Methodology for Carbon Footprint in Forestry

Findings and ways of improvement

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The subject

- Goal: build a **methodology** for **carbon footprint** in **forestry** and **apply** it
- Problem: The ADEME's *Bilan Carbone* is **not well suited** for the forestry sector

→ delimitation of geographical and structural frames

→ raw data collection

→ change into carbon equivalent

The subject

- **A number** of studies about the carbon **sequestration** in the wood
- **Few** about **GHG emissions** in **forestry**
- Many differences in activities taken into account

→ our approach is **generic** with an **application in the Auvergne region** (Fr)

Methodology

- Difficulties with the data collection

Forest owners → forestry companies
(much fewer)

Regional wood → regionally cut wood
(commodity with statistics)

Methodology

- Three sectors:

Wood harvesting (mechanized or manual)

↓

Wood forwarding (mechanized)

↓

Wood transport

Methodology

- Three machines:

Harvester (harvesting)	Forwarder (forwarding)	Skidder (forwarding)
		

Methodology

Mechanized harvesting/forwarding	Manual harvesting
Car use	Car use
Motor saws consumption	Motor saws consumption
Motor saws amortization	Motor saws amortization
Others (computers, services, etc.)	Others (computers, services, etc.)
Machines consumption	
Machines amortization	Transport
Transport truck use	Truck consumption
Transport truck amortization	Truck amortization

emitting activities

Methodology

EF diesel oil	0.804 kg Ce/l	EF various services	0.03 kg Ce/€
EF premium gasoline	0.774 kg Ce/l	EF machine manufacture	1.5 kg Ce/kg
EF oil	0.82 kg Ce/l	EF computer manufacture	350 kg Ce/unit
EF car (with amort.)	58 g Ce/km	EF institution employee	1.14 t Ce/year

most used emission factors

- Transport: different from other types of transport (usually no return load)

Methodology

- Transport:

National statistics + professionals' data + Auvergne weighting

table

Emissions per m^3

× quantity of processed wood

Annual emissions

Methodology

- Mechanized harvesting and forwarding:

Regional statistics + manufacturers' data + refining with professionals

↓ table

Annual emissions

↓ ÷ productivity

Emissions per m^3

Methodology

- Manual harvesting:

Professionals' data + manufacturers' data

↓ table

Emissions per m^3

↓ × (forwarded wood – mechanically harvested wood)

Annual emissions

Findings

- Several ways to present results

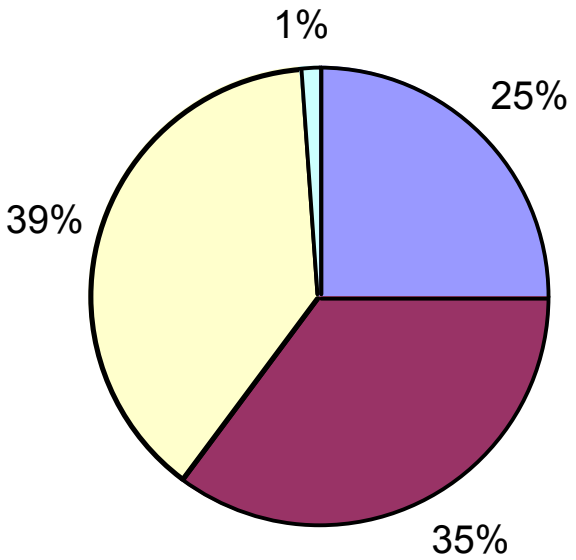
→ Emissions per m^3 (most meaningful)

→ Depending on the type of wood

(industrial wood, timber, fuelwood, “general”)

Sector	Wood	Type	Per m^3 (kgCe)	%
Harvesting	General	Mean	1.178	24.9
	Industrial	57 % mechanized	1.204	22.6
	Timber	64 % mechanized	1.277	28.6
	Fuelwood	10 % mechanized	0.6797	20.6
Forwarding	General	Mean	1.675	35.4
	Industrial	81 % with forwarder	1.550	29.1
	Timber	20 % with forwarder	1.787	40.1
	Fuelwood	80 % with forwarder	1.555	47.1
Transport	General	75 km	1.760	38.4
	Industrial	127.5 km	2.510	47.1
	Timber	70 km	1.333	29.9
	Fuelwood	30 km	1.003	30.4
Other (institutions, cooperatives)	General	/	0.0627	1.3
	Industrial	/	0.0627	1.2
	Timber	/	0.0627	1.4
	Fuelwood	/	0.0627	1.9
Total	General	/	**4.676**	100
	Industrial	/	**5.327**	100
	Timber	/	**4.460**	100
	Fuelwood	/	**3.300**	100

Findings



harvesting
forwarding
transport
other

Emissions for "general" wood

Ways of improvement

- Now:
  - Few actions already done
  - Actions done indirectly
- Studies:
  - FPInnovation
  - AFOCEL
  - Etc.

Ways of improvement

- **32 propositions**, graded according to their potential of reduction and applicability (+ ; ++ ; +++)
- **Close future** possible reduction: **15 %**
- Longer scale possible reduction: 25-30 %

Ways of improvement

Suggestion	Relevance
Use of biofuels	+++
Transport of drier wood	++
Cooperative for trucking companies	+++
Give priority to depot on the bottom of sloping working sites	++
Use of larger trucks	+++
Drive the machines on the road to reduce their transport	+++
Use the alternative methods for forwarding	+
Give priority to manual harvest	++
Use harwarder (harvester/forwarder)	+++
…	

Goal	Trucks and machines consumption
Action	Use, in a reasonable way, biofuels with the different vehicles
Stakes	8000 t
Possible gain	(if 5 % more of biofuels) 3.5 % i.e. 280 tons
Means	Consciousness raising
Indicators	Proportion of biofuels used
Limits	Biofuels cannot replace all fuels used. Positive effects are still controversial.
Duration	6 months
Go-between	DRAAF - DREAF
Conditions	Verification of biofuels impact on the earth
Relevance	+++

Conclusion

- Simplified methodology for a new sector
- Several variables (transport distances, mechanized proportion, etc.)
- Division of activities, presentation per m^3
- 4.7 kgCe - 1/3 for each step
- Possible reduction of emission: 15-30 %

Thank you

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