

Case study: Boreal and temperate forests



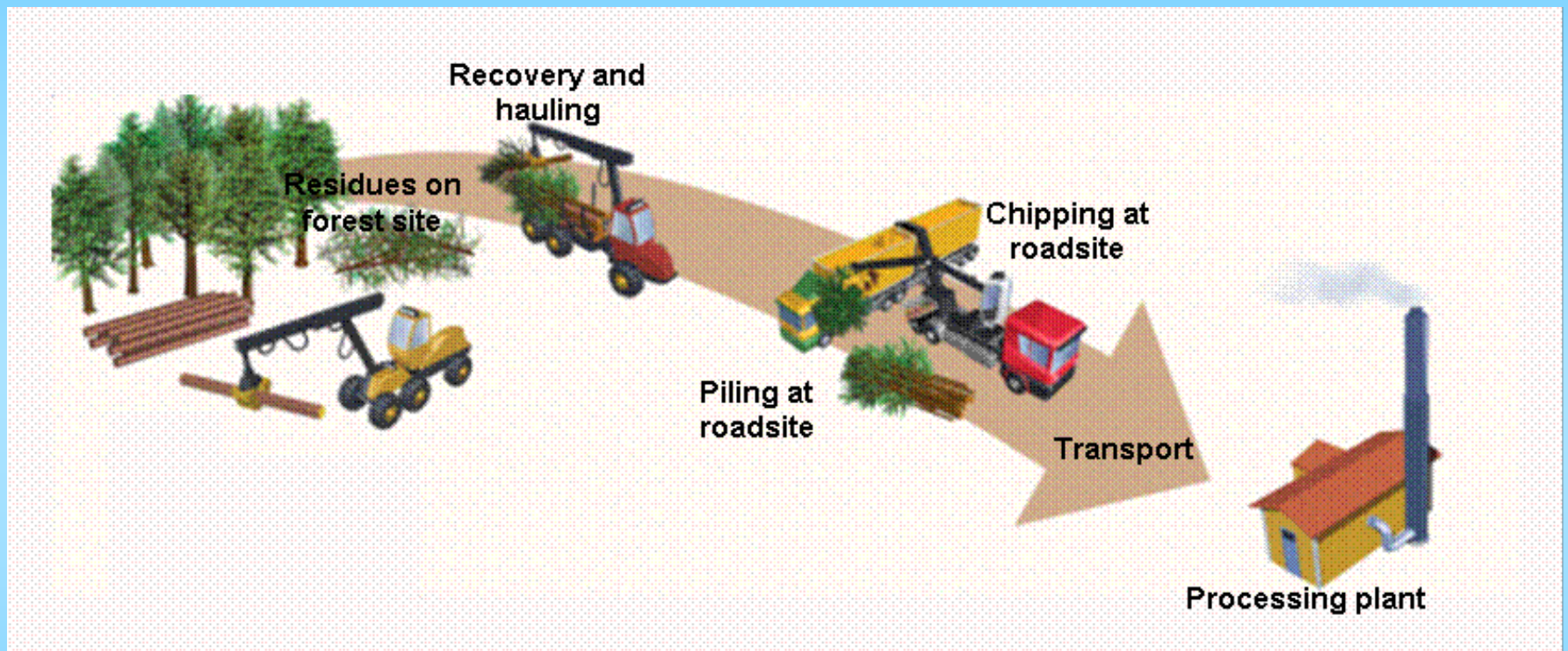
Supply chain:

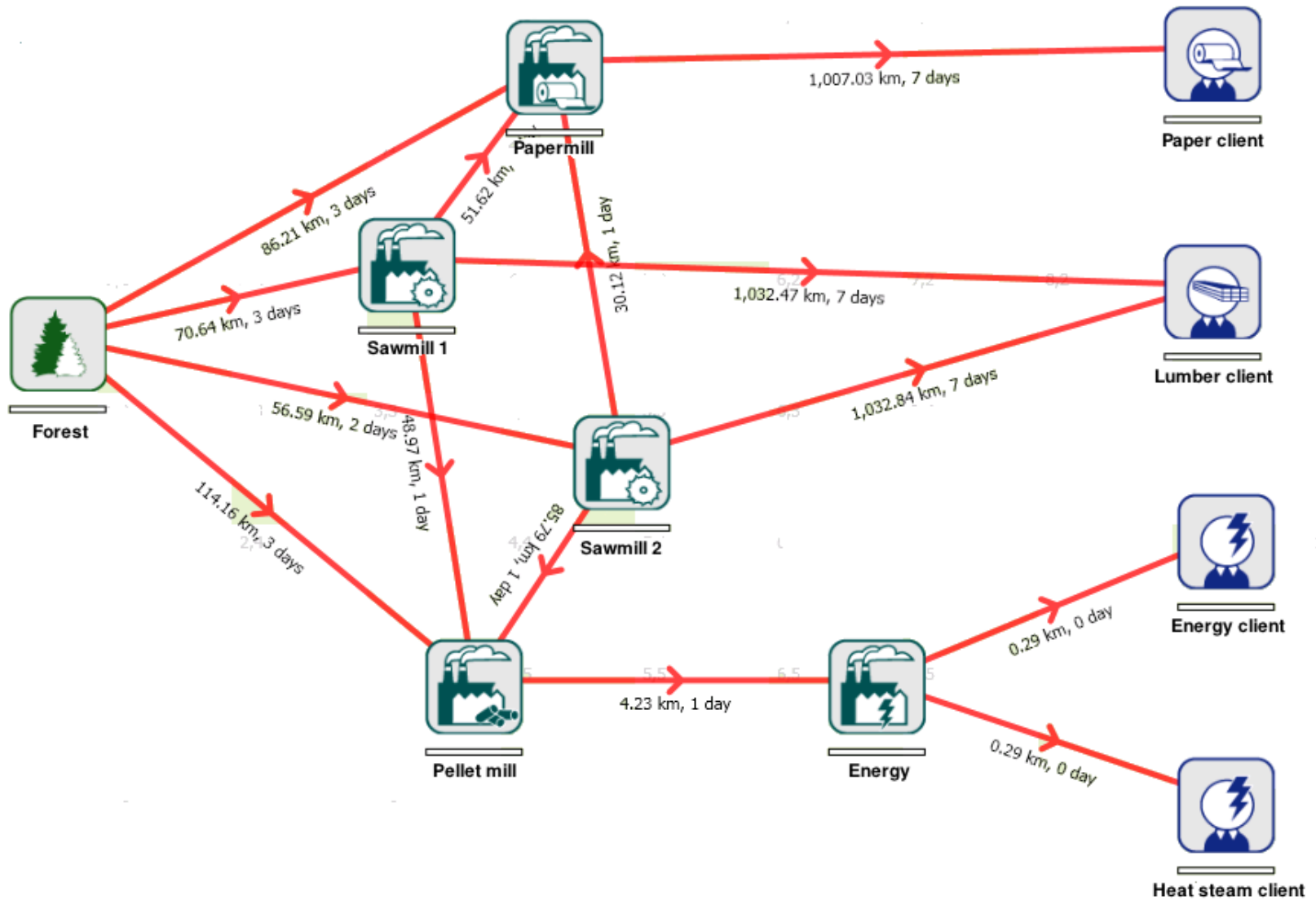
Network of organizations, people, activities, information and resources involved in the physical flow of products from supplier to customer.

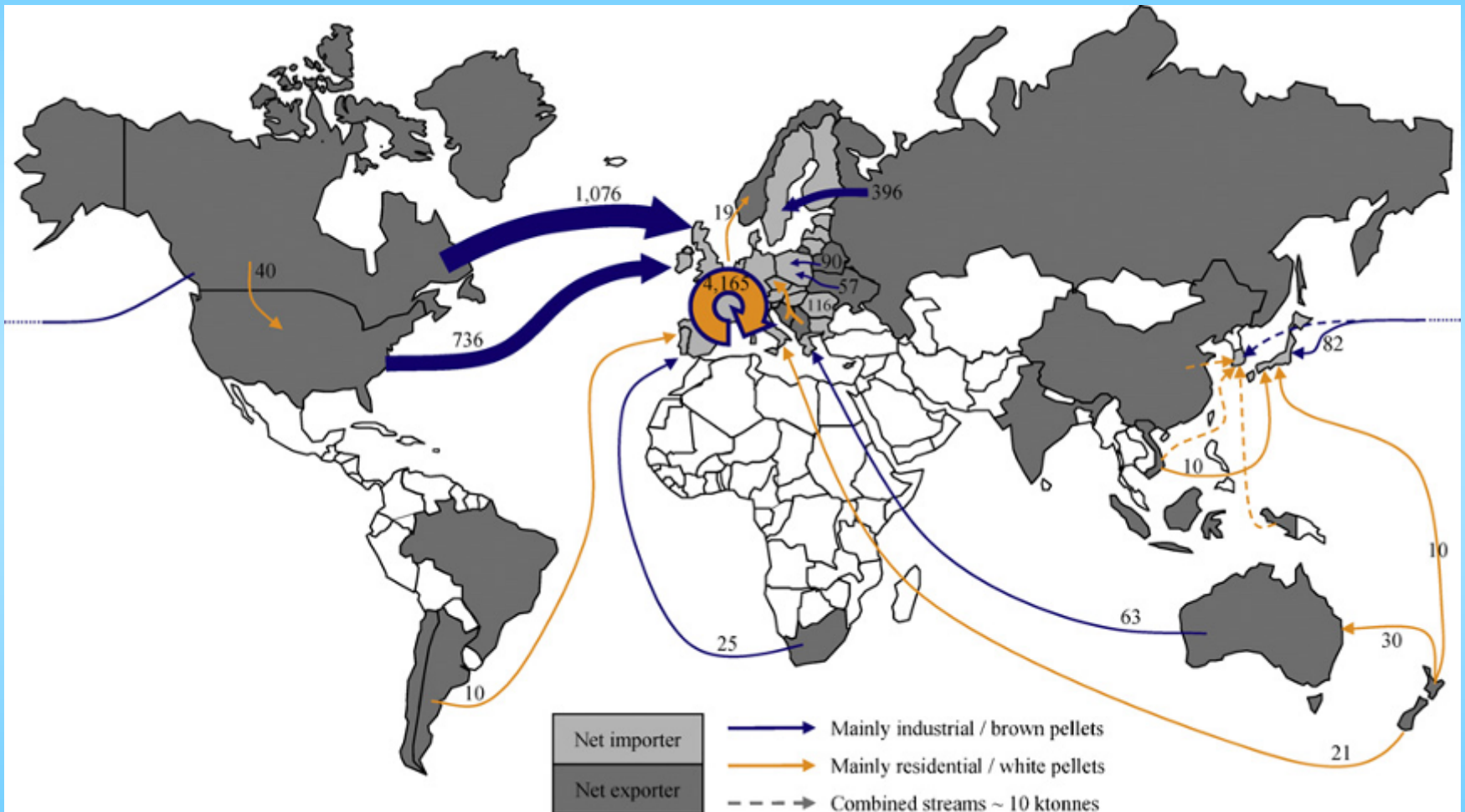
Functions of:

- procurement of raw materials
- transformation of these materials into semi-finished products and finished products
- transportation between facilities and to customers

- Actors
- Processes
- Material flow
- Information flow
- Financial flow







External environment
Theoretical resources
Policies
Industry sector
International sector

Framework of analysis for wood supply chains

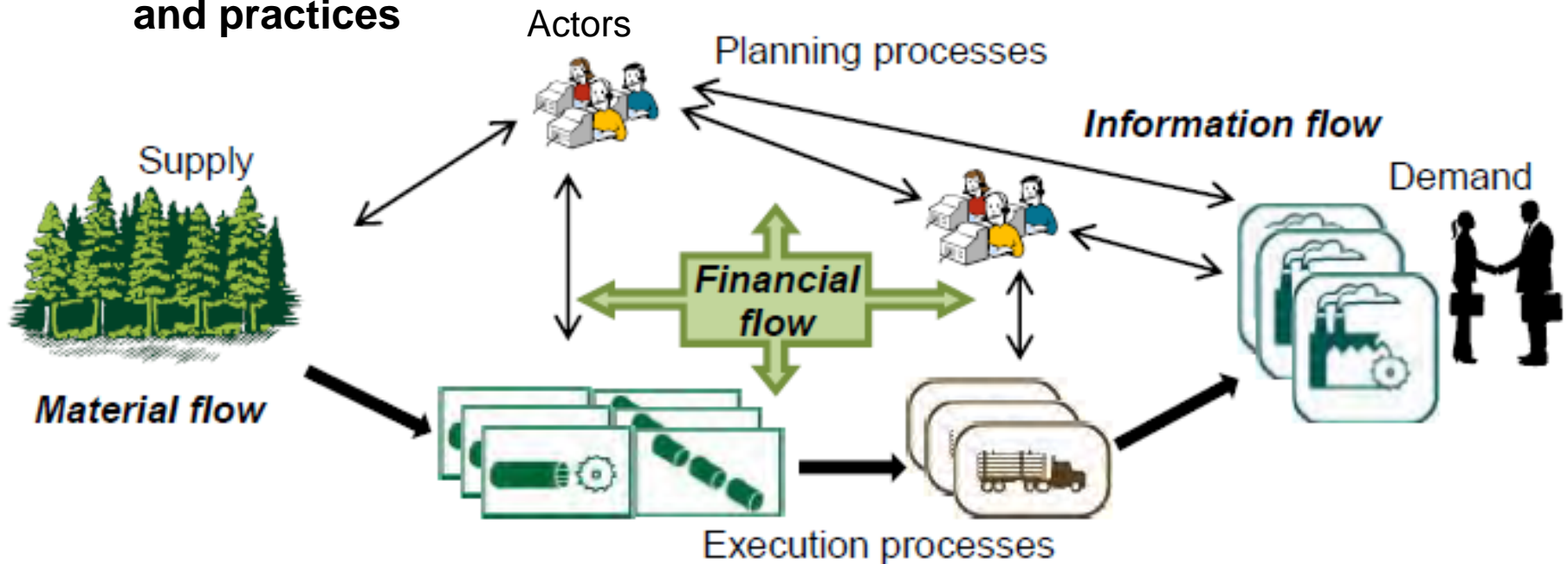
Source: Audy et al.

Performance
Efficiency
Agility
Profitability

Sustainability

Business strategy

Supply chain structure and practices



Canada

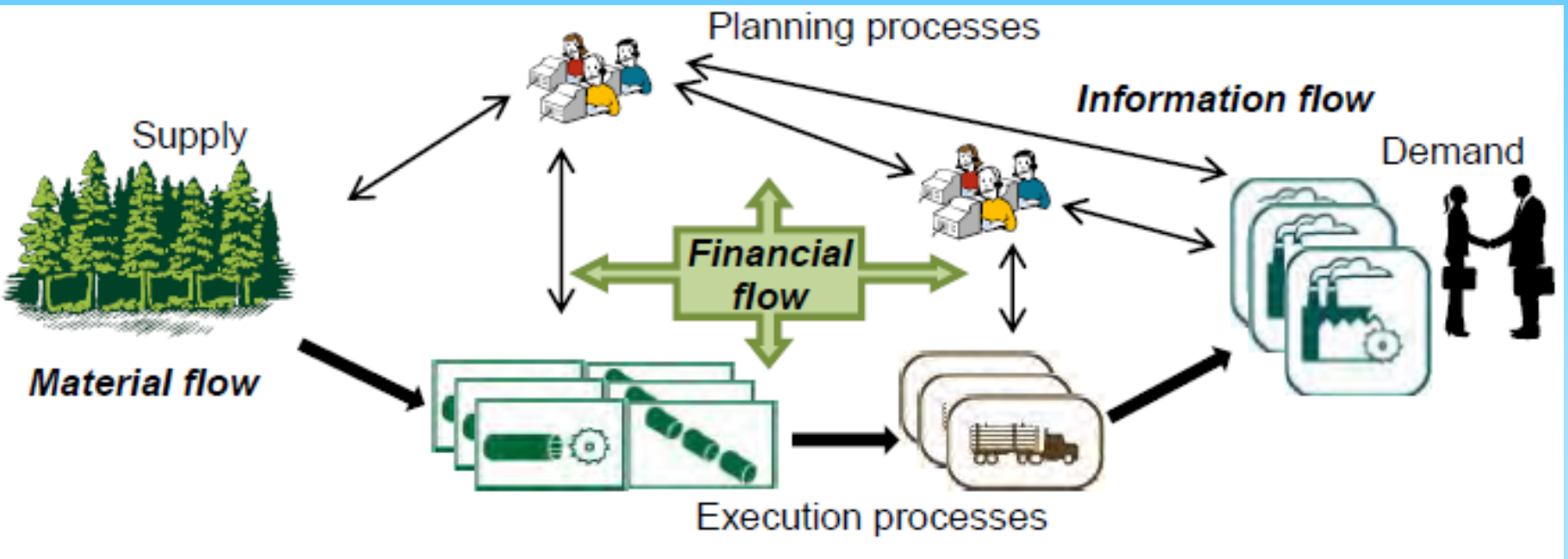


Immature forest bioenergy sector

Sweden and Finland



Mature forest bioenergy sector



Feedstocks:

- Primary forest residues
- Secondary residues
- Bioenergy plantations
- Unutilized forest growth

Model of deployment:

- Local heat and/or power
- International trade of pellets
- Biorefineries

Two axes of analysis:

Country Deployment	Canada	Sweden - Finland	Other?
Local heat and/or power			
International export of solid biomass			
Biorefineries			
Other?			

Main aspects of mobilisation:

Forest biomass supply inventory

Sources of uncertainty in estimates, drivers of supply

Logistics of supply chains

Organisation of actors

Main decision nodes and decoupling points

Factors that influence performance

Sustainability

Environmental footprint: soil, water, biodiversity, GHG balance

Trade-offs between ecosystem services

Other?

External environment

Theoretical resources
Policies
Industry sector
International sector



Business strategy



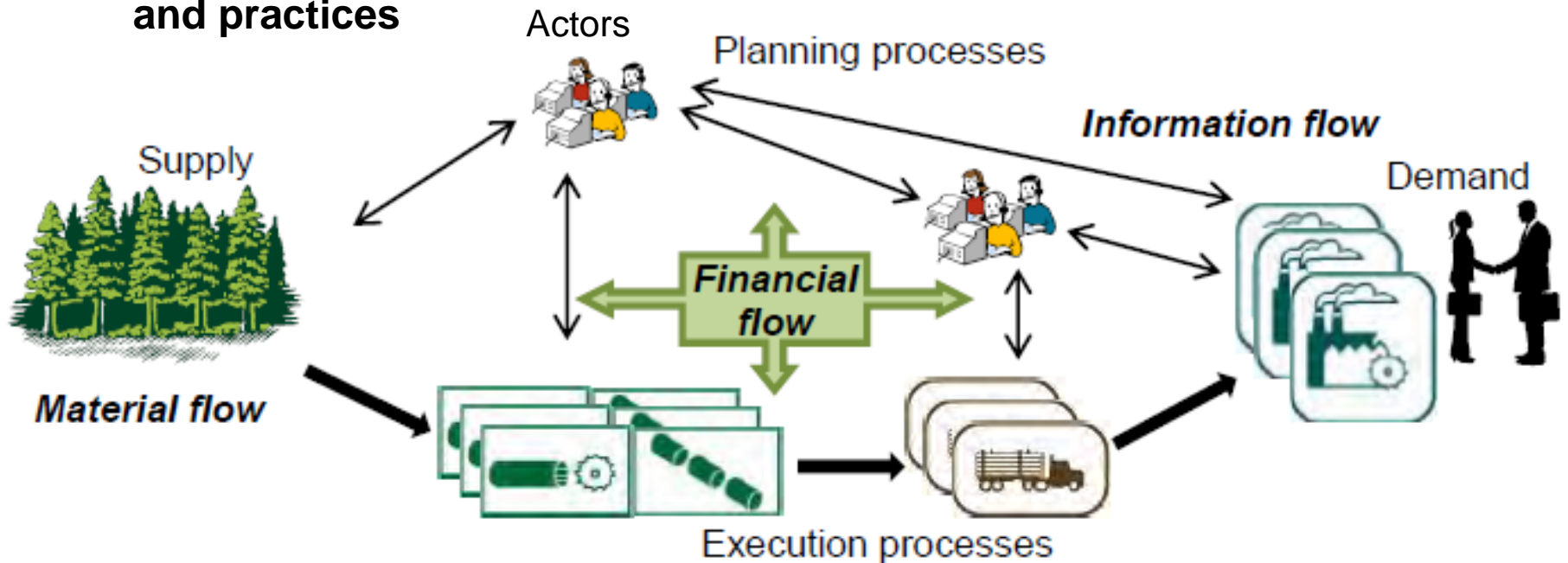
Performance

Efficiency
Agility
Profitability

Sustainability



Supply chain structure and practices



Team:

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Forest biomass inventory for Canada's commercial forest landbase

Lead: Evelyne Thiffault, Canadian Forest Service. EcoEnergy Innovation Initiative 2012-2016

Biomass resources from managed forests:

- harvest residues from final cuttings
- salvage harvesting of naturally-disturbed stands

Spatially and temporally explicit estimates, standardized across the commercial forest landbase

Temporal estimates based on historical and predicted rates of clearcutting and natural disturbances

Sources and levels of uncertainty in estimates

Indicators: biomass availability in tonnes/ha/year

Scenario testing: variation in regimes of natural disturbances

Assessing forest biomass as a bioenergy feedstock: the availability and recovery of biomass in uneven-aged forests

Lead: John Casperson, University of Toronto. EcoEnergy Innovation Initiative 2012-2016

Community-level operational and social organisation of biomass supply chains for district heating

Lead: Eugène Gagné, Fédération québécoise des coopératives forestières du Québec. EcoEnergy Innovation Initiative 2012-2016

Logistics of biomass harvesting, transport and conditioning operations, and stakeholders' network organisation for community district heating systems

Ecologically sustainable thresholds of forest biomass removal

Lead: Lisa Venier, Canadian Forest Service. EcoEnergy Innovation Initiative 2012-2016

Spatially explicit identification of site suitability to forest biomass harvesting for soil and biodiversity conservation

Modelling of biomass supply chains

Lead: Evelyne Thiffault, Canadian Forest Service. EcoEnergy Innovation Initiative 2012-2016

Spatially and temporally explicit modelling of flow of biomass from the forest site to the industrial network

Modelling based on forest management strategies for procurement of biomass for bioenergy along with wood for traditional products, forest policies, configuration of road network, land-use patterns

Indicators: biomass availability tonnes/ha/year

Scenario testing:

- ecological/policy constraints to biomass harvesting for soil and biodiversity conservation
- operational constraints for technical recovery of biomass from forest site

Characterization and sustainability of biomass feedstocks for conversion to bioenergy

Lead: Suzanne Wetzel, Canadian Wood Fibre Centre/ Sally Krigstin, University of Toronto

.EcoEnergy Innovation Initiative 2012-2016

Physical, chemical and thermal characteristics of biomass feedstocks

Forecasting of optimal end-use of various sources of feedstock

Development of classification systems for biomass fuels

Development of framework for an integrative measure of sustainability

Modelling of bioenergy value chains

Lead: Evelyne Thiffault, Canadian Forest Service. EcoEnergy Innovation Initiative 2012-2016

Spatially and temporally explicit modelling of flow of biomass through the industrial network

Modelling based on existing and predicted wood product and bioenergy plant populations, transformation processes, pricing

Indicators: production of unit of energy/year, cost of production in \$/unit of energy

Scenario testing:

- demand for bioenergy
- subsidies for bioenergy
- demand for traditional wood products

Three main aspects of mobilisation:

Forest biomass supply inventory

Sources of uncertainty in estimates



Intertask Working Group 1

Logistics of supply chains

Organisation of actors

Main decision nodes and decoupling points

Factors that influence performance



Intertask Working Group 1

Sustainability


Environmental footprint: soil, water, biodiversity, GHG balance

Trade-offs between ecosystem services



Intertask Working Group 2

Two axes of analysis:

Country	Canada	Sweden - Finland	Other?
Deployment			
Local heat and/or power			
International export of solid biomass			
Biorefineries			
Other?		Link with Case Study on Biorefineries	