



Using LEAP for GHG Mitigation Assessment

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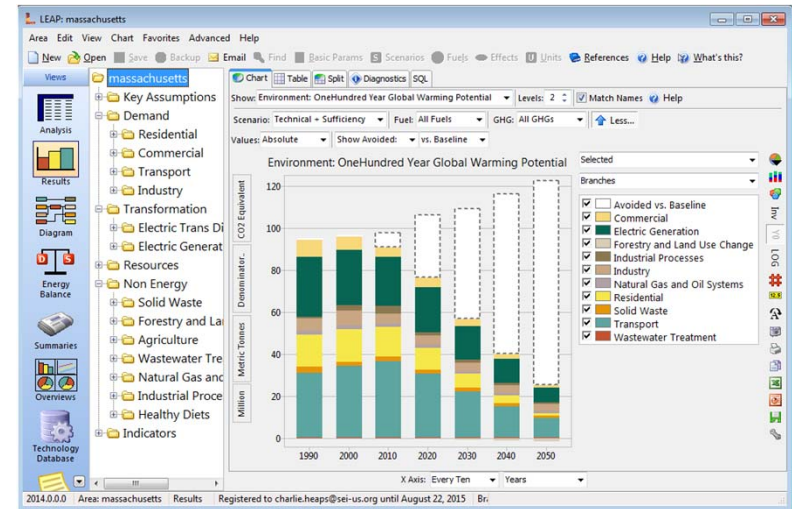
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What is LEAP?

- A Windows-based tool for energy planning and GHG mitigation assessment developed over the last 30 years by the Stockholm Environment Institute (SEI).
- Applied in over 190 countries. At least 37 used LEAP to help develop their INDCs. 5000 active users.
- A scenario-based modeling tool that explores how emissions may change in the future under alternative policy settings (e.g. baselines and low emissions development scenarios).
- Typically used at the national scale but also works for cities, regions and multi-country analyses.
- Primarily focused on energy sector GHG emissions but can be used across all sectors (e.g. industrial processes, solid waste, land-use change and forestry).
- Not just for modeling: supports data management & documentation, results visualization & stakeholder communication.
- Examines GHGs, SLCPs, local air pollutant emissions, economic costs, energy security, resource requirements and technology and activity trends. Now also addresses land-use change, forestry and bioenergy.
- Closely follows IPCC Inventory Guidelines. Includes Tier 1 & 2 default emissions factors and standard GWPs.
- Free for governments, academia and non-profits in low and lower-middle income countries. Discounted in upper-middle-income countries.



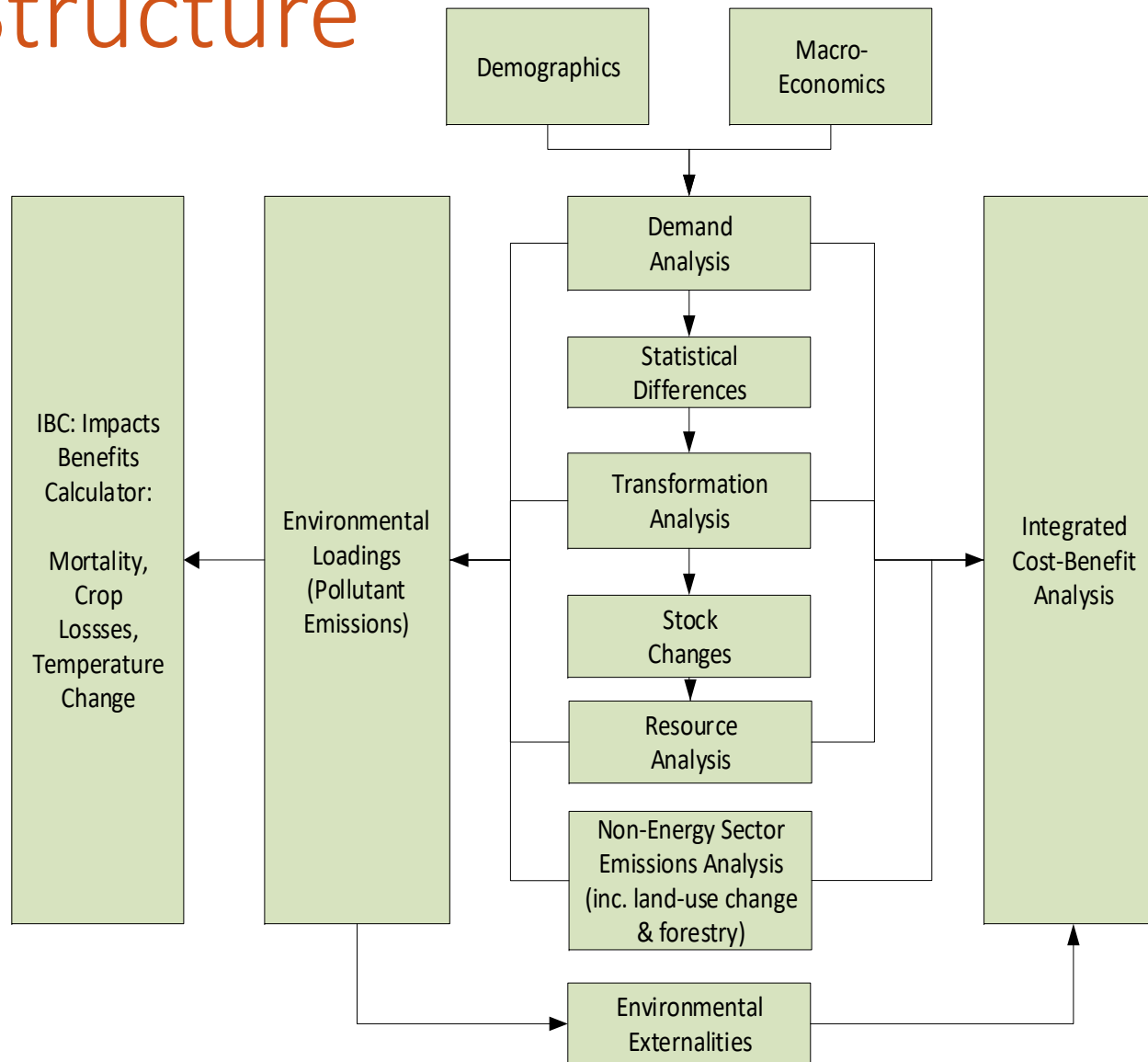
Mitigation Analysis for NDCs

- GHG mitigation analysis is difficult!
 - It considers the future where data is inherently unknowable.
 - An inherently political exercise: envisioning alternative futures for a country.
 - It ideally requires “bottom up” end-use oriented modeling to consider how technology trends may play out under alternative scenarios.
 - It requires detailed technology and activity data, much of which are unavailable or of low quality.
- Developing countries face particular challenges since they typically have less data and only limited expert capacity.
- Countries sometimes outsource their analyses to consultants. But this stops local learning and may help explain why GHG mitigation plans often don't get reflected in national development plans and actual activities.
- LEAP can help address a few of these issues...

LEAP for NDC Mitigation Analysis

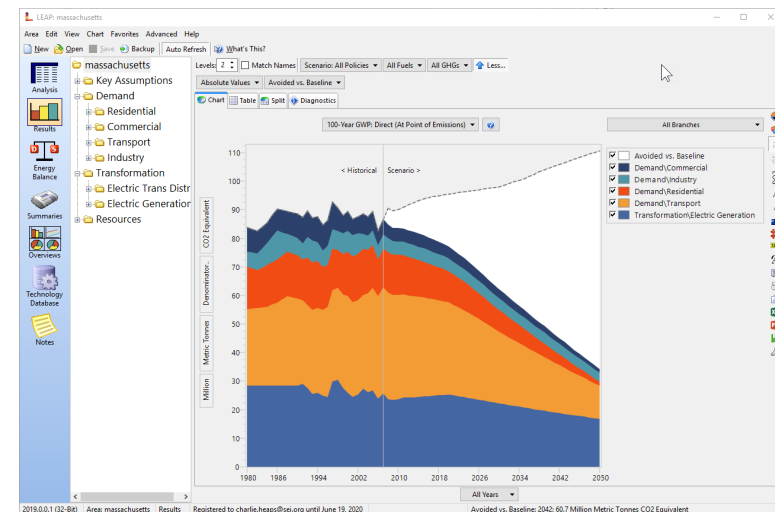
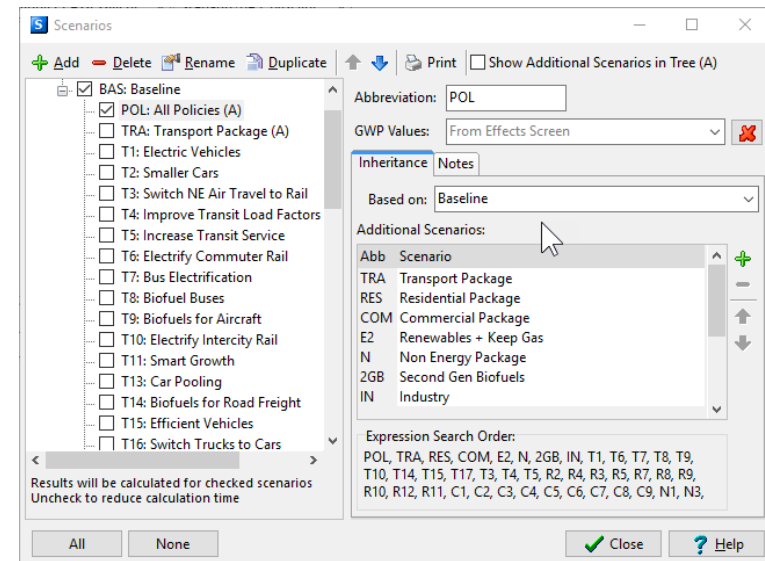
- Its low initial data requirements make it usable in situations where good data is in short supply and expertise is limited.
- Its user-friendly design and emphasis on results communication helps make NDC analyses more broadly accessible: to planners, decision makers and other stakeholders (not just modelers).
- Its demand-first, end-use oriented structure helps frame mitigation analysis within broader development goals.
- Fast, interactive calculations encourage users to take an iterative “build and refine” approach to mitigation modeling.
- Its bottom-up approach is well suited for exploring technology-oriented energy and climate policies.

LEAP Structure



Scenarios in LEAP

- Scenarios are consistent and plausible stories of how a system might evolve over time. Used for policy and/or sensitivity analysis.
- *Inheritance* allows you to create hierarchies of scenarios that inherit defaults from their parent scenarios: minimizes data entry, and streamlines data management.
- *Multiple inheritance* allows scenarios to inherit from more than one parent scenario. E.g. combining packages of measures (NAMAs) to create overall integrated scenarios (LEDS).
- The Scenario Manager screen is used to organize scenarios and specify inheritance.
- Powerful reports for analyzing and comparing scenarios.



How Do You Get LEAP?

- Download from: www.energycommunity.org
- User name and password required to fully enable downloaded software. Provided to licensed users.
- Licenses are available at no charge to non-profit, academic and governmental institutions based in developing countries. Simple and quick process to apply online. Others required to purchase a license.
- Technical support from LEAP web site.
- Most users will need training: available through SEI or regional partner organizations.
- Check LEAP web site for news of training workshops.

Coming Soon in LEAP 2019

- Gender disaggregated air pollution health impacts. Use to examine multiple benefits of clean energy strategies: climate, health, ecosystem impacts, etc.
- New methods for modeling health impacts of indoor air pollution (cooking).
- Yearly global climate impacts (temperature change) based on emissions of all gases (including HFCs): helps to show both short- and long-run implications of alternative pathways.
- NEMO (Next Energy Modeling system for Optimization): A new, super-fast optimization modeling engine that supports energy storage modeling for examining large-scale deployment of variable renewables.
- A new cloud-based technology database: open access with costs, emission factors and technical characteristics of energy technologies. Can be used with LEAP or other models via an open, web-based API.
- Big performance improvements: faster calculations and a more responsive user interface.

Coming later in 2019

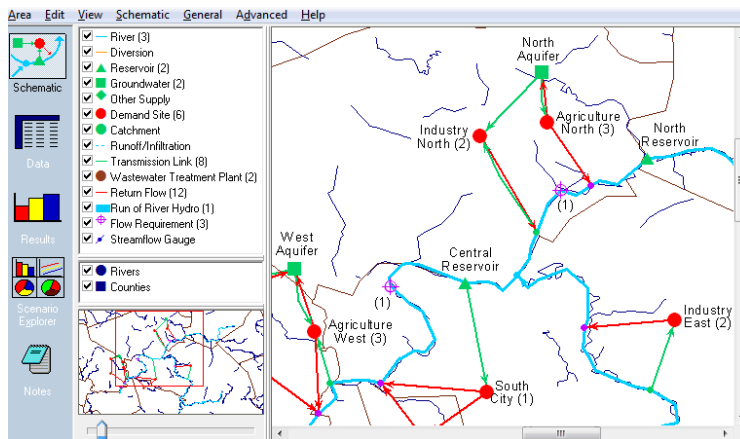
- Air pollution modeling at the city-scale, including mapping of emissions, concentrations and impacts.
- Detailed methods for modeling land-use, land-use change and forestry sector GHG emissions.
- webLEAP: Publish LEAP results to an interactive web site – for broader stakeholder engagement with NDCs and LEDs.

SEI's Tools for Climate Adaptation



- The Water Evaluation and Planning system is a powerful software tool for integrated water resources planning.
- It shares many of the same concepts and approaches used in LEAP and can even be linked to LEAP for “nexus” analyses.
- www.weap21.org

- weADAPT is SEI's popular online global platform containing high-quality information about climate adaptation. It links theory, policy and practice across scales and places.
- www.weadapt.org



Highlights and News



Designing user-driven climate services
 This publication outlines the Climandes project approach to systematically integrate small-scale farmers in the Andean highlands into the design and delivery of climate services.
[Read more](#)

Promoting gender-responsive adaptation in the agriculture sectors

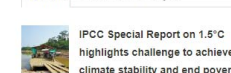
Using the framework of the NAP process, this brief provides an overview of the key gender issues to consider and main entry points for gender mainstreaming in the agriculture sector.



Urban resilience and everyday risk
 African cities face unique challenges and

Latest

Content Discussions People



IPCC Special Report on 1.5°C highlights challenge to achieve climate stability and end poverty
 This CDKN blog describes why we must heed the IPCC's 1.5°C Special Report and prevent further climate change that will harm the most vulnerable people.
[Read more](#)



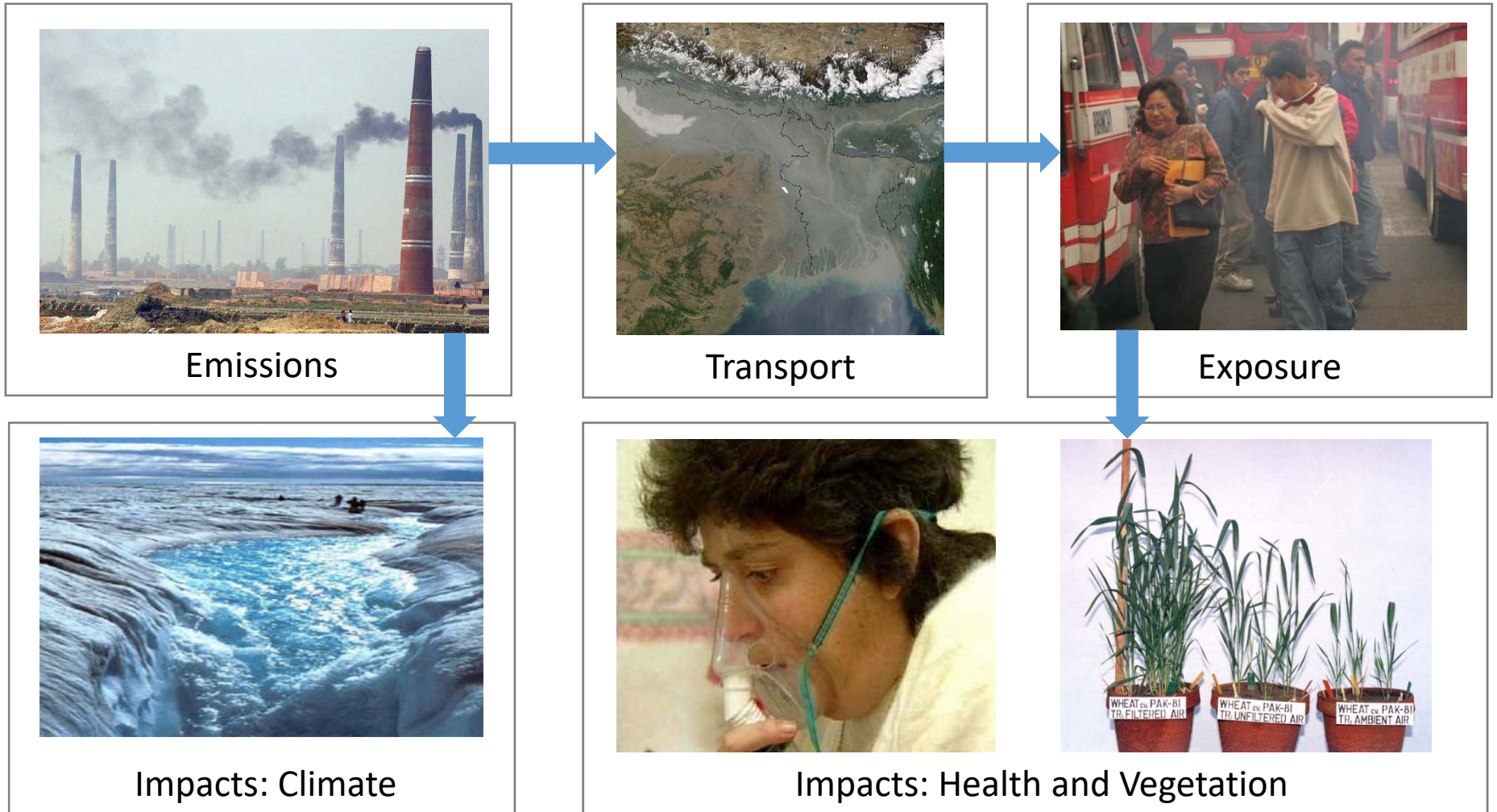
Thank you!

At Least 37 Countries Used LEAP for INDC Preparation

| | | |
|------------------------|------------|-------------|
| Armenia | Ghana | Myanmar |
| Albania | Haiti | Niger |
| Antigua & Barbuda | Iraq | Nigeria |
| Azerbaijan | Israel | Palau |
| Bahamas | Jamaica | Palestine |
| Bangladesh | Lebanon | Philippines |
| Belarus | Liberia | Serbia |
| Bosnia and Herzegovina | Mauritania | Uganda |
| Botswana | Mongolia | Vietnam |
| Cambodia | Montenegro | Yemen |
| Chile | Morocco | Zambia |
| Ecuador | Mozambique | Zimbabwe |
| Micronesia | | |

Many others using LEAP to help develop National Communications (TNCs), Biennial Update Reports (BURs), Low Emission Development Strategies (LEDS), Nationally Appropriate Mitigation Actions (NAMAs), etc.

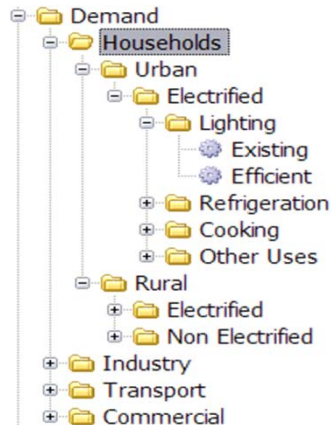
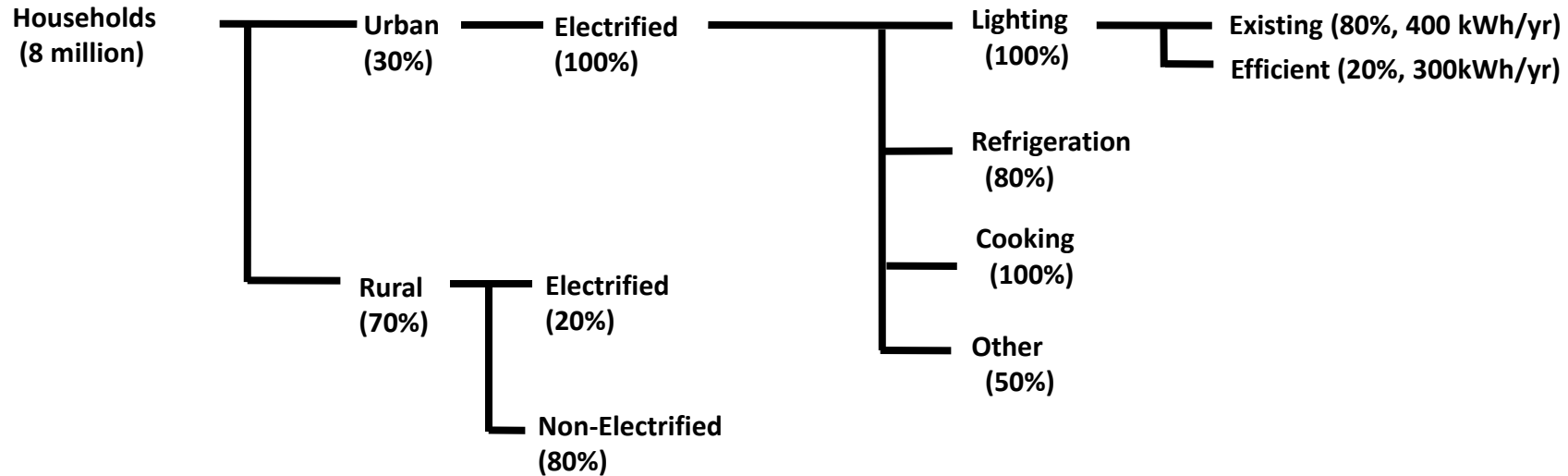
LEAP-IBC Model Pathway



LEAP and IBC

- Emissions scenarios for primary pollutants (CO_2 , $\text{PM}_{2.5}$, CH_4 , CO , NO_x , NMVOCs, BC, OC, SO_x) developed in LEAP.
- LEAP's emissions feed into the Integrated Benefits Calculator (IBC), which contains background rest-of-world emissions scenarios from IIASA GAINS "Eclipse" scenarios (baseline and "do everything" scenarios with 16 measures and banning of agricultural burning).
- IBC translates emissions into population weighted concentrations of secondary pollutants in the selected country showing in-country, rest-of-world, and natural background emissions).
- IBC is based on the Geoschem-Adjoint (G-A) model: a global 3-D atmospheric chemical transport model driven by meteorological input from the Goddard Earth Observing System (GEOS) of NASA. G-A calculates coefficients that relate *concentrations* of secondary pollutants in a target country to the *emissions* of primary pollutants in all other grid squares in the world.
- IBC also contains concentration-exposure-response functions (based on yje Global Burden of Disease study) to calculate health (mortality) and ecosystem (crop loss) impacts.
- All data, calculations and results occur quickly and displayed back in LEAP's user interface.

Demand Analysis in LEAP



- The tree is the main data structure used for organizing data and models, and for reviewing results.
- Icons indicate the types of data (e.g., categories, technologies, fuels and environmental effects).
- Users can edit the tree on-screen using standard editing functions (copy, paste, drag & drop)
- Structure can be detailed and end-use oriented, or highly aggregate (e.g. sector by fuel).
- Detail can be varied from sector to sector.

Transformation Analysis in LEAP

- Demand-driven engineering-based analysis of energy conversion, transmission and distribution, and resource extraction.
- Transformation “modules” contain one or more “processes”. Each can have one or more feedstock fuels and one or more auxiliary fuels.
- Choice of solution methodologies: simulation or optimization.
- Each year divided into “time slices” to represent seasonal and time of day variations.
- Calculates process capacity expansion and operation, emissions, costs/ benefits, imports, exports, etc.
- Produces detailed results as well as standard format reports such as energy balances and Sankey diagrams.

