Efficient wood transportation with optimization and High Capacity Transport

Wood Industry Summit - 26th May 2017

Skogforsk in brief

Forestry and the government in collaboration

Applied research and development for sustainable and profitable forestry

Communication of knowledge

Research areas:

- Forest production
- Wood supply

Wood transportation in Sweden

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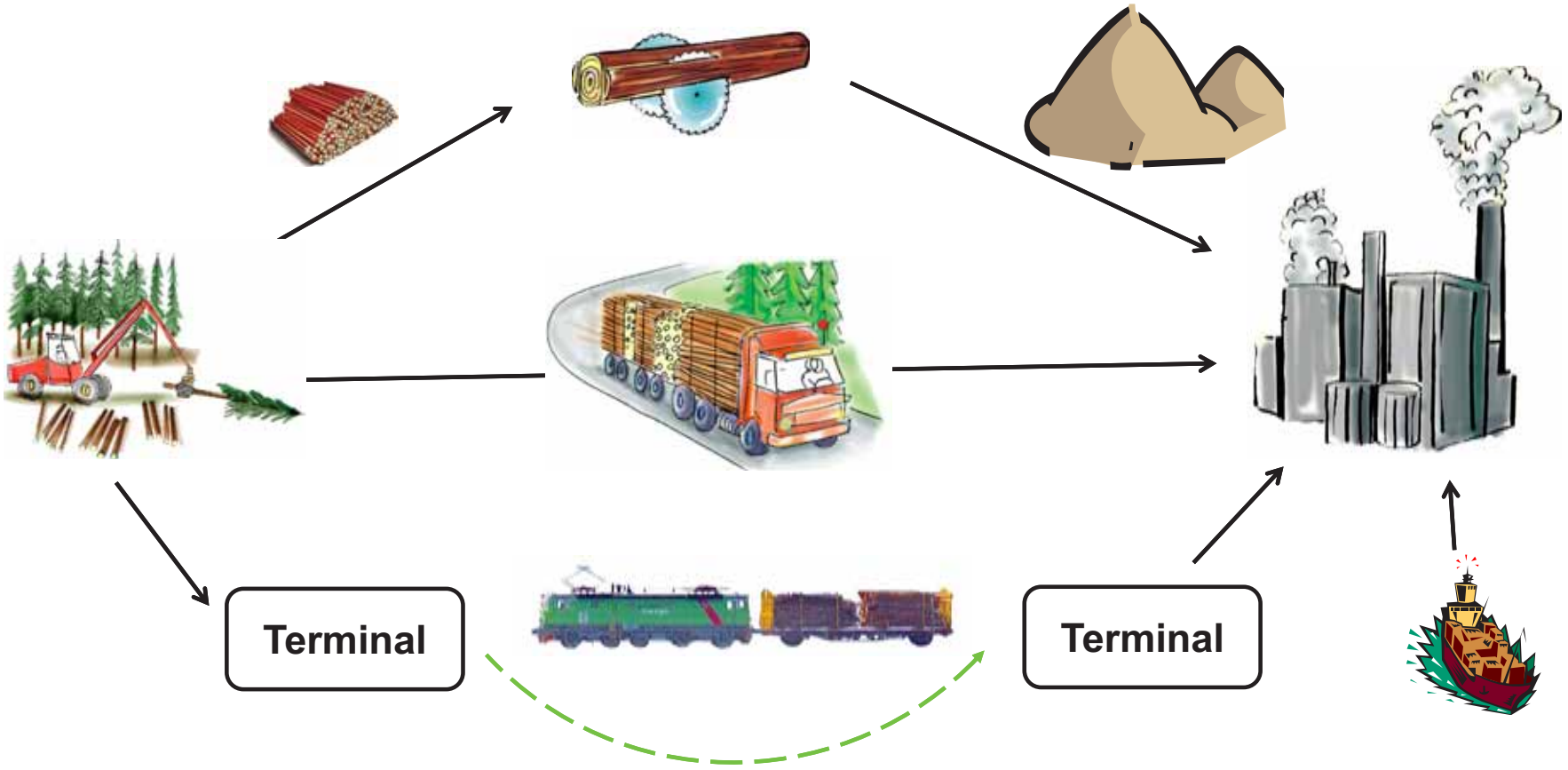
- Transported weight 72 millions tonne
- Average transport distance 91 km
- 26 % of wood supply cost

Wood supply network



DSS in Wood supply

- FlowOpt – Strategic and tactical planning of wood transportation
- RouteOpt - for routing and scheduling of logging trucks
- Calibrated route finder

FlowOpt

A decision support tool for flow planning

Designing a wood supply network

Strategic and tactical planning

- 5 year – year – months
- Customer
- Supply area
- Multimodal

Due to

- Supply
- Demand

FlowOpt model

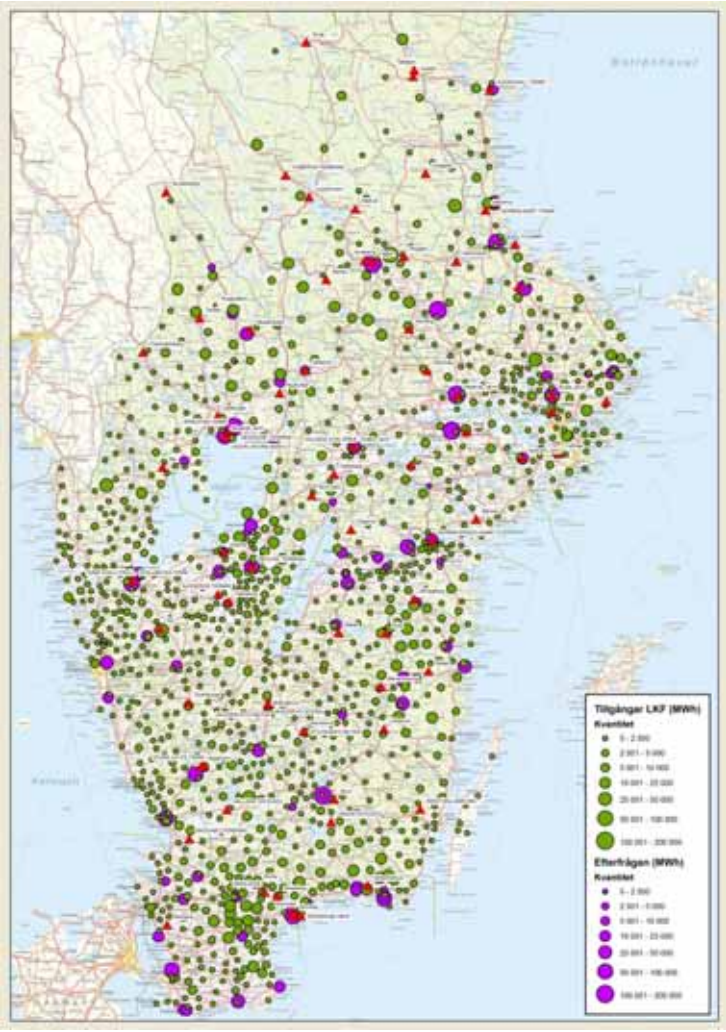
Maximizes profit by

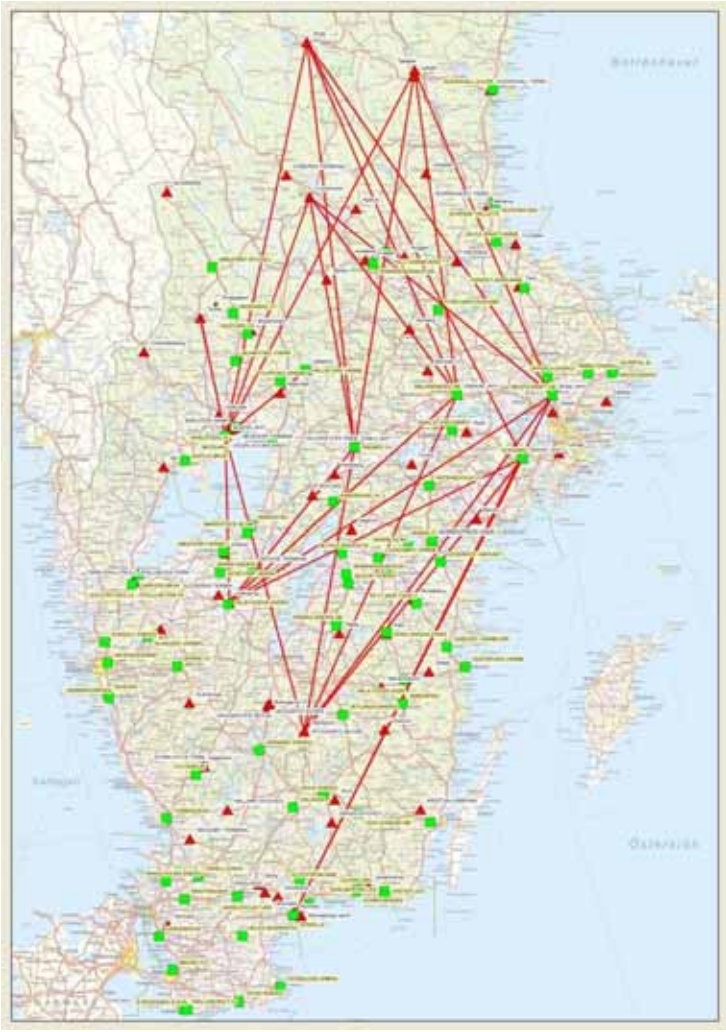
- Determining the optimal flow to industry from
  - Supply points
  - Terminals
- Determining the optimal mix of transport modes
  - Truck
  - Train
  - Boat

Taking into account differences in

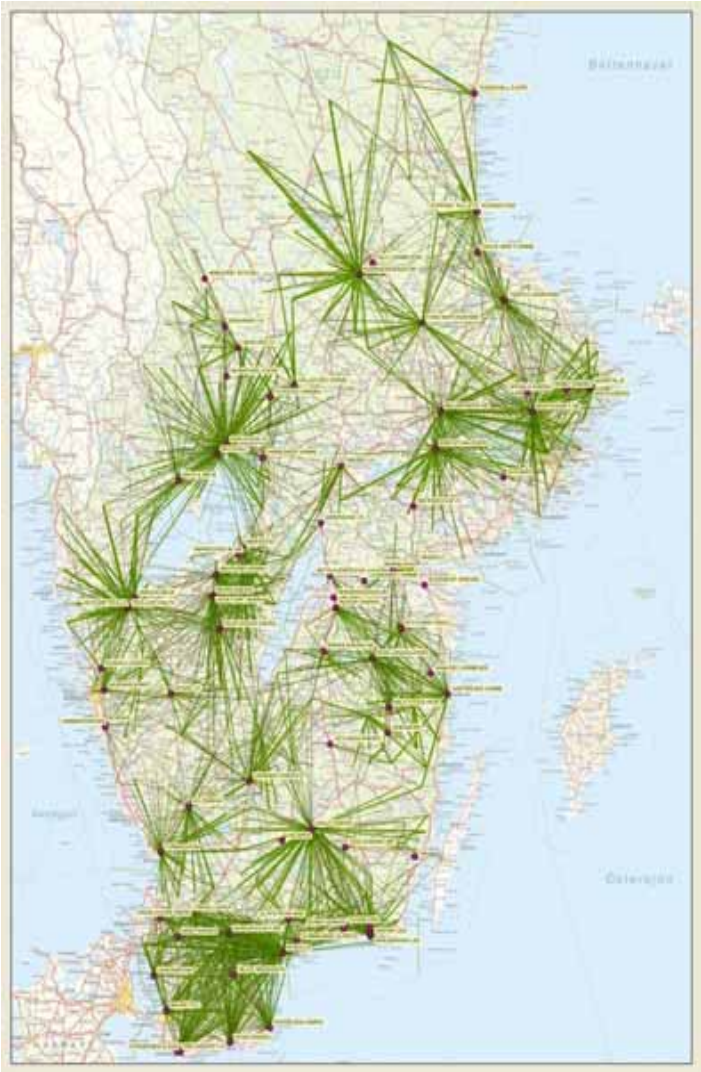
- Demand
- Assortment
- Time periods
- Prices
- Costs
- Etc.

Case from southern Sweden

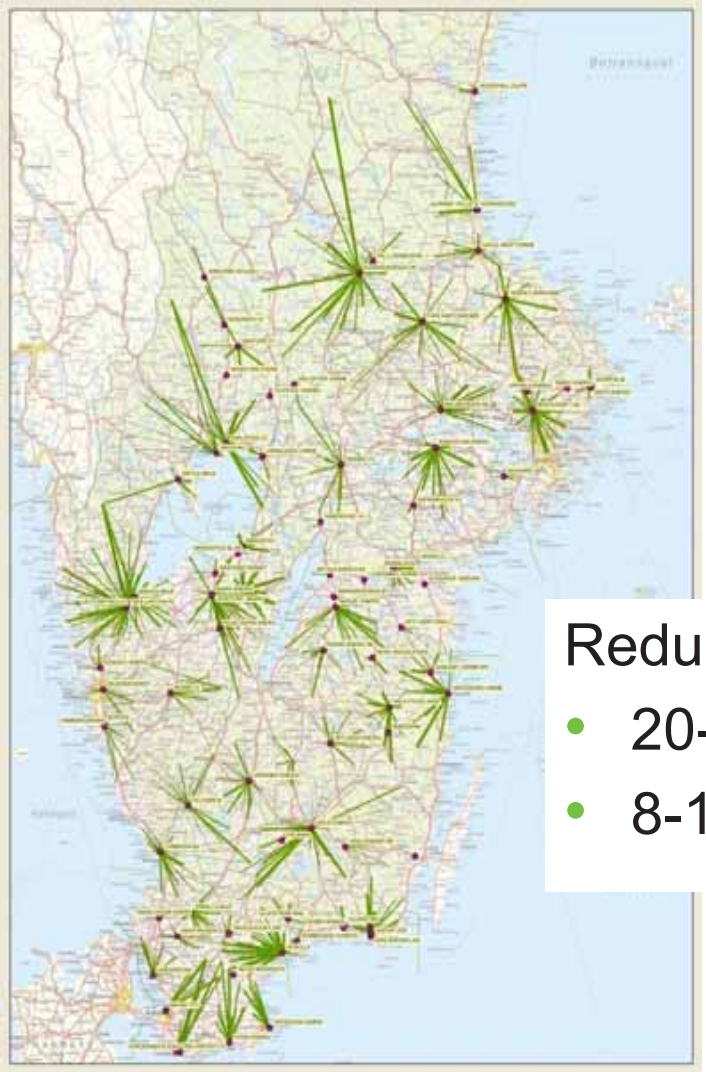




Before opt.



After optimization



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Reduced transport distance

- 20-30 % for wood chips
- 8-15 % for round wood

RouteOpt

A decision support tool for routing of logging trucks

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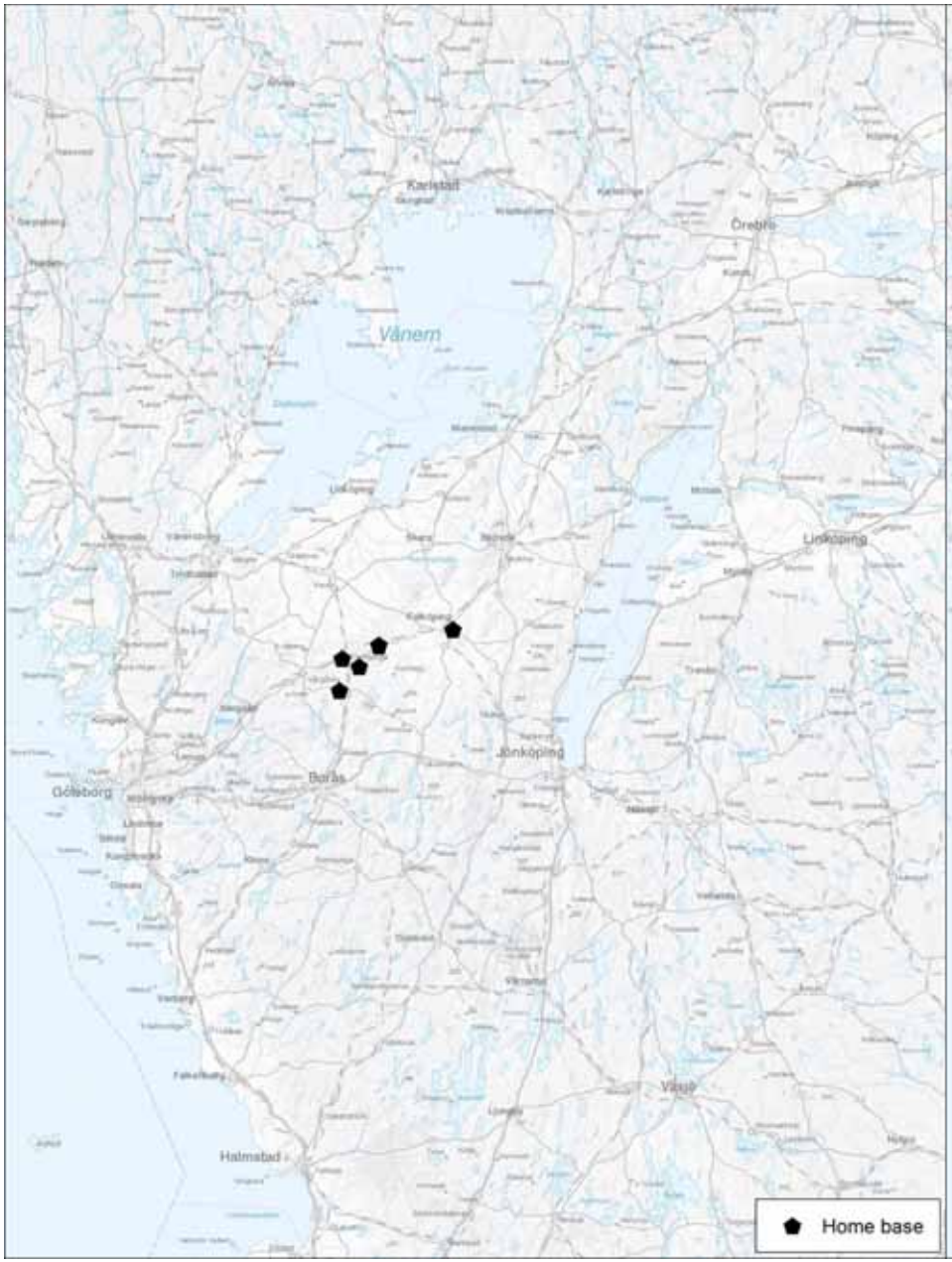
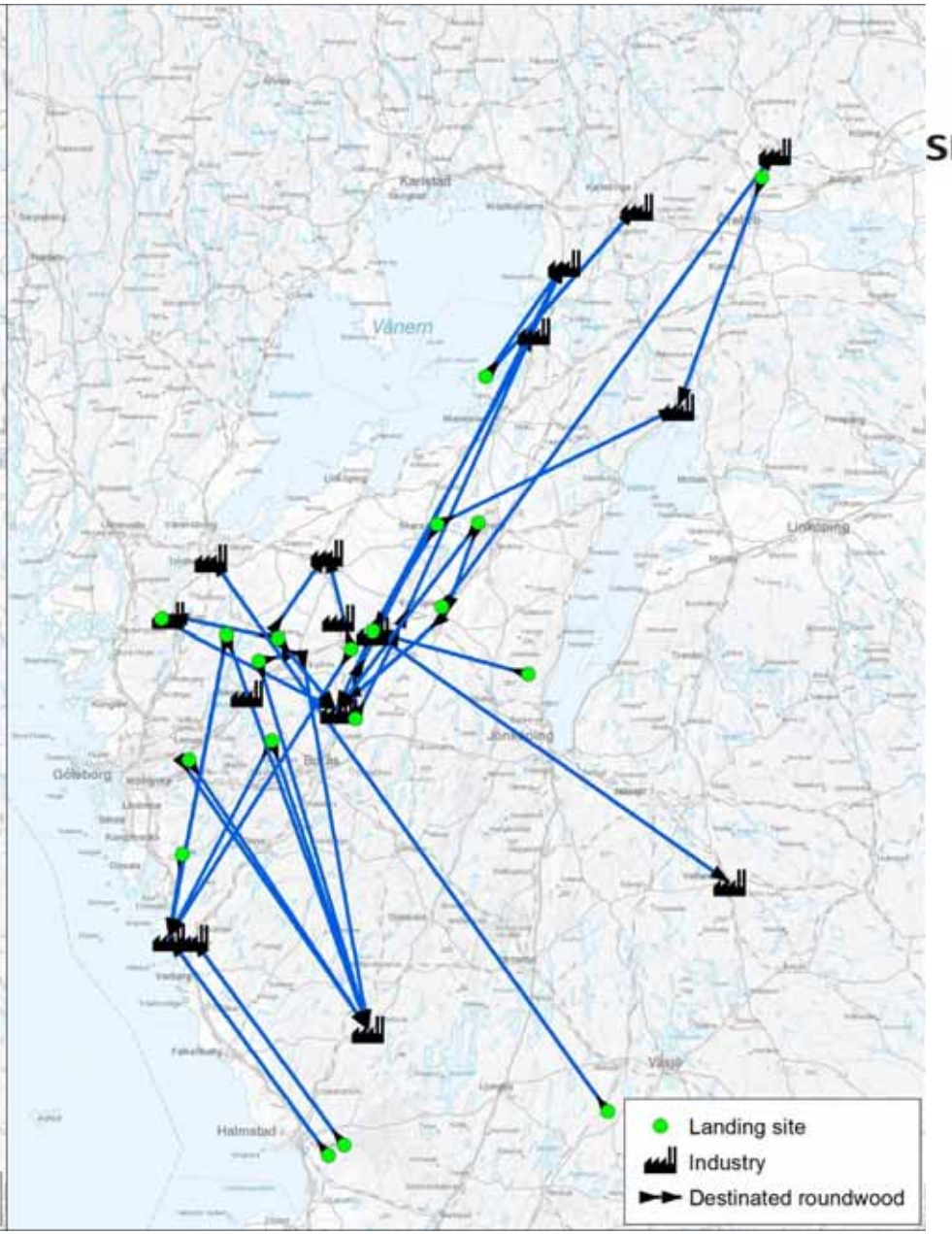
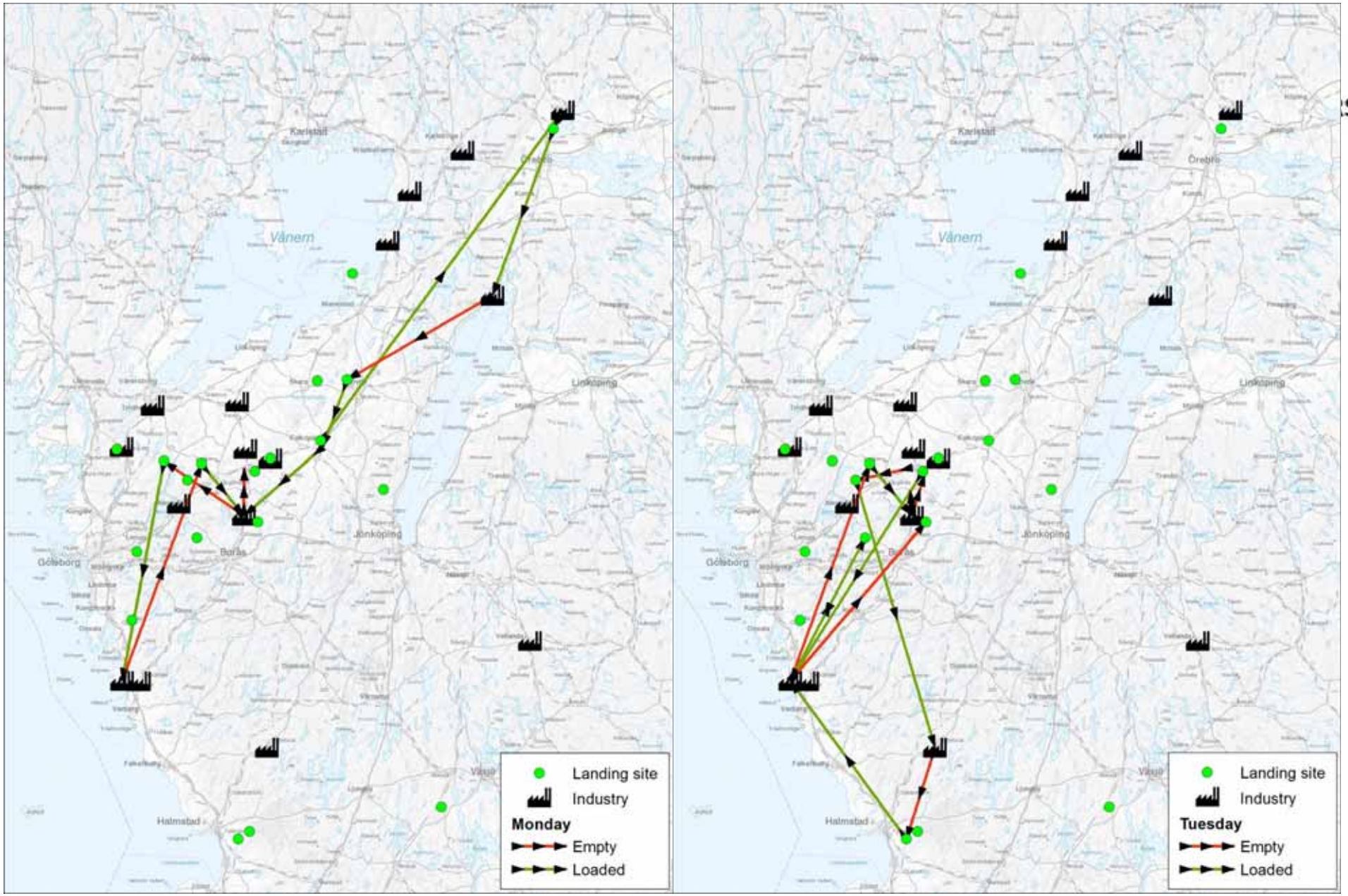
Route planning for a whole fleet

- VRPTW – Vehicle Routing Problem with Time Windows
- Dispatching and scheduling involves
  - Supply and demand
  - Home base for trucks
  - Truck capacity
  - Roadside storage
  - Opening hour at industry


Vänern
Karlstad
Örebro
Linköping
Jönköping
Borås
Göteborg
Halmstad
Växjö
Home base


Vänern
Karlstad
Linköping
Jönköping
Borås
Göteborg
Halmstad
Växjö
Landing site
Industry
Destinated roundwood

SK

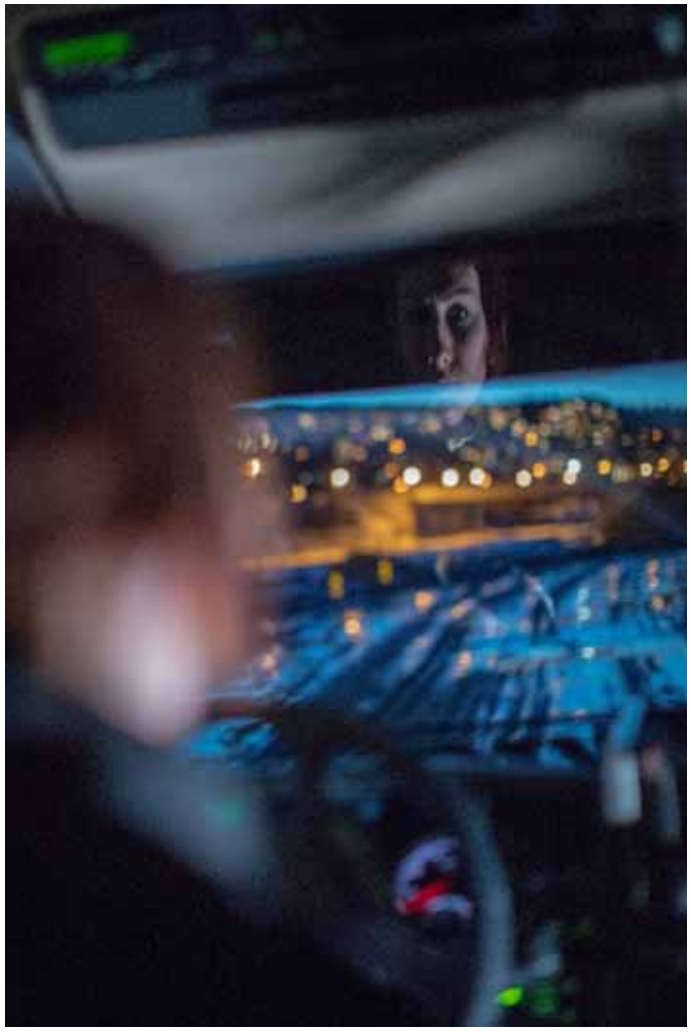

Vänern
Karlstad
Örebro
Linköping
Jönköping
Borås
Göteborg
Halmstad
Landing site
Industry
Monday
Empty
Loaded
Vänern
Karlstad
Örebro
Linköping
Jönköping
Borås
Göteborg
Halmstad
Landing site
Industry
Tuesday
Empty
Loaded

Benefits

- Cost reduction (3-5 %)
- Reduced emissions
- Increased delivery precision
- Fast rescheduling!

Weaknesses

- Real time data
- Centralized decision-making
- Reality is complicated



One More Pile-project, Transporting timber with 74-tonne and 90-tonne vehicles

Hypotheses for the project

Cost -20 %

Emission (CO_2) -20 %

Number of trucks -30 %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TLV
TimmerLogistikVäst AB


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VOLVO


SCANIA


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reaxcer


TRANSPORT
STYRELSEN


TRAFIKVERKET


MICHELIN


FORDONS
KOMPONENT
GRUPPEN


SVERIGES ÅKERIFÖRETAG


Skogs
Industrierna


SSAB


REV


vti


rethink.
storaenso


Söderenergi


HOLMEN


HIAB


BILLERUDKORSNÄS


WABCO


SCA
Care of Life


SVEASKOG


SÖDRA

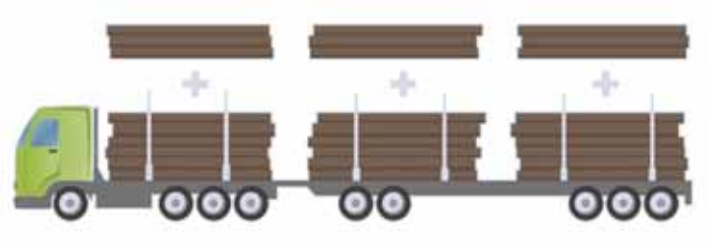

ÖRNFRAKT


Bergs Fegen

Conventional vehicle

Gross vehicle length: 24 m
Gross vehicle weight: 60 t (64 t)

High capacity transport (HCT)



”Bigger Piles”

Gross vehicle length: 24 m
Gross vehicle weight: 74 t

”One More Pile”

Gross vehicle length: 30 m
Gross vehicle weight: 90 t

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ETT – One More Pile


Movie: 90-tonne vehicles tested on forest roads

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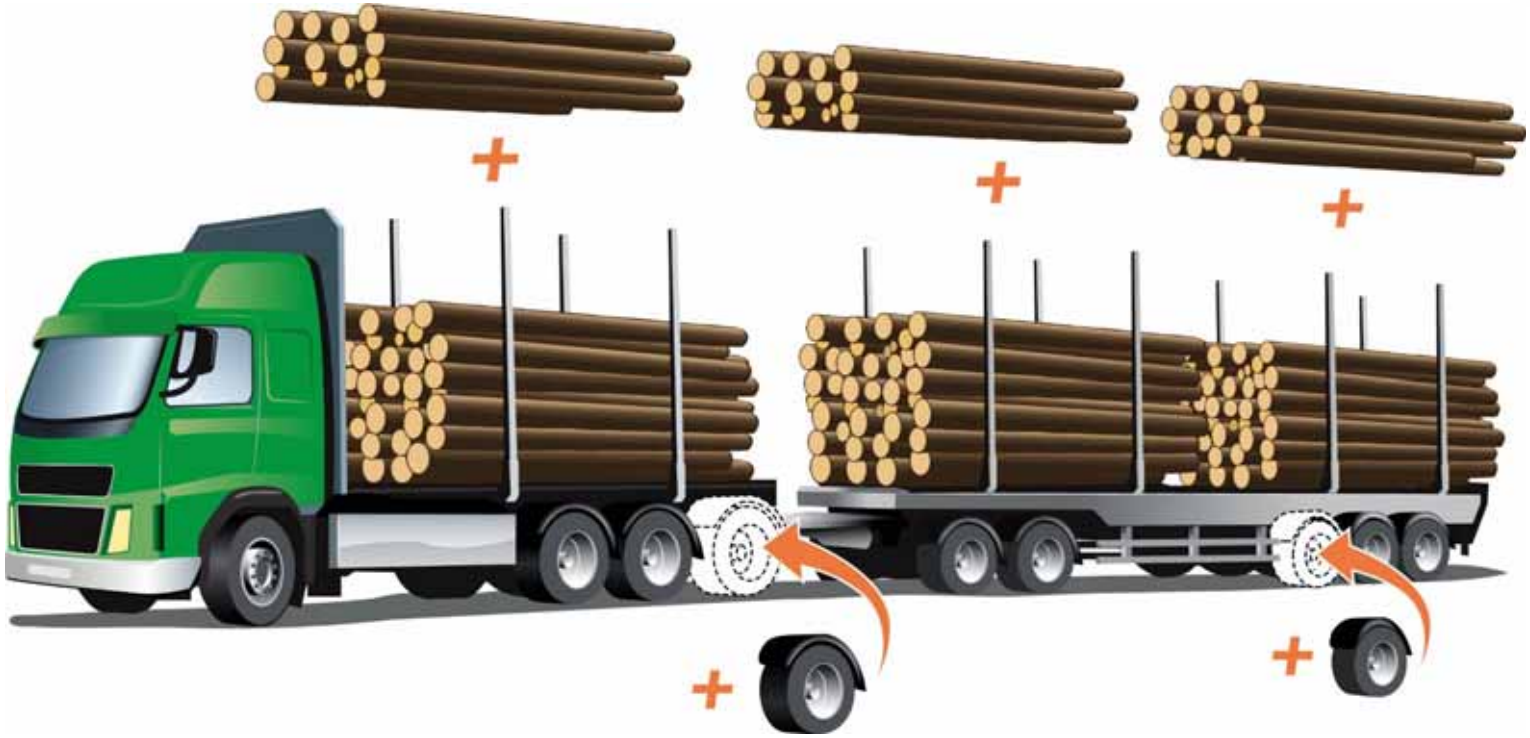

More efficient transports with increased payload

Transport economy

	60	64	74
Annual costs	-	-	+6%
Costs per distance	-	+2%	+13%
Total costs	-	<1%	+6%
Transport work	-	+4%	+15%
Transport cost per ton	-	-4%	-9%

Impact on environment

With crane:

74 tonnes vs. 60 tonnes -8 %

Without crane:

74 tonnes vs. 60 tonnes -13 %

90 tonnes vs. 60 tonnes -20 %

10 HCT-vehicles saved 106 thousand liter diesel and 300 ton CO_2 during 2014

Thanks for listening

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