



IMT Atlantique
Bretagne-Pays de la Loire
École Mines-Télécom

Linking Carbon, Energy and Air Pollutant Emission Factors to Design Smart and Efficient Long Term Regional Strategies

Air Pollution Emission Factors

Cross-sectoral Approach for Strategy Development

- ▶ **Air Pollution** – Increasing for the past 50 years; results in several respiratory diseases. In 2016, fine particles caused 2,530 premature deaths in the Pays de la Loire (Santé Public France)
- ▶ **Four major polluting sectors** – Energy, Building Heating, Transportation, and Agriculture
- ▶ **Emission Factors** – Amount of pollutant release for a given source, relative to its unit of human activity
- ▶ **Objective: Create integrated strategies to address climate change, air quality and energy for Pays de la Loire using the emission factor methodology**
- ▶ **Methodology**
 - Emission Factors → Activity Data → Emission Inventory → Regional Strategy for Pays de la Loire

Stakeholders



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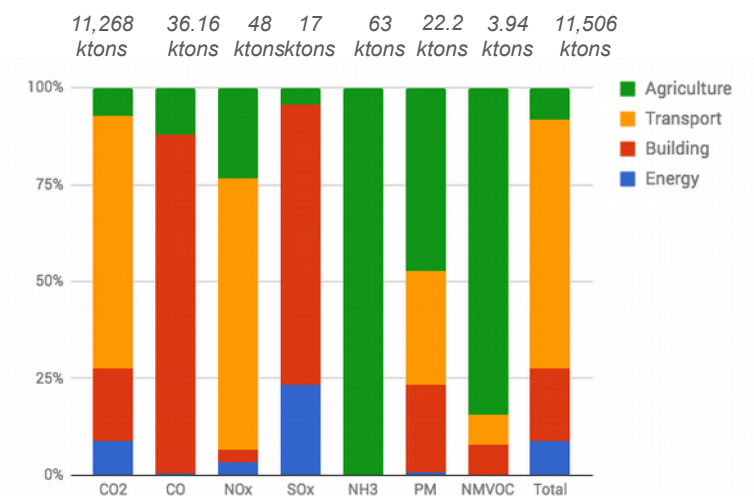
Tutor

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Results: Pays de la Loire

Emission Inventory

- ▶ Calculated using: **Activity Data x Emission Factor**
 - AD: Human activity causing pollution
 - EF: Mass pollutant released per unit of AD
- ▶ **11,506 ktons** total pollutant emissions
- ▶ The **Transport** sector has the highest emission
- ▶ **Carbon Dioxide** highest by volume
- ▶ Strategies developed based on these observations



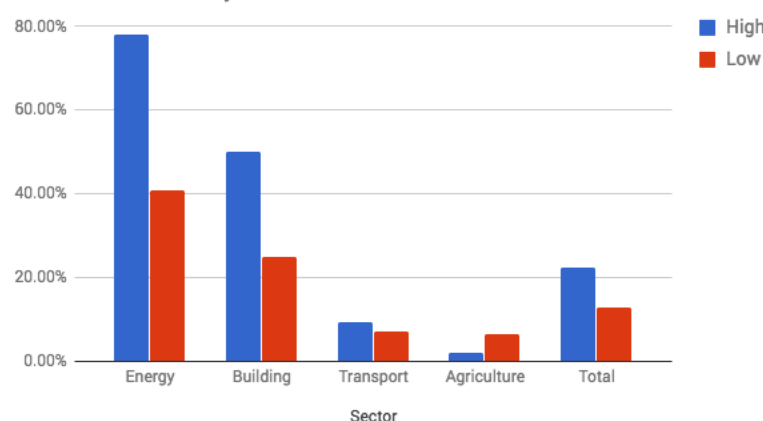
Inventory of Major Air Pollutants based on Emission Factors and Activity Data Collected

Results: Pays de la Loire

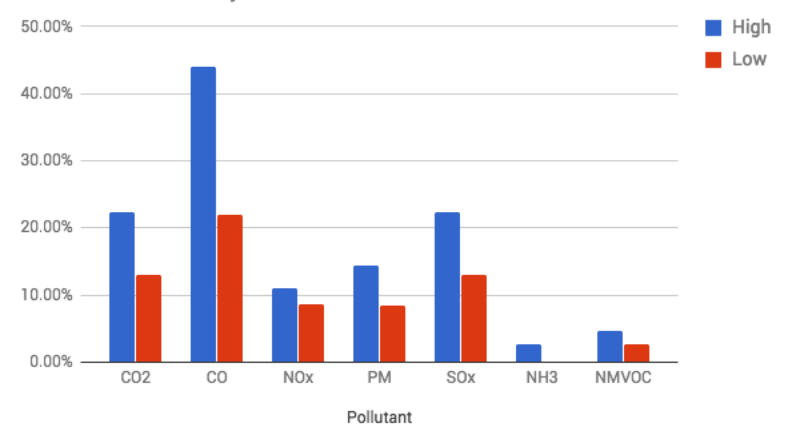
Strategies

Sector	High scenario	Low scenario
Energy	Switch 83% of Thermal Energy production to Energy production with Wind Turbines	Switch 41.5% of Thermal Energy production to Energy production with Wind Turbine
Building-Heating	Improve buildings energy efficiency by 35% 15% of heat consumption connected to a renewable heating network	Improve buildings energy efficiency by 15% 10% of heat consumption connected to a renewable heating network
Transport	Switch 10% of the active population from travelling by car to walking/biking	Switch 10% of the active population from travelling by car to electric car
Agriculture	Reduction of 40 kg-N/ha in the dose of fertilizers 90% NH3 reduction from improvement in manure application techniques (soil injection)	Reduction of 25 kg-N/ha in the dose of fertilizers 30% NH3 reduction from improvement in manure application techniques (trailing hose)

Emission Reduction by Sector



Emission Reduction by Pollutant



- ▶ **Energy** sector had the most impact on pollution mitigation
- ▶ Pollutant most mitigated was **Carbon Monoxide**
- ▶ Total mitigation for high and low scenarios were **22% and 13%**, respectively

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