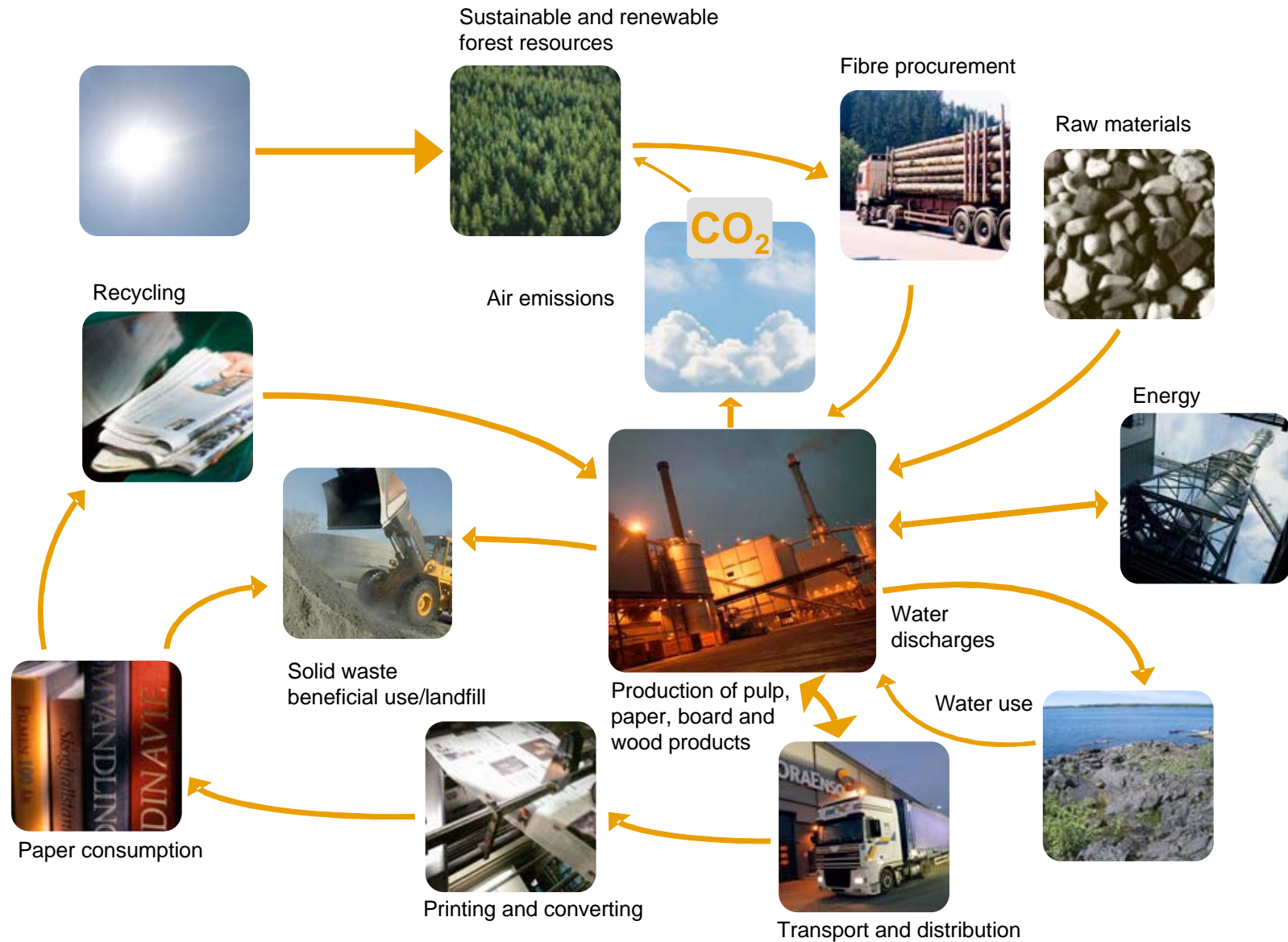


# Paper, packaging & forest products

**Sustainable vision in a carbon  
constrained global economy**

**Hannu Ryoopponen, May 19 2007**

# Forest product industry value chain is lengthy and complex

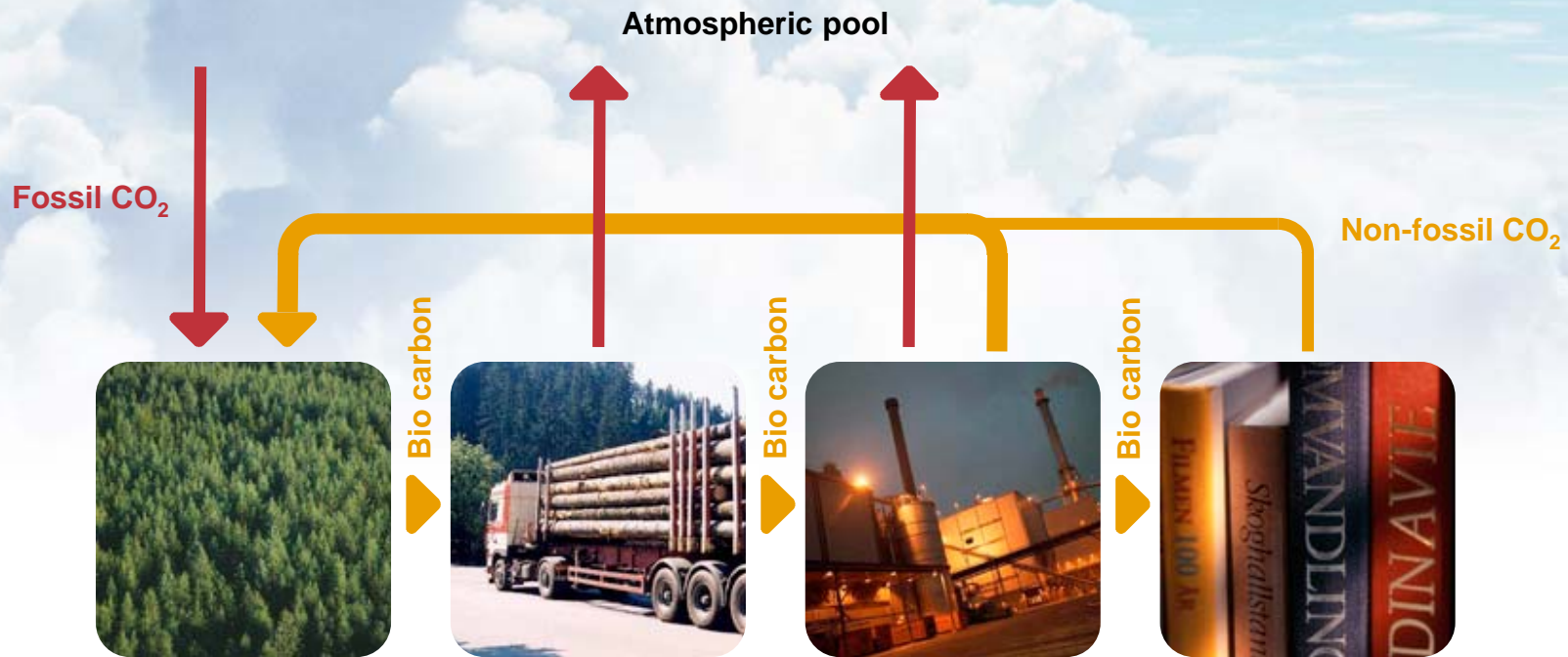


# Climate change is key sustainability issue for forest products industry



- Raw materials
  - Basic raw material wood is renewable through sustainable forest management
  - Recovered paper also a key raw material for industry
- Energy
  - Energy intensive industry
  - Most GHG emissions from energy production
  - High dependence on carbon-neutral biofuels
- Products
  - Store carbon for active service life
  - Can be recycled or burned for energy recovery
- Transportation
  - Primarily fossil fuel based today
  - Increasing as industry becomes more global
- Customers and stakeholders increasingly demanding action and disclosure

# Carbon Cycle for the Forest Products Industry



**Forest carbon:**  
Increase when growth is larger than harvest (active forest management is positive for the forest growth)

**Fossil carbon**

**Bio-mass**  
**Fossil carbon**

**Product carbon pool:**  
Increase when accumulation of fibre materials (examples: timber products in buildings and furniture; paper in books and archives)

# Impact of climate change on the forest products industry

There are challenges.....

- Increasing cost and availability of wood
  - Affordable and sustainable energy sources
  - Sustainable logistics
  - Current and future climate change regulations
  - Risk of infrastructure and supply chain disruptions
-

# Impact of climate change on the forest products industry

But there are also opportunities.....

- Business case to reduce energy costs through efficiency
- High utilization of carbon-neutral biofuels
- Combined heat and power
- Forest products are recyclable; therefore minimize landfill methane emissions
- Sustainably managed forests serve as a carbon sink
- Forest products store carbon throughout their service life
- Lower carbon footprint than many competing products (market advantage)
- Market-based/flexibility mechanisms
- Additional value-added products through bio-refining applications

# Forest Products Industry Contribution to Mitigating Climate Change



- Renewable basic raw material (wood) through sustainable forest management
- Product recycling and using recovered paper (vs. landfilling)
- Carbon-neutral biomass energy
- Carbon sequestration in forests and forest products
- Forest products lower carbon footprint than many competing products
- Bio-refining – Conversion of biomass into clean fuels and chemicals valued by society

# Paper, packaging & forest products

**Bio-refinery vision**

## Bio-refinery concept

**Bio-refinery** – Process and equipment that converts renewable, local, available biomass (bark, wood waste, forest residual, corn, agricultural waste, municipal waste, etc.) into fuels

- Utilization of biomass in higher value products
- Use of all components (lignin, hemicellulose, cellulose) beyond combustion
- Inherently “green” technology to produce renewable fuels/chemicals/material
- Paradigm beyond traditional forest products

## Why interest in bio-refineries

- Need for new revenue streams in forest product industry
  - Unlimited potential for clean biofuels
  - Rising cost of energy-especially petroleum
  - Government initiatives
  - Age of capital equipment, e.g., recovery boilers
  - Potential to reduce carbon footprint
-

# Conclusions

- Forest Products Industry has unique opportunities to:
  - Contribute to mitigating climate change
  - Minimize climate change costs and business risks
  - Develop sustainable future profitable business in carbon constrained global economy