

Transport, Energy and Environment - INDIA

S Sundar

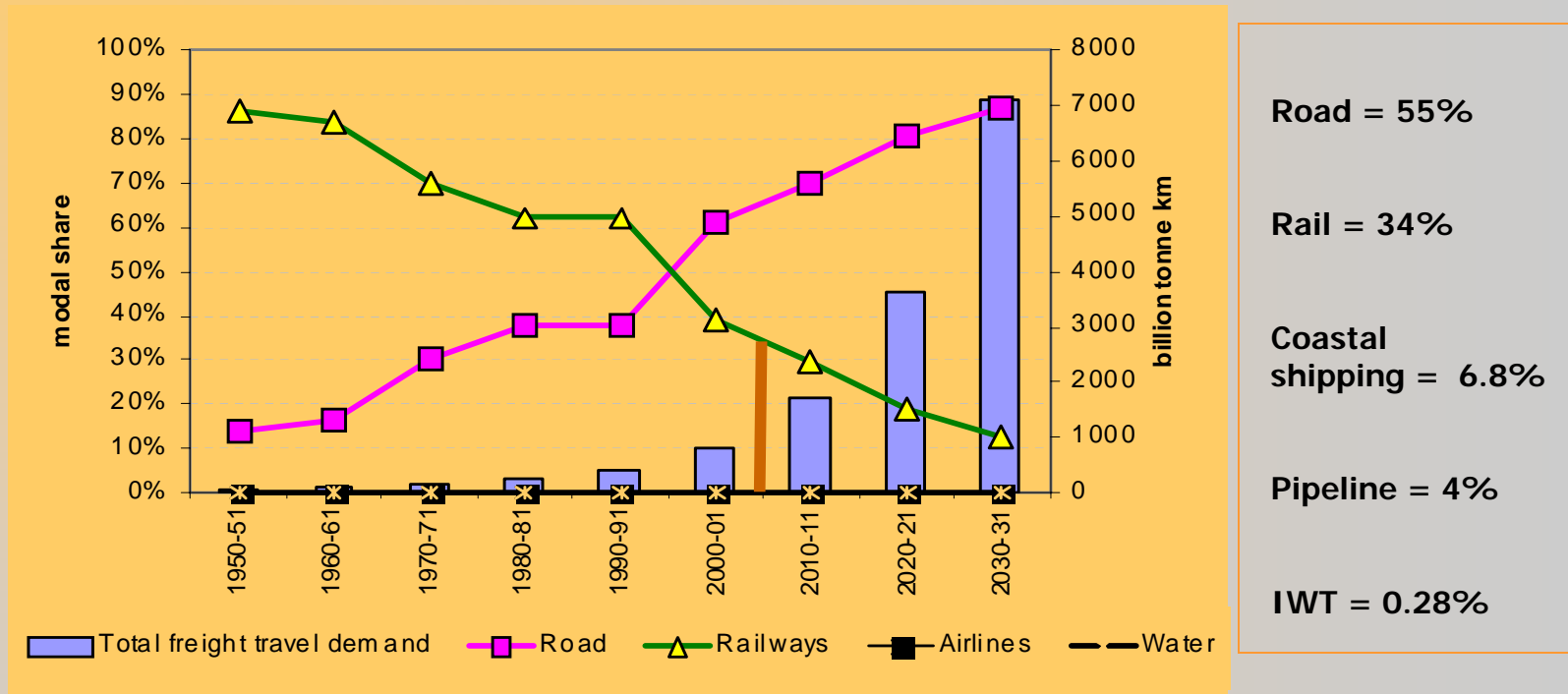
Distinguished Fellow, TERI

&

NTPC Professor, TERI University



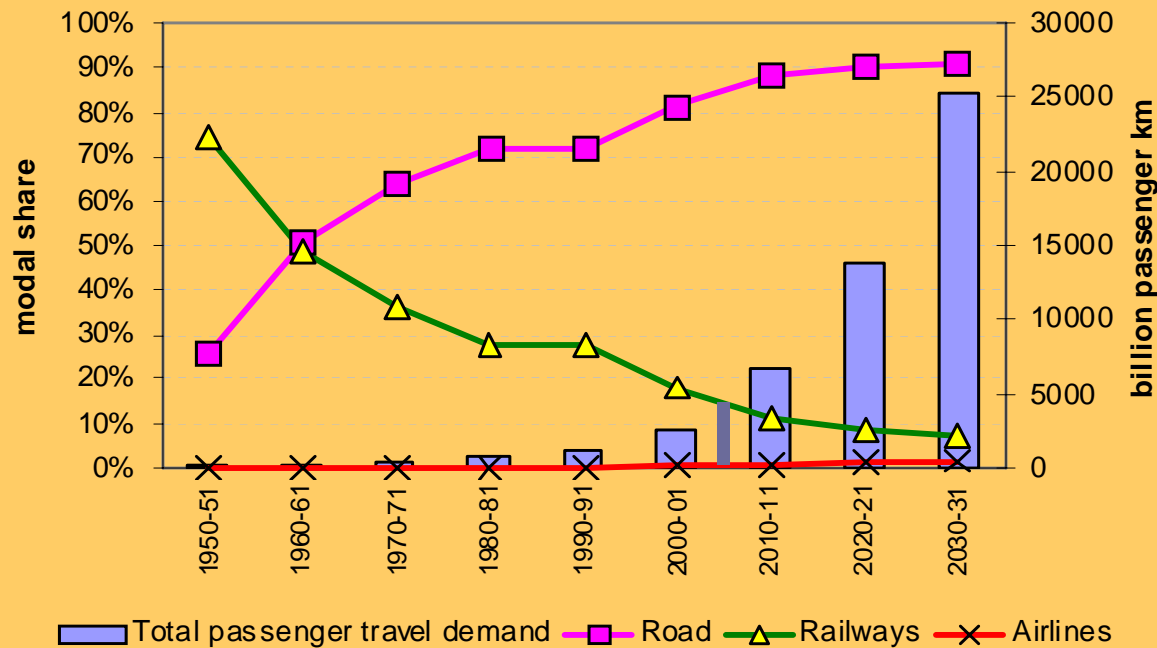
Freight Traffic: Inter Modal Share



- Continuous erosion in the share of Railways in freight movement and increase in share of less fuel efficient road transport
- Road transport is the most dominant mode of transport. Over 60% of freight were moved by road in 2004-05 (Planning Commission, 2007)



Passenger Traffic: Inter Modal Share



Road = 86.7%

Rail = 12.9%

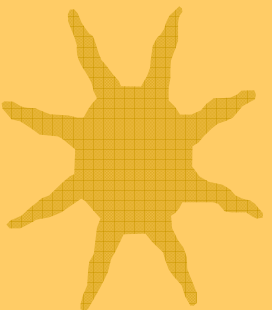
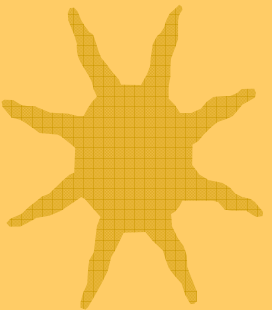
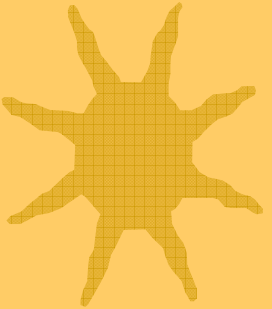
Air = 0.4%

- Substantial shift from rail to road
 - Rail dominates long-haul
 - Road dominates short-haul

- Road transport is the most dominant mode of transport. Over 85% of passengers are moved by road in 2004-05 (Planning Commission, 2007)



Rural Connectivity



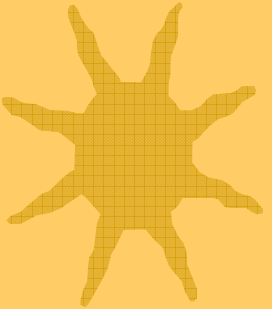
Total number of Habitations*	944922
Connected**	588255 (62.3%)
Unconnected	356667 (37.7%)

GoI targets to connect all rural habitations by 2010

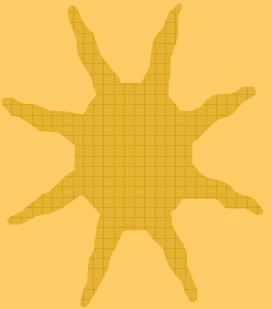
- * A **Habitation** is a cluster of population, living in an area, the location of which does not change over time
- **Connectivity, by way of an All-weather Road (with necessary culverts and cross-drainage structures, which is operable throughout the year)



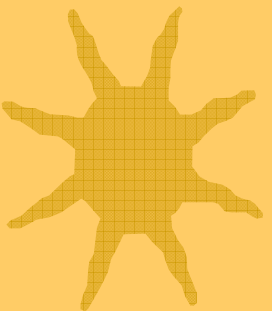
The Urban Transport Scenario



★ 28% of the total population in urban India; projected to grow to 33% percent by 2025 and over 50% by 2050.



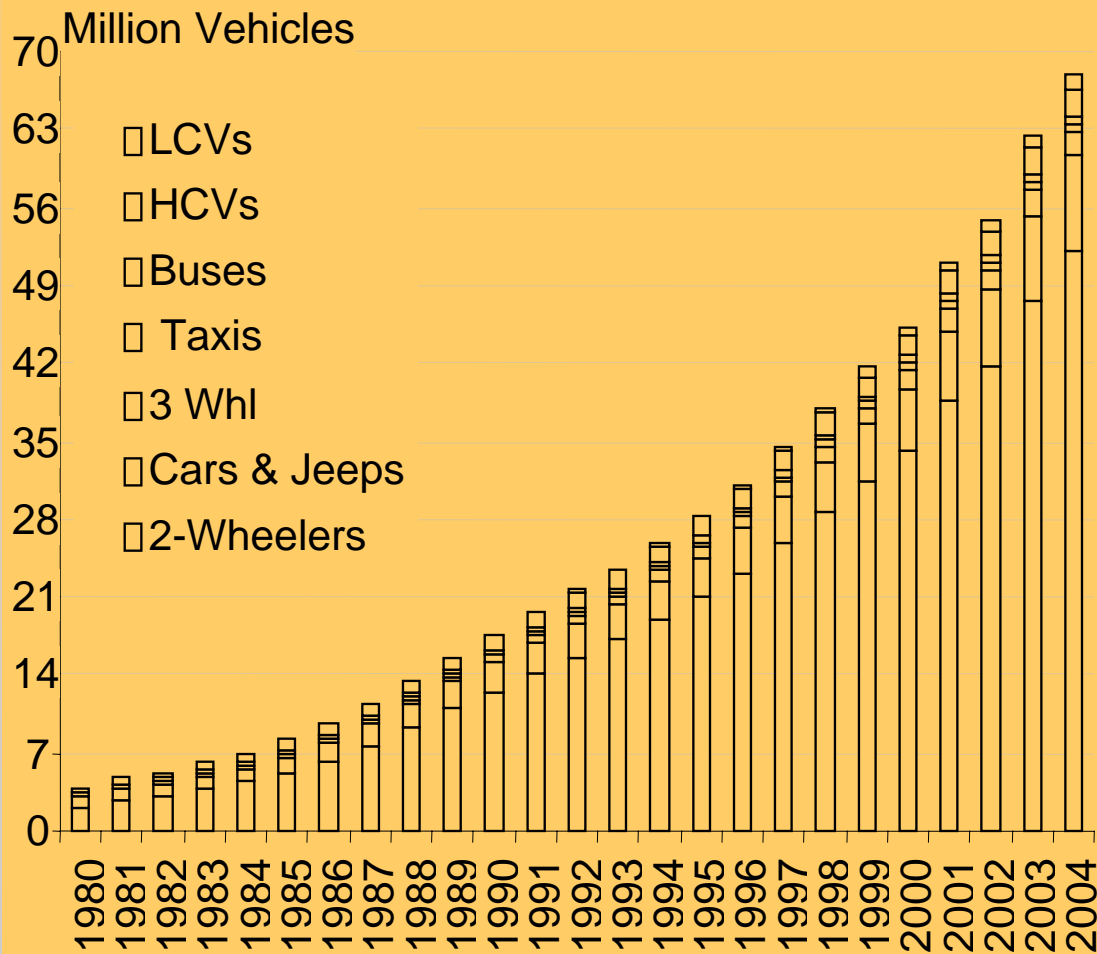
★ 5161 cities; 35 of them are million plus. 60-70 million plus cities by 2025 .



★ Most million plus cities are urban sprawls with increasing travel demand and growing reliance on personal vehicles



Growth in Registered Number of Motor Vehicles

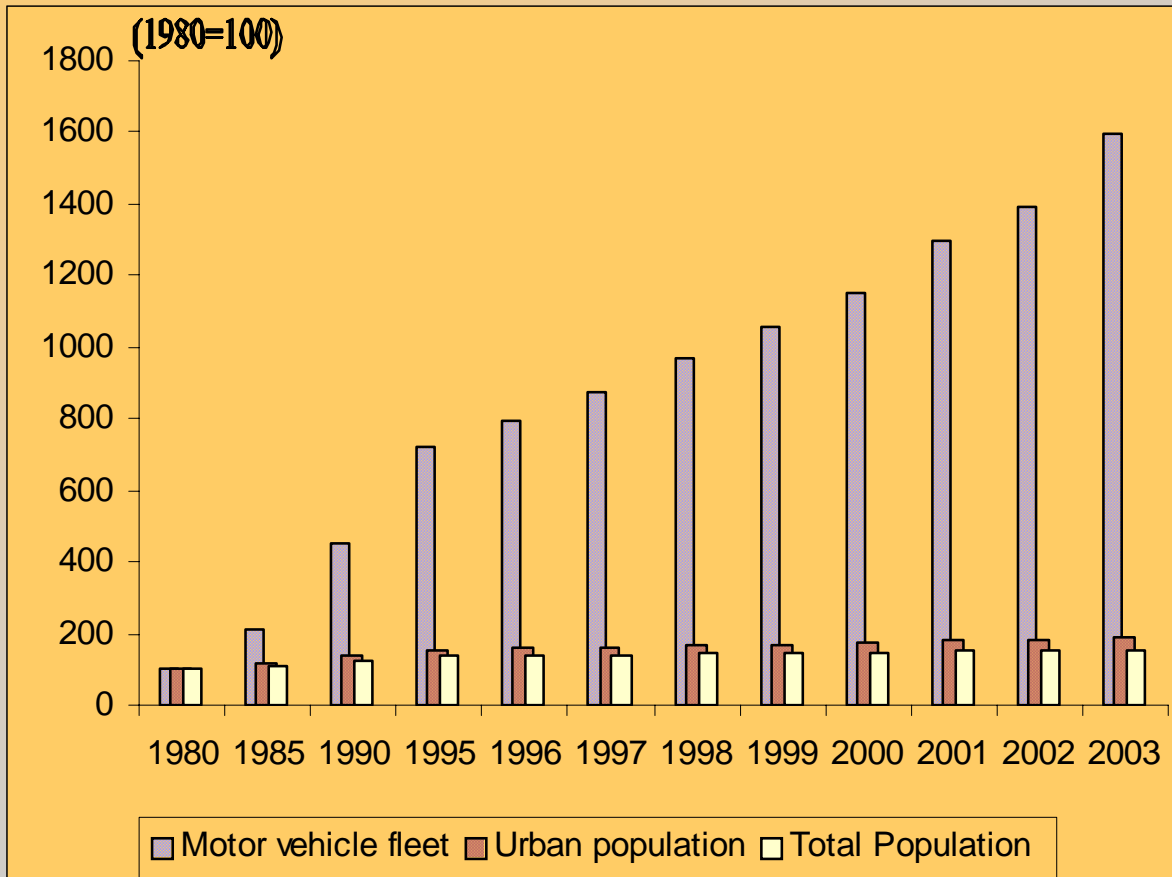
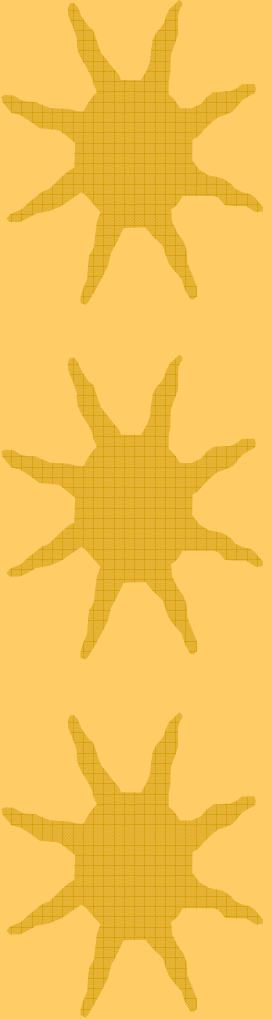


- Over 1/3rd of the total vehicles are registered in 35 cities (each over 1 million size)
- Most of the medium and small sized cities have very large number of 2-whs.
- Public transport vehicles are confined to only major cities

Source: Ministry of Road Transport and Highways, Govt. of India. "Motor Transport Statistics of India (various years)".



Growth of Population, Urban Population and Motorization

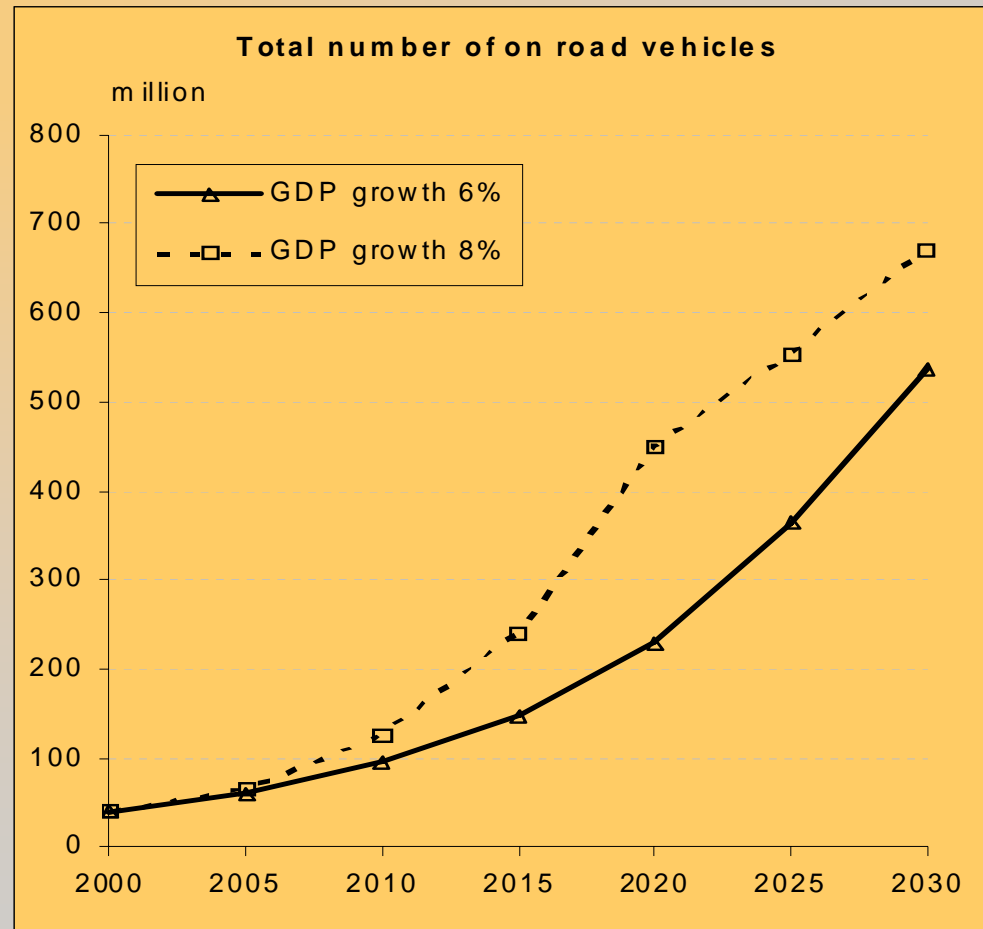


- Population-size Almost Doubled
- Vehicles Increased 15-Times

Source: TERI, 2006



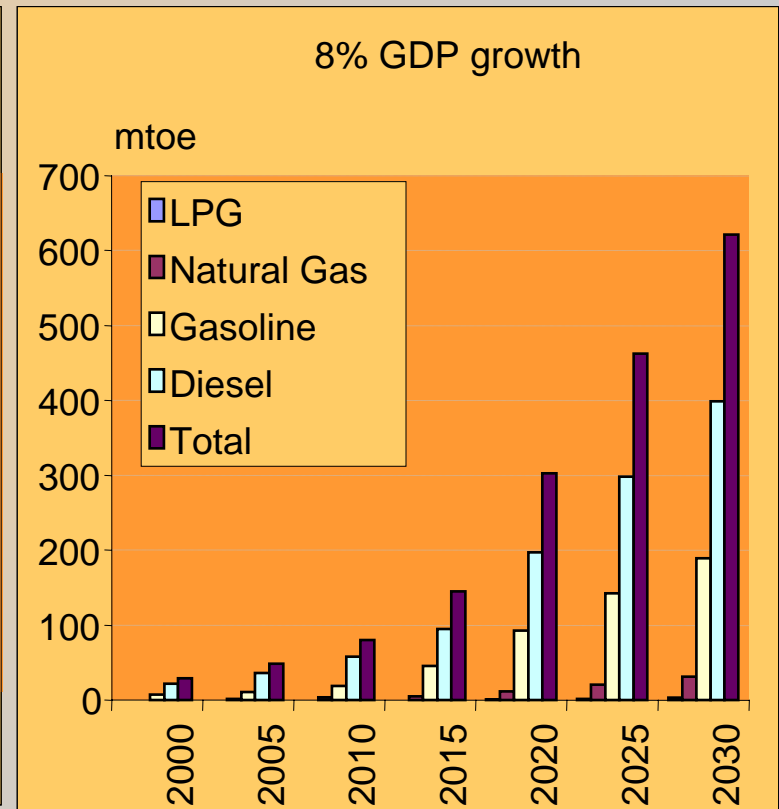
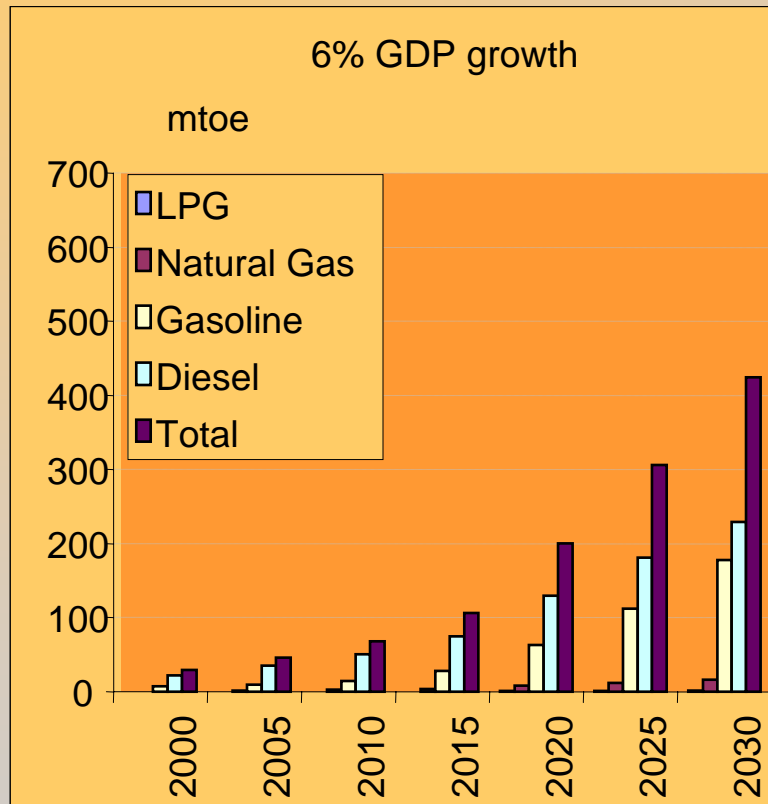
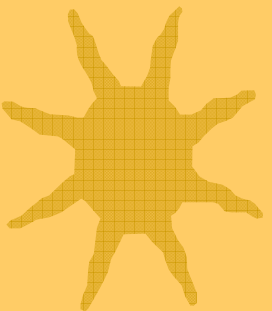
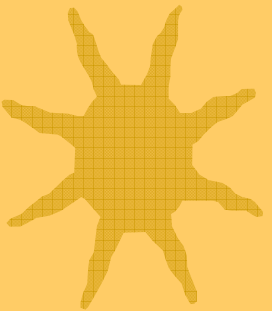
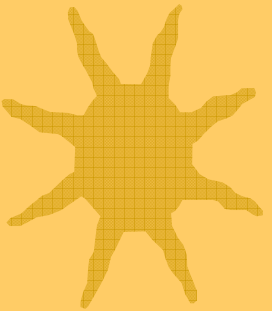
Growth in GDP and Vehicles



Source: TERI study "Energy Efficiency and Climate Change considerations for on-road transport in Asia" published by ADB (2006)



Growth in Fuel Demand



Source: TERI study "Energy Efficiency and Climate Change considerations for on-road transport in Asia" published by ADB (2006)

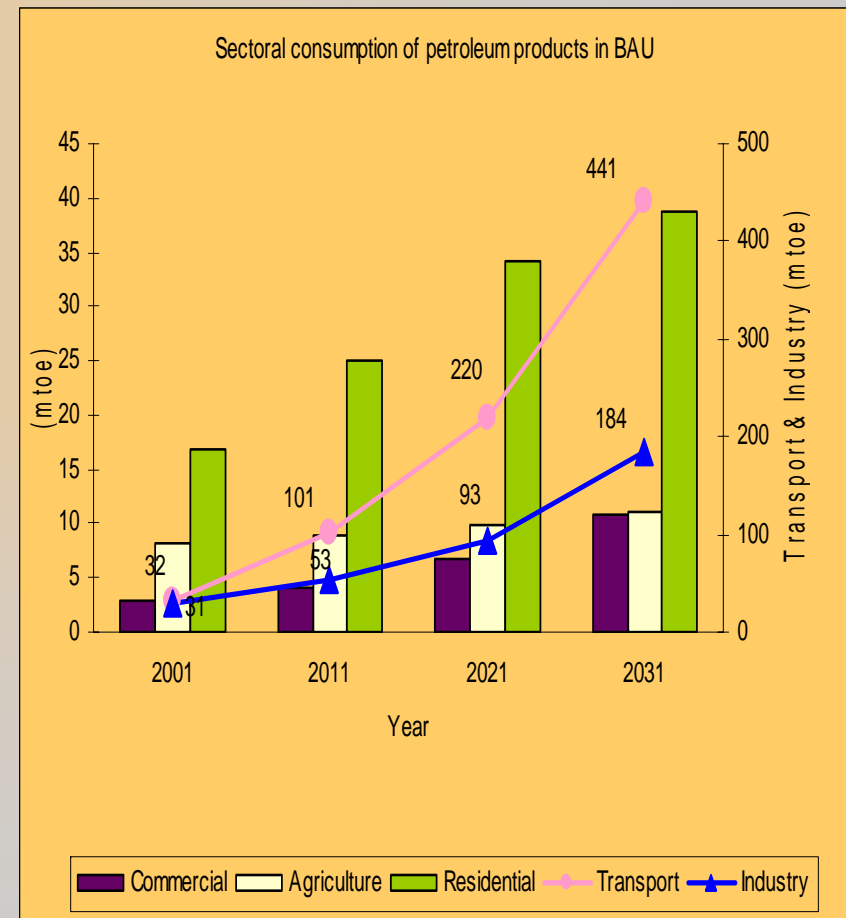


Implications for India's Energy Security

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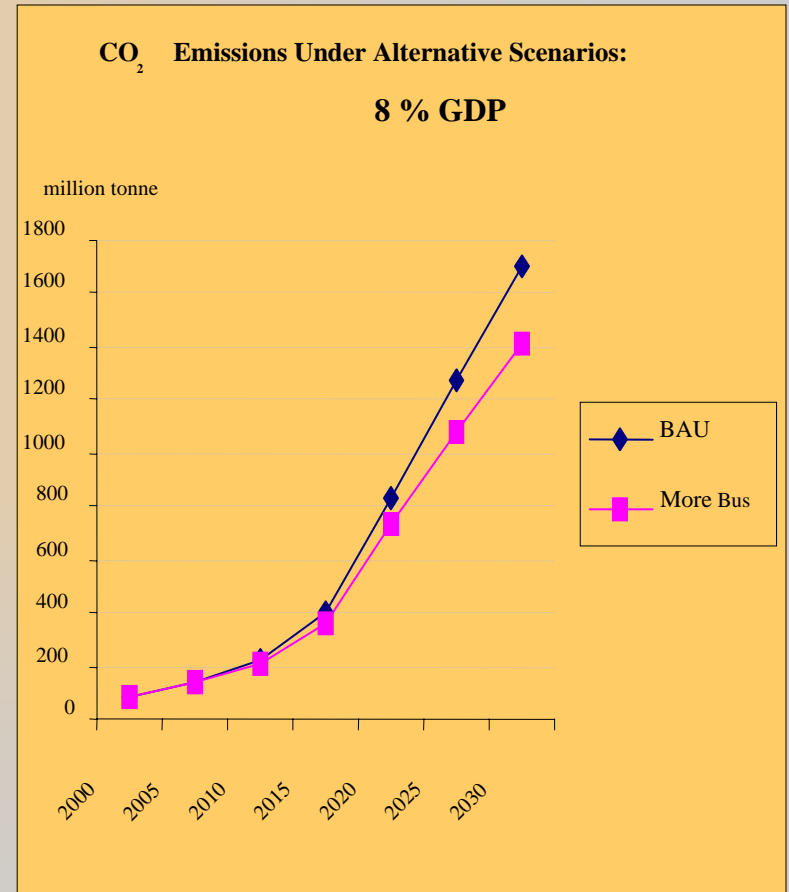
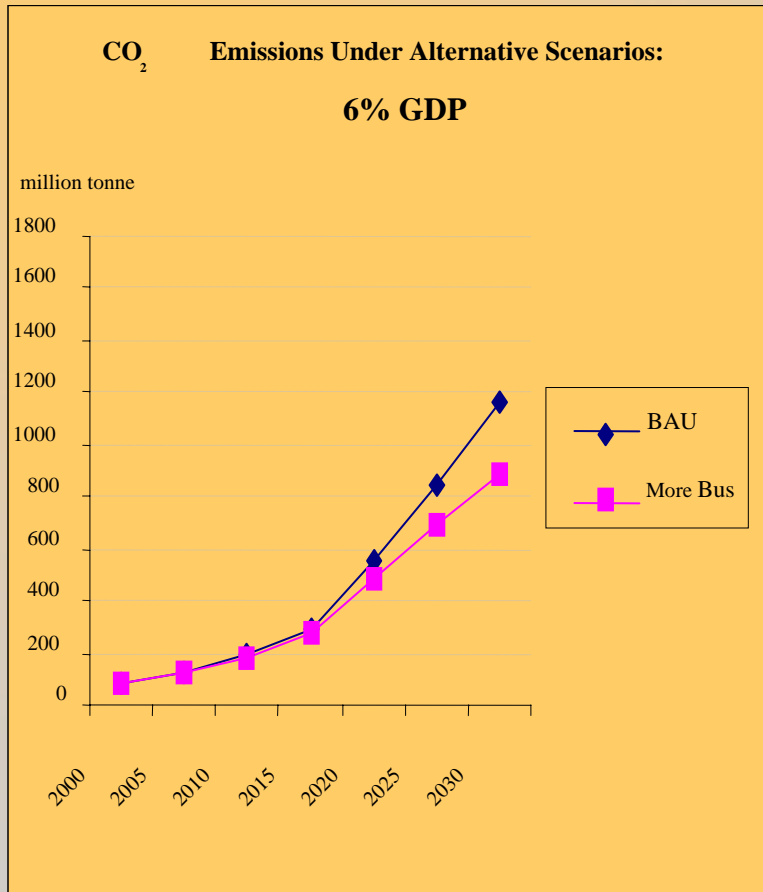
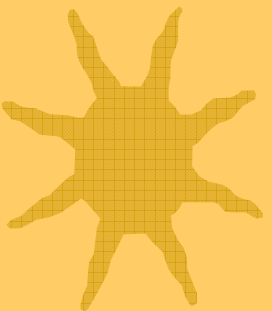
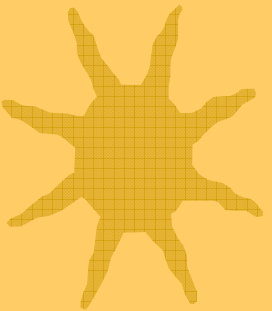
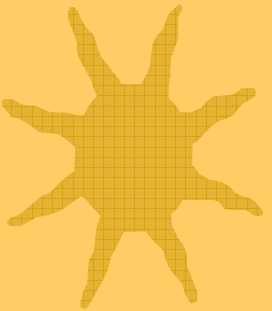
Second largest consumer of energy (18%) after industry (42%)

- ★ Largest consumer of petroleum products (35%)
 - Petroleum fuels 98% and electricity 2%
- ★ Share of transport in petroleum consumption to increase from 51% in 2006-07 to 64% in 2030
- ★ Oil import dependency to increase from 76% of 141mt to 93% of 731mt by 2031.
- ★ Limited fuel switching options for transport sector





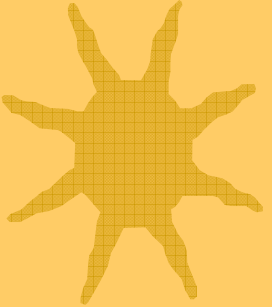
CO₂ Emissions Under Alternate Scenarios From Road Transport



Source: TERI study “Energy Efficiency and Climate Change considerations for on-road transport in Asia” published by ADB (2006)

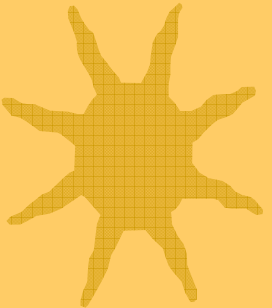


Current Policy Scenario



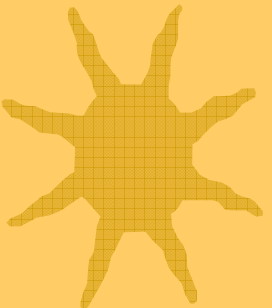
- ★ Fuel efficiency improvements standards –yet to be introduced

- ★ Euro III standards in 11 cities; Euro III in rest of India & Euro IV in 11 cities only by 2010



- ★ Transport demand not managed in any Indian city

- ★ Public transport and NMT declining-



- ★ Fragmented responsibility

- ★ No urban transport policy in any state or city



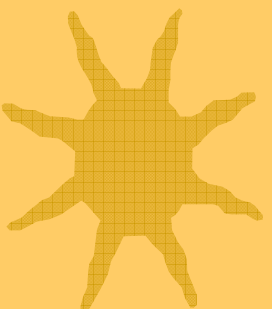
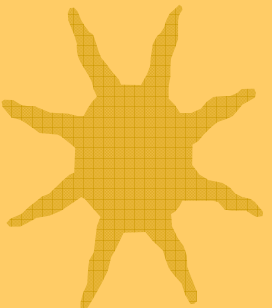
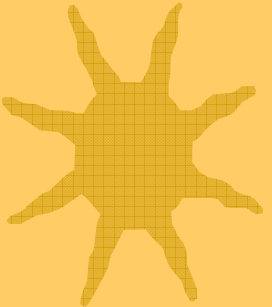
National Urban Transport Policy, 2006

To ensure safe, affordable, acceptable, reliable and sustainable access to urban residents through initiatives such as :

- ★ Integrated land use and transport planning
- ★ Investing in rapid transport systems to encourage greater use of public transport
- ★ Emphasis on discouraging use of personal vehicles and encouraging NMT
- ★ Cities encouraged to draw up Comprehensive Mobility Plans and integrate land use with transport
- ★ Promoting PPPs
Provides for financial support under JNNURM



Potential for Energy Efficiency in the Transport Sector

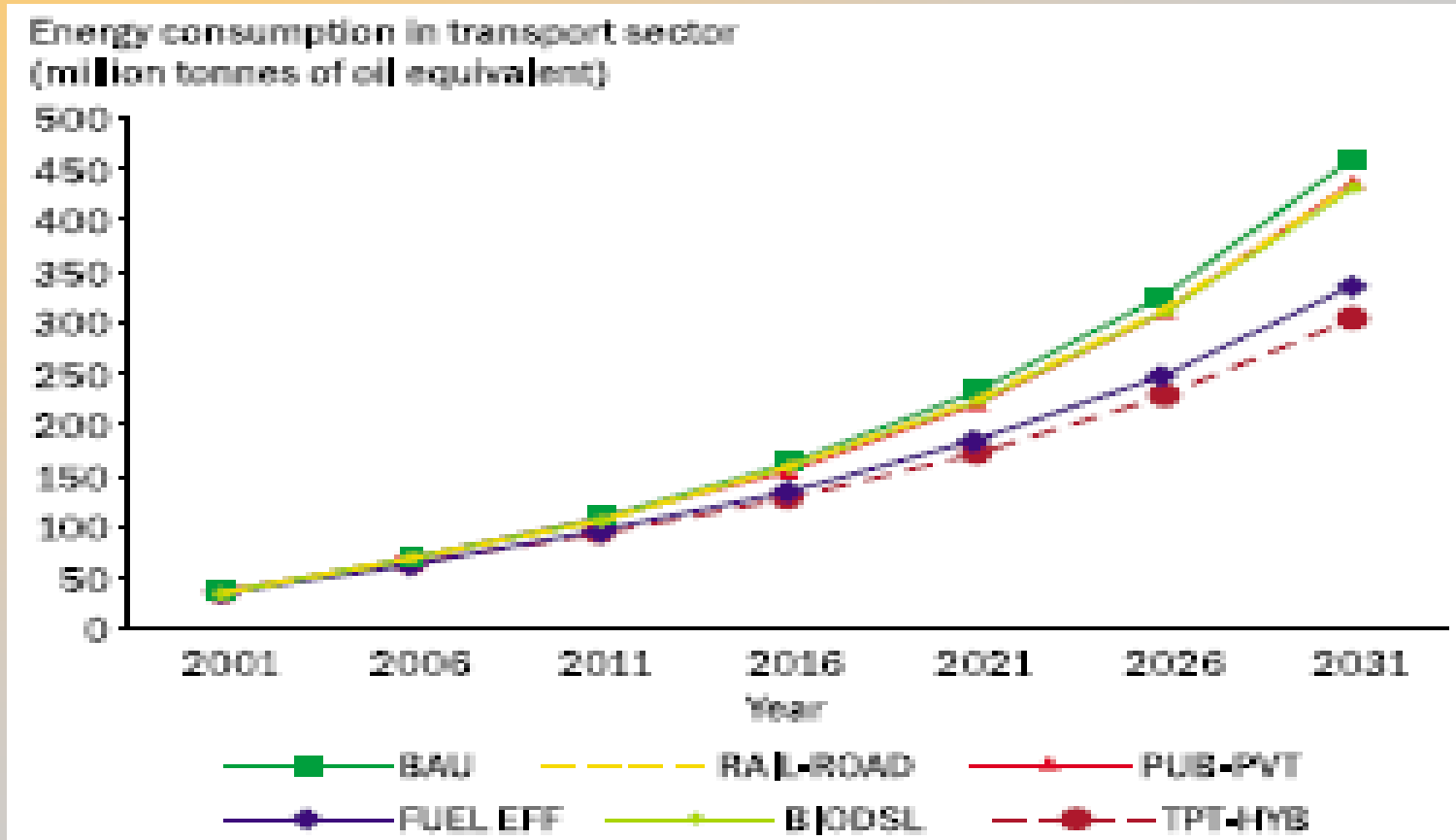


Scenario	Description
Enhanced share of public transport	Share of public transport modes to increase to 60% in 2036.
Increased share of rail in passenger and freight movement vis-à-vis road	Railway freight share to increase from 37% in 2001 to 50% in 2036. Railway passenger share to increase from 23% in 2001 to 35% in 2036. Share of electric traction to increase for rail passenger and freight to 80%.
Fuel efficiency improvements	Fuel efficiency of all existing motorized transport modes to increase by 50% from 2001 to 2036.
Use of bio-diesel in transport	Enhanced penetration of bio-diesel by 65 Mtoe by 2036.
Transport sector hybrid	Incorporates all the above-mentioned scenarios, in addition to those in the BAU.

Mtoe - million tonnes of oil equivalent

Source: National Energy Map for India: Technology Vision 2030

Energy Consumption in Transport Sector Across Scenarios



Source: National Energy Map for India: Technology Vision 2030



Energy Consumption in Transport Sector (in Mtoe) Across Scenarios

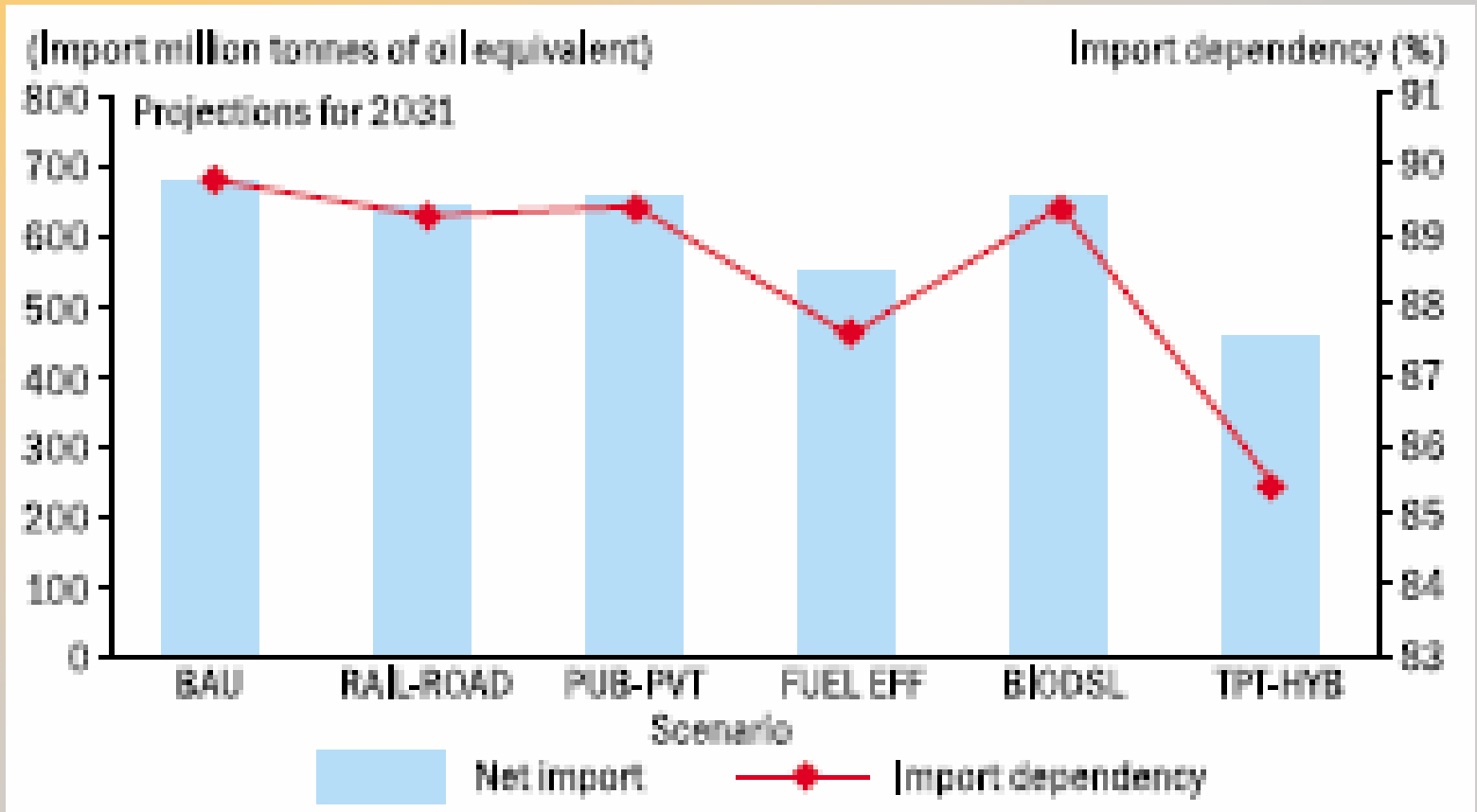
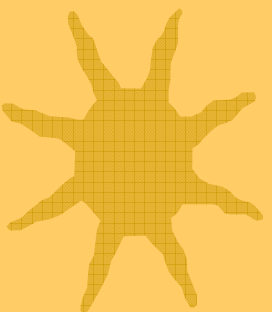
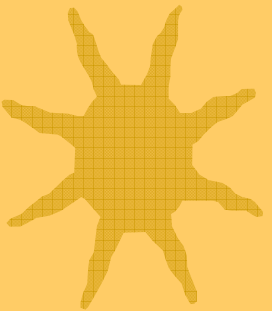
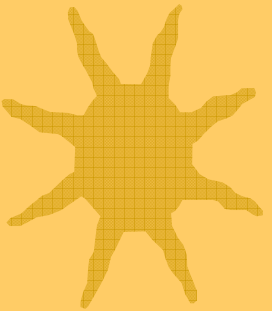
Scenario	2001	2006	2011	2016	2021	2026	2031
BAU	34	67	106	161	231	328	461
RAIL-ROAD	34	67	105	158	223	312	430
PUB-PVT	34	68	107	154	219	310	436
FUEL EFF	34	63	94	135	184	249	336
BIODSL	34	67	104	157	222	310	433
TPT-HYB	34	64	94	126	171	228	302

BAU - business-as-usual; Mtoe - million tonnes of oil equivalent.

Source: National Energy Map for India: Technology Vision 2030



Possible Reduction in Net Import and Import Dependency

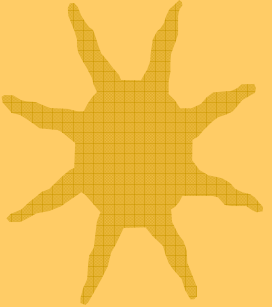


2031

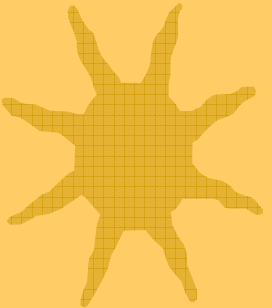
Source: National Energy Map for India: Technology Vision 2030



Way Forward- National Action



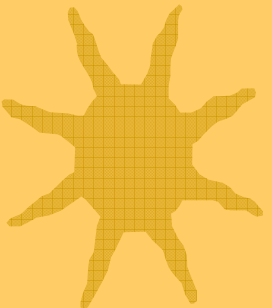
★ Formulate and **implement** an integrated policy to increase the share of the railways, water transport and pipeline in freight transport



★ Implement The National Urban Transport Policy

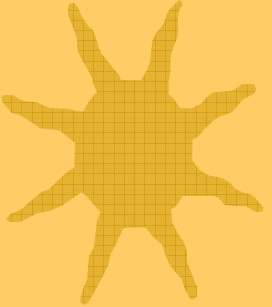
★ Vigorously promote alternate fuels

★ Introduce fuel efficiency improvements

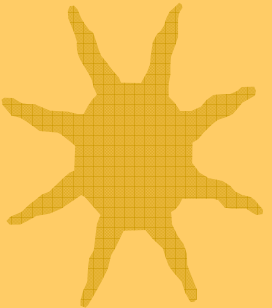




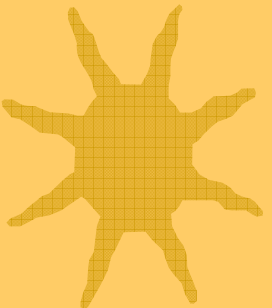
International Cooperation



- ★ Explore International agreement on a common minimum standard for fuel efficiency



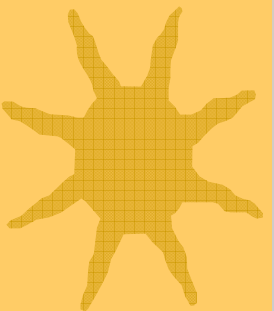
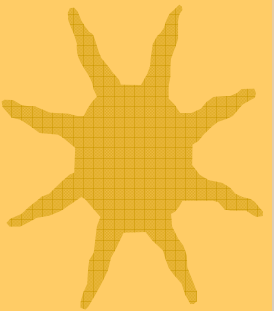
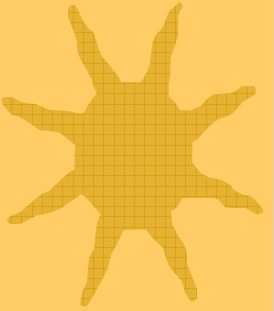
- ★ Encourage auto industry to employ best available engine technology and ECDs



- ★ Accelerate R&D in fuel efficiency improvement

- ★ Expedite commercial development of alternate fuels

- ★ Facilitate transfer of technology



Thank You