Concept of Sustainable Transport: 
Planning and Designing for 
Sustainable and Inclusive Transportation Systems
What is the presentation about?

- Main Challenges
- Concept of sustainable transport
- Long-term vision for the development of the region’s transport system
- Planning sustainable transport System – Strategies and Barriers
- Way forward
Sustainable Transport

Our Main Challenges

Transport vital for economic development and personal welfare, but...

- **Difficult to meet growing demand** (economic and population growth, rising income) – faster than economies growing
- **Growing energy consumption and other resources** – 15-20% or more of total import cost
- **Air pollution, emission of GHGs** – growing faster than GDP
- **Adverse health and social impacts** - outdoor air pollution contributed to 712,000 deaths in South Asia (GBD Study)
- **Road safety** – more than 2,800 road deaths in Sri Lanka in 2010 (WHO)
- **Non-inclusive development** – not all are benefiting

Combined cost could be up to 10% of GDP

Cannot do business-as-usual
Sustainable Transport

Sustainable Development

• The development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Report)

• Three pillars: economic, social, and environmental
Sustainable Transport

Main current approaches

• Reduction of transport demand
  
• Promotion/improvement of more energy efficient and environment friendly transport modes
  
• Improvement in efficiency of the transport process
  
• Introduction of new technology

Avoid

Shift

Improve
Sustainable Transport

Long-Term Vision

“An international integrated intermodal transport and logistics system”
Endorsed by the Commission (2007 and 2012)

It is the system that has the intermodal network of well designed, maintained and interconnected highways, railways, inland waterways, sea ports, river ports, airports or dry ports that, through modal shift,

• optimizes the needs of transporting goods and passengers
• minimizes consumption of energy, land and other resources
• generates low emissions of, greenhouse gases and ozone depleting substances
• minimizes the adverse social impacts arising from transport operations.
**Sustainable Transport**

**Key Factors**

“An international *integrated intermodal transport and logistics system*”

<table>
<thead>
<tr>
<th>Economic Factors</th>
<th>Social Factors</th>
<th>Environment Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Access</td>
<td>Energy Intensity</td>
</tr>
<tr>
<td>Speed</td>
<td>Min. Accident</td>
<td>Emission</td>
</tr>
<tr>
<td>Capacity</td>
<td>Congestion</td>
<td>Pollution</td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The system combines the advantages of each mode of transport to achieve the balanced integration of *economic, social and environmental* benefits.
## Sustainable Transport

### Key Factors

<table>
<thead>
<tr>
<th>Economic Advantages/ Disadvantages</th>
<th>Cost per Ton-Mile (USD)</th>
<th>Capacity (Truck Equivalent)</th>
<th>Speed</th>
<th>Reliability</th>
<th>Flexibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>High</td>
<td>Lowest</td>
<td>Moderate</td>
<td>Good</td>
<td>High</td>
</tr>
<tr>
<td>Train</td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
<td>Good</td>
<td>Low</td>
</tr>
<tr>
<td>Ship</td>
<td>Lowest</td>
<td>Highest</td>
<td>Slow</td>
<td>Limited</td>
<td>Low</td>
</tr>
<tr>
<td>Airplane</td>
<td>Highest</td>
<td>Low</td>
<td>Very High</td>
<td>Very good</td>
<td>Medium</td>
</tr>
</tbody>
</table>
## Sustainable Transport

### Key Factors

<table>
<thead>
<tr>
<th>Environment</th>
<th>Energy Intensity (BTU per ton mile) USA - 2006</th>
<th>CO2 Emission (per ton-km) Europe - 2011</th>
<th>Air Pollution* (Euro ct/tkm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck</td>
<td>4047.00</td>
<td>75.33</td>
<td>0.73-0.93</td>
</tr>
<tr>
<td>Train</td>
<td>330.00</td>
<td>Electric - 17.89 Diesel - 28.88</td>
<td>Electric - 0 Diesel 0.88-1.05</td>
</tr>
<tr>
<td>Ship</td>
<td>571.00</td>
<td>12.02</td>
<td>0.09</td>
</tr>
<tr>
<td>Airplane</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
# Sustainable Transport

## Key Factors

<table>
<thead>
<tr>
<th>Social Advantages/Disadvantages</th>
<th>Opportunity cost of Land Use</th>
<th>Congestion (Euro/vkm)</th>
<th>Cost of accidents and injuries (Euro ct/tkm)</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Truck" /></td>
<td>High</td>
<td>0.13-4.00</td>
<td>0.23-0.92</td>
<td>High</td>
</tr>
<tr>
<td><img src="image" alt="Train" /></td>
<td>Medium</td>
<td>minimal</td>
<td>0.02</td>
<td>Average</td>
</tr>
<tr>
<td><img src="image" alt="Ship" /></td>
<td>Low</td>
<td>minimal</td>
<td>minimal</td>
<td>Low</td>
</tr>
<tr>
<td><img src="image" alt="Airplane" /></td>
<td>Low</td>
<td>n/a</td>
<td>n/a</td>
<td>Average</td>
</tr>
</tbody>
</table>

*Handbook on estimation of external costs in the transport sector (2008), Commissioned by European Commission DG TREN*
Modal Shift

Modal shift from road to rail at Lat Krabang ICD Terminal

Volume moved by Rail in May 2015: 38,026 TEUs

With Simple Calculation

- Appx 5,000 tons of CO2 reduction/month
- Cheaper options
- Free up at least 19,000 trucks along 118 km roads in that month – less congestion at port

(calculation using the average of dry container at appx 24 t)

Lat Krabang ICD Terminal

One of the most developed and advanced dry port in Asia, developed on Concession in 1993

27 Km East of Bangkok, 118 Km from Laem Chabang port (direct rail connection to port)
Sustainable Transport

Urban Transport

PASSENGER-KILOMETRES OF TRAVEL PER 1 TON OF CO2 EMITTED

(values given in passenger-kilometers)

All values reflect a 100% occupation rate.

Pedestrian: 146,100
Bicycle: 119,100
Bi-articulated BRT Bus (diesel): 101,200
Articulated Bus (diesel): 80,600
2-axle Urban Bus (diesel): 31,100
Metro Rail (Urban Bus (single car)): 26,500
Passenger Car (diesel): 26,200
Scooter (4-stroke urban roads): 17,200
Passenger Car (petrol):
Scooter (2-stroke urban roads):
Sustainable Transport

Urban Transport

TRANSPORT MODE SPACE REQUIREMENTS
people per hour on 3.5 m wide lane in the city

BRT = Bus Rapid Transit

<table>
<thead>
<tr>
<th>Mode</th>
<th>Space Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Traffic</td>
<td>2,000</td>
</tr>
<tr>
<td>Regular Bus</td>
<td>9,000</td>
</tr>
<tr>
<td>Cyclists</td>
<td>14,000</td>
</tr>
<tr>
<td>Pedestrians</td>
<td>19,000</td>
</tr>
<tr>
<td>BRT (Single Lane Bus)</td>
<td>20,000</td>
</tr>
<tr>
<td>Light Rail</td>
<td>22,000</td>
</tr>
<tr>
<td>BRT (Double Lane Bus)</td>
<td>43,000</td>
</tr>
<tr>
<td>Heavy Rail (e.g., Hong Kong, China)</td>
<td>80,000</td>
</tr>
<tr>
<td>Suburban Rail (e.g., Mumbai)</td>
<td>100,000</td>
</tr>
</tbody>
</table>

SOURCE:
Adapted from ADB & GIZ (2011)

United Nations ESCAP
Economic and Social Commission for Asia and the Pacific
Sustainable Transport

Example – Passenger

• Better and integrated public transport systems – inclusive services
• Use of NMTs (including walking)
• Modal shift

Photo credit: Ridwan Quaium
Rajshahi, Bangladesh
Pun Pun Bike sharing, Bangkok
Sustainable Transport

Non-Motorized Transport

Example – Passenger

Photos Credit – pun pun BKK Bicycle Share / member no. 2127723 at www.pantip.com
Main strategies:

- **Improved system operation** (ITS application, integration of transport modes)
- **Demand management** (staggered working hours)
- **Economic instruments** (tax, subsidy, pricing, etc)
- **Regulatory standards** (vehicle, fuel, maintenance)
- **New technology** (engine, vehicle, fuel, material etc)
Sustainable Transport

- **Engine** (emission control, direct injection etc)
- **Vehicle** (safety, fuel efficiency)
- **Fuel** (higher emission standard compatible)
- **ICT/ITS** (coordinated traffic signals, transit operation, management of toll roads, expressways)
- **Infrastructure** (pavement, material etc)
Institutional Barriers

- Planning and policy formulation – non-inclusive, technocratic
- Laws, regulations, rules – not always supportive
- Coordinated action by different agencies
  - difficulties in inter-agency coordination
- Social and cultural barriers – Car represent social status?
- Resource barriers (including human resource)
Sustainable Transport

Potential Barriers

Policy and structural barriers

• Policy biases are common – eg., favouring road sector in resource allocation, ignoring sustainable development measures, – needs of marginal and other groups ignored

• Policy distortions (eg. energy pricing) – fuel subsidy in some countries; inconsistent, contradictory policies across sectors

• Sector and market structure in transport – eg, fragmented freight sector in most DCs, difficult to improve efficiency

• Regulatory institutions and performance standards - may be either lacking or deficient etc.
Sustainable Transport

Suggestions for consideration

• Inclusion of Sustainable transport (ST) in national development framework

• Formulation of an agreed national policy framework on ST (national and urban)

• Development of a framework of indicators and benchmarks for planning and monitoring the progress in sustainable transport development

• Institutionalization of integrated planning, policy formulation and coordination of action

• Creating a supportive environment (e.g. R&D)

• Social awareness and education
Thank you

www.unescap.org/our-work/transport
Info.: escap-ttd@un.org