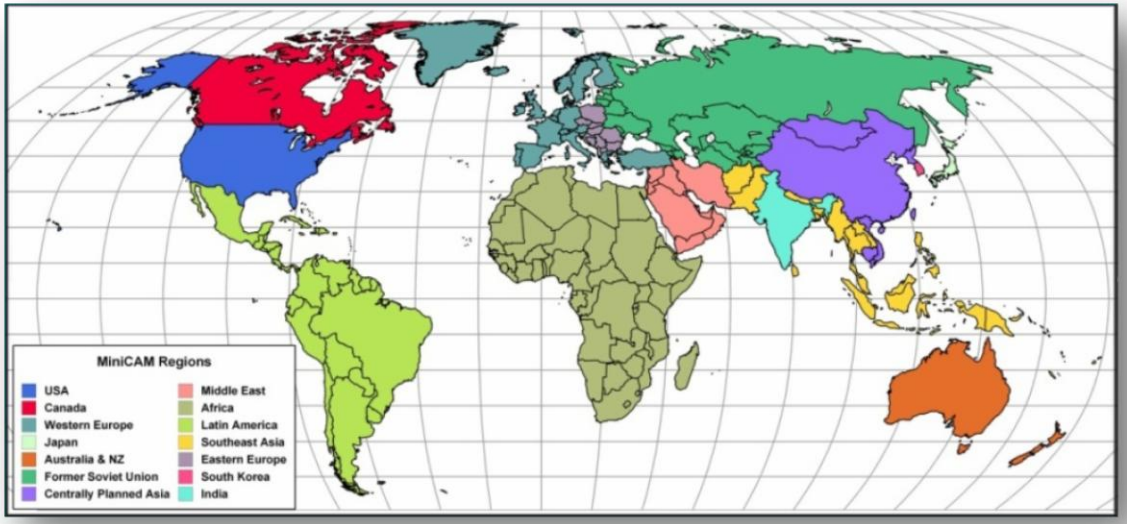
GLOBAL TRANSPORTATION DEMAND: THE NEW SHARED SOCIOECONOMIC PATHWAYS



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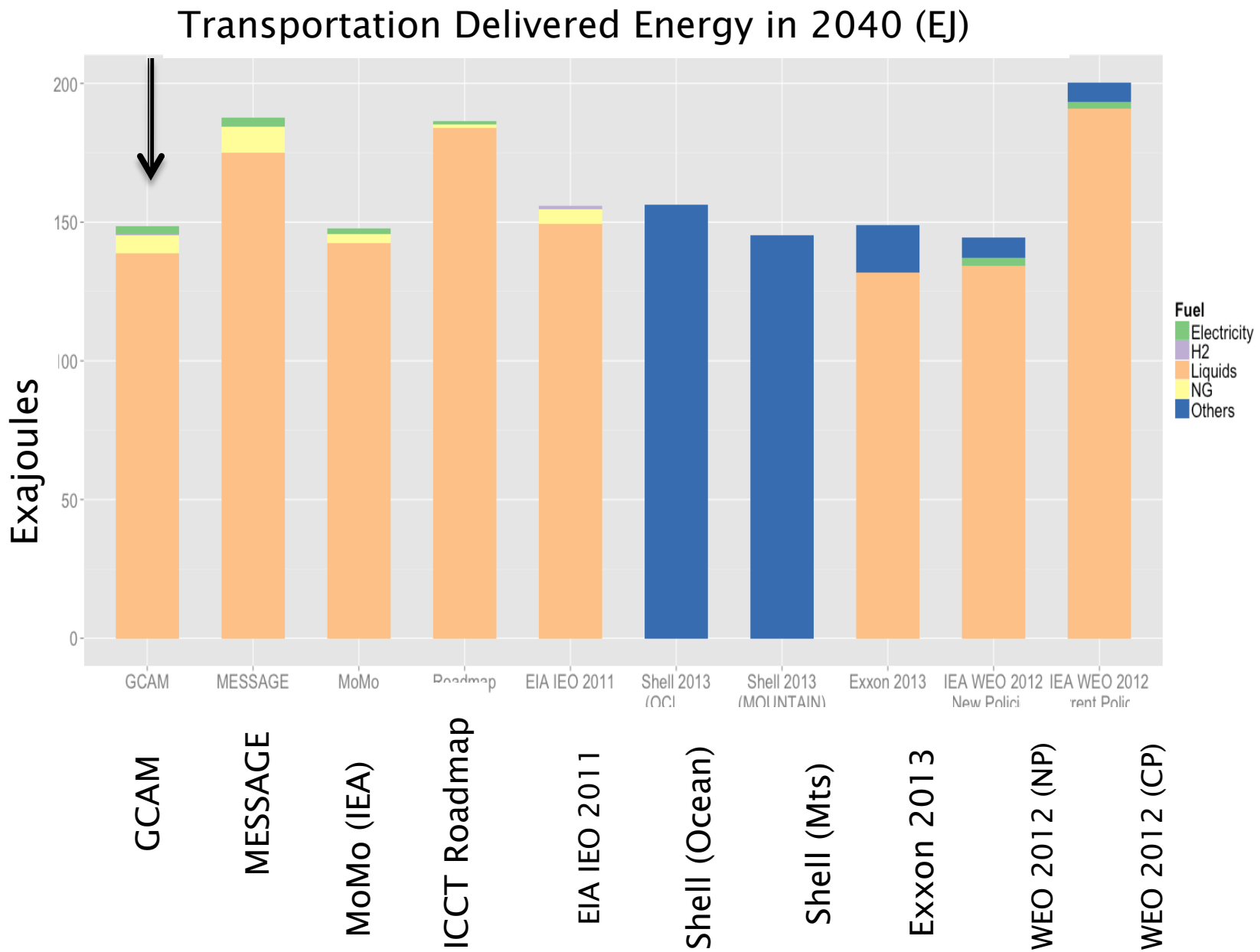
PNNL: Page Kyle, Sonny Kim

MODEL COMPARISON



MOTIVATION

Motivation #1:

- Global models do a poor job representing the transportation sector

India

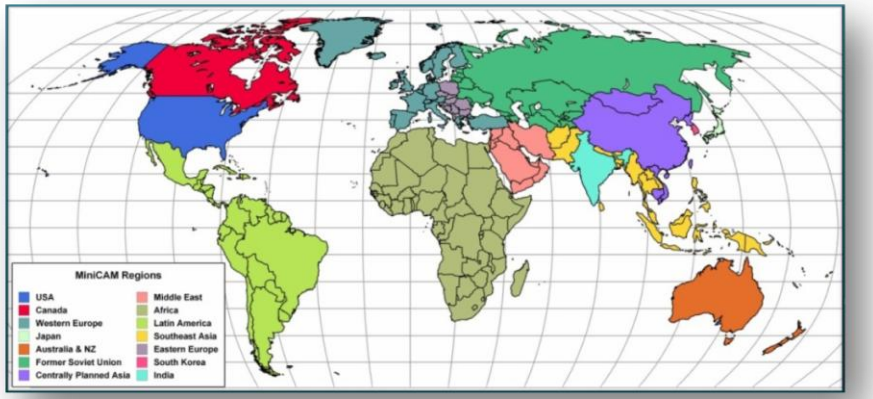
USA

Motivation #2:

- "SSPs" = Shared Socioeconomic Pathways
  - SSP #1 – Sustainable future, mitigation policies are working.
  - SSP #2 – Middle of the road
  - SSP #3 – Fragmentation, poverty, high emissions
  - SSP #5 – Prosperous world but fossil fuel use remains high

THE GLOBAL CHANGE ASSESSMENT MODEL (GCAM)

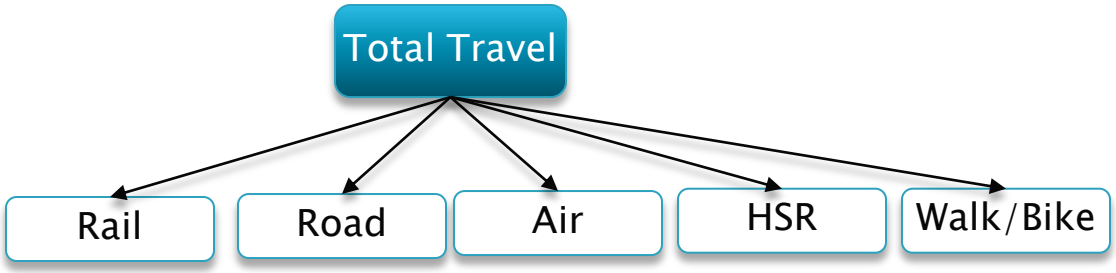
14 Region Energy/Economy Model



- **Integrated assessment model (IAM)**
- Links **Economic, Energy, Land-use,** and **Climate** systems
- Runs through **2095**
- **Inputs:**
  - Policy levers (e.g. c-tax, c-cap, LCFS, tech change, CCS availability)
  - GDP/Pop
- **Outputs:**
  - Energy use
  - Ag production
  - Service (e.g. pass-km)
  - GHG

- Open-source
- Documentation available at: **wiki.umd.edu/gcam**

THE TRANSPORTATION MODULE IN GCAM



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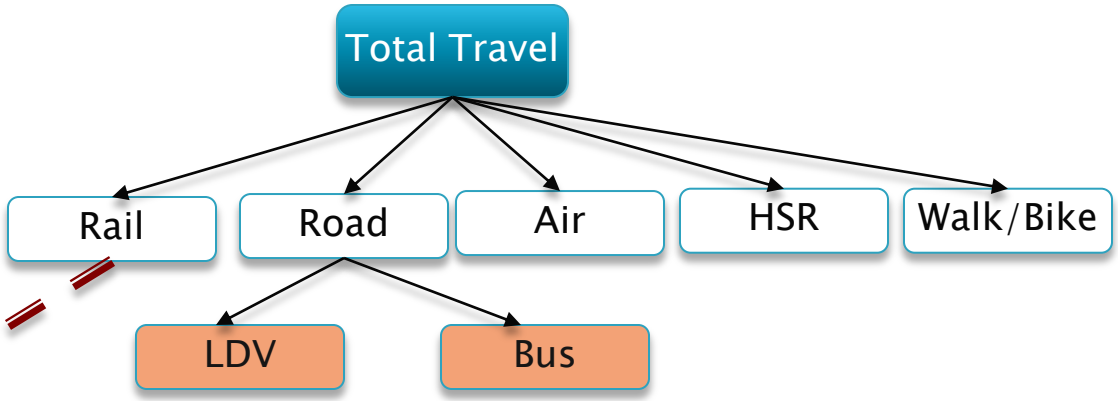

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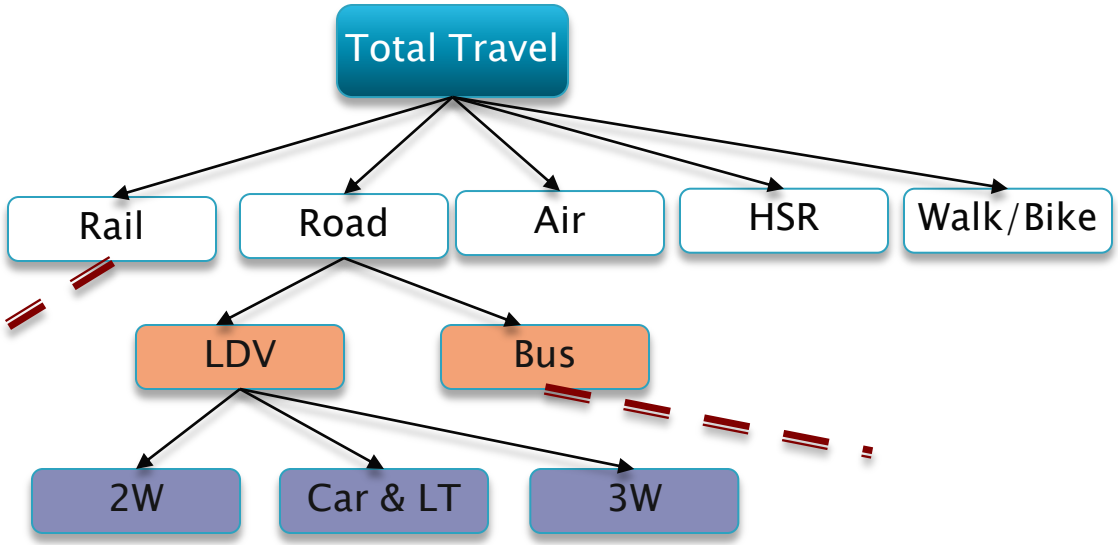

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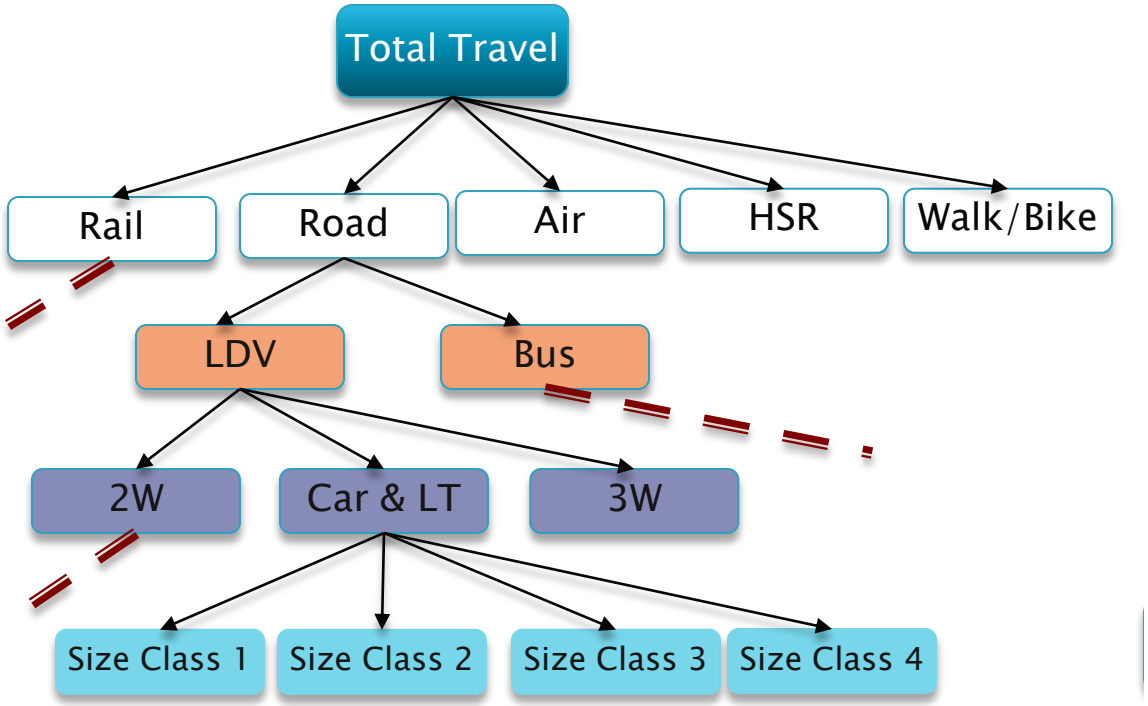
THE TRANSPORTATION MODULE IN GCAM



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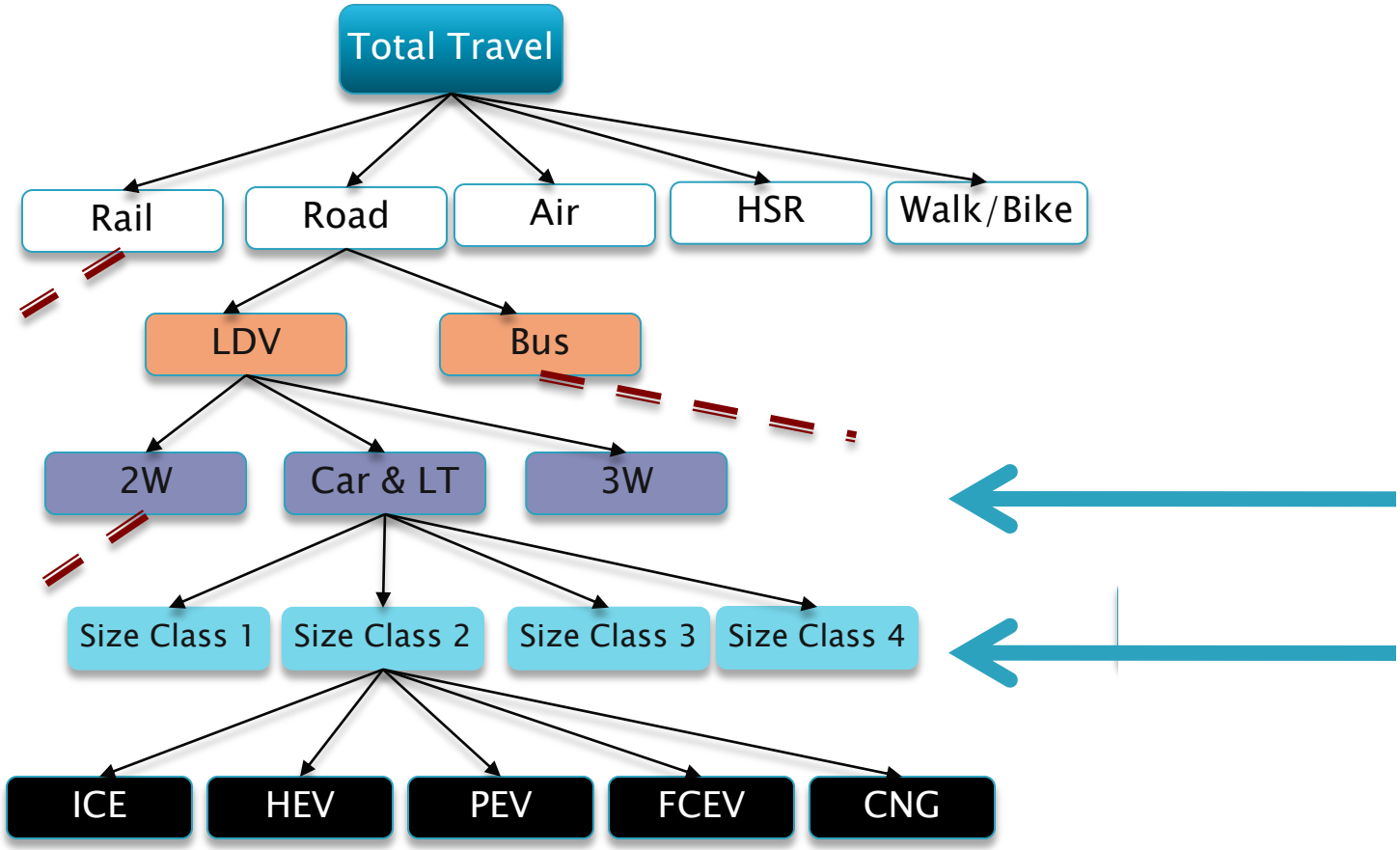
THE NEW TRANSPORTATION MODULE IN GCAM



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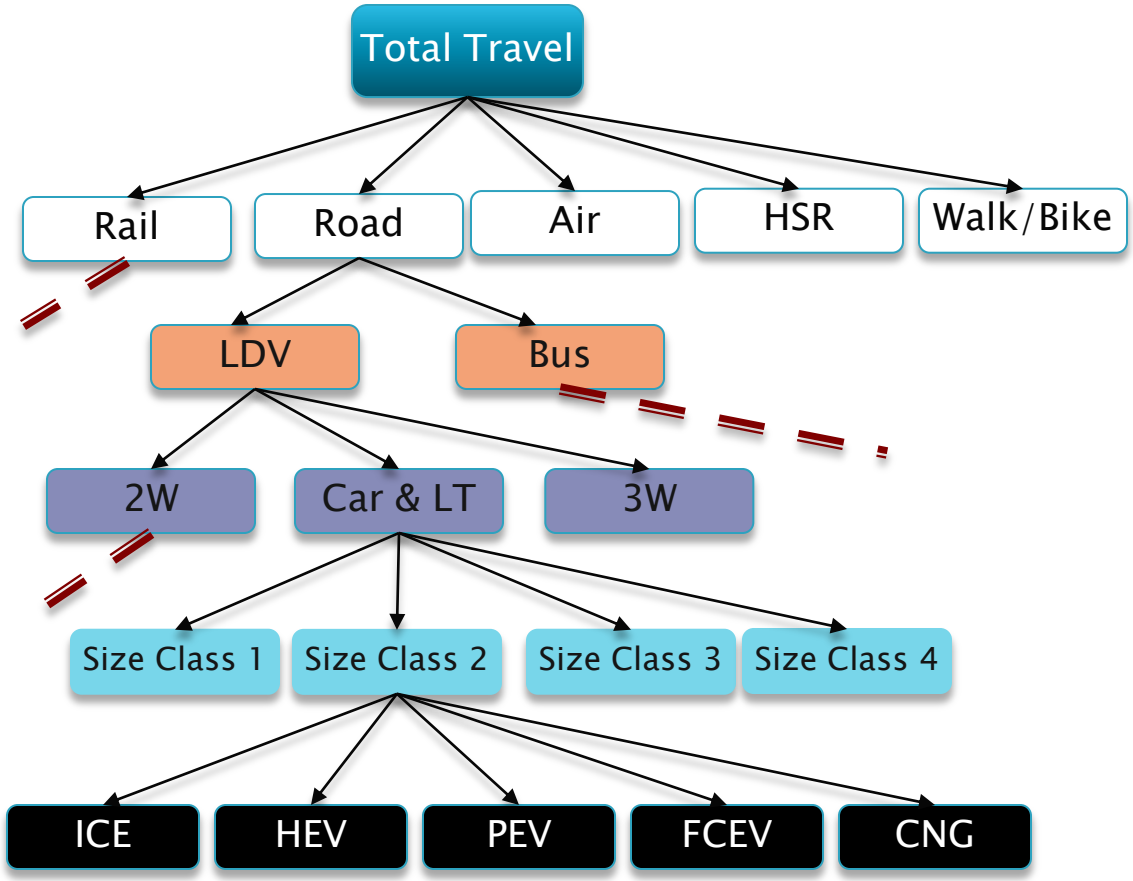

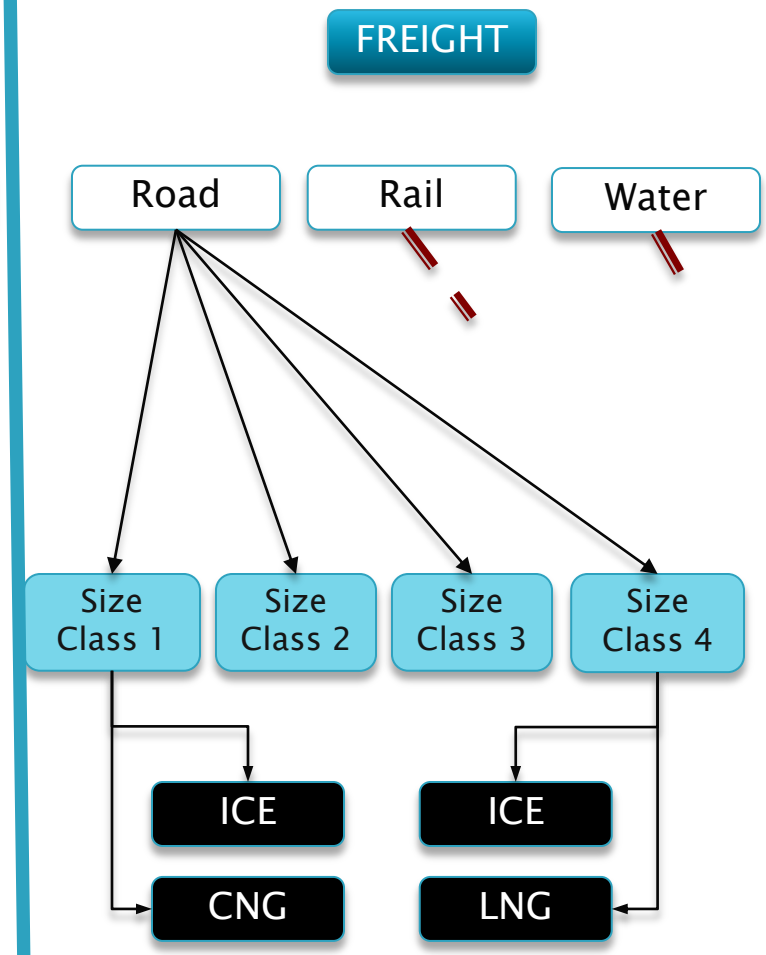

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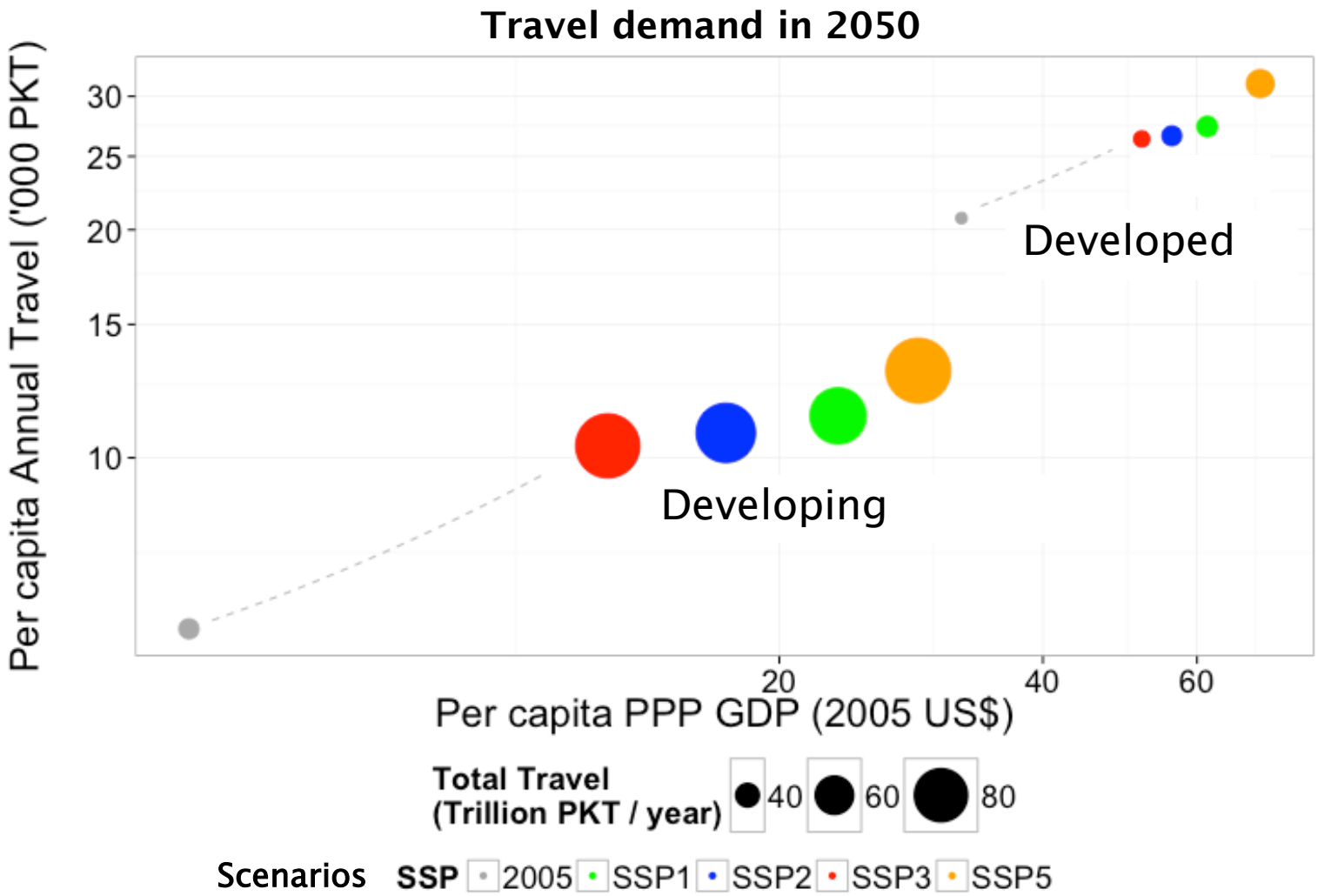
MODELING TRANSPORTATION IN GCAM

Demand for transportation service	D = f (Income, Price of transportation, Population)
Price of transportation	$P = P_{fuel} + P_{non-fuel} + Value_of_time$
Share of modes / size classes / technologies	Logit model based on price of transportation

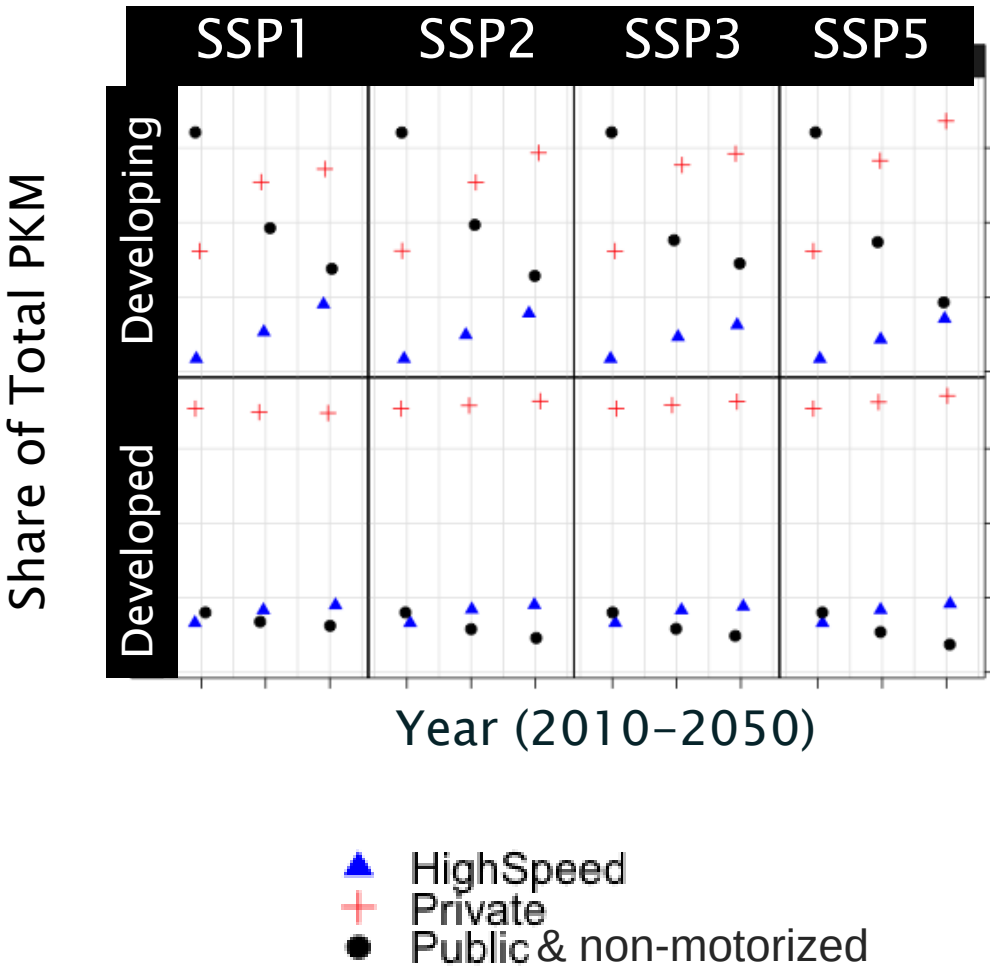
GCAM – NEW UCDTransport MODULE

Travel Demand (Passenger-KM Traveled or PKT) is projected to grow substantially over the next 4 decades, especially in developing countries.



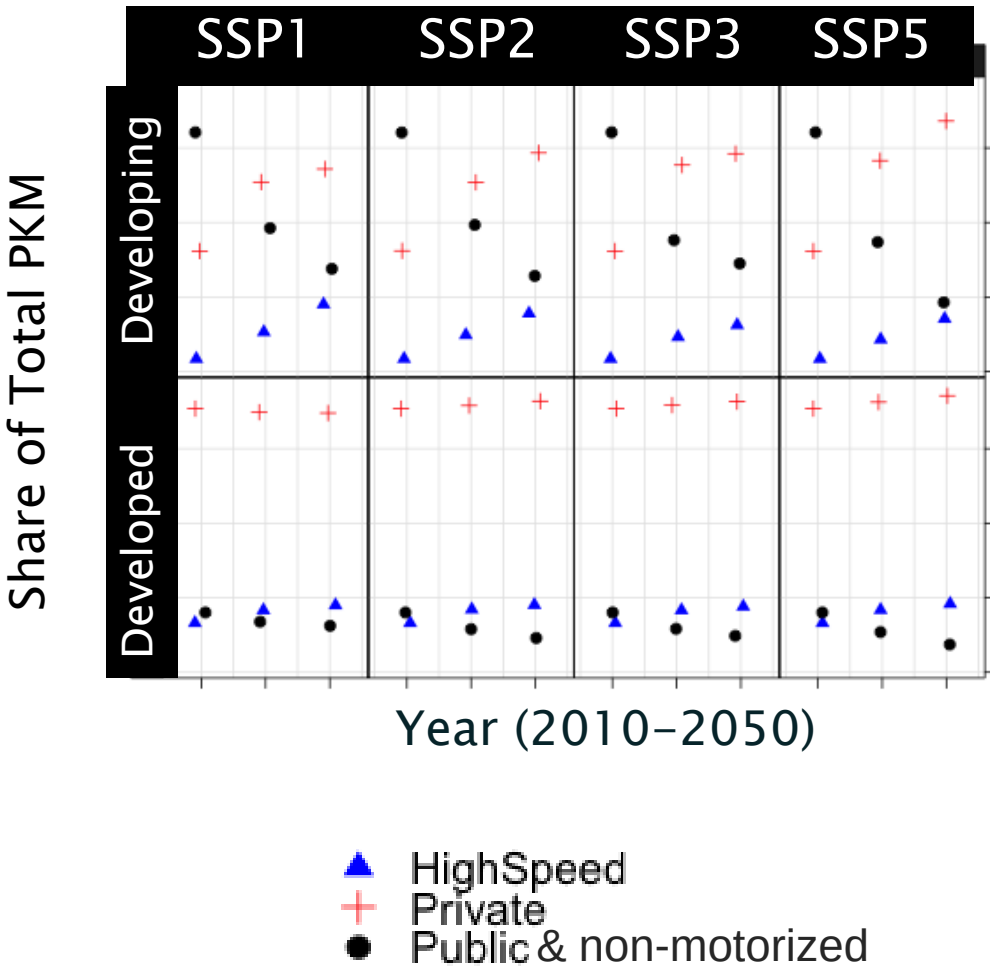
GCAM – NEW UCDTransport MODULE

"Privatizing Effect" in developing world

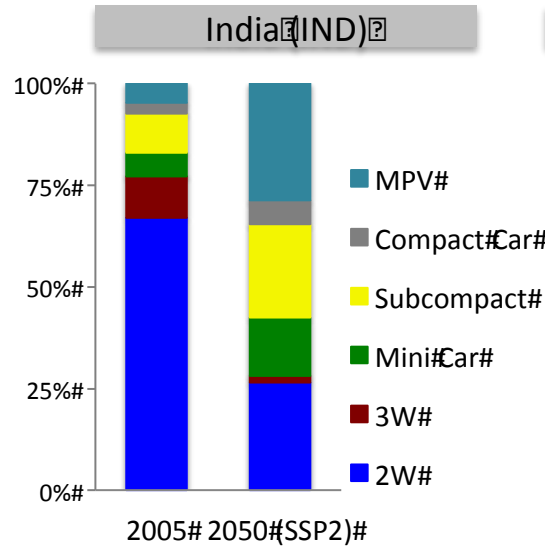


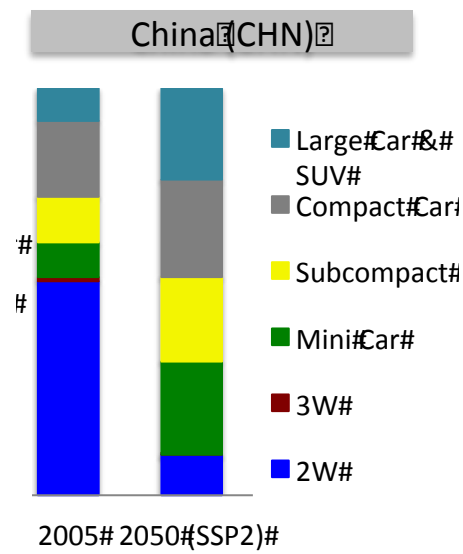
GCAM – NEW UCDTransport MODULE

"Privatizing Effect" in developing world

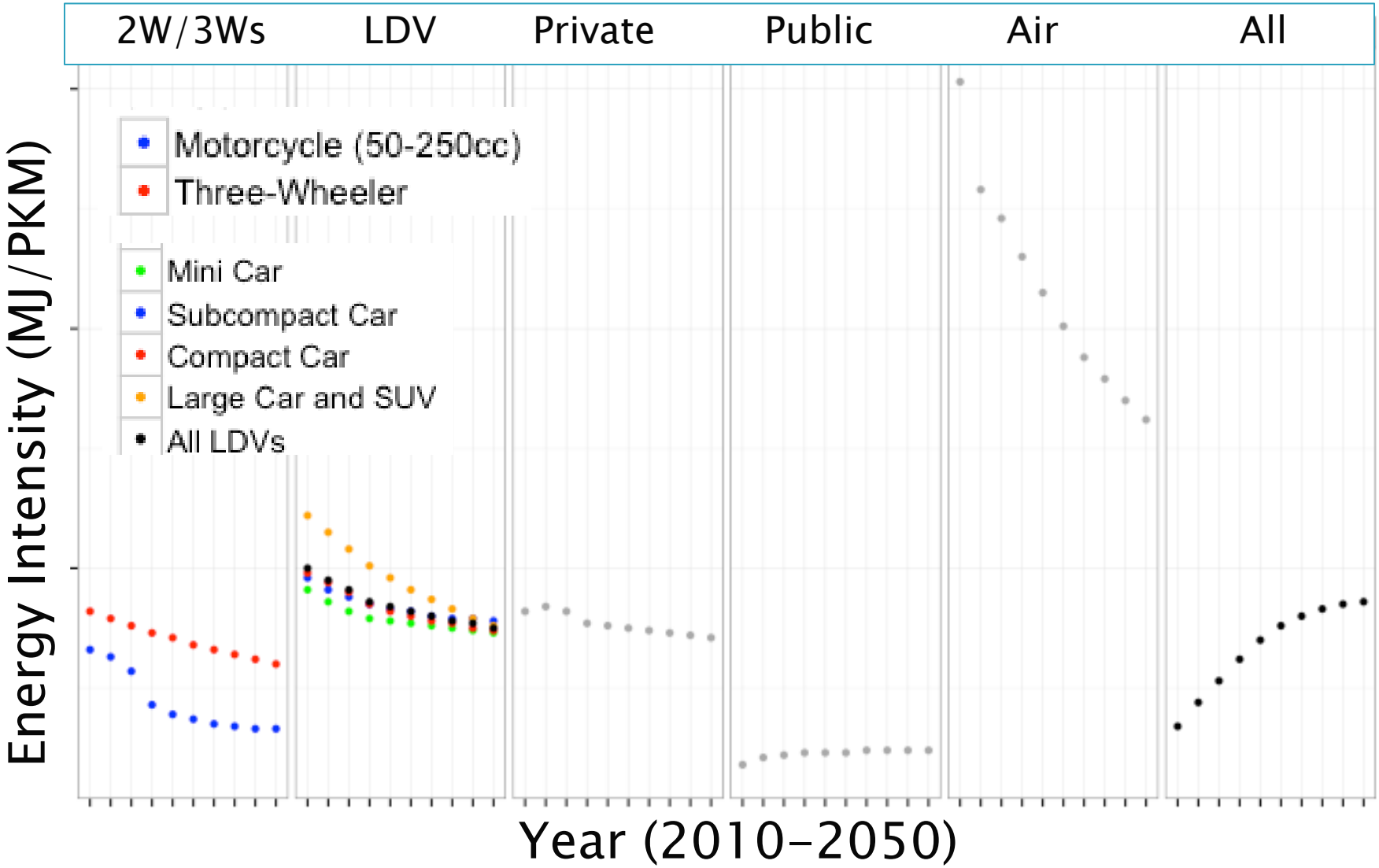


… and "upsizing effect"

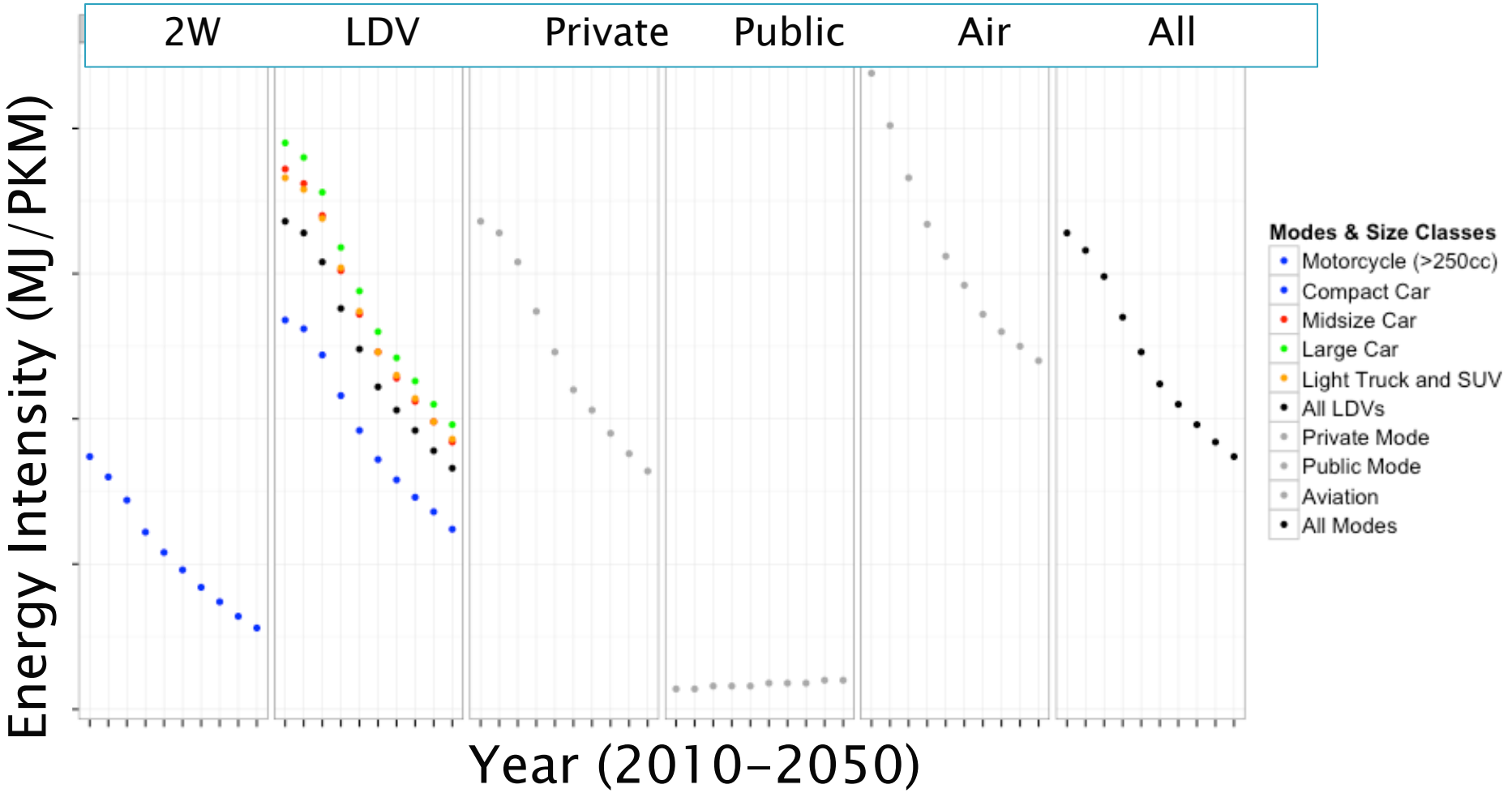




CHINA (SSP2 ONLY)



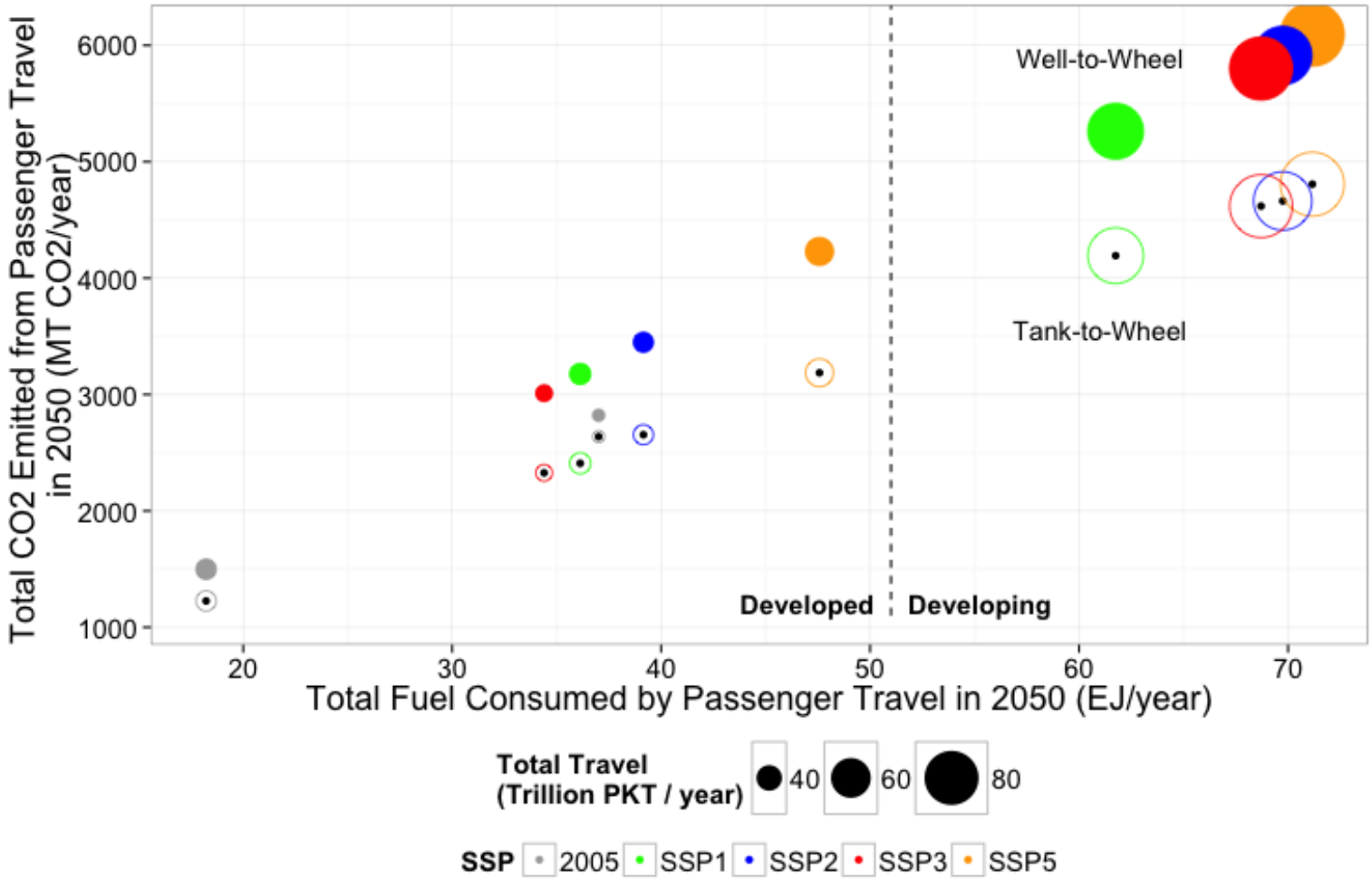
USA (SSP2 ONLY)



GCAM – UCDTransport MODULE

…as a result, fuel demand and CO2 emissions by developing countries will grow at an even faster rate

Fuel demand and CO_2 emissions from passenger transportation in 2050



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