Toward a strategy for wood-energy in Canton de Vaud
LCA of various technologies of wood transformation

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Denis Bochatay – Quantis
denis.bochatay@quantis-intl.com
Guillaume Schneider – Quantis

Situation

1. Consumption of wood as energy is constantly increasing in Canton de Vaud

2. Internal (geographical perimeter : Vaud) wood resources is limited

3. Energetic strategy 2050 (Switzerland) is the driver for several large scale projects using wood for energy production

➢ Necessity for Canton de Vaud to define a strategy regarding the use of its wood resources in order to be able to answer requests from the market

Towards a strategy at the level of Canton de Vaud

1

- Development of wood heating at the scale of Canton de Vaud
- Environmental and economic assessment of various technologies of wood-energy plants
- Potential and costs of wood resources

2

- Scenarios of development of large scale wood-energy plants
- Market assessment

3

- Definition of local strategy -> political decisions

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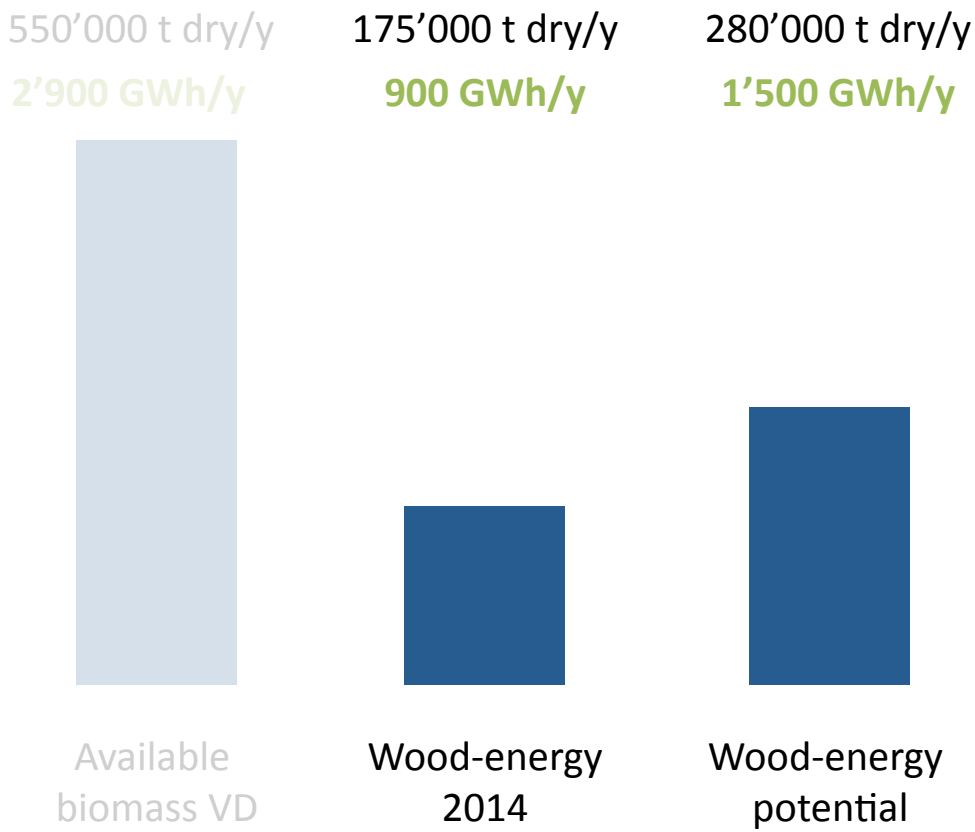
Two questions to be answered

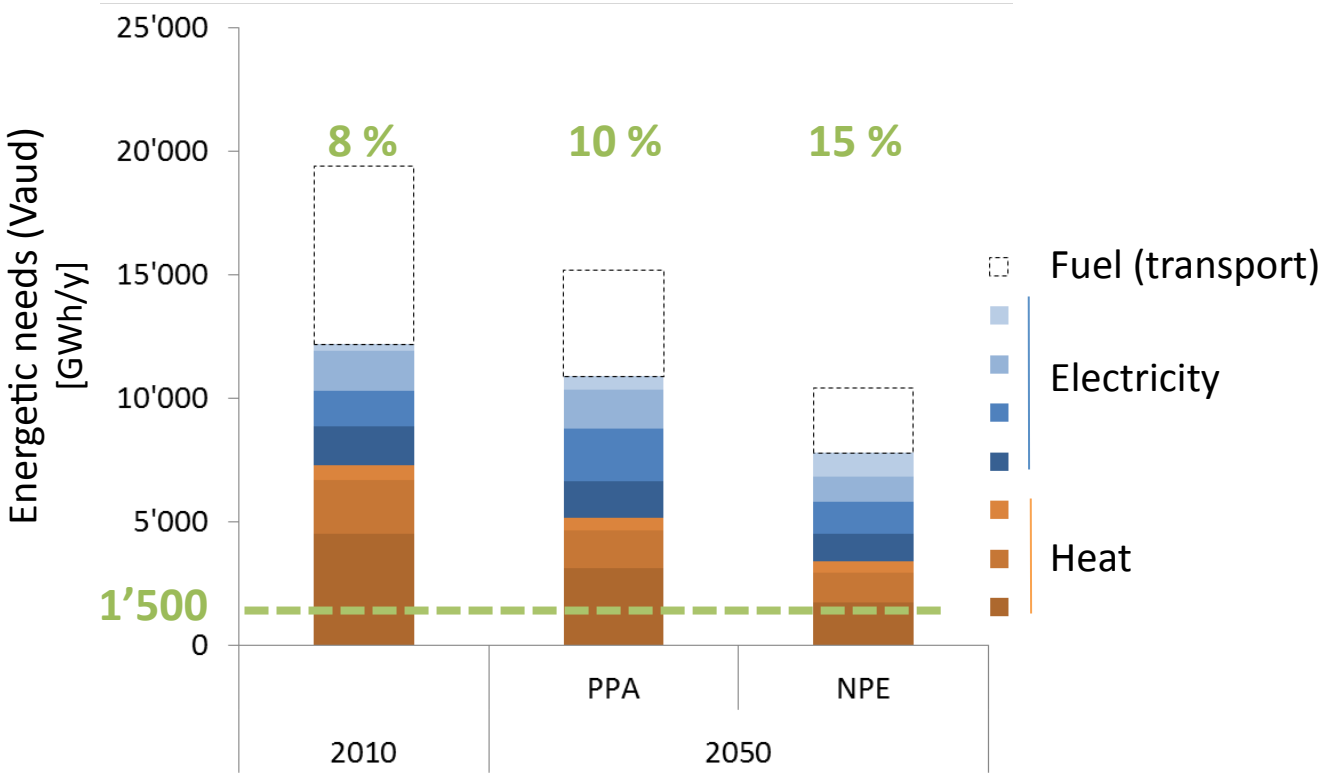
1. Are these technologies more interesting energetically and environmentally than traditional wood chips power plants?

2. What will be the effect of the potential development of such project on the wood resources?

About 100’000 t wood additional seems to be available in Canton de Vaud

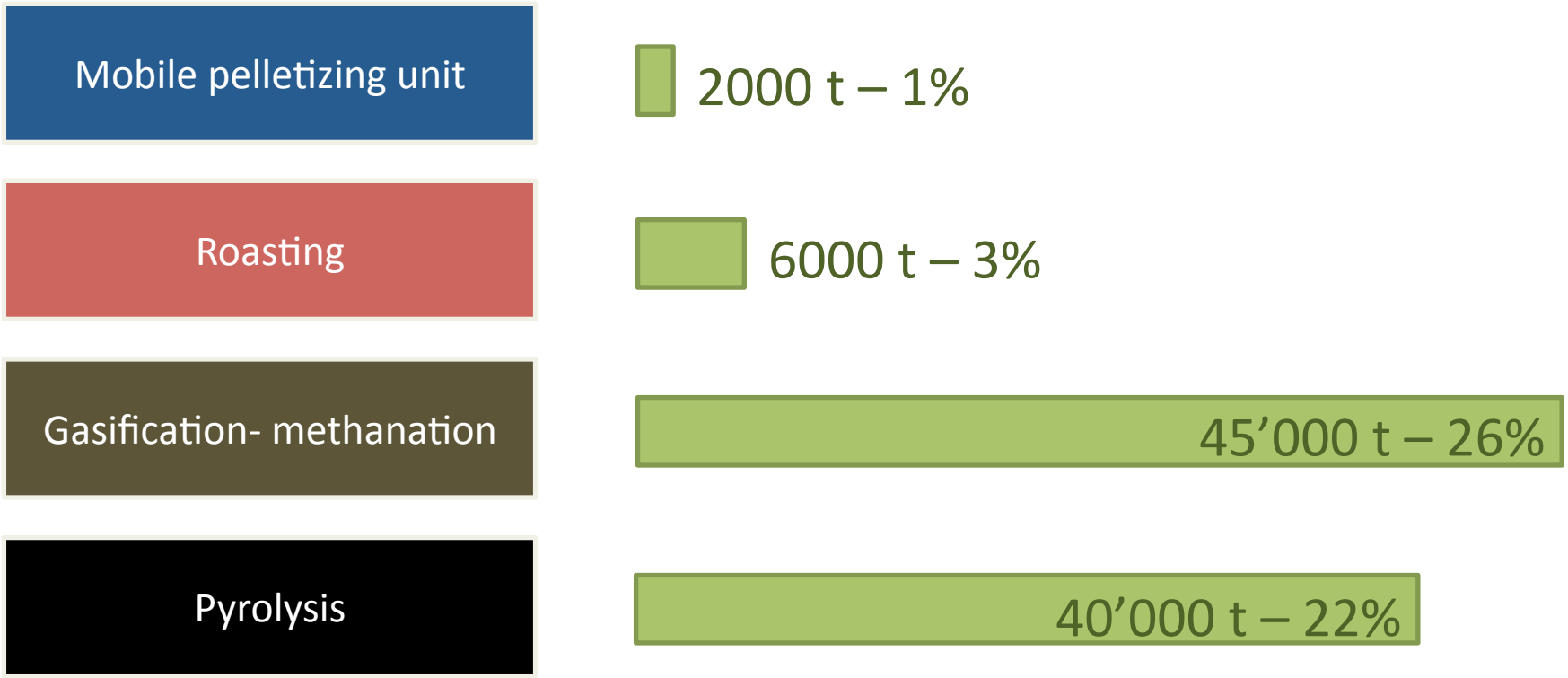


Wood potential of State Vaud can represent up to 15% of the energetic needs of Canton de Vaud



PPA = development of the actual policy
NPE = new energetic policy

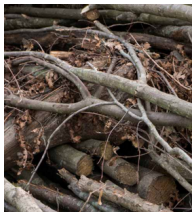
Four technologies are assessed, and compared to regular wood-chips heating systems

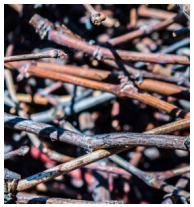


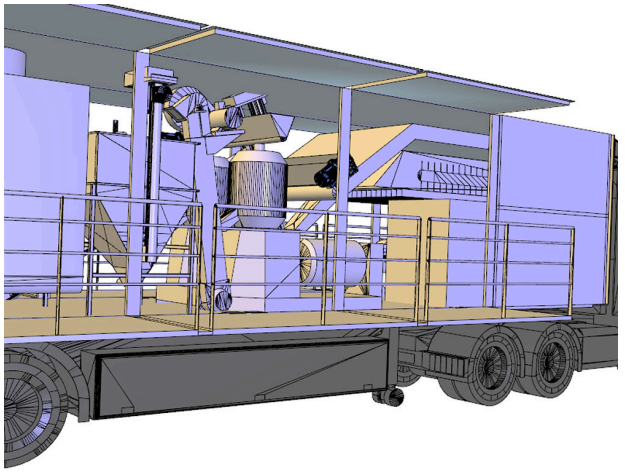
Mobile pelletizing unit

From biomass to pellet. Resource is local, unit is mobile

- **Mobile pelletizing unit**
- Roasting
- Gasification- methanation
- Pyrolysis







Wood chips or pellets roasting

Mobile pelletizing unit

Roasting

Gasification- methanation

Pyrolysis

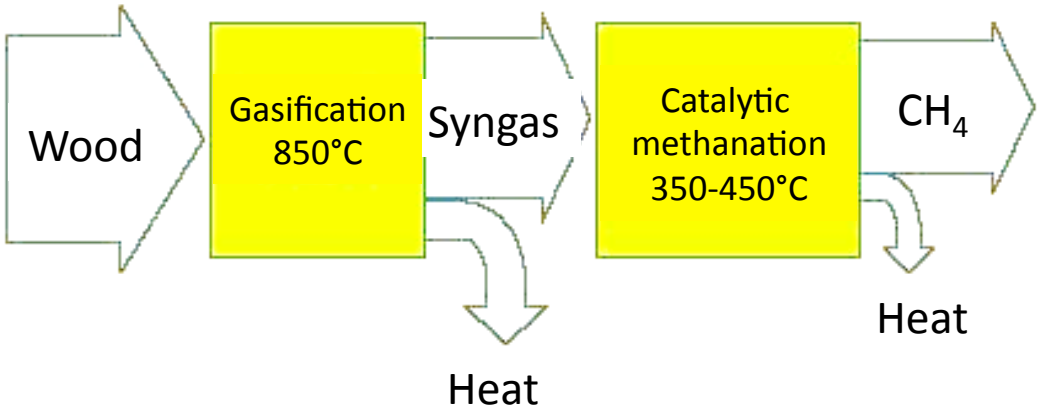
Roasted (torrefied wood chips or pellet) by a thermochemical process at 250-300 °C

Advantages :

- Up to 70% less energy for crushing
- Hydrophobic product → easier storage
- Mass and volume reduction per unit of energy (15 GJ/ m^3 for roasted wood pellets)

Gasification-methanation of wood resources

- Mobile pelletizing unit
- Roasting
- **Gasification- methanation**
- Pyrolysis



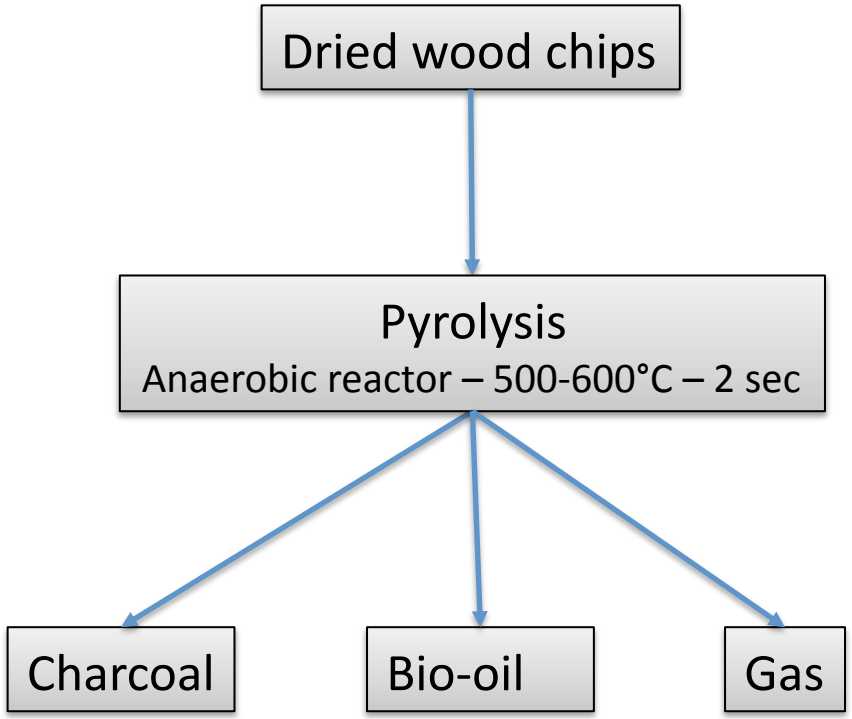
Pyrolysis of wood

Mobile pelletizing unit

Roasting

Gasification- methanation

Pyrolysis



Main interests

Mobile pelletizing unit	Valorisation of biomass “by-products” (waste, branches, boughs, etc.) Mobile
Roasting	Hydrophobic Homogen and high energetic density
Gasification- methanation	Multi-usage of gas
Pyrolysis	Ability to be stored

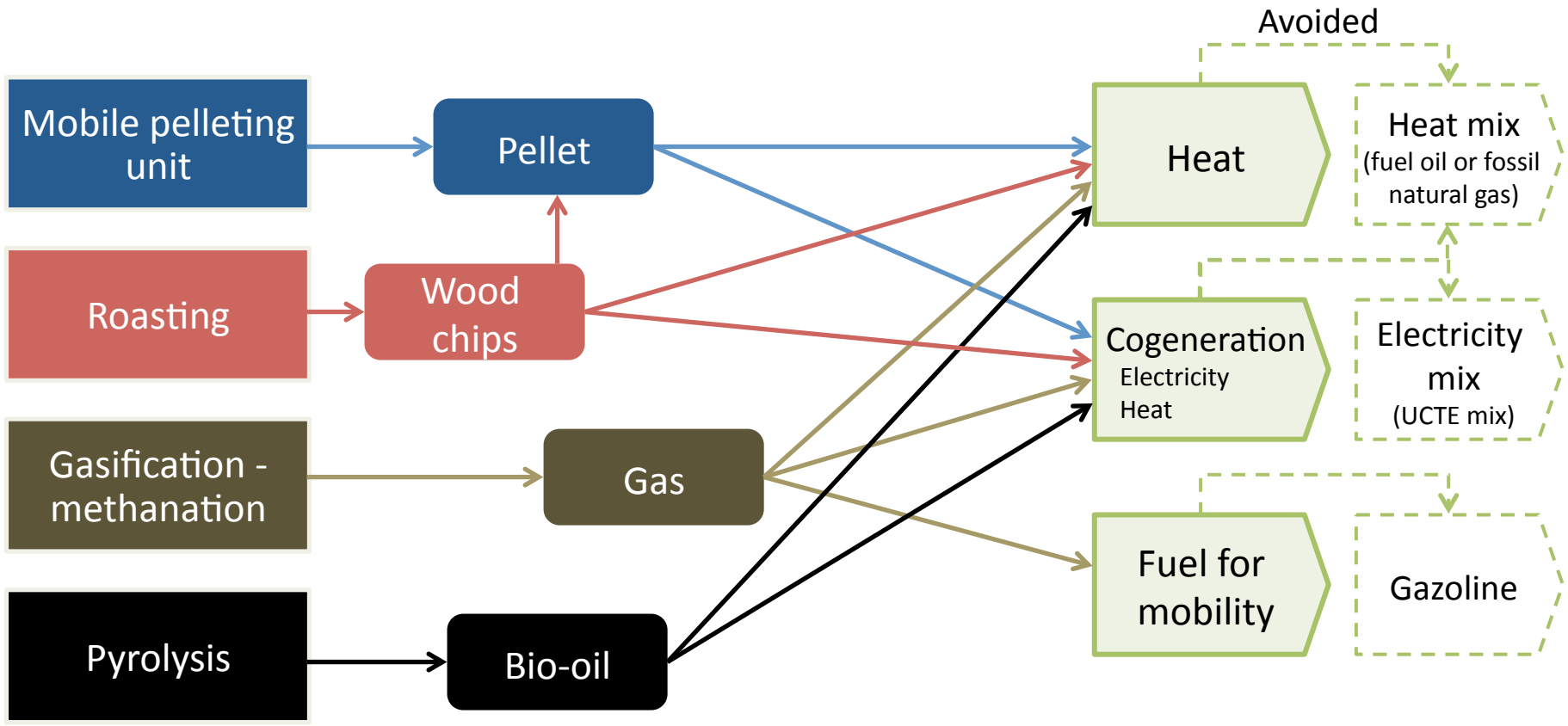
Environmental assessment

"One tonne of wood used for energy purpose"

Climate change (CO2 –eq)

Human health (DALY)

Outputs of the projects



→ Compared with traditionnal wood chips power plant

Based on scenarios

Energy efficiency

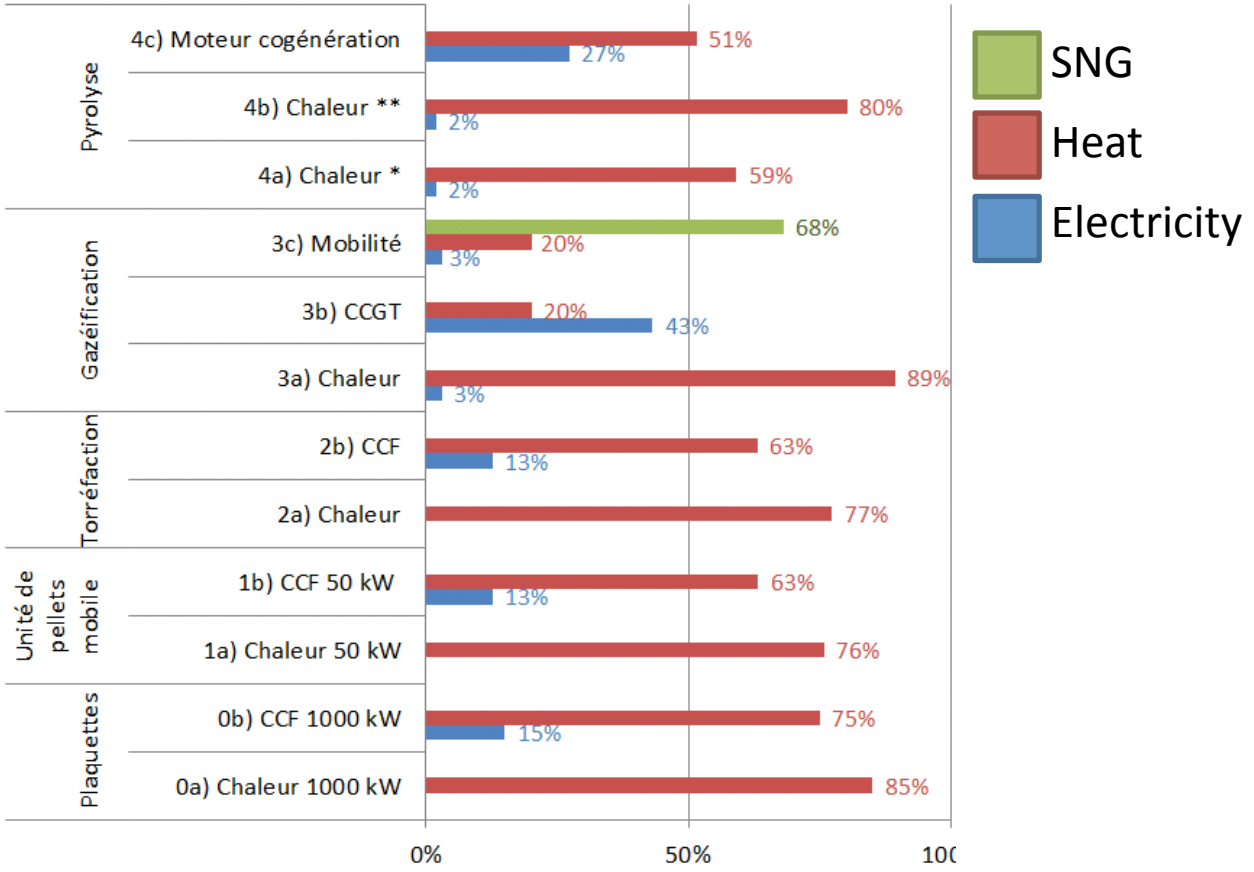
Pyrolysis

Gasification-methanation

Roasting

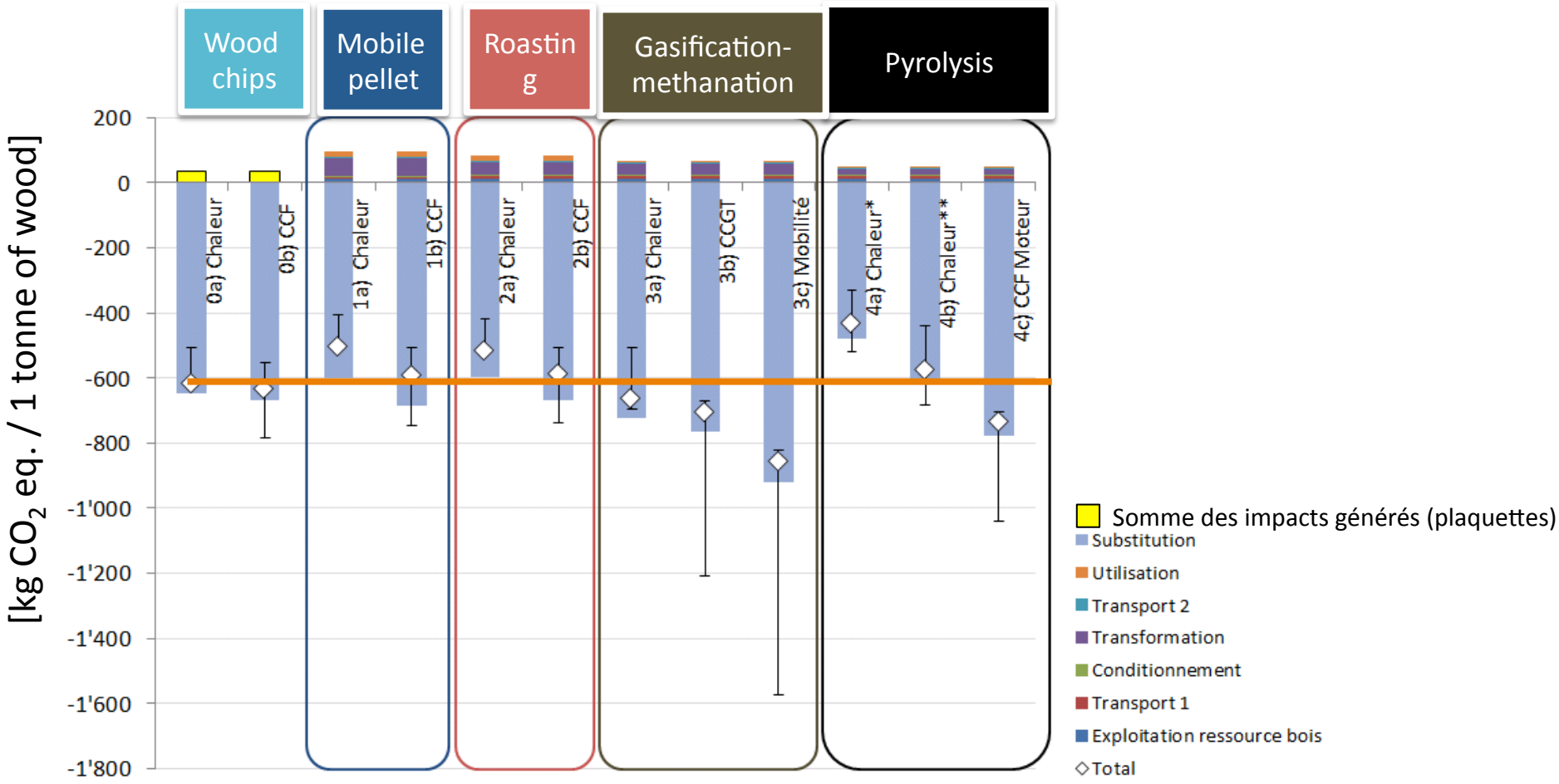
Mobile pelletizing unit

Wood chips



Results.

Indicator : climate change



CCF = Combined heat and power ; CCGT = combined cycle gas

Results.

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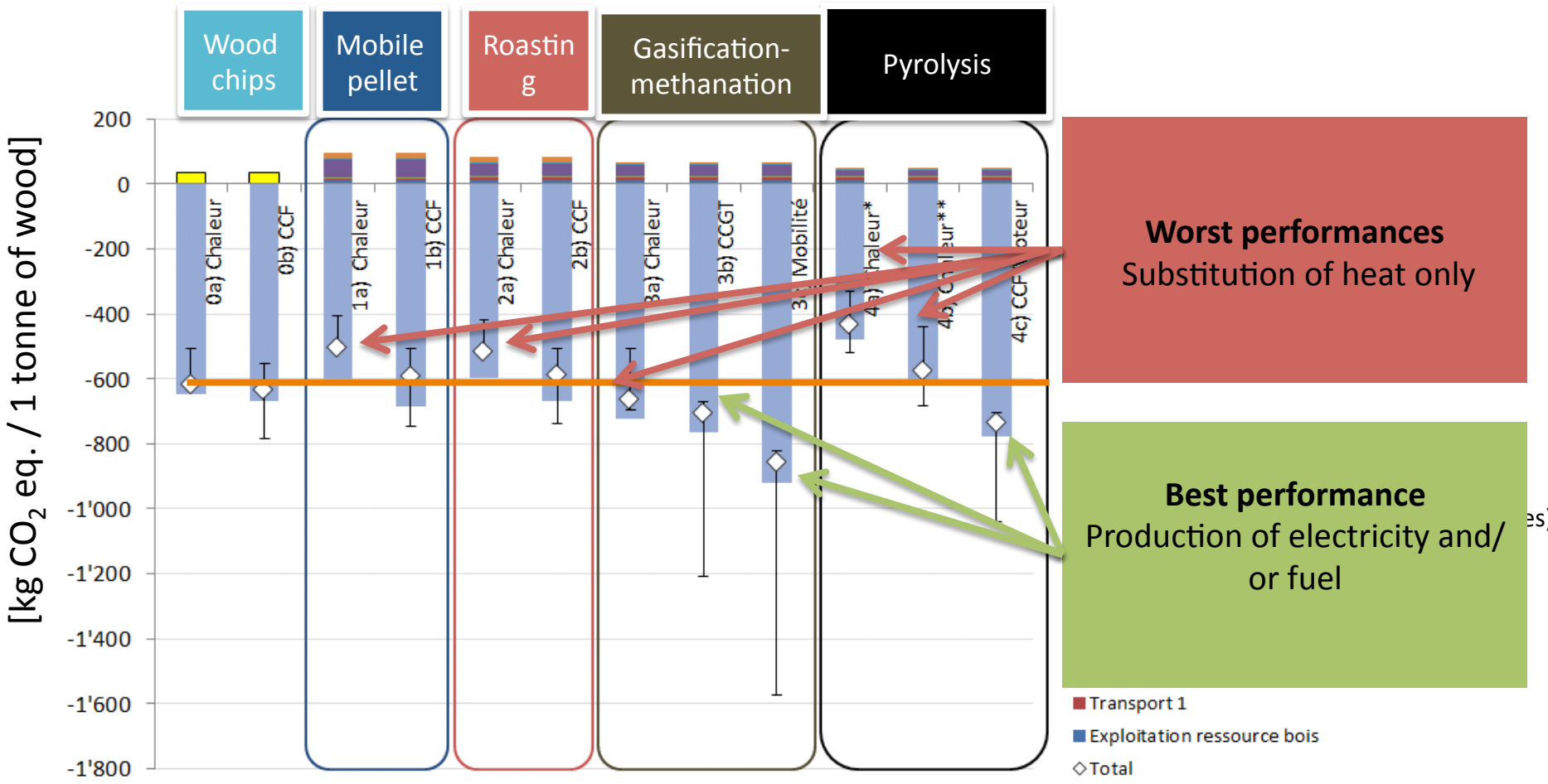

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Conclusion and recommandation

- Use of wood as energy for electricity generation in priority
- Use the residual heat for district heating distribution network, at low temperature
- Promote low temperature solutions
- Favour future developments of gasification

What's next?

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quantis-intl.com

@Quantis

Quantis

Quantis International

+Quantis

Denis Bochatay - Quantis,
Denis.bochatay@quantis-intl.com

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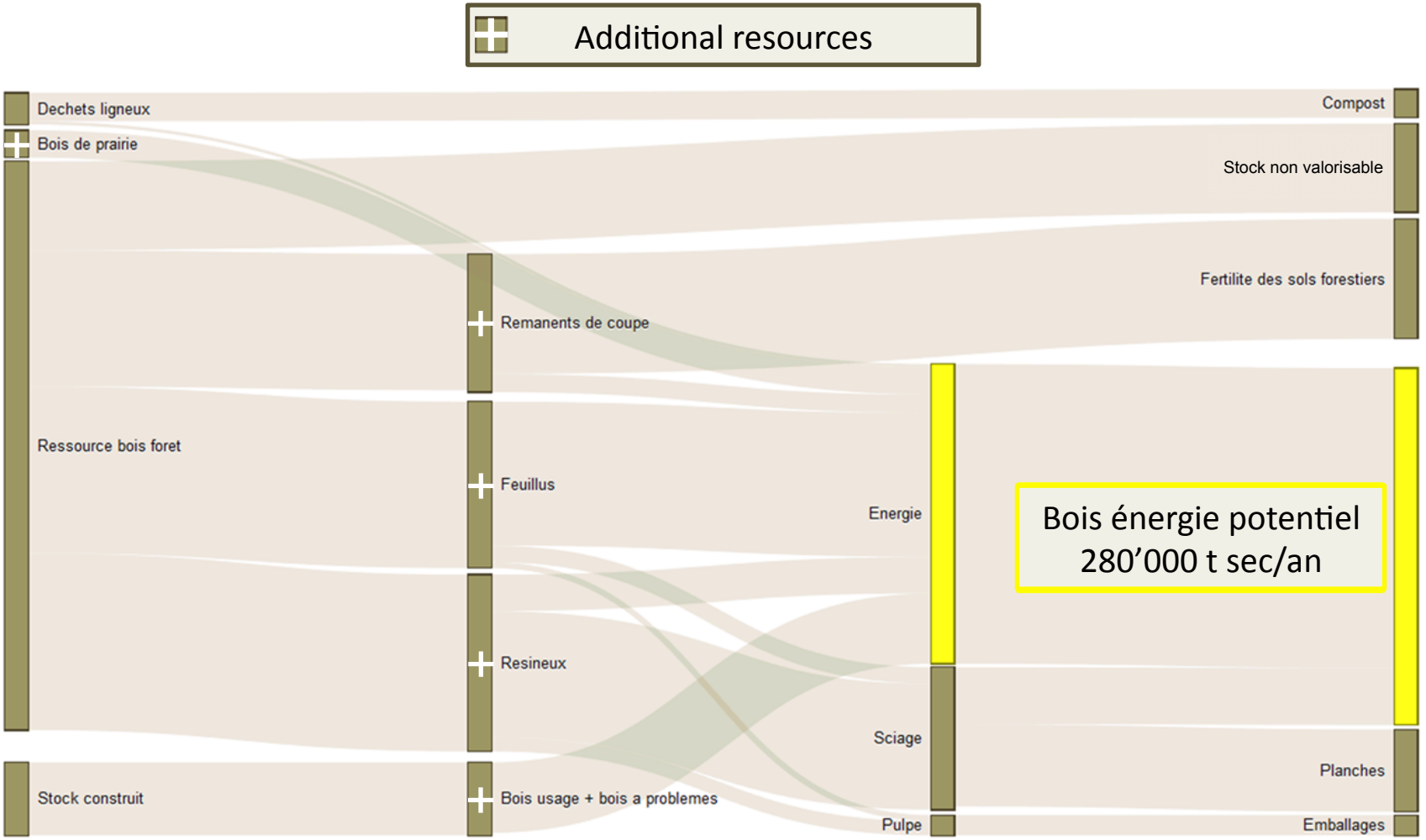
Total available biomass Vaud = 550’000 t dry/y
Potential of wood energy Vaud = 280’000 t dry/y (+ 100’000 tonnes)



Results

Indicator : human health