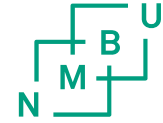


Use of backcasting in forest sector models

SSAFR Uppsala, August 20 2015

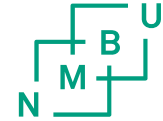
Hanne K. Sjølie,

Norwegian University of Life Sciences



Outline

- About backcasting
- How forest sector models can be useful for backcasting
- The case
- Lessons learned

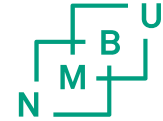


Backcasting

- ✓ Foresight method dating back from the 1970s. Popularized by Lavin's «Soft energy path» (A. Lavins: Energy Strategy: the road not taken? *Foreign Affairs* Oct. 1976)
- ✓ Much used in energy system analyses and sustainability analyses
 - ✓ Which requirements have to be met to reach a desirable/given future?
 - ✓ What are the effective economic and policy decisions to reach this future?
 - ✓ What policies/societal changes and decoupling from the past are necessary to reach a given future?
- ✓ Thus, differ from forecasting (which is based on continuation of current/past trends as consumption patterns, technologies..)

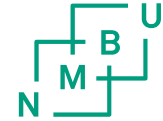
Objective of study: To explore how a forest sector model can be useful in backcasting, using a pronounced vision for the Norwegian forest sector





The Norwegian forest sector

- Annual cuts of about 10 million m³ is about 2/3 of the long-term sustainable yield (and 40% of growth)
- P&P industry was traditionally concentrated around newsprint and magazine paper. Large changes the last few years, with several large mills shut down and production about halved
- With harvest levels stable-to-increased, trade of fibers have shifted from ~2.5 mill. m³ in net imports to ~3 mill. m³ in net exports in a few years



«Forest22» [Skog 22]

- Large committee appointed by the government 2013, delivered final report last January
- Vision (excerpt): wood-based preferred in the markets and constitute a key role in the Norwegian bio-economy.
- Objectives:
 - Harvest levels increase to 15 million m³
 - High degree of domestic manufacturing and value-added
- How to reach the goals:
 - More available capital for investments
 - More industrialization and use of wood in buildings (urban)
 - Policies to trigger demand for 2G biofuels and bio-heating
 - Larger properties, more effective harvest, more forest roads



Recommendations

- More available capital for investments
- More industrialization and use of wood in buildings (urban)
- Policies to trigger demand for 2G biofuels and bio-heating
- Larger properties, more effective harvest, more forest roads

Scenarios

Ref: Reference scenario

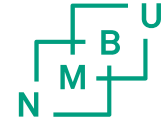
S1: Reduced investment costs for sawmills (down 30%)

S2: S1 + price growth (import/export) sawn wood 2% p.a.

S3: S2 + biodiesel (1 mill. cbm) and energy prices increase (up 30%)

S4: Harvest costs reduced (30% down)

S5: S3 + S4



NorFor – a forest sector model of Norway

Simulating 3 groups of agents and how these groups maximize the

- ❑ Industry ➤ surplus
- ❑ Consumers ➤ utility from consuming wood products
- ❑ Forest owners ➤ surplus from sale of timber and harvest residues and the utility of owning old forest

- ✓ All agents are price-takers, but prices are endogenous to the volumes produced and consumed in each region
- ✓ The model simulates how these groups of agents adapt to changes in economic and policy frames
- ✓ Consistency throughout the value chain – changes in one side impact the entire sector

Trade



Forestry

Based on ~9000 NFI plots
Several forest management options and harvest timing possible; in the optimization each hectare is assigned a management plan and harvest timing



Industry

Input factors: capital, labor, energy, fiber varying with mills/counties
Processing into sawnwood, P&P, bioenergy products

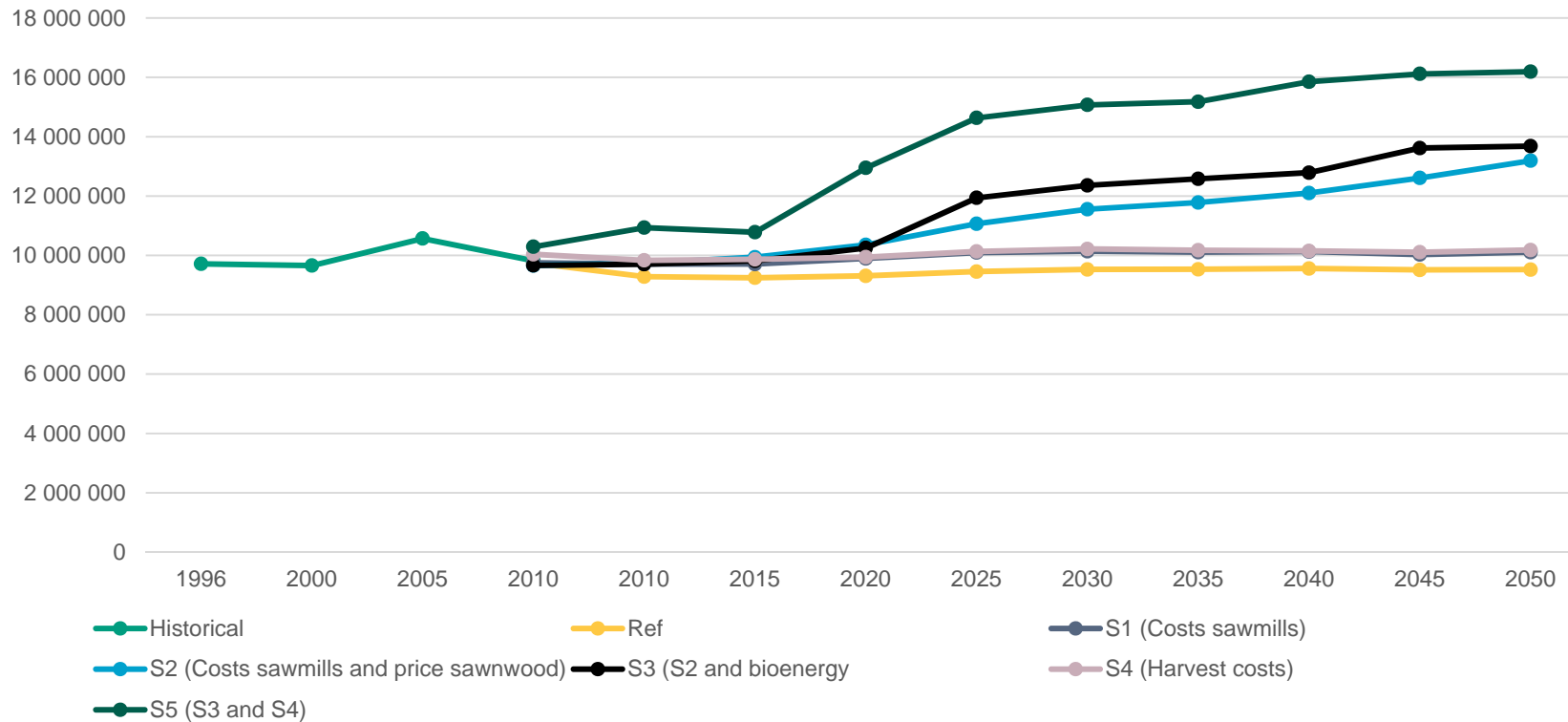


Consumption

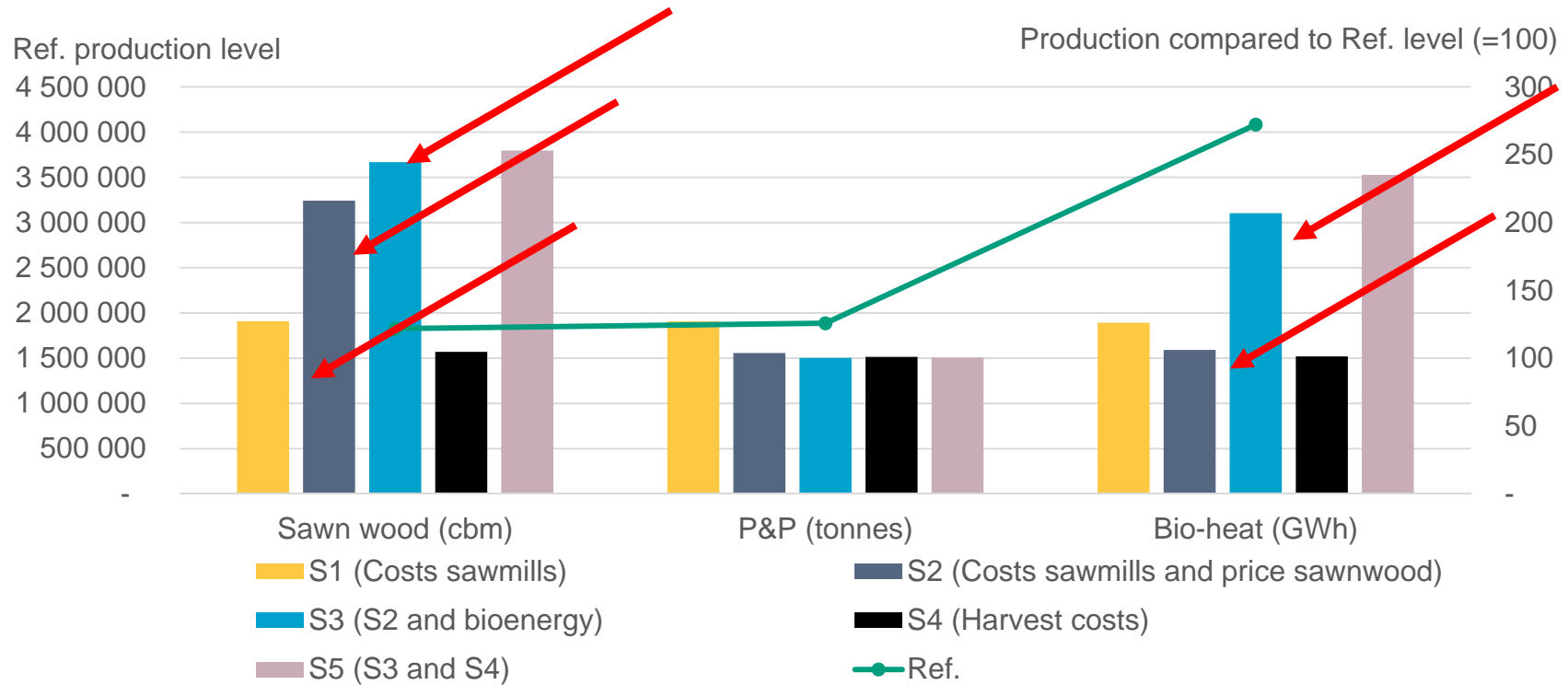
Function of GDP per capita, population and price
3 types of sawnwood, 2 of boards and of pulp, 5 of paper and 3 of bioenergy
3 market bio-heat segments: spatial heating, water borne, industry

**Prices and quantity given in the optimal solution —
all markets balance**

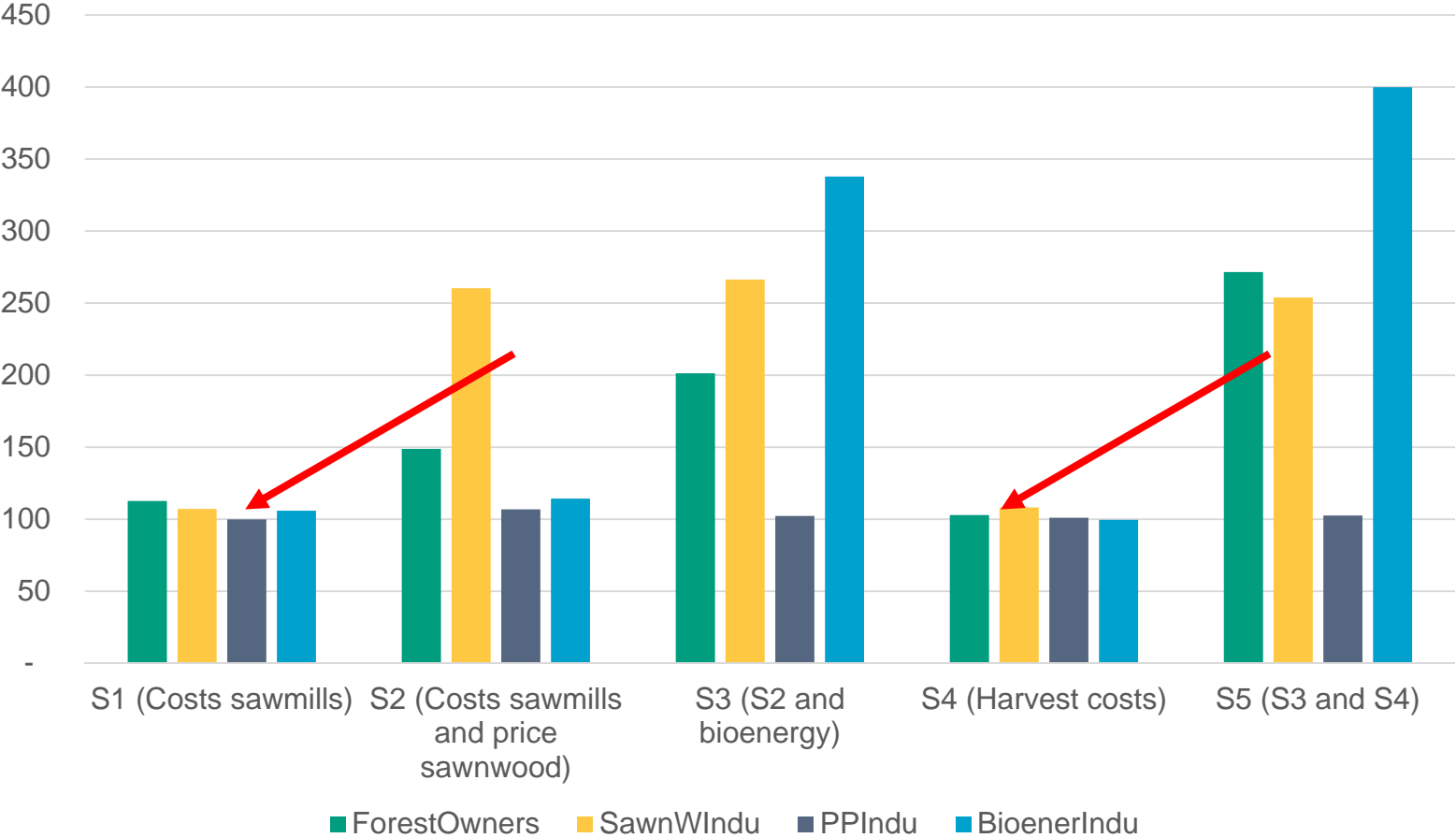
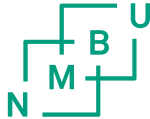
Domestic harvest



Production levels 2050



Changes in producer surplus (Ref=100)





Discussion

- Backcasting offers useful information of the required steps to be taken in order to reach a given future
- However, in order to be provide realistic information, foresight studies also need to consider the current situation
- Forest sector models with high degree of resolution are useful for providing realistic estimates of impacts of policies
- Combination of several approaches give better basis for policy recommandations
- Forest sector models can identify
 - leverage points where policies can be cost-effective
 - interactions between different segments of the sector
- Balancing realism in the projections vs. necessary decoupling to reach objectives



Thank you!

hanne.sjolie@nmbu.no