Projections and Scenarios - Transport Sector

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Outline

- About CSTEP
- CSTEP’s Past Work in Low-Carbon (Transport) Pathways
- Ongoing Work – Desired Quality of Life Project
- Scope for Improvement

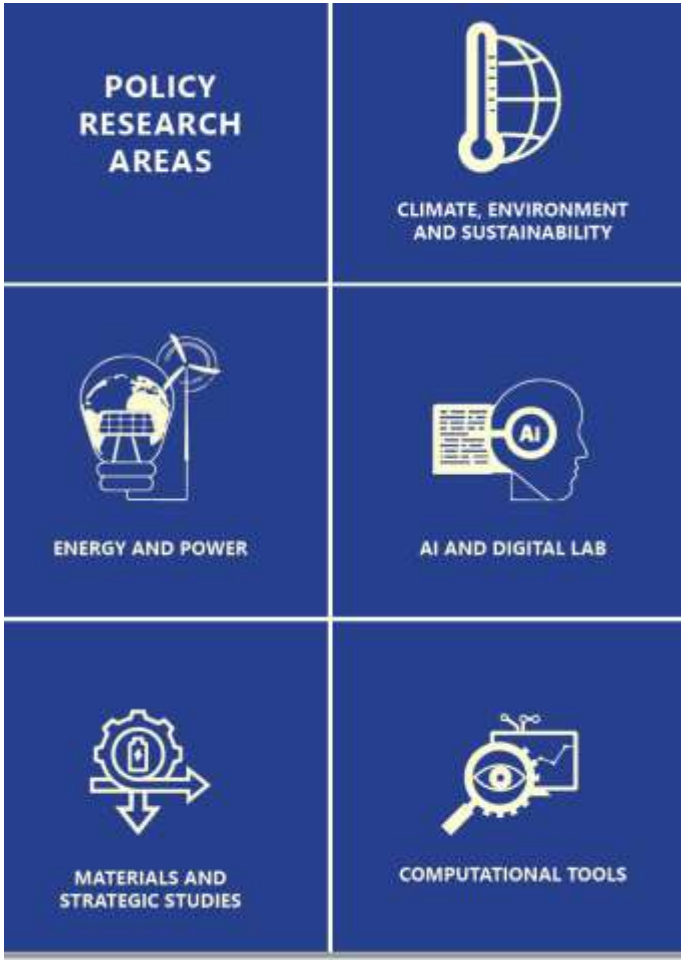
About CSTEP

Leading policy think tank

- Over 140 employees from sectors such as engineering, policy, economics, IT, and management
- Budget: USD 3.4 million; three offices in India
- Section 25 (Companies Act, 1956) Registration; FCRA
- Recognised as Scientific and Industrial Research Organization (SIRO) by MoST

Chairperson: Dr. V. S. Arunachalam

Executive Director: Dr. Jai Asundi



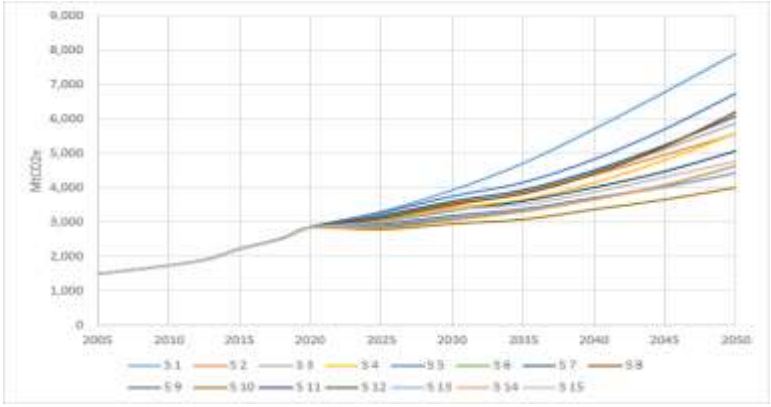
Past Work in Low-Carbon (Transport) Pathways

Long-Term Strategy for Low-Carbon Growth

Objectives:
- Project emissions up to 2050 by using energy modelling
- Assess 'Peaking Year' implications across scenarios
- Scenario analysis for 16 storylines on growth, energy access, clean energy transition, and sustainable urbanisation

Insights:
- Decoupling of energy demand and emissions owing to RE & EE
- Growth in rapid transport sector fastest under current policy scenario
  - Transport energy demand will grow 5X by 2050 ; can be halved with aggressive EV, PT, FE

- Power sector emissions will peak during 2035-45



Funder: MoEFCC

Decarbonisation Strategies for India's Land Transport Sector

Objective: To assess land transport's contribution to India's Nationally Determined Contribution (NDC) target

- Under Sustainable Growth Working Group (SGWG) – NITI Aayog
- Advisory board comprising representatives from MoEFCC, BEE, MoRTH, and MNRE

Modelling Teams

- CSTEP, CEEW, IRADe, TERI

Knowledge Partner

- Pacific Northwest National Laboratory (PNNL)

CSTEP's Model

National Model
TIMES-IMRT

Demands soft linked to CGE model outputs/GDP-population drivers

Technology and modal share data from IESS V2 & PPAC data

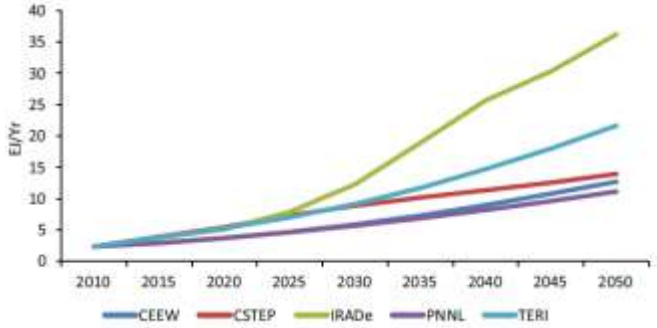
Modal share and technology share – based on 'expert' views; benchmarked constraints (e.g. EVs)

Can explore 'what if' scenarios and impact on energy demand and emissions

Funder:

SSEF

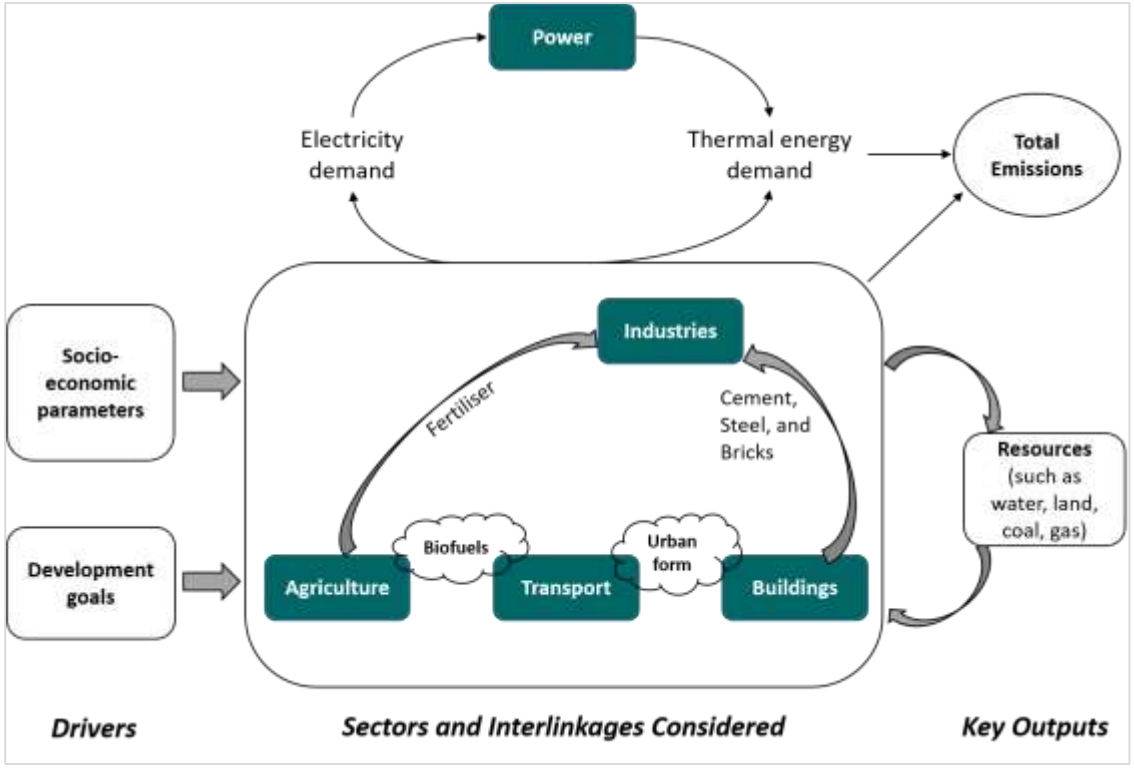
Decarbonisation Strategies for India's Land Transport Sector



Change in Transport CO_2 Emissions in Ambitious Policy Scenario (2050)

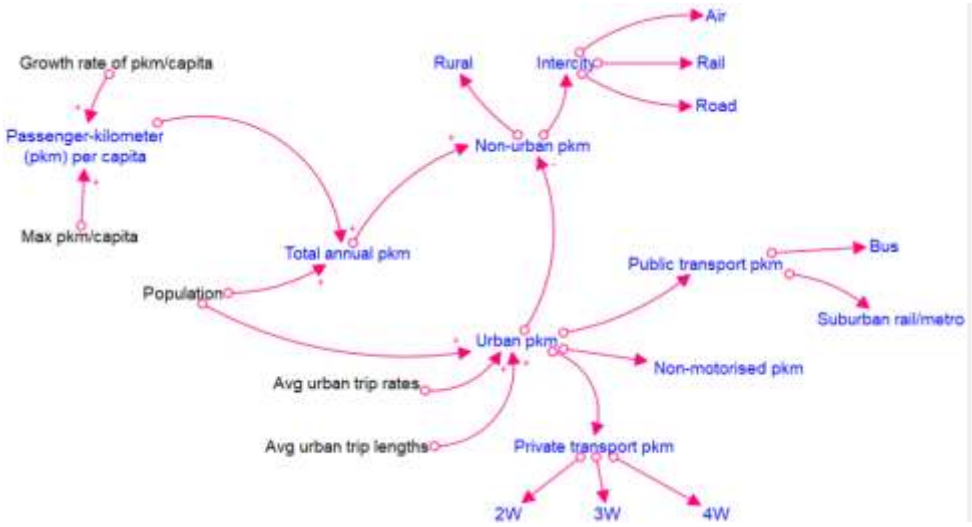
	CSTEP	PNNL	CEEW	IRADe	TERI
Reference emissions 2050 (million tonnes)	991	692	791	2389	1446
Electrification	-7%	-24.7%	-12.8%	-21%	-22%
Increased efficiency	-9%	-22.7%	-12.3%	-72%	-21%
Modal shift	-21%	-3.5%	-8%	-9%	-16%
Moderating demand	-10%	-11.4%	-10.6%	-19%	-10%
Alternative fuels	-6%	-13.2%	-8.8%	-16%	-8%

Sustainable Alternative Futures for India (SAFARI) Model



- **Simulation model** for India's long-term energy, emissions, and resource implications of achieving development goals
- **System dynamics modelling** captures interlinkages
- **Transport interlinkages** are with buildings (urban form) and agriculture (biofuels) sectors

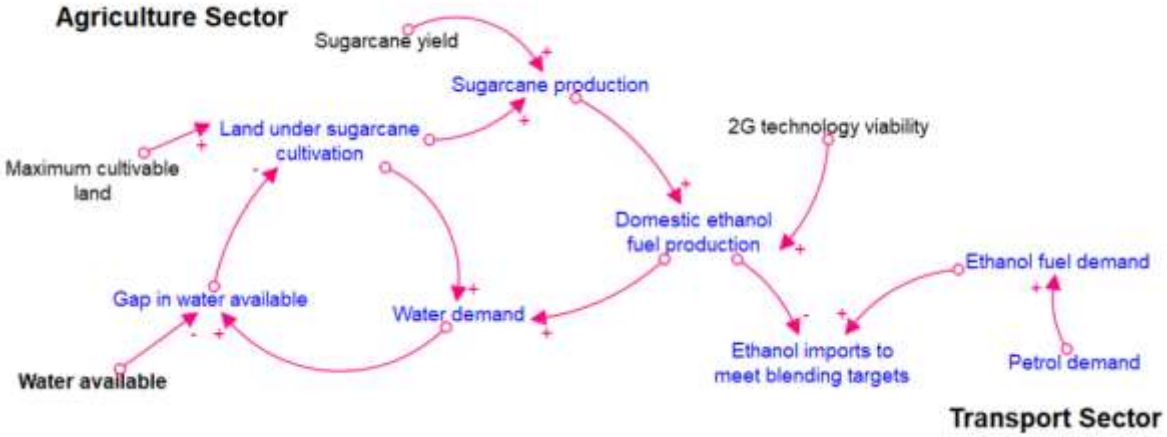
Funders: AfD; Pathways 2050



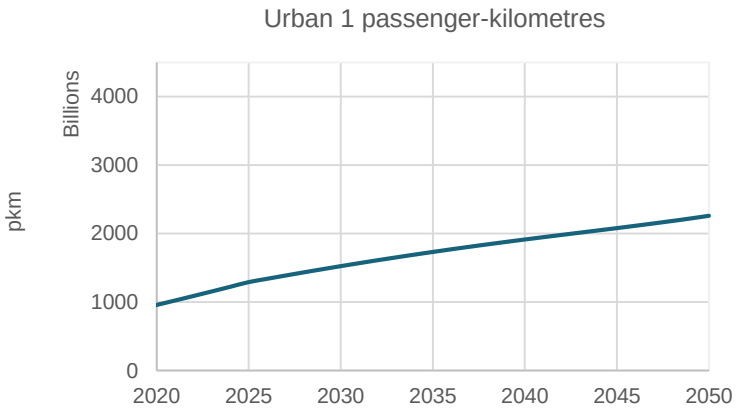
Passenger Demand

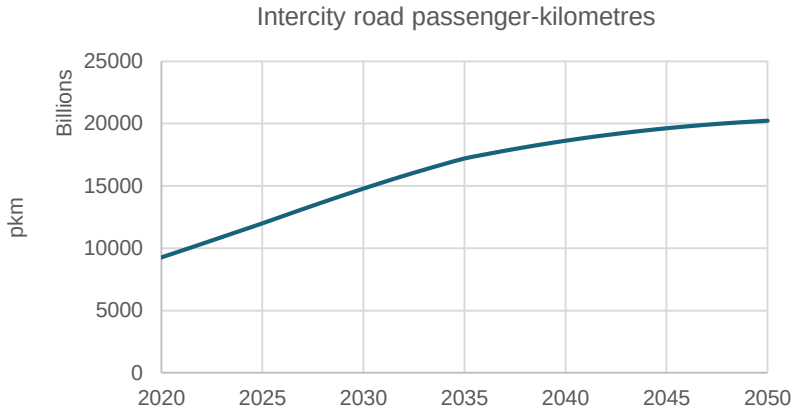
U1, U2, Intercity

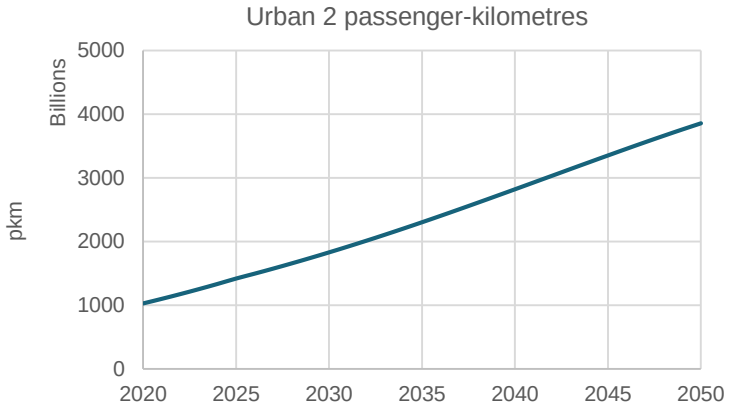
System Linkages

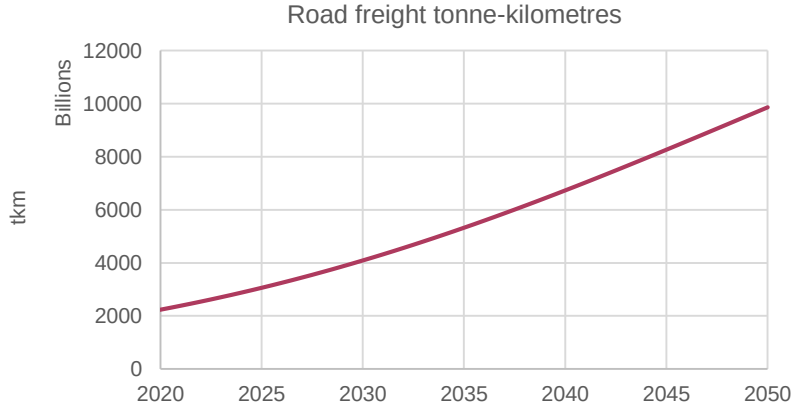


Road Transport Demand



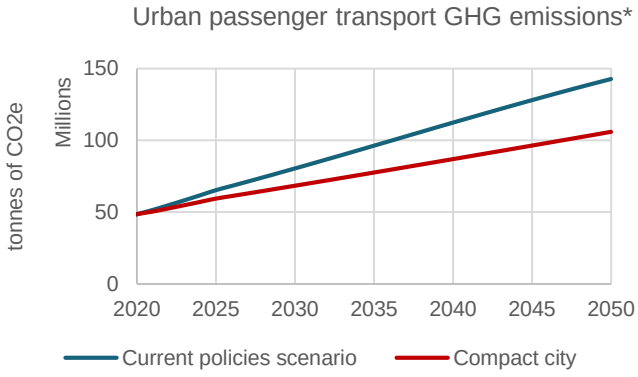




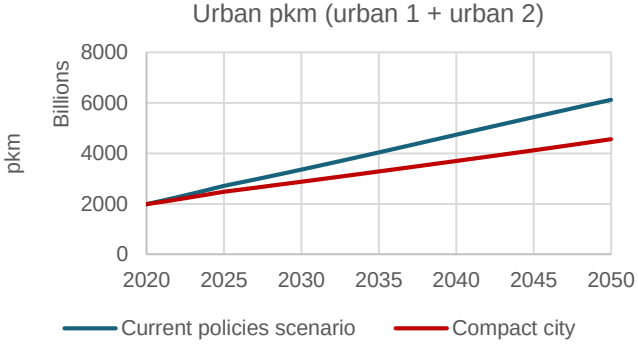


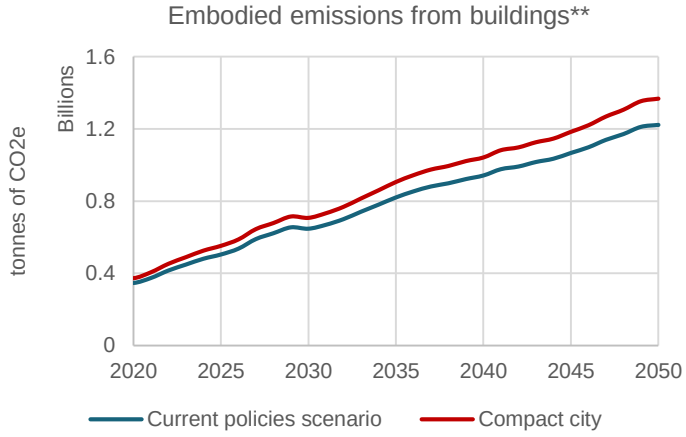
Urban Form: Implications of Densification on Transport & Buildings

Densification or compact city development leads to reduced trip lengths and therefore lower transport demand, but what does it mean for the buildings sector energy consumption?



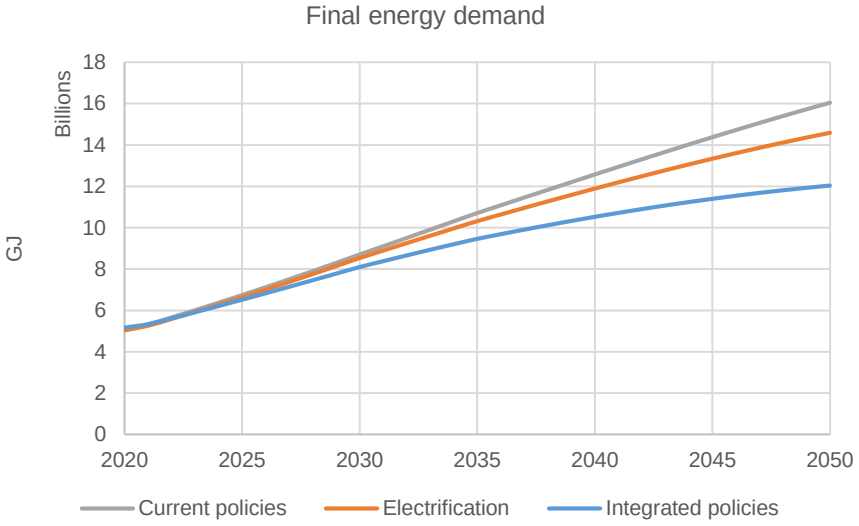
*includes direct tail-pipe GHG emissions from passenger vehicles in urban areas.

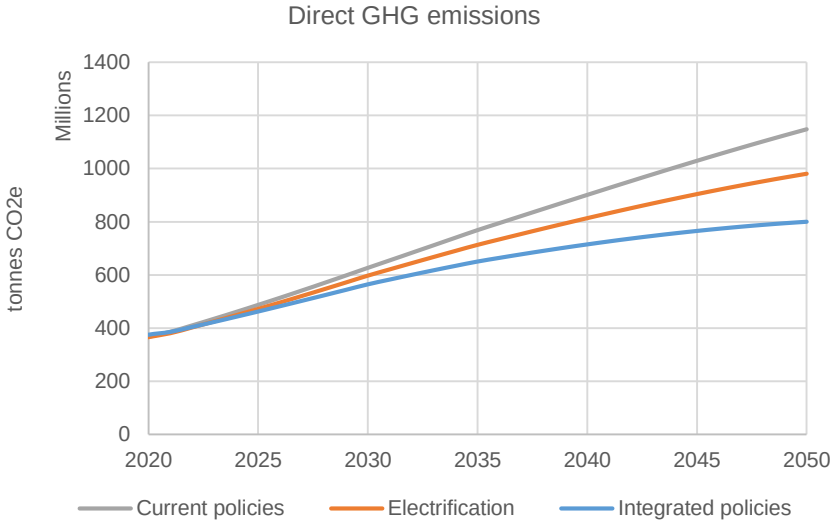




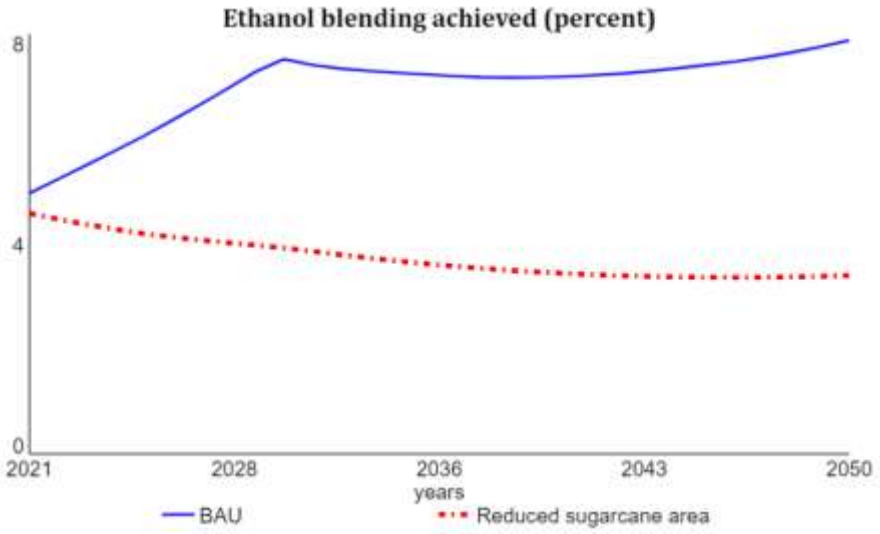
**includes emissions from producing construction materials like cement, steel, etc., as well as from operational energy (electricity generation)

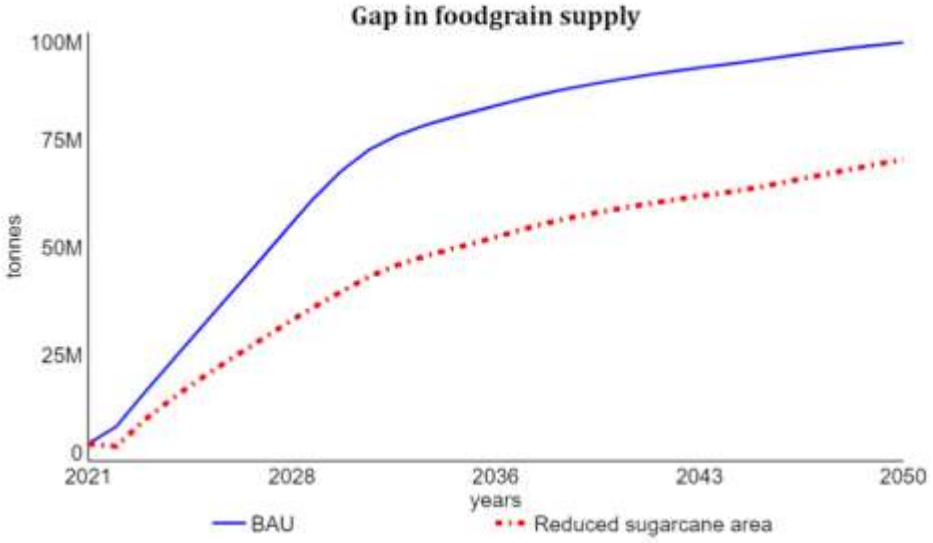
Energy and Emissions Implications of Road Transport





Trade-offs





- National policy on biofuels 2018 - 20% ethanol blending target by 2030
- Reduced area under sugarcane affects ethanol production and blending % achieved, unless 2G technology picks up

Scope for Transport Model Improvement

- Ongoing under SPIPA project funded by EU (GiZ)
  - Transport Modal Choice
    - MESSAGE ix Vehicle Choice Modal Methodology (TCO; Urban Travel Behaviour)
    - Cost and price sensitivities to inform modal choice under various scenarios

- Net-Zero Implications & Carbon Budgets (WRI)
  - Transport, Industry, Power
  - Using CGE-SAFARI Model

Scope for Transport Model Improvement

- Potential Plug-Ins
  - Economic impacts of EV transition
    - GDP growth, implied costs of travel (affordable mobility), impact on allied economic sectors
  - Techno-economic & modelling assessment for H_2 use in aviation, buses, freight
  - Soft-linking regional and city-level technology and policy plans

Thank You

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