CBIT-GSP
CLIMATE TRANSPARENCY

Partnership on Transparency
in the Paris Agreement

forestry, fisheries
& the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Training workshop for Anglophone African countries: Deep dive into tracking NDC mitigation commitments under the Paris Agreement

LEAP as a supporting tool to estimate ex ante mitigation actions

Dominic Sheldon

Senior Consultant – Climate Action Planning and Transparency

Ricardo Energy and Environment

UN environment programme | copenhagen climate centre

UN environment programme

supported by UNOPS

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

gef

Supported by:
Federal Ministry for Economic Affairs and Climate Action
Federal Foreign Office
on the basis of a decision by the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

UN environment programme 50 1972-2022

Registration details

When you open the software, answer **NO** to the question of do you want to register

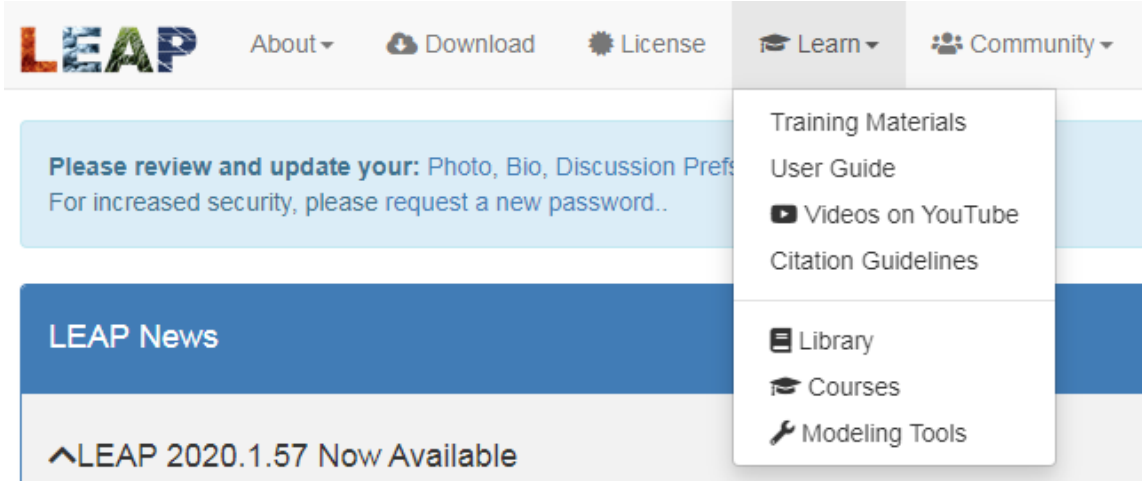
Navigate to:

- Help
  - Register

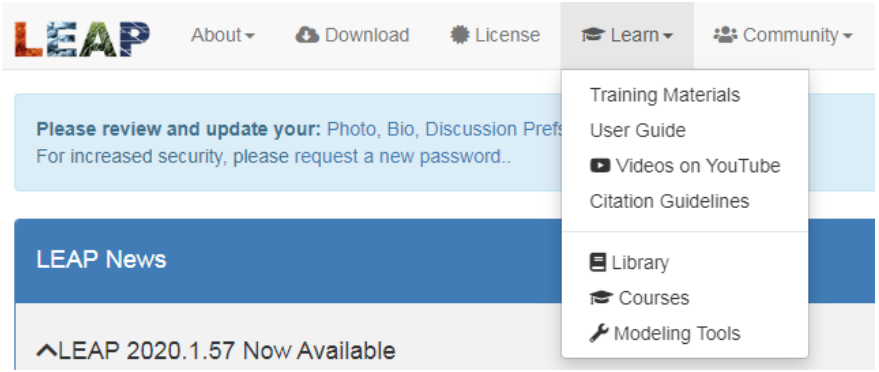
Input the details below

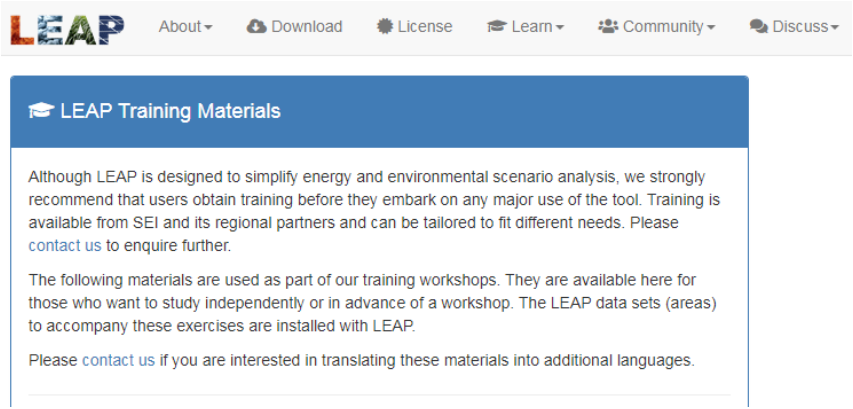
User name	**CAPT May 2023**	(not case sensitive)
Registration code	**987-743-643-996-170**	(you can omit the dashes if you prefer)

LEAP resources available



LEAP resources available: Training materials





Main Training Exercises

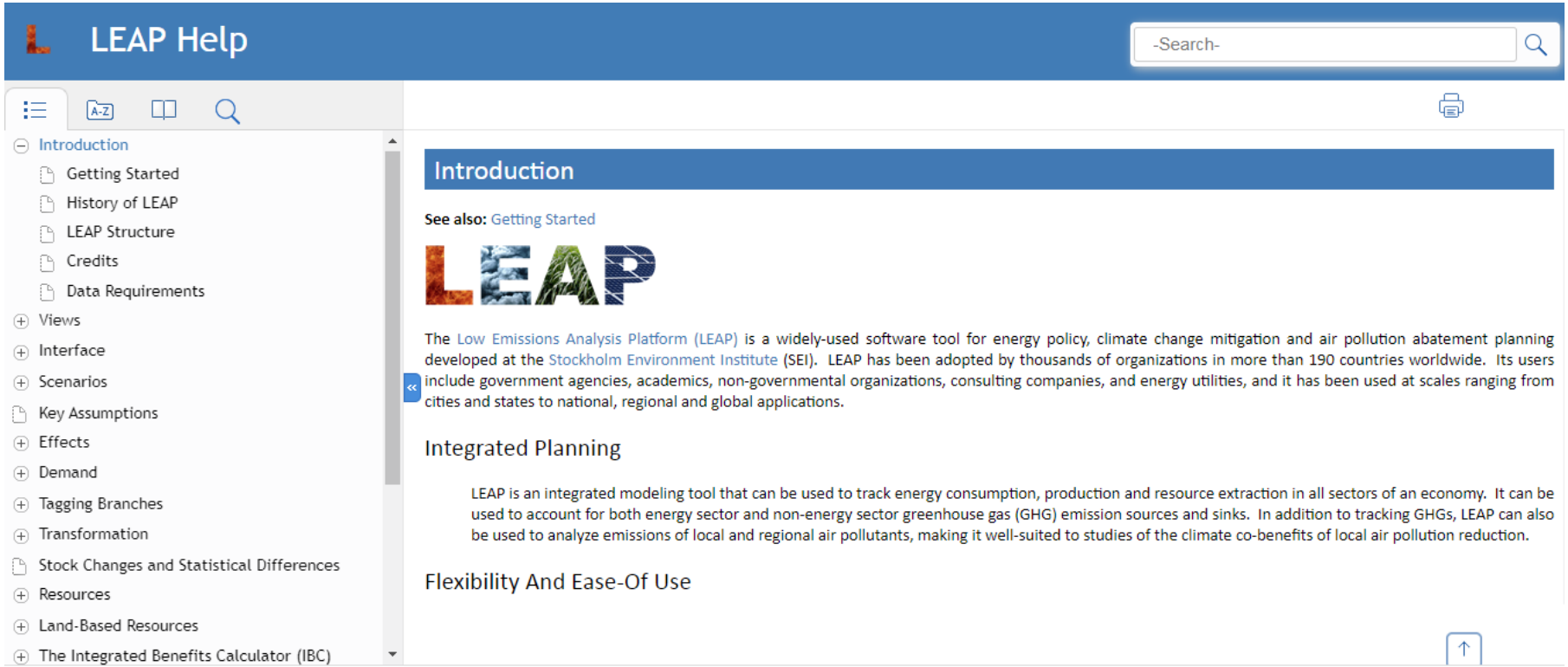
The first four of these exercises teach basic LEAP skills including energy demand modeling, energy supply (Transformation) modeling, electric system simulation modeling, emissions analysis and cost-benefit analysis. The fifth exercise examines modeling of non-energy sector greenhouse gases. The sixth exercise focuses on the transport sector: showing how to create a vehicle stock-turnover model. The seventh exercise demonstrates the use of LEAP's optimization features for least-cost electric generation modeling.

GHG Mitigation Analysis Exercises

These exercises introduce techniques used in a Greenhouse Gas (GHG) Mitigation Assessment. In a first exercise, you use a spreadsheet-based tool to conduct a screening of mitigation options, including analyzing the costs and mitigation potential for each option and displaying these on a standard Marginal Abatement Cost (MAC) curve. In a second exercise, you examine additional important criteria using a multi criteria assessment (MCA) approach. In a third exercise you create a mitigation scenario within LEAP based on your preferred options and compare it to a baseline scenario.

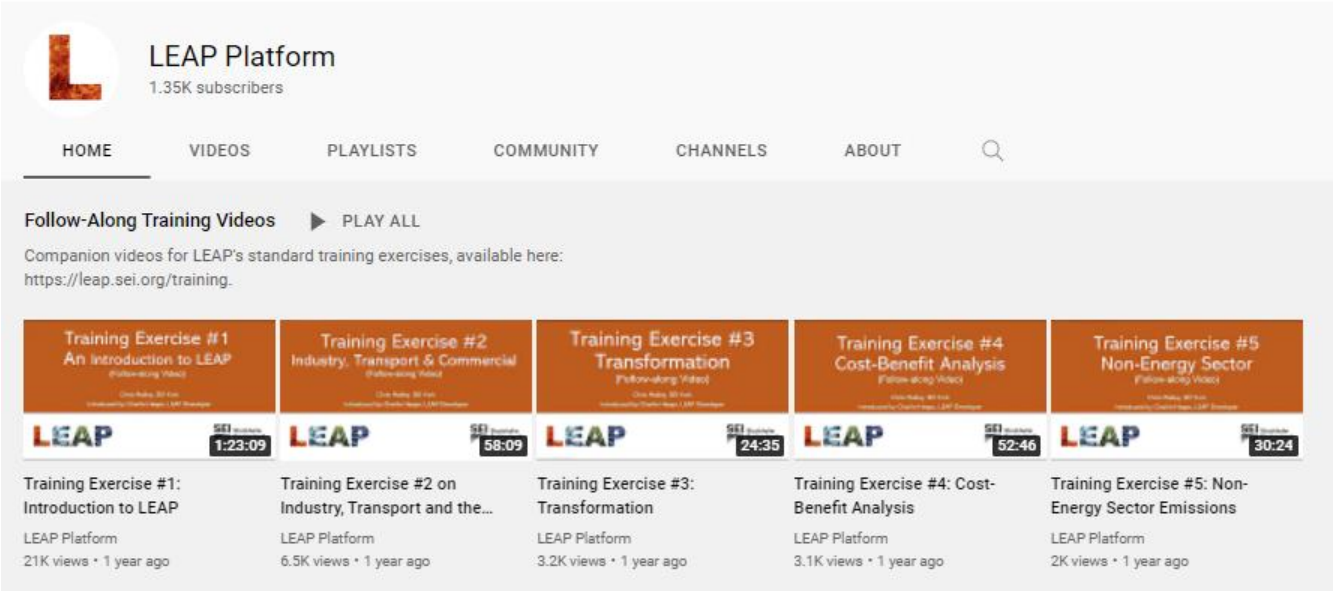
- GHG Training Exercises (English: PDF)
- Excel Screening spreadsheet: Partial, Complete

LEAP resources available: User guide



LEAP resources available: YouTube training videos

The Low Emissions Analysis Platform

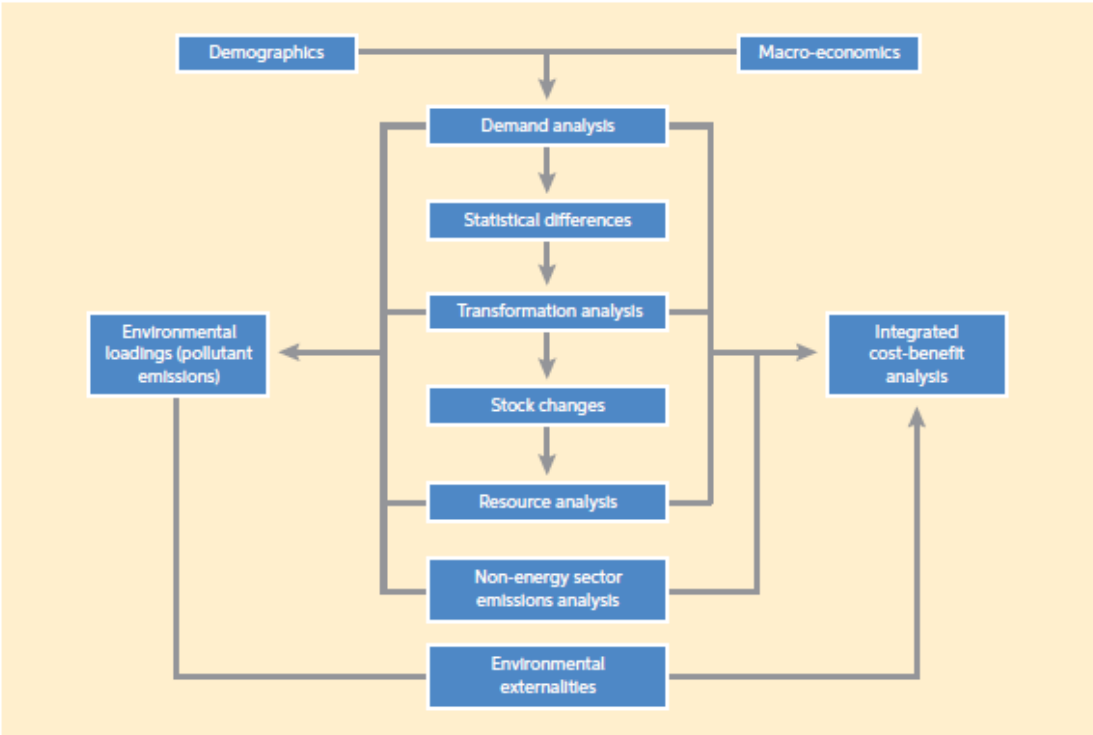


Introduction to LEAP

In order to develop the scenarios described in the previous section, a pre-existing model, the Low Emissions Analysis Platform (LEAP), was used. LEAP is an integrated, scenario-based modelling tool that can be used to track energy consumption, production and resource extraction in all sectors of an economy. The benefits of using LEAP in this project are:

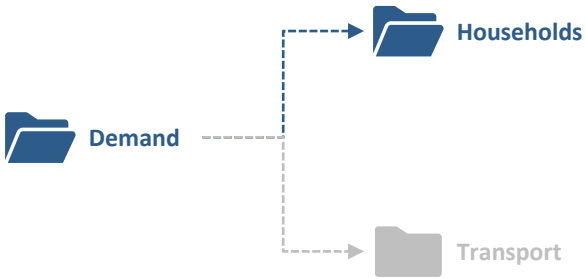
- It is a model that is **familiar to key stakeholders around the world** and has been used for previous modelling exercises, so will allow for greater comparability with previous GHG scenarios.
- The **LEAP model has been used for NDCs and LTSs**
- The model **is relatively simple to use**.
- The **model is free for developing countries to use**
- Its **low initial data requirements** are well suited to a country like Uganda where accessing robust data has been, and will continue to be, a challenge.
- It presents outputs in a **transparent and intuitive** way.

LEAP can be intimidating

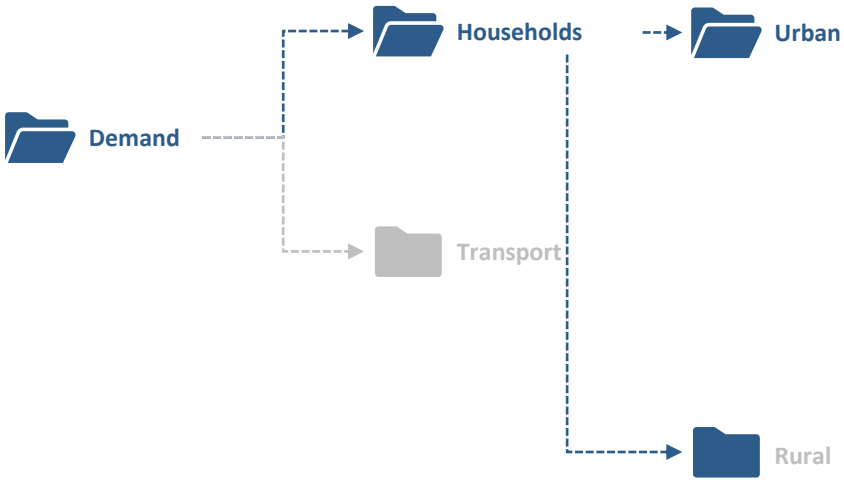


Source: https://leap.sei.org/default.asp?action=introduction;

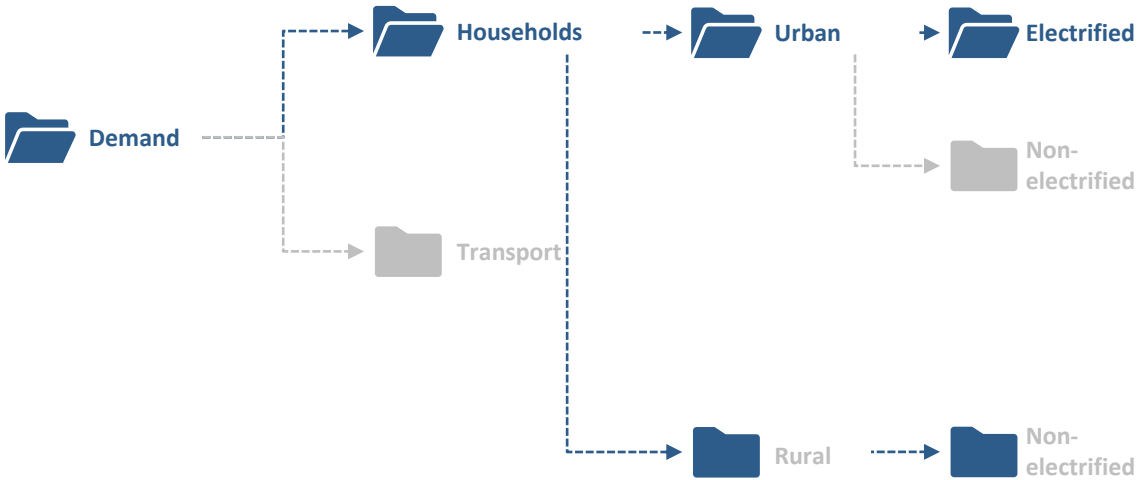
Basic structure of LEAP model: The Tree and its branches



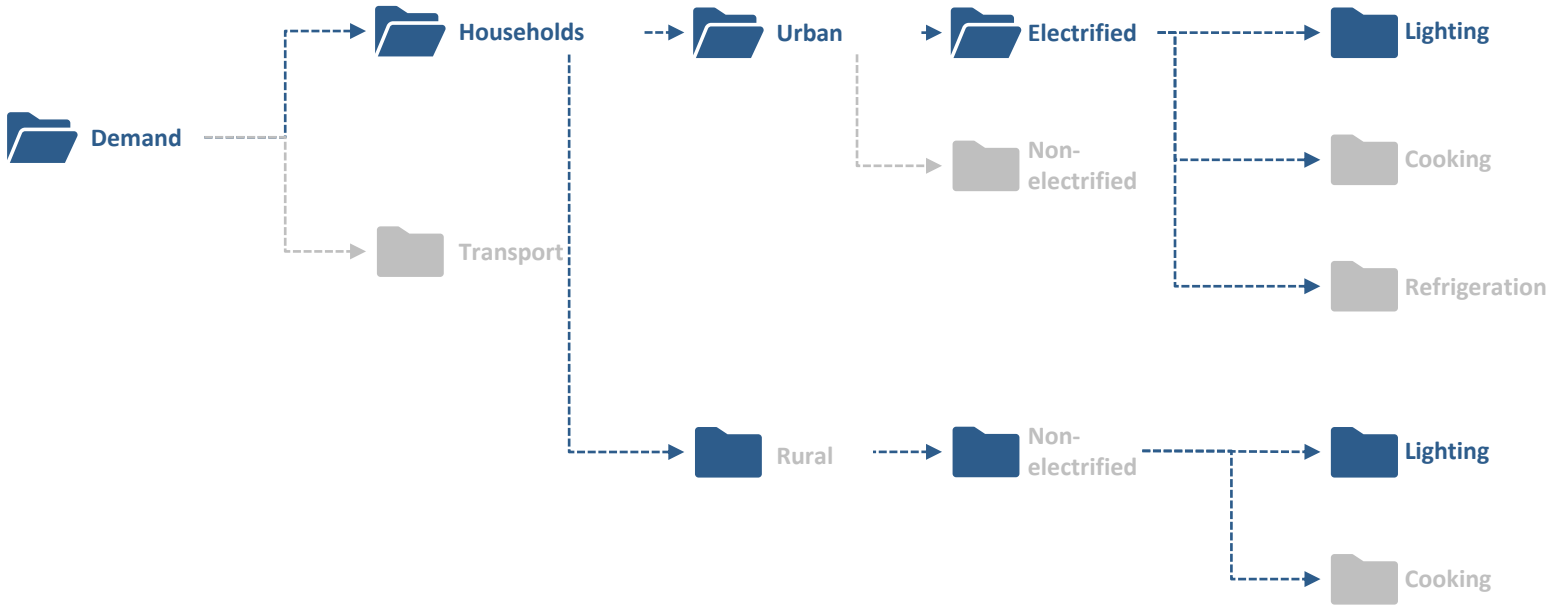
Basic structure of LEAP model: The Tree and its branches



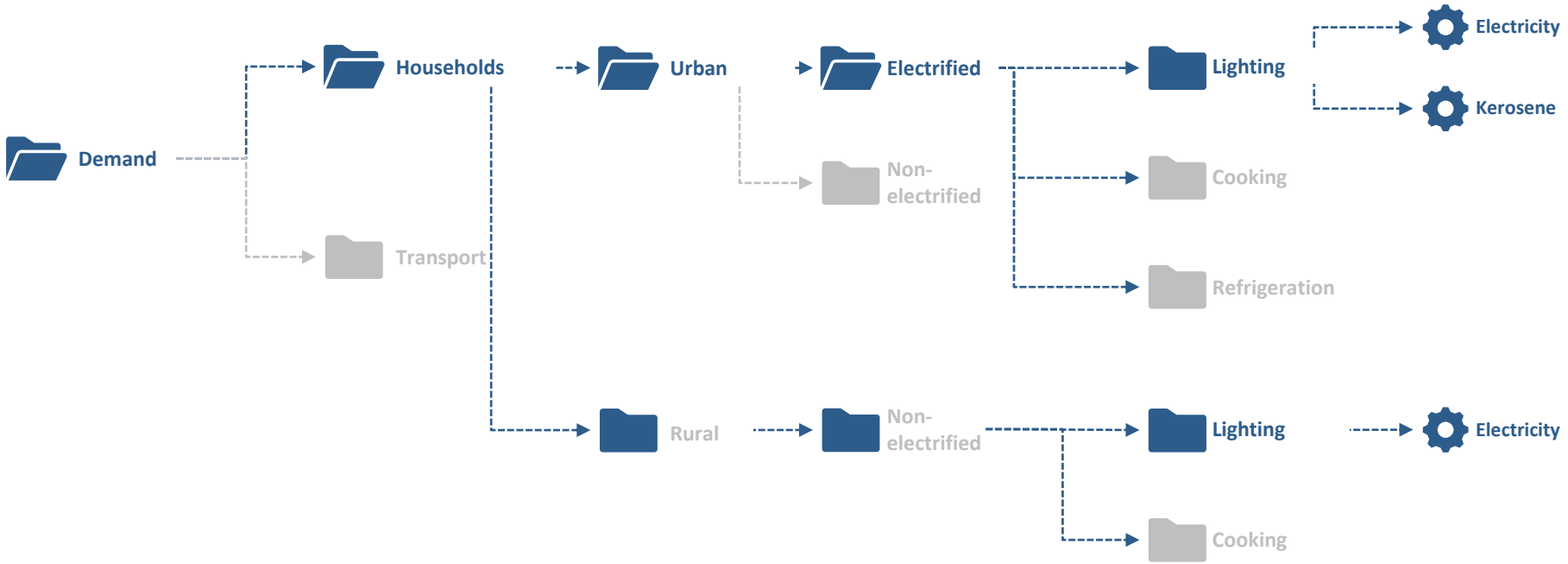
Basic structure of LEAP model: The Tree and its branches



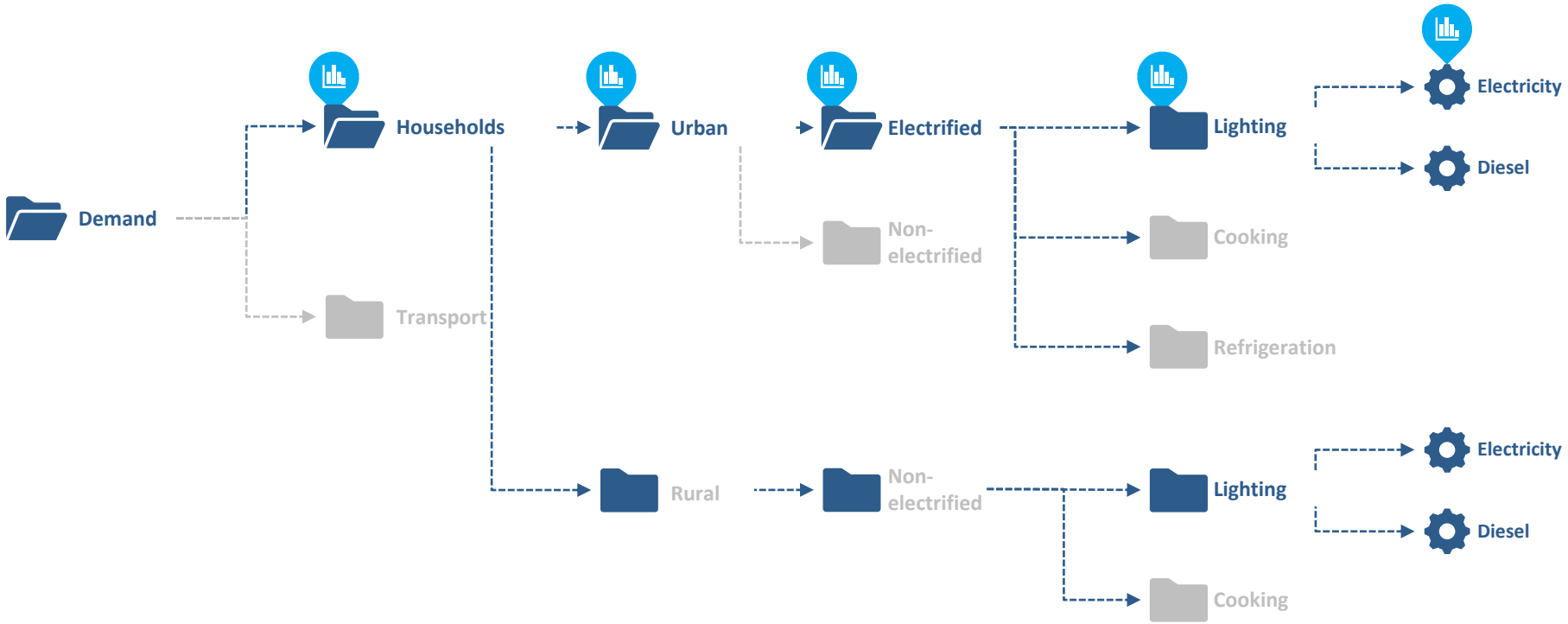
Basic structure of LEAP model: The Tree and its branches



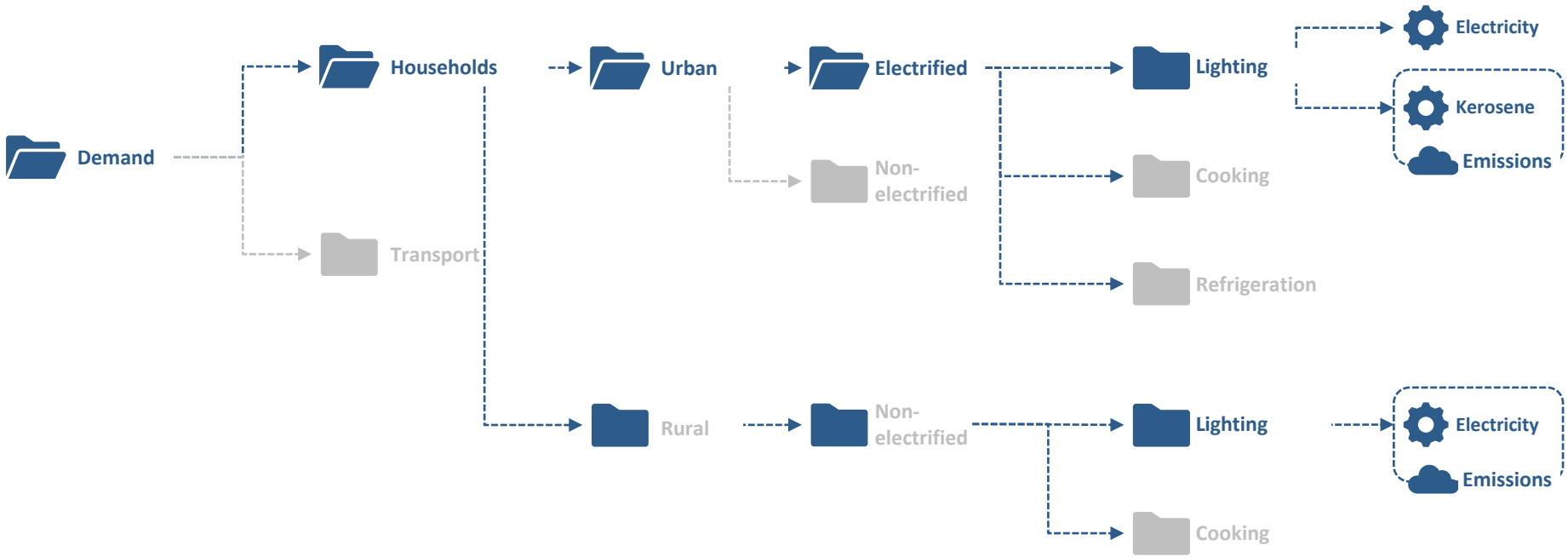
Basic structure of LEAP model: The Tree and its branches



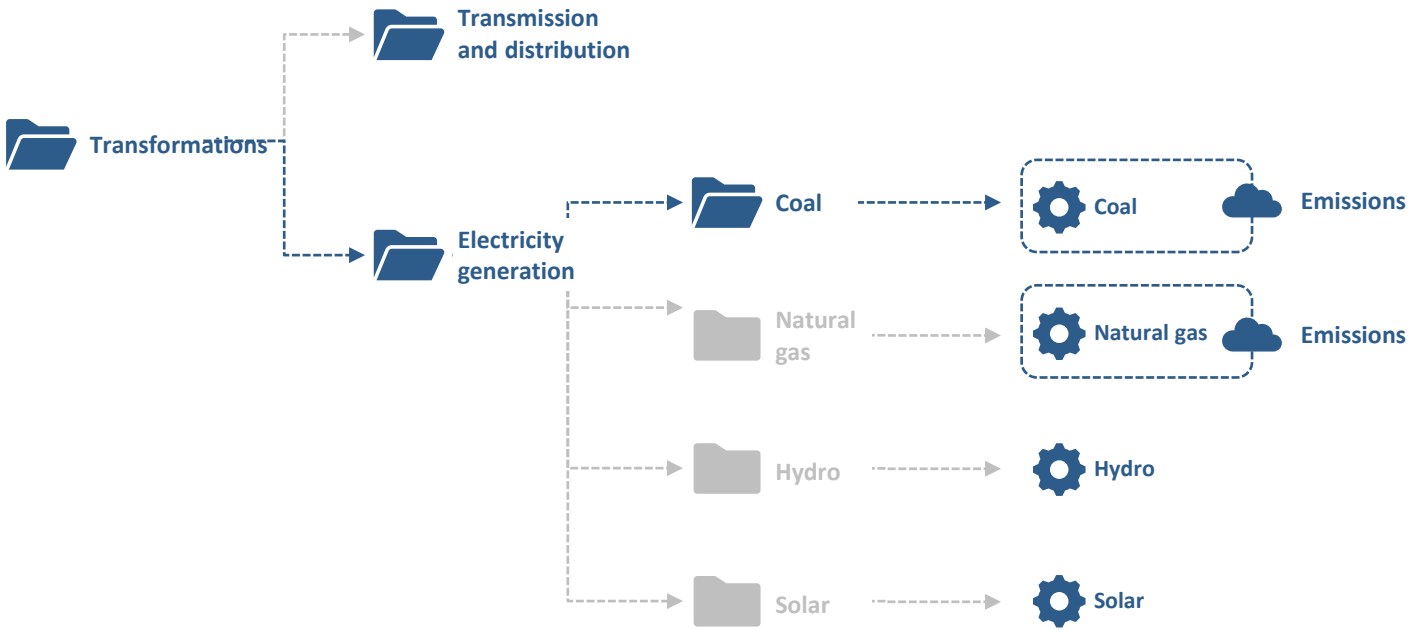
Basic structure of LEAP model: The Tree and its branches



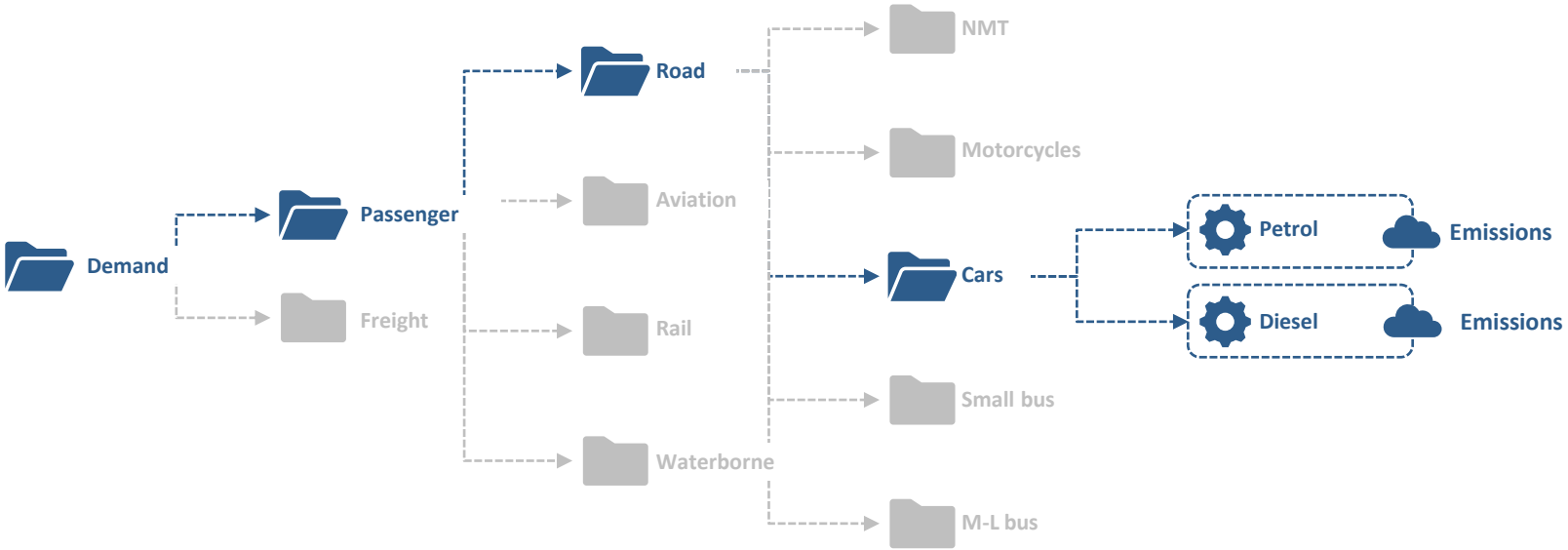
Basic structure of LEAP model: The Tree and its branches



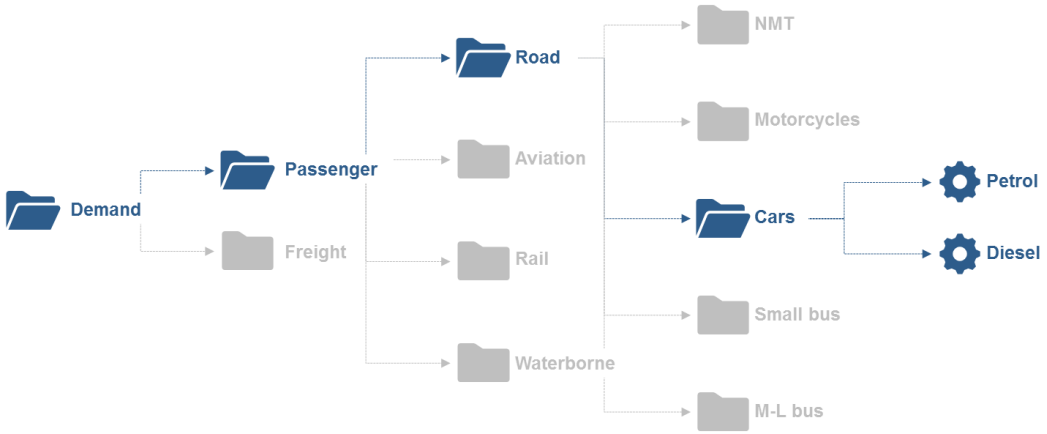
Basic structure of LEAP model: The Tree and its branches

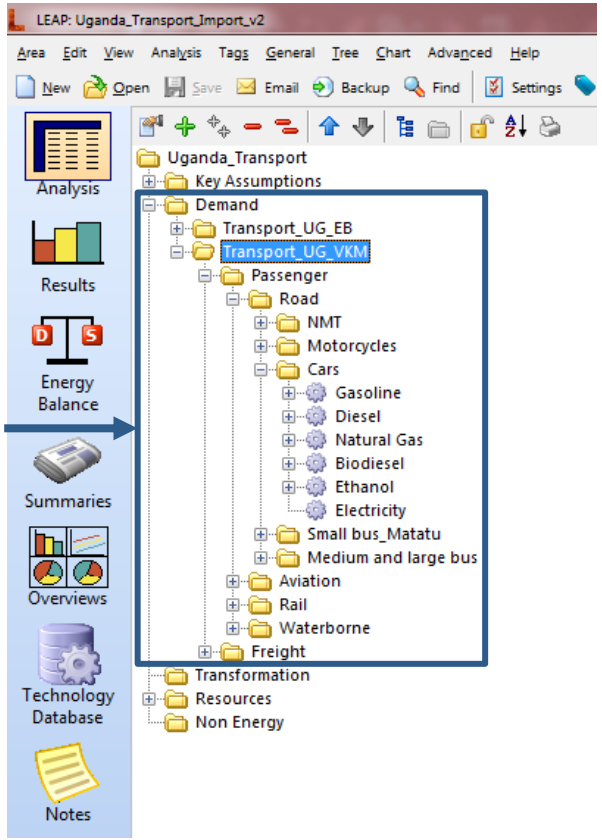


Basic structure of LEAP model: The Tree and its branches



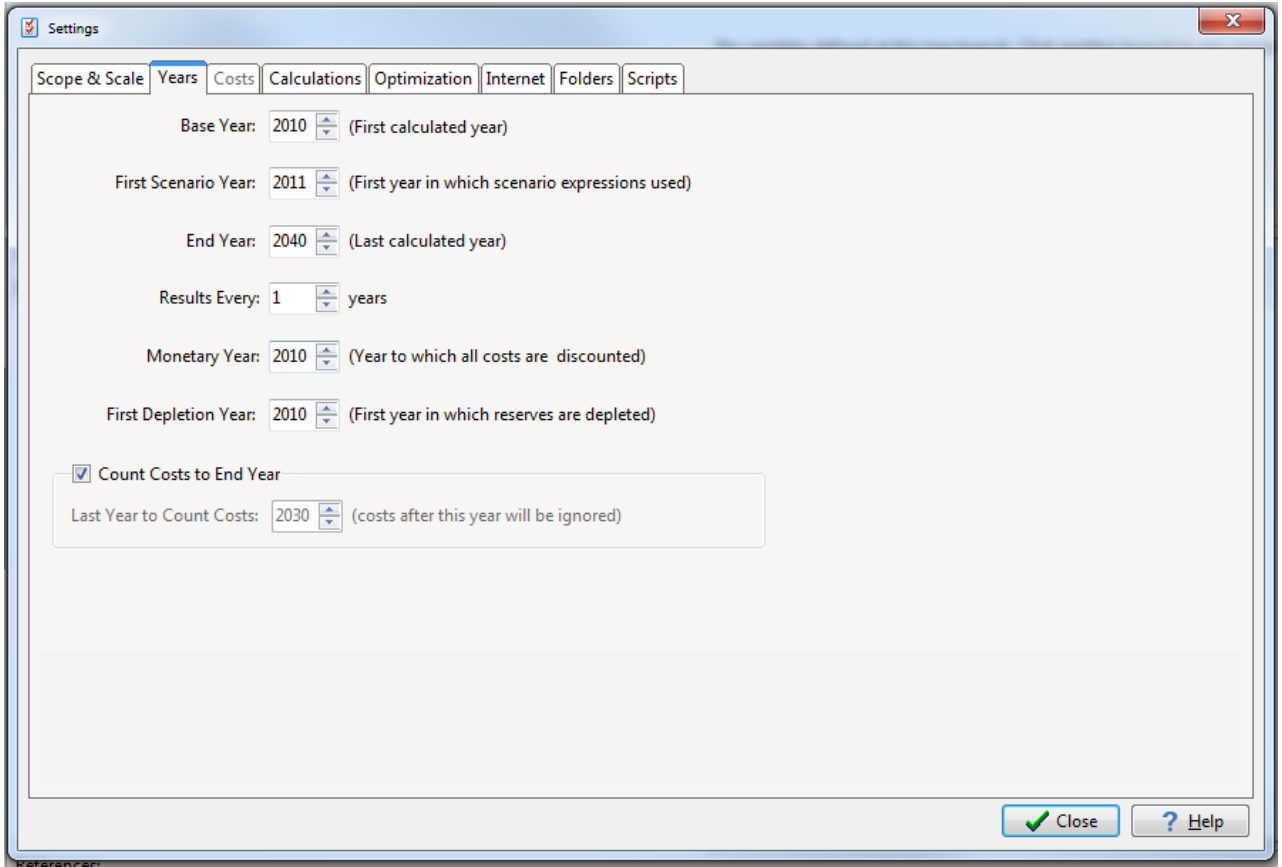
Basic structure of LEAP model: The Tree and its branches





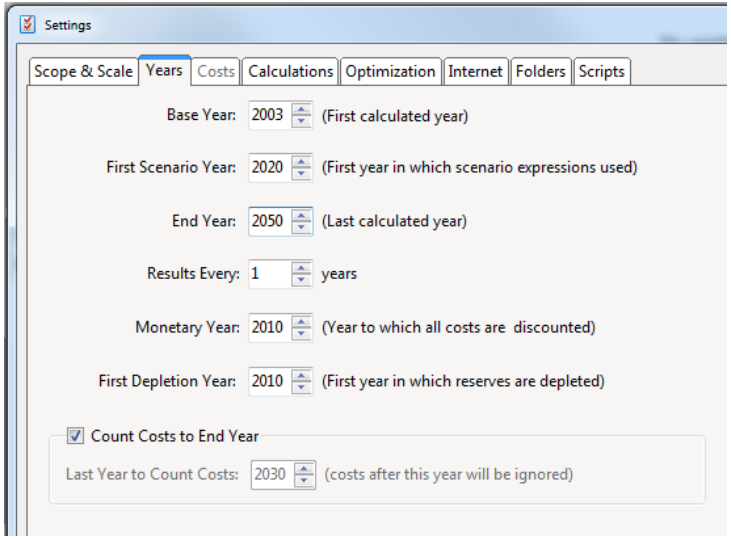
Using LEAP

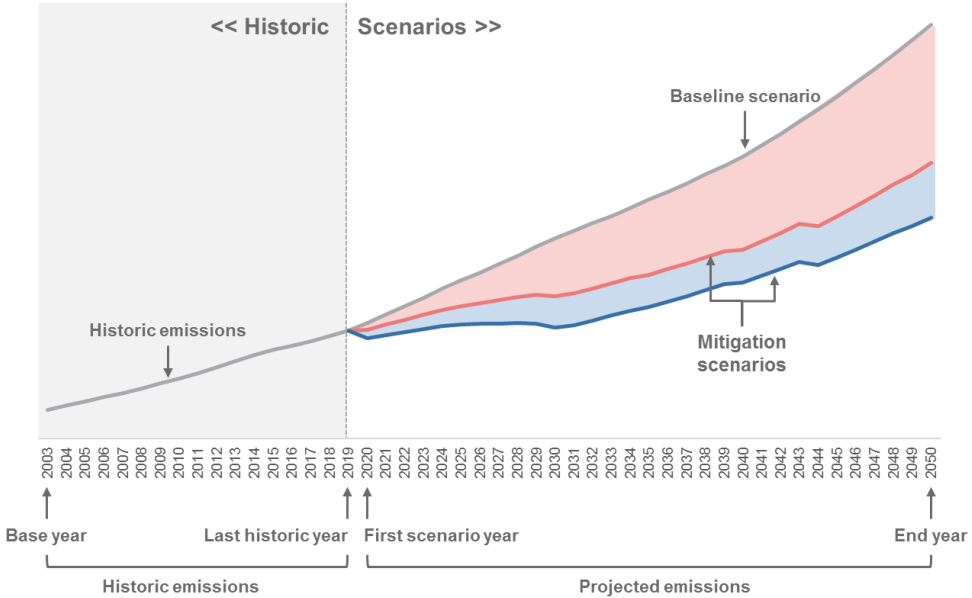
LEAP: Settings input



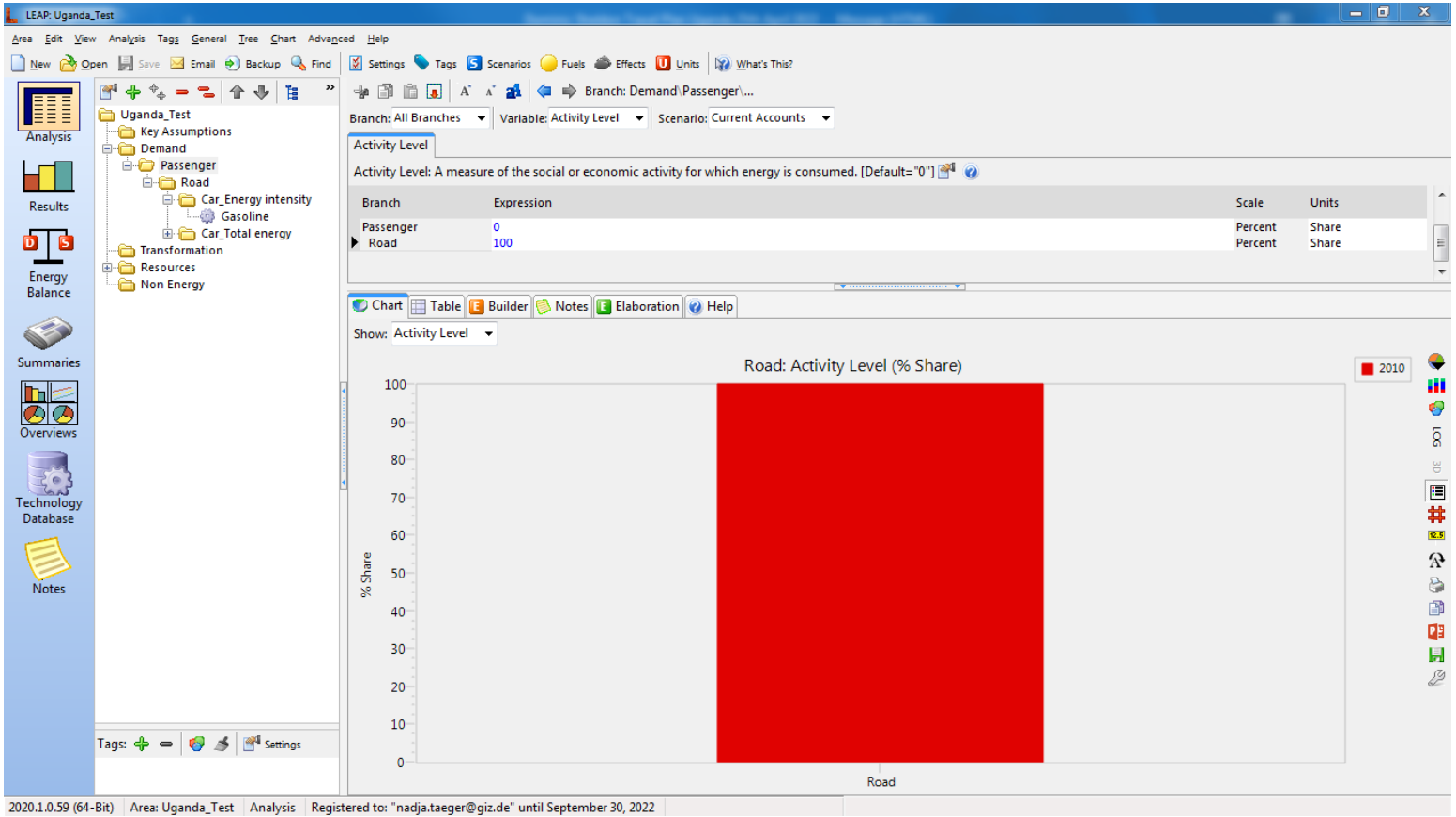
LEAP: Settings input

Settings input

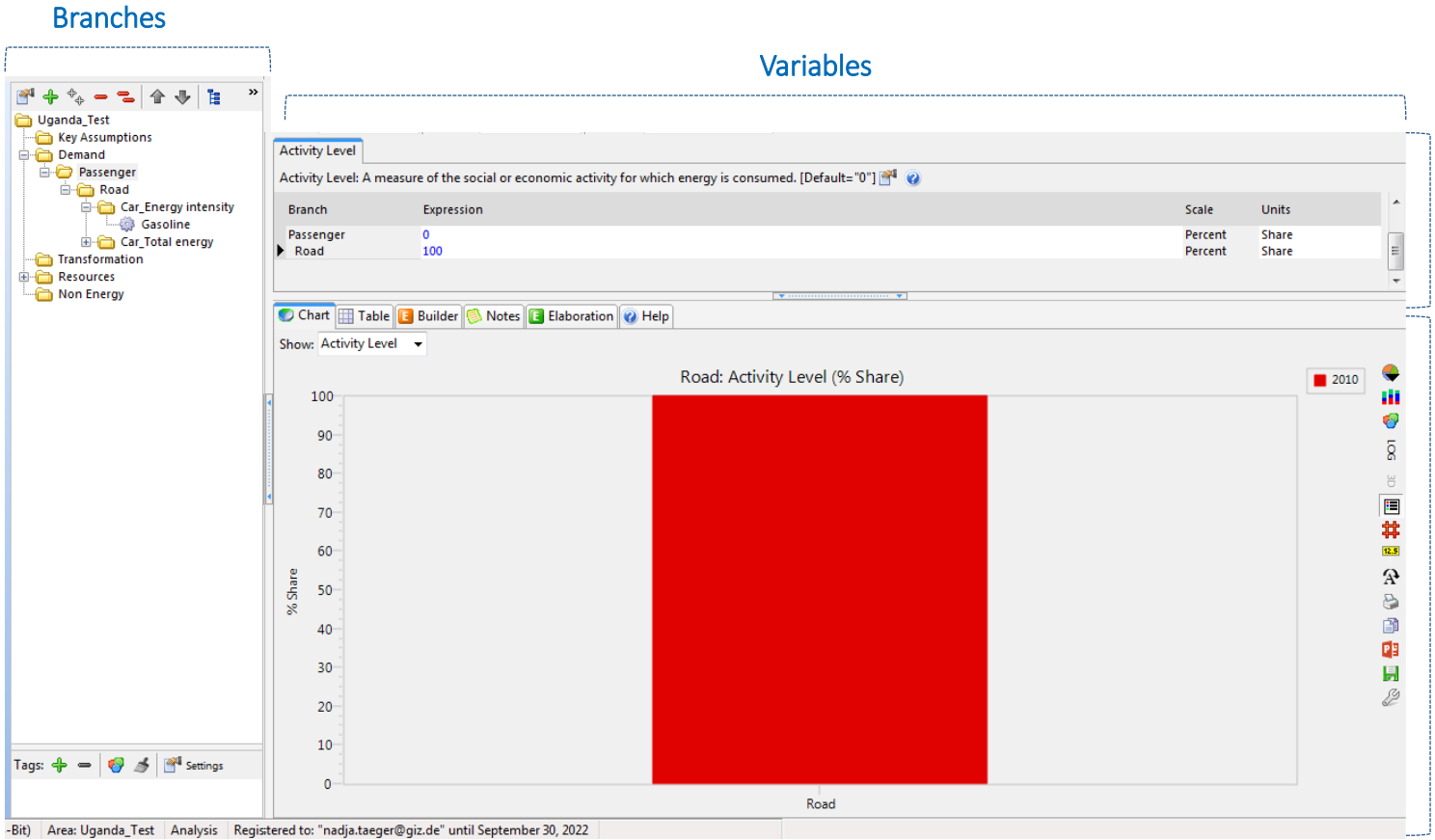




Interface: Overview

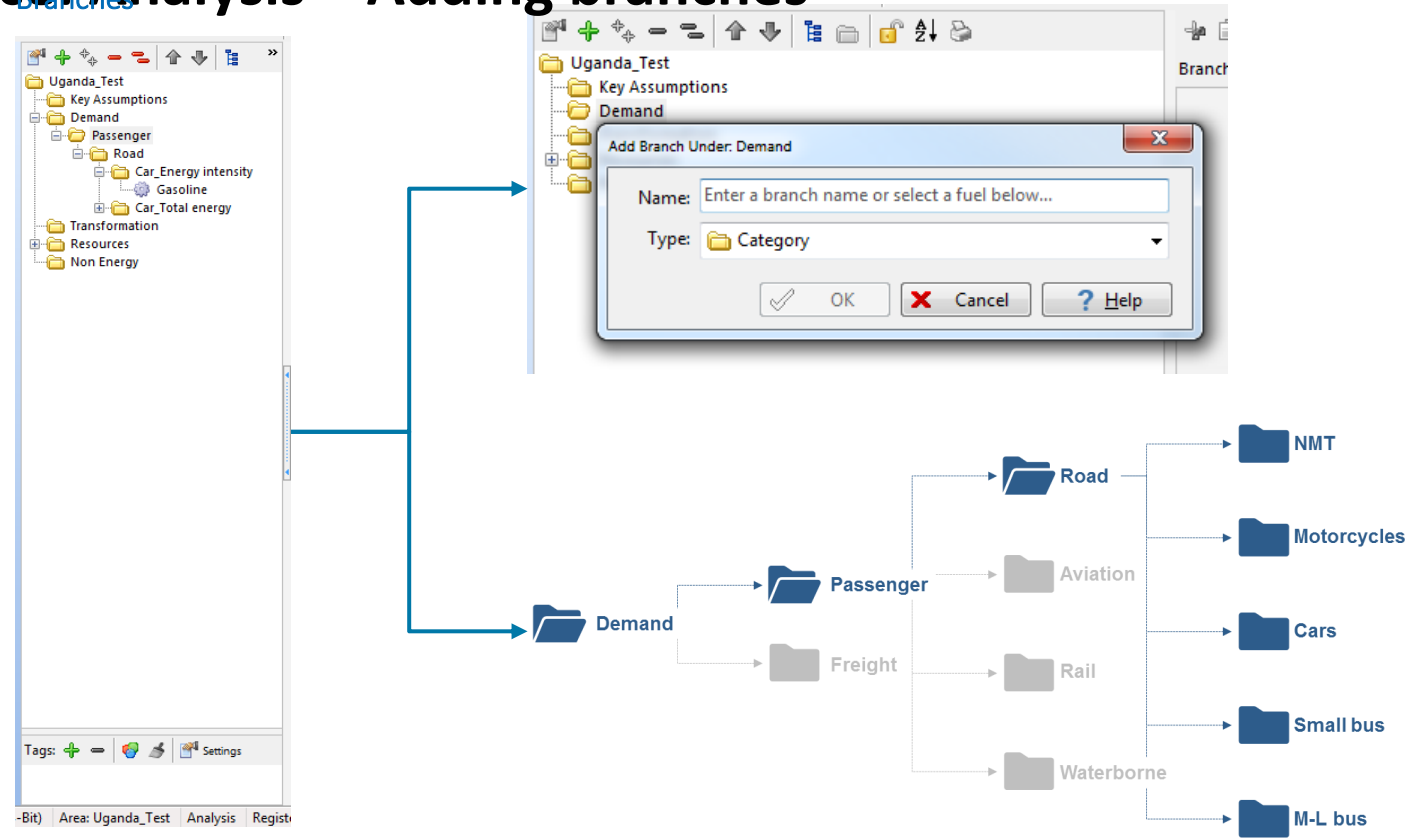


Interface: Analysis

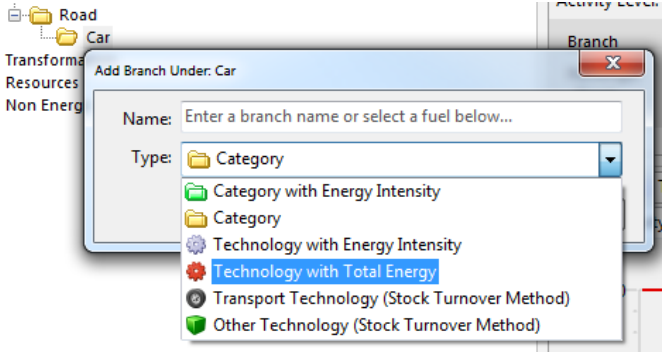


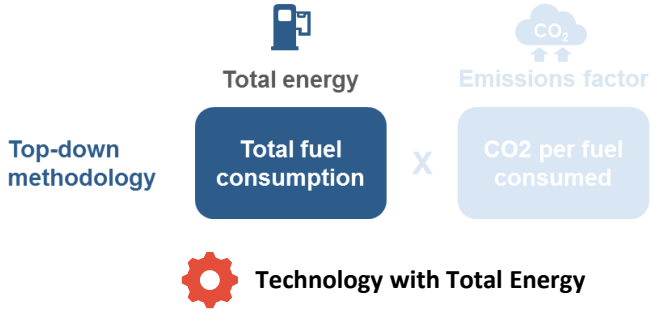
Interface: Branches

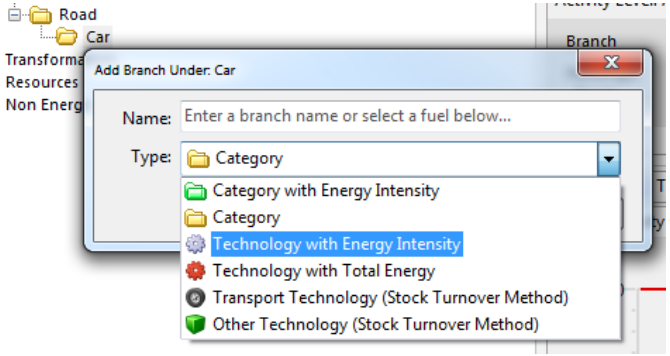
Interface: Analysis – Adding branches

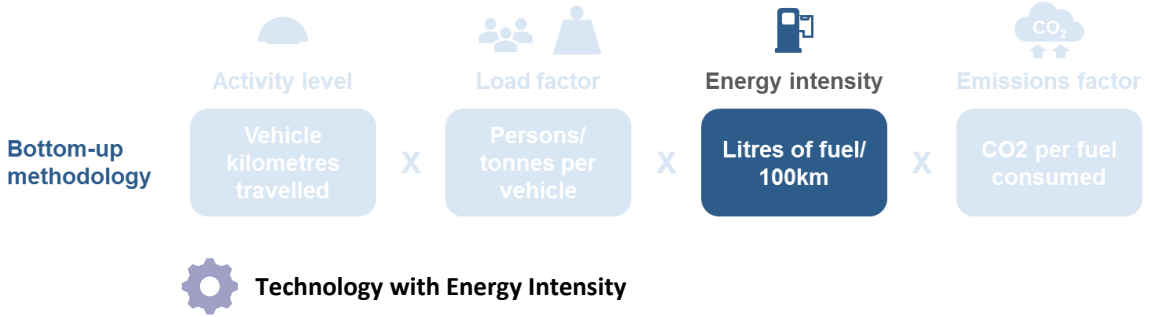


Interface: Analysis – Variables



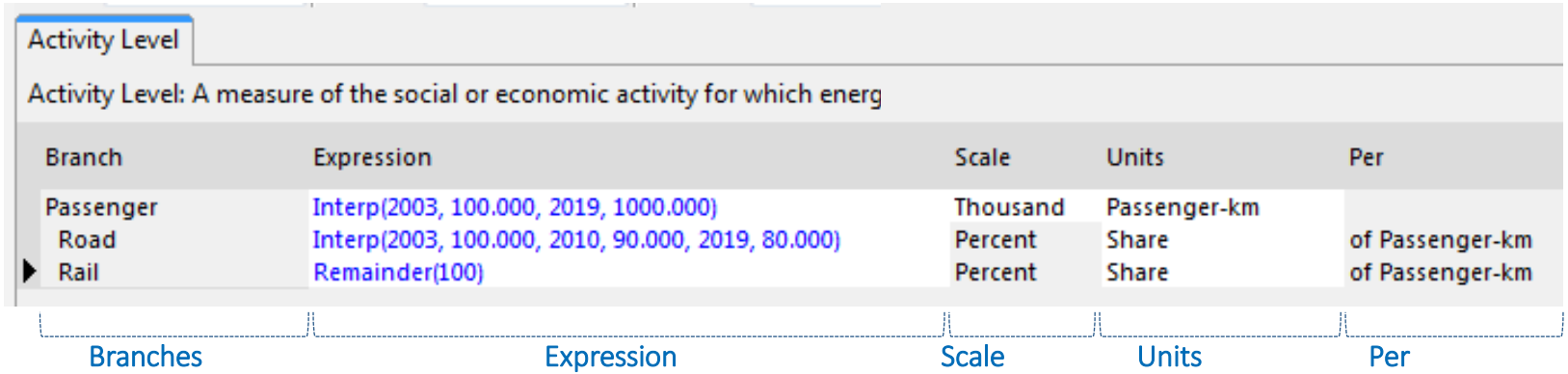






Interface: Expressions

Interface: Variables - Expressions



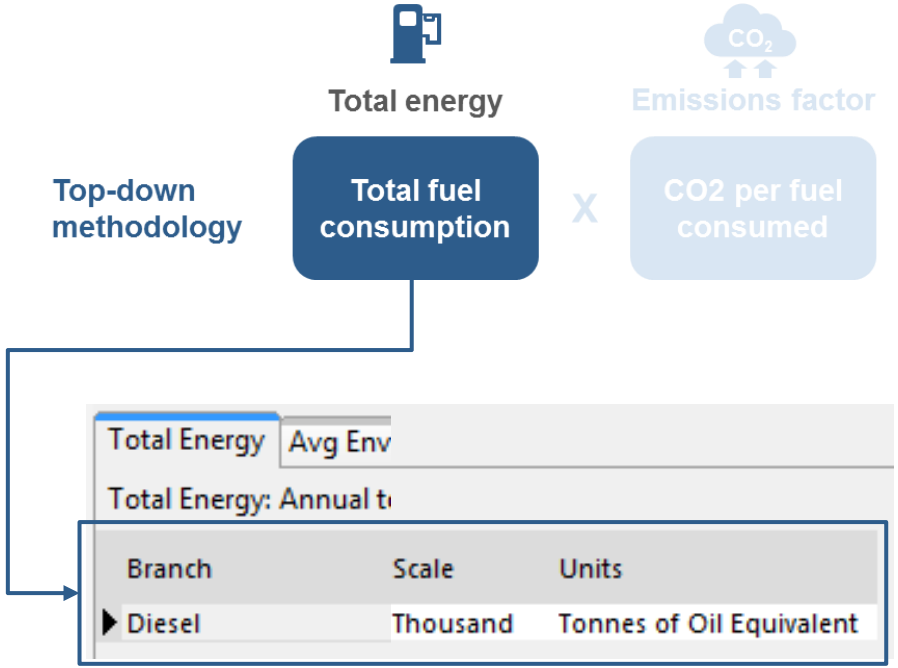
Top-down methodology: Variables

Technology with Total Energy

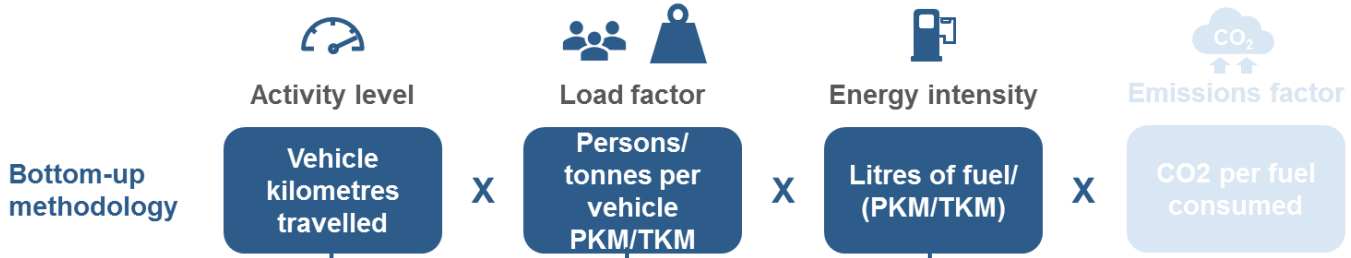
Activity Level | Total Energy

Total Energy: Annual total final consu

Branch	2019 Value
Jet Kerosene	111.81



Bottom-up methodology: Variables



Technology with Total Energy

Activity Level	Final Energy Intensity

Activity Level: A measure of the social or econom

Branch	2019 Value	Expression
Transport_UG_VKM		
Passenger		
Road		

Activity Level	Final Ener

Activity Level: A measure

Branch	Scale	Units	Per
Transport_UG_VKM		No data	
Passenger		No data	
Road		No data	
Cars	Million	Passenger-km	
Gasoline	Percent	Share	of Passenger-km
Diesel	Percent	Share	of Passenger-km

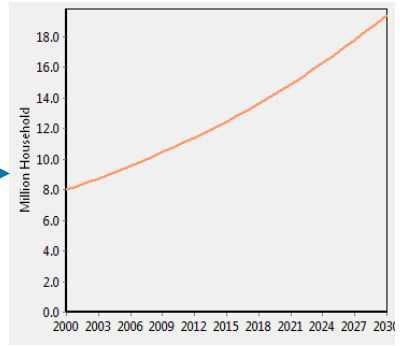
Activity Level	Final Energy Intensity

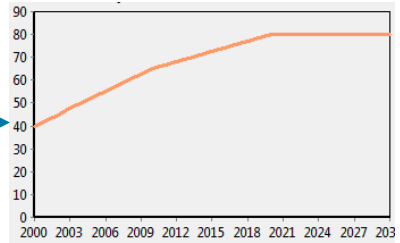
Final Energy Intensity: Annual final co

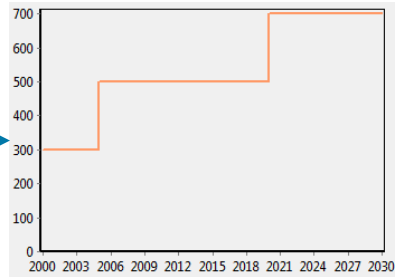
Branch	Fuel	Units	Per
Gasoline	Gasoline	Liter	per Passenger-km
Diesel	Diesel	Liter	per Passenger-km

Interface: Expressions

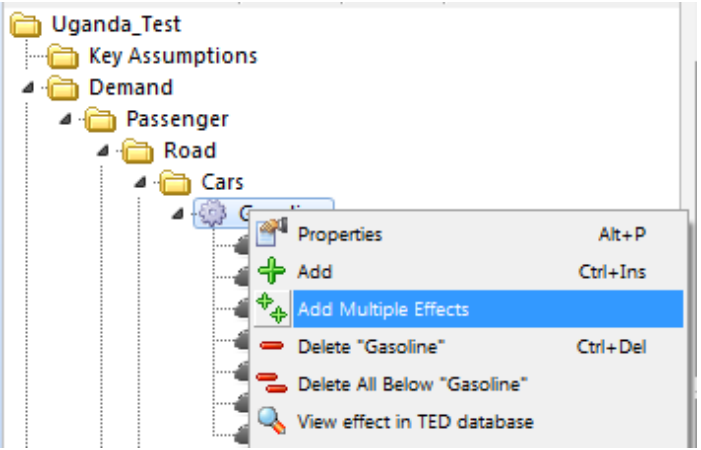
Type	Syntax	Example Syntax and Graph
Simple Number	Value	3.1415
Simple Formula	Value (operator (+ - / *)) value	0.1 * 5970
Growth Rate	Growth(annual % growth)	Growth(3.2%)
Interpolation	Interp(Year, value, year, value)	Interp(2000, 40, 2010, 65, 2020, 80)
Step	Step(Year, value, year, value)	Step(2000, 300, 2005, 500, 2020, 700)
Remainder	Remainder(Value)	Variable A: 70 Variable B: Remainder(100) (=30)
Branch and Variable References	Branch (operator) Value	Passenger: Activity Level + 10%
GrowthAs	GrowthAs(Branch,elasticity)	GrowthAs(Key\Income,1.1)

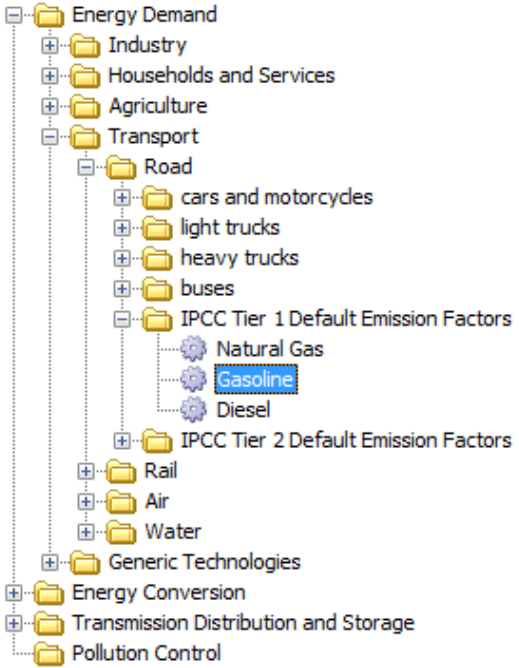


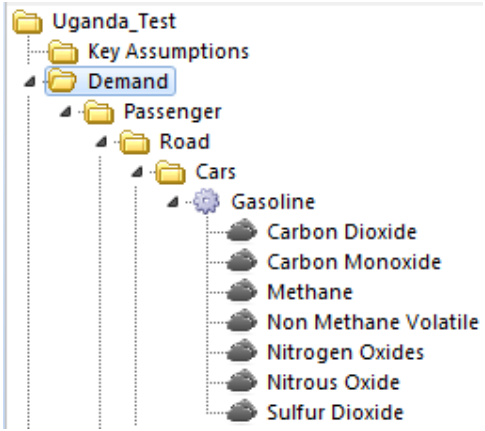




Interface: Variables – Multiple effects

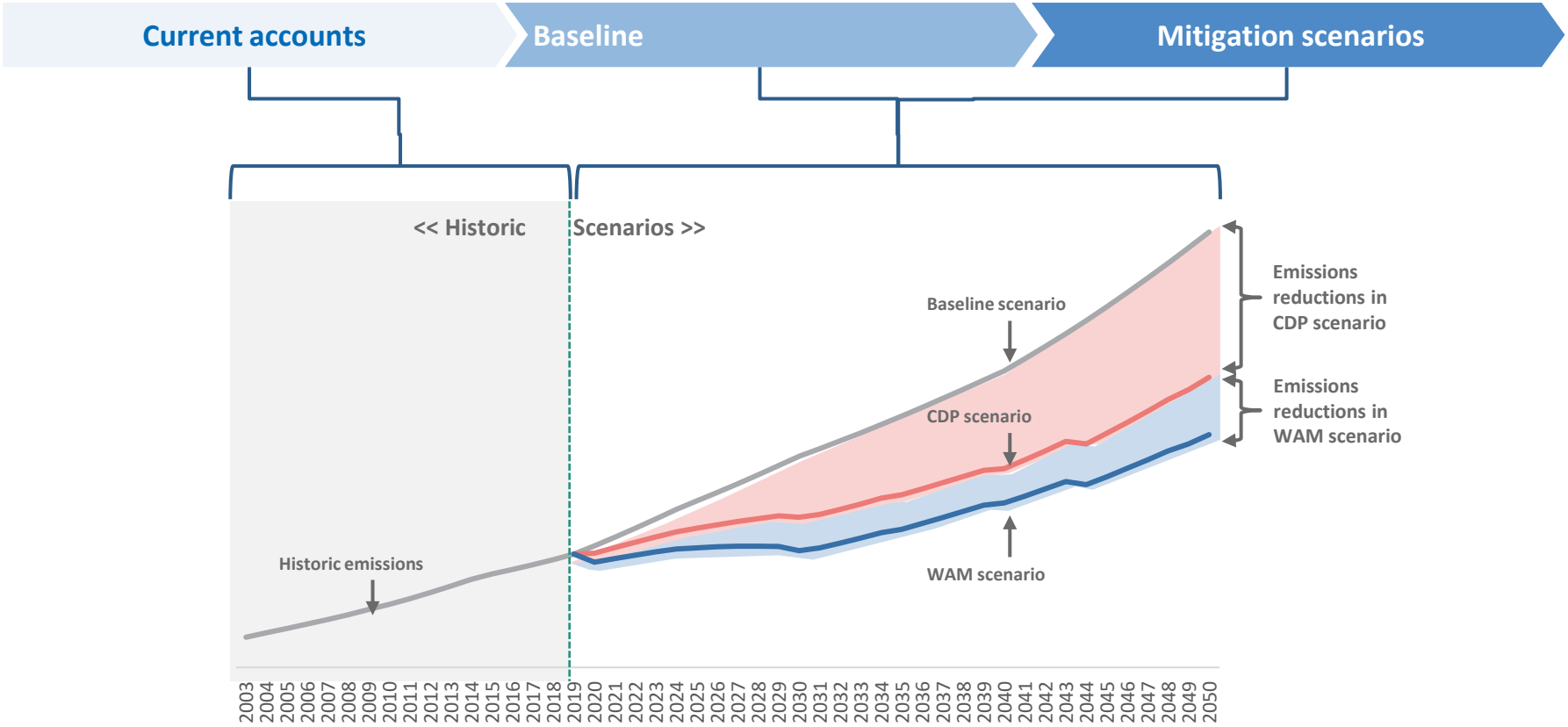






Interface: Scenarios

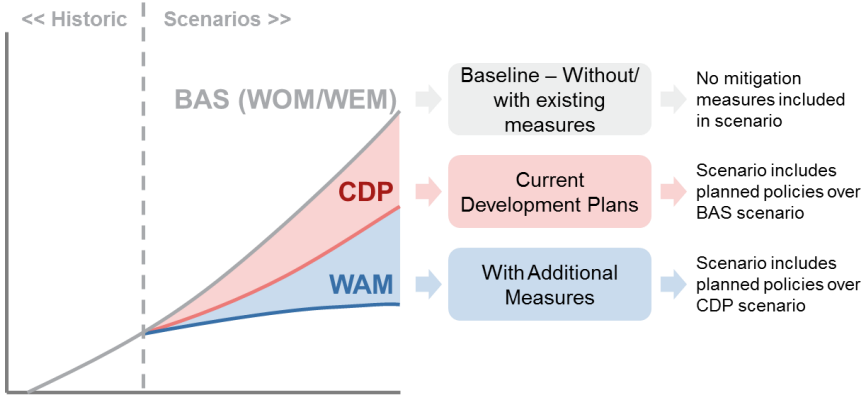
Interface: Scenarios

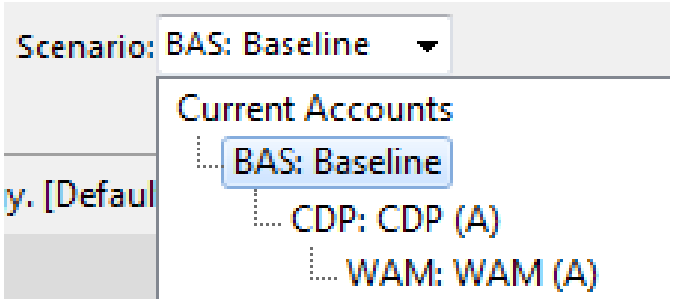


Scenario inheritance

Within LEAP, each scenario "inherits" the conditions of the previous scenario.

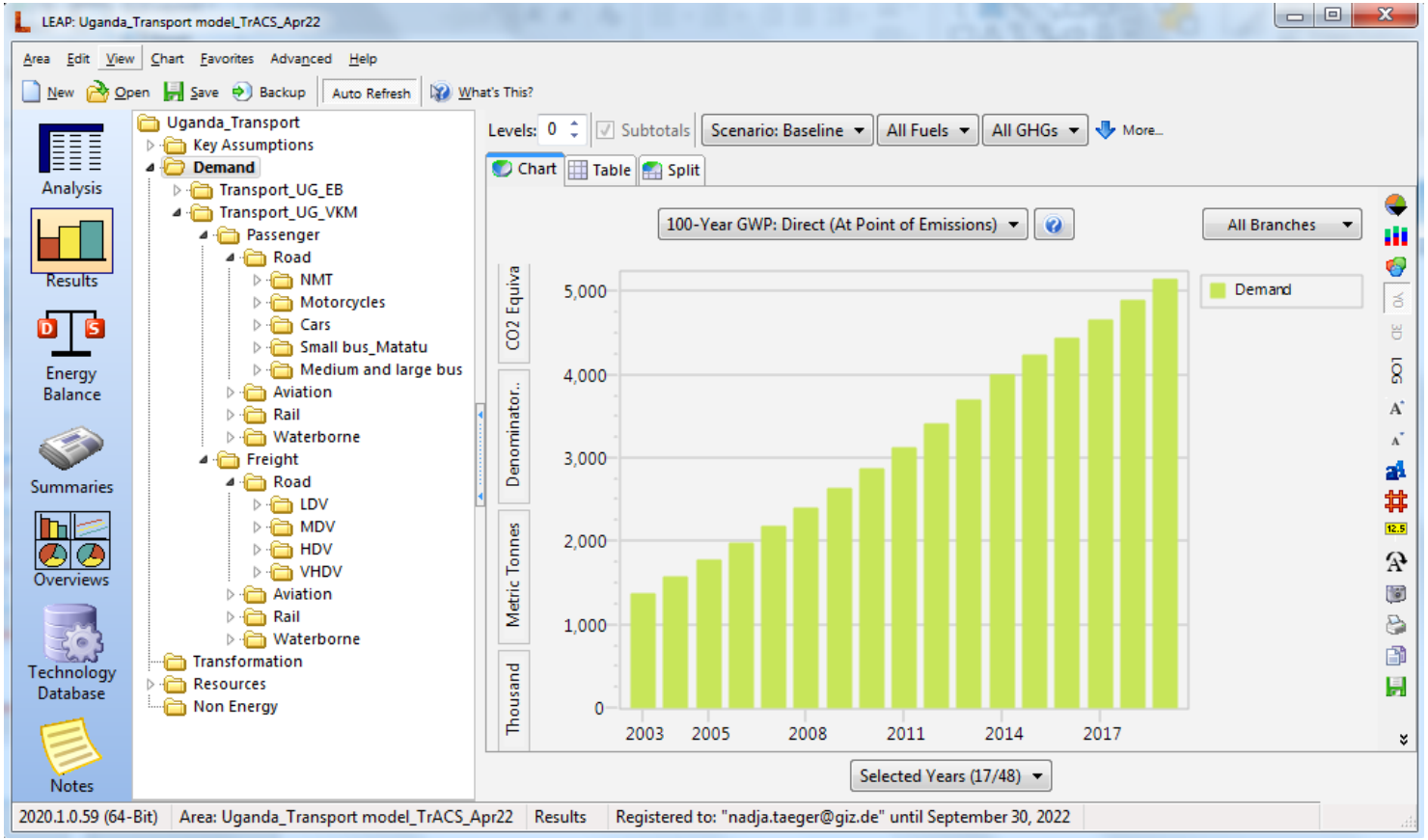
- **Baseline scenario: BAS:** The baseline scenario forms the foundation of the model. In this case the BAS is identical to both a without measures and a with existing measures scenario as it is considered that no mitigation measures are currently implemented.
    - **Current development plans: CDP = BAS (WEM) + CDP measures:** The CDP takes the conditions modeled in the BAS+WEM and adds the effects of currently planned measures
        - **With additional measures: WAM = BAS (WEM) + CDP + WAM measures:** The WAM adds the effects of the final layer of measures





Interface: Results tab

Interface: Results

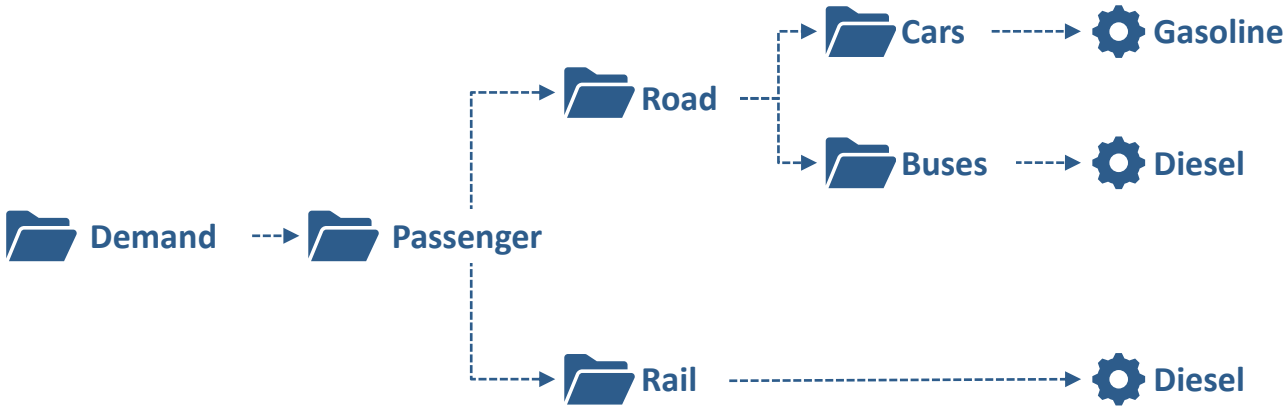


Building a basic energy demand model

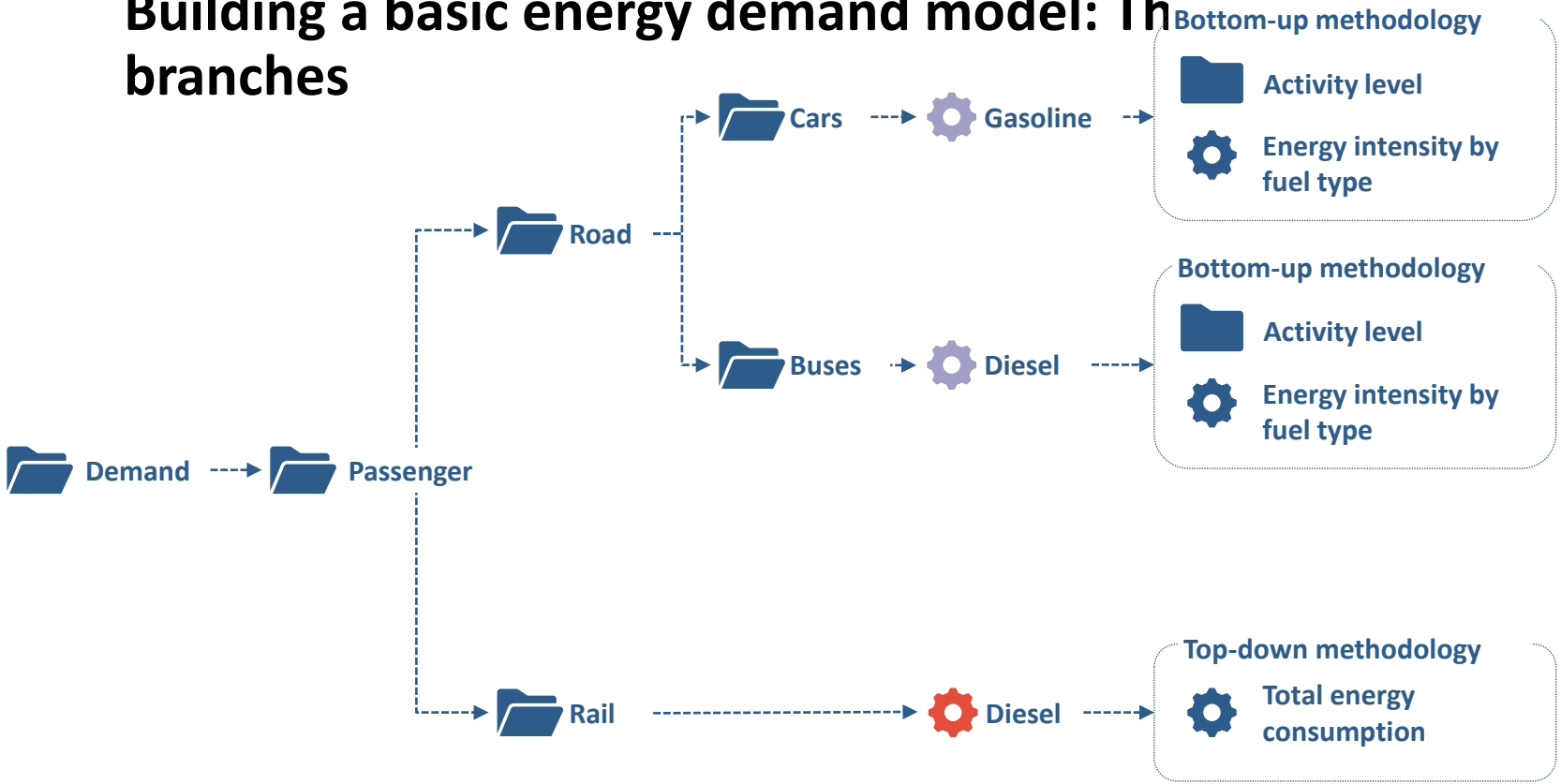
Building a basic energy demand model: The Tree and its branches

Characteristics of the system

- One branch of demand
  - Passenger
- Two sub-sectors:
  - Road
  - Rail
- Two road modes:
  - Cars
  - Buses
- Two fuels:
  - Gasoline
  - Diesel



Building a basic energy demand model: Th… branches



Building a basic energy demand model: input data

Top-down methodology

Total energy consumption

Bottom-up methodology

Activity level

Energy intensity by fuel type

Proportion of diesel consumption

Mode	Unit	Proportion
Road	%	50
Rail	%	50

Energy demand

Fuel	Unit	2015	2016	2017	2018
Total diesel	ktoe	6000	7000	8000	9000
Road	ktoe	3000	3500	4000	4500
Rail	ktoe	3000	3500	4000	4500

Energy intensity/fuel economy

Mode	Unit	Fuel economy
Cars	L/PKM	0.04
Buses	L/PKM	0.01

Passenger kilometres travelled

Data	Unit	2015	2016	2017	2018
Total	Mil. PKM	25,000	27,000	29,000	31,000
Cars	%	60			
Buses	%	40			

Building a basic energy demand model: Results

Making our energy demand model an emissions model

Making our energy demand model an emissions model: Results

Creating a baseline scenario

Creating a baseline scenario: Results

Creating individual mitigation scenarios

Aggregating mitigation scenarios

Aggregating mitigation scenarios: Results