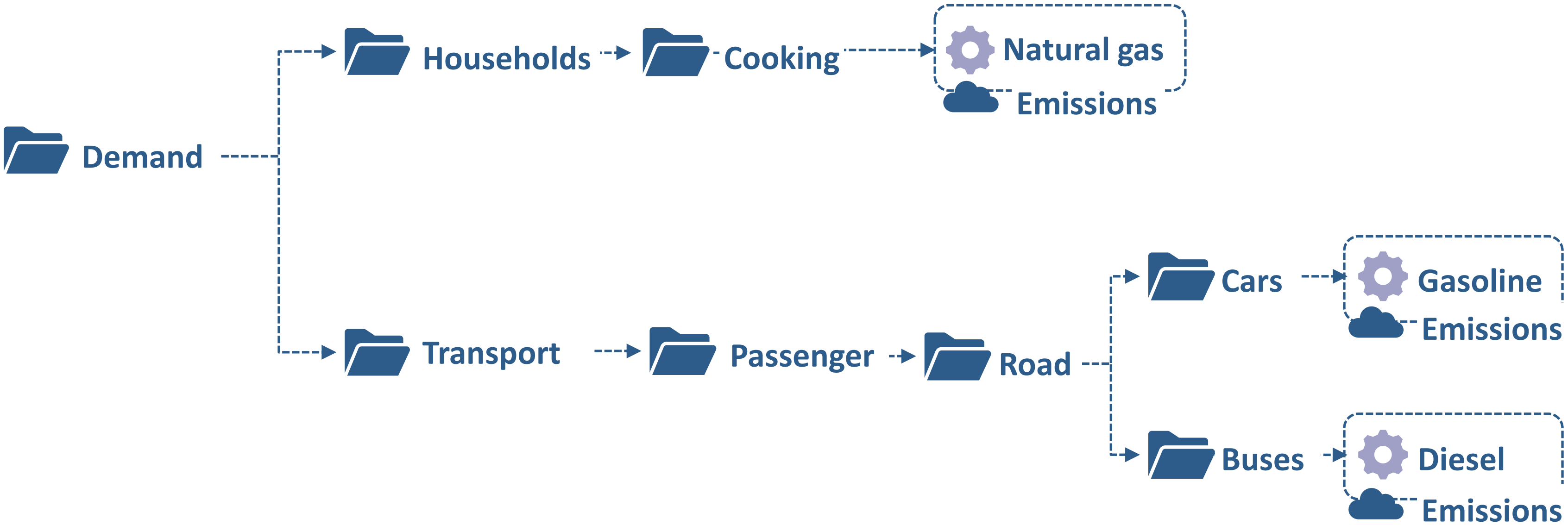
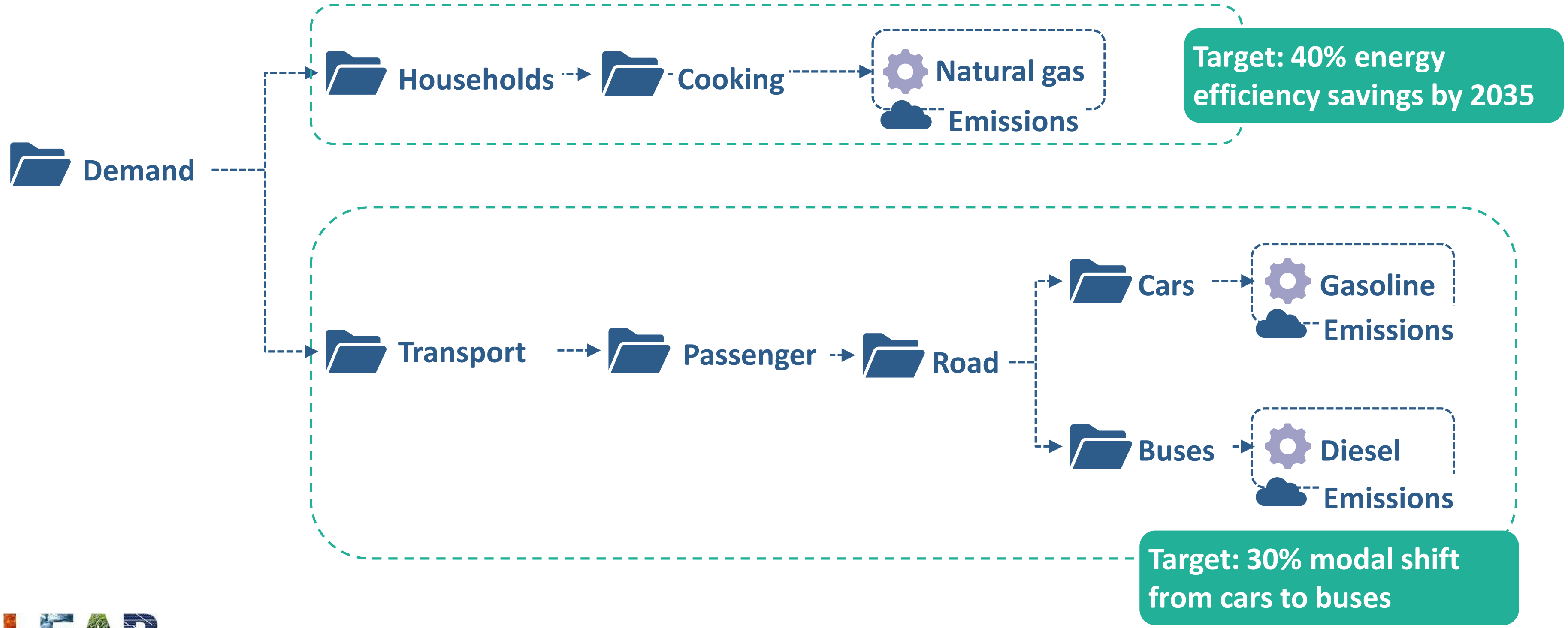
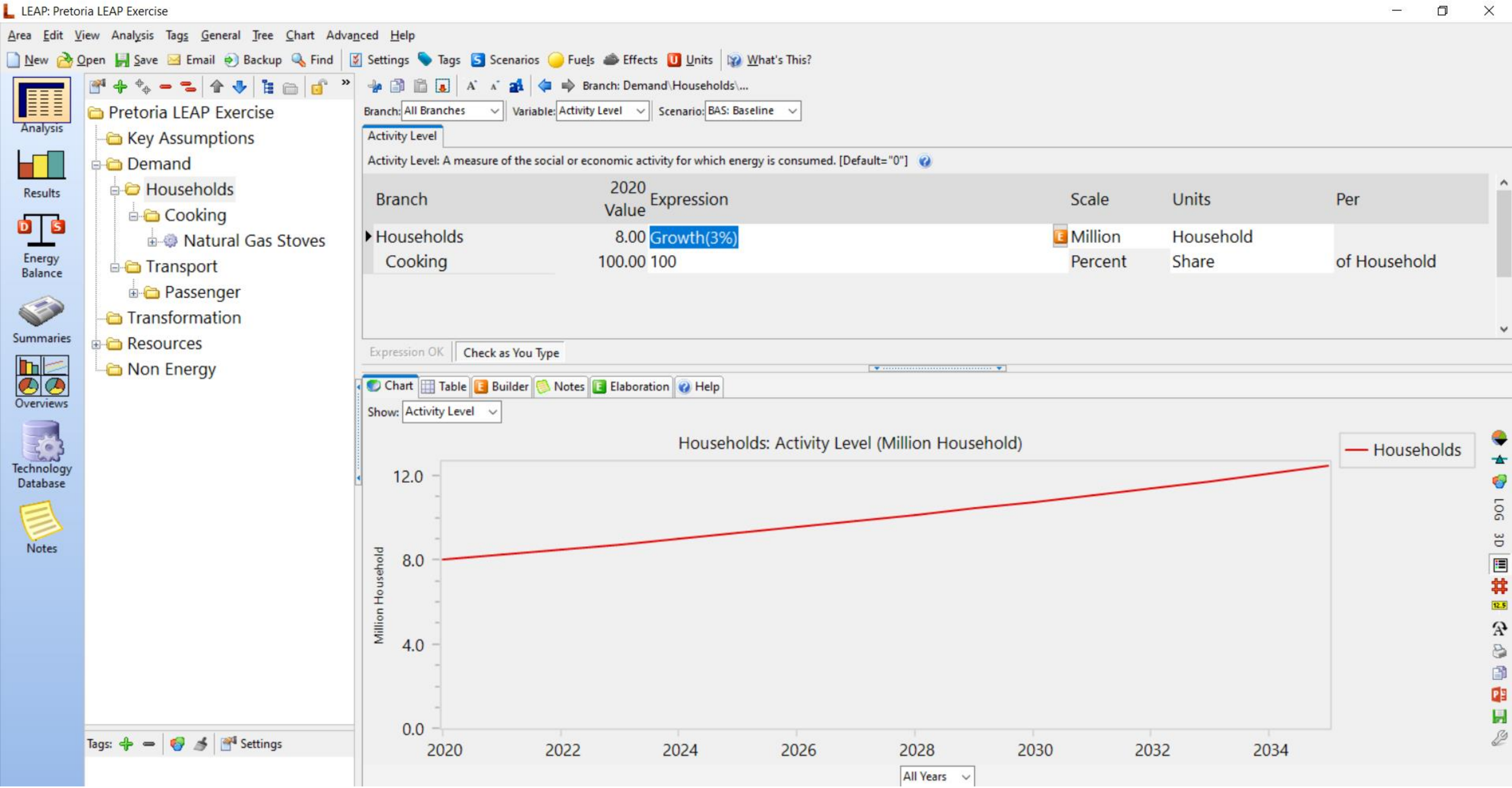
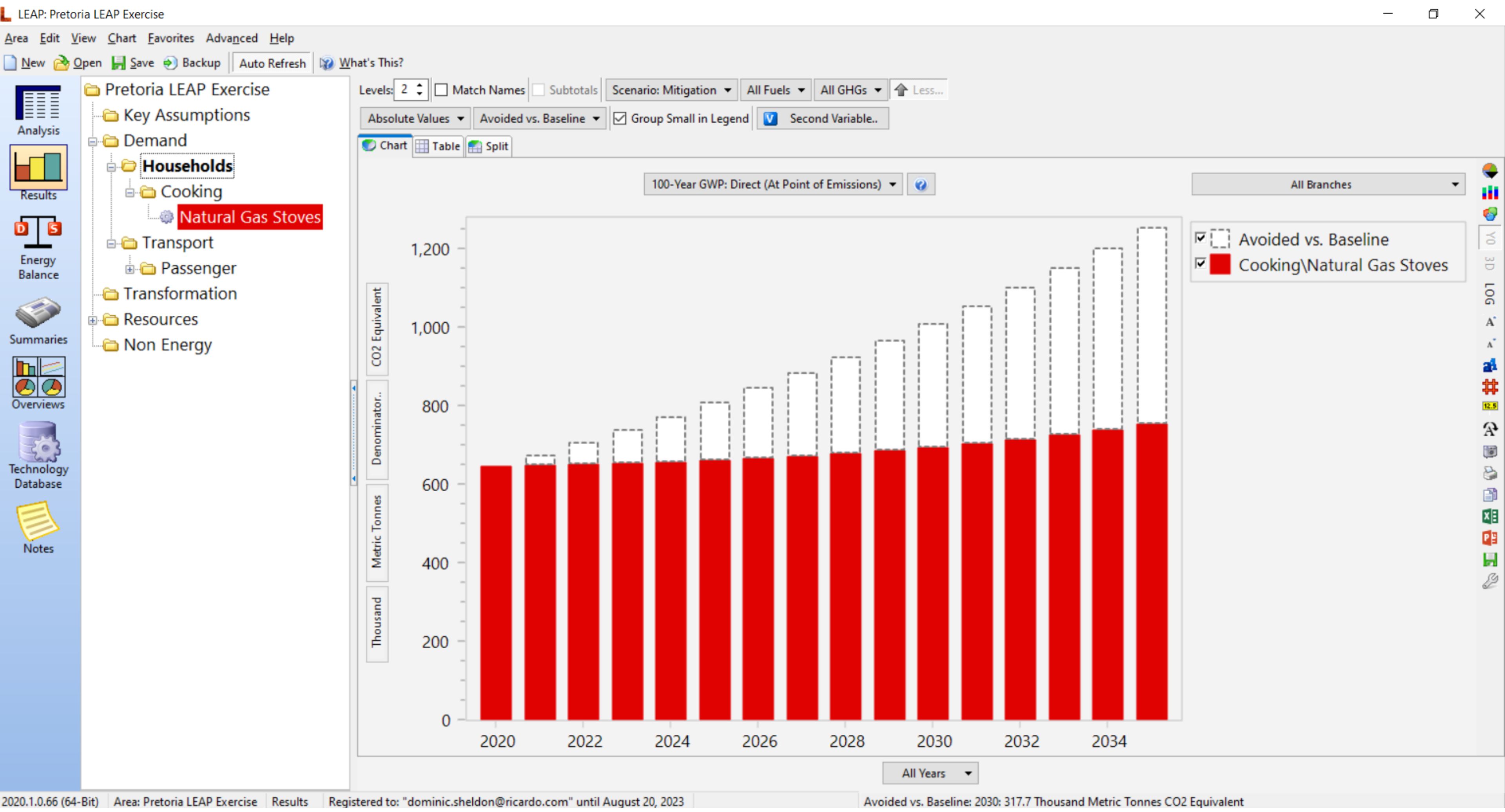
Basic structure of LEAP model: The Tree and its branches



Basic structure of LEAP model: The Tree and its branches




LEAP: Pretoria LEAP Exercise
Area Edit View Analysis Tags General Tree Chart Advanced Help
New Open Save Email Backup Find Settings Tags Scenarios Fuels Effects Units What's This?
Analysis
Results
Energy Balance
Summaries
Overviews
Technology Database
Notes
Pretoria LEAP Exercise
Key Assumptions
Demand
Households
Cooking
Natural Gas Stoves
Transport
Passenger
Transformation
Resources
Non Energy
Tags: Settings
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
Households: Activity Level (Million Household)
Households
Million Household
12.0
8.0
4.0
0.0
2020
2022
2024
2026
2028
2030
2032
2034
All Years



LEAP: Pretoria LEAP Exercise
Area Edit View Chart Favorites Advanced Help
New Open Save Backup Auto Refresh What's This?
Analysis
Results
Energy Balance
Summaries
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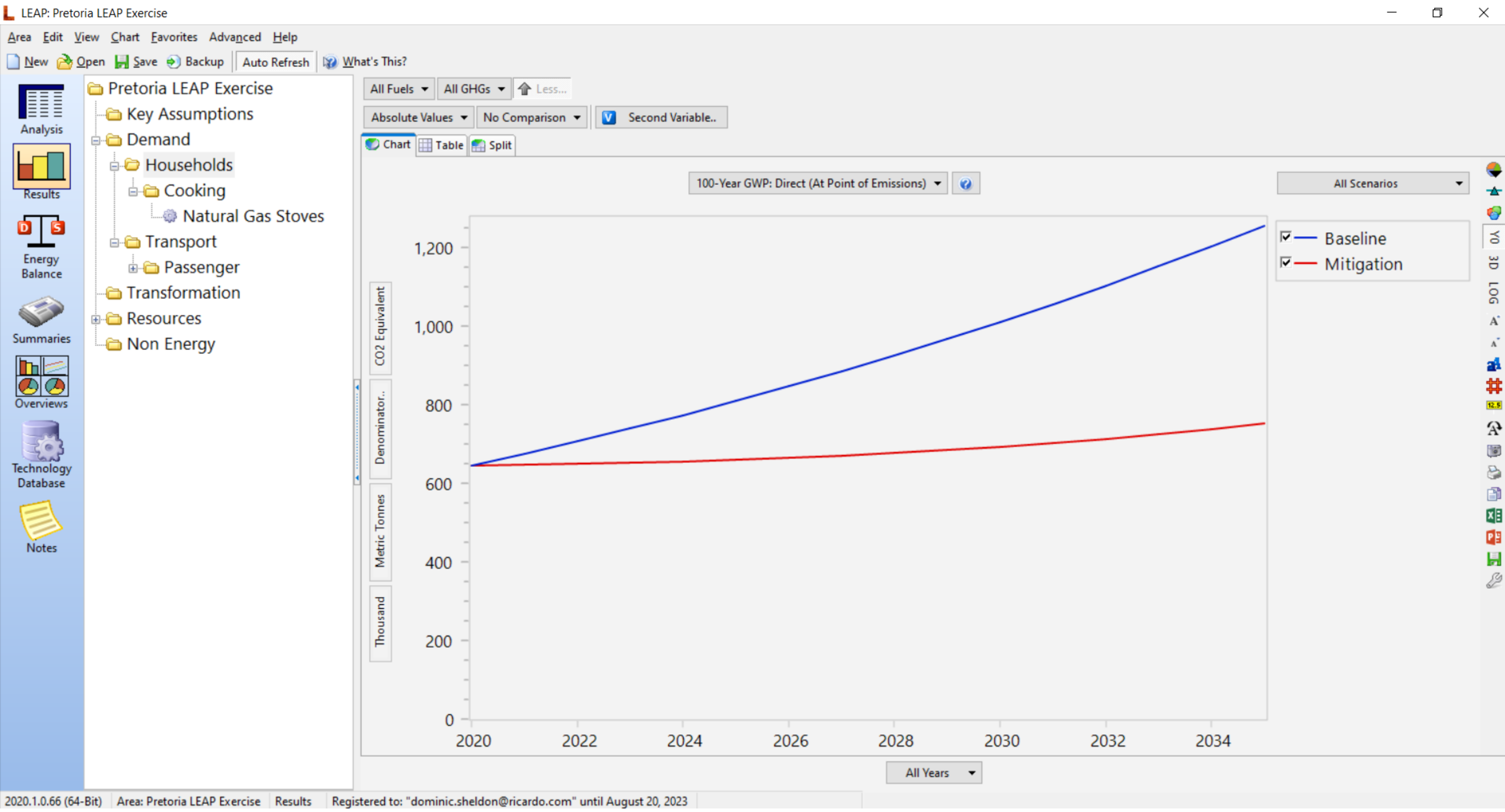
Technology Database
Notes
Pretoria LEAP Exercise
Key Assumptions
Demand
Households
Cooking
Natural Gas Stoves
Transport
Passenger
Transformation
Resources
Non Energy
Levels: 2
Match Names
Subtotals
Scenario: Mitigation
All Fuels
All GHGs
Less...
Absolute Values
Avoided vs. Baseline
Group Small in Legend
Second Variable..
Chart
Table
Split
100-Year GWP: Direct (At Point of Emissions)
All Branches
Thousand Metric Tonnes CO2 Equivalent
Denominator..
1,200
1,000
800
600
400
200
0
2020
2022
2024
2026
2028
2030
2032
2034
Avoided vs. Baseline
Cooking\Natural Gas Stoves
All Years
2020.1.0.66 (64-Bit)
Area: Pretoria LEAP Exercise
Results
Registered to: "dominic.sheldon@ricardo.com" until August 20, 2023
Avoided vs. Baseline: 2030: 317.7 Thousand Metric Tonnes CO2 Equivalent


LEAP: Pretoria LEAP Exercise
Area Edit View Chart Favorites Advanced Help
New Open Save Backup Auto Refresh What's This?
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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
Baseline
Mitigation
CO2 Equivalent
Denominator..
Metric Tonnes
Thousand
1,200
1,000
800
600
400
200
0
2020
2022
2024
2026
2028
2030
2032
2034
All Years
2020.1.0.66 (64-Bit)
Area: Pretoria LEAP Exercise
Results
Registered to: "dominic.sheldon@ricardo.com" until August 20, 2023

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

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

Registration details

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

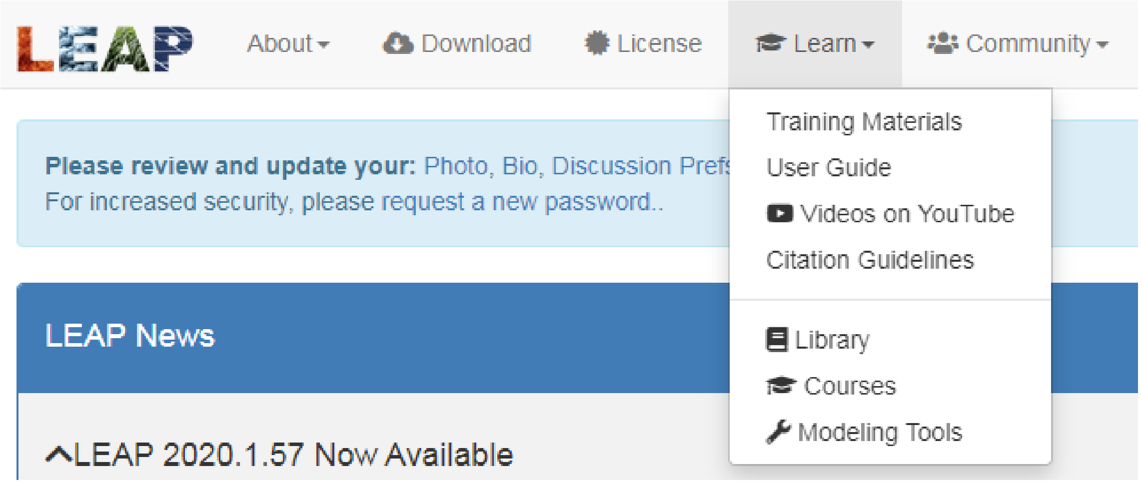
Navigate to:

- 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

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- Training Materials
- User Guide
- Videos on YouTube
- Citation Guidelines
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- Courses
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Please review and update your: Photo, Bio, Discussion Prefs
For increased security, please request a new password..

LEAP News

^LEAP 2020.1.57 Now Available

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LEAP Training Materials

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.

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.

Please contact us if you are interested in translating these materials into additional languages.

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 Help

-Search-

- Introduction
  - 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
- The Integrated Benefits Calculator (IBC)

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.

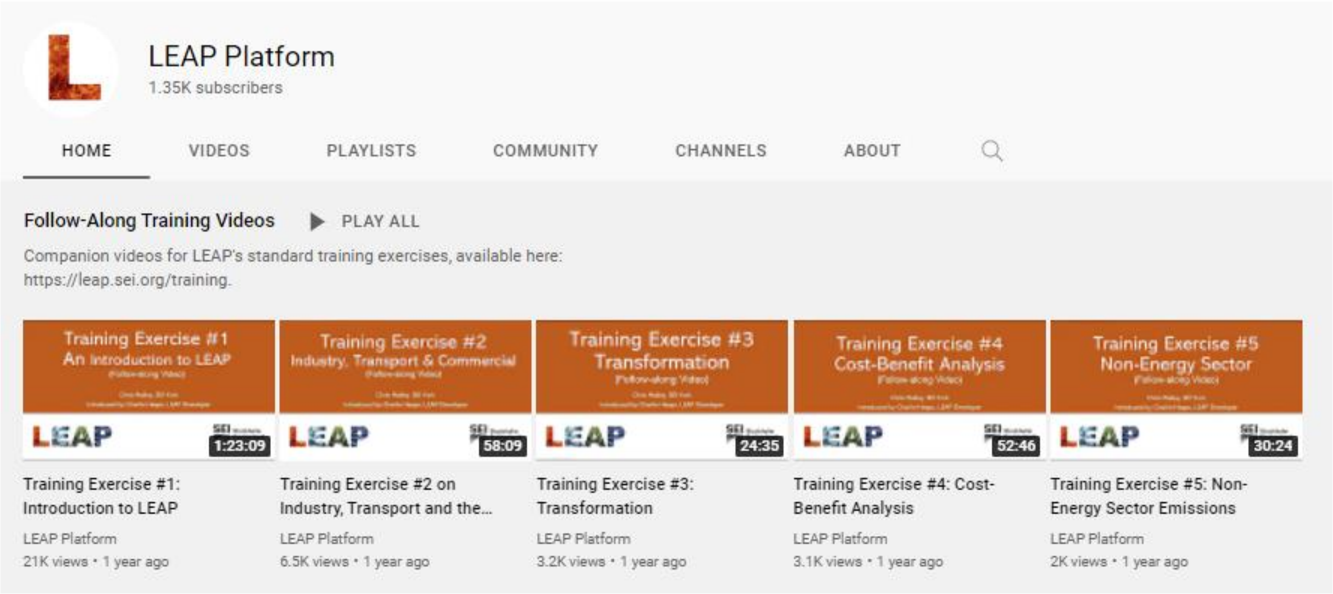
Integrated Planning

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

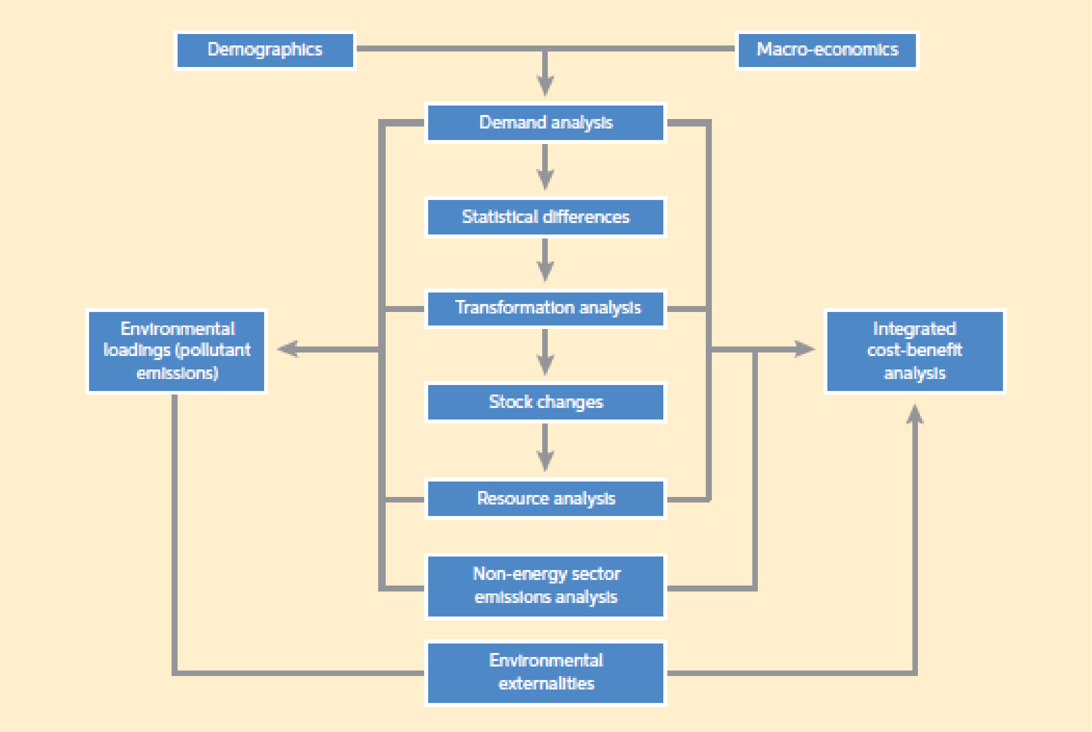


Introduction to LEAP

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:

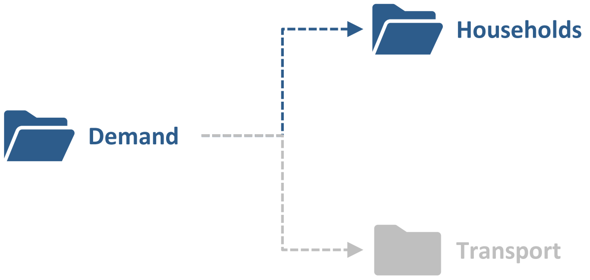
- It is a model that is **familiar to key stakeholders around the world** and has been used for previous modelling exercises, so will allow for greater comparability with previous GHG scenarios.
- The **LEAP model has been used for NDCs and LTSs**
- The model **is relatively simple to use**.
- The **model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

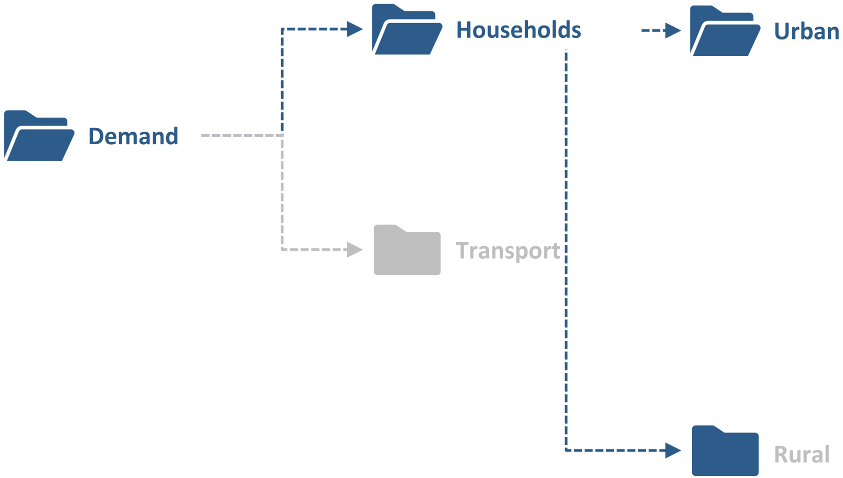


Source: https://leap.sei.org/default.asp?action=introduction;

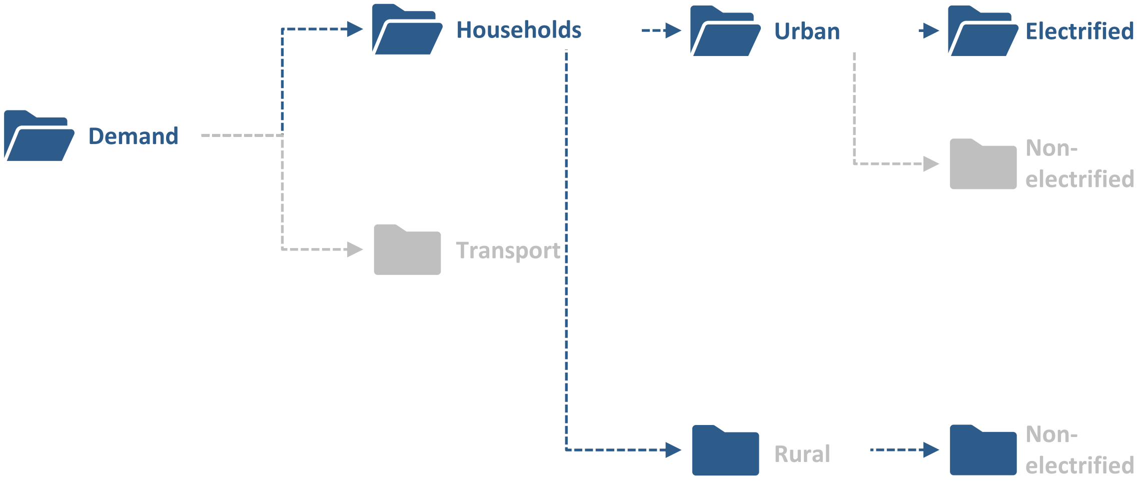
Basic structure of LEAP model: The Tree and its branches



Basic structure of LEAP model: The Tree and its branches



Basic structure of LEAP model: The Tree and its branches



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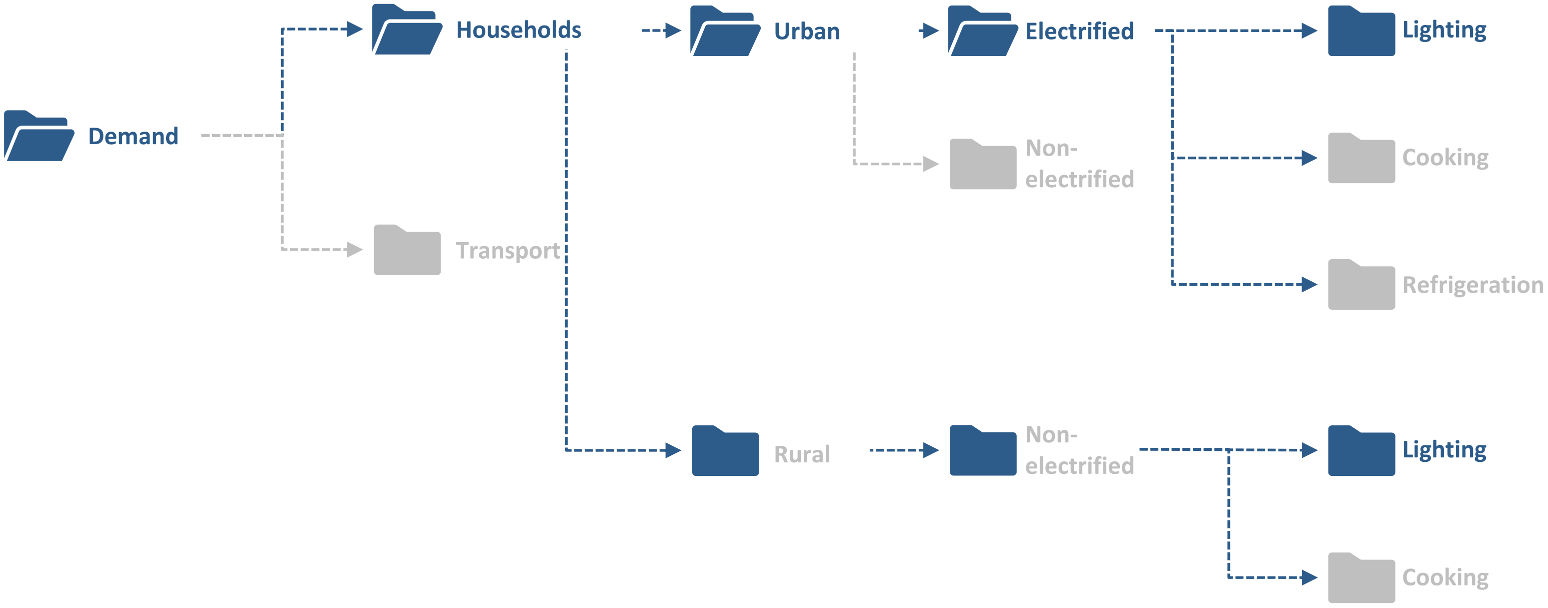

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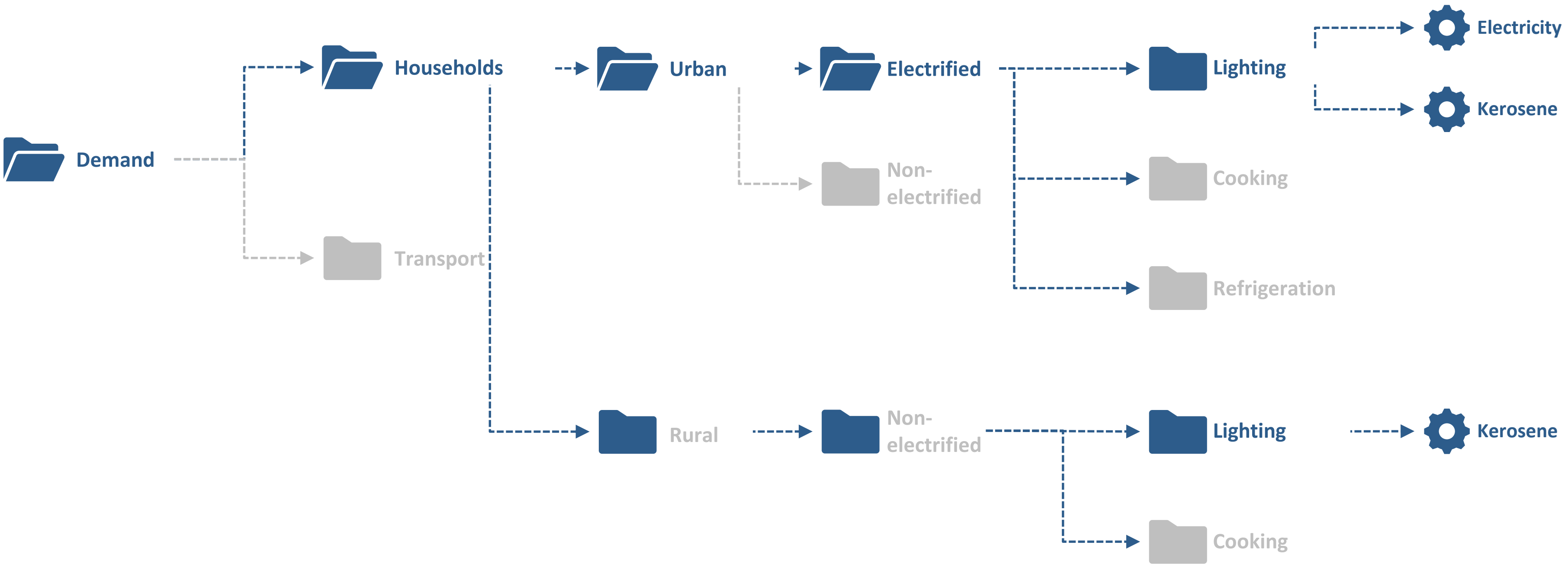

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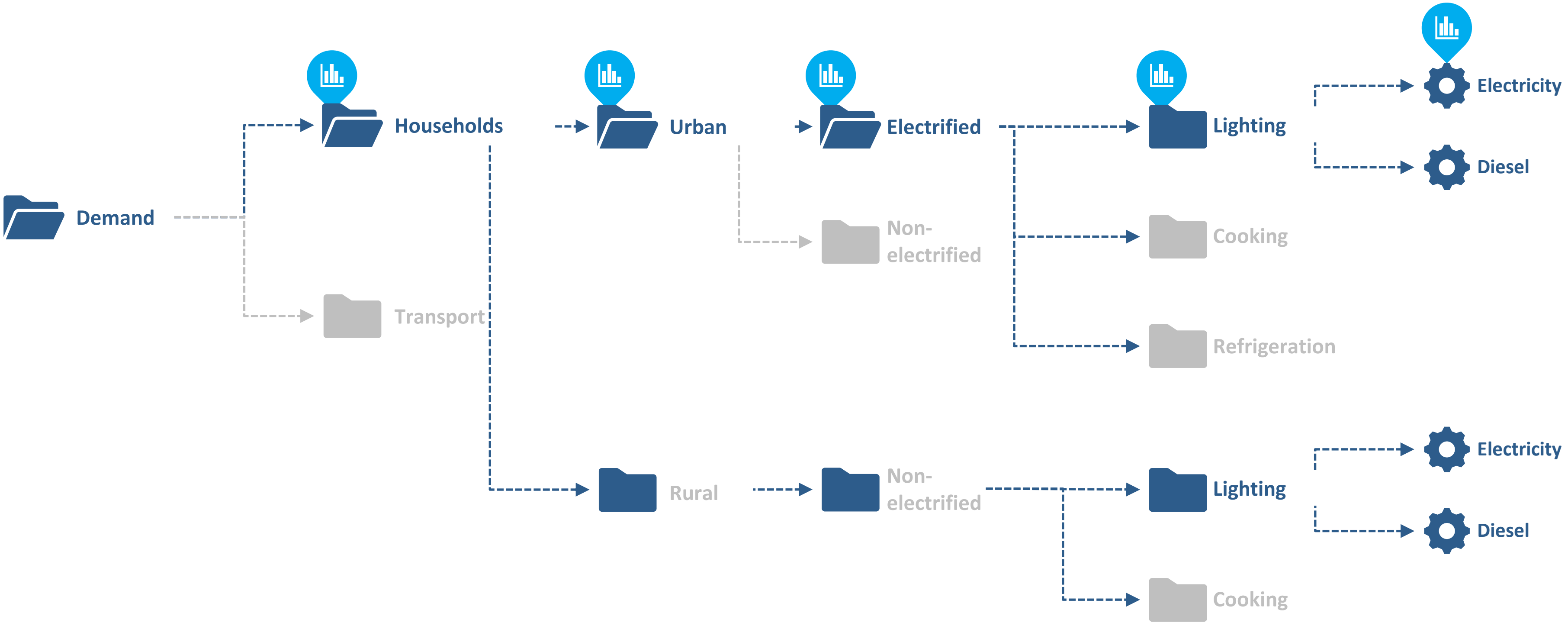
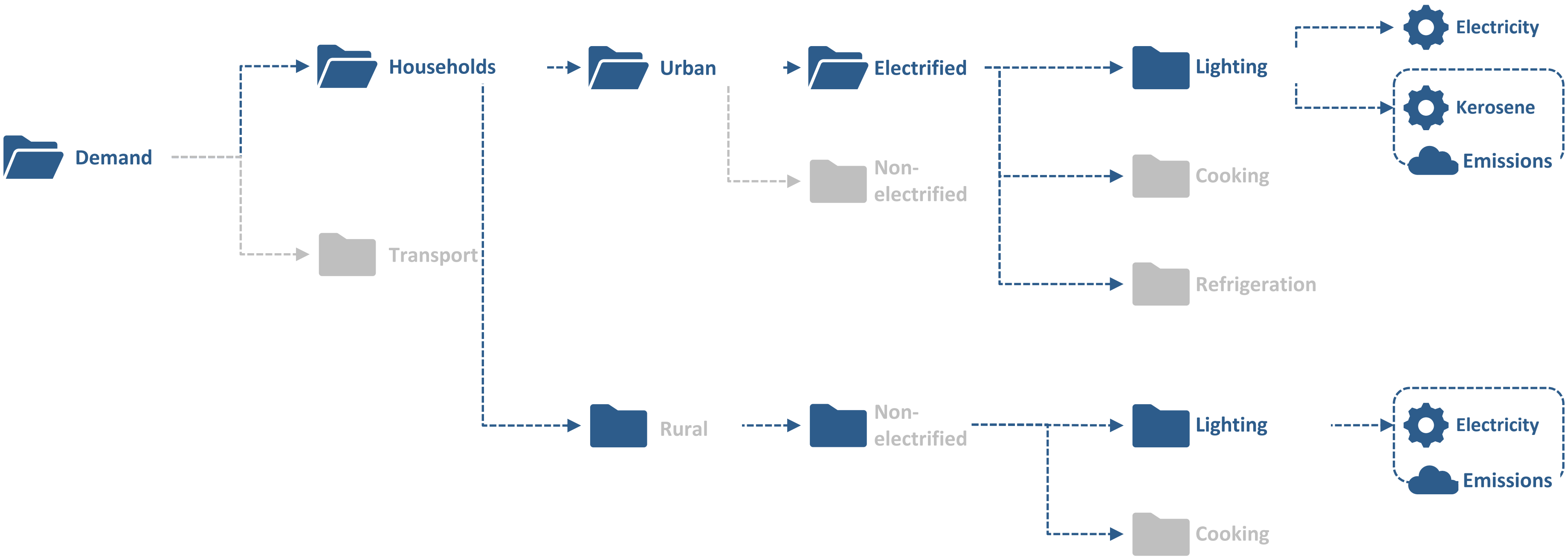
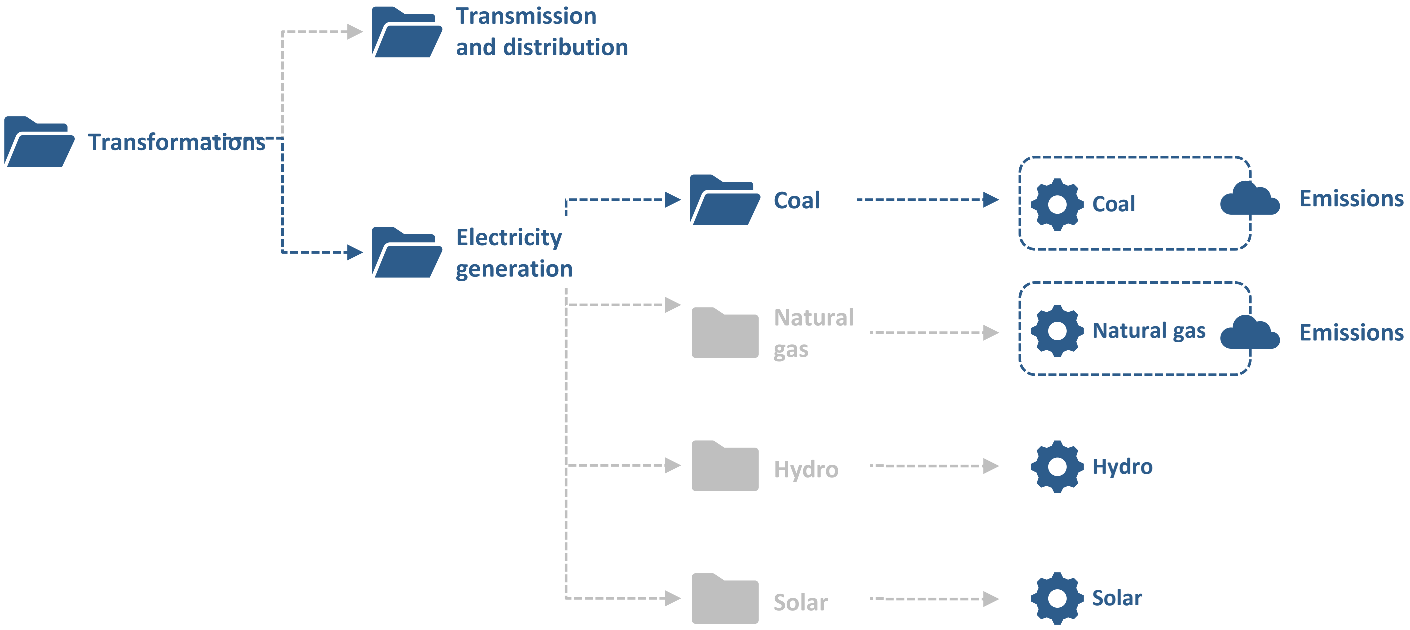


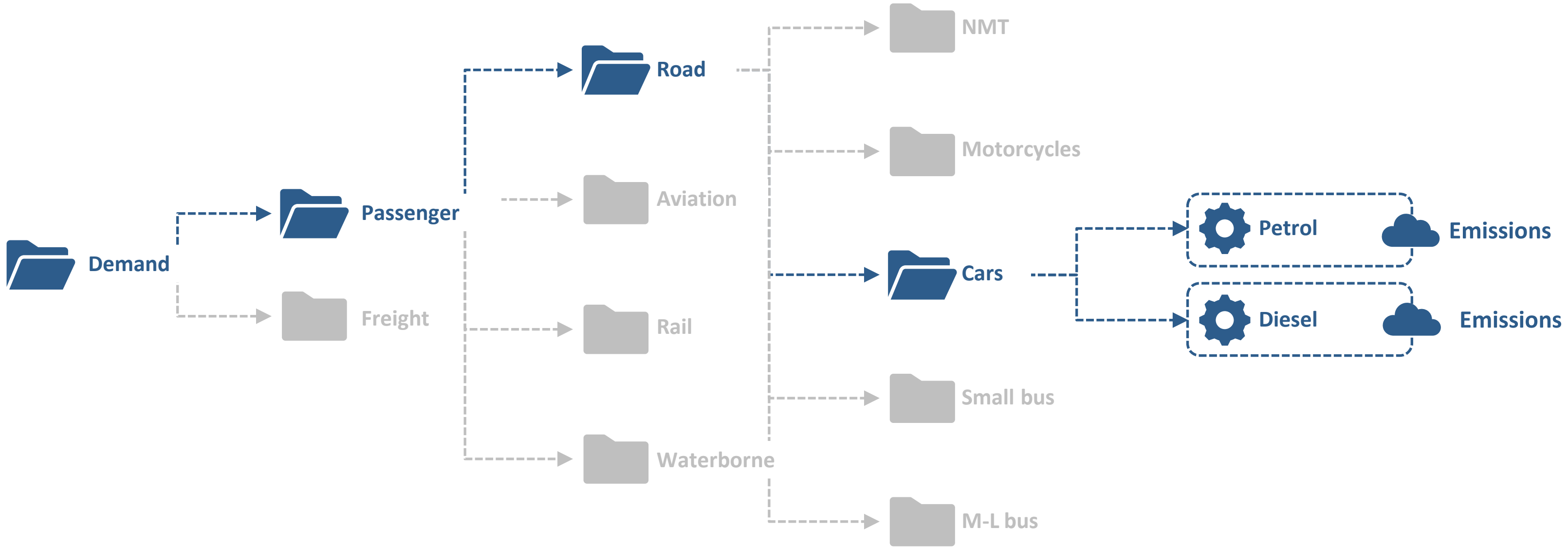
Basic structure of LEAP model: The Tree and its branches



Basic structure of LEAP model: The Tree and its branches

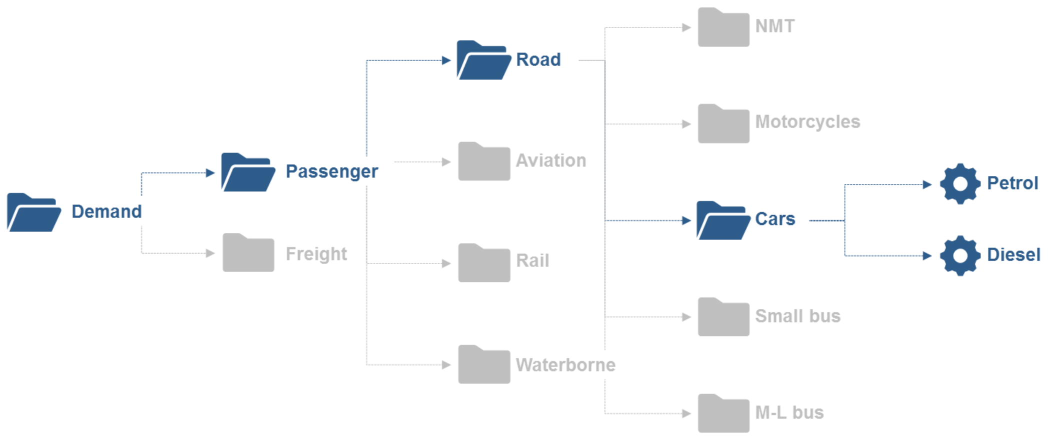


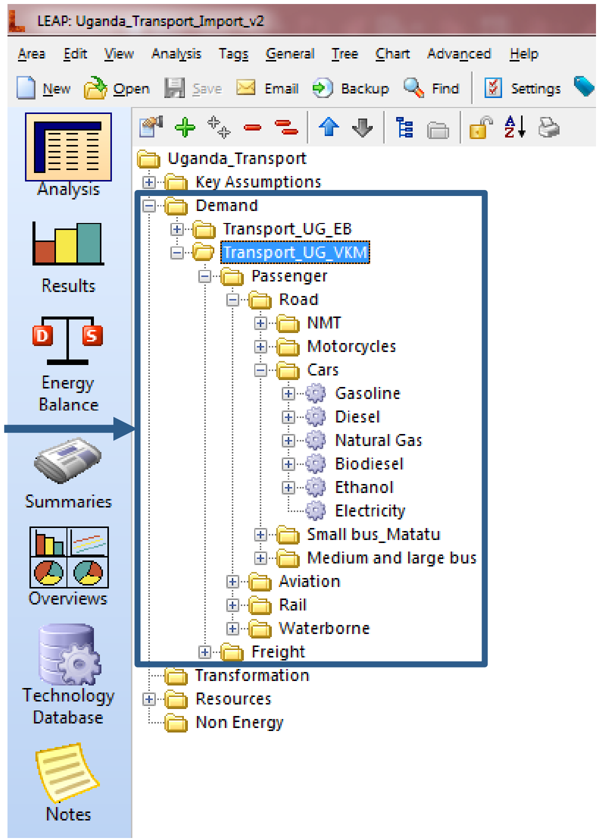
Basic structure of LEAP model: The Tree and its branches



LEAP

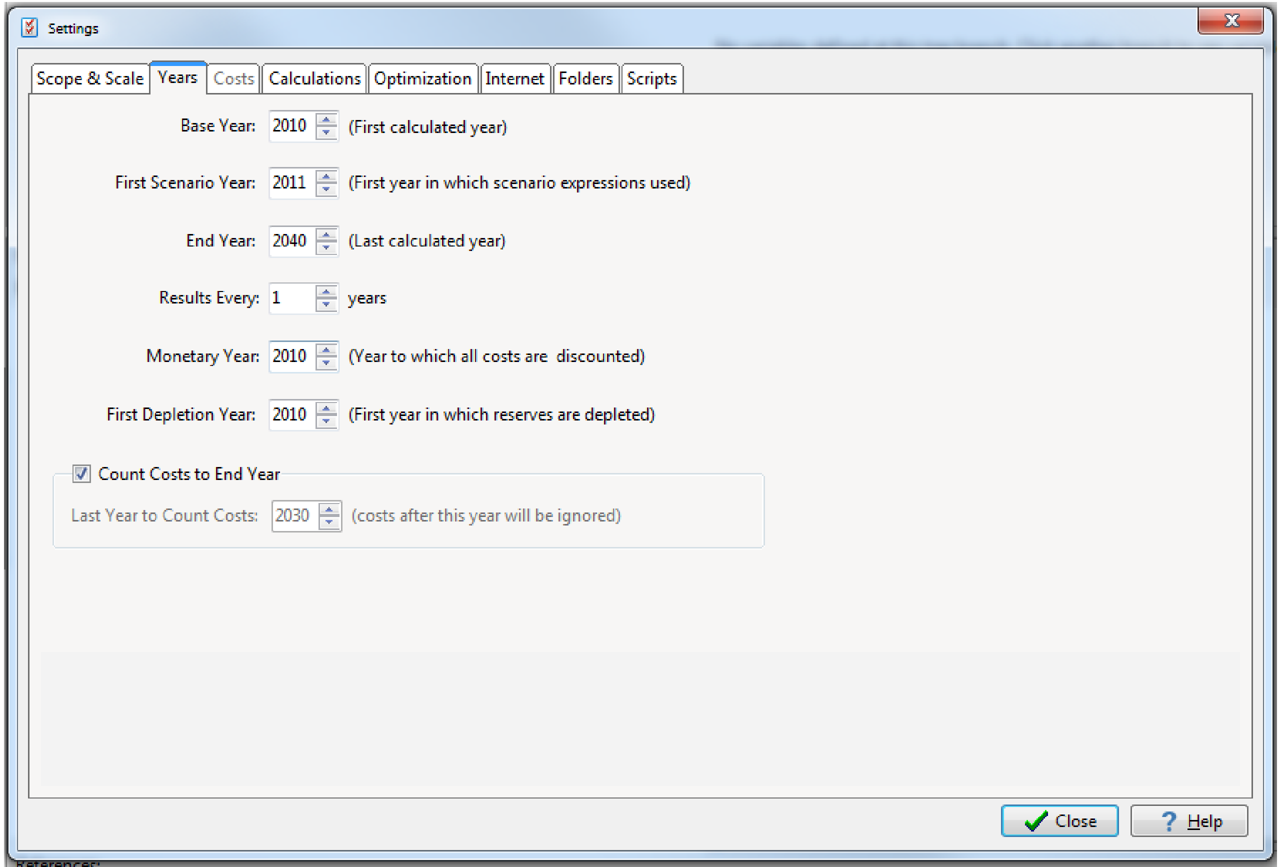
Basic structure of LEAP model: The Tree and its branches





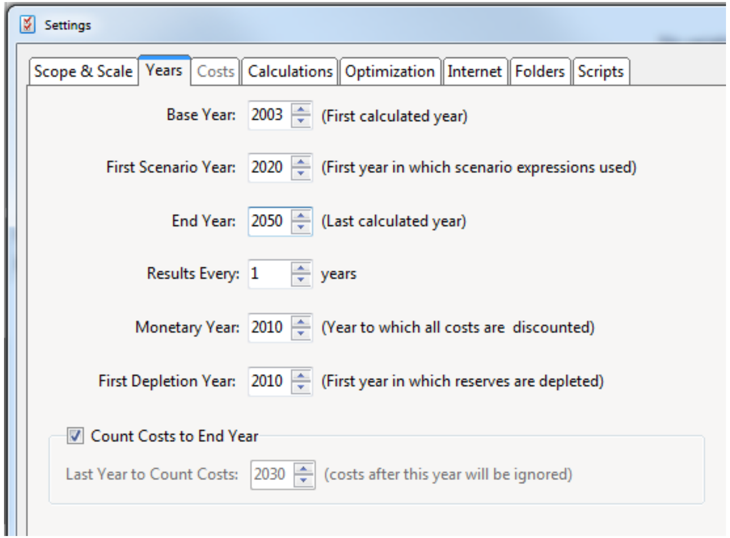
Using LEAP

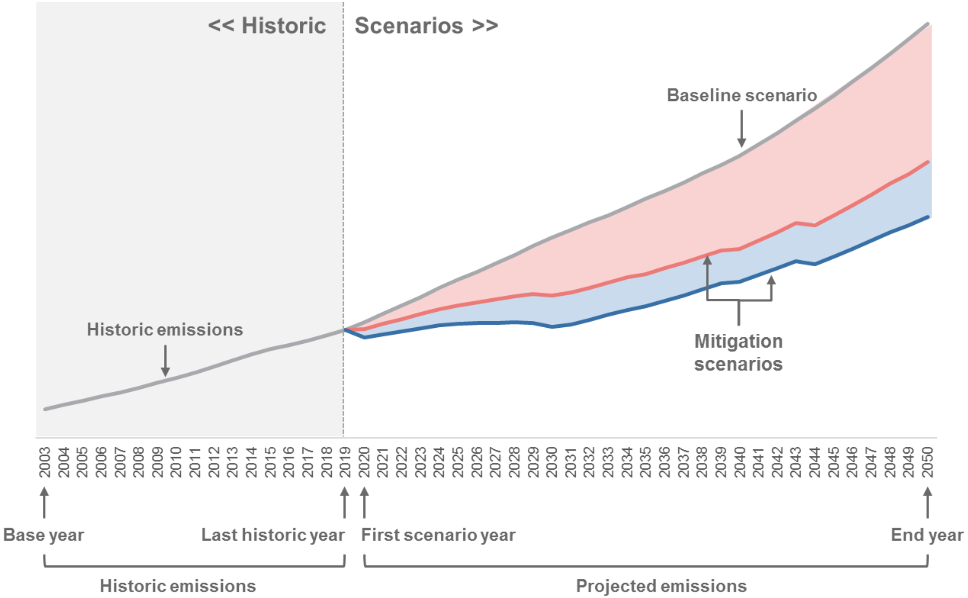
LEAP: Settings input



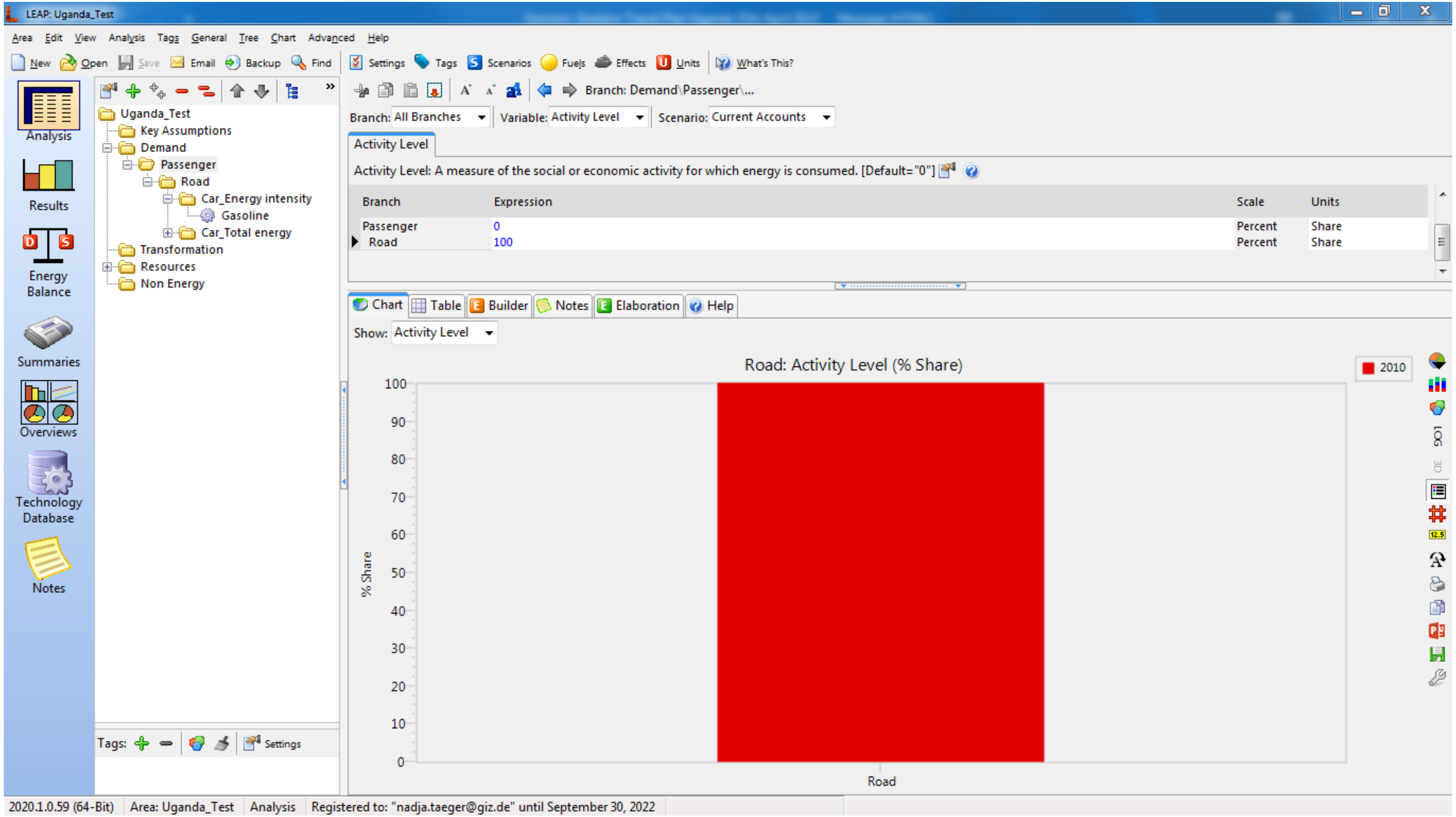
LEAP: Settings input

Settings input

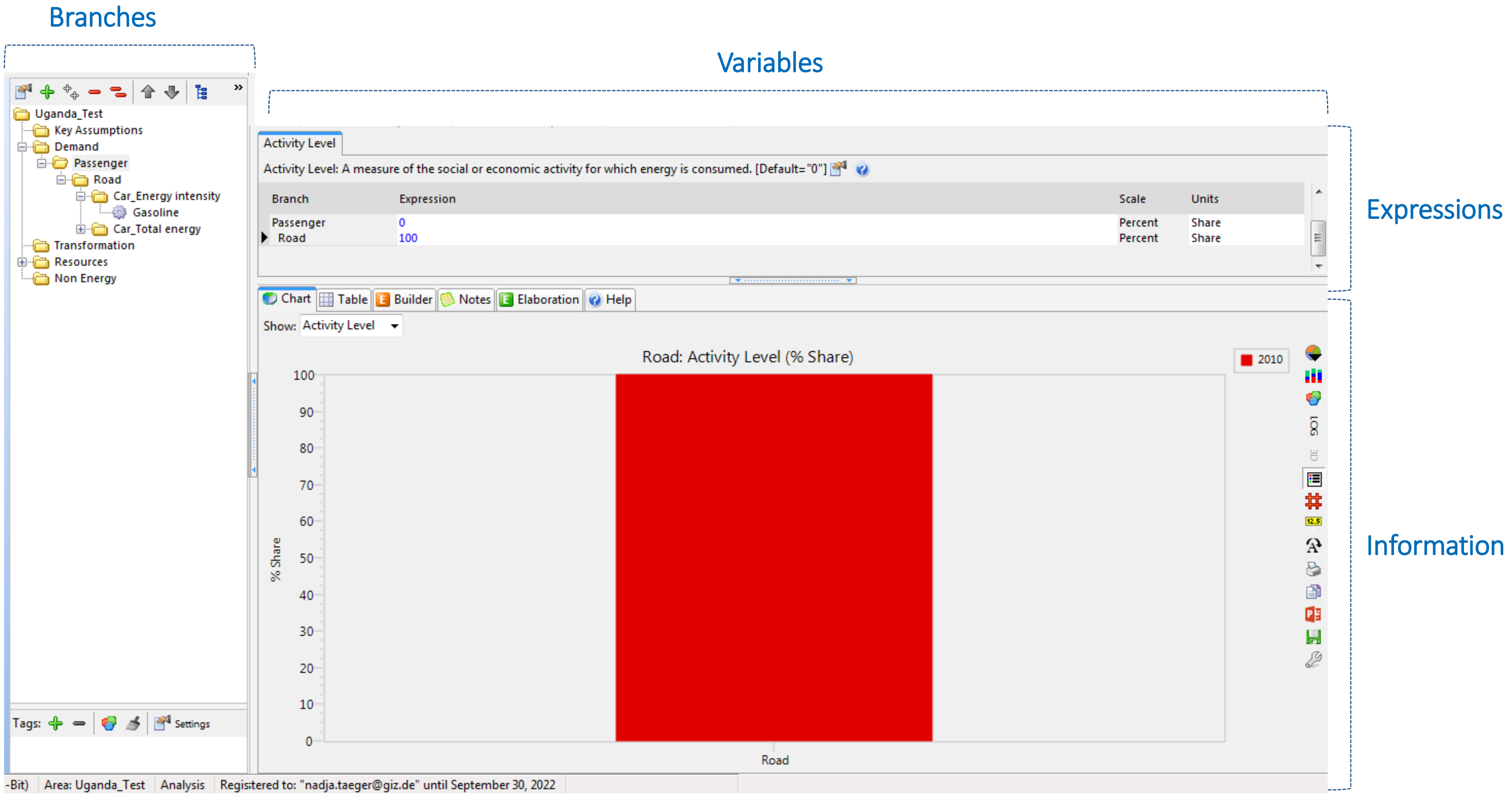




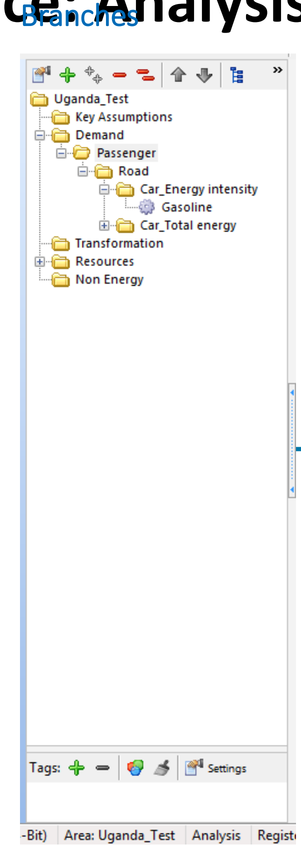
Interface: Overview

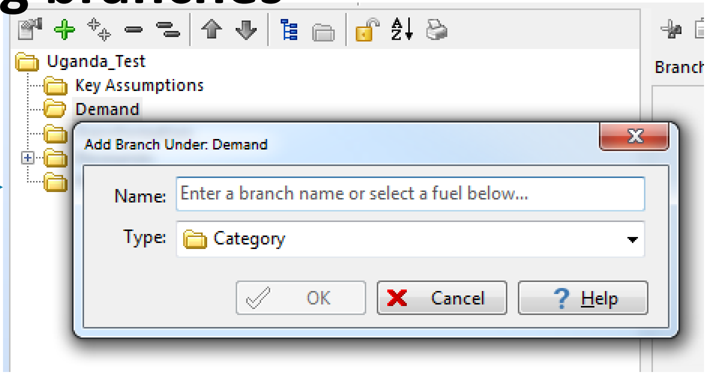


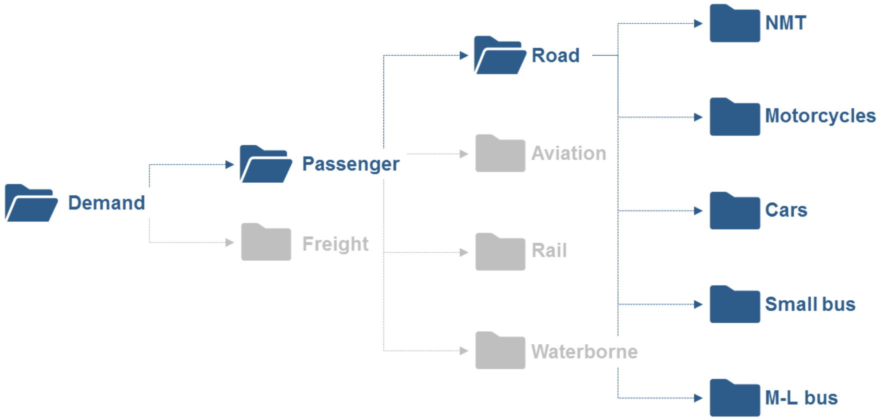
Interface: Analysis



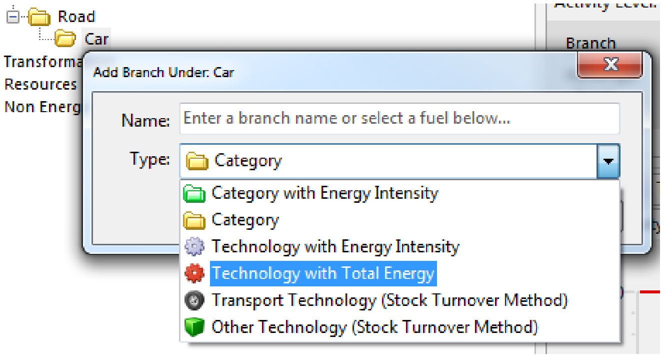
Interface: Analysis – Adding branches

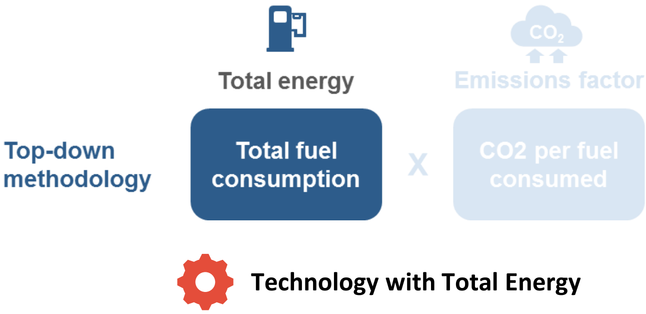


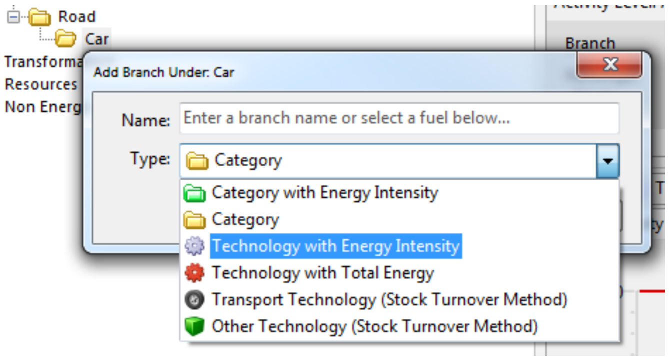


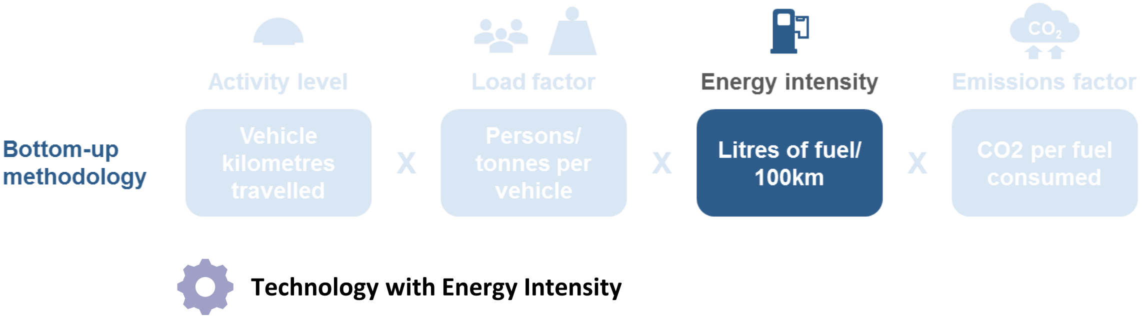


Interface: Analysis – Variables









Interface: Variables - Expressions

Activity Level

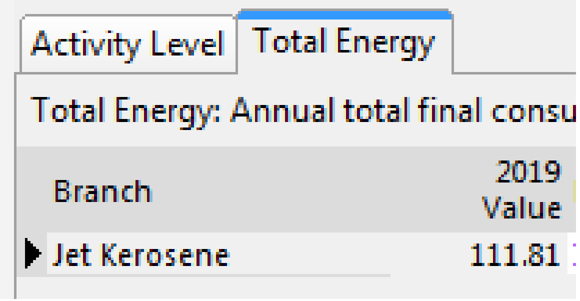
Activity Level: A measure of the social or economic activity for which energ

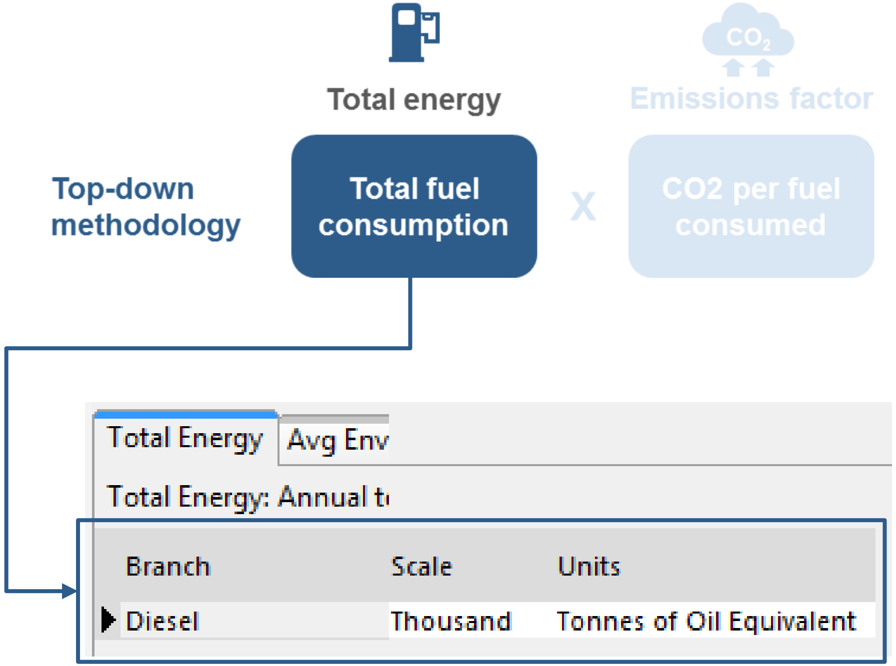
Branch	Expression	Scale	Units	Per
Passenger	Interp(2003, 100.000, 2019, 1000.000)	Thousand	Passenger-km	
Road	Interp(2003, 100.000, 2010, 90.000, 2019, 80.000)	Percent	Share	of Passenger-km
Rail	Remainder(100)	Percent	Share	of Passenger-km

Branches Expression Scale Units Per

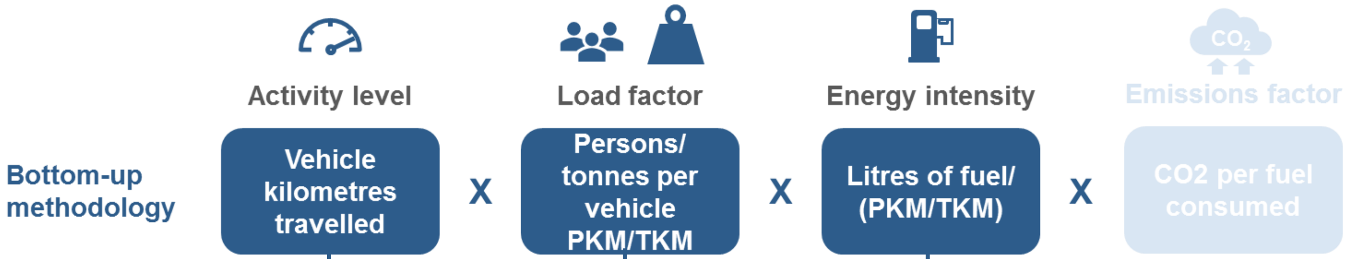
Top-down methodology: Variables

Technology with Total Energy





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

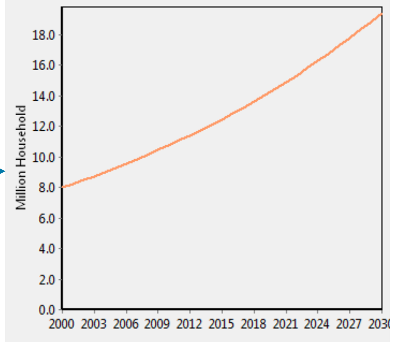
Activity Level | Final Energy Intensity

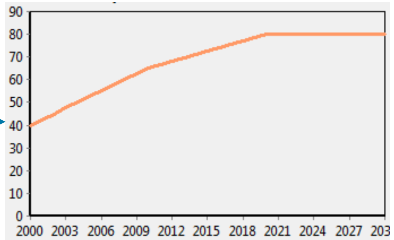
Final Energy Intensity: Annual final co

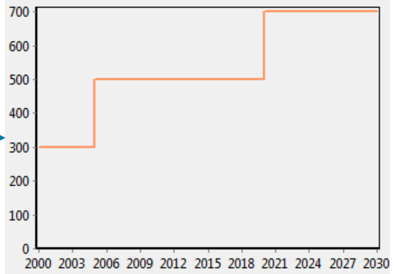
Branch	Fuel	Units	Per
Gasoline	Gasoline	Liter	per Passenger-km
Diesel	Diesel	Liter	per Passenger-km

Interface: Expressions

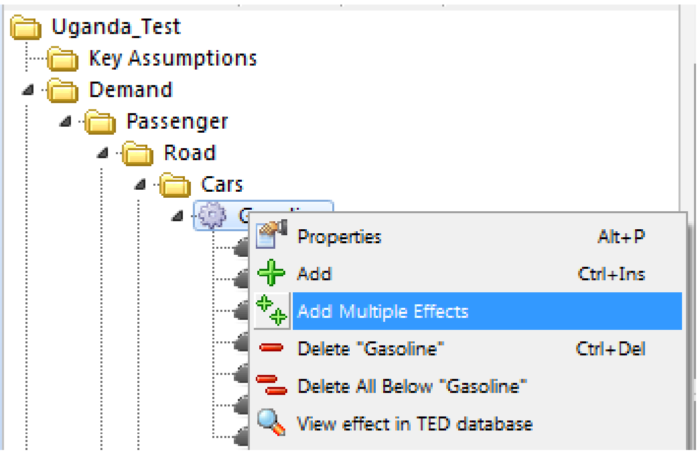
Type	Syntax	Example Syntax and Graph
Simple Number	Value	3.1415
Simple Formula	Value (operator (+ - / *)) value	0.1 * 5970
Growth Rate	Growth(annual % growth)	Growth(3.2%)
Interpolation	Interp(Year, value, year, value)	Interp(2000, 40, 2010, 65, 2020, 80)
Step	Step(Year, value, year, value)	Step(2000,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

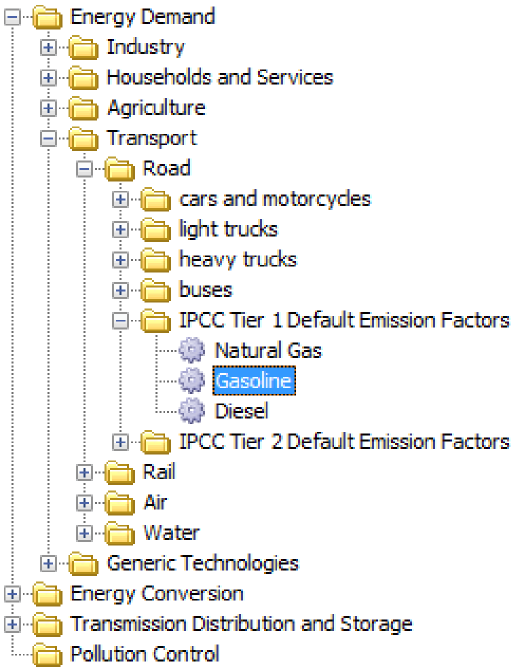


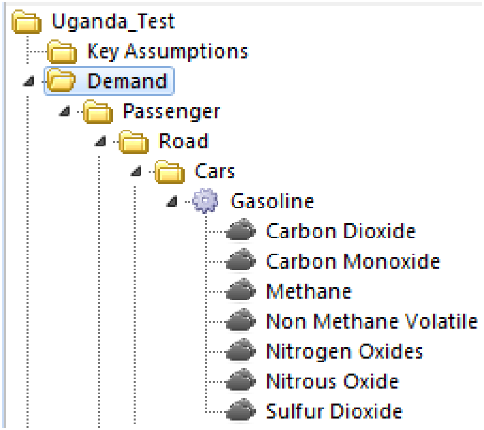




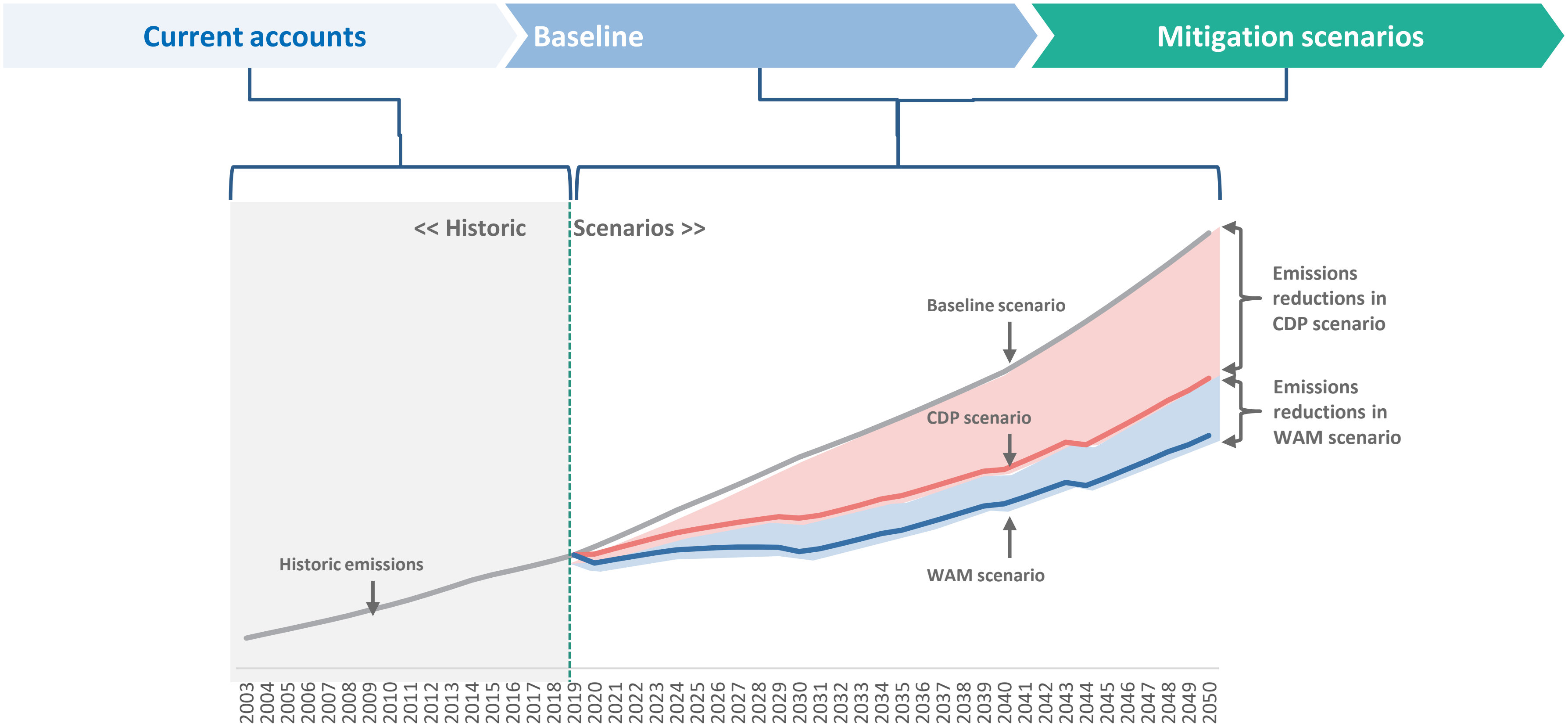
Interface: Variables – Multiple effects







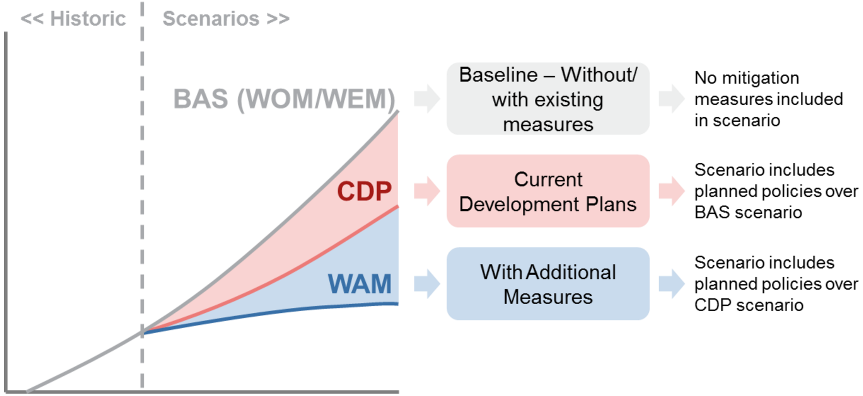
Interface: Scenarios

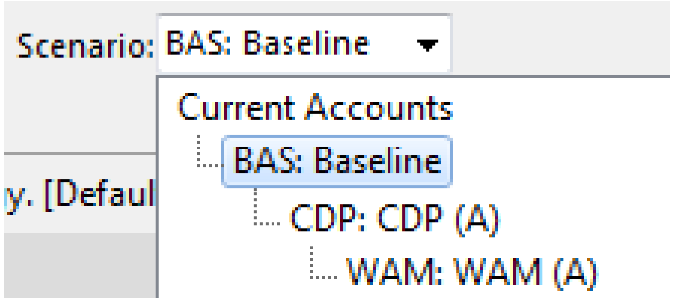


Scenario inheritance

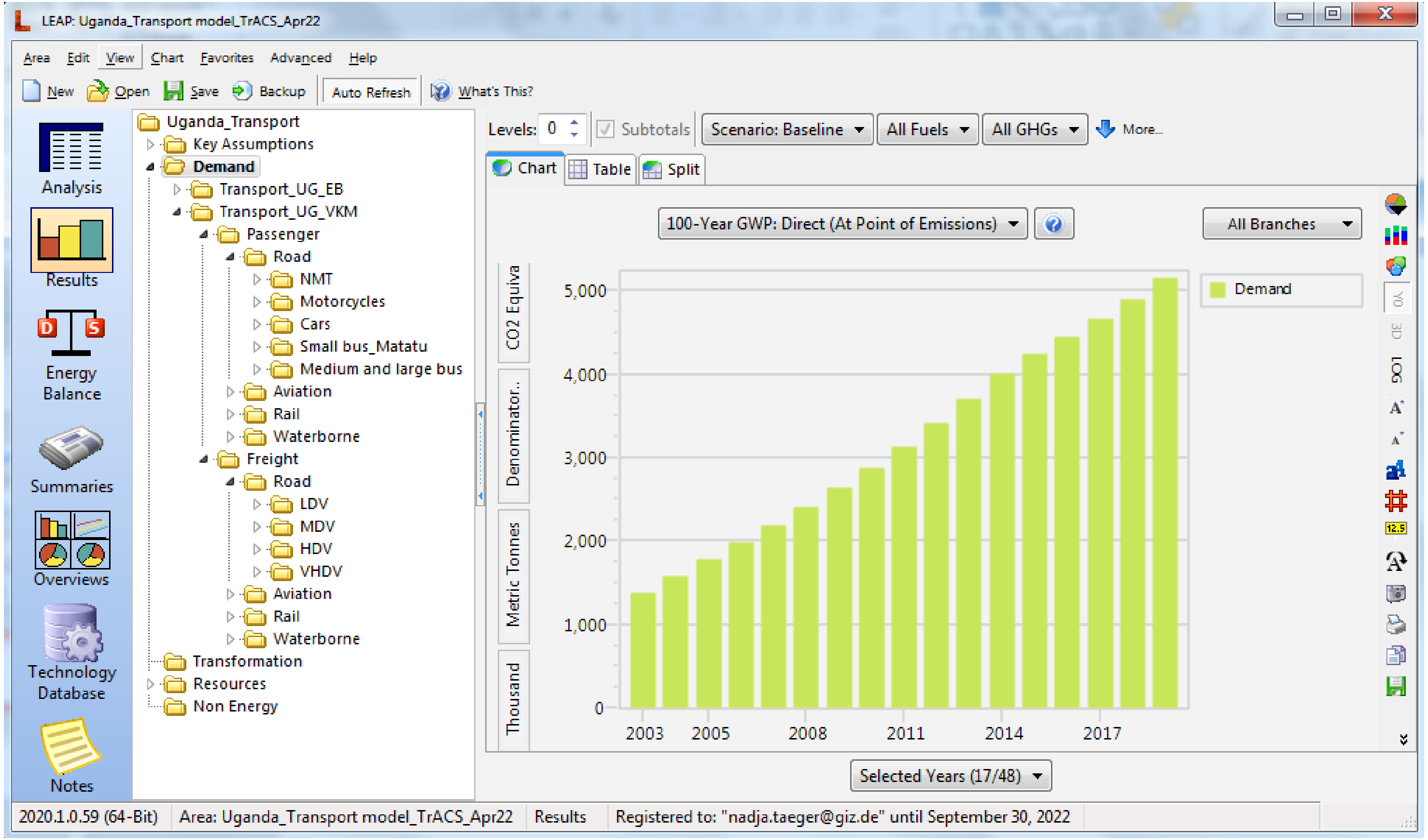
Within LEAP, each scenario “inherits” the conditions of the previous scenario.

- **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

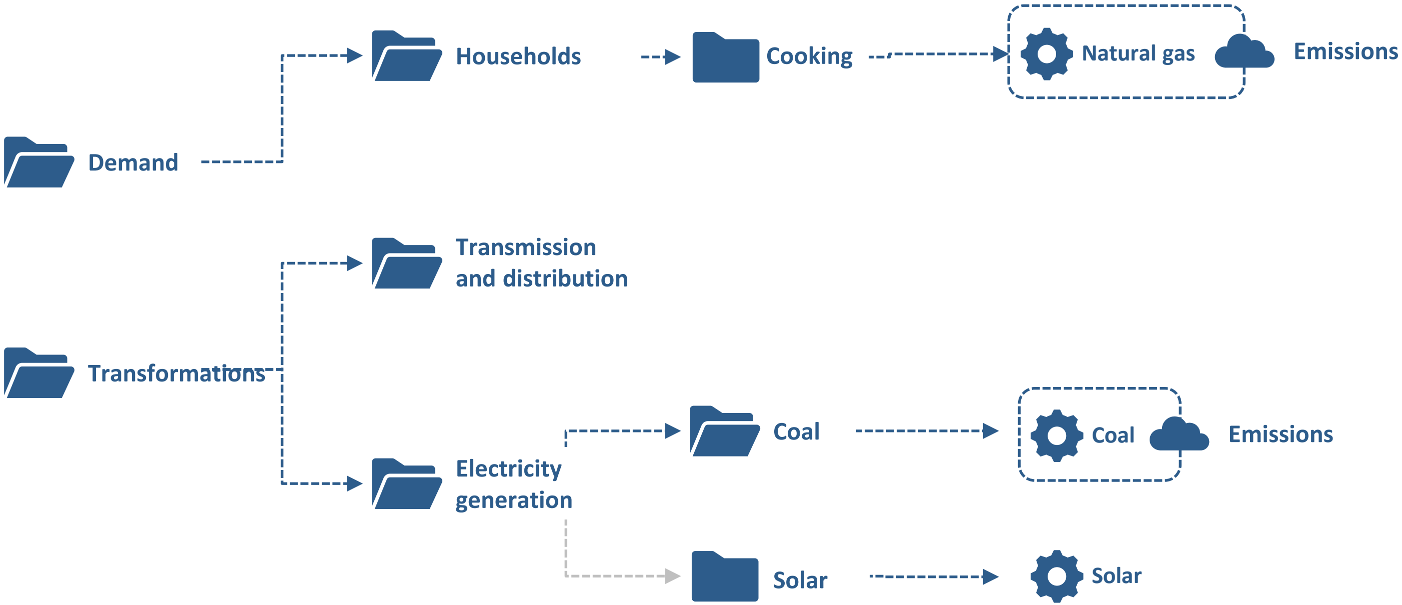




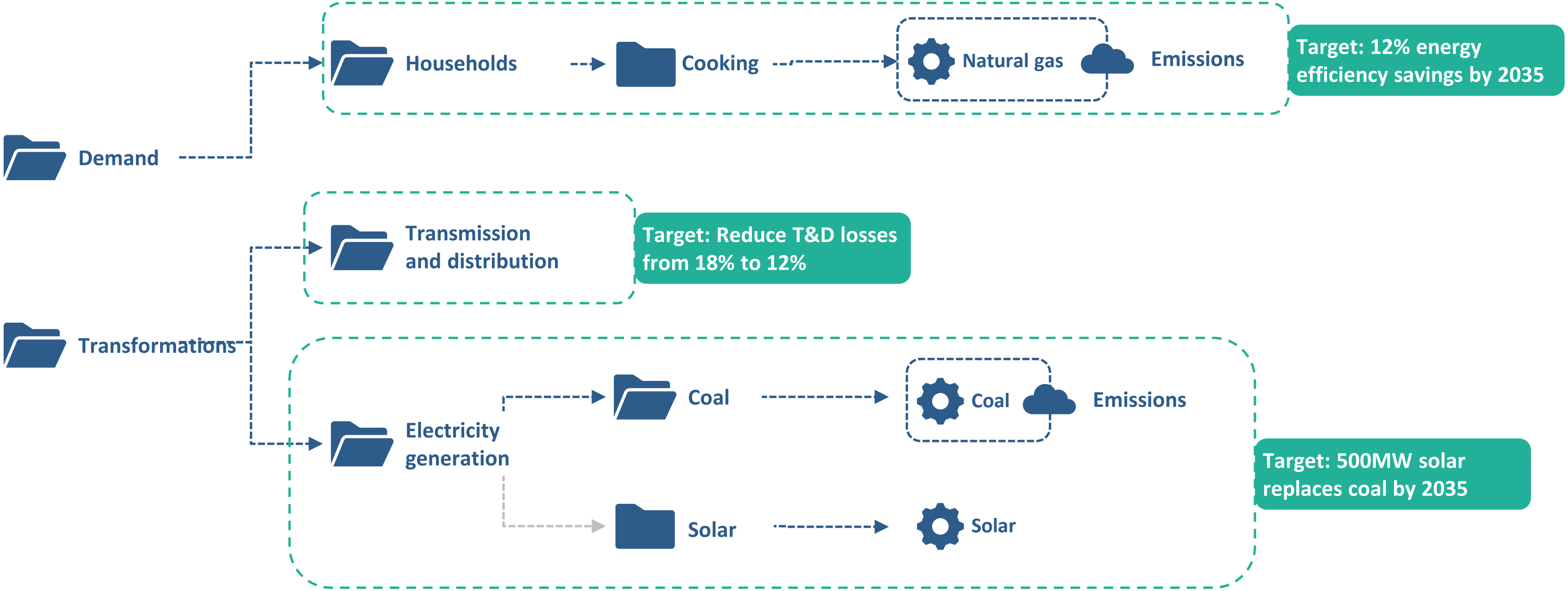
Interface: Results



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
  - 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

- 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

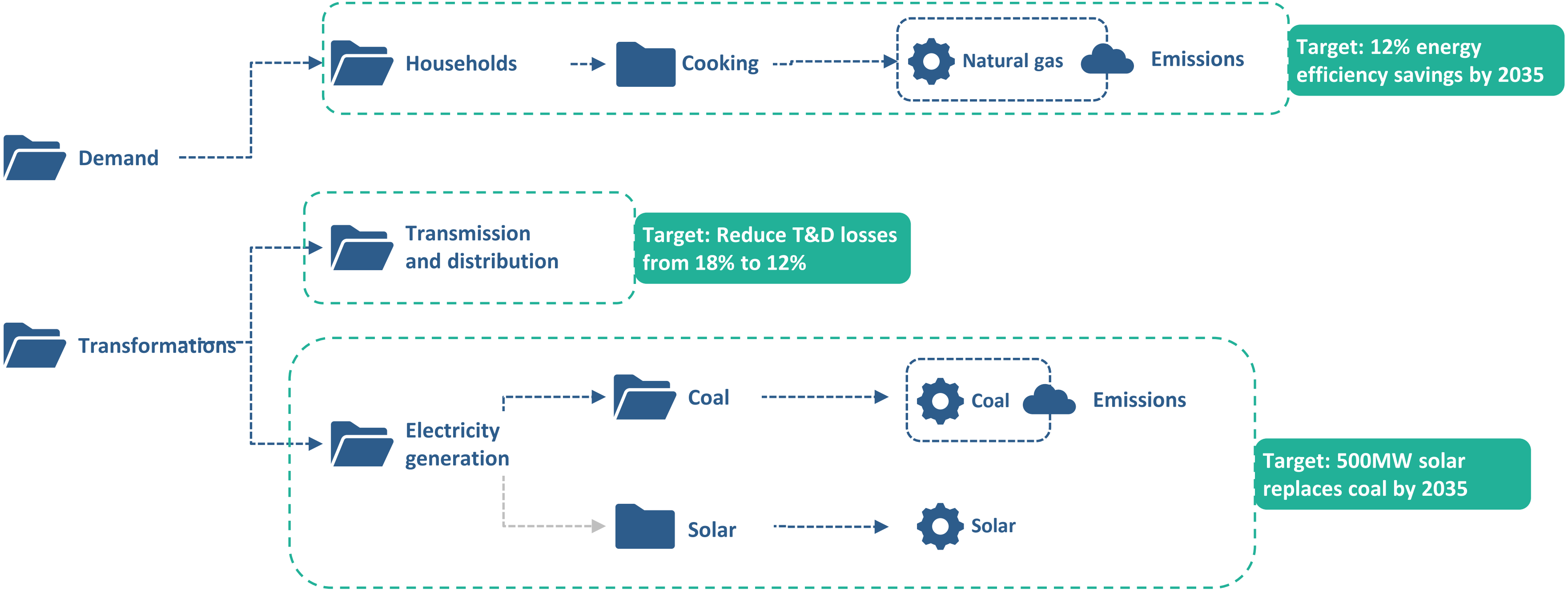
- Transformation
  - Transmission and distribution
    - Processes:
      - **Electricity**
        - Feedstock fuels: Electricity
          - T&D losses: **18%** = **Interp(2035,16%)**

LEAP exercise: Part 7: Baseline – Electricity generation

- 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

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