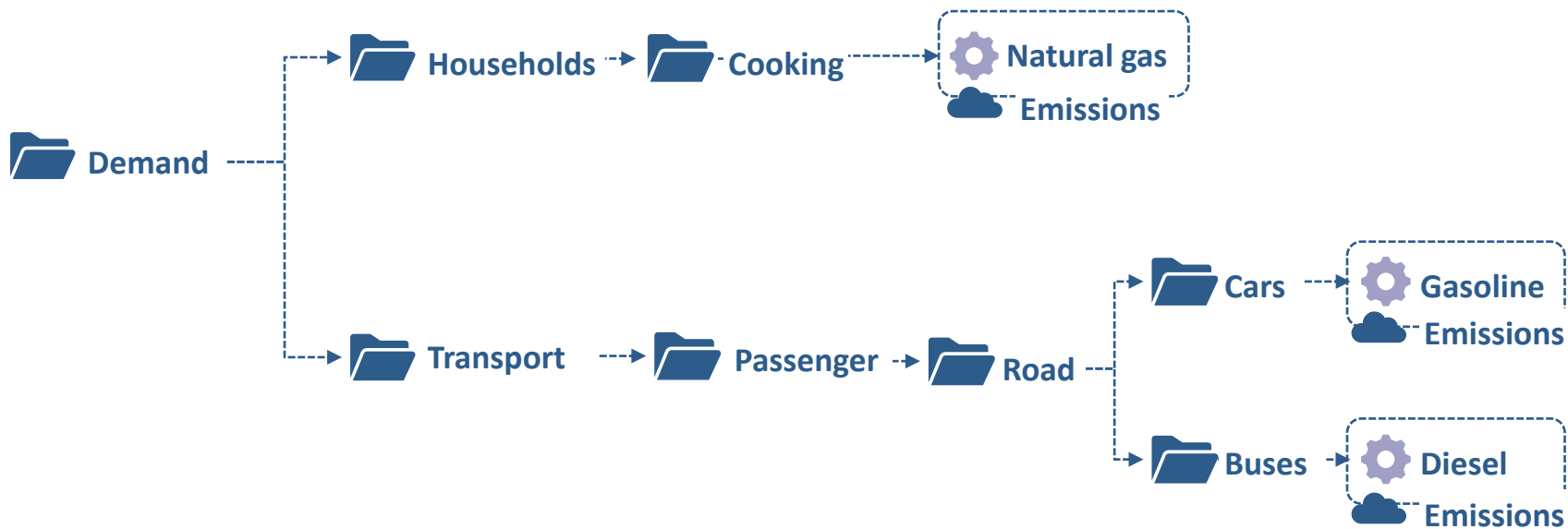
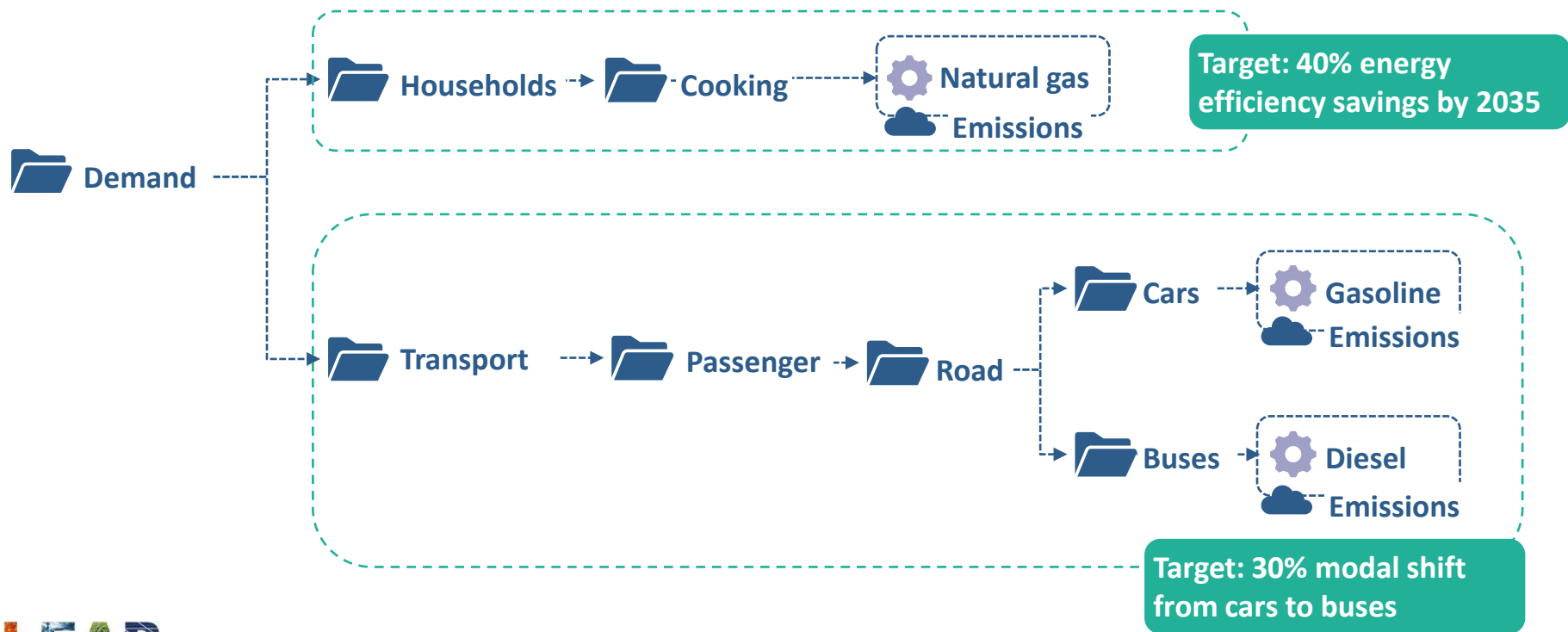
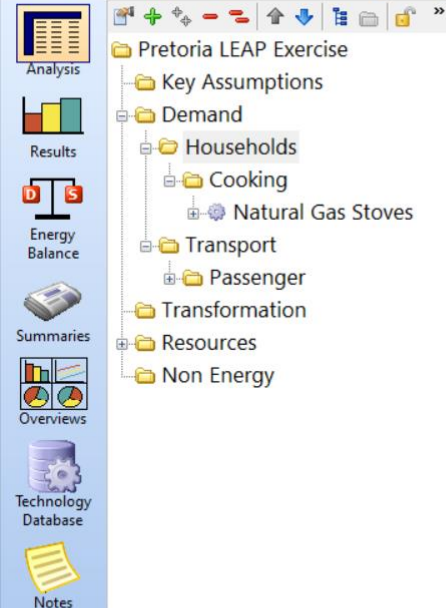


Basic structure of LEAP model: The Tree and its branches



Basic structure of LEAP model: The Tree and its branches





Branch: Demand: Households:...

Branch: All Branches Variable: Activity Level Scenario: BAS: Baseline

Activity Level

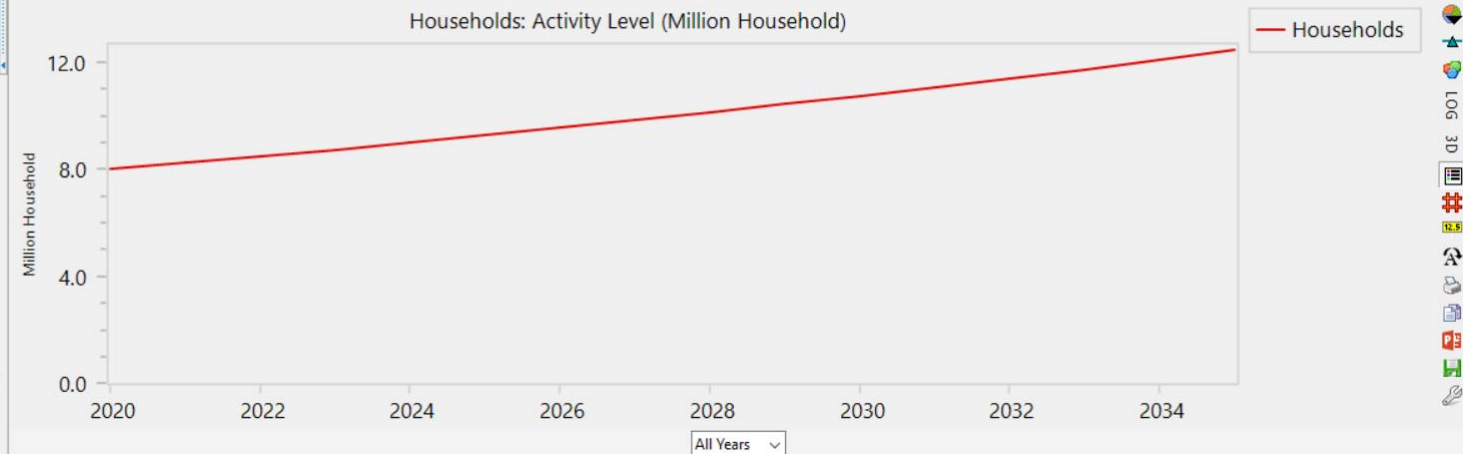
Activity Level: A measure of the social or economic activity for which energy is consumed. [Default="0"]

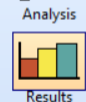
Branch	2020 Value	Expression	Scale	Units	Per
Households	8.00	Growth(3%)	Million	Household	
Cooking	100.00	100	Percent	Share	of Household

Expression OK Check as You Type

Chart Table Builder Notes Elaboration Help

Show: Activity Level





Pretoria LEAP Exercise

Key Assumptions

Demand

Households

Cooking

Natural Gas Stoves

Transport

Passenger

Transformation

Resources

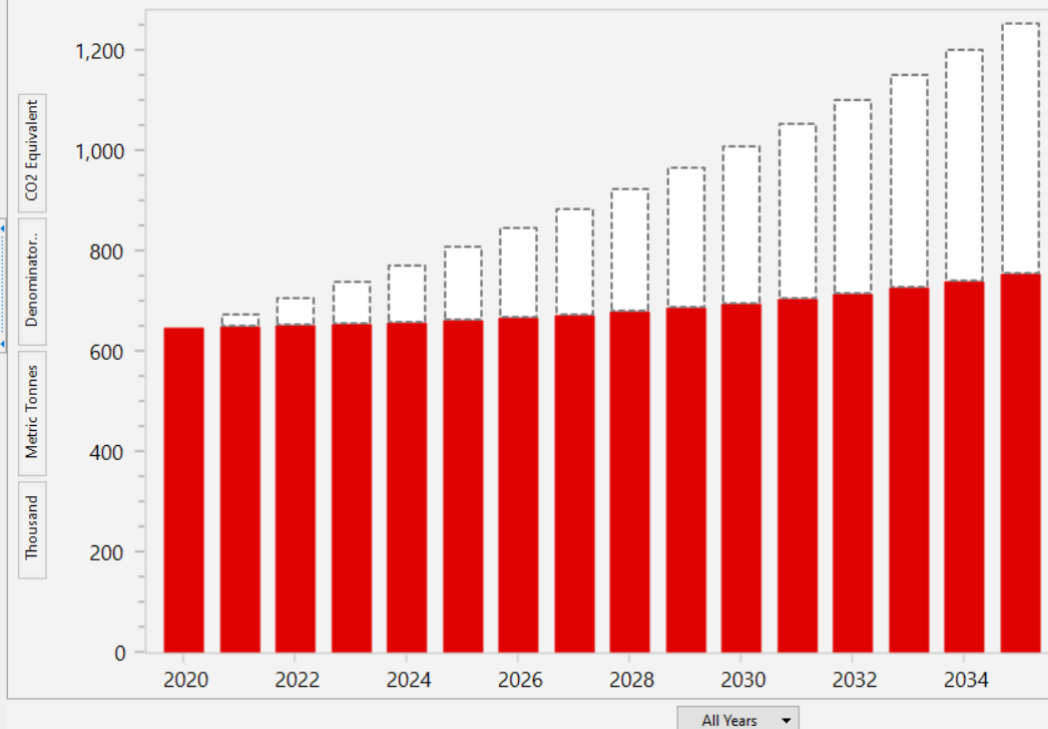
Non Energy

Levels: 2 Match Names Subtotals Scenario: Mitigation All Fuels All GHGs Less...Absolute Values AVOIDED vs. Baseline Group Small in Legend Second Variable..

Chart Table Split

100-Year GWP: Direct (At Point of Emissions)

All Branches



-
- Avoided vs. Baseline
-
-
- Cooking, Natural Gas Stoves

Pretoria LEAP Exercise

- Key Assumptions
- Demand
 - Households
 - Cooking
 - Natural Gas Stoves
 - Transport
 - Passenger
 - Transformation
 - Resources
 - Non Energy

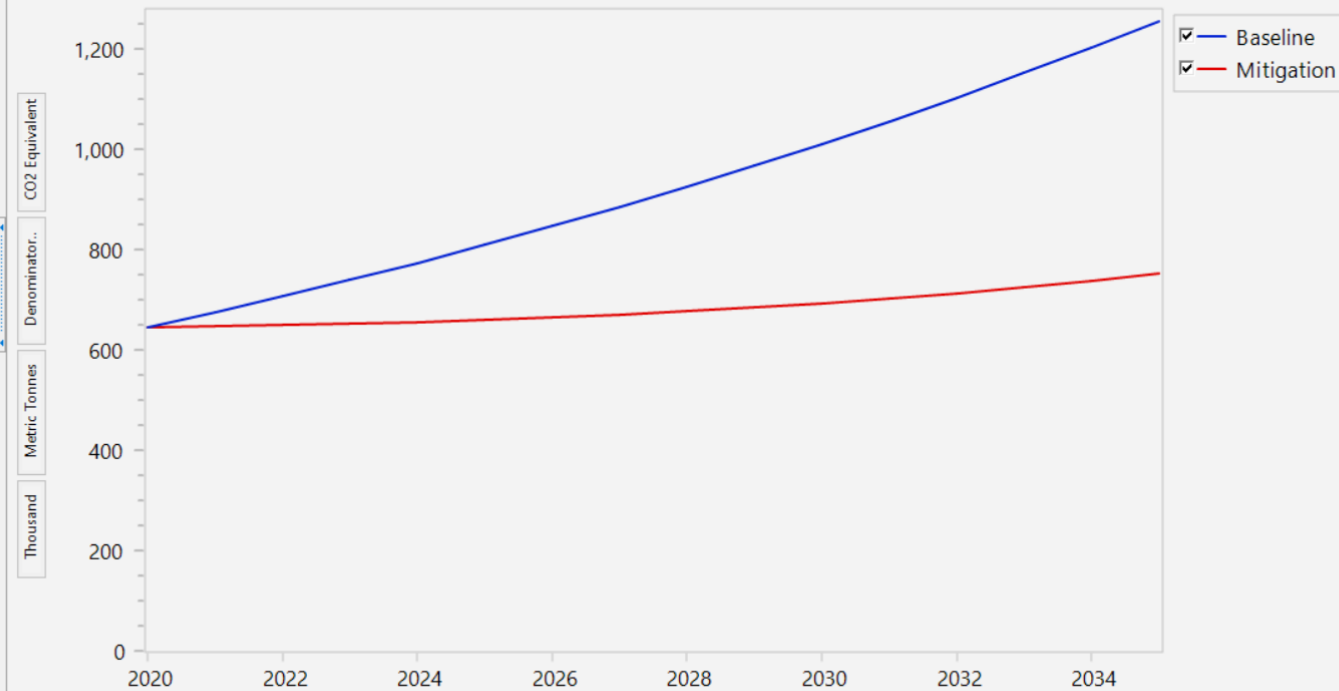
All Fuels ▾ All GHGs ▾ ⬆ Less...

Absolute Values ▾ No Comparison ▾ Second Variable..

Chart Table Split

100-Year GWP: Direct (At Point of Emissions) ▾

All Scenarios ▾



All Years ▾

Training workshop for anglofone 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

Registration details

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



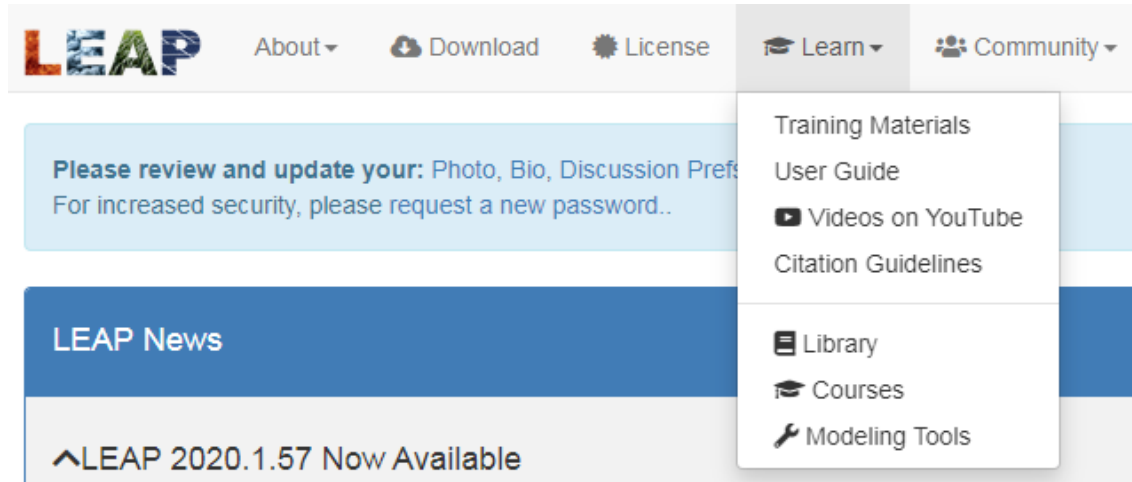
Navigate to:

- 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



The screenshot shows the top navigation bar of the LEAP website. The navigation items are: LEAP logo, About, Download, License, Learn, and Community. The 'Learn' dropdown menu is open, displaying the following options: Training Materials, User Guide, Videos on YouTube, Citation Guidelines, Library, Courses, and Modeling Tools. Below the navigation bar, there is a light blue notification box with the text: "Please review and update your: Photo, Bio, Discussion Pref... For increased security, please request a new password..". Below that is a dark blue section titled "LEAP News" with a sub-section "LEAP 2020.1.57 Now Available".

LEAP

About Download License Learn Community

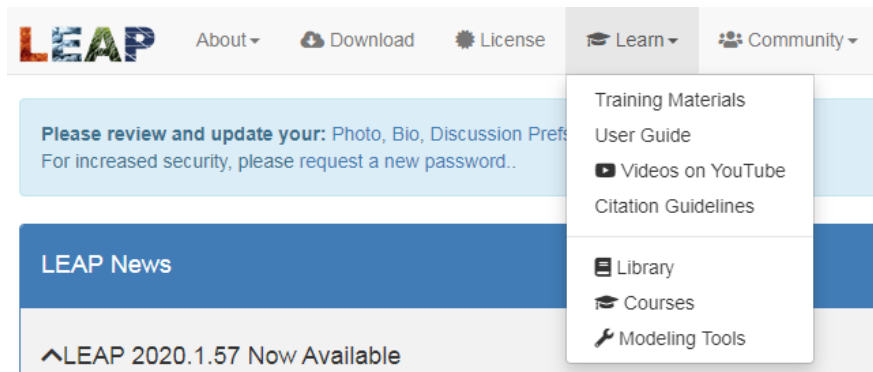
Please review and update your: Photo, Bio, Discussion Pref...
For increased security, please request a new password..

LEAP News

LEAP 2020.1.57 Now Available

- Training Materials
- User Guide
- Videos on YouTube
- Citation Guidelines
- Library
- Courses
- Modeling Tools

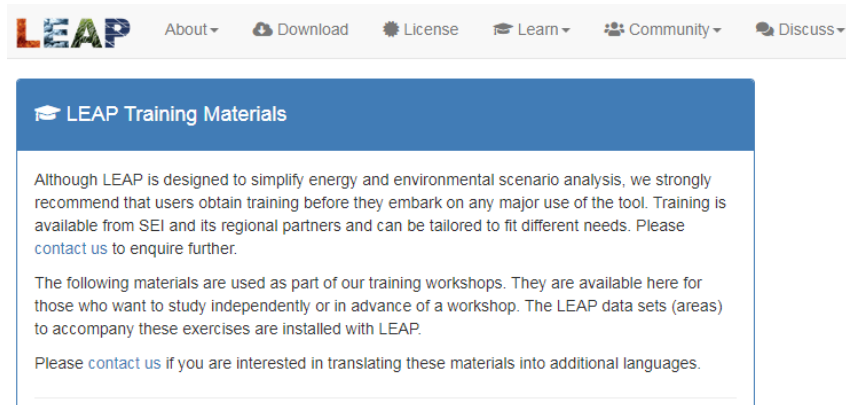
LEAP resources available: Training materials



The screenshot shows the top navigation bar of the LEAP website. The 'Learn' menu is open, displaying the following options: Training Materials, User Guide, Videos on YouTube, Citation Guidelines, Library, Courses, and Modeling Tools. Below the navigation bar, there is a light blue banner with the text: 'Please review and update your: Photo, Bio, Discussion Pref... For increased security, please request a new password..'. Below that is a dark blue banner with the text: 'LEAP News'. At the bottom of the screenshot, there is a grey banner with the text: 'LEAP 2020.1.57 Now Available'.

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.



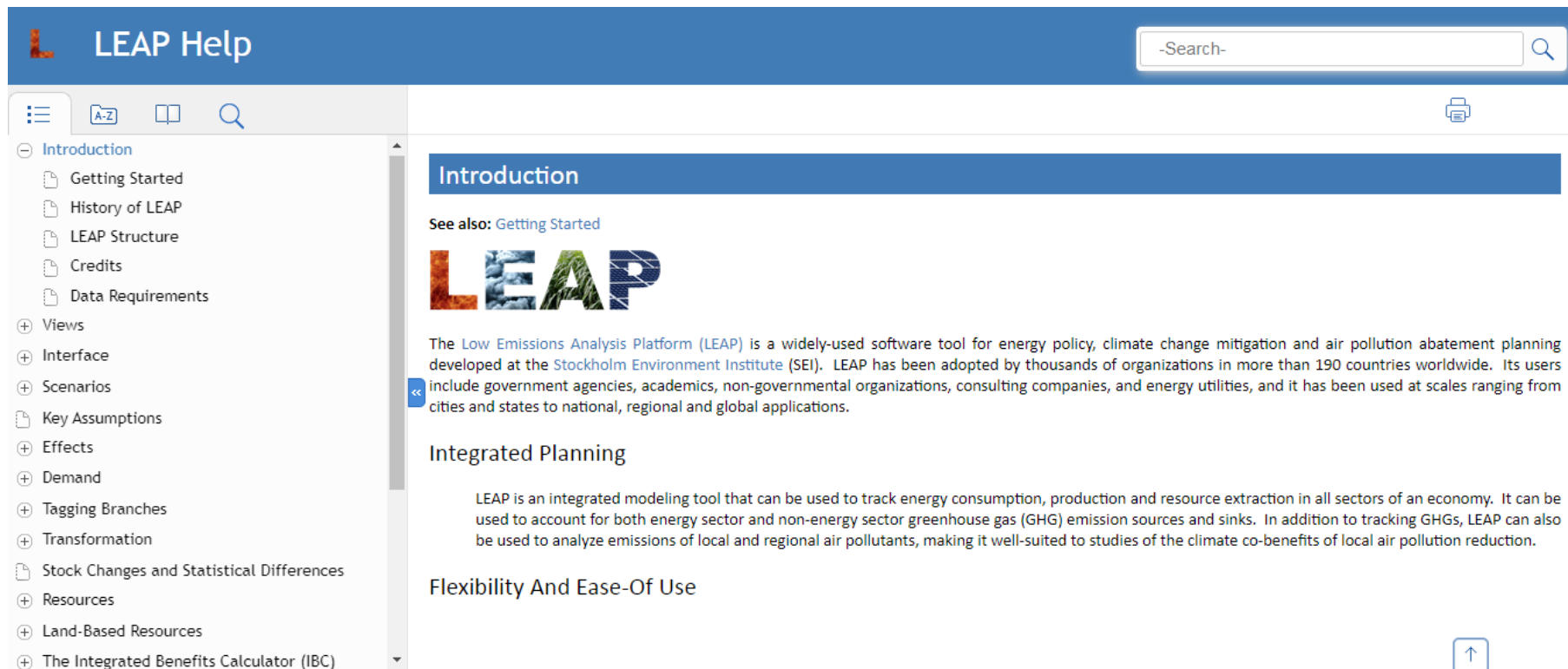
The screenshot shows the 'LEAP Training Materials' page. The page has a blue header with the text 'LEAP Training Materials'. Below the header, there is a paragraph of text: 'Although LEAP is designed to simplify energy and environmental scenario analysis, we strongly recommend that users obtain training before they embark on any major use of the tool. Training is available from SEI and its regional partners and can be tailored to fit different needs. Please contact us to enquire further.' Below this paragraph, there is another paragraph: 'The following materials are used as part of our training workshops. They are available here for those who want to study independently or in advance of a workshop. The LEAP data sets (areas) to accompany these exercises are installed with LEAP.' Below this paragraph, there is a final paragraph: 'Please contact us if you are interested in translating these materials into additional languages.'

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



The screenshot shows the LEAP Help user guide interface. At the top, there is a blue header with the LEAP logo and the text "LEAP Help". To the right of the header is a search bar with the placeholder text "-Search-". Below the header is a navigation sidebar on the left with a list of topics: Introduction (expanded), Getting Started, History of LEAP, LEAP Structure, Credits, Data Requirements, Views, Interface, Scenarios, Key Assumptions, Effects, Demand, Tagging Branches, Transformation, Stock Changes and Statistical Differences, Resources, Land-Based Resources, and The Integrated Benefits Calculator (IBC). The main content area on the right has a blue header for "Introduction". Below this header, there is a link "See also: Getting Started" and a large graphic of the word "LEAP" where each letter is filled with a different image related to energy and environment. The main text describes LEAP as a widely-used software tool for energy policy, climate change mitigation and air pollution abatement planning developed at the Stockholm Environment Institute (SEI). It mentions that LEAP has been adopted by thousands of organizations in more than 190 countries worldwide. Below the main text, there are sections for "Integrated Planning" and "Flexibility And Ease-Of Use". At the bottom right of the main content area, there is a small icon of an upward-pointing arrow.

LEAP Help

-Search-

Introduction

See also: [Getting Started](#)

LEAP

The [Low Emissions Analysis Platform \(LEAP\)](#) is a widely-used software tool for energy policy, climate change mitigation and air pollution abatement planning developed at the [Stockholm Environment Institute \(SEI\)](#). LEAP has been adopted by thousands of organizations in more than 190 countries worldwide. Its users include government agencies, academics, non-governmental organizations, consulting companies, and energy utilities, and it has been used at scales ranging from cities and states to national, regional and global applications.

Integrated Planning

LEAP is an integrated modeling tool that can be used to track energy consumption, production and resource extraction in all sectors of an economy. It can be used to account for both energy sector and non-energy sector greenhouse gas (GHG) emission sources and sinks. In addition to tracking GHGs, LEAP can also be used to analyze emissions of local and regional air pollutants, making it well-suited to studies of the climate co-benefits of local air pollution reduction.

Flexibility And Ease-Of Use

LEAP resources available: YouTube training videos



The Low Emissions Analysis Platform

LEAP Platform
1.35K subscribers

HOME VIDEOS PLAYLISTS COMMUNITY CHANNELS ABOUT

Follow-Along Training Videos ▶ PLAY ALL

Companion videos for LEAP's standard training exercises, available here:
<https://leap.sei.org/training>

Training Exercise #1 An Introduction to LEAP <small>(Follow-along Video)</small>	Training Exercise #2 Industry, Transport & Commercial <small>(Follow-along Video)</small>	Training Exercise #3 Transformation <small>(Follow-along Video)</small>	Training Exercise #4 Cost-Benefit Analysis <small>(Follow-along Video)</small>	Training Exercise #5 Non-Energy Sector <small>(Follow-along Video)</small>
1:23:09	58:09	24:35	52:46	30:24
Training Exercise #1: Introduction to LEAP LEAP Platform 21K views • 1 year ago	Training Exercise #2 on Industry, Transport and the... LEAP Platform 6.5K views • 1 year ago	Training Exercise #3: Transformation LEAP Platform 3.2K views • 1 year ago	Training Exercise #4: Cost- Benefit Analysis LEAP Platform 3.1K views • 1 year ago	Training Exercise #5: Non- Energy Sector Emissions LEAP Platform 2K views • 1 year ago

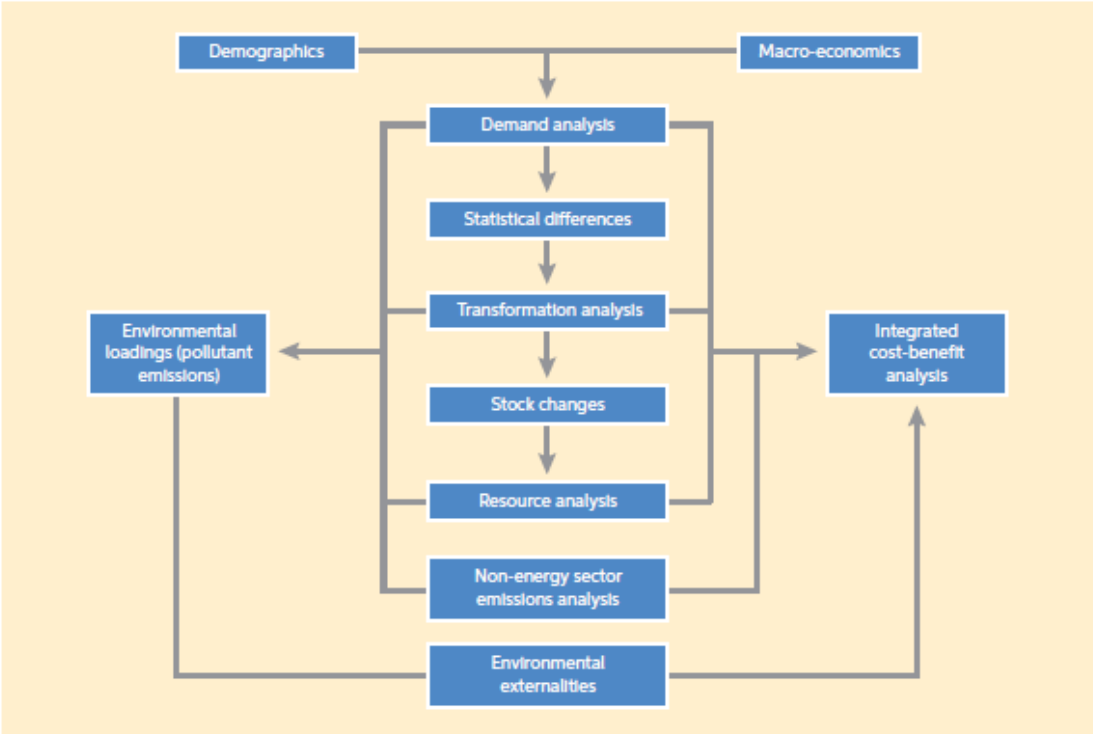


Introduction to LEAP

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:

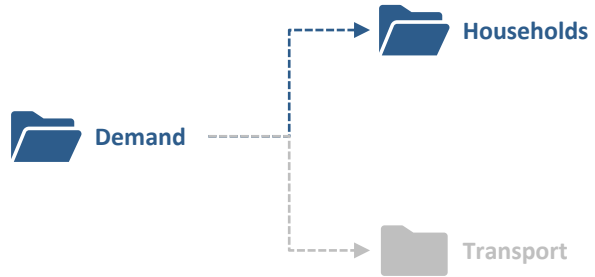
- It is a model that is **familiar to key stakeholders around the world** and has been used for previous modelling exercises, so will allow for greater comparability with previous GHG scenarios.
- The **LEAP model has been used for NDCs and LTSs**
- The model **is relatively simple to use**.
- The **model 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

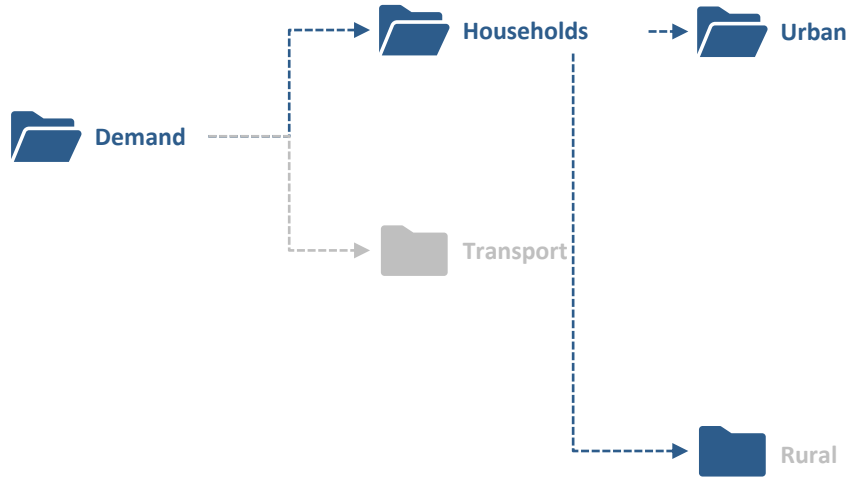


Source: <https://leap.sei.org/default.asp?action=Introduction>;

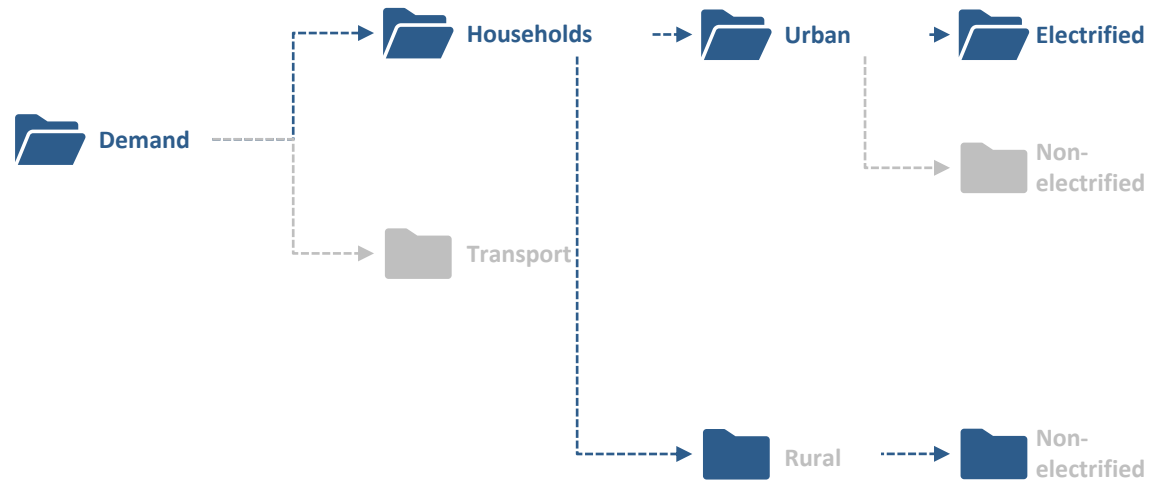
Basic structure of LEAP model: The Tree and its branches



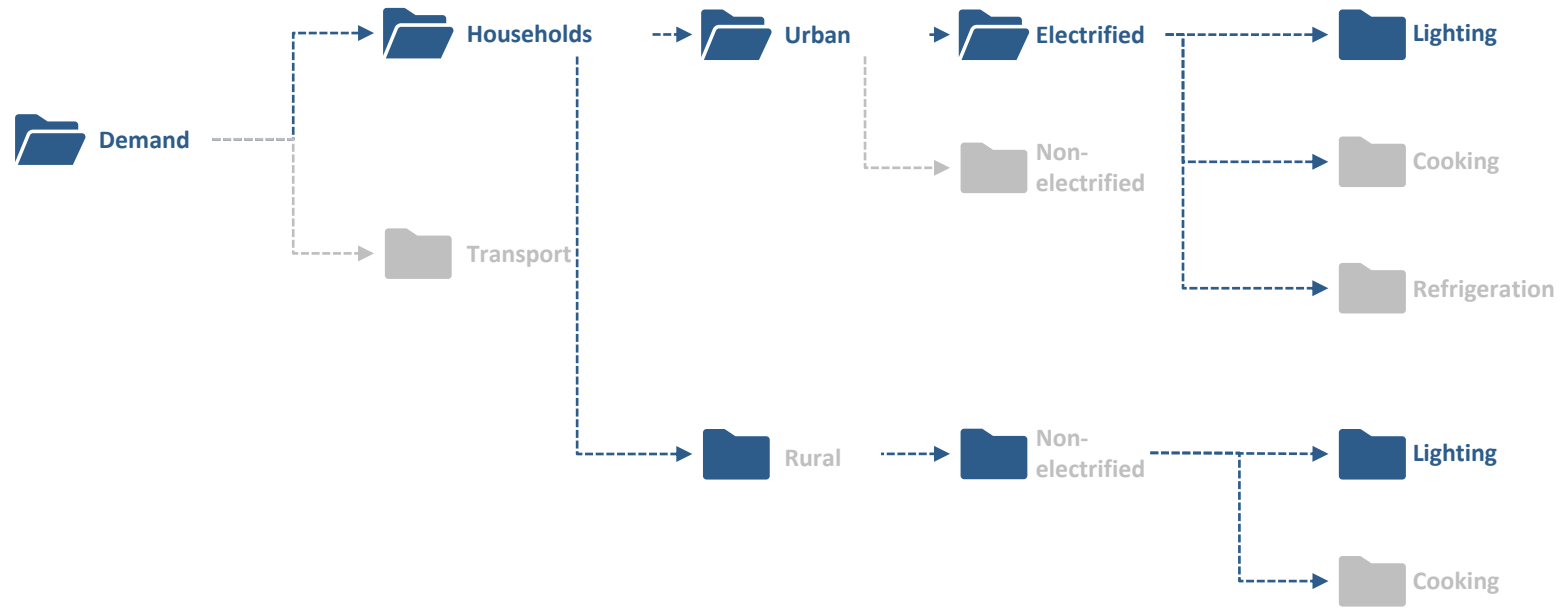
Basic structure of LEAP model: The Tree and its branches



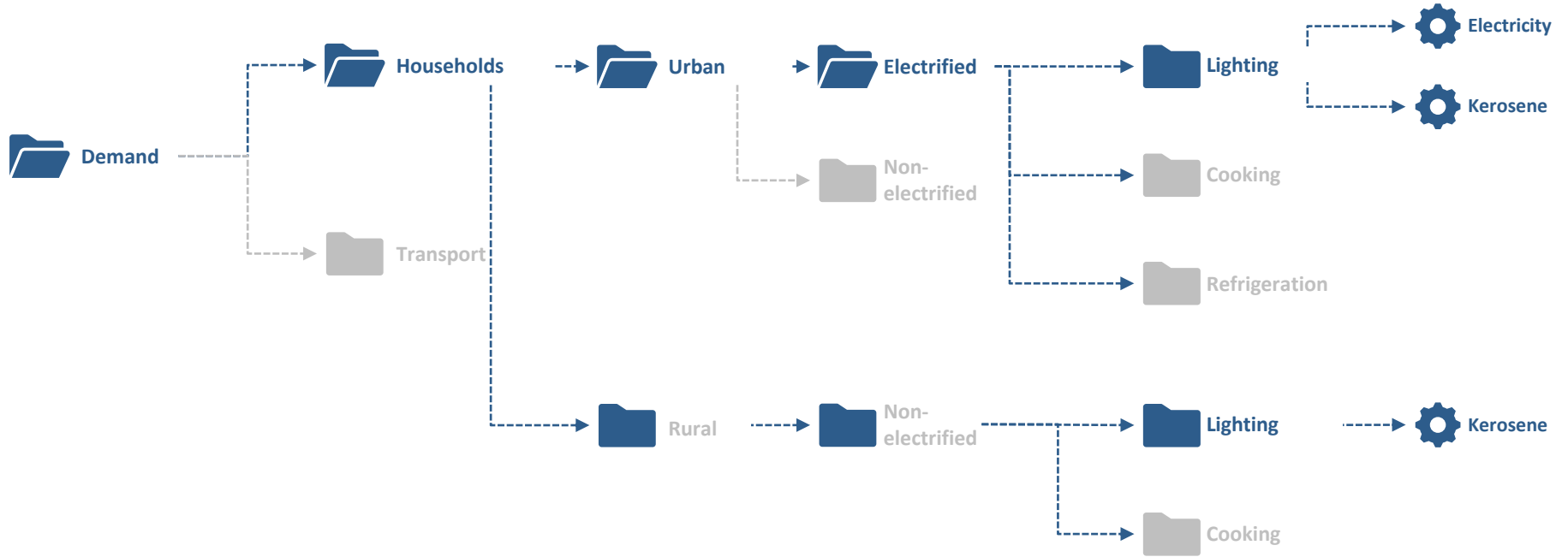
Basic structure of LEAP model: The Tree and its branches



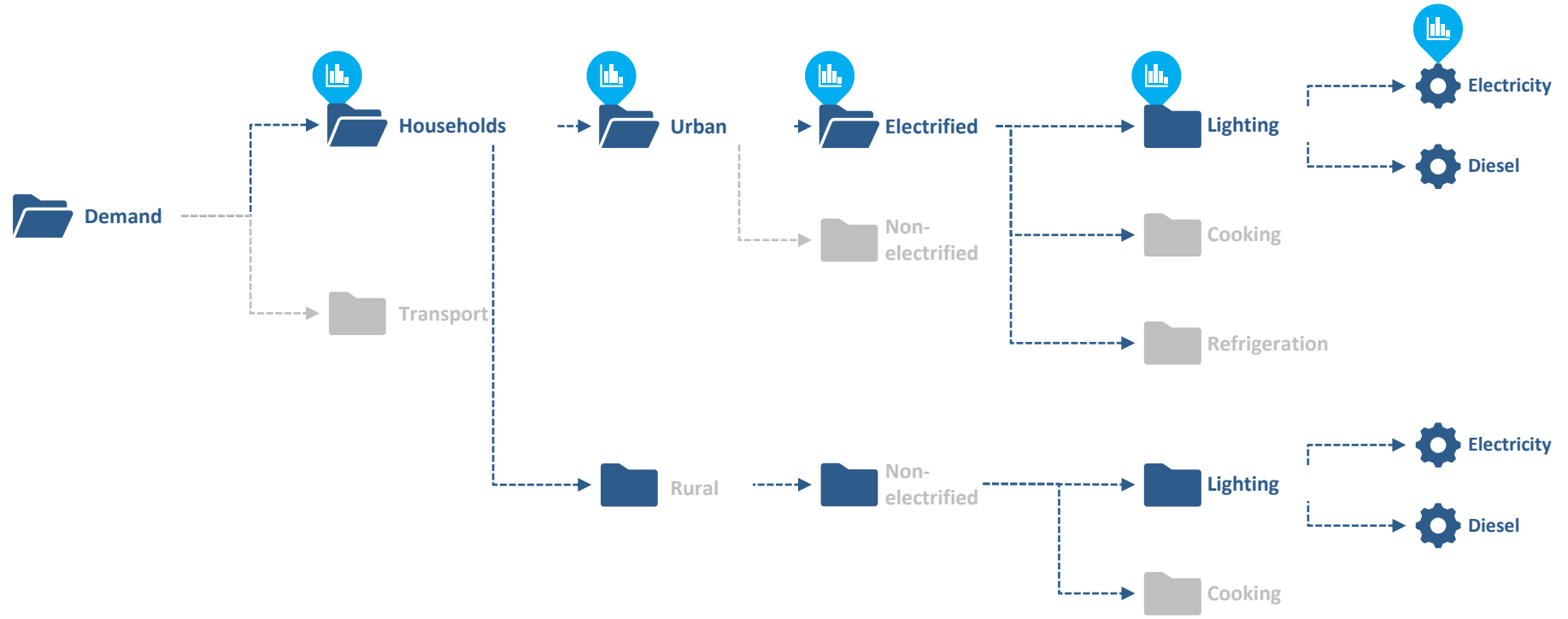
Basic structure of LEAP model: The Tree and its branches



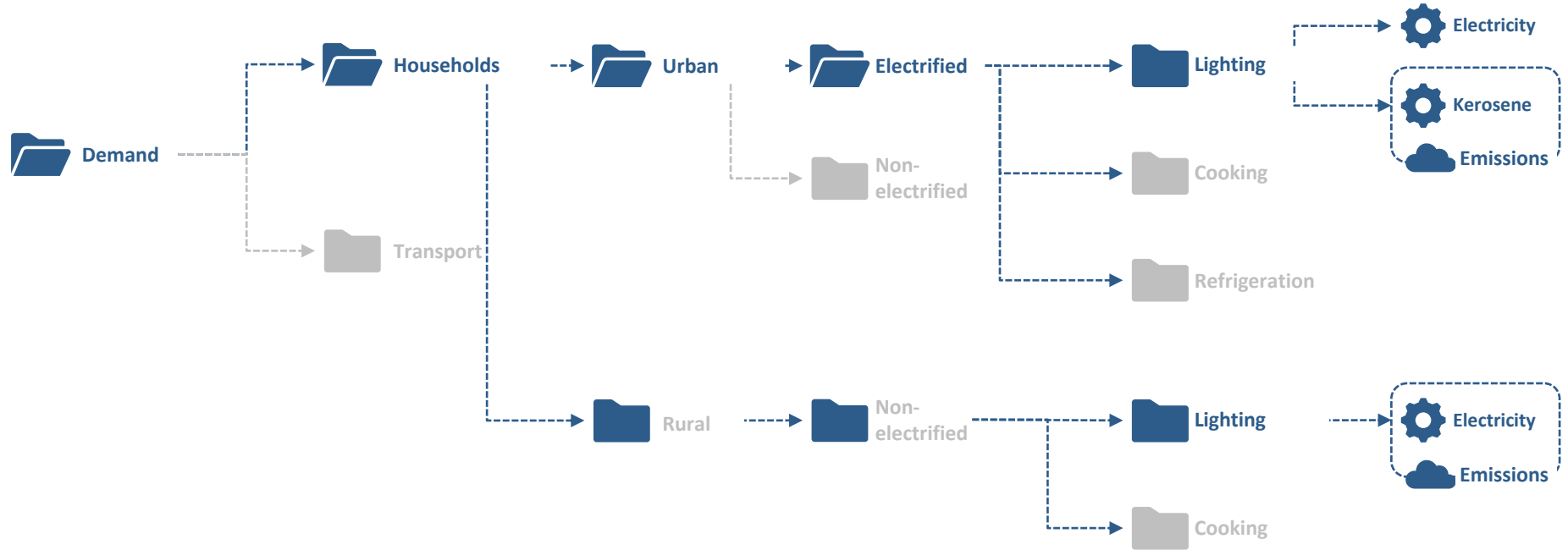
Basic structure of LEAP model: The Tree and its branches



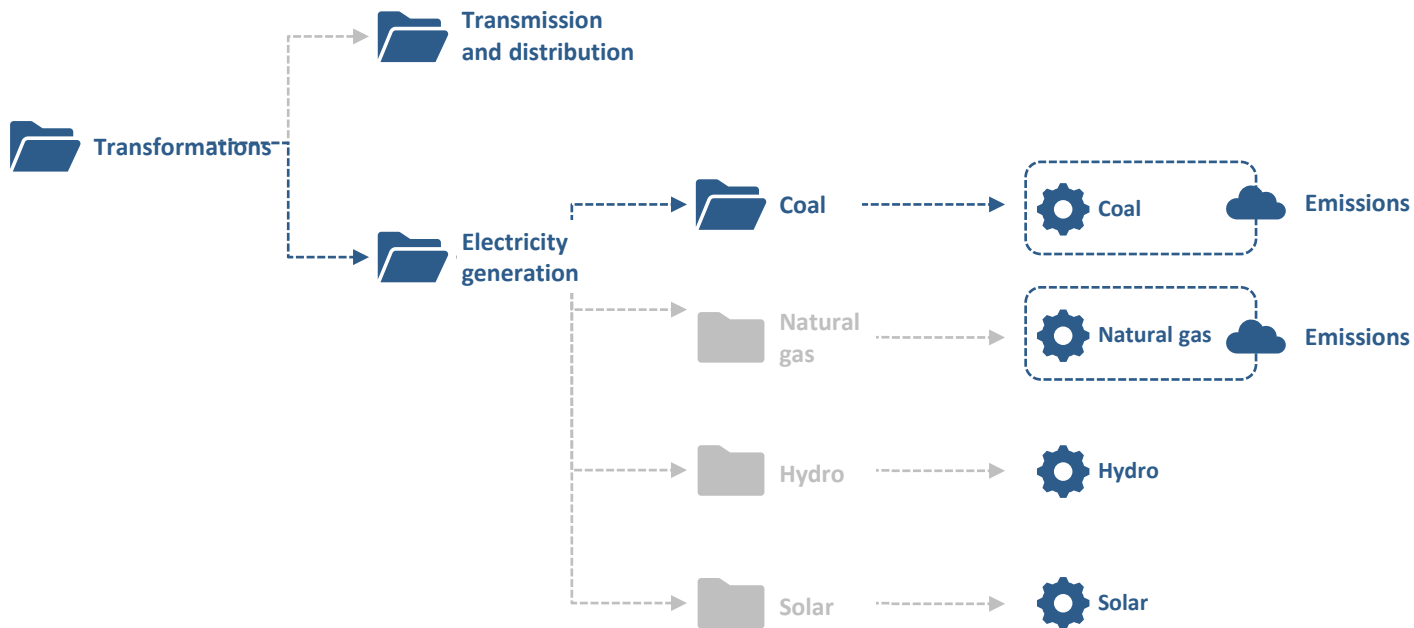
Basic structure of LEAP model: The Tree and its branches



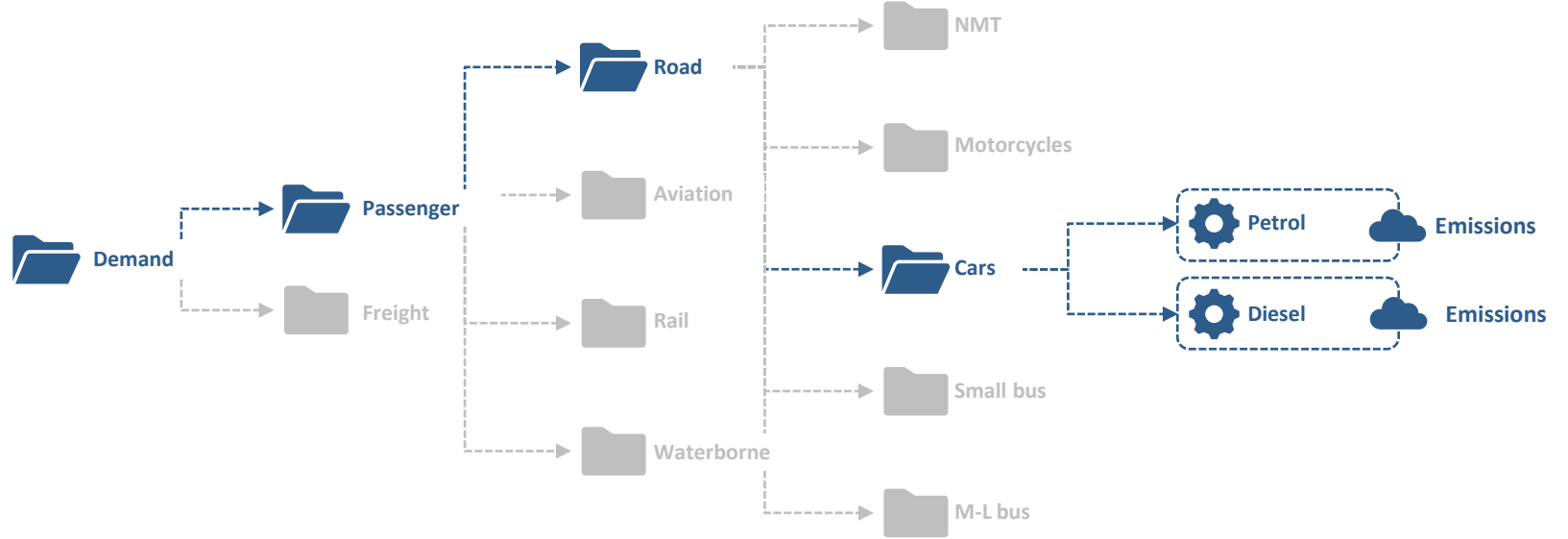
Basic structure of LEAP model: The Tree and its branches



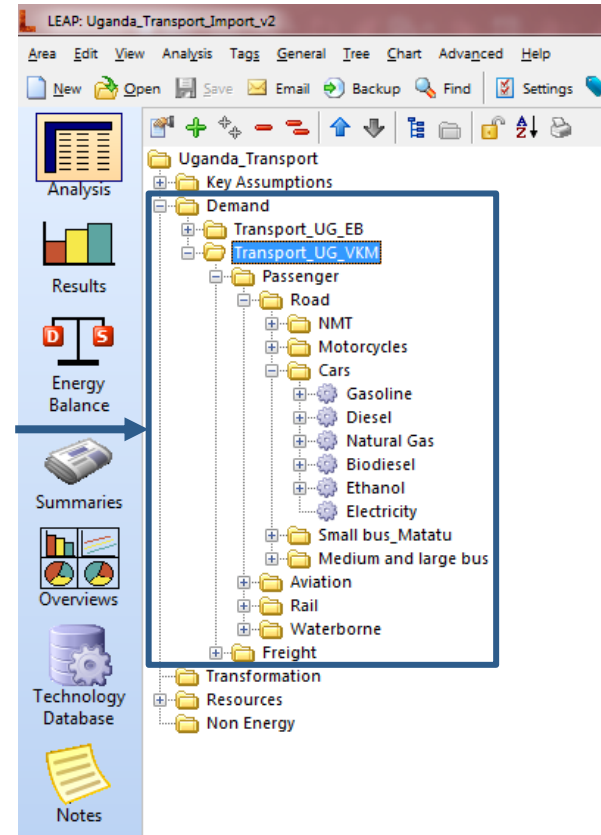
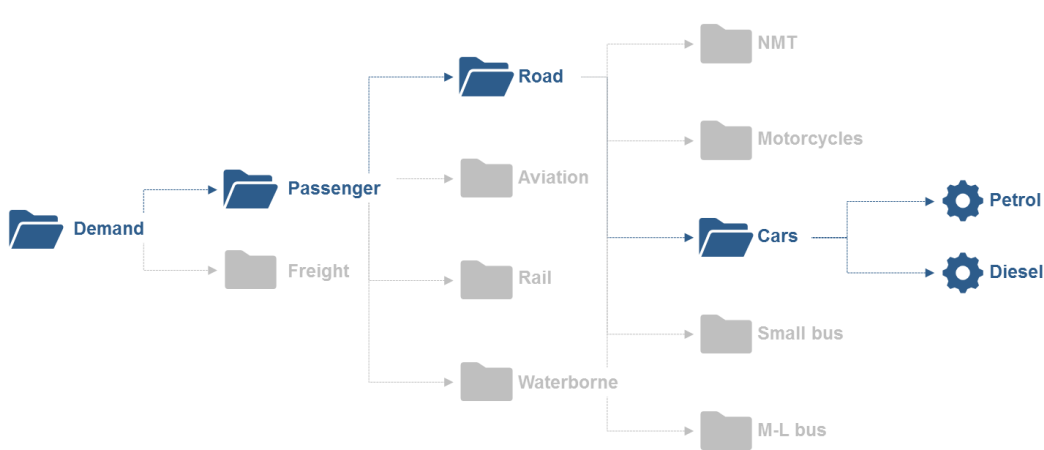
Basic structure of LEAP model: The Tree and its branches



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

The screenshot shows the 'Settings' dialog box with the 'Years' tab selected. The dialog has a title bar with a close button and a 'Settings' label. Below the title bar are several tabs: 'Scope & Scale', 'Years', 'Costs', 'Calculations', 'Optimization', 'Internet', 'Folders', and 'Scripts'. The 'Years' tab contains the following settings:

- Base Year: 2010 (First calculated year)
- First Scenario Year: 2011 (First year in which scenario expressions used)
- End Year: 2040 (Last calculated year)
- Results Every: 1 years
- Monetary Year: 2010 (Year to which all costs are discounted)
- First Depletion Year: 2010 (First year in which reserves are depleted)

There is a checked checkbox for 'Count Costs to End Year' and a sub-section containing:

- Last Year to Count Costs: 2030 (costs after this year will be ignored)

At the bottom right, there are two buttons: 'Close' (with a green checkmark) and 'Help' (with a question mark).



LEAP: Settings input

Settings input

Settings

Scope & Scale | **Years** | Costs | Calculations | Optimization | Internet | Folders | Scripts

Base Year: 2003 (First calculated year)

First Scenario Year: 2020 (First year in which scenario expressions used)

End Year: 2050 (Last calculated year)

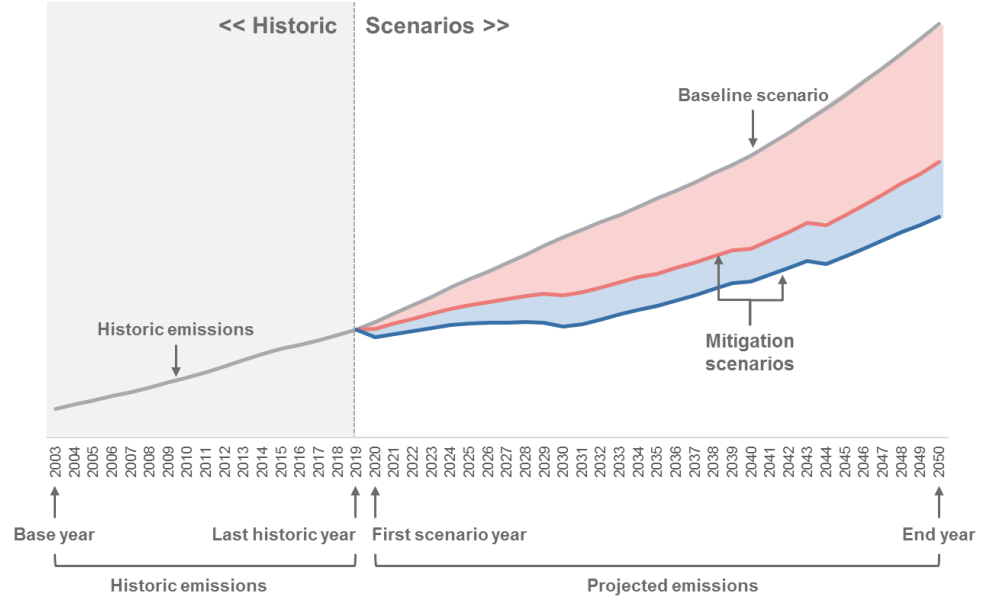
Results Every: 1 years

Monetary Year: 2010 (Year to which all costs are discounted)

First Depletion Year: 2010 (First year in which reserves are depleted)

Count Costs to End Year

Last Year to Count Costs: 2030 (costs after this year will be ignored)



Interface: Overview

The screenshot displays the LEAP software interface for the 'Uganda_Test' project. The interface is organized into several key sections:

- Menu and Toolbar:** Located at the top, including options like 'Area', 'Edit', 'View', 'Analysis', 'Tags', 'General', 'Tree', 'Chart', 'Advanced', and 'Help'. A secondary toolbar contains icons for 'New', 'Open', 'Save', 'Email', 'Backup', 'Find', 'Settings', 'Tags', 'Scenarios', 'Fuels', 'Effects', 'Units', and 'What's This?'.
- Left Sidebar:** A vertical navigation pane with icons for 'Analysis', 'Results', 'Energy Balance', 'Summaries', 'Overviews', 'Technology Database', and 'Notes'.
- Tree View:** A hierarchical tree structure on the left showing the model's components: 'Uganda_Test' (parent), 'Key Assumptions', 'Demand', 'Passenger', 'Road', 'Car_Energy Intensity', 'Gasoline', 'Car_Total energy', 'Transformation', 'Resources', and 'Non Energy'.
- Table View:** A table titled 'Activity Level' with columns for 'Branch', 'Expression', 'Scale', and 'Units'. It lists 'Passenger' with an expression of 0 and 'Road' with an expression of 100.
- Chart View:** A chart titled 'Road: Activity Level (% Share)' showing a single red bar representing 100% for the year 2010. The y-axis is labeled '% Share' and ranges from 0 to 100. The x-axis is labeled 'Road'.
- Bottom Status Bar:** Displays the version '2020.1.0.59 (64-Bit)', the current area 'Area: Uganda_Test', the analysis status 'Analysis', and registration information: 'Registered to: "nadja.taeger@giz.de" until September 30, 2022'.

Interface: Analysis

Branches

- Uganda_Test
 - Key Assumptions
 - Demand
 - Passenger
 - Road
 - Car_Energy intensity
 - Gasoline
 - Car_Total energy
 - Transformation
 - Resources
 - Non Energy

Variables

Activity Level

Activity Level: A measure of the social or economic activity for which energy is consumed. [Default="0"]

Branch	Expression	Scale	Units
Passenger	0	Percent	Share
Road	100	Percent	Share

Expressions

Chart Table Builder Notes Elaboration Help

Show: Activity Level

Road: Activity Level (% Share)

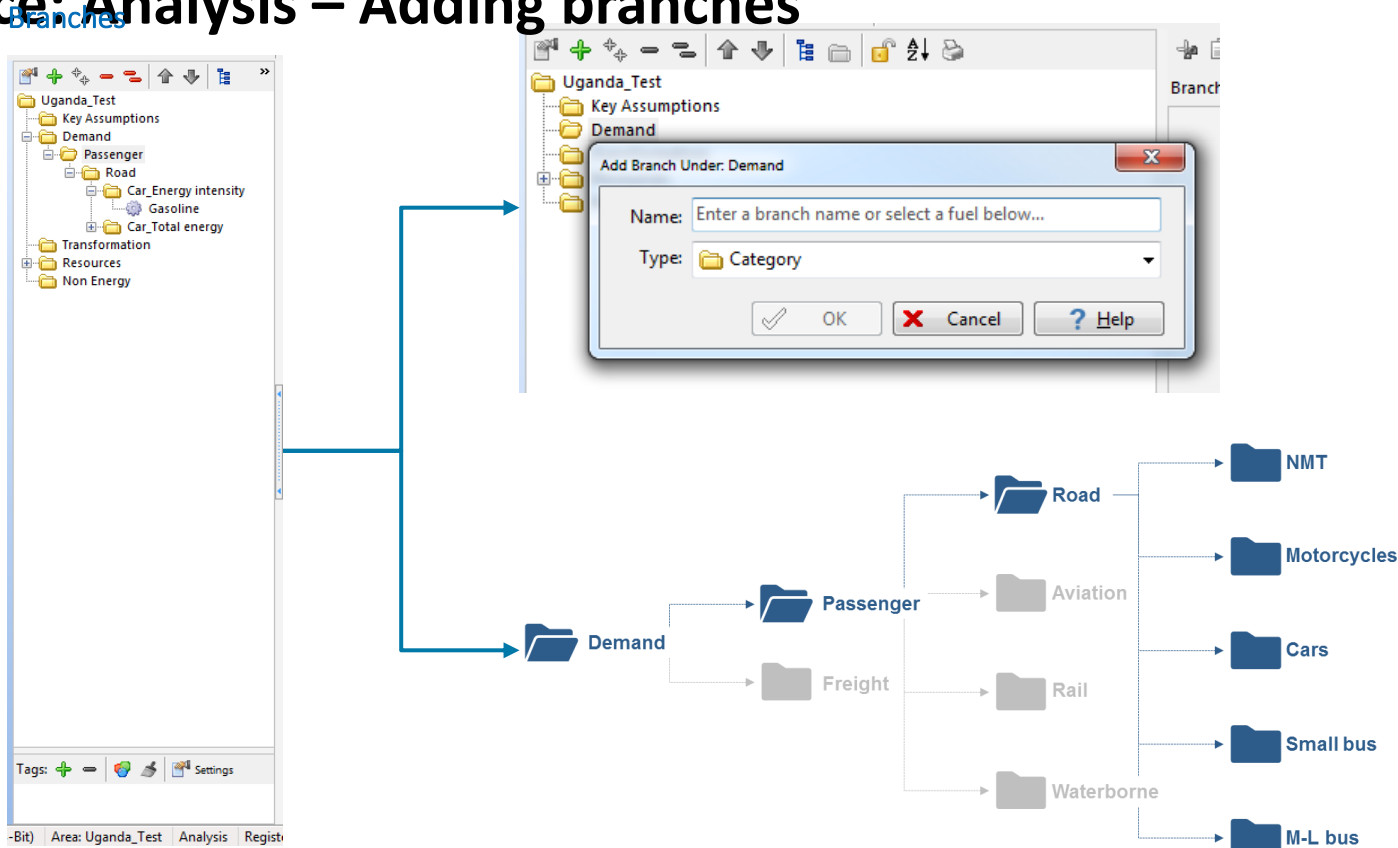
Year	Road: Activity Level (% Share)
2010	100

Information

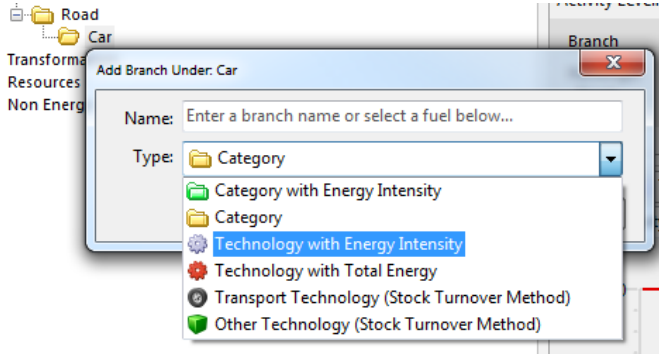
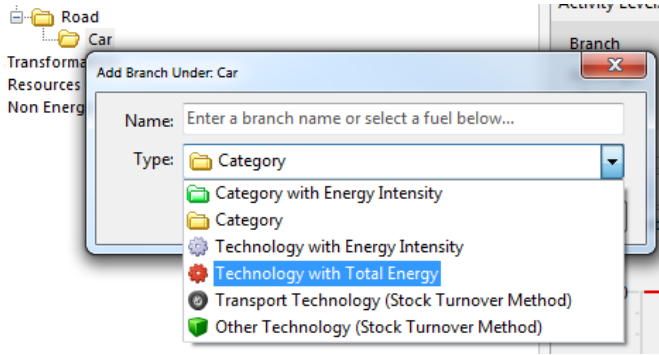
Tags: + - Settings

-Bit | Area: Uganda_Test | Analysis | Registered to: "nadj.taeger@giz.de" until September 30, 2022

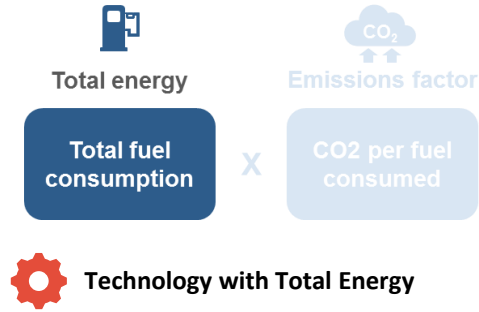
Interface: Analysis – Adding branches



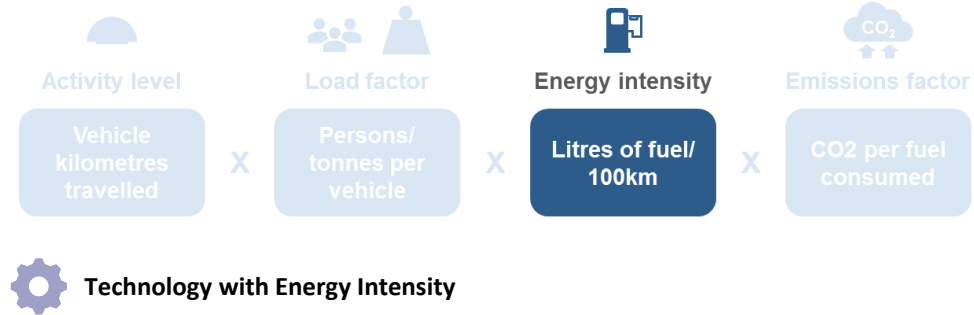
Interface: Analysis – Variables



Top-down methodology



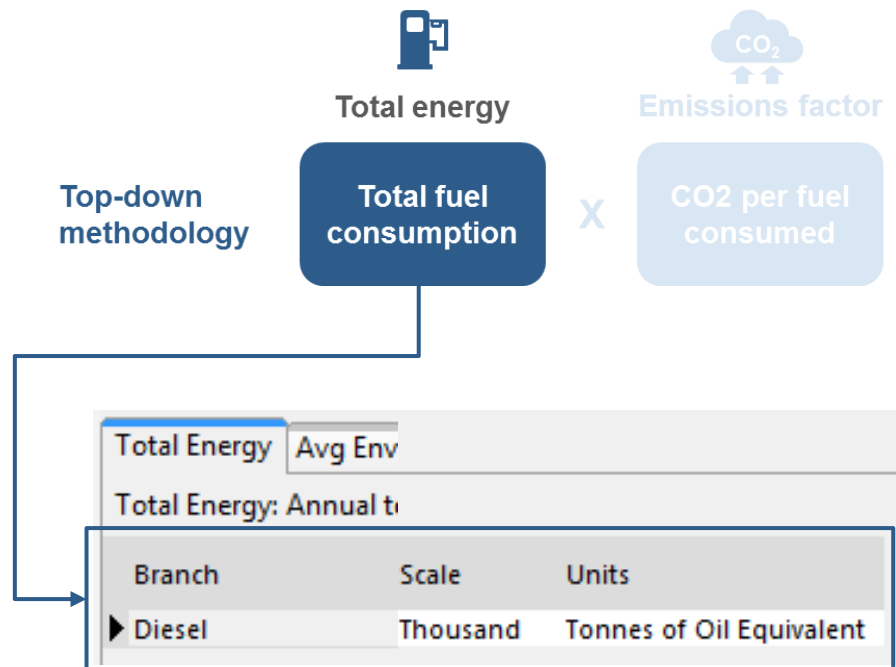
Bottom-up methodology



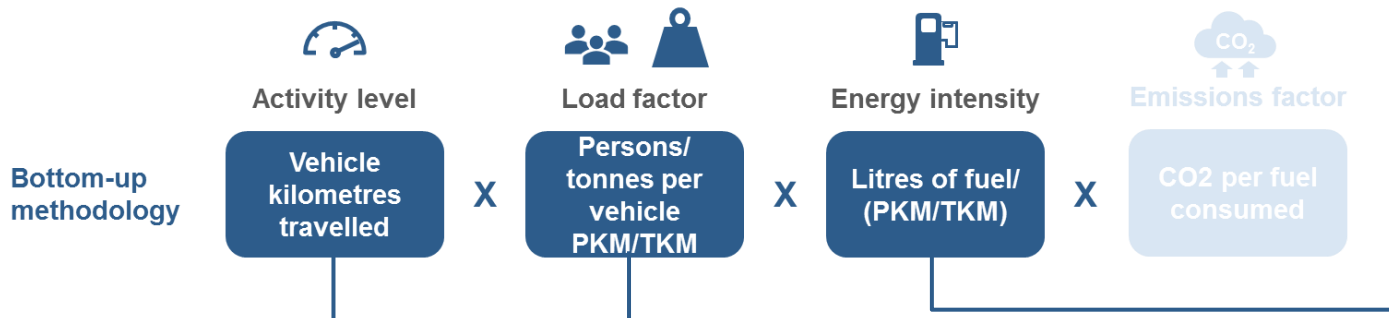
Top-down methodology: Variables

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

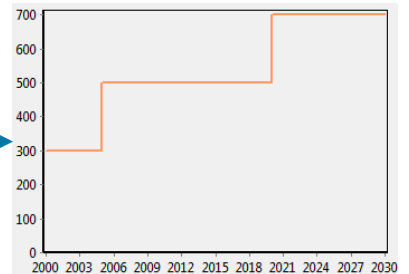
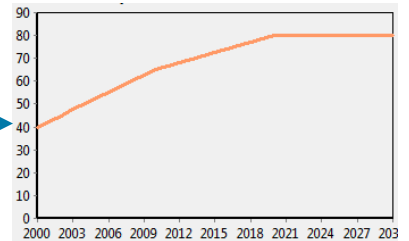
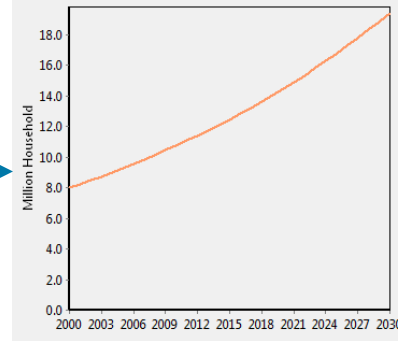
Activity Level		Final Energy Intensity	
Activity Level: A measure of the social or economic			
Branch	2019 Value	Expression	
Transport_UG_VKM			
Passenger			
Road			

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

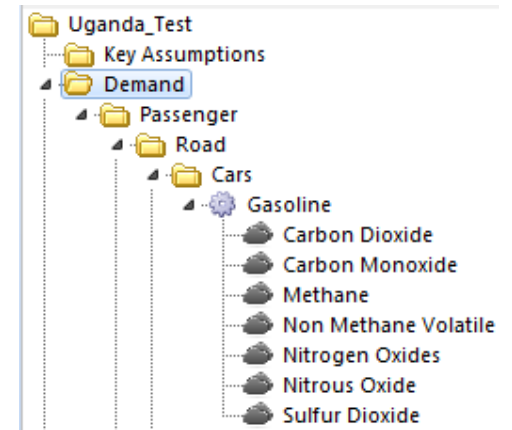
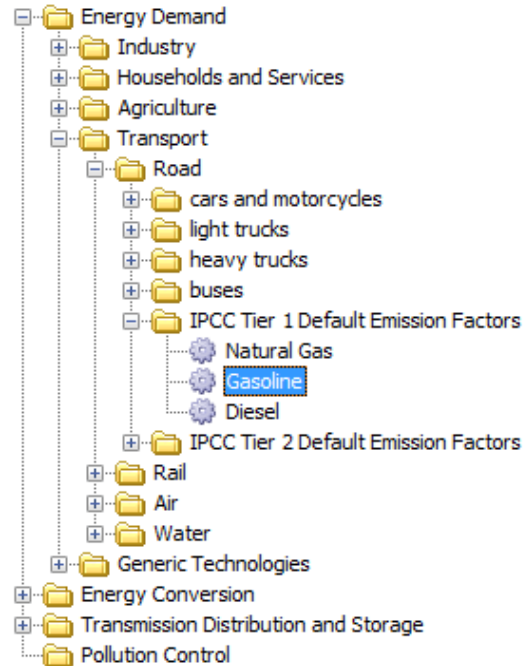
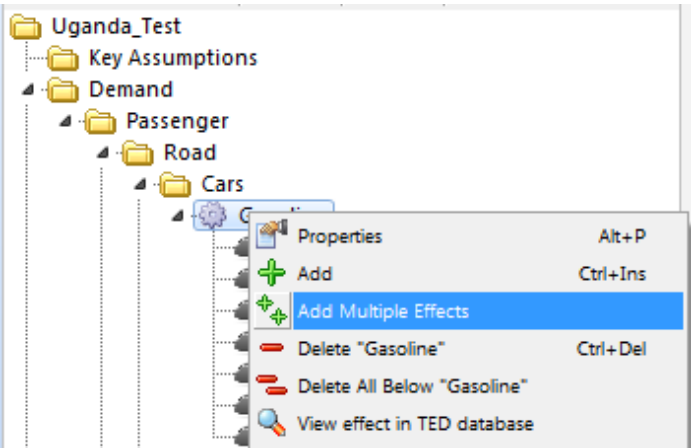
Activity Level		Final Energy Intensity	
Final Energy Intensity: Annual final co			
Branch	Fuel	Units	Per
Gasoline	Gasoline	Liter	per Passenger-km
Diesel	Diesel	Liter	per Passenger-km

Interface: Expressions

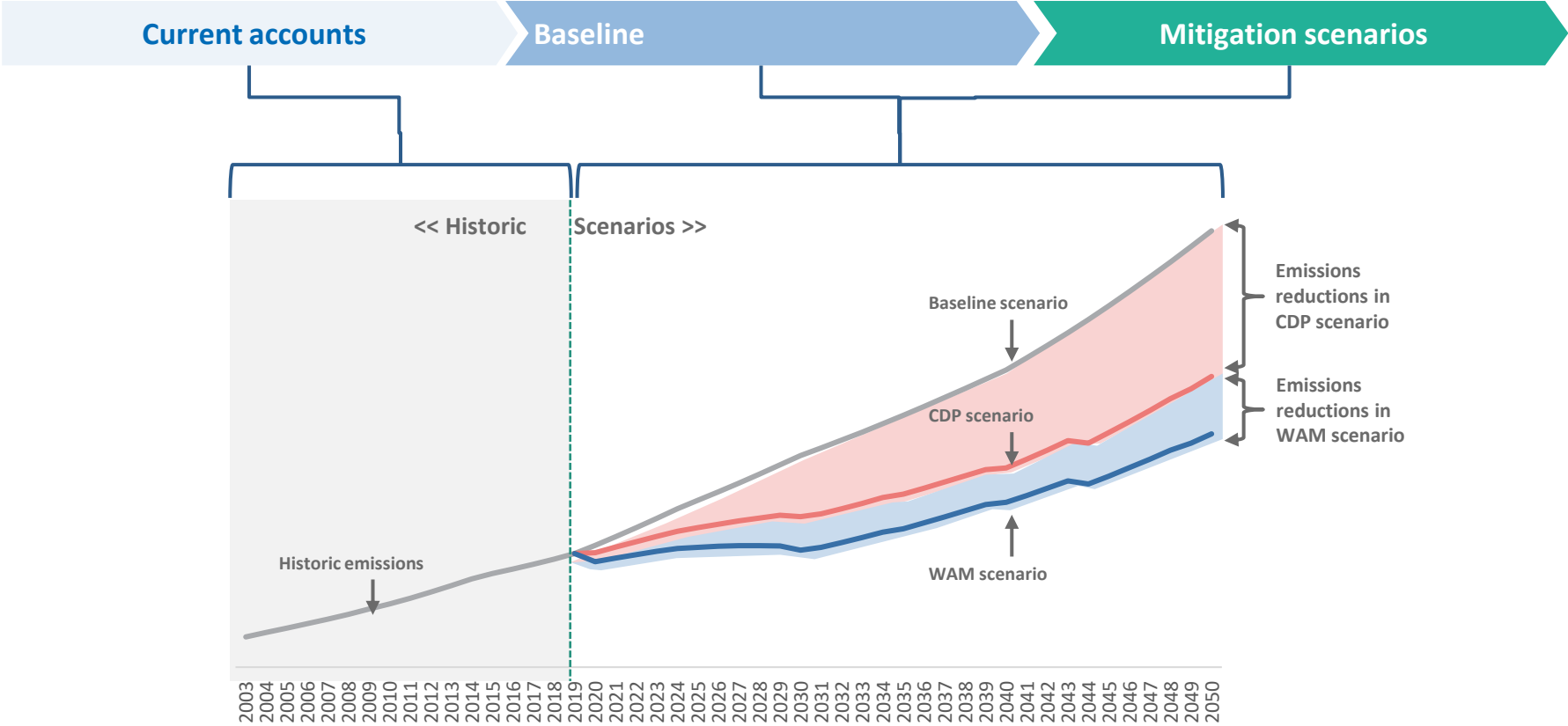
Type	Syntax	Example Syntax and Graph
Simple Number	Value	3.1415
Simple Formula	Value (operator (+ - / *)) value	0.1 * 5970
Growth Rate	Growth(annual % growth)	Growth(3.2%)
Interpolation	Interp(Year, value, year, value)	Interp(2000, 40, 2010, 65, 2020, 80)
Step	Step(Year, value, year, value)	Step(2000, 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



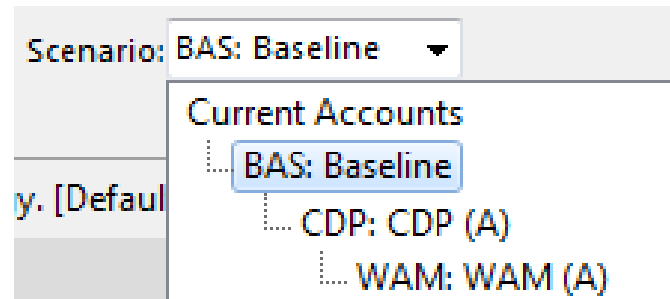
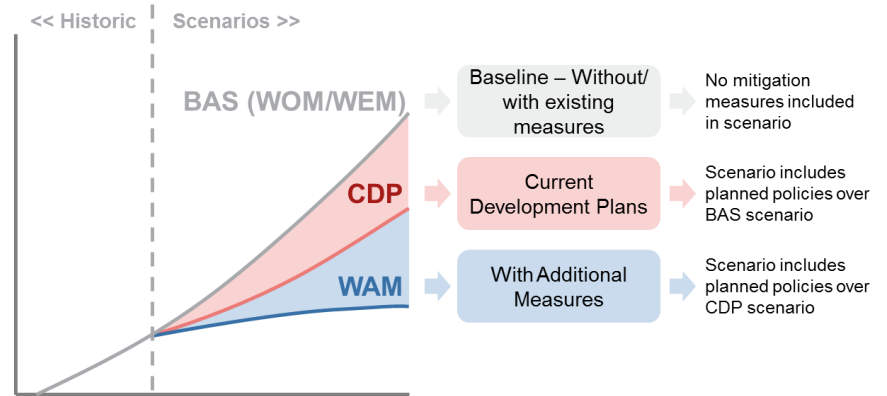
Interface: Scenarios



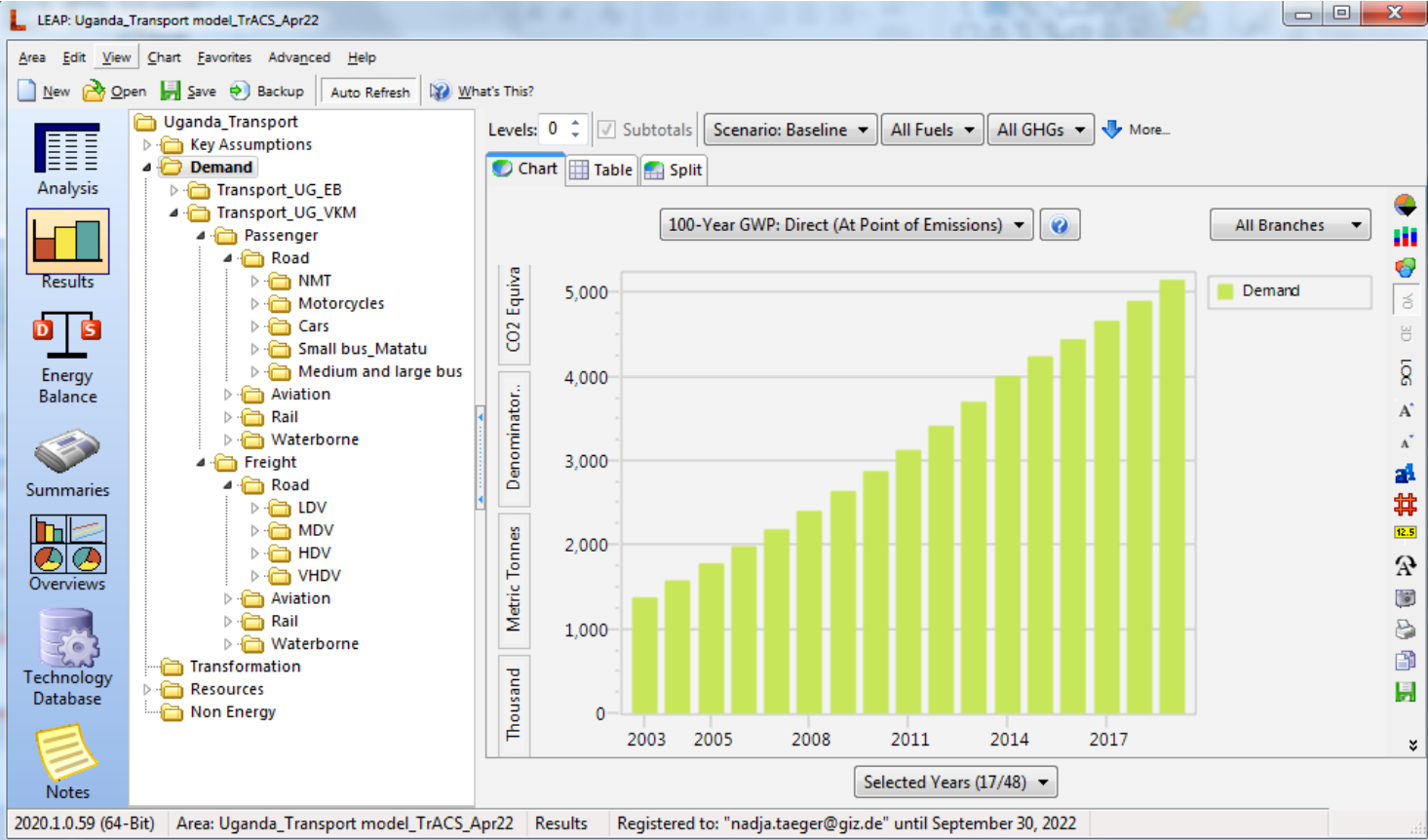
Scenario inheritance

Within LEAP, each scenario “inherits” the conditions of the previous scenario.

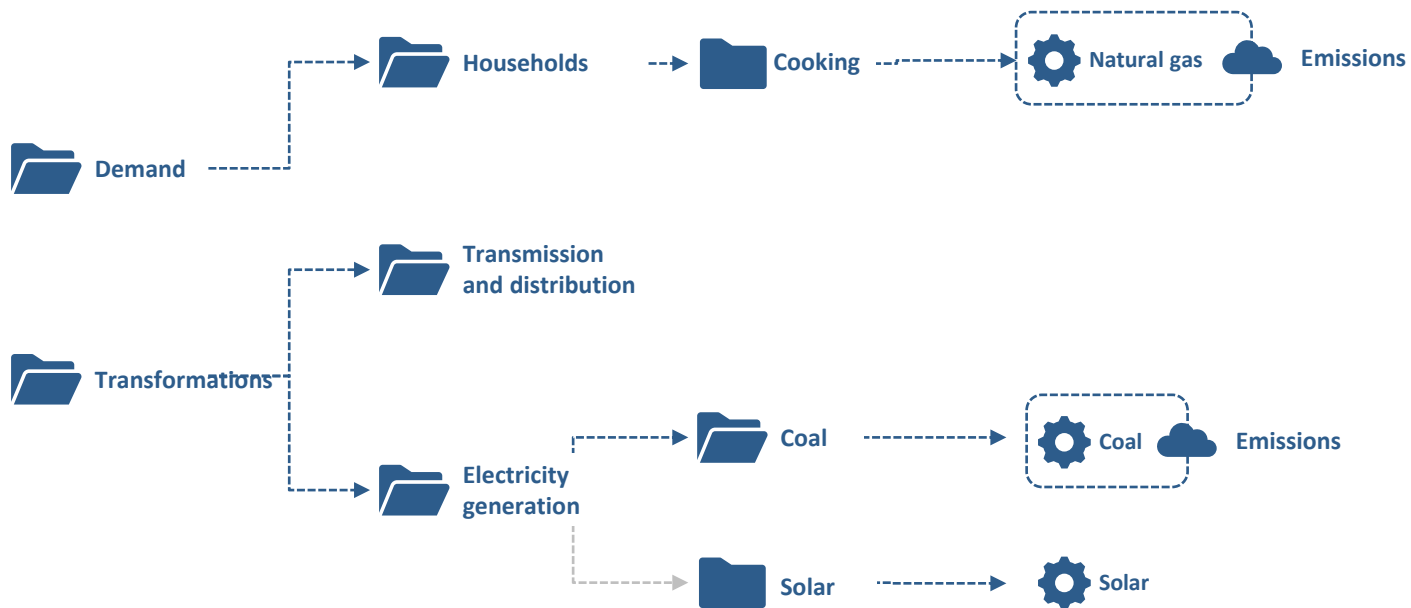
- **Baseline scenario: BAS:** The baseline scenario forms the foundation of the model. In this case the BAS is identical to both a without measures and a with existing measures scenario as it is considered that no mitigation measures are currently implemented.
 - **Current development plans: CDP = BAS (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



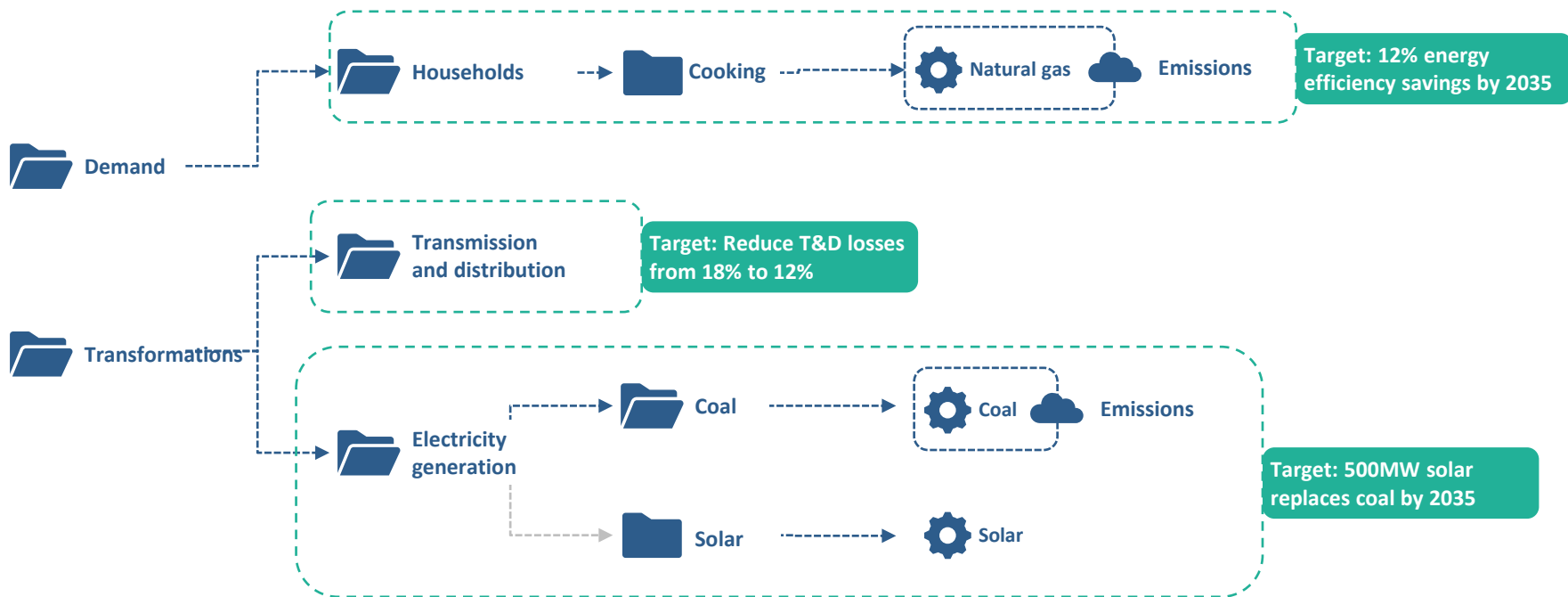
Interface: Results



Basic structure of LEAP model: The Tree and its branches



Basic structure of LEAP model: The Tree and its branches



LEAP exercise: Part 1: Settings

- Create new LEAP area
 - Name this area

1. Settings

1. Base year: **2020**
2. First scenario year: **2021**
3. End year: **2035**

LEAP exercise: Part 2: Current accounts – Demand

Current accounts

Baseline

Mitigation scenarios

- Current accounts
 - Demand
 - **Cat**: Households: **8 million**
 - **Cat**: Cooking: **100% share**
 - **Tech**: Natural gas: **100% share**
 - Energy intensity: **400 kWh**
 - **Effects**: **IPCC Tier 1 Natural Gas Residential**

LEAP exercise: Part 3: Current accounts – Transformation

Current accounts

Baseline

Mitigation scenarios

- Transformation
 - **Cat:** Transmission and distribution
 - **Simple non dispatched model**
 - **Losses**
 - Processes:
 - **Tech: Electricity**
 - Feedstock fuels: **Electricity**
 - T&D losses: **18%**

LEAP exercise: Part 4: Current accounts – Electricity generation

Current accounts

Baseline

Mitigation scenarios

- **Cat:** Electricity generation (w/ capacities)
 - Output fuels: Electricity
 - Processes:
 - **Tech:** Existing coal
 - Feedstock fuel: Coal bituminous
 - Dispatch rule: FullCapacity
 - Exogenous Capacity (MW): 1000
 - Efficiency (%): 30
 - Maximum availability (%): 70
 - Historical production (GWh): 6132 GWh
 - **Effects:** Coal Tier 1 Default

View results

LEAP exercise: Part 5: Baseline – Electricity generation

Current accounts

Baseline

Mitigation scenarios

- **Create Scenario - BAS: Baseline**

- Demand

- Households: 8 million = **Growth(3%)**

- Cooking: **100%**

- Natural gas: **100%**

- Energy intensity: 400 kWh – **Interp(2035,450)**

- Effects: **IPCC Tier 1 Natural Gas Residential**

LEAP exercise: Part 6: Baseline – Electricity generation

Current accounts

Baseline

Mitigation scenarios

- Transformation
 - Transmission and distribution
 - Processes:
 - **Electricity**
 - Feedstock fuels: Electricity
 - T&D losses: **18%** = **Interp(2035,16%)**

LEAP exercise: Part 7: Baseline – Electricity generation

Current accounts

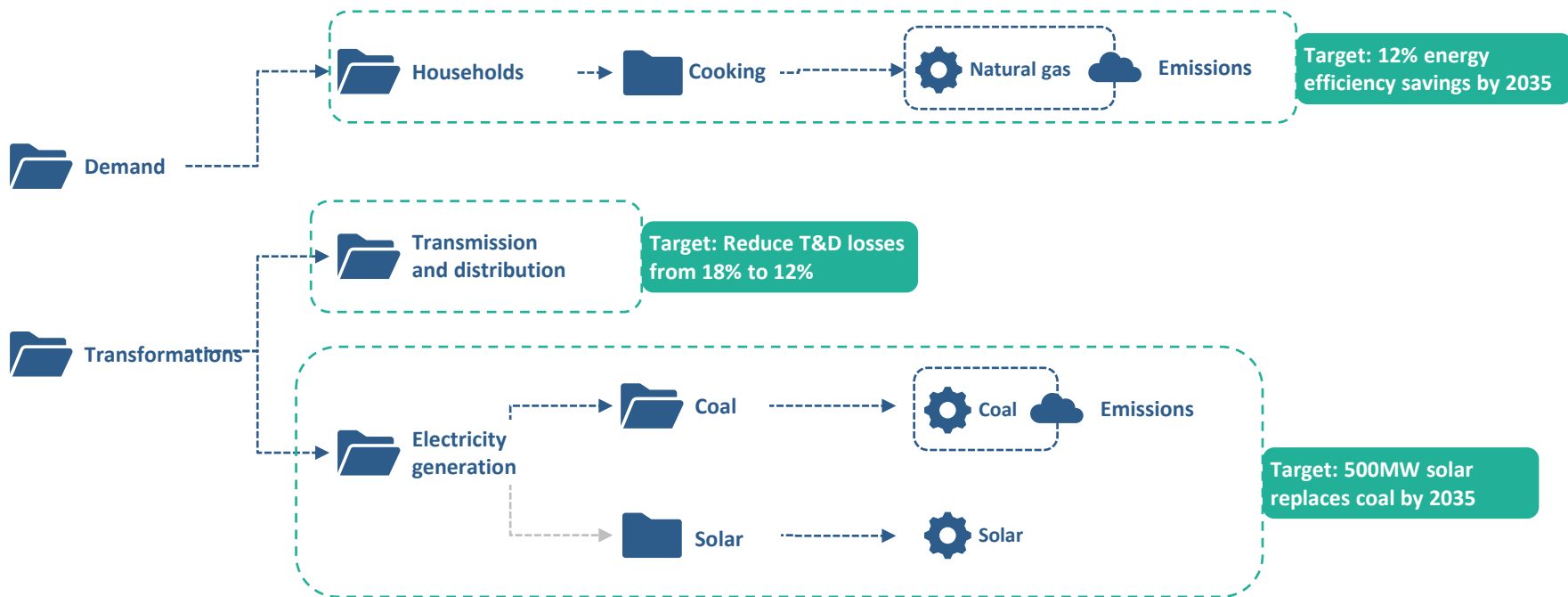
Baseline

Mitigation scenarios

- Electricity generation
 - Output fuels:
 - **Electricity**
 - Processes:
 - **Existing coal**
 - Dispatch rule: **FullCapacity**
 - Exogenous Capacity (MW): **1000 = Step(2030,1250)**
 - **2020 (BY) = 1000 : 2025 = 1000 : 2030 = 1250 : 2035 = 1250**
 - Efficiency (%): **30**
 - Maximum availability (%): **70**
 - Historical production (GWh): **6132**
 - Feedstock fuel: **Coal bituminous**
 - Effects: **Coal Tier 1 Default**

View results

Basic structure of LEAP model: The Tree and its branches



LEAP exercise: Part 5: Baseline – Electricity generation

Current accounts

Baseline

Mitigation scenarios

- Demand
 - Households: 8 million = **Growth(3%)**
 - Cooking: **100%**
 - Natural gas: **100%**
 - Energy intensity: **Interp(2035,450) –**
 - **Interp(2035, BaseYearValue * 0.8)**
 - Effects: **IPCC Tier 1 Natural Gas Residential**

LEAP exercise: Part 5: Baseline – Electricity generation

Current accounts

Baseline

Mitigation scenarios

- Transformation
 - Transmission and distribution
 - Processes:
 - **Electricity**
 - Feedstock fuels: Electricity
 - T&D losses: **18%** = **Interp(2035,12%)**

LEAP exercise: Part 5: Baseline – Electricity generation

Current accounts

Baseline

Mitigation scenarios

- Electricity generation
 - Output fuels: **Electricity**
 - Processes: **Existing coal**
 - Exogenous Capacity (MW): **Step(2030,750,2035,500)**
 - **2020 (BY) = 1000 : 2025 = 1000 : 2030 = 750 : 2035 = 500**
 - Efficiency (%): **30**
 - Maximum availability (%): **70**
 - Historical production (GWh): **3500**
 - Feedstock fuel: **Coal bituminous**
 - Effects: **Coal Tier 1 Default**
- **New solar**
 - Exogenous Capacity (MW): **1000 = Step(2030,250,2035,500)**
 - **2020 (BY) = 0**
 - **2025 = 0**
 - **2030 = 250**
 - **2035 = 500**
 - Efficiency (%): **100**
 - Maximum availability (%): **20**
 - Historical production (GWh): **NA**
 - Feedstock fuel: **Solar**
 - Effects: **NA**

View results