Territorial Alliance for Carbon Neutrality: Siena (Italy)

Workshop on Life Cycle Assessment and GIS Tools for Energy planning (TW3-TW4)

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Development of ISO 14064-1 certified time series of greenhouse gas (GHG) balances of the Province of Siena from 2006 (baseline or reference year) to 2014.

The Province of Siena is the first case in Europe, in which the joint application of the GHG inventory methodology and the ISO 14064-1 standard of certification is applied to a large governmental/territorial system.
GHG BALANCE OF THE PROVINCE OF SIENA

Gross emissions
Uptake
Net emissions

72% 78% 83% 84% 94% 102% 101% 104% 109%
72%
The connection between 2006 IPCC GHG inventory methodology and ISO 14064-1 certification standard – A reference point for the environmental policies at sub-national scale

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GHG EMISSION REDUCTION PROCESS

1. Elaboration of the GHG inventory
2. Identification of the main emission sources
3. Emission reduction scenarios
4. Implementation of policies for the GHG emission reduction
WHAT DO WE CONSIDER?

2006 IPCC Guidelines for National Greenhouse Gas Inventories
IPCC: Intergovernmental Panel on Climate Change

ENERGY
INDUSTRY
WASTE
AFOLU (Agriculture, Forestry and Other Land Use)

GROSS EMISSIONS IN CO₂ EQUIVALENT

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### GHG EMISSION SECTORS

<table>
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<tr>
<th>Sector</th>
<th>Examples</th>
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| Energy       | ✓ Consumption of fossil fuels (Transport, Heating and Energy production in industry)  
               | ✓ Consumption of electricity imported from the national grid  
               | ✓ Electricity production from burned wastes in the incinerator |
| Industry     | ✓ Production of materials (Crystal and Bricks)                            |
| Waste        | ✓ Landfill  
               | ✓ Composting plants  
               | ✓ Wastewater treatment  
               | ✓ Incineration of wastes |
| Agriculture, Forestry and Other Land Use (AFOLU) | ✓ Land use change  
                                                    | ✓ Agriculture  
                                                    | ✓ Livestock  
                                                    | ✓ Absorption by forestland |
METHOD

Bottom-Up

Top-Down

Data are collected locally
No national or regional average values
GROSS EMISSIONS BY SECTOR

The percentage variation of the gross emissions (2006-2014): \(-24.6\%\)
GHG EMISSIONS FROM THE ENERGY SECTOR

- Natural gas: 34%
- Diesel: 49%
- Gasoline: 12%
- LPG: 5%

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CONSUMPTION OF FOSSIL FUELS

- Transport: 59%
- Heating: 35%
- Industry: 3%
- Electricity: 3%

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ELECTRICITY

Production: 92%
Consumption: 3%
Import/Export: 5%

Geothermal energy: 92%
Incinerator + biogas from landfill: 3%
Solar cells: 5%

GWh production and consumption for years 2006 to 2014.
METHANE (CH$_4$) EMISSIONS FROM LANDFILLS
**CO₂ ABSORPTION**

Province of Siena: 3821 km²
Forestland in the Province: 1705 km²

1,308,215 t CO₂ uptake/year
WORKING SCHEME

MPS Foundation

Siena Province Administration

ISO 14064-1 Certification

Appointment, Evaluation of Policies

Ecodynamics Group, University of Siena

Balance

RINA S.p.A.

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ENVIRONMENTAL POLICIES

CAUSES OF THE DECREASE IN EMISSION

GLOBAL FACTORS
✓ Economic crisis;
✓ Oil price;
✓ Higher winter temperatures (about 2 °C).

LOCAL ENVIRONMENTAL POLICIES
✓ Transport: Methane buses with filters, Bio-fuels;
✓ Heating: Tests on boilers, Energetic certifications and retrofitting of buildings;
✓ Electricity: Geothermal energy, Solar cells, Decrease of the imported electricity form the national grid;
✓ Waste: Increase of waste recycling;
✓ Forestland: Reforestation, Efficient wind-land fire prevention plan.
26 May 2017

The Territorial Alliance for Carbon Neutrality of Siena was founded by the MPS Foundation, the Tuscany Region, the Province, the Municipality and the University of Siena.

They work together to consolidate the already achieved Carbon Neutral status.
THANK YOU

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