



International Transport Energy Modeling (iTEM)

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7th International Transport Energy Modeling (iTEM) Workshop - TDC

18th September 2024, United Nations Economic Commission for Europe, Palais des Nations, CH-1211 Geneva 10,
Switzerland

About iTEM...

- 🔗 A consortium of groups that:
 - ✦ use **models** to project **future transport activity**,
 - ✦ **globally** and inclusive of **all modes**,
 - ✦ with a focus on **energy use and GHG emissions** (minimum), and other
 - ✦ environmental impacts.
- 🔗 Groups contribute their **model outputs as data** for inter-comparison and
- 🔗 participate in interpretation.
- 🔗 Inaugural iTEM workshop: Davis, CA, US — October 2014.
 - ✦ Four models included: US DoE/PNNL GCAM, IIASA MESSAGE, IEA MoMo, ICCT Roadmap.
 - ✦ Described in “Detailed assessment of global transport-energy models’ structures and projections” (Yeh et al. 2016)
- 🔗 <https://transportenergy.org>



Key feature of iTEM

- ✎ Including **a wide set of participants** brings benefits, but can complicate the process of comparison in ways alien to other model intercomparison efforts:
- ✎ A mix of groups:
 - ✎ National and international government organization—e.g. U.S. DoE PNNL, IEA.
 - ✎ NGOs, non-profits & think-tanks—e.g. ICCT.
 - ✎ Research/academic—e.g. IIASA, MIT, Chalmers.
 - ✎ Firms—e.g. BP, Shell, Exxonmobile.
- ✎ Diverse research foci & scenarios (business strategy, IPCC support, academic), core model logic, methods, resolution, & sectoral/regional aggregation.
- ✎ Model source code, input data, and full-resolution outputs may each be either **public or proprietary**, or in between.



Method

<https://github.com/transportenergy/database>



**Establish
common
template for
submissions**

Dimensions
Variable —
Scenario — Region
— Mode —
Technology —
Fuel.

Units prescribed for
each quantity.

Mandatory and
optional entries.



**Teams
prepare &
submit data
for scenarios**

Some rescaling,
aggregation and
unit conversion
happens at this
stage.

Textual notes on
model
idiosyncrasies to
aid in comparison.



**Clean input
data, check
for
consistency,
and rescale
into common
regions**



**Derive
quantities
from base
variables**

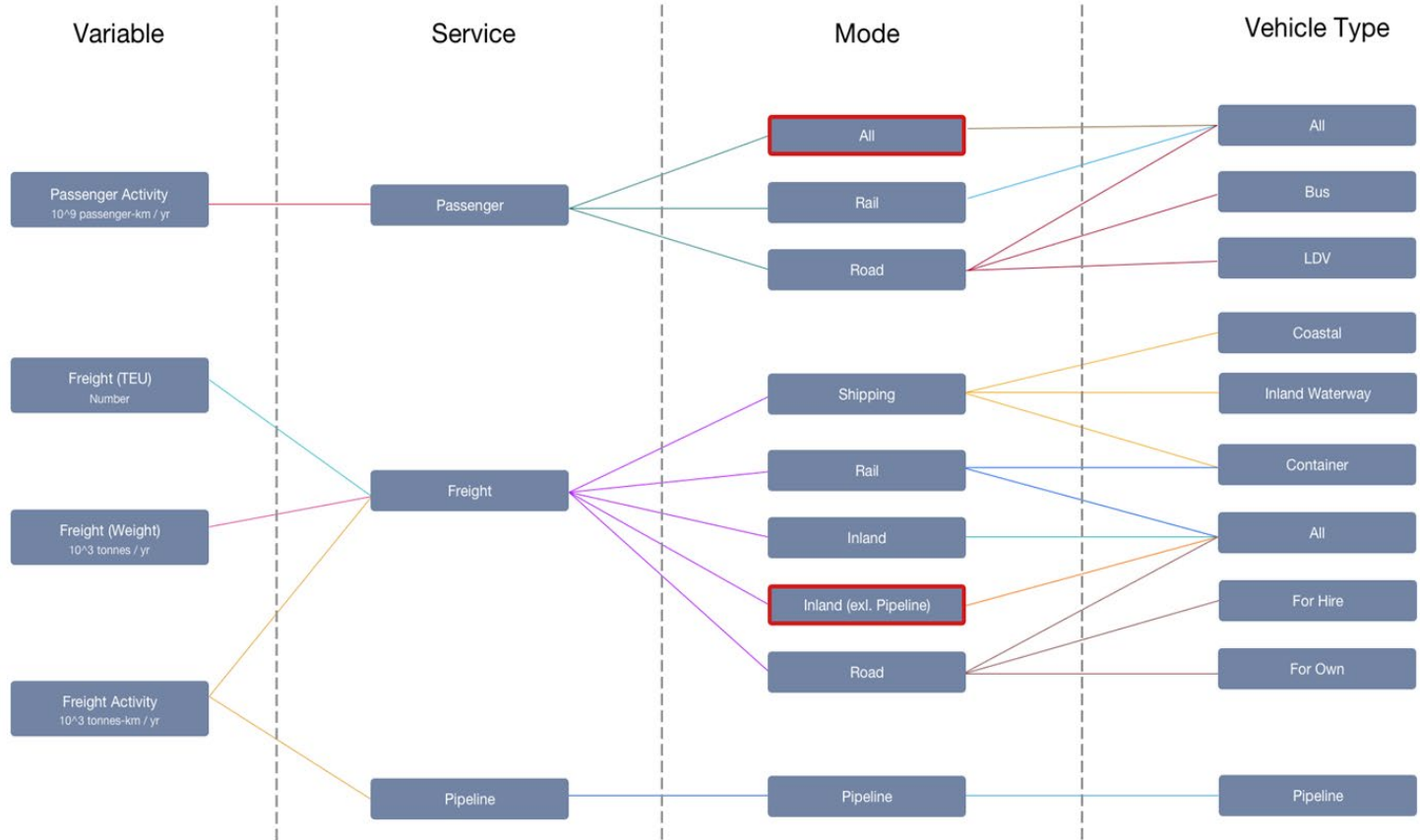
e.g. energy-
intensity of
passenger activity
[MJ/pass.-km]



**Prepare
plots,
calculations
and tables as
objects for
discussion
between
modeling
teams**



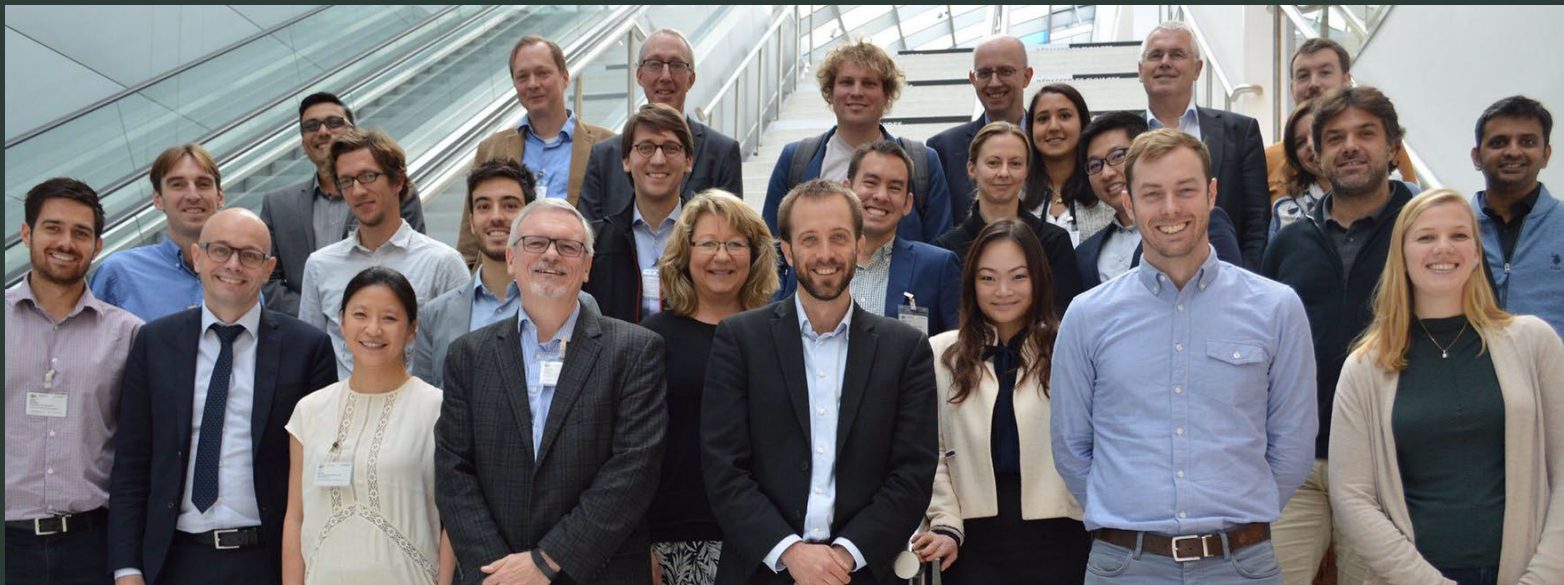
Data Architecture



Challenges and Issues

- ⌘ Aggregation/disaggregation of
 - ✦ Regions, Technology set, Activity, Fuels...
- ⌘ Incomplete or unreported data
- ⌘ Input assumptions are hard(er) to collect but important to recognize the inconsistencies in the historical data





Selected results



How Much Do People Travel? How Certain Are We?

International Transport Energy Modeling (TEM) comparison, thousand PKM/capita/yr, all modes, 2015

<u>Australia</u>	<u>Brazil</u>	<u>China</u>	<u>U.S.</u>
26.2	5.4	5.0	23.1
21.7	8.3	8.4	26.6
33.7	6.9	15.2	15.2
43.5	5.4	4.5	27.7
17.5	4.2	6.3	19.7
17.5	8.4	6.5	26.8



Pacific Northwest
NATIONAL LABORATORY

International
Transport Forum

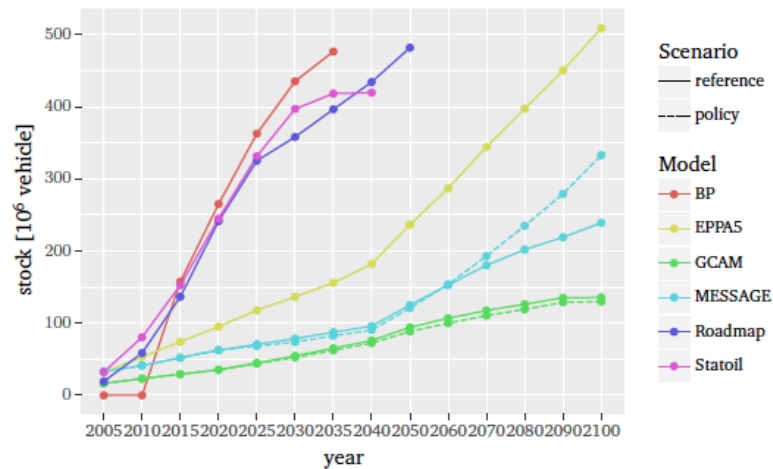
International Institute for
Applied Systems Analysis
IIASA

iea International
Energy Agency

icct
THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION



Huge uncertainty about China: China's LDV stock



- Will there be 90 million cars or 500 million cars in China by 2050?

iTEM Open Data (2020, 2024)

ITEM Open Data & Harmonized Transport Database

Published September 11, 2024 | Version 11-09-2024

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Versions

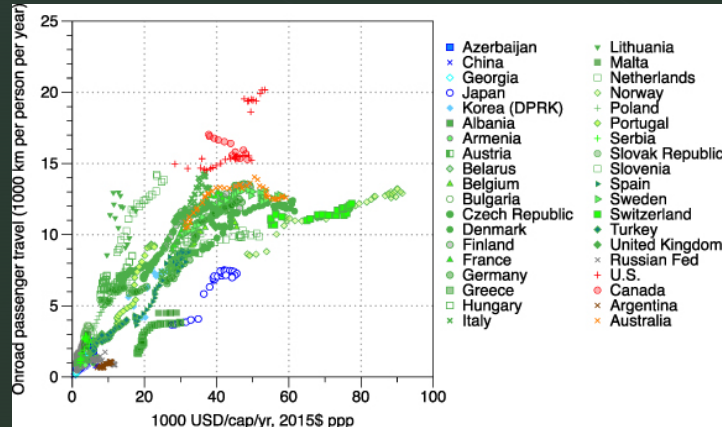
Version	Created
Version 11-09-2024	Sep 11, 2024
10.528/10e660-1374991	
Version 15-04-2020	Oct 23, 2020
10.528/10e660-4297423	
Version 15-04-2020	Oct 23, 2020
10.528/10e660-4121180	

This dataset and documentation contains detailed information of the ITEM Open Database, a harmonized transport data set of historical values, 1970 – present. It aims to create transparency through two key features:

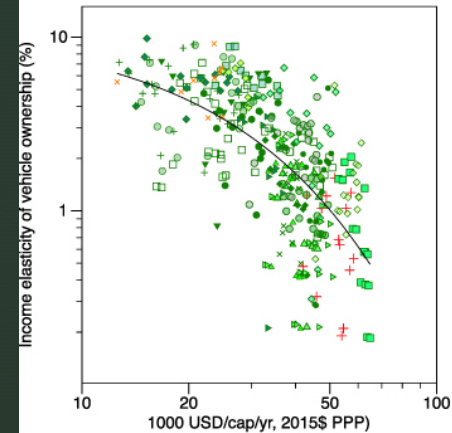
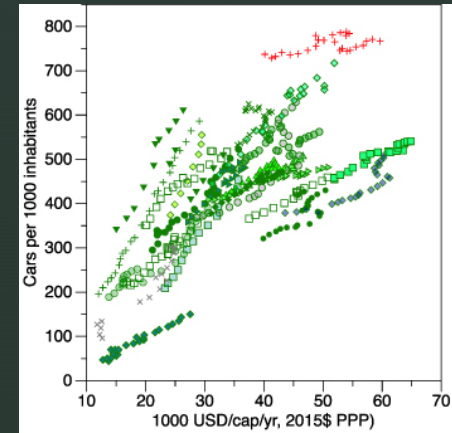
- Open-Data: Assembling a comprehensive collection of publicly-available transportation data
- Open-Code: All code and documentation will be publicly accessible and open for modification and extension. <https://github.com/transportenergy>

The ITEM Open Database is comprised of individual datasets collected from public sources. Each dataset is downloaded, cleaned, and harmonised to the common region and technology definitions defined by the ITEM consortium <https://transportenergy.org>. For each dataset, we describe the name of the dataset, the web link to the original source, the web link to the cleaning script (in python), variables, and explain the data-cleaning steps (which explains the data-cleaning script in plain-English).

Should you find any problems with the dataset, please report the issues here <https://github.com/transportenergy/databases/issues>.



ITEM Open Data, onroad passenger travel distance and GDP, 1980-2018



Progress in Energy

PERSPECTIVE • OPEN ACCESS

Improving future travel demand projections: a pathway with an open science interdisciplinary approach

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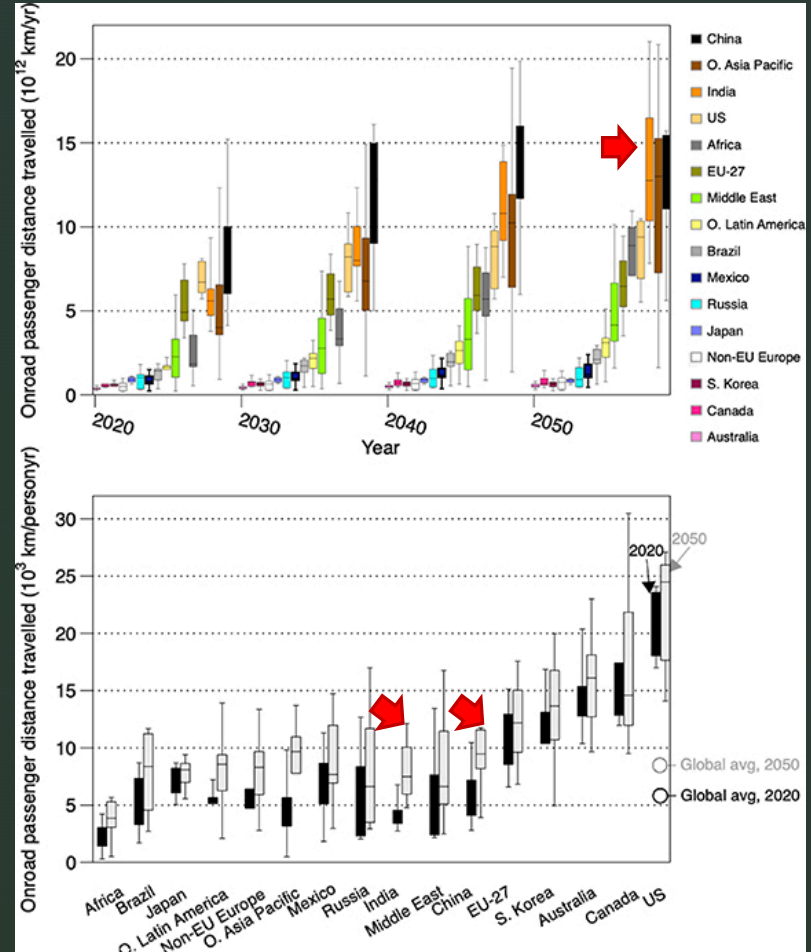
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ITE3 onroad passenger distance travelled per country/per person



Concluding Remark

- **Vision:** robust knowledge for all about the world's transport system, based on open data and models that are scientific and continually improved.
- **Mission:** to facilitate production of this knowledge, by supporting an active community of stakeholders, organizing events, and coordinating joint research projects.
- **Administrative:** active members of iTEM + ITF-OECD as permanent secretariat
- **Activities:** iTEM Workshop, iTEM Modeling Comparison, iTEM Open Data