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The use of Invasive Alien Plants for Bioenergy in South Africa:

Contribution to multiple sustainable development goals

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IEA Bioenergy and GBEP Workshop 15-16 June

How can biomass supply for bioenergy deliver multiple benefits and contribute to sustainable development goals?



Background

- Study commissioned by Netherlands Enterprise Agency for NL-SA Knowledge platform on sustainable biomass.
- South Africa has fossil-based energy system. High GHG emission reduction targets.
- Invasive Alien Plants (IAPs) promising resource for bioenergy. Main reason for eradication of IAPs is water consumption.
- **Objective: Assess the potential and the environmental and socio-economic impacts of bioenergy production from invasive alien plants in South Africa.**
- Environmental: GHG balance, Water
- Socio-economic: Employment, Competitiveness



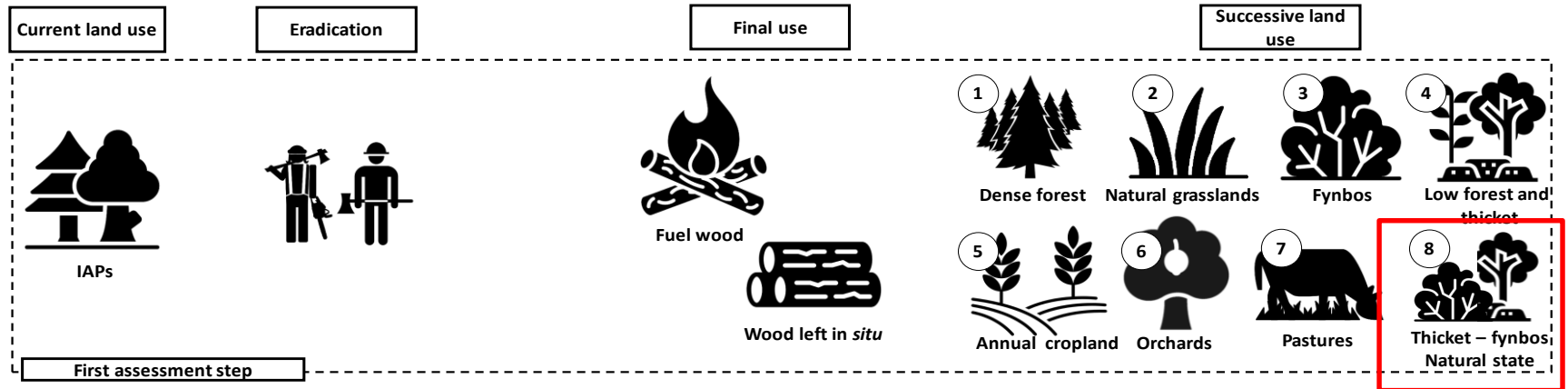
Geographical scope of the study: Case study Port Elizabeth region



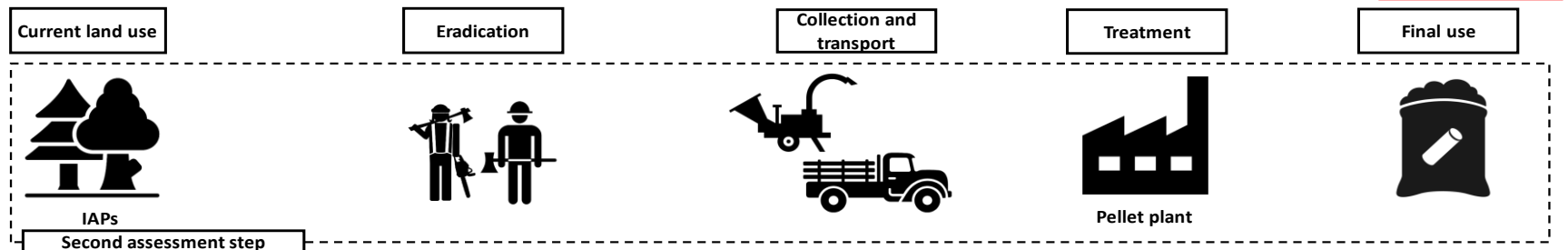


Scope

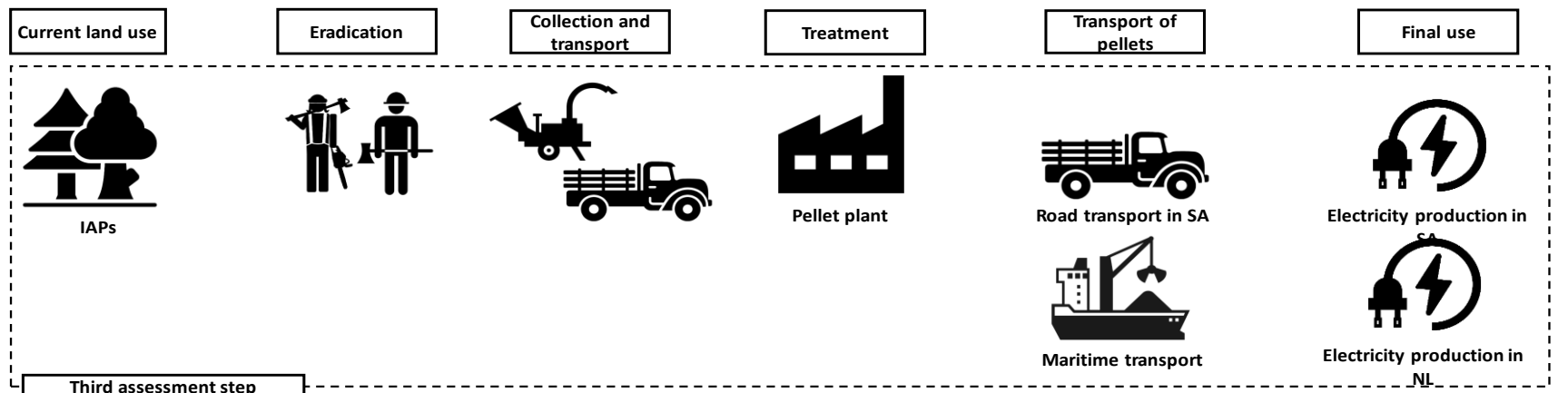
Scope 1



Scope 2

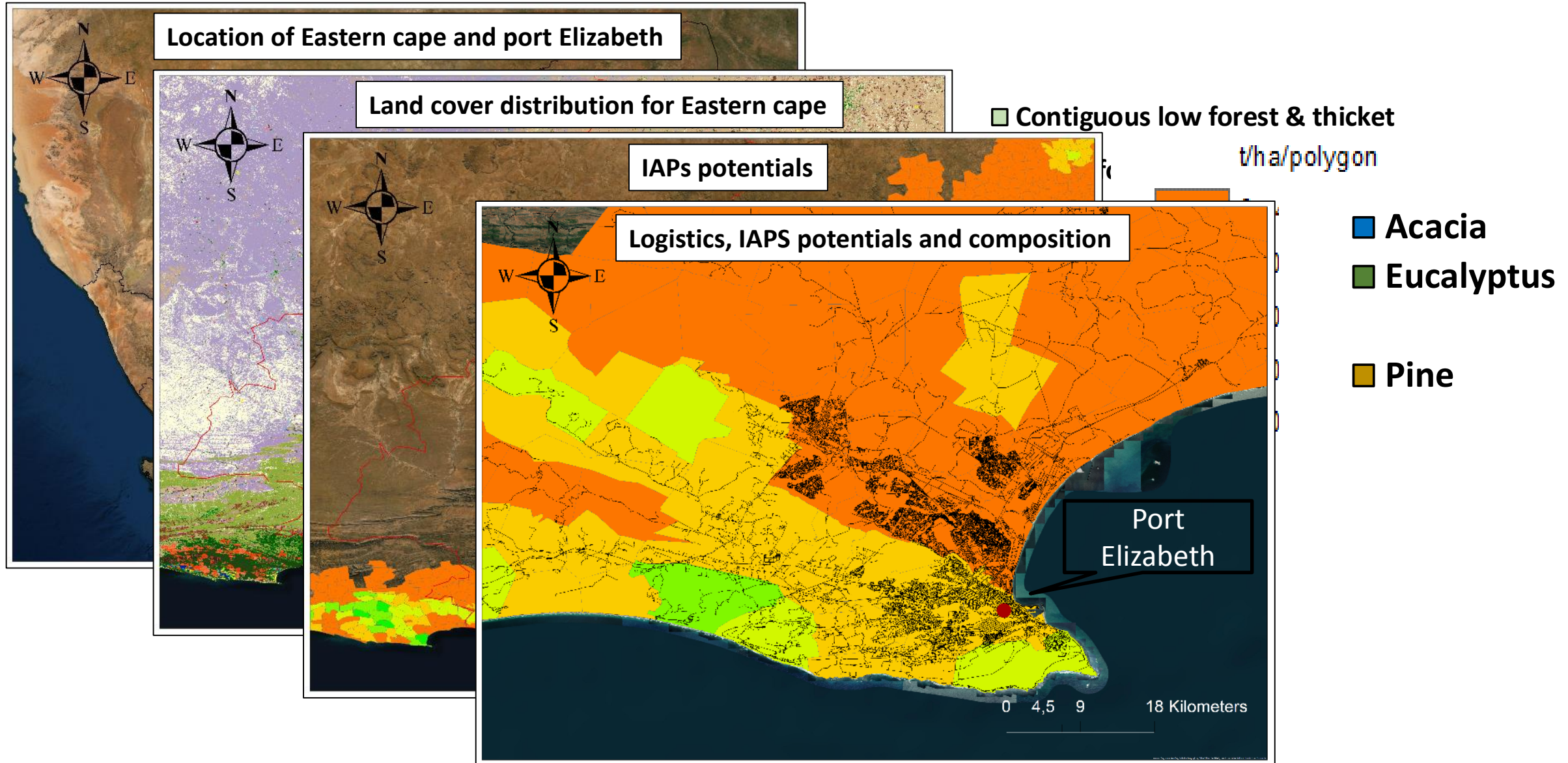


Scope 3



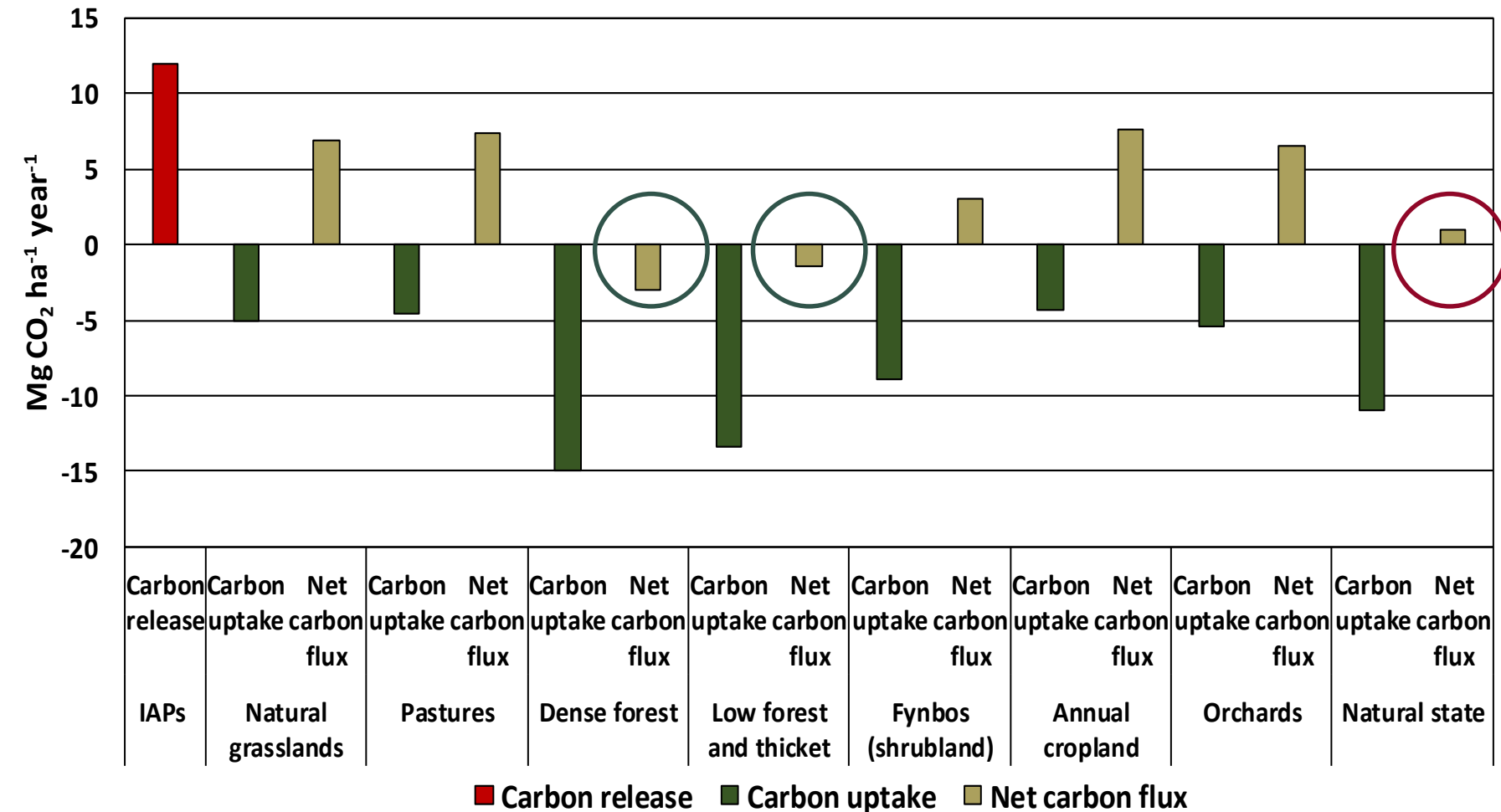


The effect of land use transitions after IAPs eradication





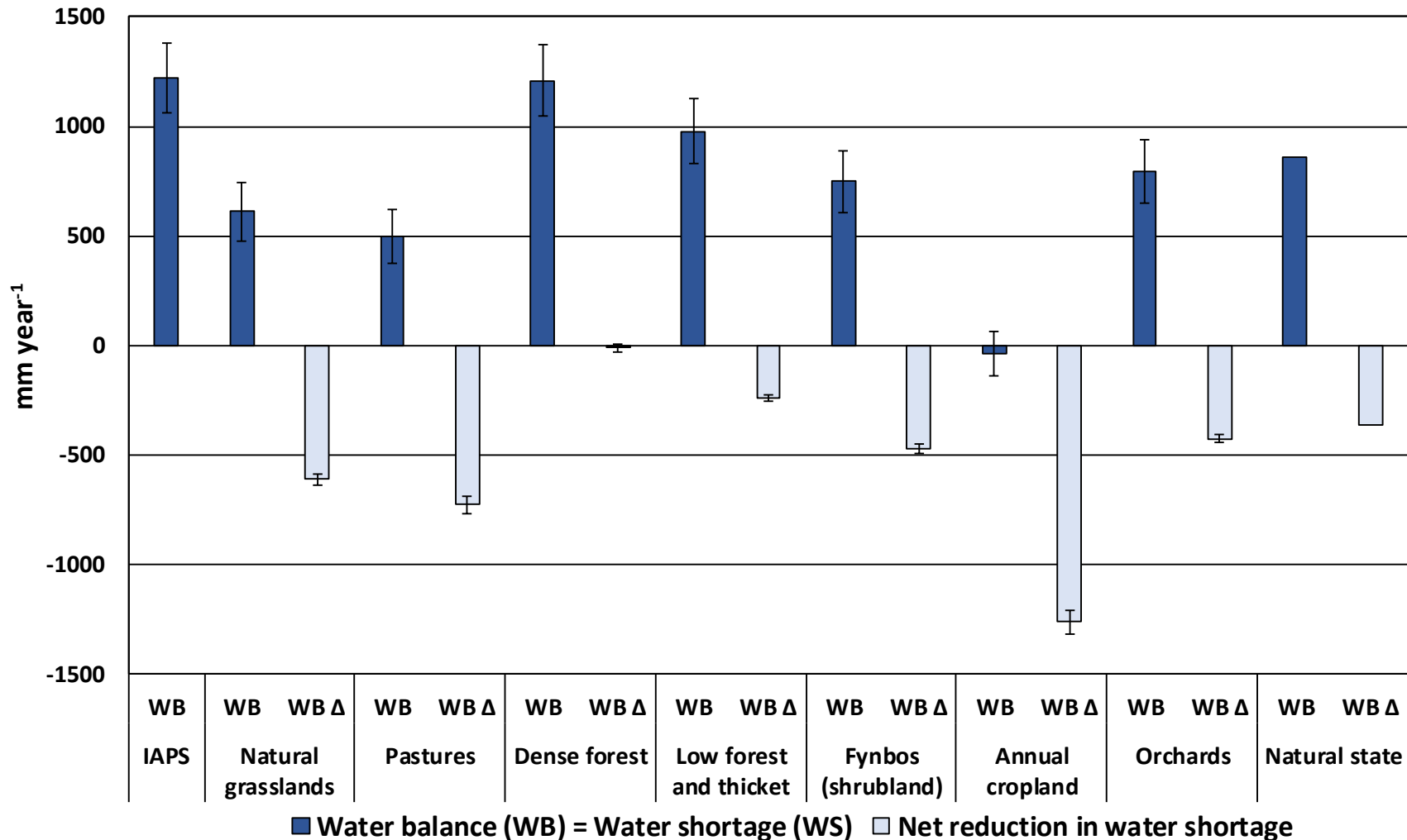
Results: Carbon emissions of IAP removal



- IAPs are a carbon sink, removal will result in a carbon loss
- Net carbon flux depends on subsequent land use.



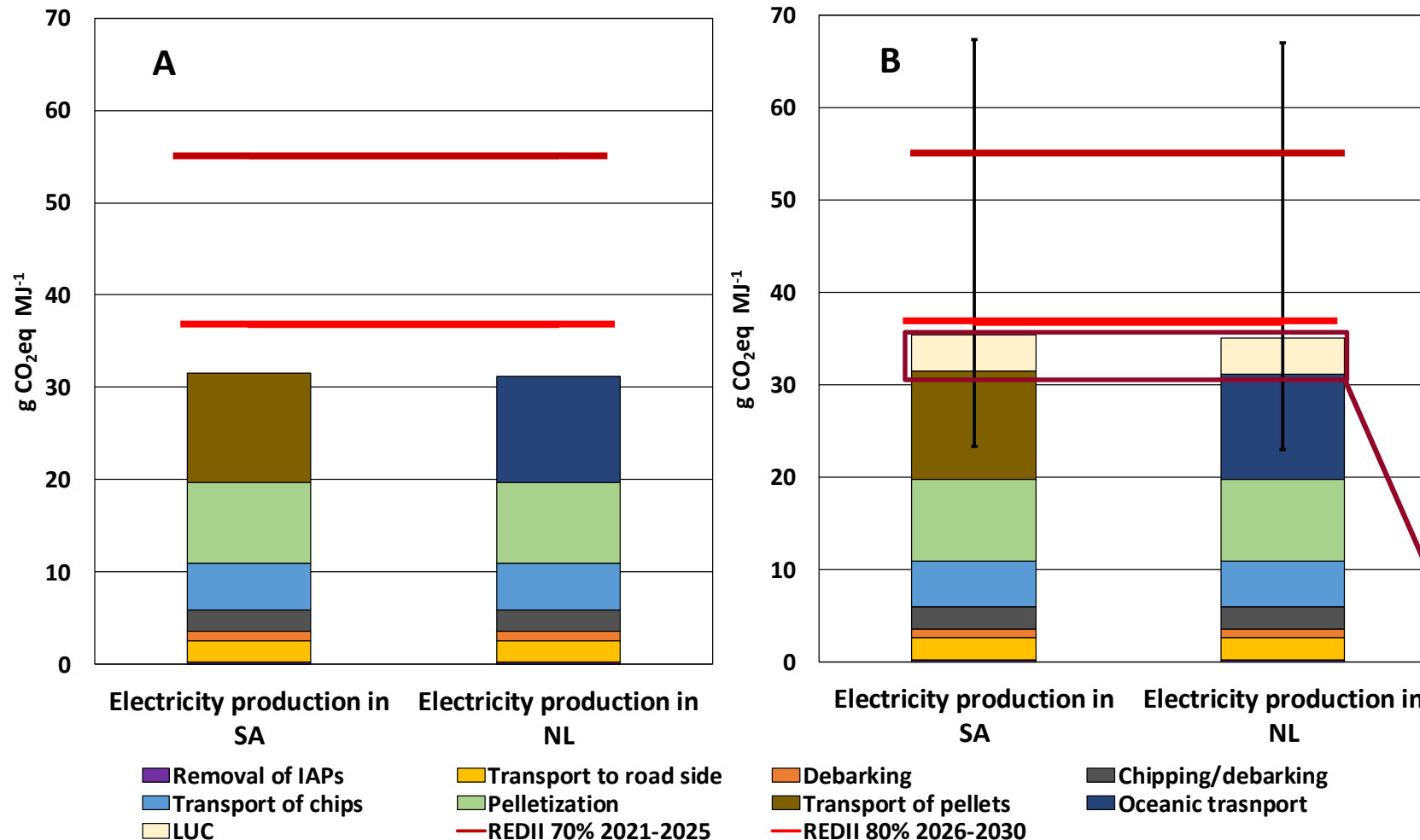
Results: Water balance of IAP removal



- In general, the removal of IAPs results in water savings considering any potential land-use transition.



Results: Supply chain GHG emissions electricity production

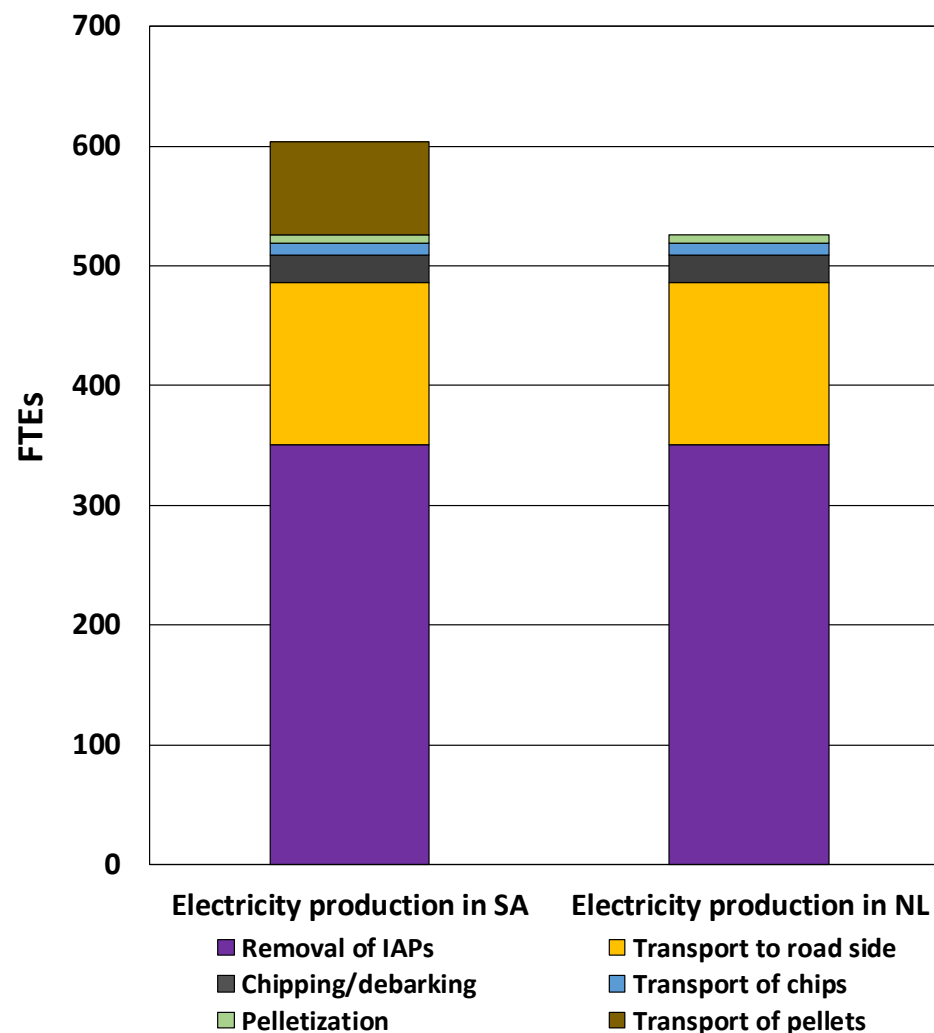
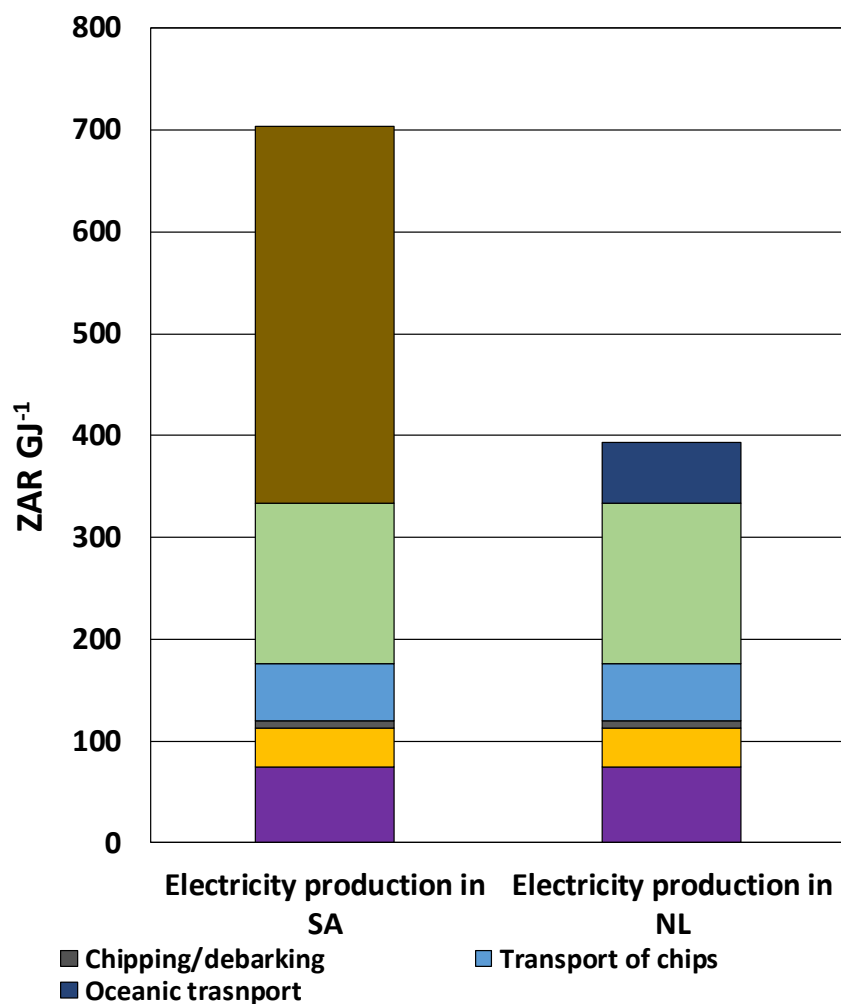


1. The main difference is caused by mode of transport.
2. Both supply chains can comply with REDII 70% / 80% GHG savings requirement.
3. Complying with REDII requirements relies strictly on restoring the land entirely to its **natural state** (thicket / dense forest).

Figure A omits the carbon stock changes induced by IAPs removal and land rehabilitation to its natural state. Figure B includes the carbon stock changes induced by IAPs removal and land rehabilitation to its natural state. The ranges indicate the carbon stock changes from other land-use transitions



Results: Costs and employment of using IAPs for bioenergy



) The cost of pellets in SA is considerably higher because of long distance road transport.

) The biggest share of pelletization costs consist of operating costs



Main conclusions

- The eradication of **IAPs results in tradeoffs** between GHG emissions, water savings, and socio-economic impacts.
- Impacts highly depend on subsequent land use
- Generally removing IAPs results in **water savings and job creation**. These can also amplify other **ecosystem services** such as conservation of biodiversity and social development under smart choices of land-use transitions.
- The use of IAPs for electricity generation can improve economic feasibility of eradication and can result in GHG emissions savings when fossil electricity is replaced.
- Reporting of GHG emissions depend on whether **IAPs are classified as a residue or not**
- Socio-economic trade-offs are different for electricity production in NL or SA



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