

Assessing Barriers to Climate Co-benefits in Transportation in Developing Asia- Framework

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Major transport-environment issues in Asian developing countries

- Choice of transport modes has been skewed towards motorized and private modes (cars, two wheelers) in early stage of economic development
- Gap between demand for motorized travel and capacity of infrastructure is high and widening
- Cities are trying to develop efficient transport systems but less or no attentions are being paid to reduce the need for transportation
- Urban planning has largely not been successful in Asian cities except few exception – so is land-use transport integration

Major transport-environment issues in Asian developing countries

- On-road energy/emission performance of fleet remains poorer despite significant penetration of emission-compliance vehicles
- Low sulfur fuel is slowly penetrating and CNG is becoming increasingly popular – yet pace is slow
- Transport and emission reductions are mostly viewed by policy makers as infrastructure and tailpipe-problem and upstream drivers are often ignored in problem solving even now (lack of integrated perspectives)

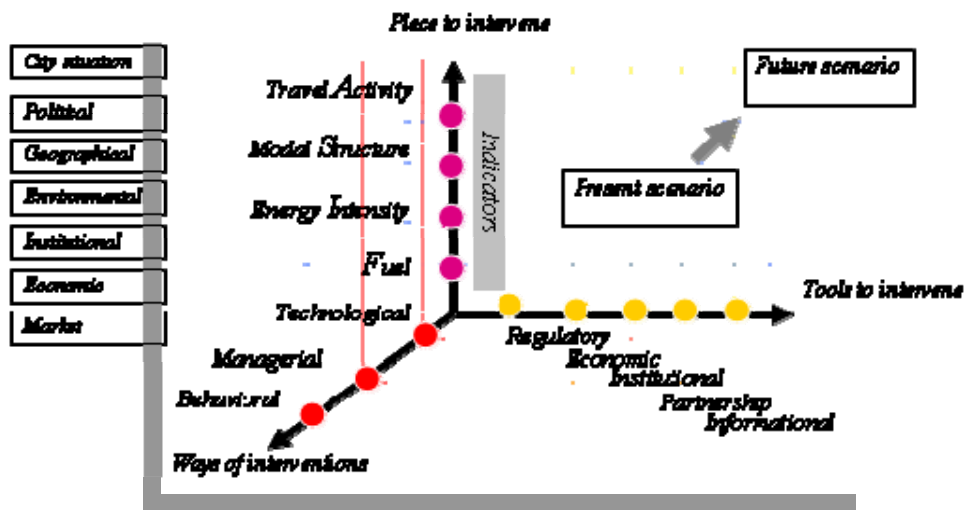
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Major policy challenges

- Policy inadequacy (over dependency on end-of-pipe solution and short term measures etc., poorly formulated)
- Weak implementation of existing policy measures, standards, and regulations
- Transport and poverty inter-linkages – equity issue
- Resource constraints for infrastructure development
- Institutional problems
 - Less commitment
 - Less capacity
 - Coordination problems
 - Prevalence of vested-interests

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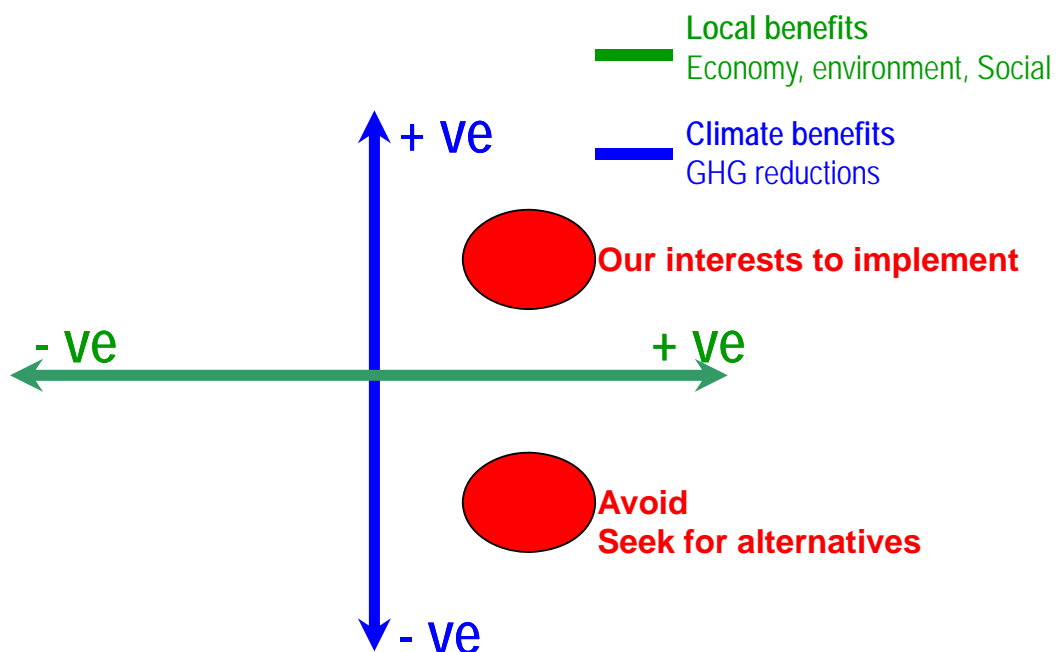
Domain of strategies for carbon mitigation and traditional environmental issues are same



But the choice we have to make for climate and traditions env problems could be different

Source: Dhakal and Schipper, 2005

Co-benefit quadrants



Local priority not always synergistic with climate objectives

- **Transport infrastructure**
 - More and better transport infrastructure invite more travel activity of private-motorized mode in developing country
- **Economy**
 - Automobile industry is a pillar of national economic development in many countries that promote motorization locally
- **New technology**
 - For new technology, life cycle CO₂ is more important – need a careful look
- **Individual measures vs systemic effect**
 - Case of fuel efficiencies of different size-class

Not always synergies with climate objectives

- **Air pollution mitigation**
 - Vehicle emission standards are for local pollution not for GHGs – instead fuel efficiency standards help
 - Technological-fix at vehicle tailpipe which is priority in Asian cities for air pollutant mitigation (catalytic converter for e.g) – does not help GHGs, may worsen GHGs if lowers fuel efficiency
 - Fuel quality improvements - do not necessarily reduce GHGs
 - Greater use of CNG do not have GHG benefits, probably worsen
 - Discouraging diesel vehicles to control PM and NO_x may increase GHG emission
 - Case of electric vehicles (EVs) depend on electricity

Case of CNG

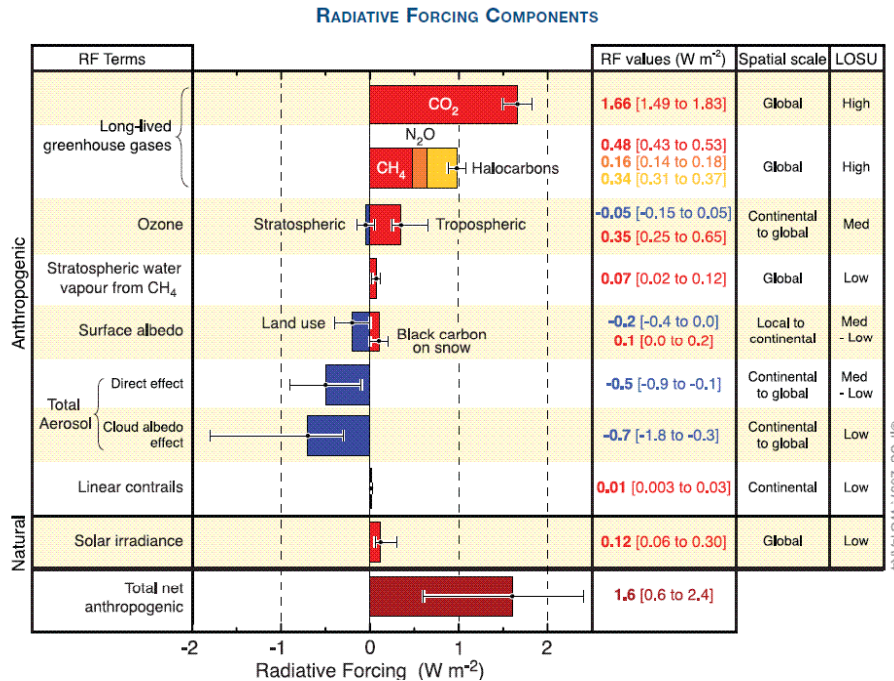
- CNG has high H:C ratio, better source for fuel cell compared to other fossil fuels for carbon emissions
- CNG is good for PM and NO_x- key criteria air pollutants
- CNG may reduce GHG compared to Gasoline vehicles, LPG and LNG
- CNG has low caloric value against diesel which it generally substitutes- in per km, thus need more energy and emit more CO₂
- Retrofit CNG vehicles- prevalent to Asian cities- CH₄ leakage is more serious (CH₄ is 23 times more worse than CO₂)

Case of diesel

- Diesel is better than Gasoline for GHG mitigation- due to high energy efficiency
- Discouraging Light Duty diesel vehicles for NO_x and PM concern in cities could be detrimental to GHG cause
- Diesel emit black carbon which has high radiative forcing- extent of benefit may depend on
 - Quality of diesel – S content
 - After exhaust technology- particulate trap
- Diselisation with better diesel quality and after exhaust treatment is attractive to local pollution as well as GHG concerns

Radiative Forcing

Radiative forcing is the quantitative measure of the strength of different human and natural agents in causing climate change



Global average radiative forcing (RF) estimates and ranges in 2005, IPCC AR4

LOSU: Level of scientific understanding

- Anthropogenic strength is far greater than natural factors

- As a gas, CO₂ is of prime concern

- CO₂ is also linked to land and ocean uptakes too

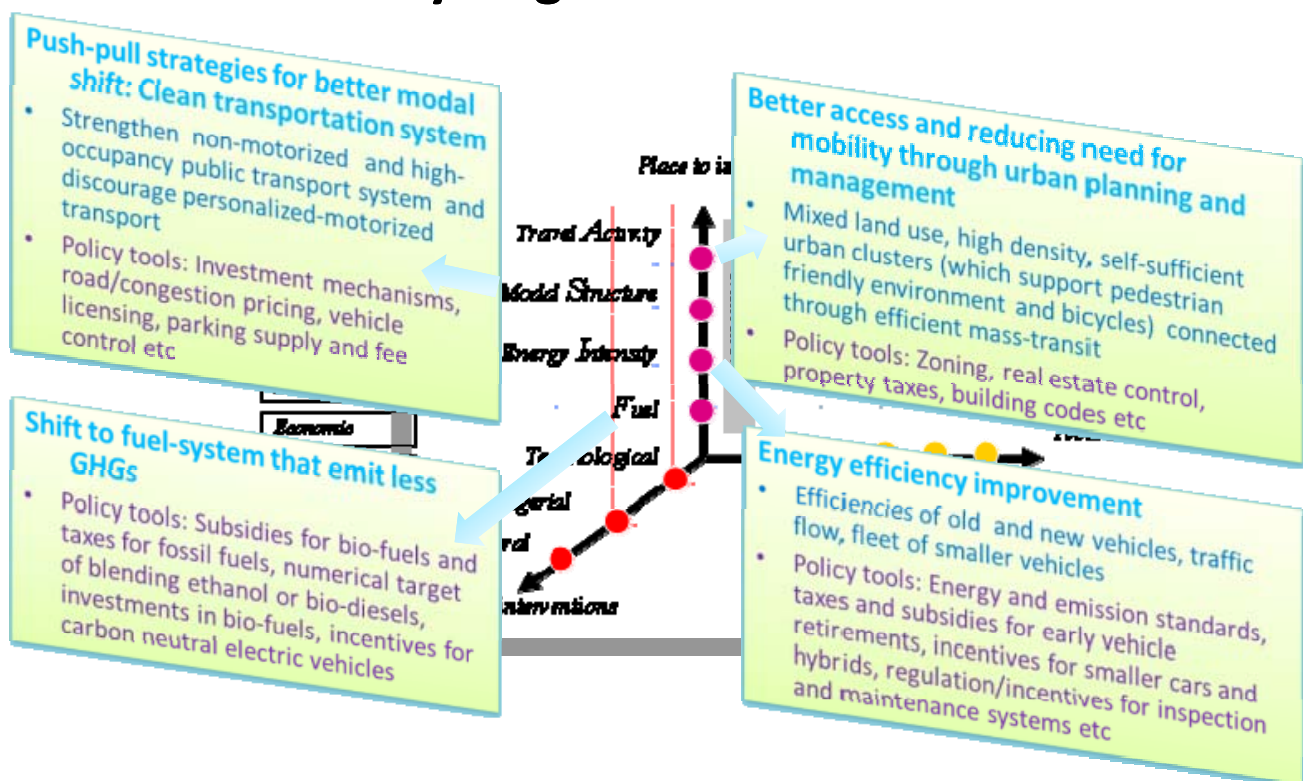
Case of urban density

- Energy use per capita in cities are function of
 - Income effect, density effect, functional locations and many others
- Density provides opportunities for lowering energy and infrastructure per capita compared to sprawled conditions (e.g. North America)
- But it is not clear what extent of density-gaps would clearly explain such phenomenon
- In case of developing Asia:
 - Cities are already dense; density is already problem because of congestion, air pollution, waste volume, sewerage etc
 - Income's effect to per capita energy use is overwhelming

Case of public transport

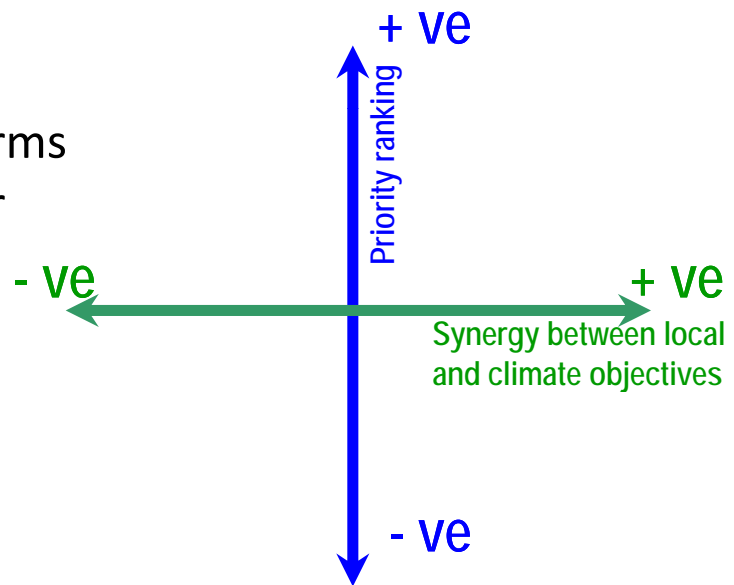
- High occupancy vs low occupancy
- Road based vs rail based
- Ability to substitute mobility demand of cars but not NMT
- Fuel used (gasoline car vs. trolley bus run on coal generated electricity)

Where are synergies with climate benefits?



Having synergies is not enough

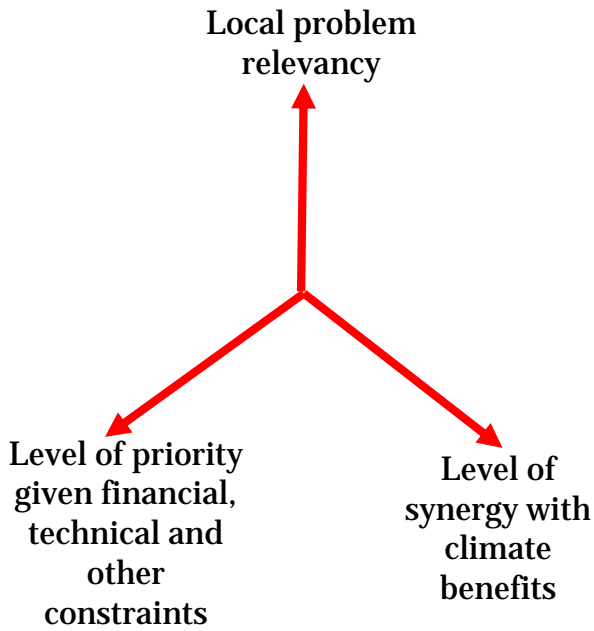
- Where synergistic measures stand in terms of priority-ranking for implementation?



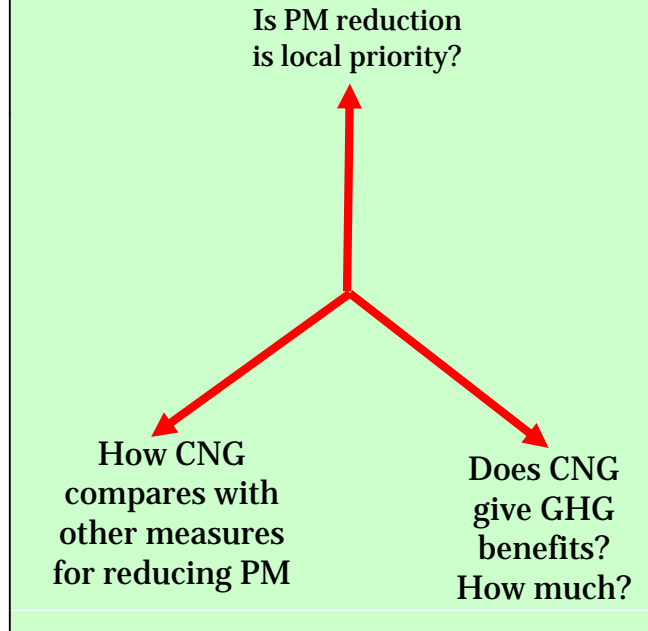
Are synergistic measures in priority list in developing Asia?

- Urban planning measures for better access- No
- Travel activity reduction measures - No
- Car restraining- No (few exceptions)
- Non-motorized travel models- No
- Inherently clean options such efficient mass public transit/transportation – Yes
- Energy efficiency improvement – Yes
- Bio-fuels – Considerable interests
- Dieselization – in Europe, new trends in Asia
- Electric and hybrid vehicles with clean electricity – No

How to view measures for co-benefits?



Example: Implementing CNG strategies to combat PM problem



Framework for operationalizing co-benefit strategies

- Implementing locally-competitive measures that are “synergistic” in nature (Do-It-Yourself)
- Uplifting measures with more-GHG-mitigating-potentials within the portfolio of locally-prioritized measures
- Avoiding measures that are high on priority list locally but are detrimental to climate concerns

Key barriers

Awareness, better assessments, lack of implementation (a)

(a) + financial priority and technology (b)

(a) + (b) + Assessment of alternatives + lack of financial and policy disincentives

Key opportunities

- Availability of no-regret options
- Demonstration projects
- Capacity building
- Experience sharing

- Capacity building
- Timing
- Re-orienting local and international financial and technology regimes (CDM, bilateral, multilateral and others)
- Sharing experiences

- Capacity building
- Using climate-momentum and national and intl. financial mechanism as a pretext for new debates
- Fee-bate systems

How to move forward?

Better assessments	Better policy making and implementation	Avoiding system lock-in into climate unfriendly mode	Formulating Support measures at multiple scale
<ul style="list-style-type: none">• Extent of co-benefits• Life cycle emission for range of technologies and measures• Feedbacks and rebound effects	<ul style="list-style-type: none">• Better focus on implementation issues• Learn from good and failed policies• Understanding on what rebounds and how (human behavior issues)• Creating political champions	<ul style="list-style-type: none">• Mode of technology or infrastructure• Long-term regulatory and policy prescriptions	<ul style="list-style-type: none">• Post Kyoto regime-explicit recognition and rewarding• Bilateral , multilateral regimes• Hook on FDI?• National support
Capacity building and facilitating co-benefit measures: International lobbying by like-minded organization			

- Thank you