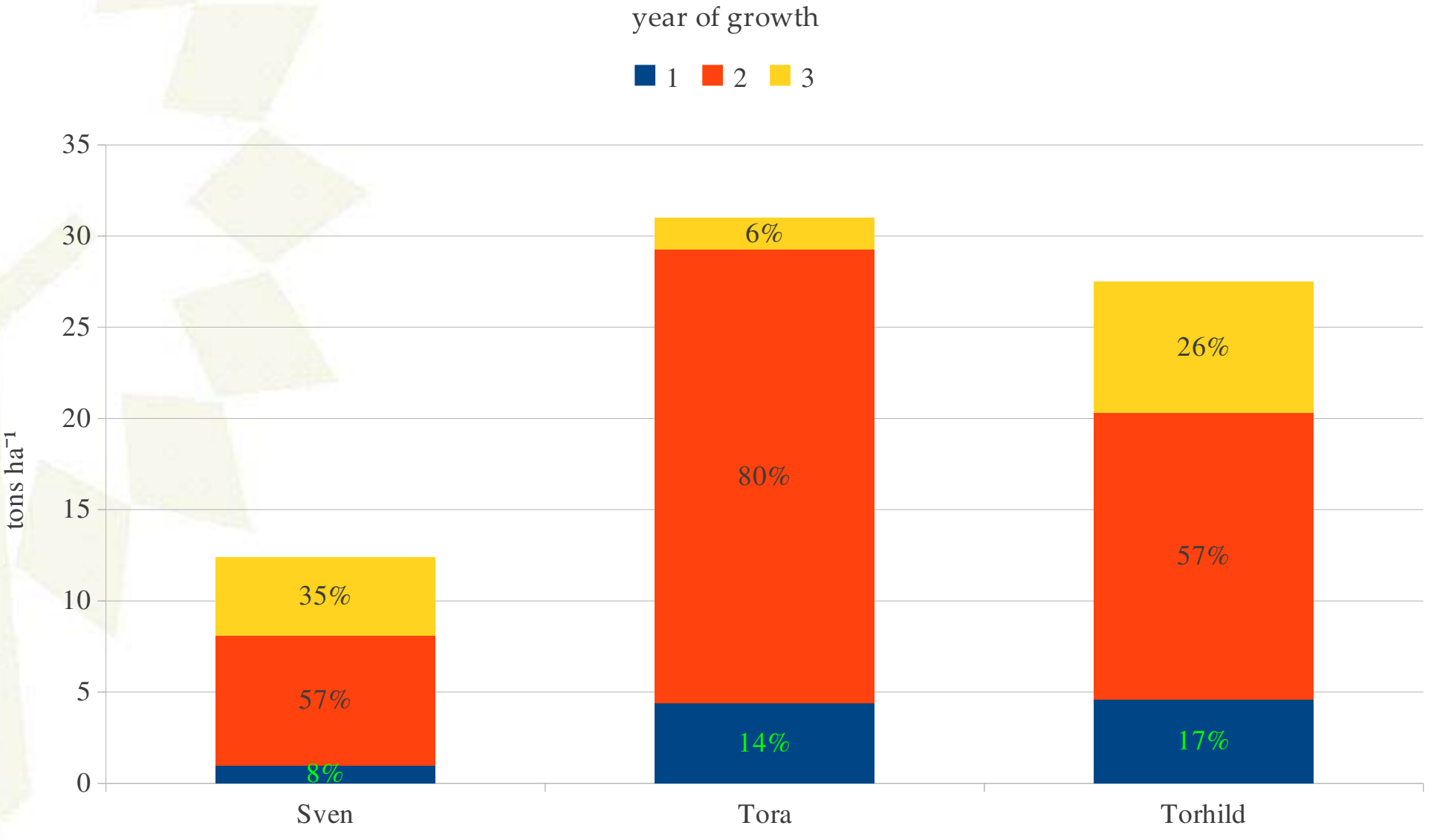
- Grey alder – 328 kha (*12-15 year rotation cycle optionally*).

- Willows – 27 000 tons of wastewater sludge available yearly (*5 year rotation cycle*) =15 kha.

Productivity of different *Salix sp.* clones in Latvia

Variety	Age of plantation	Number of shoots, thousands per ha	Number of shoots from cutting	D_0, cm	H, m	Stock, tons DM ha^{-1}
Sven	1	33,9	2,3	1,1	2,0	1,0
	2	69,0	4,6	1,4	3,3	8,1
	3	**51,2**	**3,4**	**1,4**	**3,7**	**12,4**
Tora	1	55,4	3,7	1,5	2,9	4,4
	2	72,9	4,9	2,1	4,6	29,3
	3	**51,6**	**3,4**	**1,9**	**5,2**	**31,0**
Torhild	1	50,5	3,4	1,6	3,1	4,6
	2	77,8	5,2	1,9	4,5	20,3
	3	**61,2**	**4,1**	**1,7**	**4,6**	**27,5**
S. viminalis	3	102,4	8,5	1,0	3,0	11,6

Formation of growing stock in willow plantations



Growing stock and costs of biomass production

	Willow	Hybrid aspen	Grey alder
Total biofuel amount (k LV m^3)	693	18	4 162
Biomass production costs (EUR LV m^{-3})	6,4 (5,1)*	5,7	3,4

* without costs of fertilization

Willows

Hybrid aspen

Grey alder

Description of biofuel production

Type of resources		Willow	Hybrid aspen	Grey alder coppice	Total/ average
Biomass	tons ha^{-1}	28,50	17,78	25,33	20,45
	kilotons per year	139	4	832	974
	GWh per year	721	19	4 328	5 067
Increment, tons ha^{-1} per year		9,50	3,56	2,53	4,67
Time consumption for production, hours per ton		0,53	0,44	0,31	0,34
Carbon emissions, kg per ton		7,78	6,41	4,50	4,97
Cost	EUR per ton	41,88	36,88	25,90	28,21
	EUR per year	5 806	131	21 557	27 494
Income from biofuel, kiloEUR per year		6 832	175	41 031	48 039
Potential profit before taxes	kiloEUR per year	1 026	44	19 474	20 545
	EUR per ha	70,3	221,7	592,6	431,1

Different options to harvest grey alder

1 LVL = 0,7 EUR

Ongoing project supported by European Regional Development Fund

- Elaboration of models for establishment and management of multifunctional plantations of short rotation energy crops and deciduous trees:
  - aim of the project;
    - to secure implementation of National and European Community targets in the fields of renewable energy and protection of environment, retaining at the same time biodiversity and diversity of rural landscapes,
  - Main tasks of the project;
    - to establish public source of practical information and interactive model for business planning of short rotation crops and plantation forestry based business,
    - to establish multifunctional training plots to demonstrate technologies and management approaches of different species of fast growing trees and grasses with high energy value on abandoned farmlands.

Thank you for attention!