Forest biomass in the EU - how much is available and how to mobilize the potential?

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"Mobilizing Sustainable Supply Chains for forest biomass for energy"

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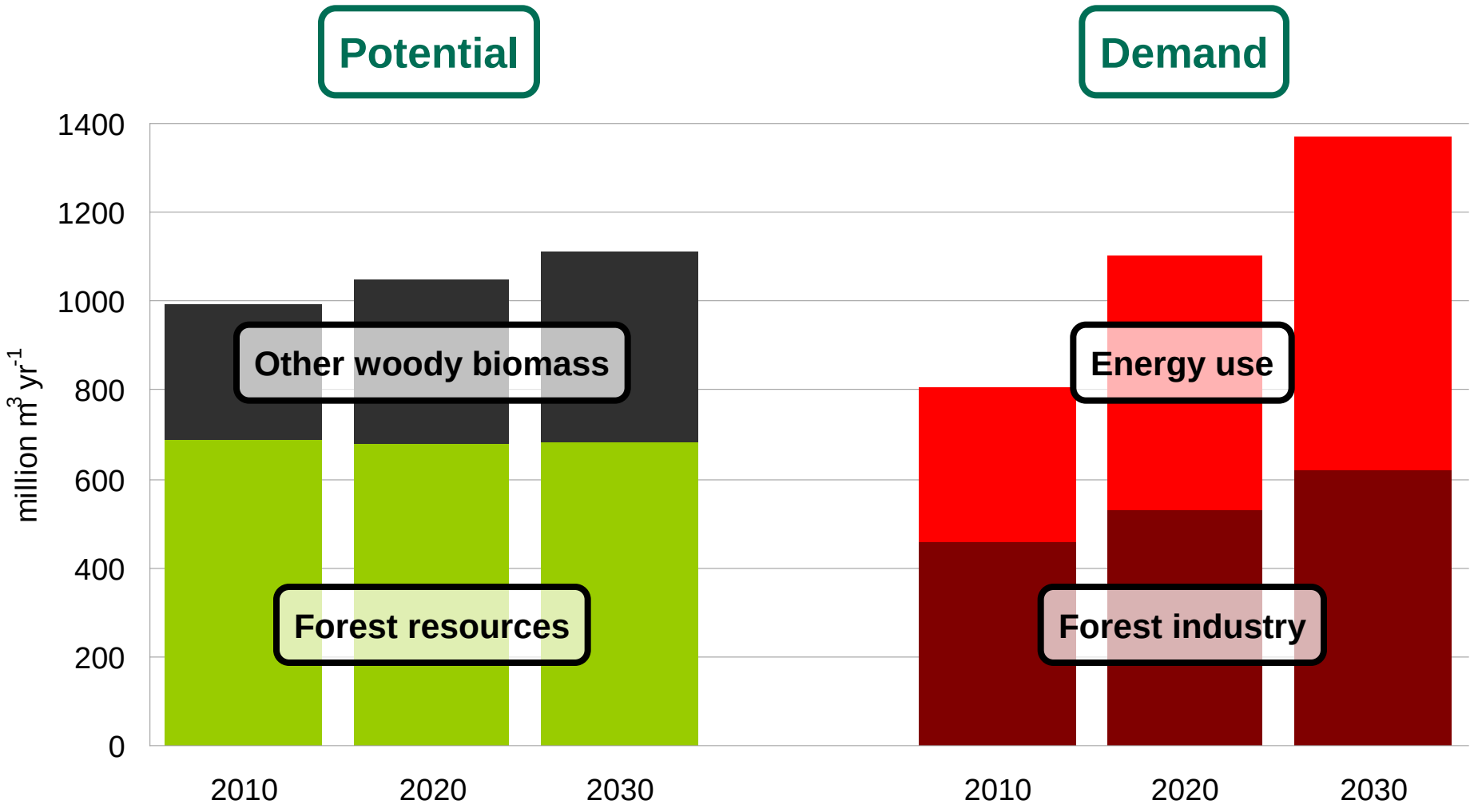
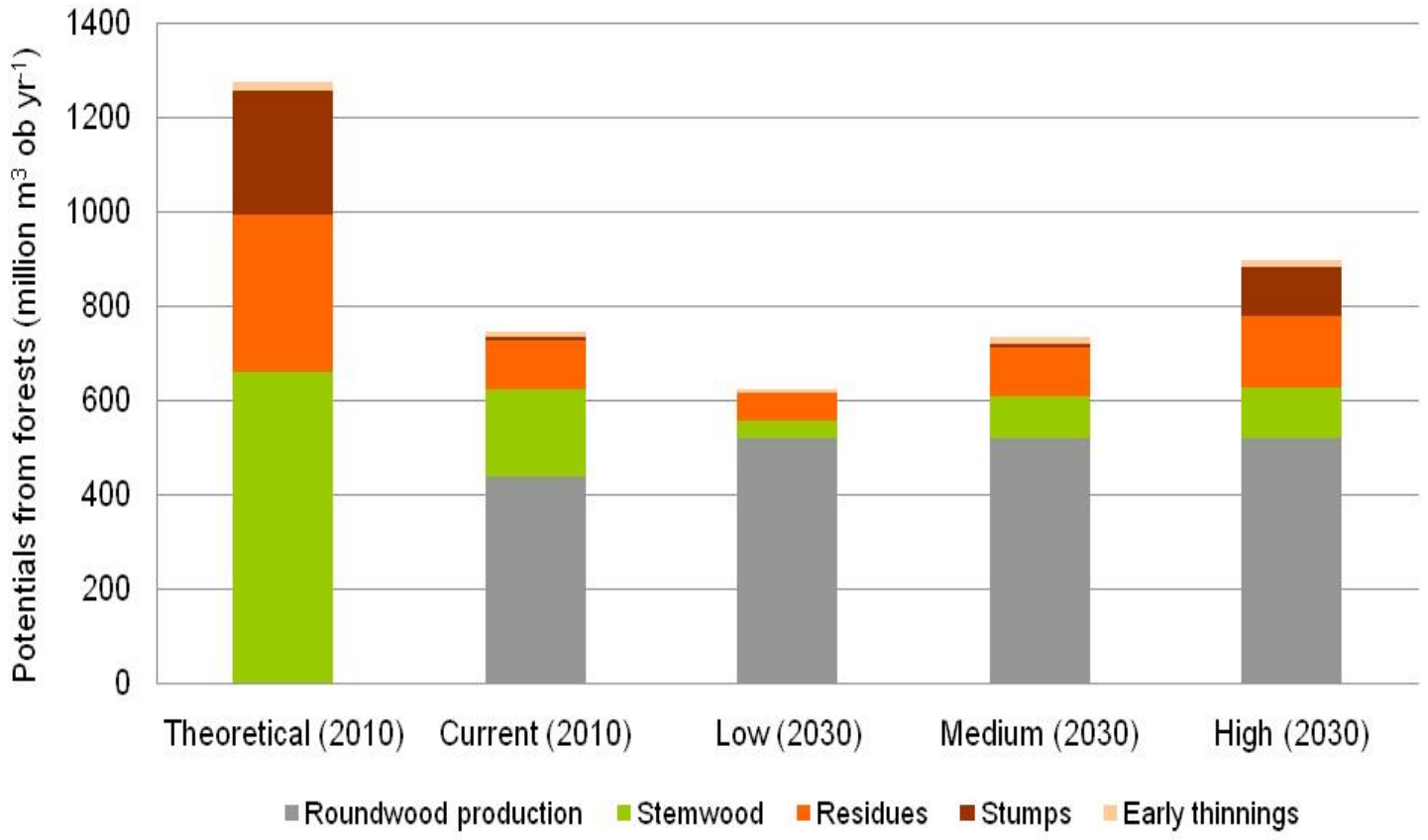
Storyline

- Wood supply and demand in EU
- Machinery and labour demand
- Harvesting technology
  - Roundwood
  - Energy wood
- R&D drivers and trends
- Conclusions

Woody biomass supply and demand in EU



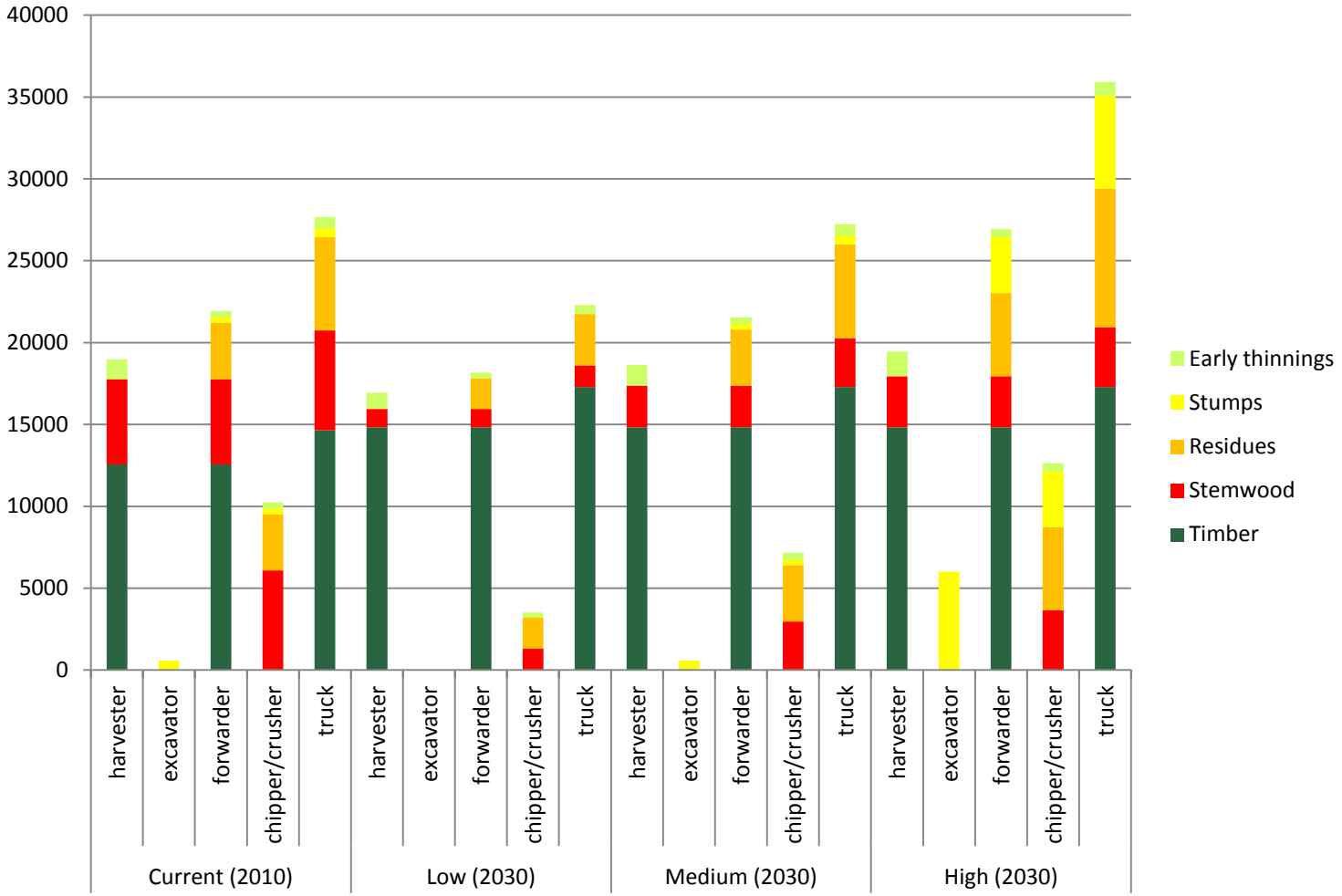
Forest biomass supply in EU



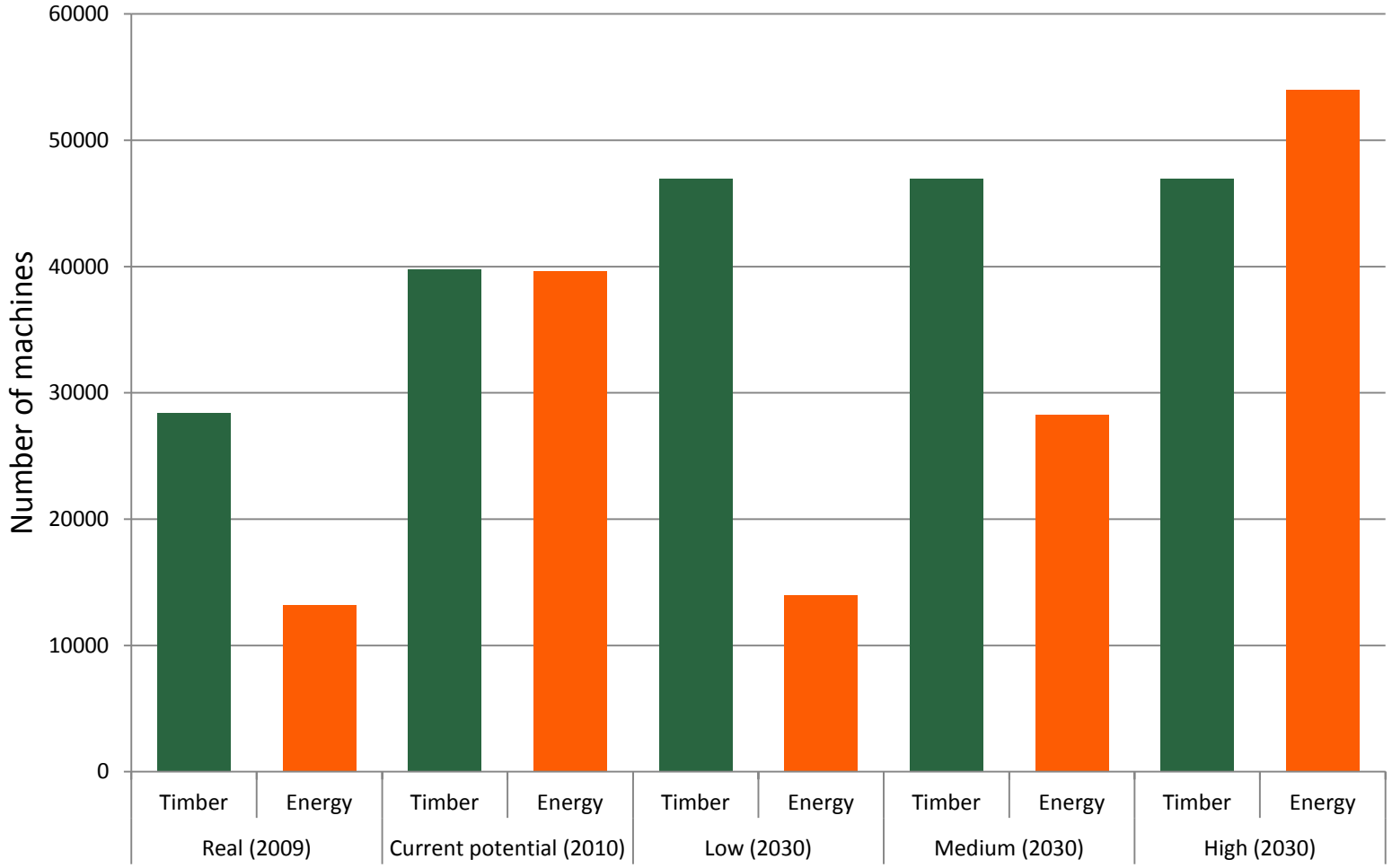
Annual capacities of machines

	Timber	Energy Stemwood	Energy Residues	Energy Stumps	Energy Early Thinning
Harvester	35 000	35 000			10 000
Excavator				17 000	
Forwarder	35 000	35 000	30 000	30 000	30 000
Chipper		30 000	30 000	30 000	30 000
Truck	30 000	30 000	18 000	18 000	18 000

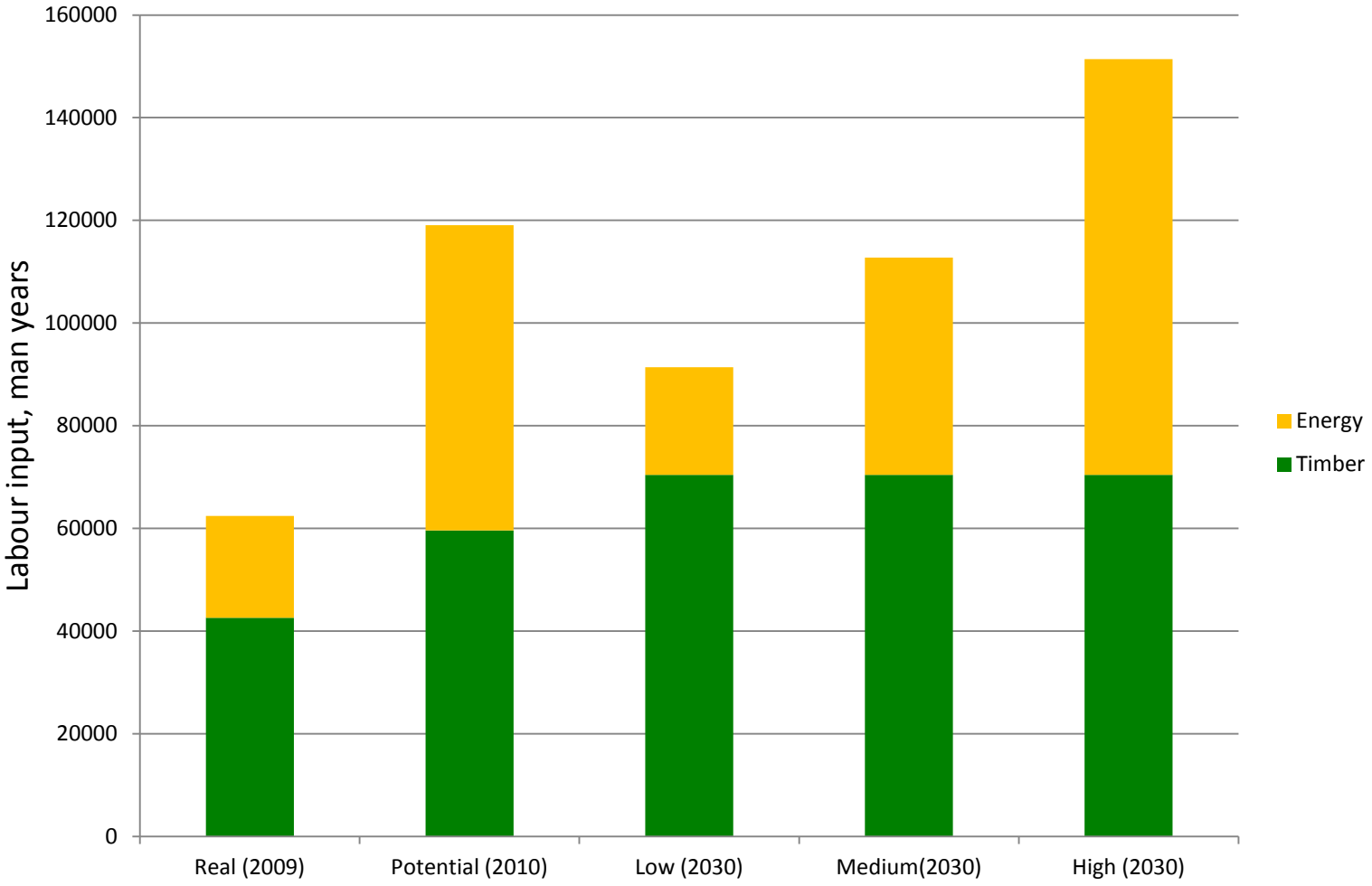
Forest machine and transport demand



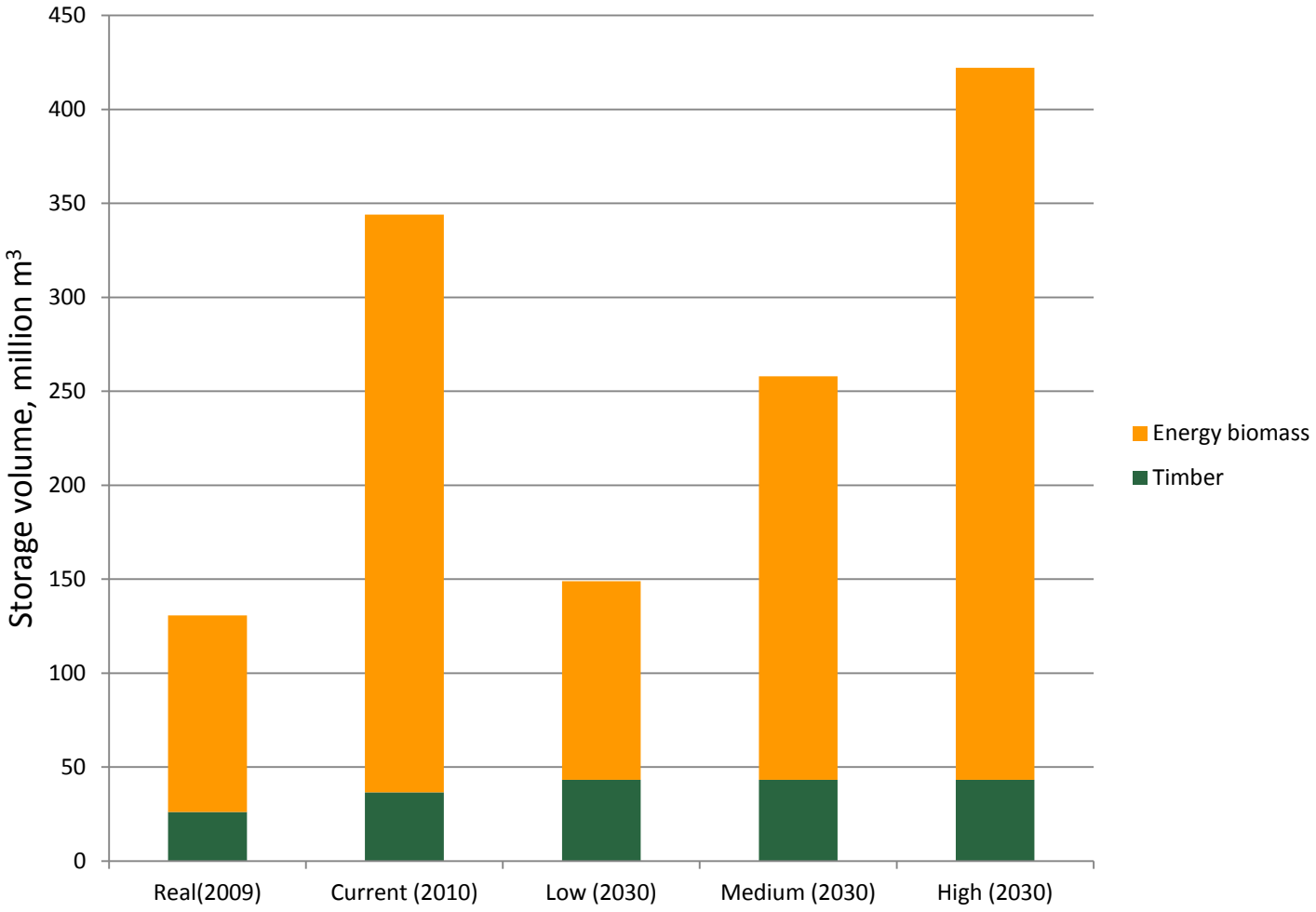
Harvesting and transport fleet demand



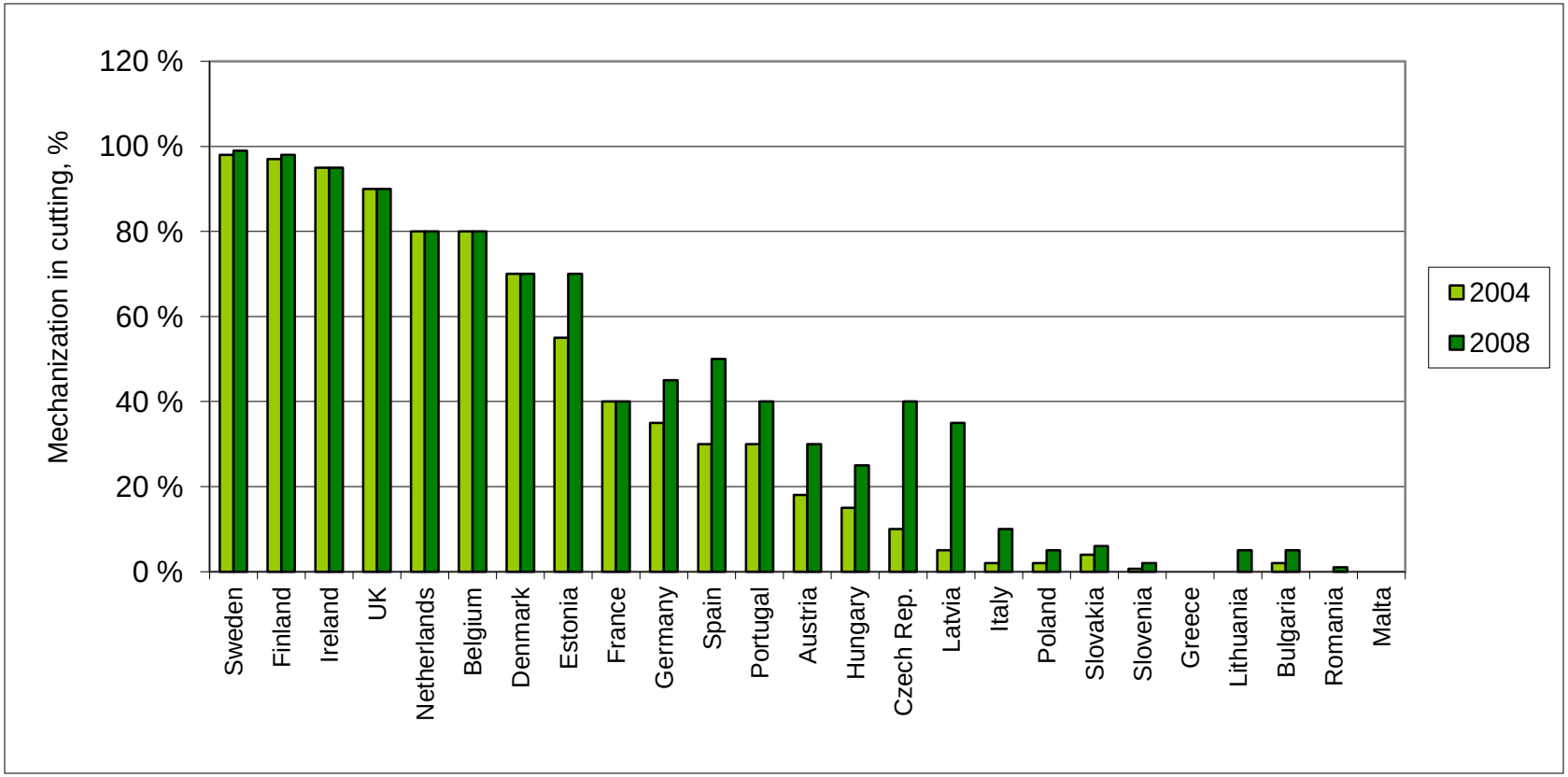
Labour demand



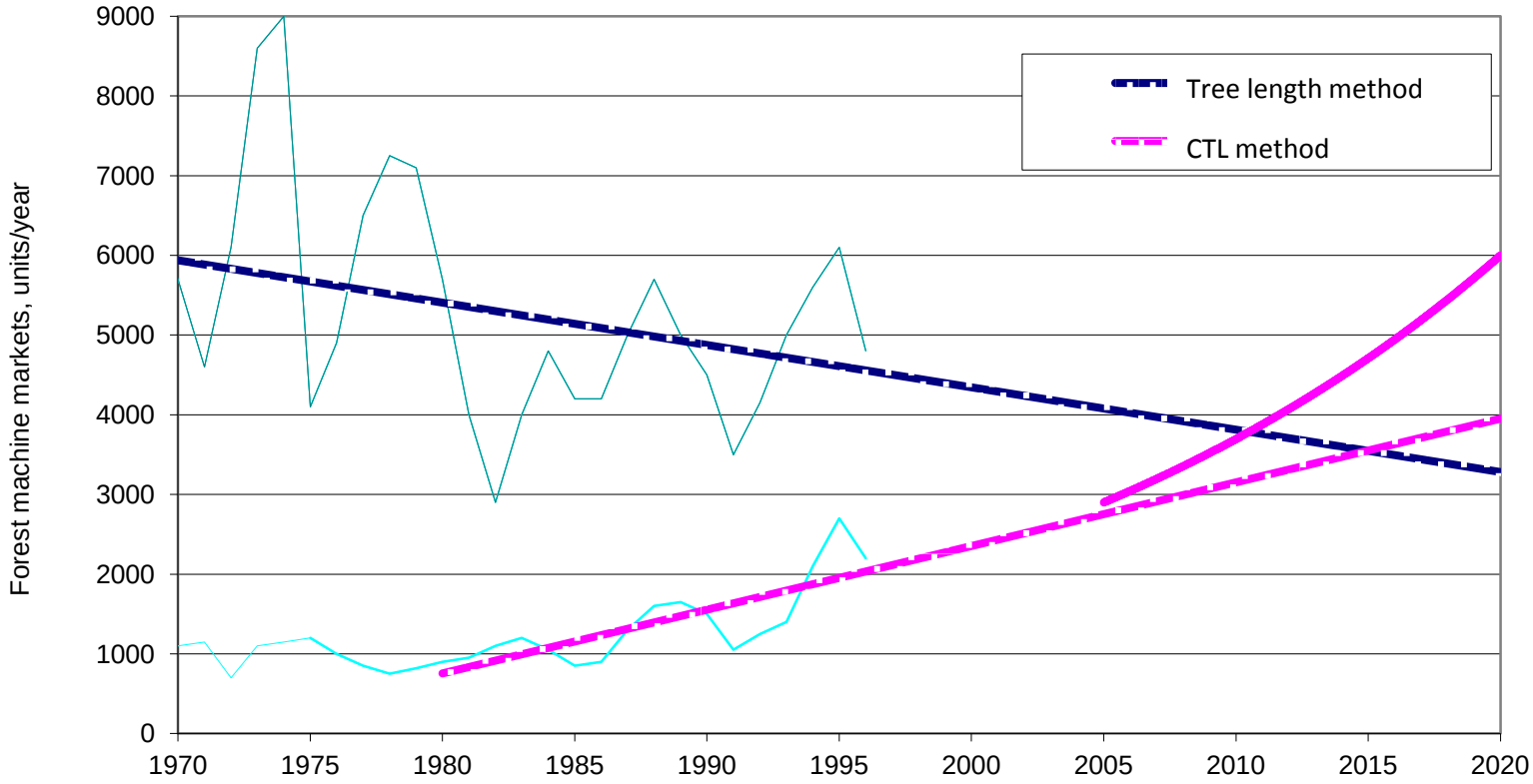
Average annual storage volumes, EU



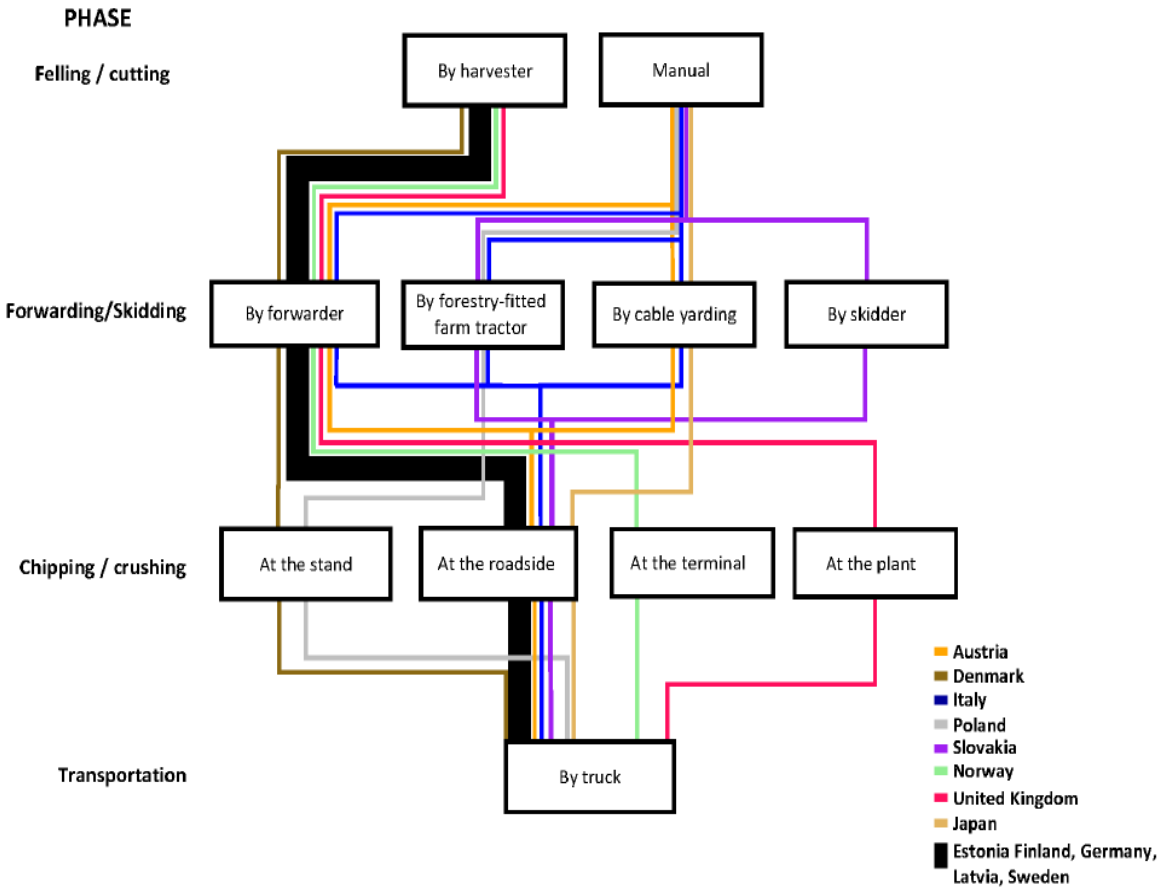
Mechanization in cutting



CTL vs. TL –methods globally



Harvesting systems for logging residues



Source: Diaz 2010

Intelligent car

Driver assistant systems

- ABS, ESC
- ACC (Adaptive Cruise Control)
- Driver Drowsiness

Cooperative systems

- Extended Environment Info
- Obstacle and Collision Warning

Location based systems

- In-vehicle emergency call
- Car-to-Car Communication

Source: Intelligent Car 2011

Intelligent forest machine

Opertor assistant systems

- Tutoring and feedback on work cycles
- Economic driving
- Driver drowsiness

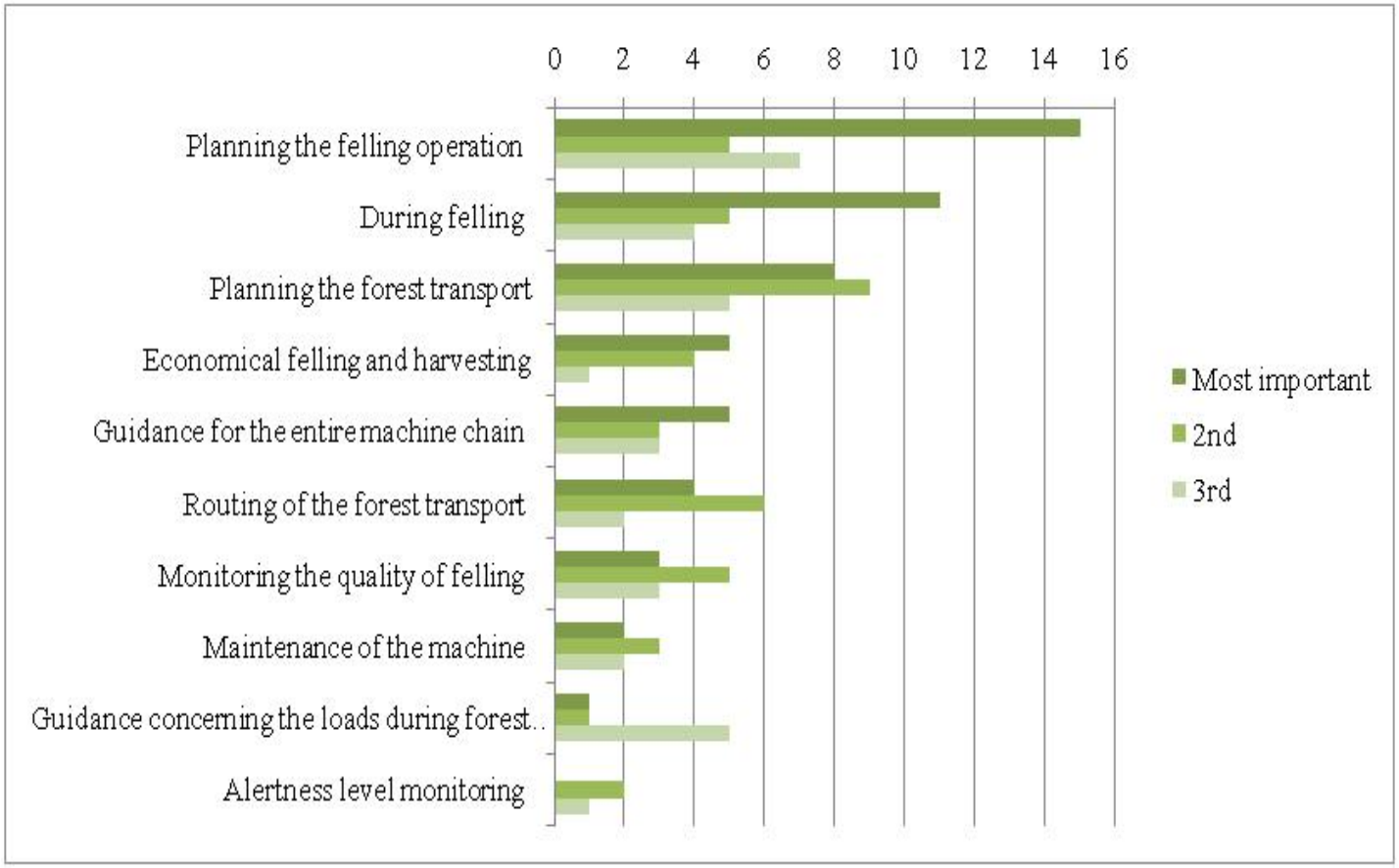
Cooperative systems

- Sensing of trees, soil
- Obstacle, power line, hiker warning

Location based systems

- Tree map generation
- Machine to machine communication (location of timber, soil trafficability)

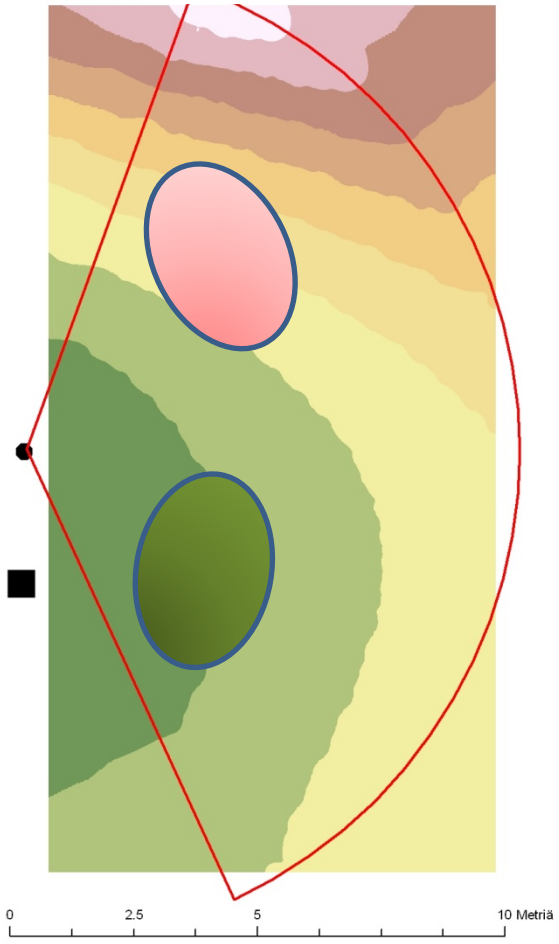
Where virtual tutor could be used?



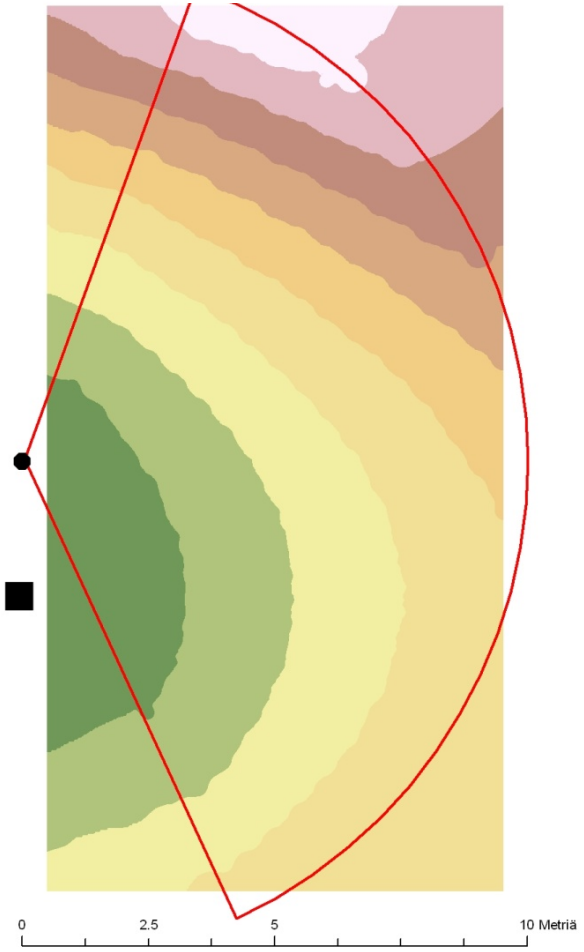
Source: Riala 2011

On-the-job tutoring: where to load?

Clear cutting



Thinning



Source: Lamminen & Väätäinen 2010

Conclusions

- Demand of woody biomass increases inducing large investments in harvesting and transport fleet
  - Technology selection
  - Operator availability
- Energy biomass demand a main development driver of harvesting technology
- Labour input can be reduced
  - Operator tutoring and semi automation will penetrate commercial level in a decade
  - Mechanization in cutting continues

Conclusions

- CTL: cutting edge development in EU
  - Growth of markets outside EU
- Decline of European pulp & paper industries may reduce the demand
  - Emerging biorefineries enter the scene in late 2020's
  - Switch from fresh to dry wood deliveries
- Investments in energy wood supply chains total 7 bill. Euro in 2030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