Feasibility and costs of mechanized energywood procurement in Northern Scotland – Case Wick

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IEA Bioenergy Workshop, Vancouver, Canada

Northern WoodHeat project

NORTHERN WOODHEAT

Northern Periphery

DEVELOPING SMALL AND MEDIUM SCALE WOODFUEL SUPPLY CHAINS

Coille Beithe na Gàidhealtachd HIGHLAND BIRCHWOODS

HÉRAÐSSKÓGAR

METLA FINNISH FOREST RESEARCH INSTITUTE

abriachan forest trust

The Highland Council Comhairle na Gaidhealtachd SERVING The Highland Community

DWP Harvesting and Marketing

Woodtherm Fuels

SKÓGRÆKT RÍKISINS

LBHI

NORTH KARELIA POLYTECHNIC

JOSEK Joensuu Regional Development Company Ltd.

INVERNESS COLLEGE

highland wood energy

UHI Millennium Institute

Forestry Commission

Northern WoodHeat project

SCOTLAND

- Detailed investigation of supply chains in local conditions
- Practical demonstrations and testing of harvesting techniques

Advice on research frameworks and supply chains.

Feedback about advisory & development products

Joint activity on raising awareness of market opportunities for both users and suppliers

FINLAND

- Development and validation of international advisory and training products in the area of woodfuels.
- Supply chain work
- Boiler technology

NORTHERN WOODHEAT

ICELAND

- Development of a pilot project including supply chain and operating woodfuel boiler.

Feasibility Study

Feedback about advisory & development products

Data on fuel characteristics

Woodfuels in Scotland – current situation

- Over 50 installations small business scale and above
- Over 40 at the provisional/planning scale
- Mostly Veto boilers with raised hoppers
- Wood chips are currently most common
- Pellets are gaining in popularity
- District heating scheme in Wick/Aviemore is underway

Possibilities of woodfuel in Northern Scotland

- The Highlands have a large reservoir of low grade timber that is often uneconomic to deliver to distant markets – no forest industry
- Often located in peripheral areas where population centres are widely scattered and very small (ideal resource for woodfuel)
- Heat and power is always needed in pheripheral areas (in Scotland conventional heat & power are particularly expensive in peripheral areas)

Possibilities of woodfuel in Northern Scotland

Large amounts of comparatively high quality wood resources

Possibilities of woodfuels in Northern Scotland

Existing and working harvesting systems

Penetraiting new markets with new technology is always difficult, existing systems should be utilised as much as possible.

Possibilities of woodfuel in Northern Scotland

- Existing productivity and cost data for procurement planning
- Educated and skillful operators
- Entrepreneur traditions
- Tariffs and wages exist
- Machinery already tested and found appropriate, “floating enough”

Possibilities of woodfuel in Northern Scotland

Large forest owners

- Ensured timber supply
- Accurate (?) data of forest resources
- Well planned harvesting schedules
- Possibility to large scale, cost effective operations
- Centralised decision making
- Business understanding

Challenges of woodfuel in Scotland

- Small volumes of current using places and location far from each other => future development important to consider
- Weak traditions of using wood based fuels
- Raw material production is not the primary objective of forestry (especially in the private sector)
- High moisture content of the raw material
- Drying of chips should be “integrated” to the supply chain

Selection of the harvesting technology

- Annual need for forest fuels and other fuels
- Annual availability of forest fuels
  - fuel mix (residues, small trees, stumps)
  - transport distances in the forest/on road network
- Location of the plant (centre of a town or in the industrial area)?
- Size of the plant yard (storage)?
- Municipal DH plant/Industrial CHP plant?
- Dominating technology to produce chips to DH plants
- Need for GIS-based fuel availability and cost analysis

Technology selection for the Scottish Highlands

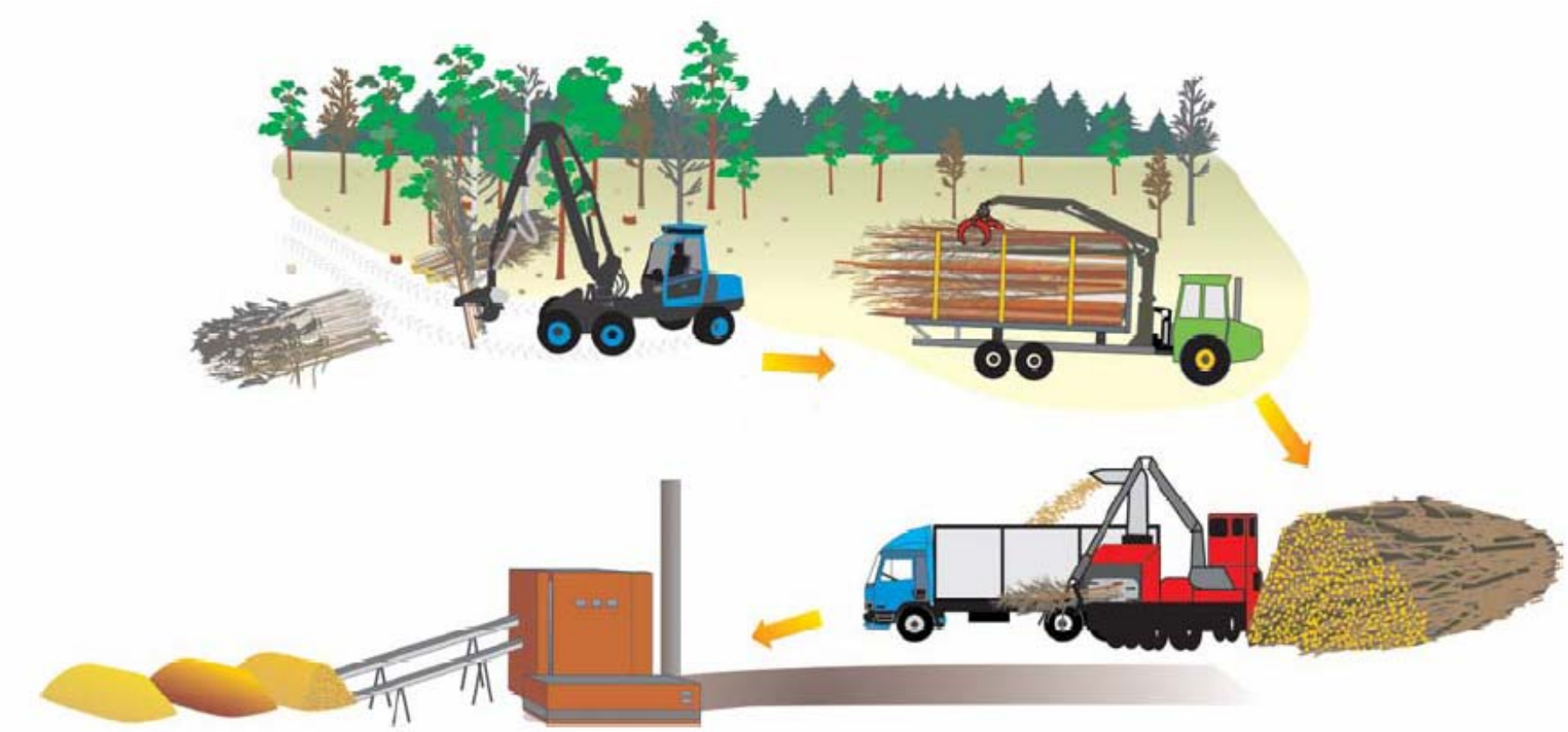
FACTS

- Low bearing capacity of soil
- Roundwood for fuel
- Existing harvesting traditions/entrepreneurs
- Several medium scale using places apart from each other
- Plenty of small using places apart from each other
- High moisture content of roundwood
- Chip burning boilers
- Gasification

EFFECTS ON SUGGESTED TECHNOLOGY

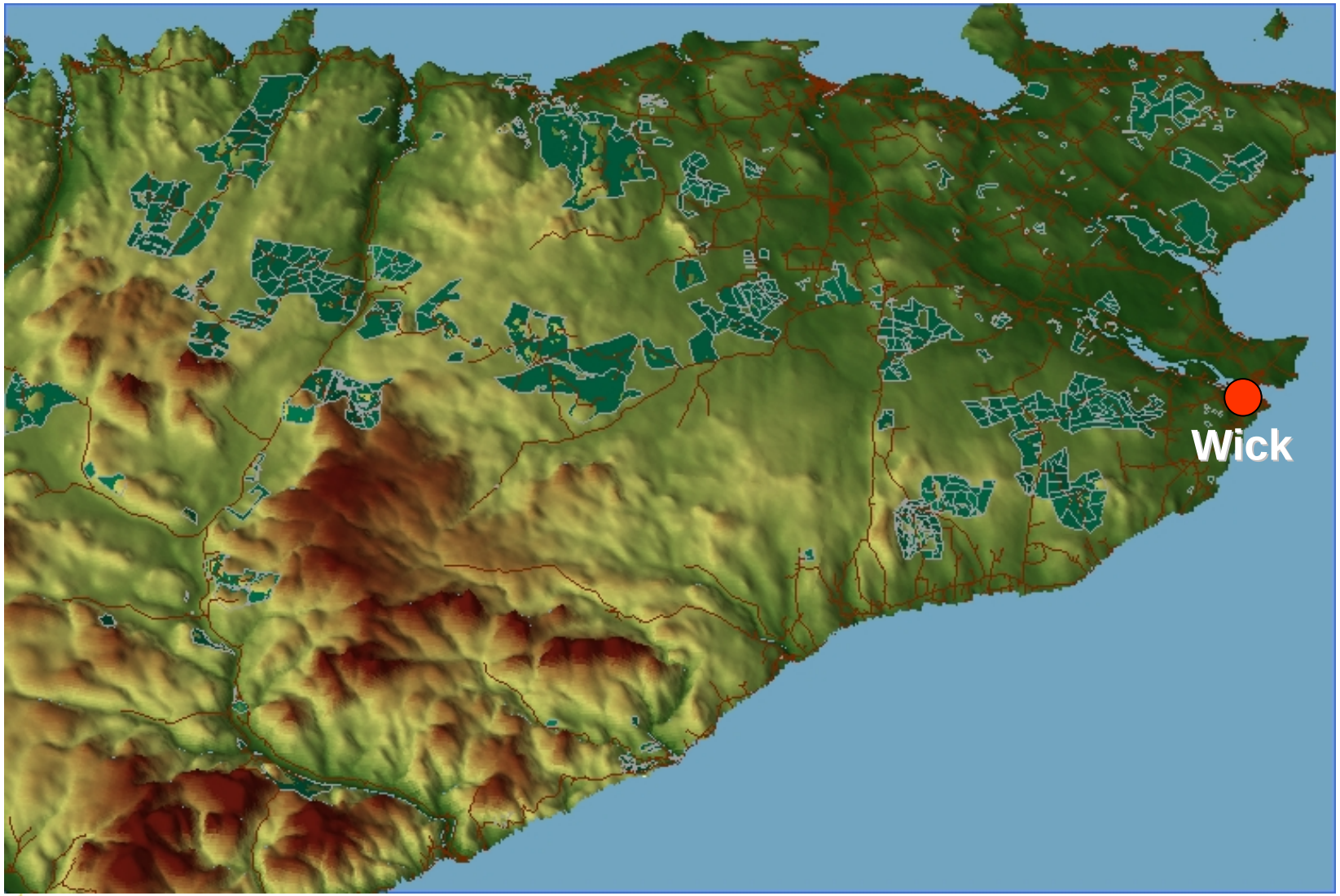
- Terrain chipping almost out of question
- Harvesters and forwarders already exist and work effectively
- Many professionals already know how to work successfully
- Chipping at plant out of question
- Mobile effective chipper with large enough feeding capacity
- Farm scale chippers and local part-time operators needed
- Storing (with covering) over the summer

Supply chain

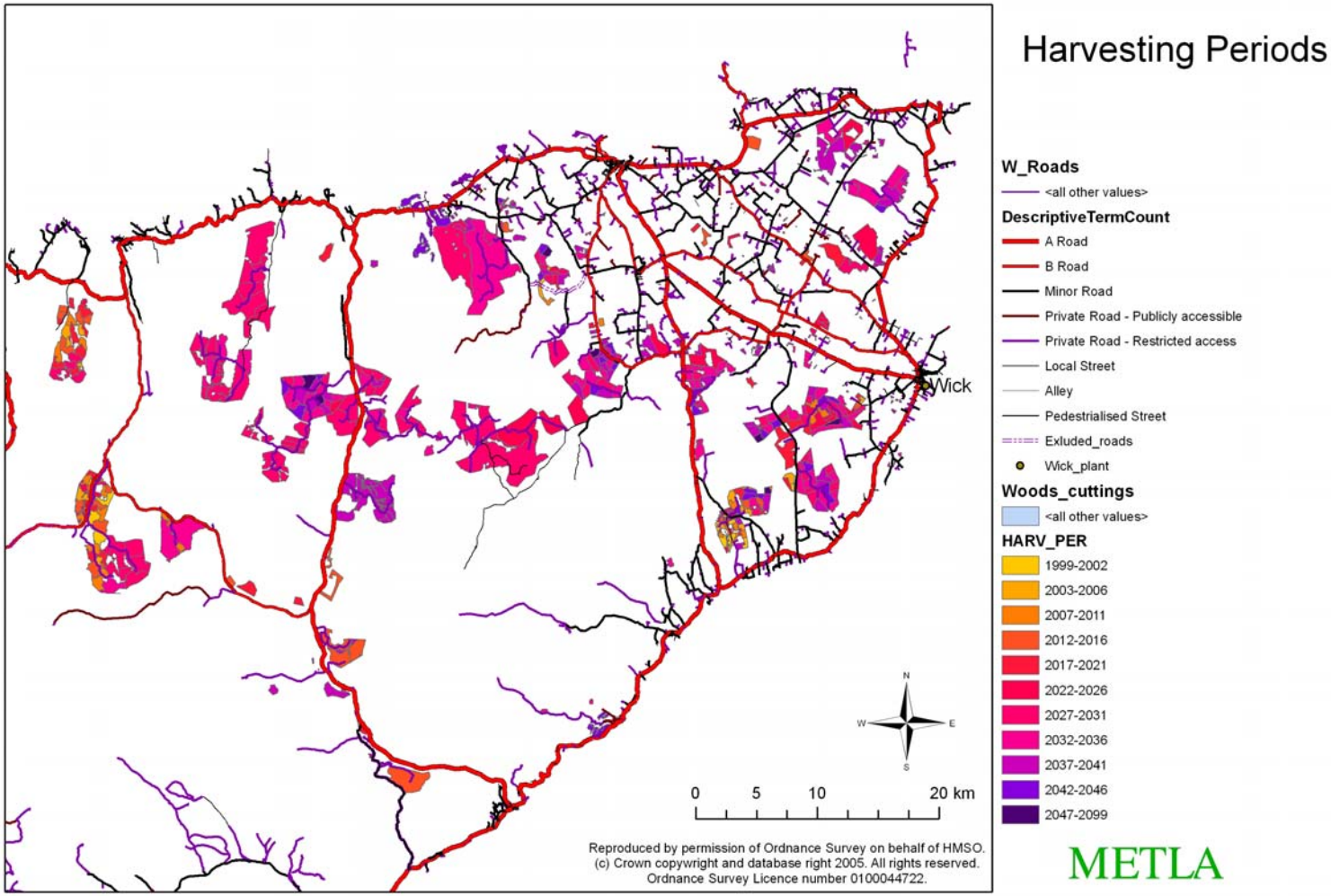


Source: Hakkila 2004. Developing technology for large-scale production of forest chips. Final Report of Wood Energy Technology Programme 1999–2003. Technology Programme Report 6/2004. Tekes

Wick case study



Wick case study



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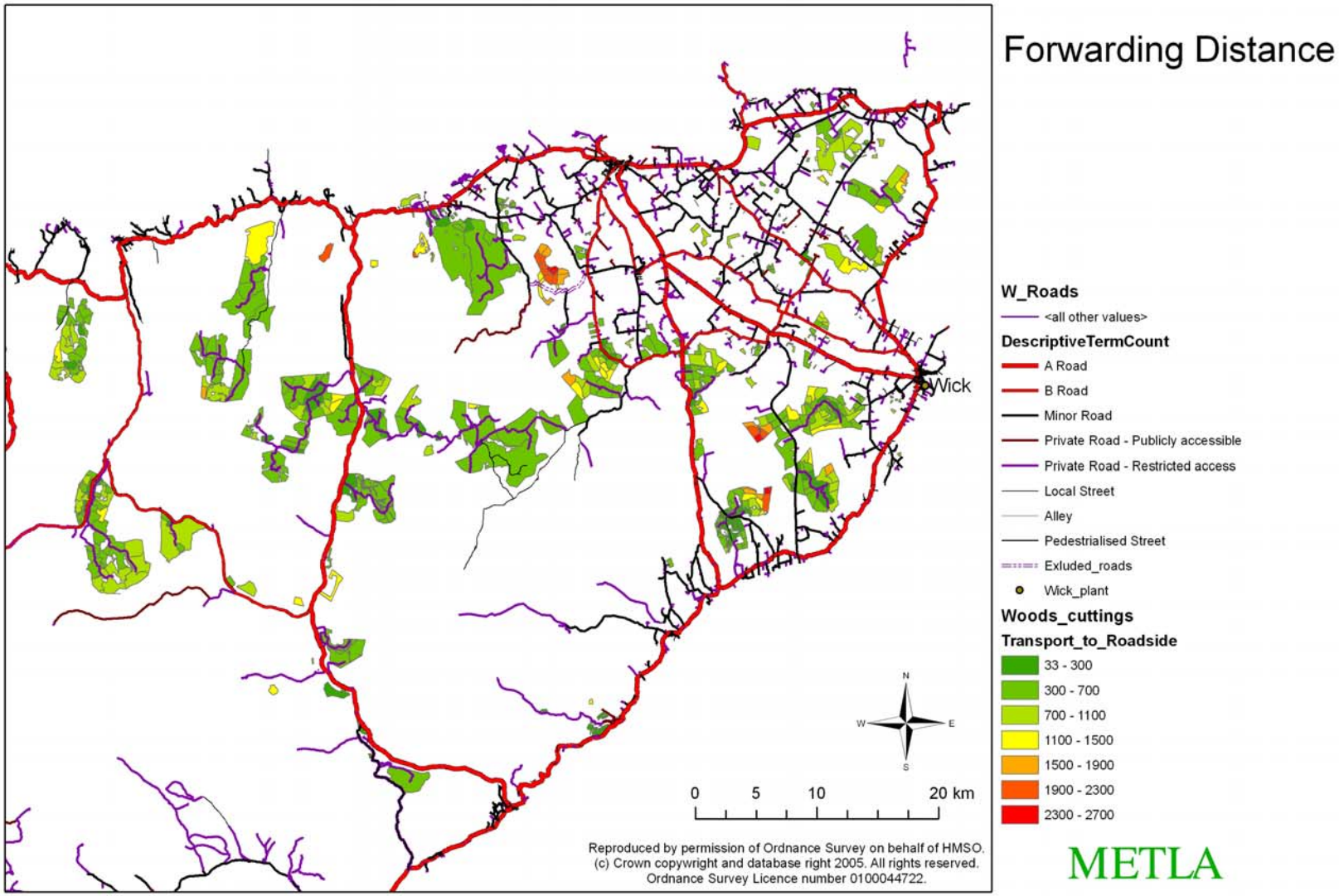
Wick case study



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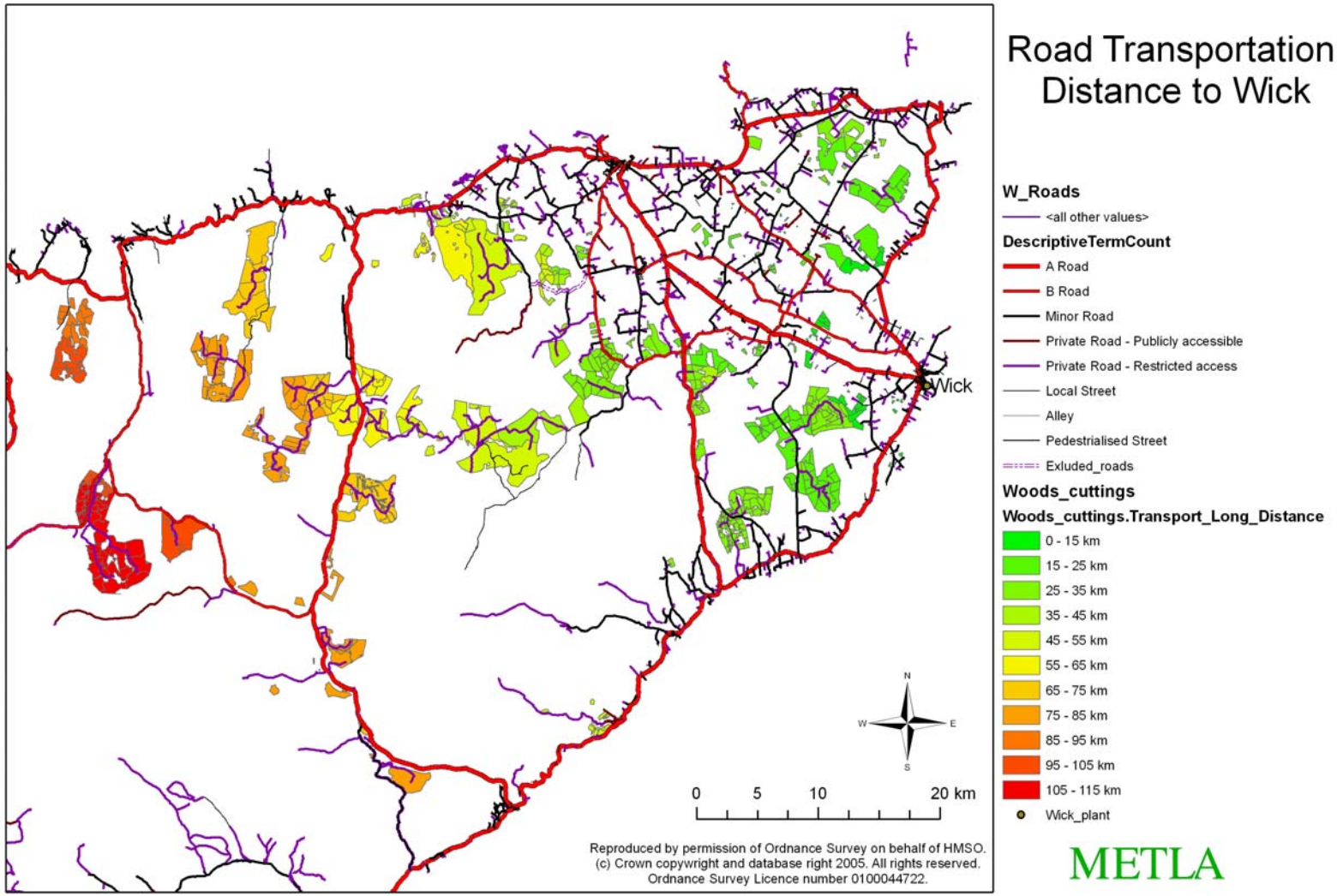
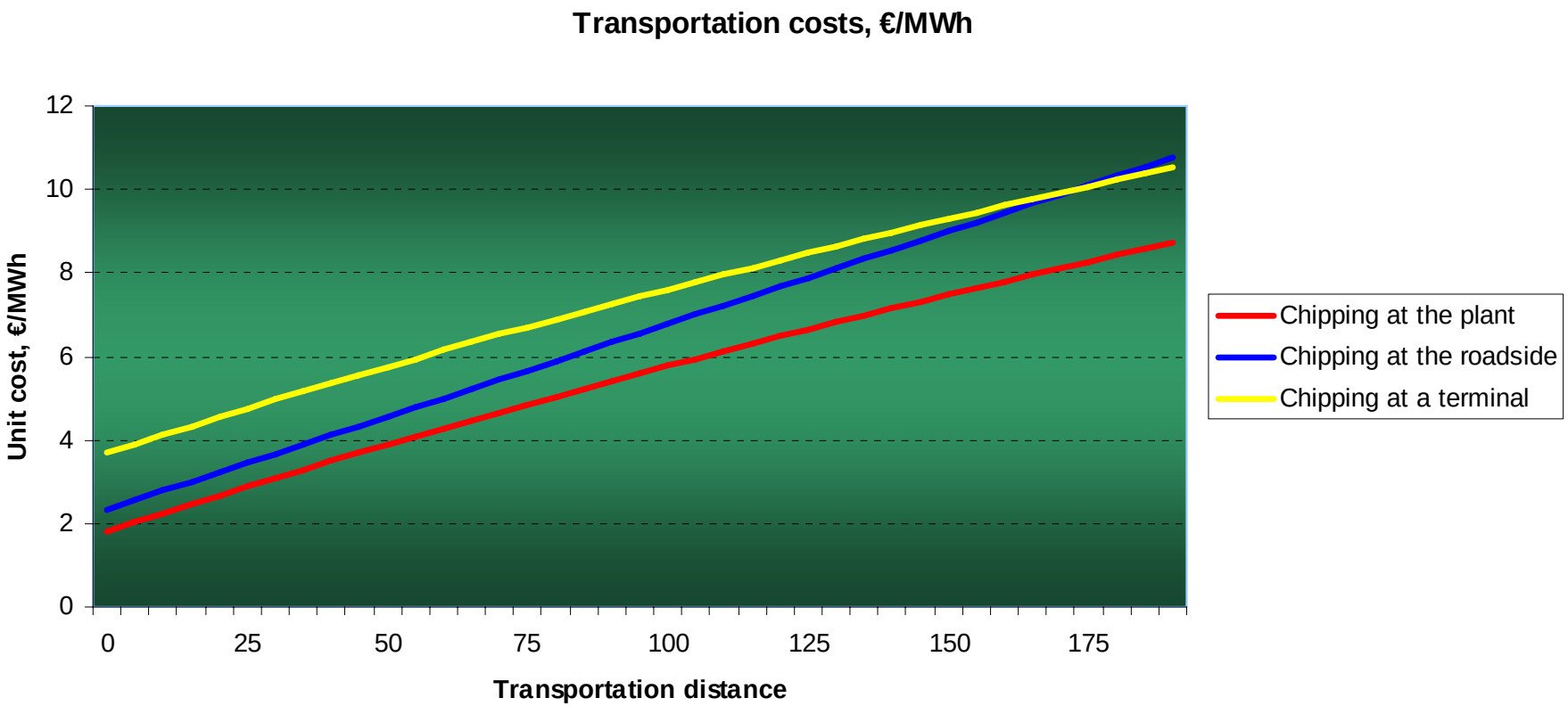


Wick case study

Transportation and transferring costs, £/tonne



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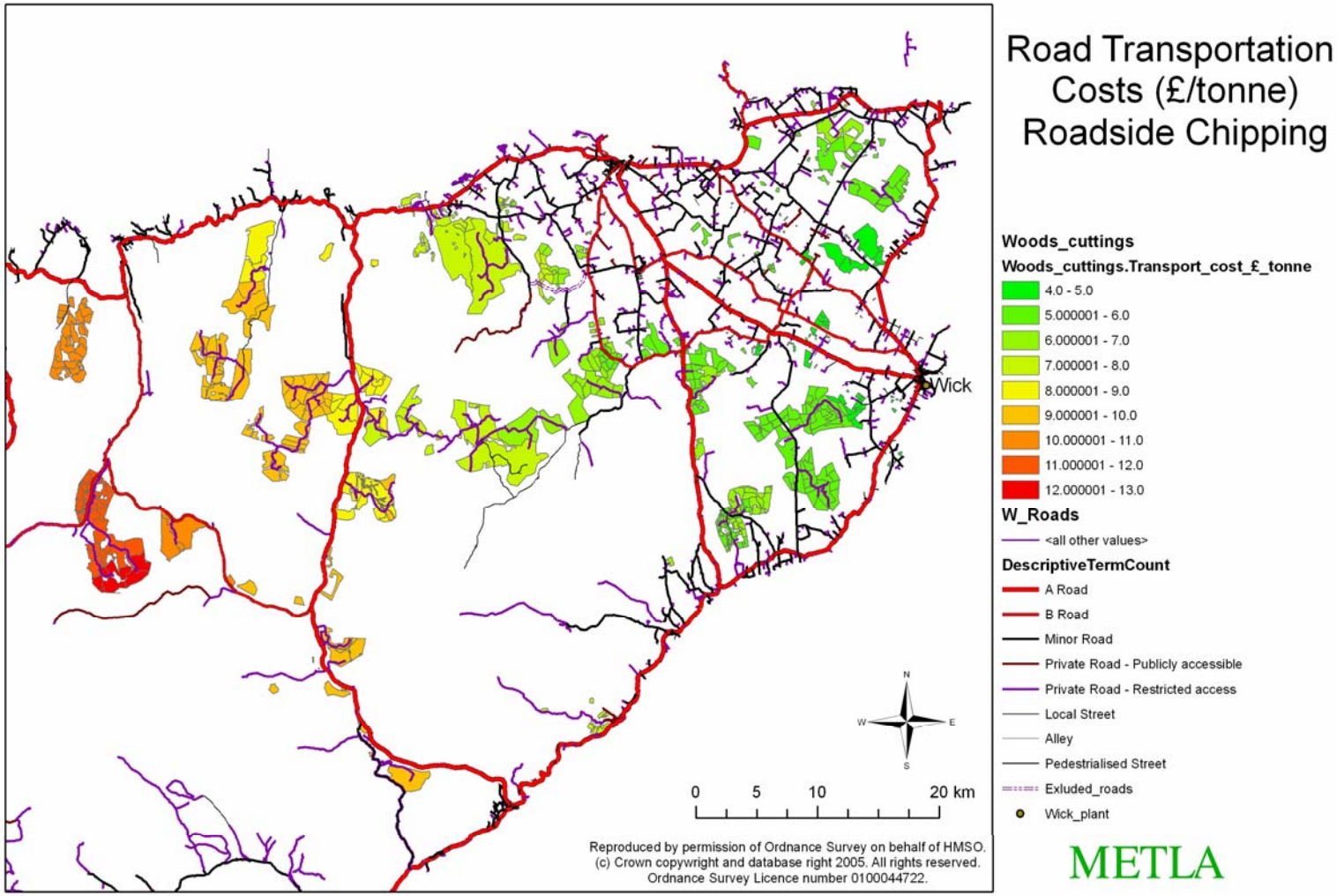
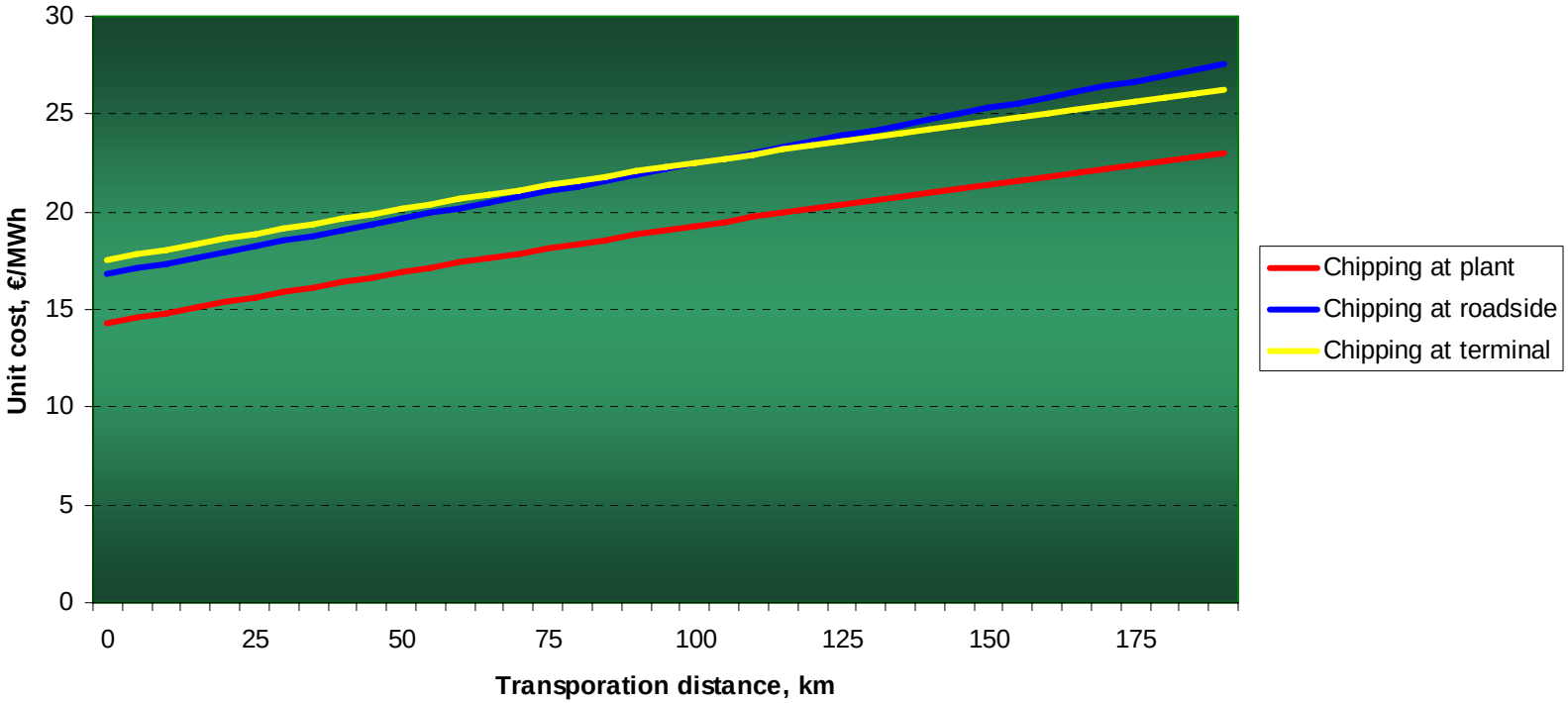


Wick case study

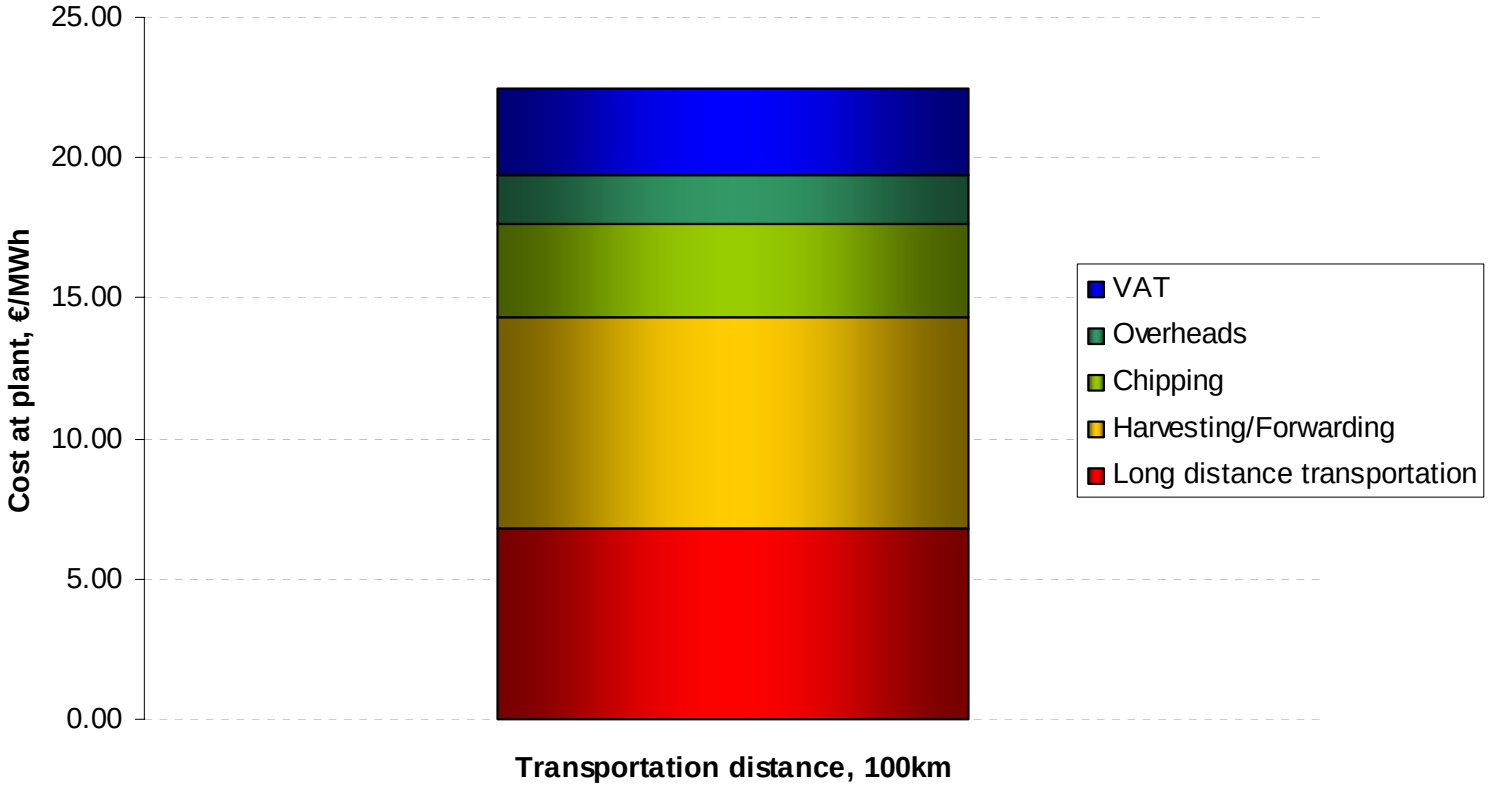
Total unit costs, €/MWh

Preassumptions: Lodgepolepine clearcutting
Full lorry net payload (22 tonnes) utilisation



Wick case study

Cost structure, €/MWh



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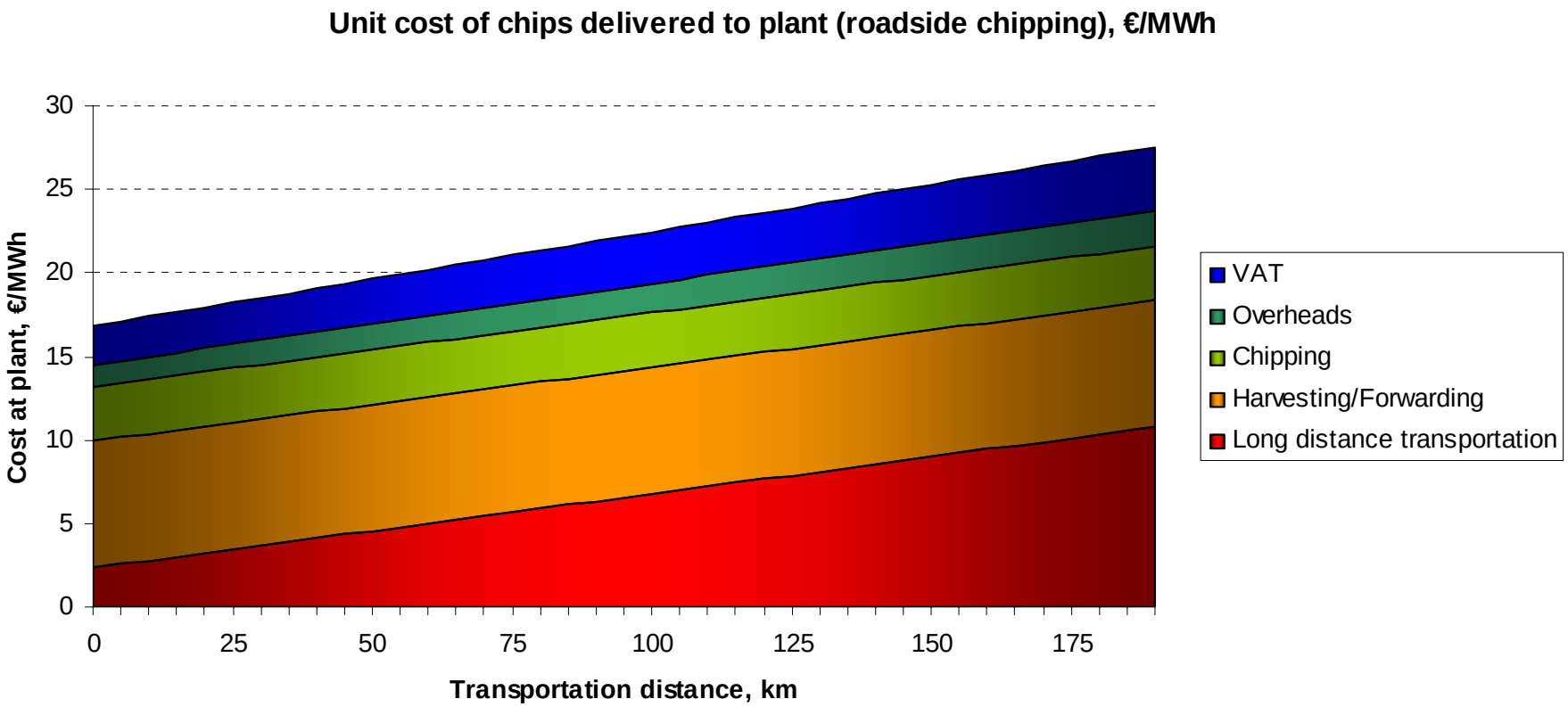

Conclusions

- Woodfuels are a competitive source of energy in Northern Scotland
- Supply chains have to be tailored to local conditions and raw material
- Existing technology should be utilized as much as possible
- Cooperation of all stakeholders is essential

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