

LONG-TERM FORESTRY AND ENERGY PLANNING

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ETSAP Workshop – Cork

Outline of the presentation

- Forestry and bioenergy sectors
- Project objectives
- TIMES forestry and energy planning model
- Preliminary results
- Conclusions

Forestry and bioenergy sectors



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Forestry and bioenergy

Project objectives

TIMES model

Preliminary results

Conclusions

- Numerous initiatives and targets to increase the use of renewable energy sources in Europe
- Biomass is increasingly being seen as important energy sources in Europe
- Pressure for forestry and agricultural sectors to supply biomass sources for production of:
 - 1st and 2nd generation biofuels
 - Electricity
 - Heat

Forestry and bioenergy sectors



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Forestry and bioenergy

Project objectives

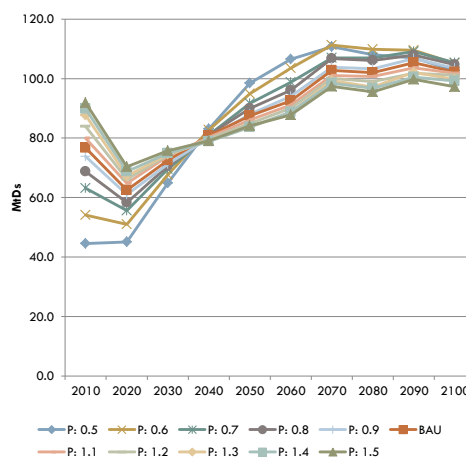
TIMES model

Preliminary results

Conclusions

- Production of forestry biomass is commonly not depending on bioenergy demand!
- Supply of forestry biomass can drastically change over time due to:
 - Harvest levels
 - Economical factors
 - Political factors
 - ...

National forest harvest potential



Forestry and bioenergy sectors



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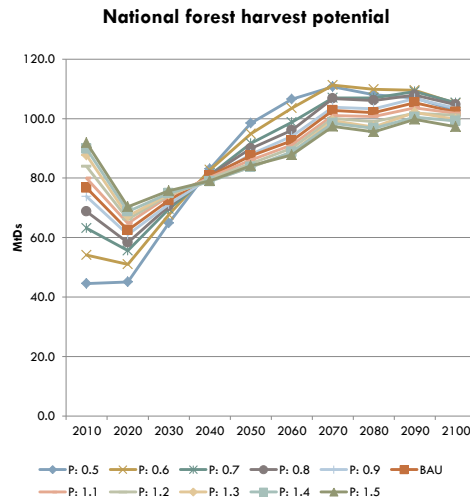
Project objectives

TIMES model

Preliminary results

Conclusions

- From a bioenergy point of view, what is the optimal forestry biomass supply level?
- What is the optimal long-term forest harvesting level?



Project objectives



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Forestry and bioenergy

Project objectives

TIMES model

Preliminary results

Conclusions

- Main aim of project:
 - Analyze the link between the forestry and bioenergy sectors
 - Analyze a long-term forest harvesting level that is optimal from a bioenergy point of view
- Create a TIMES model that considers:
 - Dependencies between the forestry and bioenergy sectors
 - Biomass sources from forestry and agricultural sectors
 - Sub-national resource specification
 - Detailed cost-supply curves of biomass sources
- Case study of Sweden, assessing the development of the forestry and bioenergy sectors

TIMES forestry and energy planning model



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Forestry and bioenergy

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- TIMES model with planning horizon: 2005 - 2100
- End-use demand of bioenergy in terms of:
 - Biofuels for road transport, private heating, district heating and electricity from CHP
- The model only considers:
 - Available agricultural land for energy purposes without competition with food and feed sectors
 - Available wood for energy purposes without competition with pulp & paper, industrial and construction sectors
- No land change between agricultural and forestry sectors

TIMES forestry and energy planning model



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Forestry and bioenergy

Project objectives

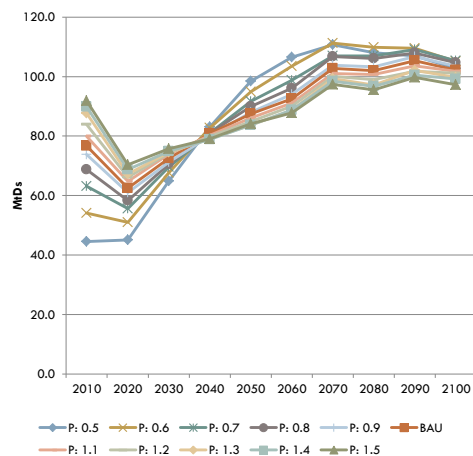
TIMES model

Preliminary results

Conclusions

- A forest harvesting scenario specifies the harvest levels during the time periods
- Optimal harvesting level is computed by the TIMES model as a linear combination of applicable harvesting scenarios

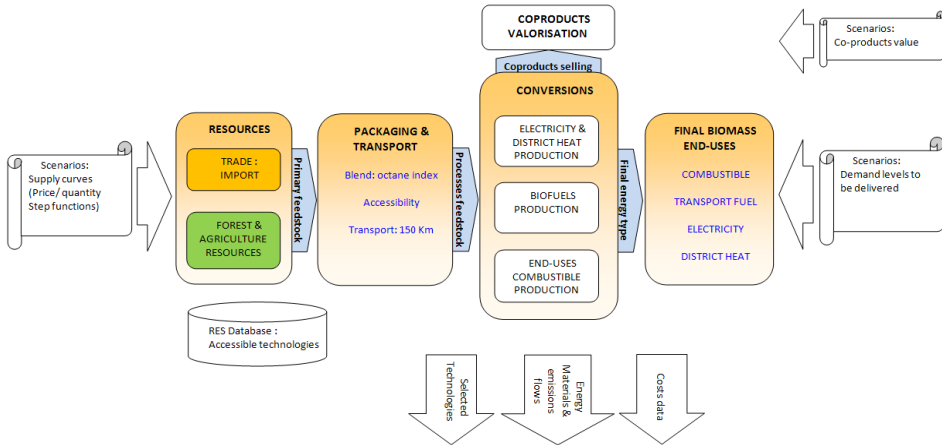
National forest harvest potential



TIMES forestry and energy planning model



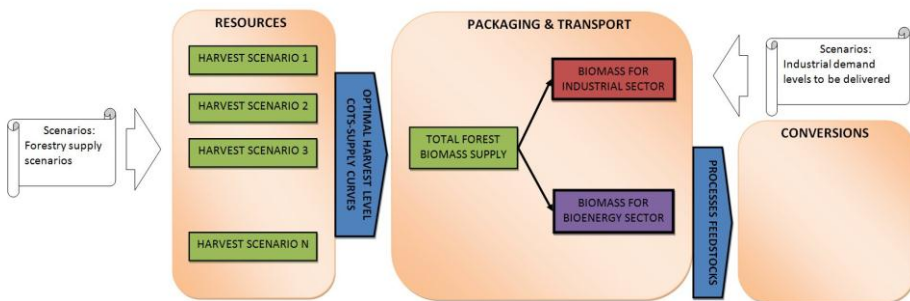
General outline of the proposed TIMES model



TIMES forestry and energy planning model



General outline of the proposed TIMES model

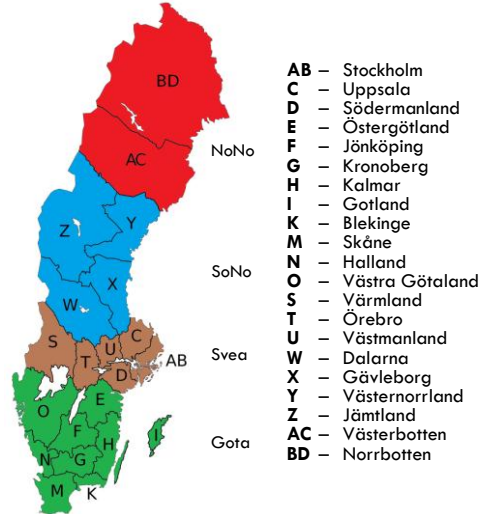


TIMES forestry and energy planning model



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Forestry and bioenergy	Project objectives	TIMES model	Preliminary results	Conclusions

- Sweden is divided into four regions: NoNo, SoNo, Svea, and Gota
- Supply and cost of forestry and agricultural resources expressed on national and regional level

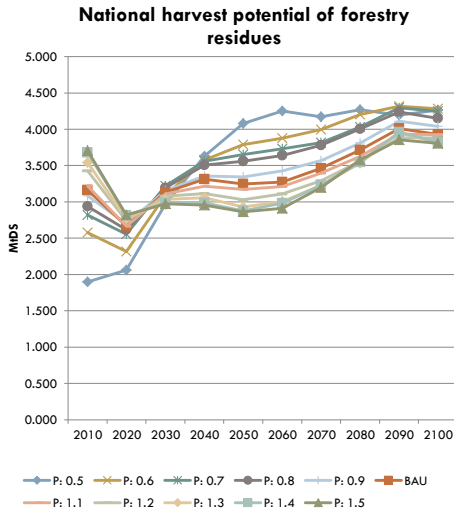


TIMES forestry and energy planning model



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Forestry and bioenergy	Project objectives	TIMES model	Preliminary results	Conclusions

- Forestry biomass resources separated into:
 - Forestry residues (crown & branches)
 - Stemwood (top stem & small stems)
 - Refined woody products (pellets)
- Harvest level impacts supply of forestry residues and stemwood



TIMES forestry and energy planning model



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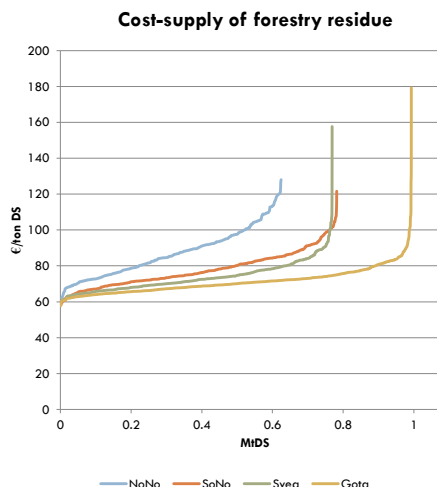
Project objectives

TIMES model

Preliminary results

Conclusions

- Supply cost of forestry biomass sources comes with high spatial variability
- Model considers detailed cost-supply curves of forestry biomass sources for each region



TIMES forestry and energy planning model



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Forestry and bioenergy

Project objectives

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Conclusions

- Numerous agricultural biomass sources are considered:
 - Starch, Sugar, Oil, Woody, and Grassy crops
- Detailed technology database including the most promising 2nd generation biofuel production

	Starch crops		Sugar crops	Oil crops	Woody crops	Grassy crops	Forestry products
	1 st	2 nd	1 st	1 st , 2 nd	2 nd	2 nd	2 nd
Bio-diesel				X			
Bio-ethanol	X		X		X	X	X
FT-diesel		X			X	X	X
Bio-HVO				X			

Preliminary results



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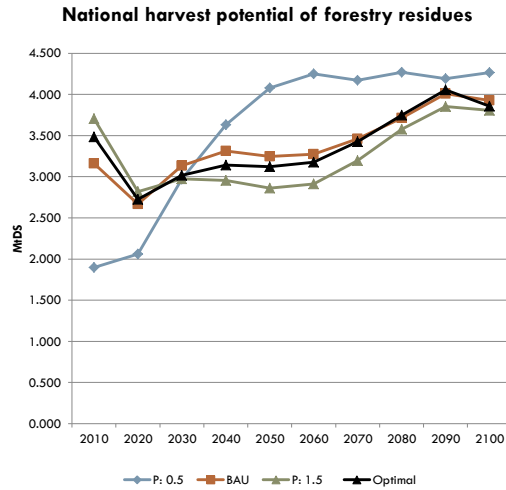
Project objectives

TIMES model

Preliminary results

Conclusions

- Optimal forest harvesting level is computed by the TIMES model
- Optimal forest harvest level is promoting:
 - High short-term harvest
 - Low mid-term harvest
 - BAU end-term harvest



Preliminary results



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Forestry and bioenergy

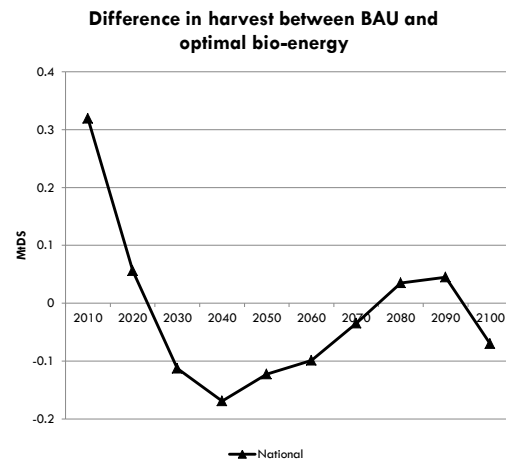
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Preliminary results



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Forestry and bioenergy

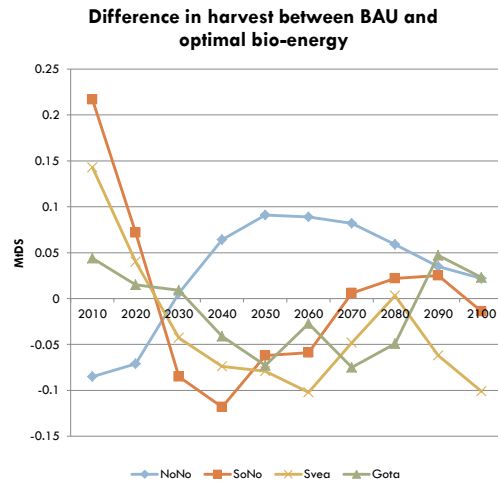
Project objectives

TIMES model

Preliminary results

Conclusions

- Optimal forest harvesting level is computed by the TIMES model
- Optimal forest harvest level is promoting:
 - ▣ High short-term harvest
 - ▣ Low mid-term harvest
 - ▣ BAU end-term harvest
- High regional differences in harvest levels



Conclusion

Conclusion



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Forestry and bioenergy

Project objectives

TIMES model

Preliminary results

Conclusions

- We are developing a TIMES model for analyze the link and dependencies between the bioenergy and forestry sectors
- Model can be used to:
 - Optimize long-term forest harvest level from a bioenergy point of view
 - Analyze regional differences in biomass utilization
 - Analyze value and impact of adapting forest harvest levels to bioenergy demand