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IIASA, Vienna, 19 November 2013
ADVANCE Conference: ENHANCING THE STATE OF TRANSPORT MODELING IN IAMS

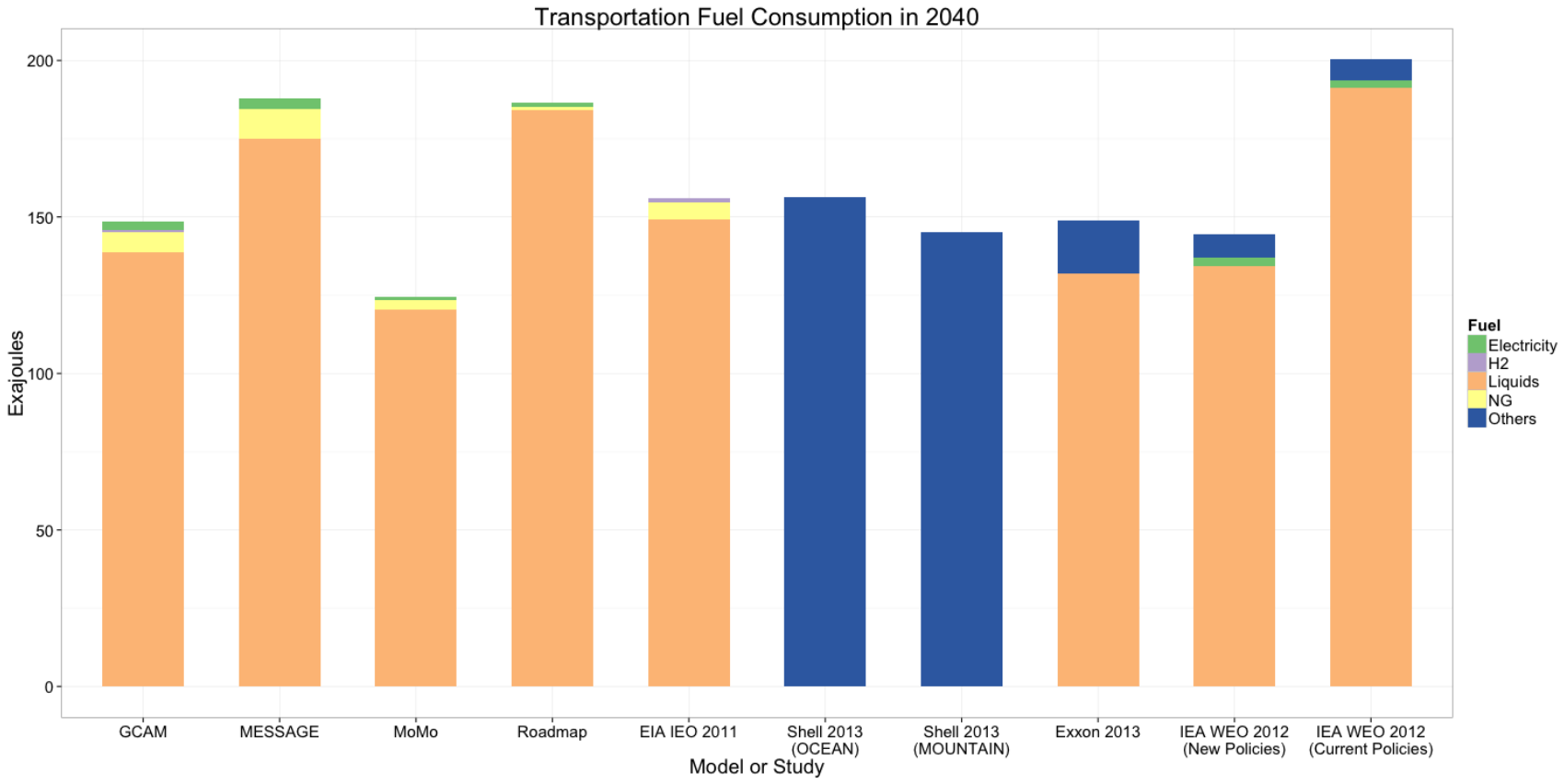
What transport data is available and what more do we need for IAM work?

Lew Fulton,
University of California, Davis

ITS UCDAVIS INSTITUTE OF TRANSPORTATION STUDIES

iTEM Model Comparison Project (IIASA, ICCT, PNNL, IEA, UCD)

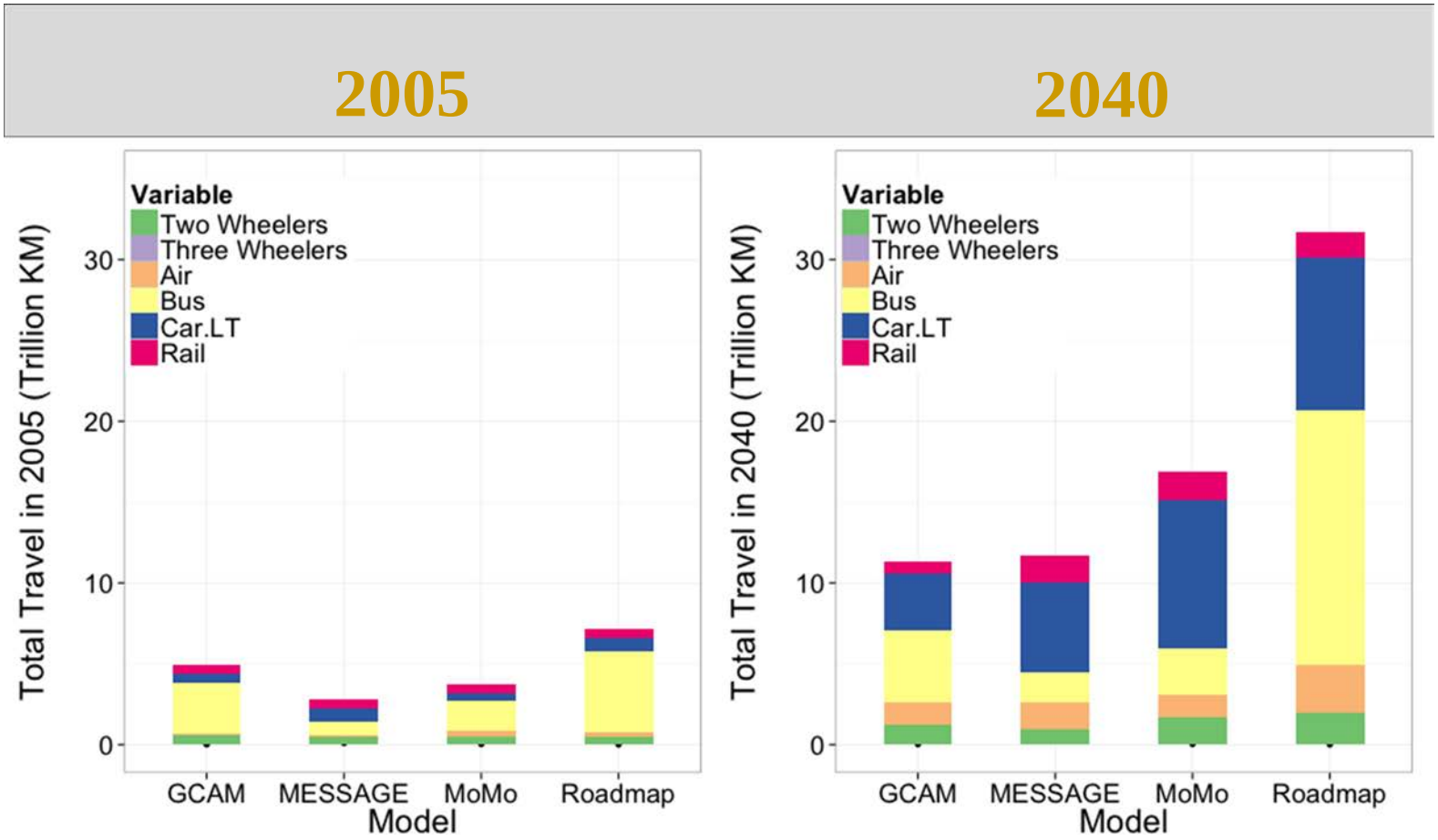
Global reference case transportation energy use projections in 2040 across 10 major global energy models



UCDAVIS
SUSTAINABLE TRANSPORTATION ENERGY PATHWAYS

iTEM Model Comparison Project

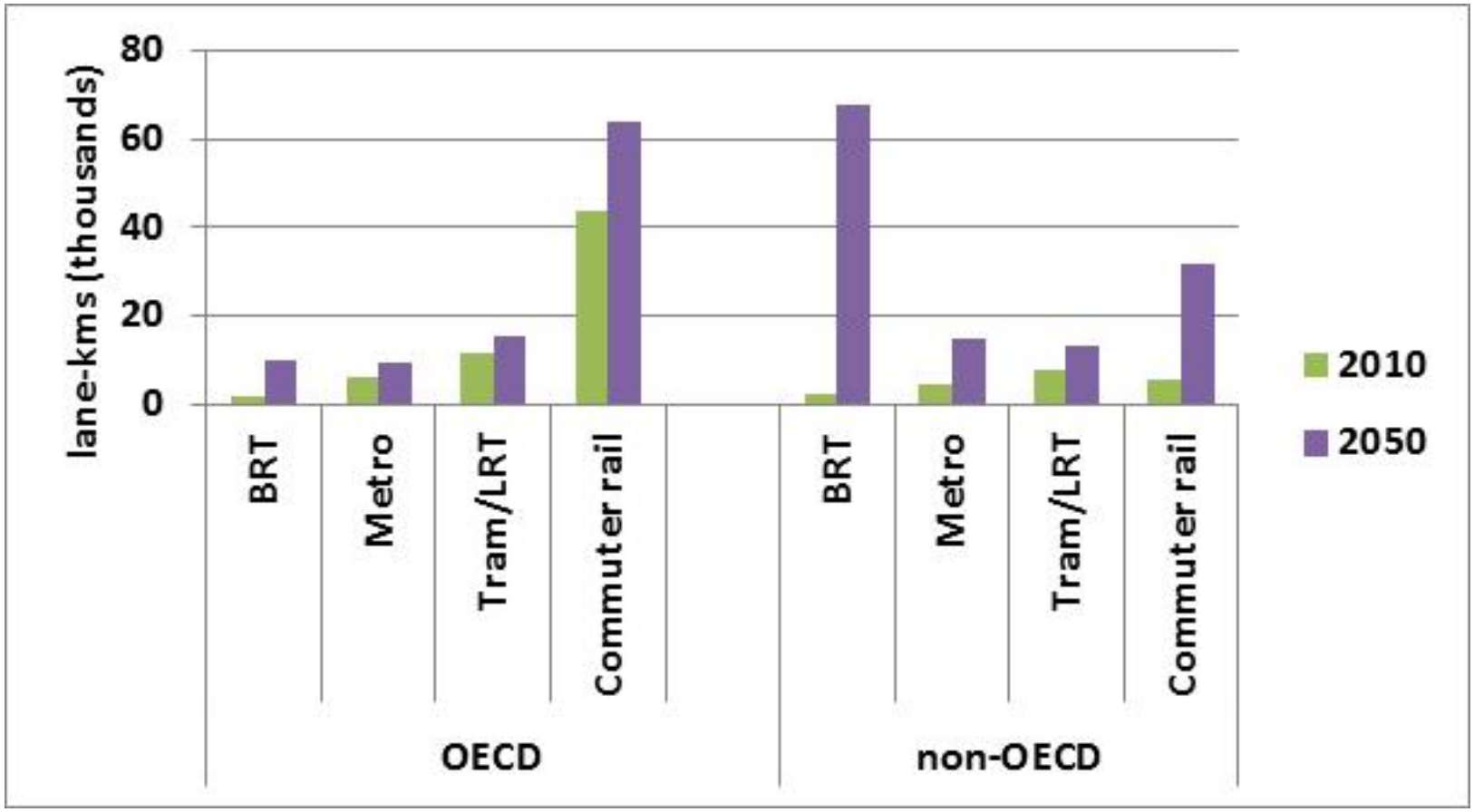
Preliminary results for China – even 2005 passenger travel data is far apart



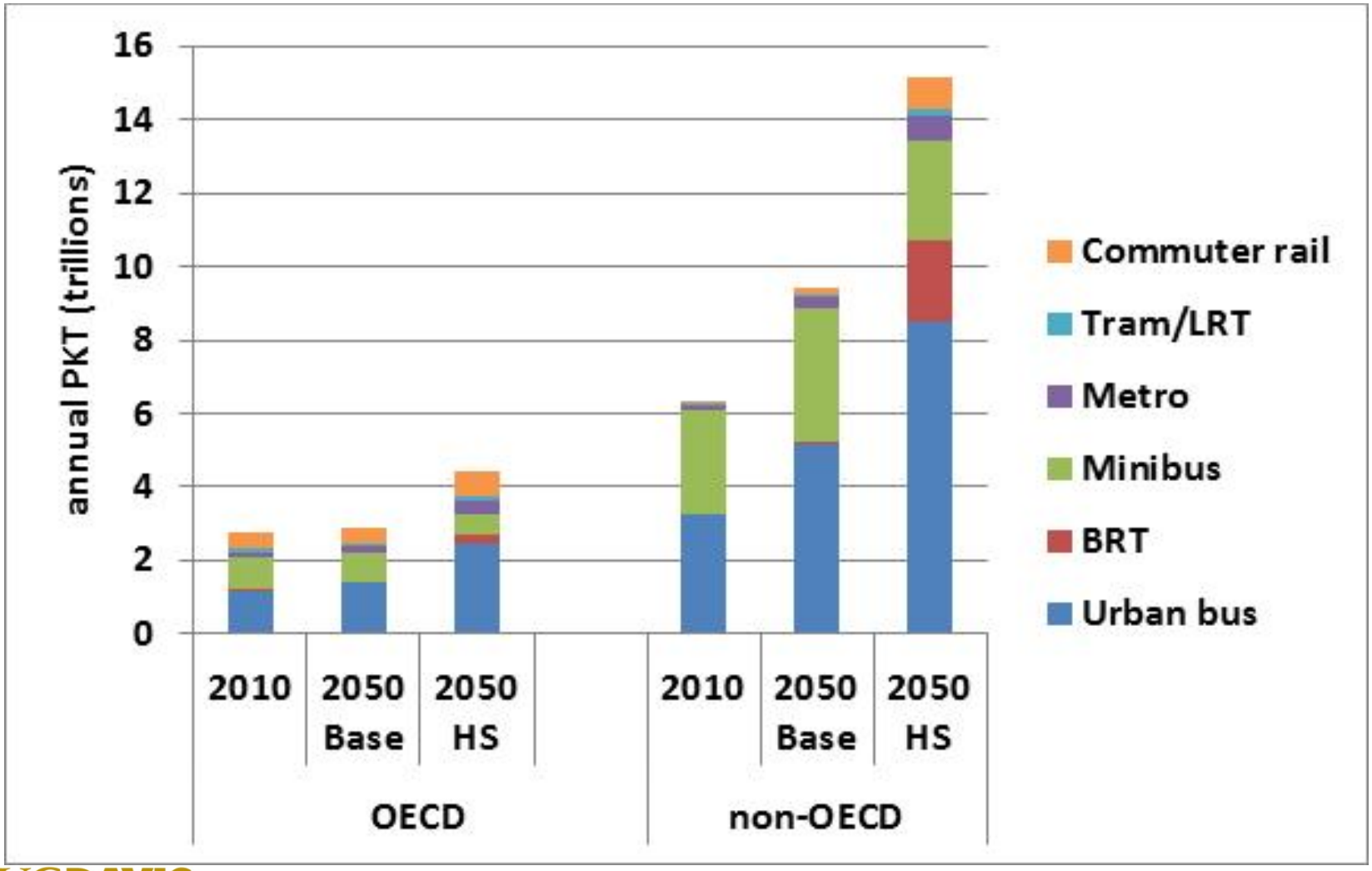
MoMo Model Shift Project

- How much can we reduce CO2 emissions (and other impacts) from urban transport by 2050 via changes in urban form and travel patterns? At what cost?
- Led by UCD, conducted in cooperation with IEA, ITDP, IADB, WB
- Analysis builds up from data on current travel patterns in different parts of the world, projections of where these may go out to 2050, using IEA Mobility Model
  - World broken into 30+ countries and regions
  - Urban mobility modules being developed
  - More modes added
  - Modal shift potential based on potential to increase capacity of transit/NMT systems to allow fewer cars

High shift case: total lane/track kms, 2010 and 2050

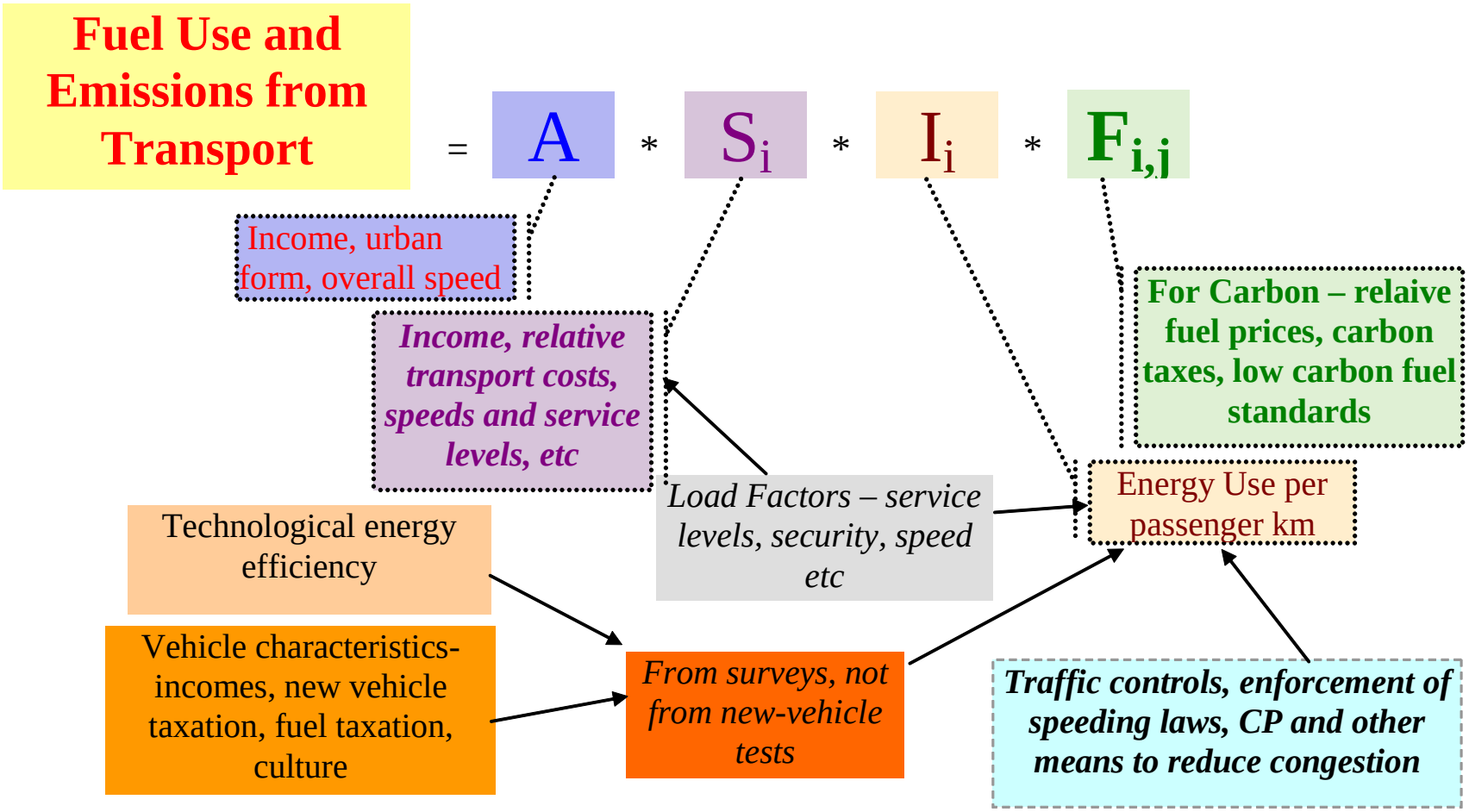


PRELIMINARY: Total urban bus and rail passenger-kms travelled (PKT) by region and scenario

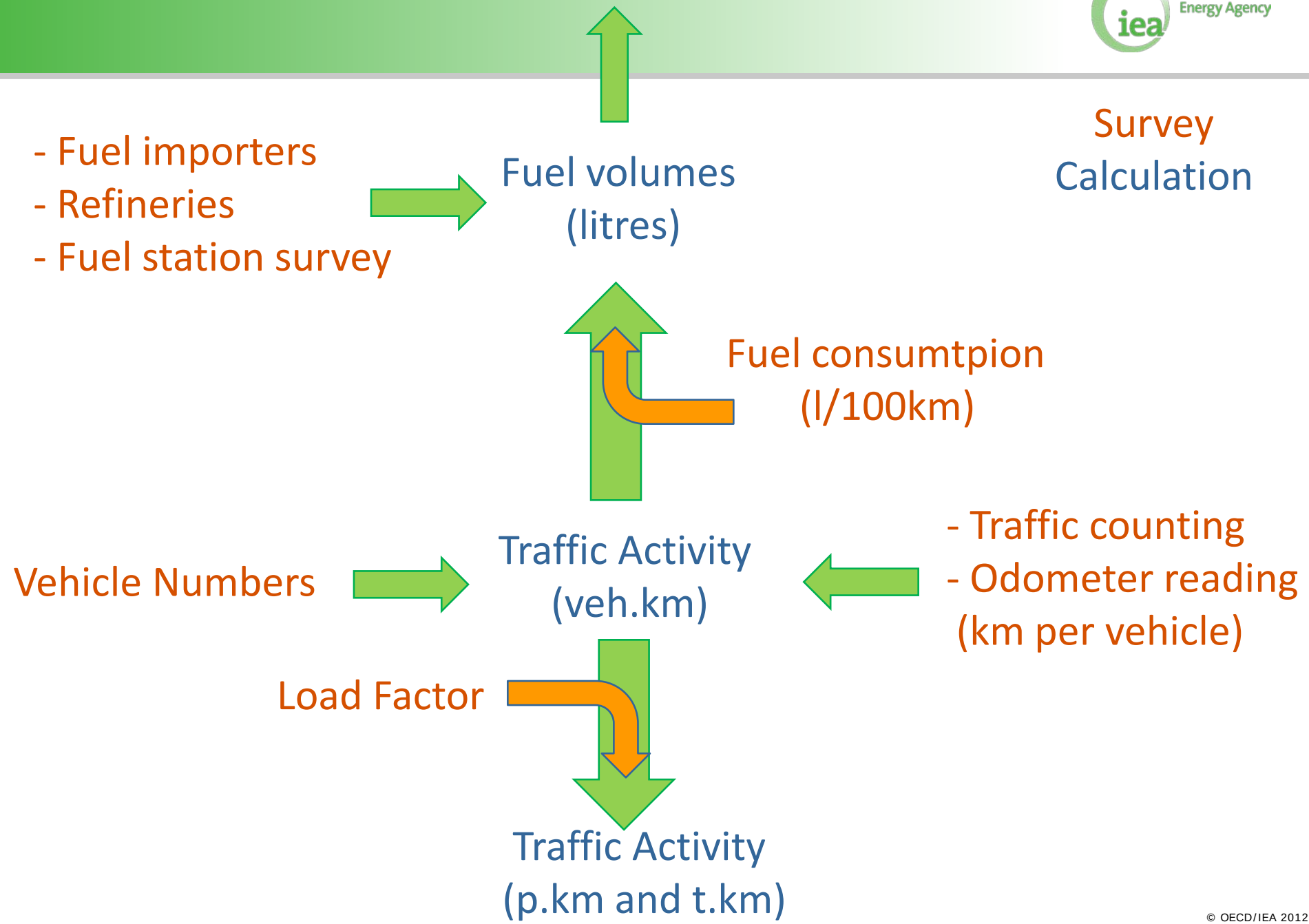


THE ASIF FRAMEWORK (by Lee Schipper)

How it all multiplies through to fuel use



Energy Use



IEA Transport database

Powertrain	Energy Source	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Passenger Cars		**23.8**	**24.2**	**24.7**	**24.8**	**25.2**	**25.8**	**26.5**	**27.1**	**27.6**	**28.1**	**28.5**	**28.8**	**29.0**	**29.0**	**29.2**	**29.4**
		23.8	24.2	24.7	24.8	25.2	25.8	26.5	27.1	27.6	28.1	28.5	28.8	29.0	29.0	29.2	29.4
	Gasoline	19.1	18.8	18.8	18.1	18.0	18.0	18.0	18.0	17.8	17.6	17.1	16.6	16.1	15.6	15.1	14.6
	Diesel	4.7	5.4	6.7	6.7	7.2	7.7	8.3	8.9	9.5	10.3	11.2	12.0	12.7	13.3	14.0	14.6
	Alternative powertrains	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
	Pure CNG																
	CNG / Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	LPG / Gasc	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
	FlexFuel																
Hybrids		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Gasoline							0.000	0.000	0.001	0.001	0.001	0.002	0.002	0.005	0.012	0.019
	Diesel																
	Alternative powertrains	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Pure CNG																
	CNG / Gas																
	LPG / Gasc																
	FlexFuel																
	Hydrogen F																
Plug-ins		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Gasoline																
	Diesel																
	Alternative powertrains	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Pure CNG																
	CNG / Gas																
	LPG / Gasc																
	FlexFuel																
	Hydrogen F																
Electric		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Pure electric																
Passenger Light Trucks		0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.2	**1.3**
ICEs		0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.3
	Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Diesel	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.4	0.6	0.7	0.8	0.9	1.0	1.2	1.3
	Alternative powertrains	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Pure CNG																
	CNG / Gas																
	LPG / Gasc																
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	Hydrogen F																
Hybrids		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Gasoline																
	Diesel																
	Alternative powertrains	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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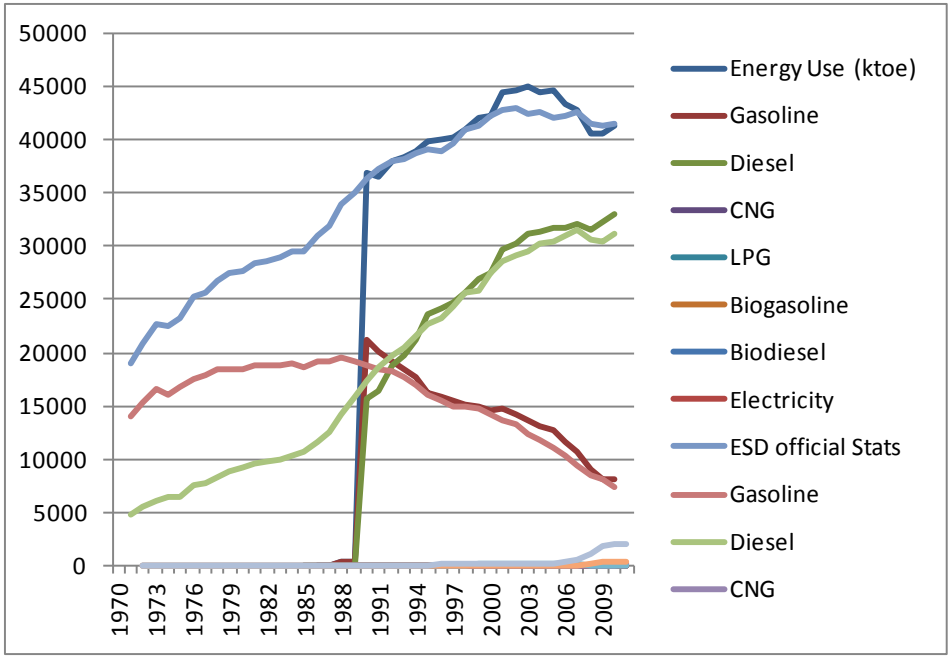
Plug-ins		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

- Transport database covers 33 single countries and 8 aggregate regions
- Stock, sales, travel, mileage, fuel economy are tracked by road vehicle mode, type, power-train and energy source
- Transport database and ESD energy balances allow for bottom-up vs. top-down comparison of fuel use data

Bottom-up vs top-down

- The combination of the transport database and ESD fuel use allows for robust fuel split
- Oddities in ESD tracking can be spotted via plausible transport assumptions on uncertain data



Ideal data vs data availability: Russian Example

Data need to develop indicators	IEA countries coverage	Data available from Russia
Energy consumption by:		
- Energy source	25	No
- Transportation mode	21	No
o Cars, SUV and personal light trucks	22	No
o Motorcycles and three-wheelers	10	No
o Buses	22	No
o Passenger train	24	No
o Domestic passenger airplane	23	No
o Domestic passenger ships	5	No
Passenger-kilometres by:	20	?
o Cars, SUV and personal light trucks	26	No
o Motorcycles and three-wheelers	6	No
o Buses	23	YES
o Passenger train	25	YES
o Domestic passenger airplane	20	YES
o Domestic passenger ships	4	YES

Ideal Data requirement vs Data availability in Russia

Data need to develop indicators	IEA countries coverage	Data available from Russia
Vehicle Kilometres by:		No
o Cars, SUV and personal light trucks	23	No
o Motorcycles and three-wheelers	11	No
o Buses	19	No
o Passenger train	2	No
o Domestic passenger airplane	3	No
o Domestic passenger ships	1	No
Vehicle stocks by:		
o Cars, SUV and personal light trucks	26	No
o Motorcycles and three-wheelers	24	Yes From MVD
o Buses	25	YES
o Passenger train	0	YES
o Domestic passenger airplane	0	NO
o Domestic passenger ships	1	NO

Potential data sources

- IEA data: Energy Balances (Beyond 2020), Energy Indicators
- Official data – National/international stats, government/ministries
  - Eurostat, BTS, EPA, EEA, MLIT, NRC, Transport ministries, RosStat, UNECE, IEEJ…
- Associations
  - JAMA, OICA, ACEA, ANFAVEA, ACEM, FCAI, NAAMSA, IRF, KAMA…
- Public & private research institutes
  - ORNL, TREMOVE, NIIAT, Tsinghua University, ANL, DLR, ARAI, ITS, UC Davis…
- Industry/consulting
  - Marklines, POLK, Walsh, car and truck manufacturers…

Beyond ASIF – what types of data do we need?

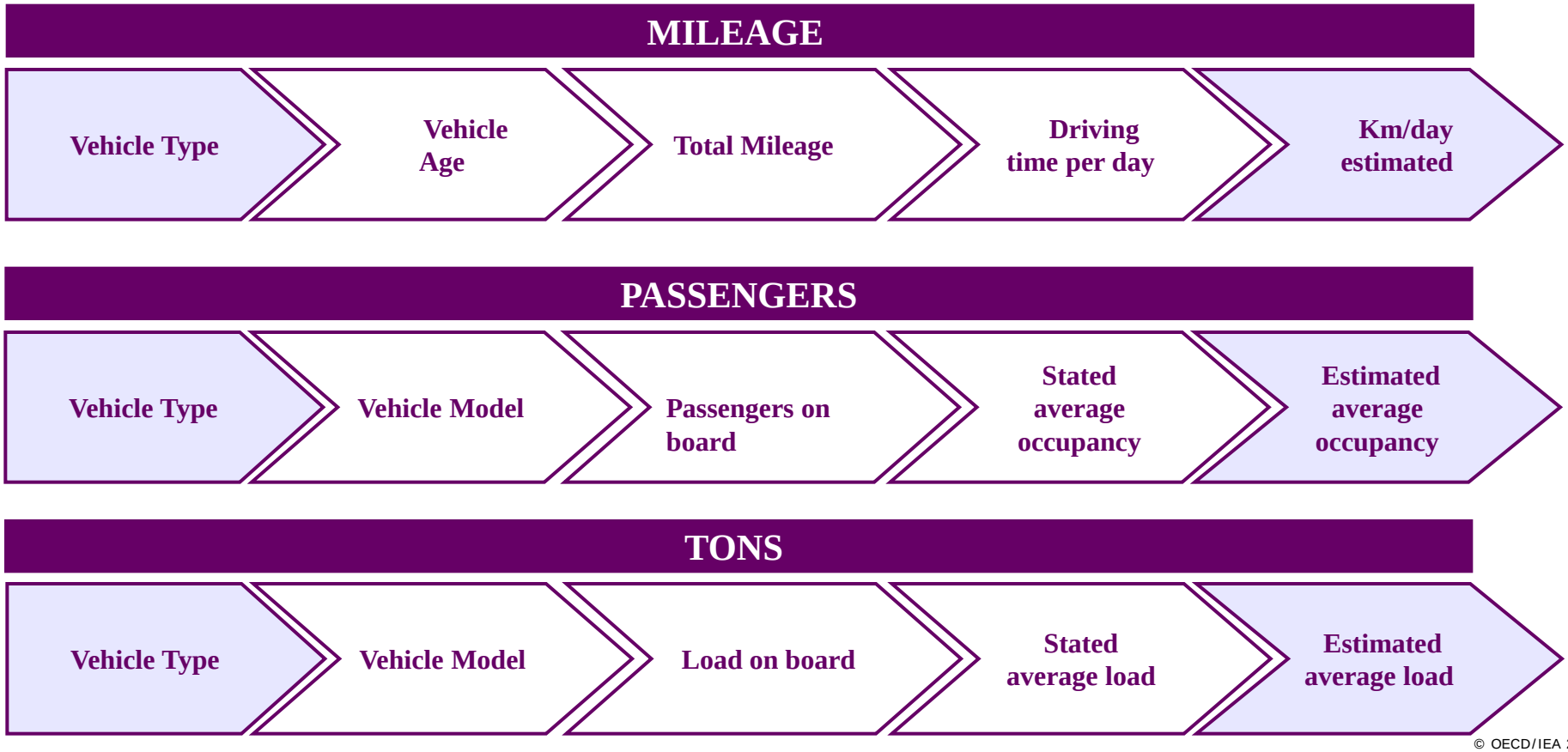
- Basic “ASIF” type data
- Deeper indicators on passenger and freight travel
  - Deeper modal breakouts
  - Stock turnover, utliization rates
  - Attribute characteristics of vehicles
  - Attributes of consumers, travellers
- Technical/technology/infrastructure data
- Cost/investment data
- Impact data beyond energy/CO2 (e.g. pollutants, congestion, safety)

How can we collect better data?

- Vehicle registration data
- Vehicle OBD system data
- Household surveys – demographic variation
- Logistic and trucking company surveys
- Scale up of urban (e.g. O-D data)?
- Use of new data collection technologies

Mexico Example - Methodology

- 5 min Questionnaire at fuel stations
- Sample size : 545 fuel stations 26265 vehicles



A way forward?

- Short term – keep working together to improve data sets (comparisons), more data sharing needed
- Medium term – more structured sharing (common international data system) and working with countries to help improve their systems
  - ADB “Global Transport Intelligence” will begin soon
- Long term – develop a common international framework/methodology for cost-effecitve, on-going data collection systems that countries adopt

Conclusions

- A wide set of data is necessary to accurately depict transport characteristics across a range of indicators
- Cross checking is possible with **ASIF**, but doesn't cover everything.
- Difficult to implement good transport policy without a good set of indicators to help design, monitor and assess it.
- Better cooperation on data, with each other and with governments, is key.

Thank you!

Lew Fulton

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