

# Productivity of Logbear F4000 forwarder on soils with low bearing capacity



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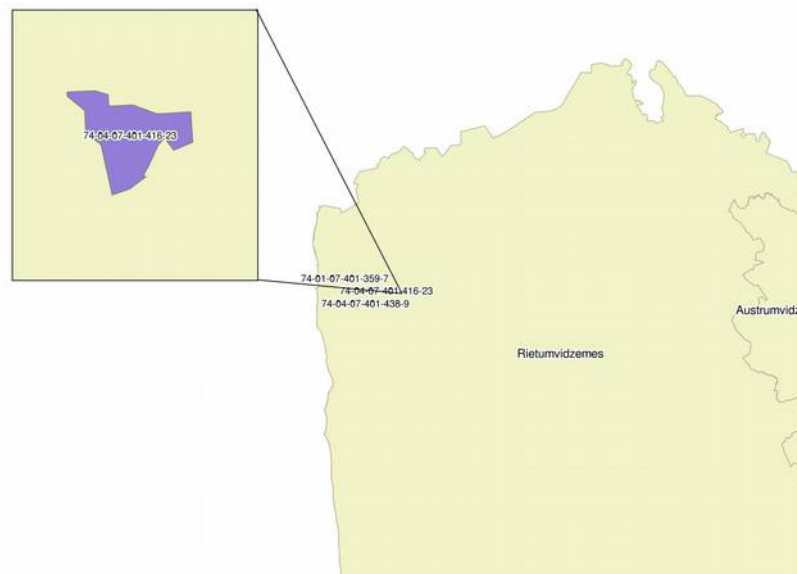


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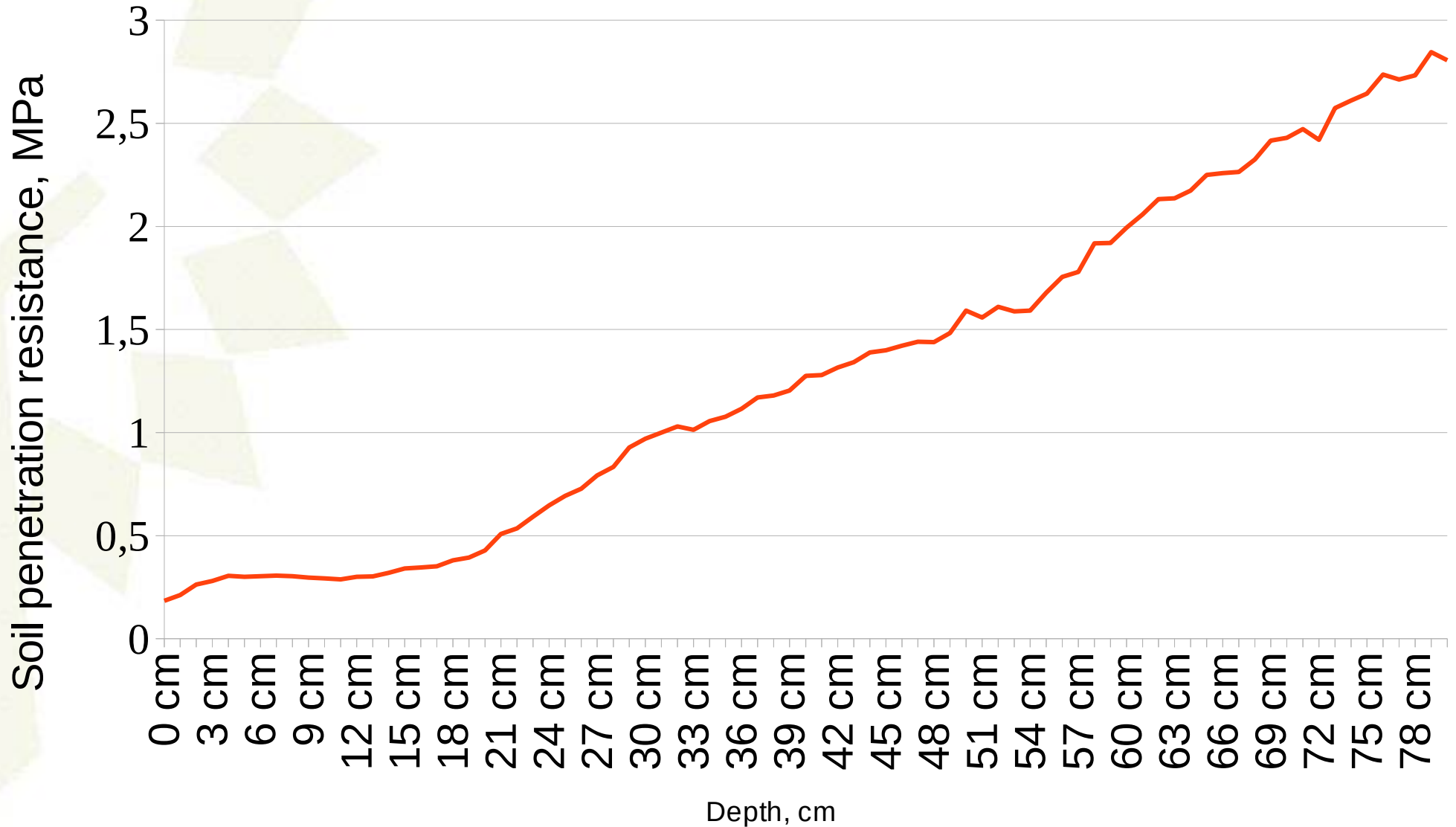
# Research sites



Type	Area, ha	Dominant species	Stand formula	Age in years	D1.3, cm	H, m	Stock, m <sup>3</sup> ha <sup>-1</sup>
Extreme conditions	9,8	Birch	4B41 3S51 2Ba4146 1Ash41		9	11	142



# Soil bearing capacity (*extreme conditions*)



# Logbear F4000 forwarder



# Specifications



- Price in basic setup 150000 €, harvester version 190000 €.
- Width 2.05 m, length – up to 7,2 m, height 2.75 m, weight 4.98 tonnes, load capacity – 4 tonnes (5.5 m<sup>3</sup>).
- Crane length 6.1 m, distance between stacks adoptable, max. 3.8 m.



# Summary of study results

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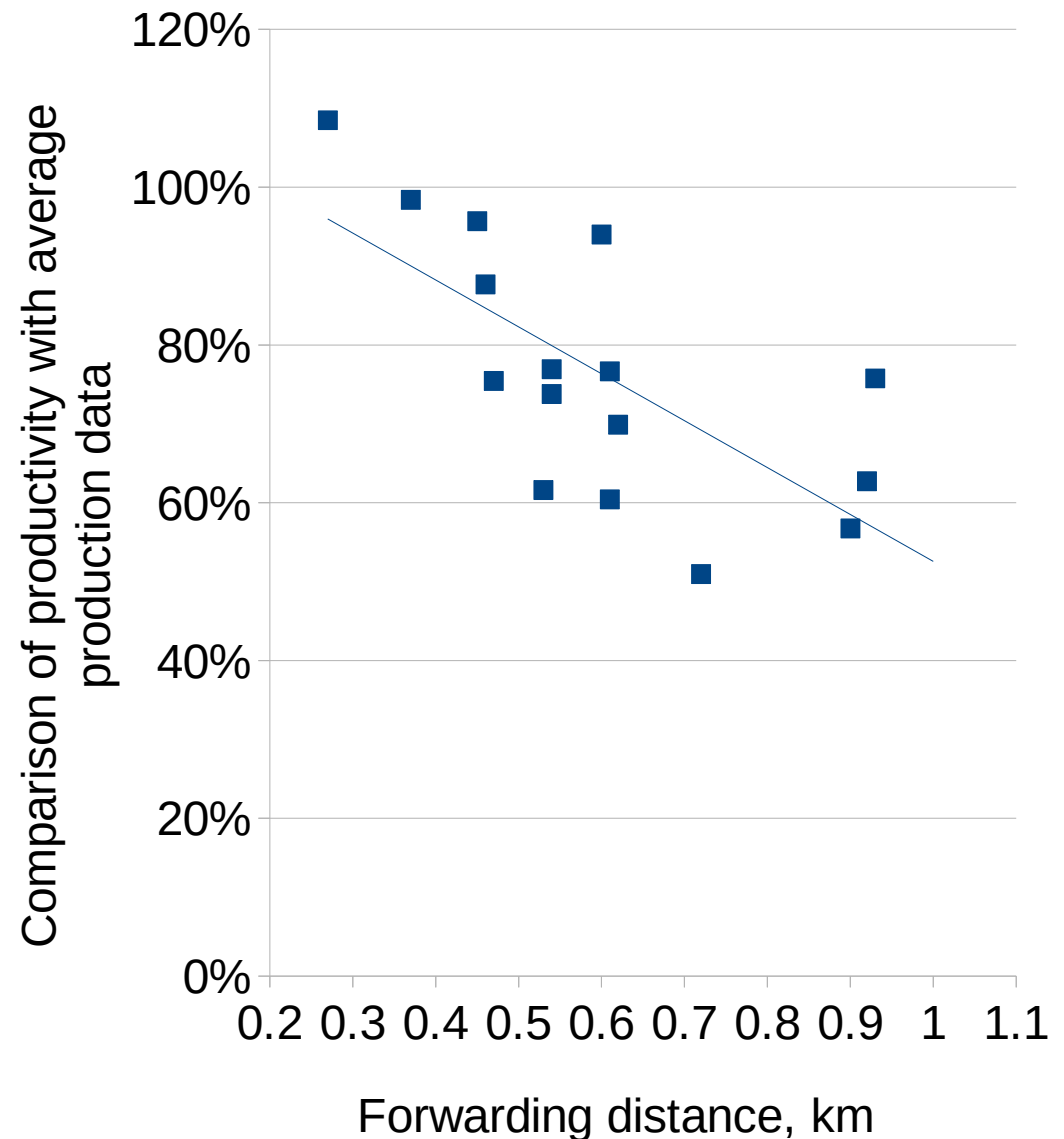


- Duration of monitoring – 700 hours
- Average fuel consumption –  $4.93 \pm 0.26$  L per hour ( $0.7$  L  $m^{-3}$ ).
- Average load (data on  $848$   $m^3$ ):
  - full loads of sawlogs –  $4$ - $4.3$   $m^3$ ;
  - full loads of pulpwood and firewood –  $3.6$ - $3.7$   $m^3$ .
- Average driving speed –  $2.7$  km  $h^{-1}$ .
- Results of time studies (in extreme conditions):
  - average load –  $3.4$   $m^3$ ;
  - forwarding distance –  $270$  m;
  - consumption of productive time:
    - loading in –  $15.5$  min. per load ( $4.56$  min.  $m^{-3}$ );
    - loading out –  $4.7$  min. per load ( $1.38$  min.  $m^{-3}$ );
  - productive time –  $84\%$ ;
- Average productivity –  $7$   $m^3$  per work hour.

# Comparison with average productivity figures in state forests



- Average forwarding productivity of companies providing service to JSC “Latvia state forests” in 2015 (*at least 50% of logs extracted in bad & extreme conditions*) – 6.8 m<sup>3</sup> per hour, average forwarding distance 620 m;
- Productivity of Logbear F4000 in the same conditions - 5.2 m<sup>3</sup> per hour.



# Prime cost of forwarding

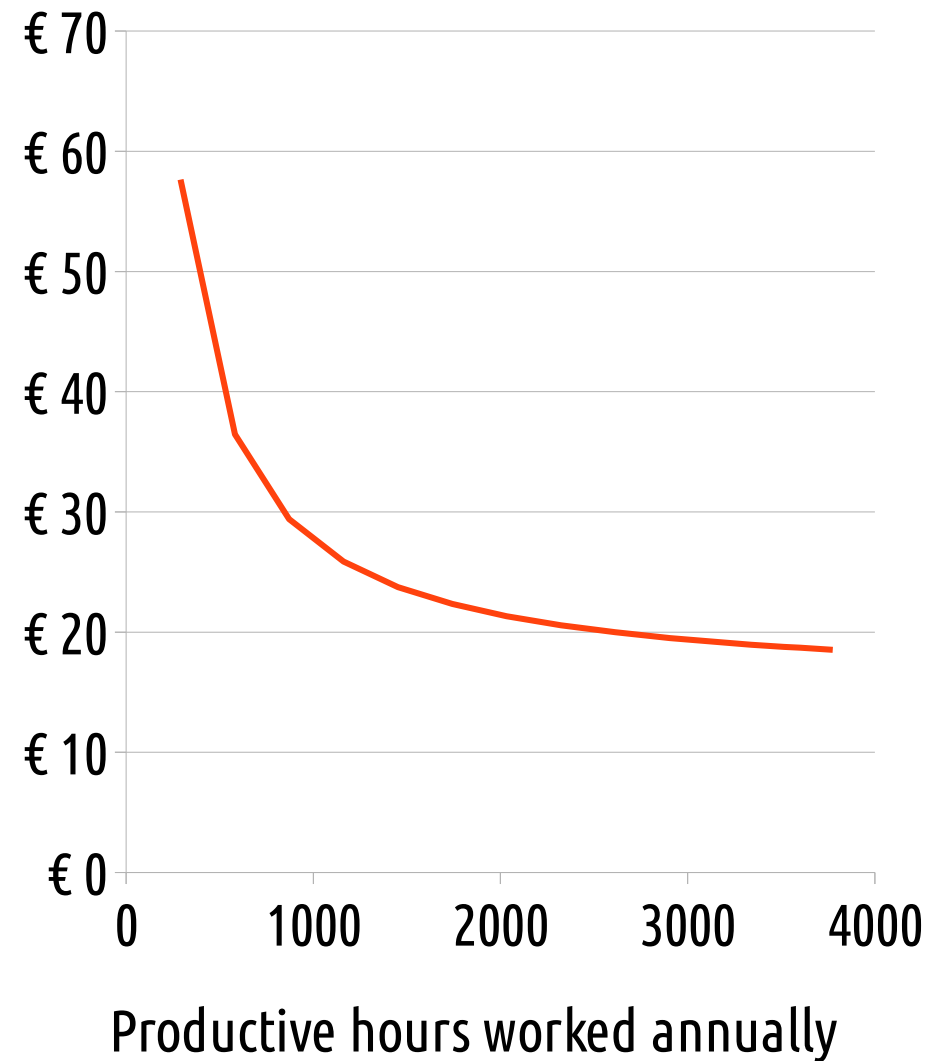
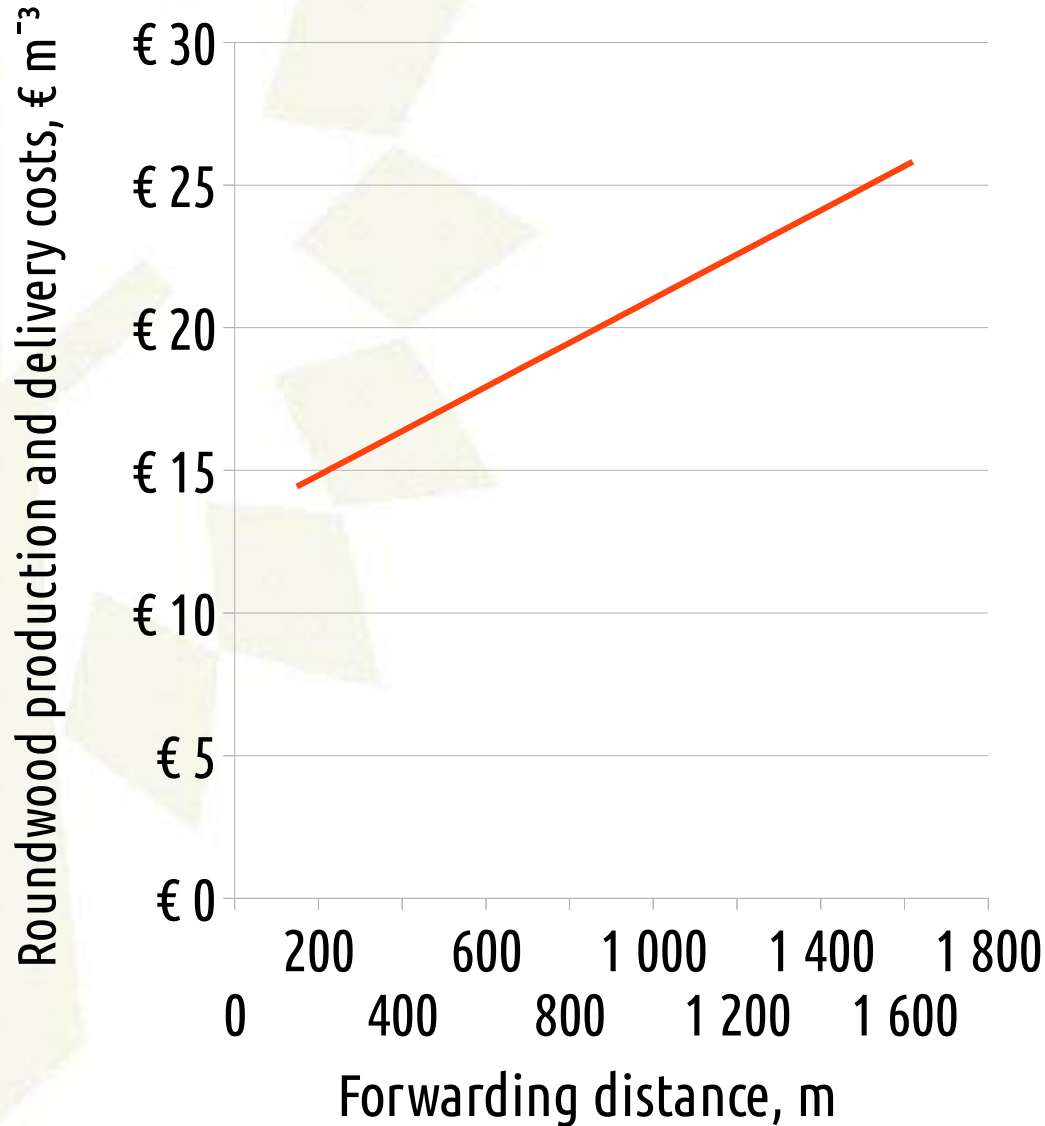


- Average cost of forwarding in 270 m distance is 6.8 € UB m<sup>-3</sup>. Prime cost is heavily affected by the conditions of central strip-roads.
- Average cost of forwarding (*with no reference to conditions*) in thinning in Latvia in 2015 was 6.14 € UB m<sup>-3</sup>.
- Operational costs were increased in 2016 due to unexpected damages of tracks (12000 €).

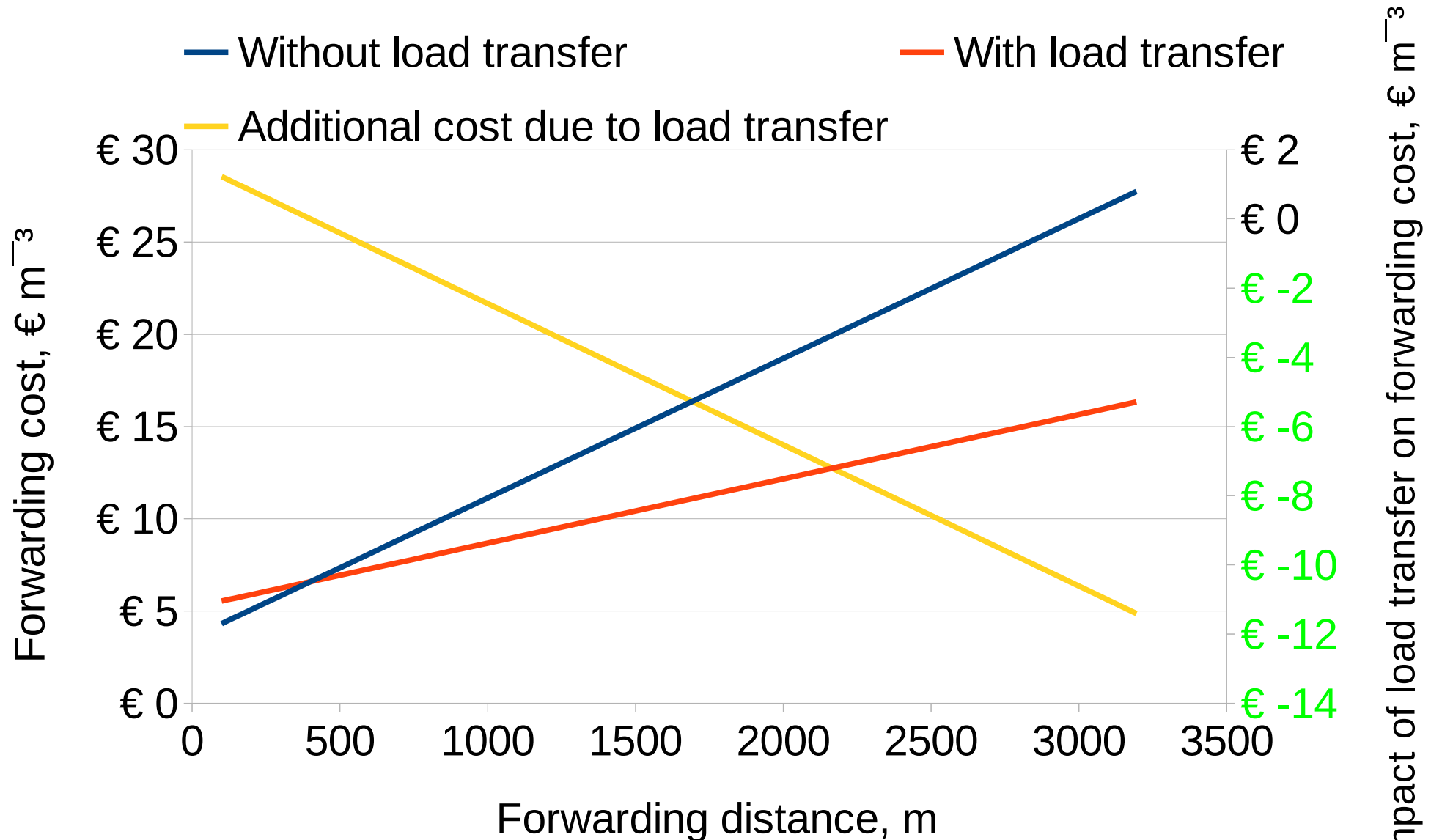




# Factors affecting forwarding cost



# Another opportunity to reduce costs – load transfer at a stand side or use of trailer



Impact of load transfer on forwarding cost, € m<sup>-3</sup>

# Conclusions & recommendations

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- Productivity of Logbear F4000 forwarder is by 23% smaller in comparison to average values in thinning due to long forwarding distance. If forwarding distance is below 400 m, the F4000 productivity is comparable with the average values.
- In spite of high operational expenses forwarding cost using F4000 is competitive with average service cost in extreme conditions in JSC “Latvia state forests”.
- Utilization of light harvesters (Vimek 404 or similar) together with Logbear F4000 can lead to significant increase of productivity in thinning without increasing soil damages.
- Transfer of load and additional trailers should be considered to reduce cost in case of long forwarding distance.
- **Use of F4000 as rescue solution after unsuccessful operations of wheeled forwarders should be avoided!!!**

