Environment and Climate Regional Accession Network ECRAN

GHG emission assessment

in LEAP

Anna Flessa, Dipl. Ing., MSc.

Research associate, KEPA

This Project is funded by the European Union

Project implemented by Human Dynamics Consortium

Contents

- Basics
- Concept
- Steps
  - Choose the basic parameters
  - Switch to Current Accounts
  - Insert emission factors
  - Add “your own” Effects
- Results

Basics

Greenhouse gases (GHGs)*

Direct: CO_2, CH_4, N_2O, PFCs, HFCs, SF_6

Indirect: SO_2, NOx, CO, NMVOC

Emission factor*

The average emission rate of a given GHG for a given source, relative to units of activity

Global Warming Potential*

A measure of the total energy that a GHG absorbs over a particular period of time (100 or 500 years), compared to CO_2. It is established as a method for comparing the climate effects of emissions of different GHGs.

*Sources:
http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php,
http://unfccc.int/ghg_data/online_help/definitions/items/3817.php
http://download.springer.com/static/pdf/122/art%253A10.1007%252Fs10584-009-9647-6.pdf?auth66=1425913923_b9ffa1015d194e1d96b1462c80e9d679&ext=.pdf

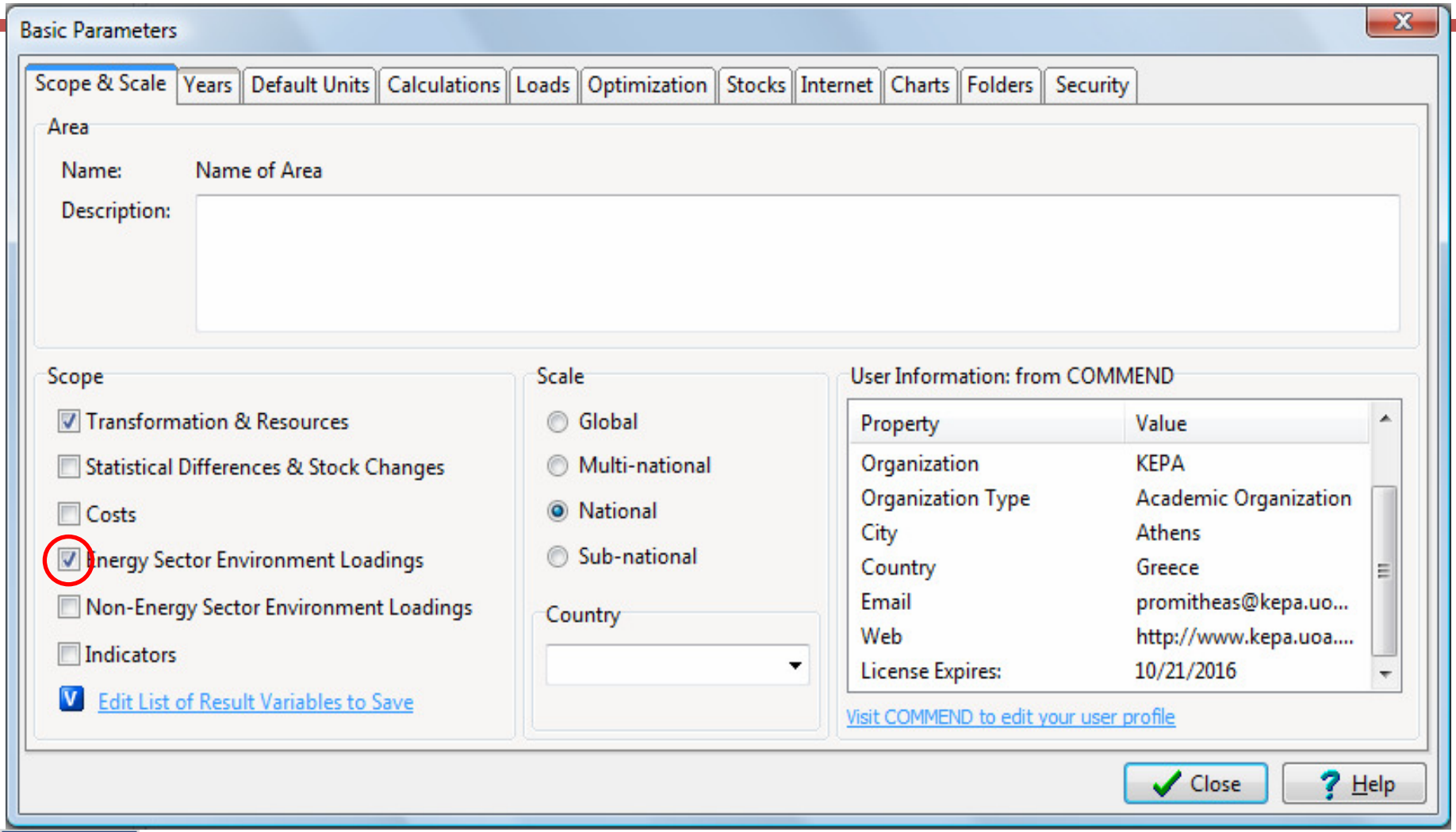
Concept

- All devices in Demand analysis, and all feedstock/auxiliary/output fuels in Transformation analysis are potential sources of emissions.
- Total emissions are calculated as the product of energy consumption or energy production and an emission factor.

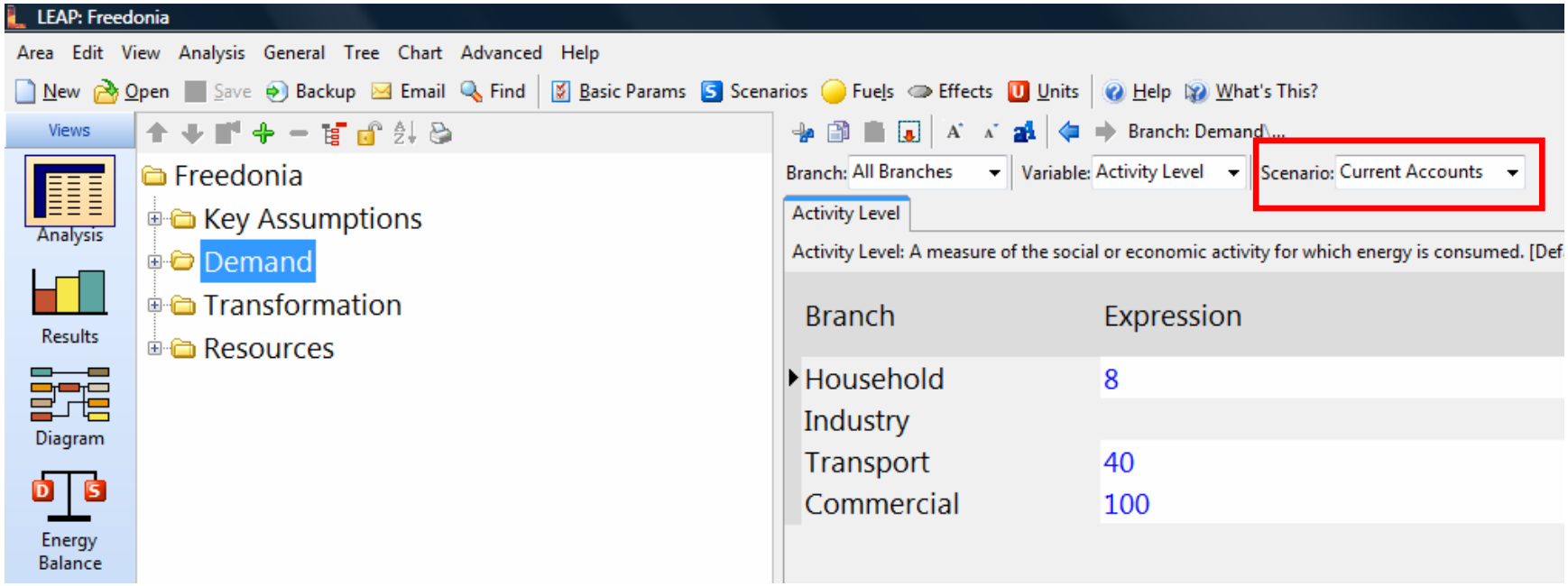
(energy consumed/produced) x (emission factor)

- Emissions are specified at the point where they occur, i.e.
  - emissions are specified for Demand devices that consume all fuels except for heat or electricity ***in Demand side***
  - emissions for heat and electricity occur ***in Transformation side*** (during their generation) and can be modeled in LEAP's Transformation calculations

Choose the basic parameters



Switch to Current Accounts



This Project is funded by the European Union

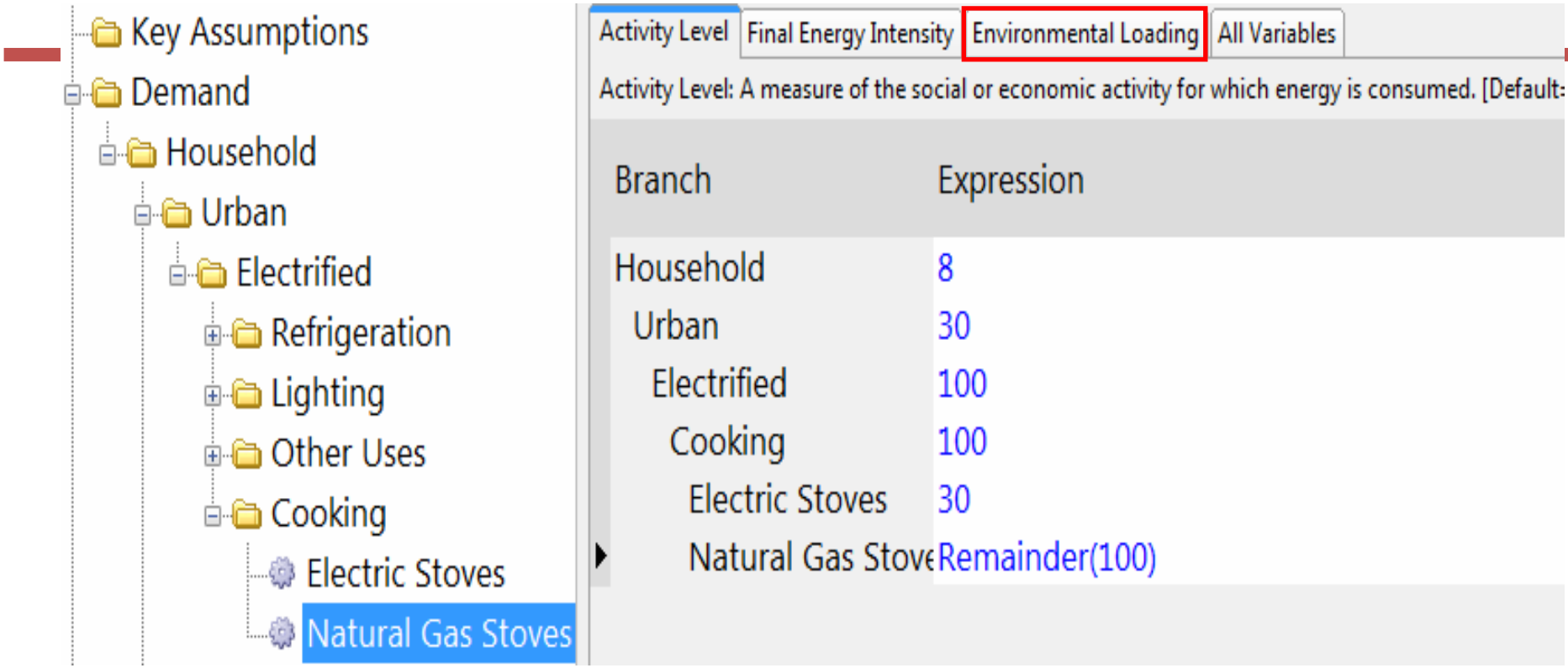
Project implemented by Human Dynamics Consortium

Insert emission factors

- Define the technologies/fuels
  - Demand: technology branches (except for electricity and heat)
  - Transformation: feedstock fuels (except for RES, except for Transmission & Distribution or mining))
- Link to TED

  or

- Enter directly

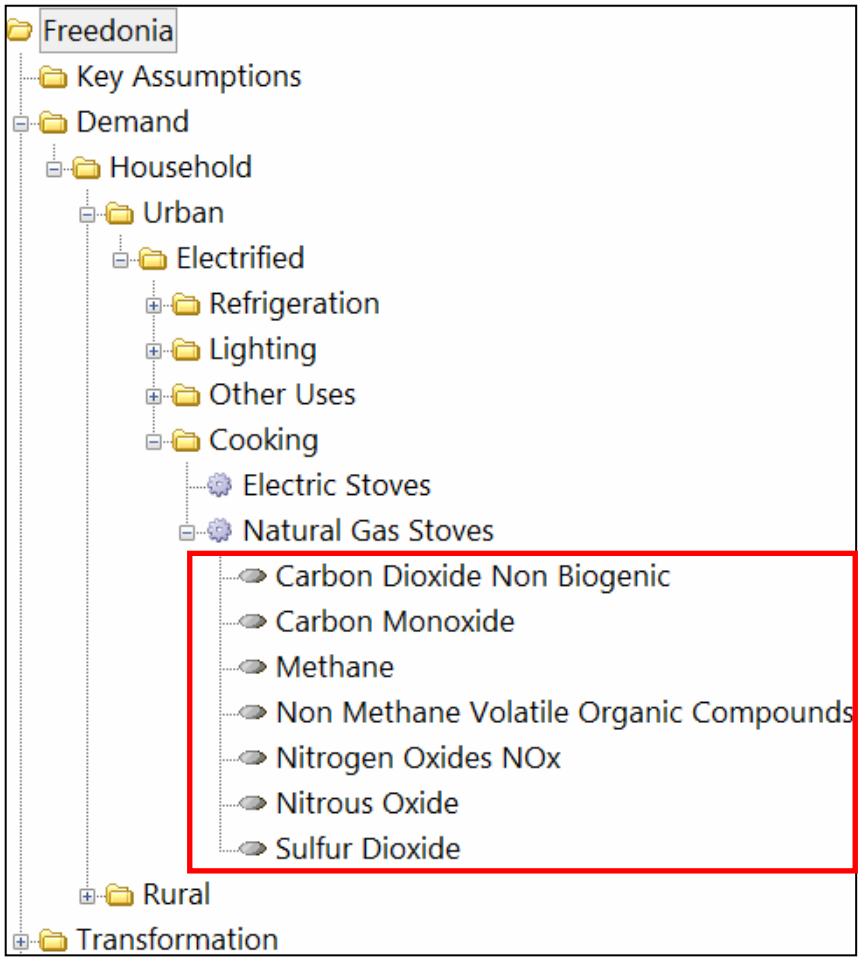

Key Assumptions
Demand
Household
Urban
Electrified
Refrigeration
Lighting
Other Uses
Cooking
Electric Stoves
Natural Gas Stoves
Activity Level
Final Energy Intensity
Environmental Loading
All Variables
Activity Level: A measure of the social or economic activity for which energy is consumed. [Default=
Branch
Expression
Household 8
Urban 30
Electrified 100
Cooking 100
Electric Stoves 30
Natural Gas Stove Remainder(100)

Link to TED

- TED contains emission factors for energy consuming/producing technologies, including the default emission factors suggested by the IPCC for use in climate change mitigation analyses.
- many of the emission factors stored in TED are expressed as formulae: function of the chemical composition of the fuel being burnt.
- To create a link to TED,
  - click on the TED button ( ),
  - use the subsequent dialog box to select a technology from TED that closely matches the technology in your Area.
  - click on the button ( ) to go directly to TED and view the full information about the TED technology and its emission factors.

Enter directly

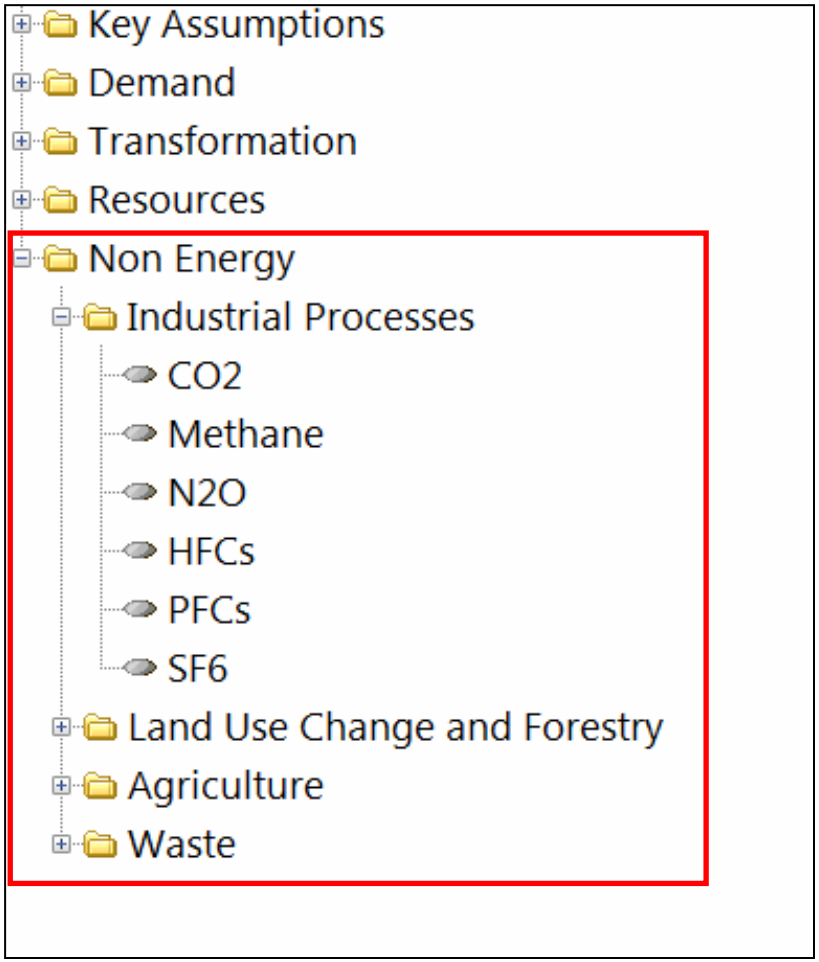
- Enter manually your own emission factors, or override the default factors by TED, adding your own country- or technology-specific factors.
- Emissions factors can be specified as simple numbers or as mathematical formulae.


Freedonia
Key Assumptions
Demand
Household
Urban
Electrified
Refrigeration
Lighting
Other Uses
Cooking
Electric Stoves
Natural Gas Stoves
Carbon Dioxide Non Biogenic
Carbon Monoxide
Methane
Non Methane Volatile Organic Compounds
Nitrogen Oxides NOx
Nitrous Oxide
Sulfur Dioxide
Rural
Transformation

Non-Energy sector

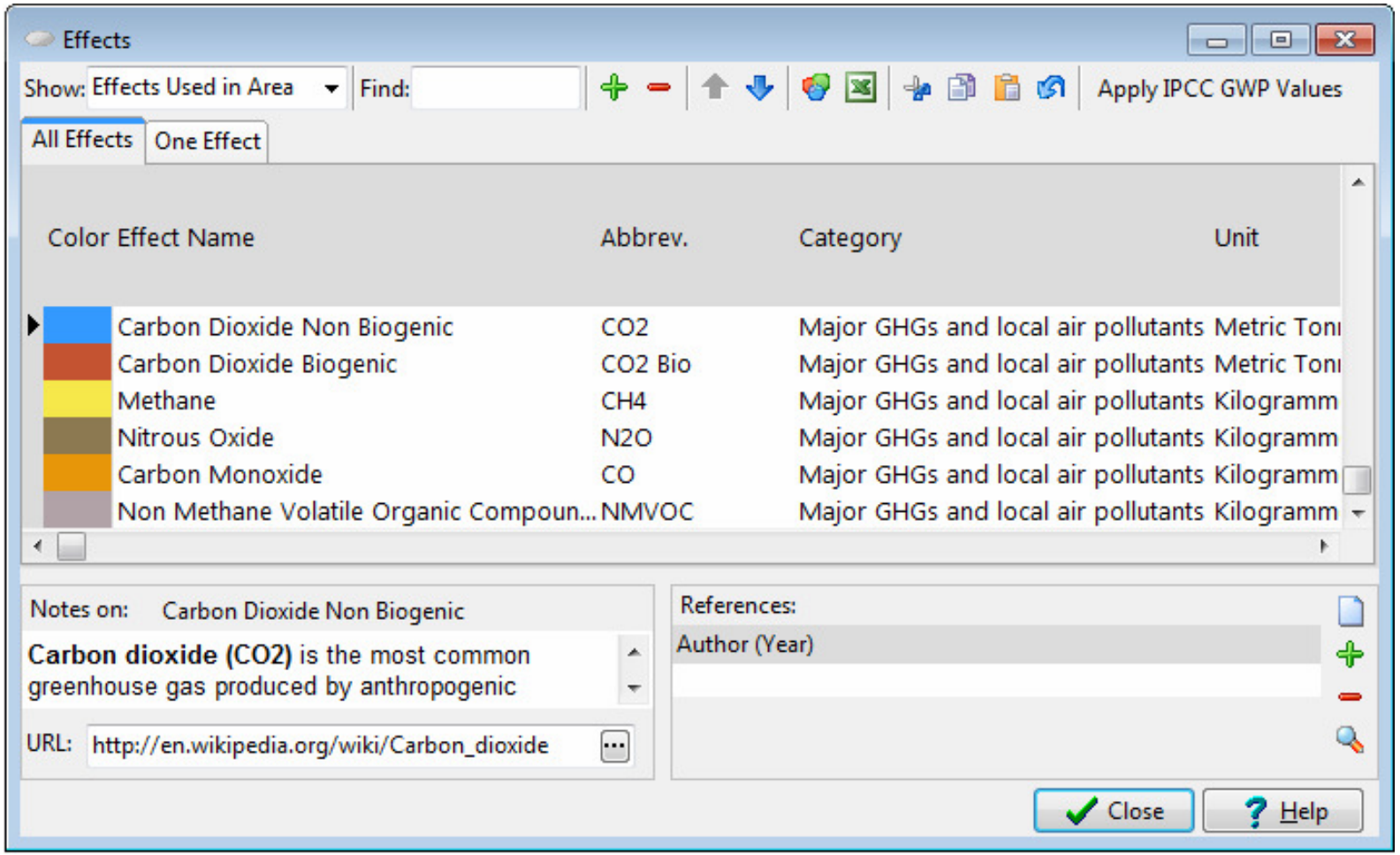
Non-energy related effects

1. Check the **Non-Energy Sector Environmental Loadings** box in **Basic parameters**
2. Go to additional tree branch **Non-Energy**
3. Add **Process** branches
4. Add **Effect** branches
5. Enter data: total annual emissions



This Project is funded by the European Union

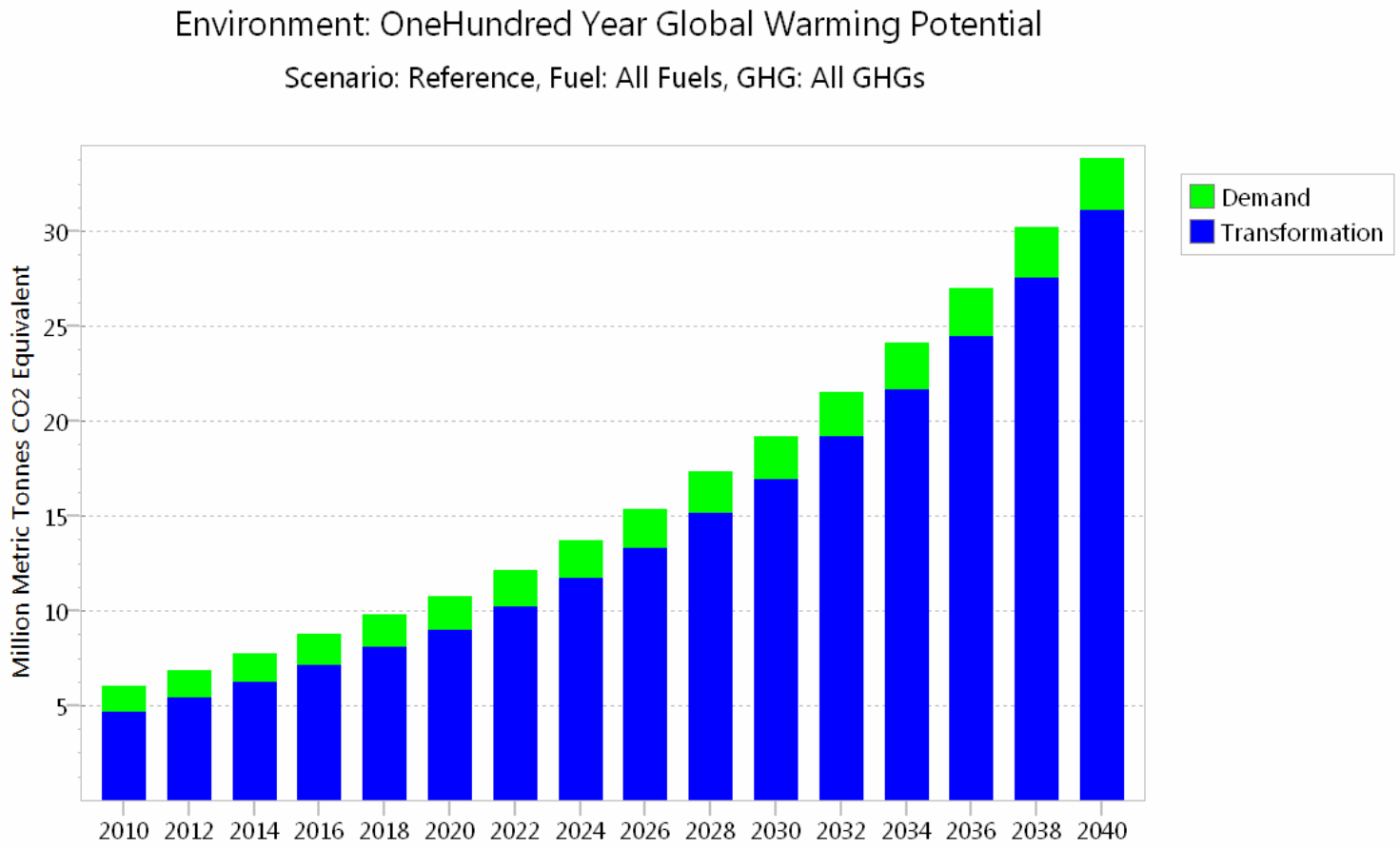
Add Effects


Effects
Show: Effects Used in Area
Find:
Apply IPCC GWP Values
All Effects
One Effect
Color Effect Name
Abbrev.
Category
Unit
Carbon Dioxide Non Biogenic
CO2
Major GHGs and local air pollutants
Metric Ton
Carbon Dioxide Biogenic
CO2 Bio
Major GHGs and local air pollutants
Metric Ton
Methane
CH4
Major GHGs and local air pollutants
Kilogramm
Nitrous Oxide
N2O
Major GHGs and local air pollutants
Kilogramm
Carbon Monoxide
CO
Major GHGs and local air pollutants
Kilogramm
Non Methane Volatile Organic Compoun...
NMVOC
Major GHGs and local air pollutants
Kilogramm
Notes on: Carbon Dioxide Non Biogenic
Carbon dioxide (CO2) is the most common greenhouse gas produced by anthropogenic
URL: http://en.wikipedia.org/wiki/Carbon_dioxide
References:
Author (Year)
Close
Help

Show Results (1/2)

- Go to Results View
- Choose
  - Results category: Environment
  - Tree branch
  - Formatting
- Results can be shown
  - organized by branch, fuel, scenario, year and region (in multi-regional areas).
  - measured in two different ways: in terms of the equivalent amount of Carbon (C) or Carbon Dioxide (CO_2).

Show Results (2/2)



This Project is funded by the European Union

Project implemented by Human Dynamics Consortium

Let's practice!

Anna Flessa
Energy Policy and Development Centre (KEPA)
National and Kapodistrian University of Athens
Tel.: +30 210 7275732
E-mail: aflessa@kepa.uoa.gr

This Project is funded by the European Union

Project implemented by Human Dynamics Consortium