

Estimating the forest biofuel resource:

the problem of different assessment criteria
and of communicating diverging results
or

politicians' questions and researchers' answers
– will they ever meet?

Jan-Erik Nylund

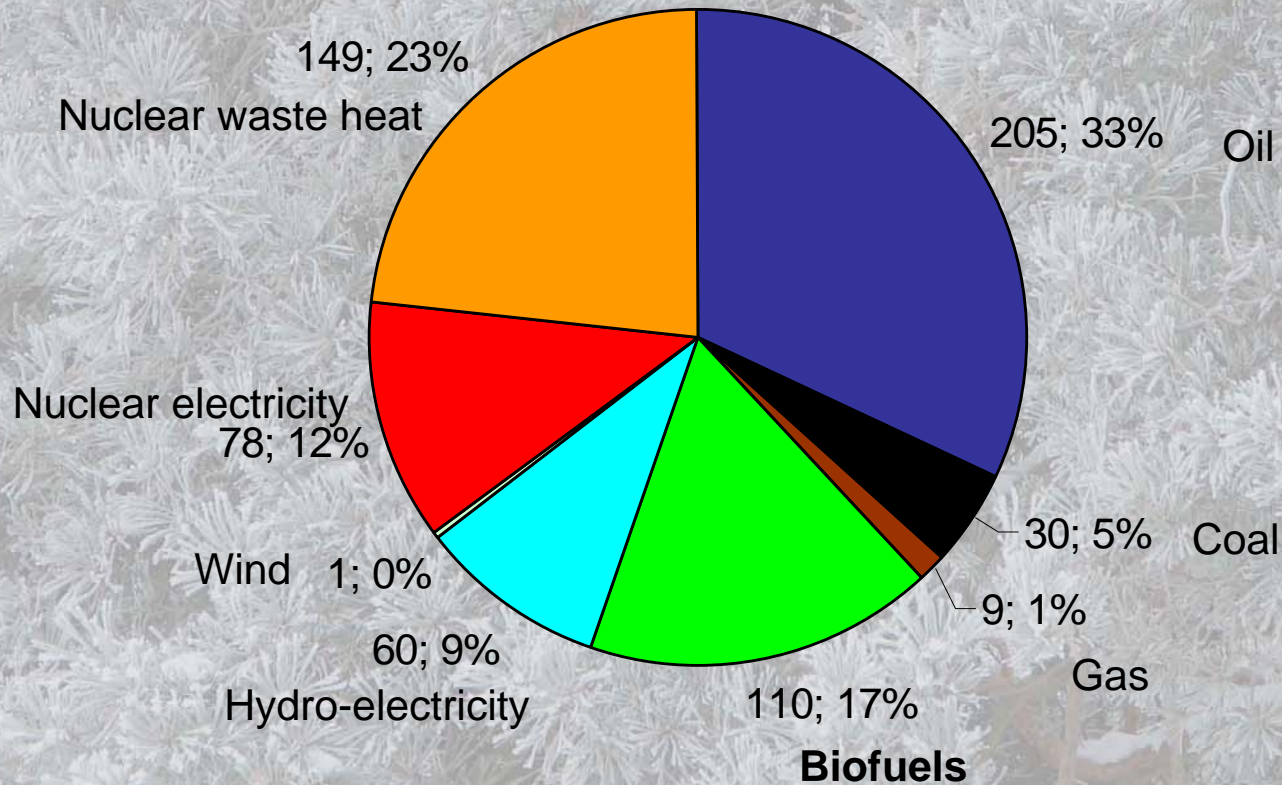
Dept. of Forest Products, SLU Uppsala

jan-erik.nylund@sprod.slu.se

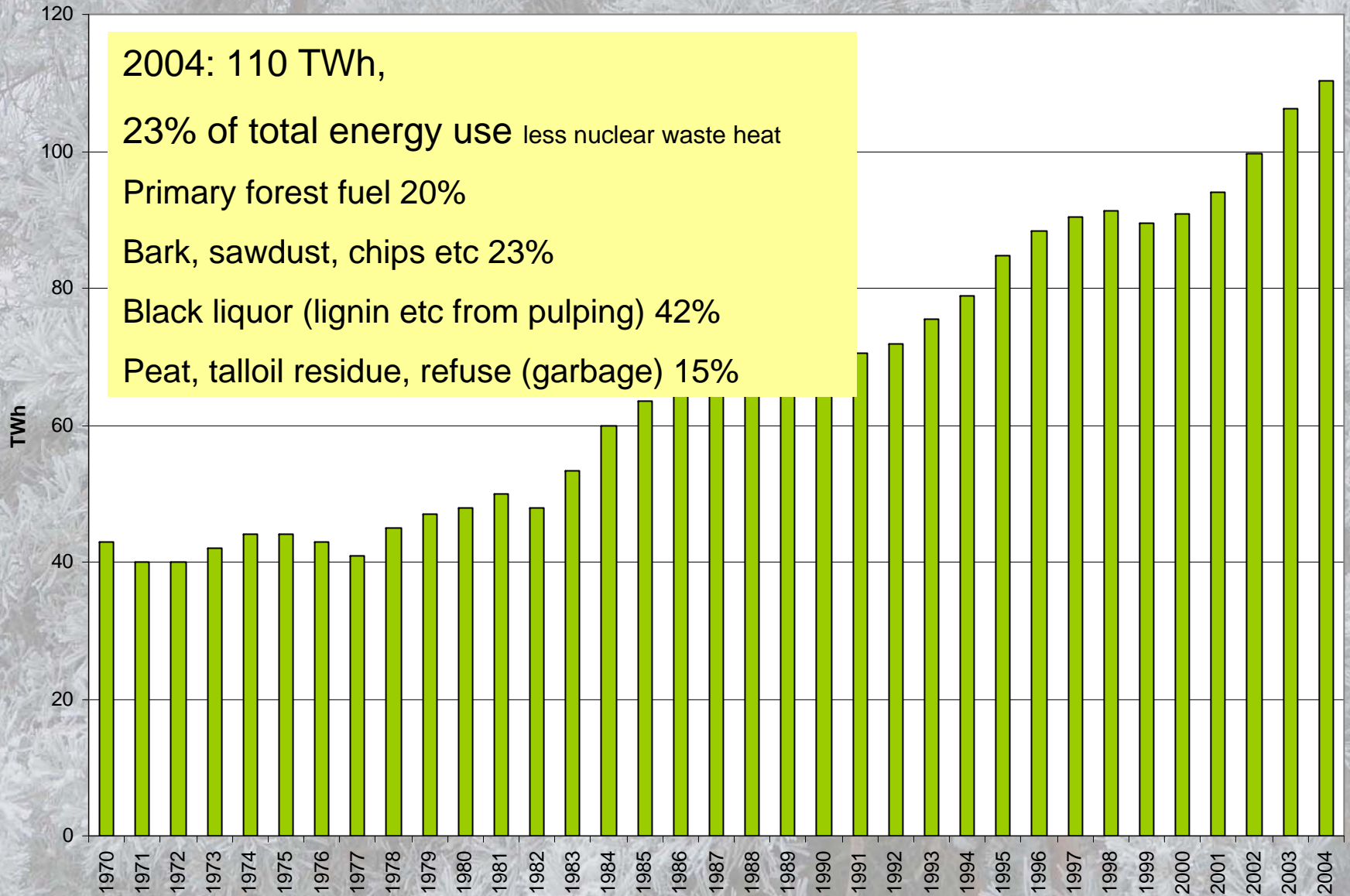


**Background:
Biofuels in Sweden**

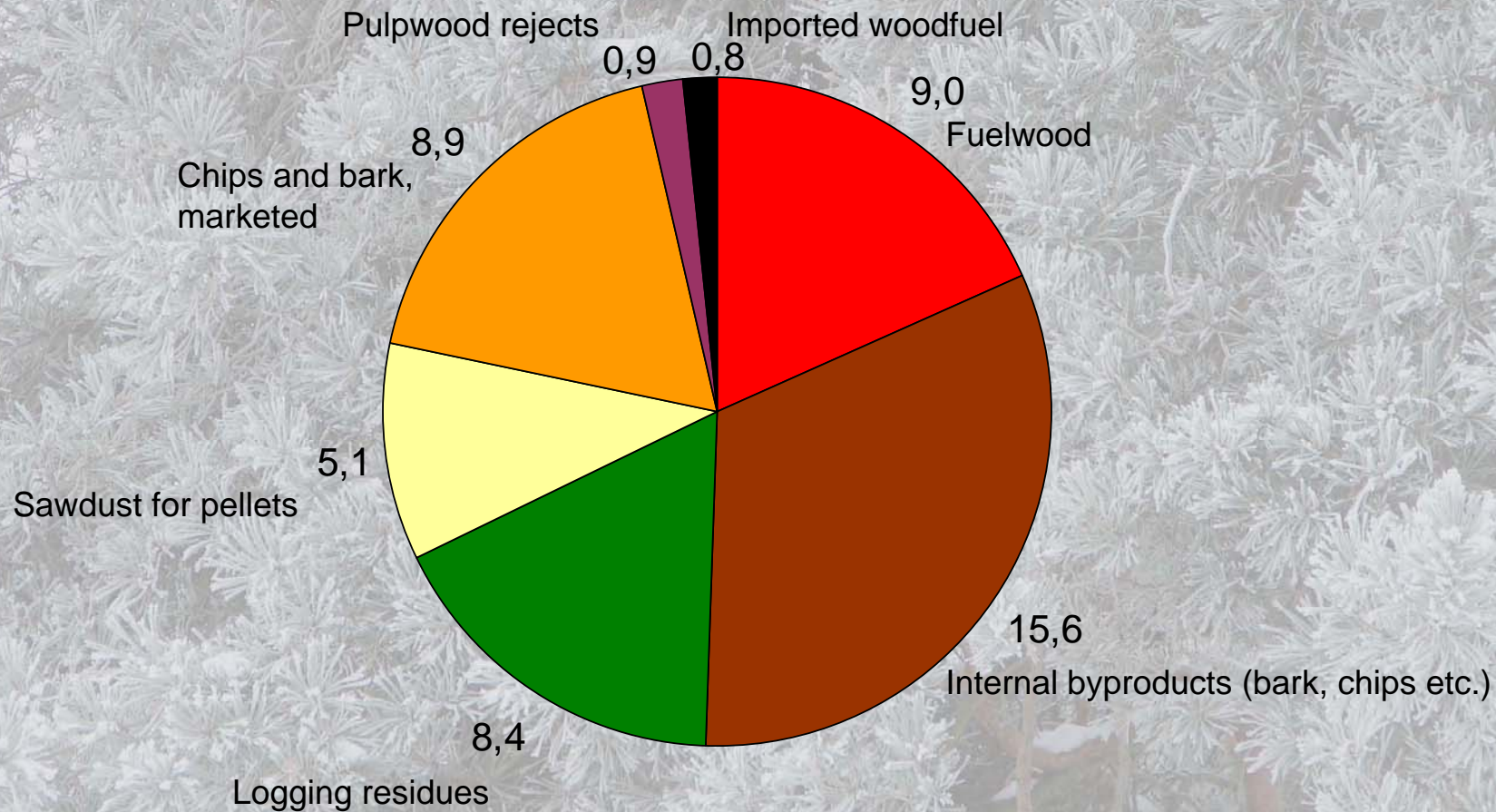
Total energy input in Sweden 2005: 647 TWh



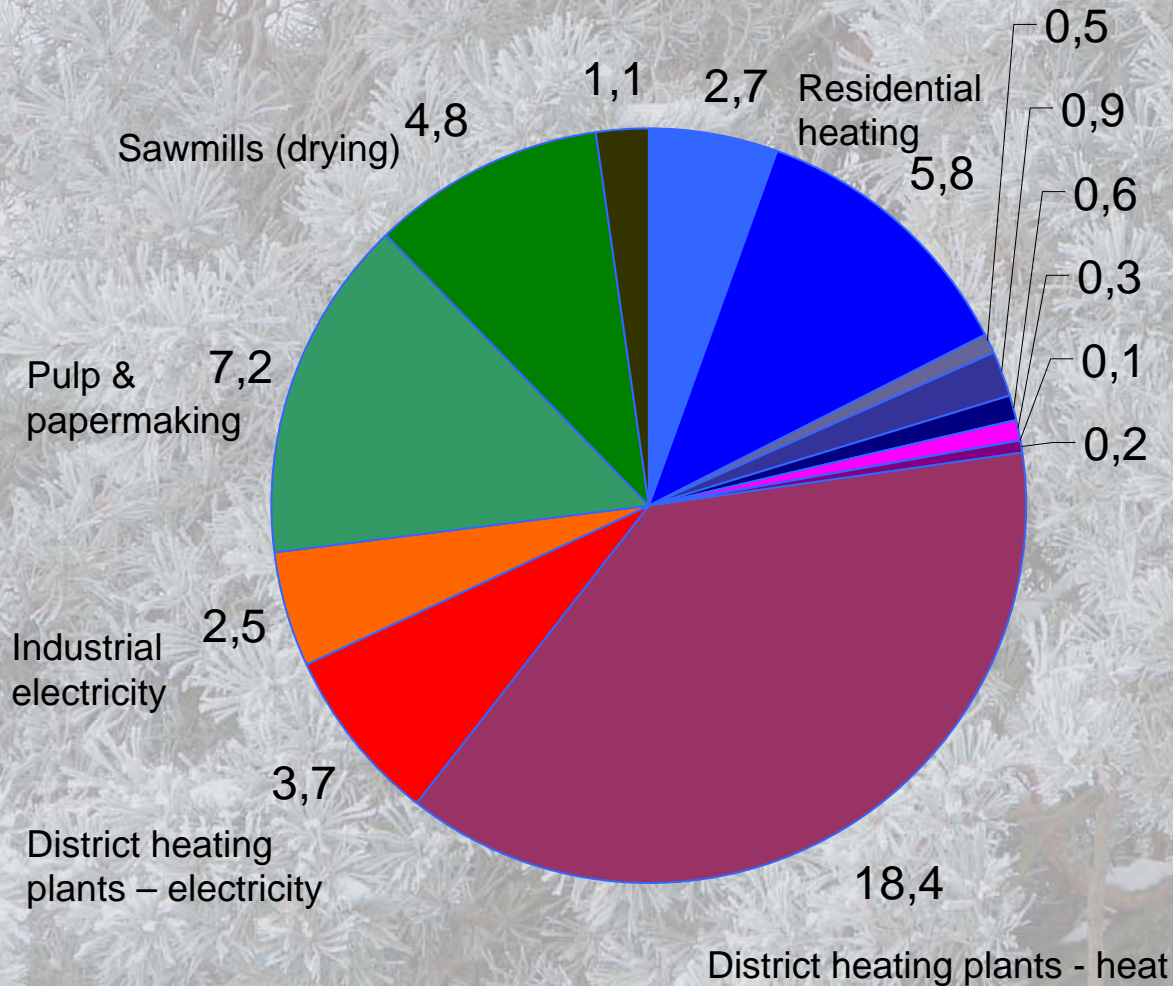
Expansion of biofuels 1970 - 2004



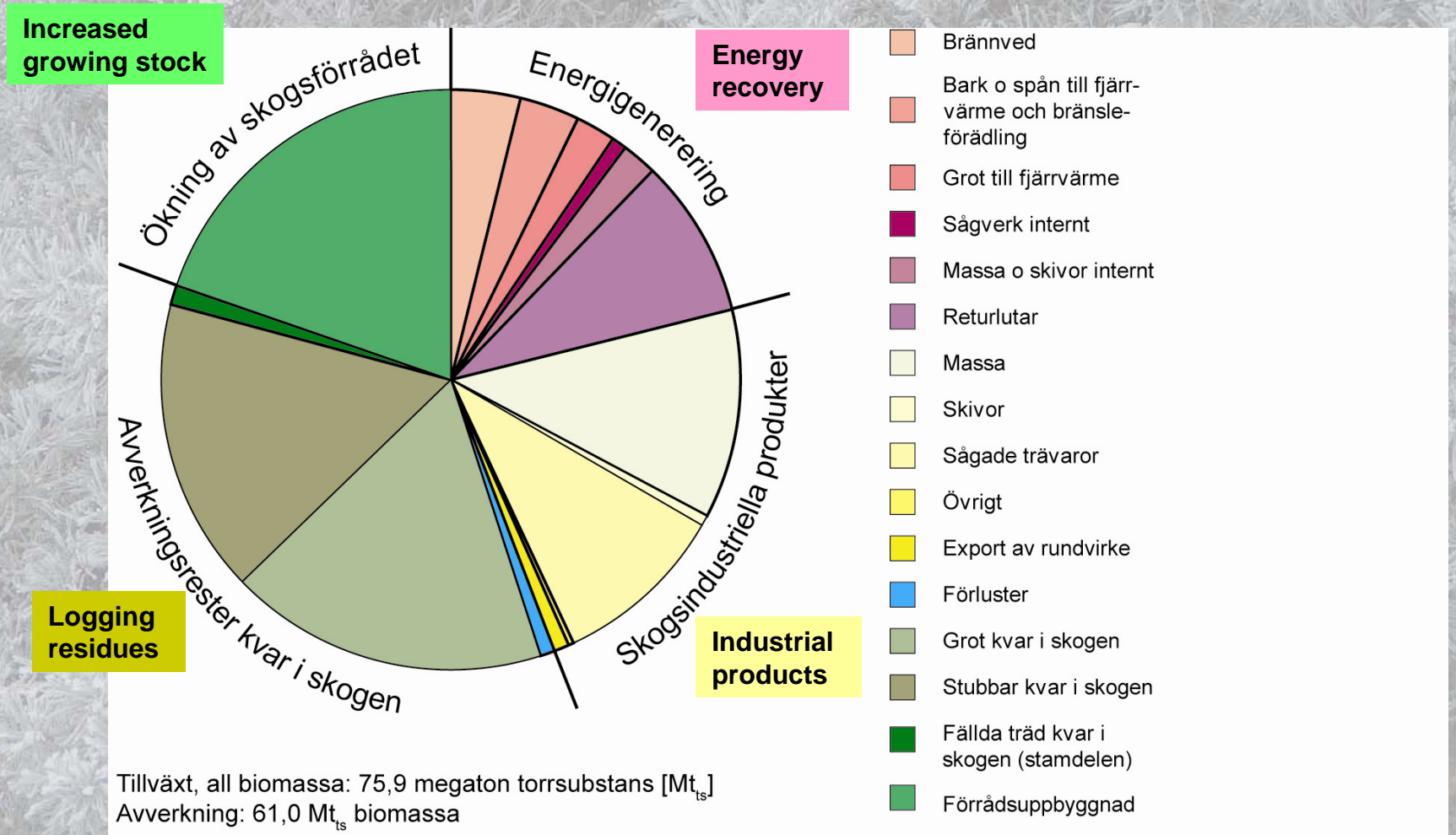
Sources of forest fuel 2002, TWh,



Users of forest fuel 2002, TWh



Fate of growing trees in Sweden – the total biomass





Estimating the primary forest fuel resource

SFA-SLU calculation

- National forest inventory data on branchwood, top and needle volumes in different stand types and volume & age classes
- Modelling of possible cutting for next 100 years under different management regimes (SKA 99) gives information on gross residues volumes
- 75% of branch and top wood, 25% of needles considered available for fuel harvesting (average 62%)

Forest Industries' calculation

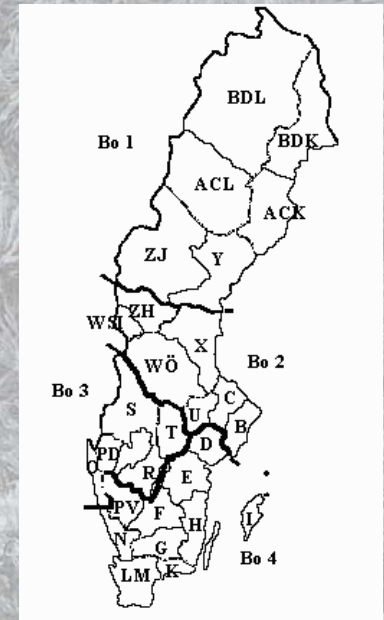
- Step 1: prognosis of roundwood extraction volumes according to SKA 99
- Step 2: empirical correlation between roundwood harvest and logging residues recovery
- Step 3: estimation of proportion of fellings where biofuel is harvested
- No harvesting from thinnings
- Stump collection in some spruce forests

Fuel potential estimates vary widely depending on criteria applied

Forest fuel potential estimates, TWh (incl. current use)	SLU	Sw. Forest Industries
	2004	2005
Residues from 1st thinning	6,1	-
Residues from other thinnings	9,6	-
Residues from final felling	25,8	15,0
Left small trees, below-grade lumps etc	3,9	
Long tops and trees from pre-commercial thinning	12,5	6,8
(Domestic) fuelwood felling, various sources	7,8	9,0
Trees from non-forest	2,9	
Rejects from saw- and pulpmills	4,9	2,7
Forest fuel - stumps not included	73,5	33,5
Byproducts: bark, chips and sawdust	16,7	
Stumps		5,1
Recycled wood (from Sweden)	3,9	
Total	94,1	

Expansion potential according to Forest Industries 2005

1.	Northern	616%	3,7 TWh
2.	Eastern Central	140%	2,1 TWh
3.	Western Central	40%	0,6 TWh
4.	Southern	44%	1,5 TWh



- Total residues expansion potential 114% - 8 TWh
- Present residues use 7 TWh – (SLU's estimate 8,4 TWh)
- Forecasted *total* biofuel 10-year demand expansion 11,6 TWh

What influences the price of forest biofuel?

- Swedish taxes
 - Energy taxes specific for each fuel – biofuel is tax exempted. Introduced in 1979, frequently adjusted.
 - Carbon dioxide tax relative to CO₂ released – biofuel tax exempted. Introduced in 1991.
- Market-driven regulatory mechanisms
 - Green/Renewable electricity certificates – all consumers have to buy certificates proportional to their energy use. Producers of renewable electricity get marketable certificates for their production. Introduced 2003. Target 17 TWh year 2017 (total electricity used 2004 was 131 TWh)
 - ETS = European Union emissions trading system. Introduced 2005
- Market prices of
 - Pulpwood and low-grade saw timber
 - Alternative fuel feedstock
 - Actual production and transport costs

... and price influences availability

Biofuel discussions in media tend to assume that we live in a centrally planned economy!



And now –

the dilemma of informing the public

Abbreviations & sources

- SLU: Swedish University of Agricultural Sciences (responsible for the National Forest Inventory)
- SFA: Swedish Forest Agency
- Forest Industries: Swedish Forest Industries Federation
- SKA 99: 100-year modelling and forecasting of Sweden's forest production under various management scenarios, using the HUGIN model. Basic data and modelling by SLU, design and analyses by SFA