POLICY RESPONSES TO CONGESTION:
Better System Management

_Briefing note – Session 2A*

KEY ISSUES

**Congestion mitigation strategies**

- Are there successful examples of congestion mitigation strategies that can serve as good practice or provide lessons for countries?

**Enhancing traffic management**

- **Intelligent transport systems:** ITS systems are playing an increasingly important role in providing and communicating information about transport system performance. Have expectations for ITS to solve congestion problems been too high? What is the right role for government in developing and making available these technologies? Who should bear the costs? How can interoperability of ITS applications be ensured across transport networks in different countries?

**Improving inter-modal interfaces**

- Which difficulties/inefficiencies contribute most to **backlog at inter-modal interfaces**? To what extent are these problems (and therefore their solutions) the responsibility of private sector actors/government?

**Facilitating Trade**

- How can **administrative and regulatory impediments** that lead to bottlenecks in the system be overcome to fluidify transport flows and facilitate trade?

- Is congestion at **border crossings** a serious hindrance on trade and economic development? Which entities are bearing the most costs from border congestion?

- How have **enhanced security measures** at borders exacerbated congestion at borders both in the aftermath of 11 September 2001 and more recently? Are bilateral solutions such as the Canada-US Smart Border Declaration the most efficient way to handle these issues or are more multilateral agreements necessary?

BETTER SYSTEM MANAGEMENT TO REDUCE CONGESTION

Improving transport system operations and management can help to clear bottlenecks and reduce congestion. Prior to making costly investments in new transport infrastructure, options for better utilising and managing existing system capacity for motorways, ports and airports, public transport systems and freight logistics should be explored.

✦ Take a strategic approach to congestion management

A first step in better managing the system involves a strategic assessment of both the direct and indirect causes of congestion across the transport network. The most direct sources of congestion in road transport include too many vehicles for a given roadway’s design, and dynamic changes in roadway capacity caused by lane-switching and car-following behaviour, among others. More indirect but nevertheless key causal factors include land-use and employment patterns; car ownership trends, regional economic dynamics and new infrastructure investment. Only when a comprehensive, multi-pronged approach – looking at both the on-road “micro triggers”, as well as the off-road “macro drivers” of congestion is taken, will the solutions be effective and lasting. This requires greater cooperation in decision-making among authorities and agencies at different levels of government and across sectors (e.g., land use, employment, public safety).

Managing demand: When road capacity is freed-up due to better management (or additional capacity), measures to manage demand for that newly available capacity must be put in place in order to “lock in” the benefits of the congestion relief on that road. Otherwise, newly created capacity can induce or attract new travel on the road in question. This involves restricting access to certain links (ramp metering) or zones (historical centres in cities); managing access to the roadway network/urban zones through parking policies; and restraining traffic levels through road pricing policies.

✦ Enhance Traffic Management

• Road traffic management measures are designed to both improve speeds of existing traffic volumes and improve speeds by reducing traffic volumes. Intelligent Transportation System (ITS) technologies – in particular dynamic traffic management, and traffic incident management techniques – can improve the efficacy of these measures.

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<th>Principles for better road system management:</th>
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<td>• Coordinate land use &amp; congestion management policies;</td>
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<td>• Manage roadways to ensure adequate system performance;</td>
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<td>• Deliver predictable travel times.</td>
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![Variable speed limit control](image1)

![Dynamic lanes](image2)
Traffic management measures include: **Prioritisation of passenger over freight traffic on roads** in peak periods to temporarily free up capacity, or conversely, prioritisation of freight trains at certain times of the day along specific corridors; **Tidal Flow**, which reverses road traffic flow to cope with peaks in traffic volumes. **Dedicated lanes**, designed for use of only specific types of vehicle – e.g. heavy goods vehicles, or buses. An example of this is **high-occupancy vehicle (HOV) lanes**, first used in the United States in the 1970s and increasingly used to promote commuter car share and other schemes. Accompanying pricing measures can increase their impact and efficiency. **Dedicated bus lanes** have proven effective in improving travel times for buses in many cities (e.g. Dublin and Paris). **Ramp metering** uses traffic signals or lights to control the rate at which vehicles can enter a motorway from an access road. A similar “drip-feed” system has been effective in optimising traffic flows through the Gotthard tunnel in Switzerland. **Variable or dynamic speed controls** smooth traffic flow by changing the speed limit according to real-time traffic speed and flow data; **Hard shoulder running** allows hard shoulders on motorways to be opened for traffic during peak periods. **Dynamic lanes** distinguish lights on the road surface that alter the number and width of lanes on a motorway or bridge to temporarily increase capacity.

**Intelligent transportation systems (ITS)** facilitate management and operation of the transport system and help keep traffic flowing. ITS applications include closed-circuit television cameras; dynamic messaging signs that provide updated information on traffic conditions; roadway-embedded sensors and wireless communications systems that transmit traffic and other information to transport officials, police, emergency-response agencies, and the public. Synergies between types of technology are constantly increasing and improving as the technologies become more available: future vehicles will be equipped with on-board navigation systems that are able to receive real-time traffic information. And intelligent systems that avoid the risks of shifting jams to alternative routes are close to commercial application.

**Dynamic Traffic Management Systems** facilitate a comprehensive approach to congestion management decision-making. Using simulation models along with real-time traffic and origin-destination information, they predict the effects of different congestion-mitigation strategies (e.g., incident management (see below), ramp metering, signal control, traveller information) on network flow patterns and travel times.

**Incident management:** Accidents, disabled vehicles, work zones, planned events or unexpected weather conditions are common sources of non-recurring congestion. Incident management plans include ITS area surveillance and traffic controls by cameras, especially on motorways, aimed to facilitate the detection and verification process. **Regional traffic management centres** bringing together transport authorities, public safety agents (police, fire protection), emergency services and the media use
variable messaging systems, in-vehicle technologies or radio information to inform users about delays, traffic flow and alternative travel routes.

- **Congestion** on railways can be addressed through a variety of measures designed to increase productivity without investment in new lines. These include: prioritisation of freight trains over passenger trains at certain times of the day along specific corridors; track sharing; improving the train control system; re-arranging the train mix; managing risk of disturbances; implementing a common gauge for rail vehicle width/height; managing demand; improving freight forecasting; and entering into collaborative arrangements with other railways.

Regarding the latter, Canada’s two main rail freight companies, for example, have agreed to operate direct to-destination trains that bypass yards and eliminate railway-to-railway handovers in order to improve freight flows to and from the Vancouver area ports. This will eliminate 90% of the traffic interchange between the two railways in the Vancouver area.

Measures targeting rail rolling stock include: increasing freight wagon size; using more powerful locomotives or coupling sets of locomotives to increase the acceleration of trains and thereby reduce conflict between slower and faster trains; and increasing train length up to limits set by passing loops and passenger train station platform lengths. Enhanced signalling systems can reduce spacing between trains and enable increased speeds. And eliminating or protecting highway/railway level crossings can improve both capacity and safety. Improving freight train and wagon management by tracking wagon locations and informing travellers of changes in expected arrival times can allow them to adjust loading and unloading schedules.

- A large share of port congestion is due to organizational, management and operational problems that include: mismatches in storage and loading capacity, poor layout of terminals, and inefficiencies in directing trucks, rail wagons and barges to the containers they are to pick up or to the yards where they should drop containers off. Coordination between ship and truck movements is complicated and often poor – ports and truck depots work to different schedules/opening hours, usually resulting in a double peak for truck arrivals, early in the morning and again in the afternoon. Possible initiatives to address the congestion-causing administrative, operational and management inefficiencies in ports include flexibility in operating hours, introducing booking systems for port-gate truck arrivals, automating document processing and freight marshalling operations. Improvements in these areas would be supported by better planning within ports to manage and organize traffic and hinterland connections.

- Managing scarce capacity at airports involves four general processes: airport slot coordination; airline scheduling, flow and capacity management, and air traffic control. According to Eurocontrol, inefficiencies in these processes include unrealistic schedules due to miss-matched slots; imposed delays in flow management to avoid too many flights arriving at once; and early arrivals of aircraft due to early departures from non-slot controlled airports. Better management of the air traffic management system could involve more tightly integrated and transparent slot-coordination that merges airport and air traffic management slot processes. With greater predictability of arrivals,
departures and ground movements, imposed time buffers between air traffic flow and ground movements could be reduced, leading to capacity gains.

**Improve Inter-modal Interfaces**

Inter-modal transport is often encouraged as a response to over-reliance on road transport. But the involvement of different modes in the transport chain – road, rail, inland waterway, air, and maritime shipping – implies often complex interfaces among the modes. A multitude of actors from different modes converge at inter-modal terminals -- hauliers, logistic service providers, rail, inter-modal and terminal operators; shippers, agents, container shipping lines. A lack of process integration can engender or exacerbate congestion. Problems at inter-modal terminals causing delays and congestion include: inappropriate terminal organisation; restricted terminal opening times; inefficient administrative and security processes; inadequate or lack of connector roads serving freight terminals; insufficient space for stack/ storage; poor links between main rail lines, terminals/ports; incompatibility between transport modes/load units/terminal equipment.

Actions to improve efficiency at inter-modal terminals include: ensuring that regional plans integrate terminal facilities for combined transport; improving infrastructure access to terminals/ upgrading terminal facilities for handling, storage and processing of Intermodal Transport Units(ITUs); supporting development of stackable ITUs for short sea shipping/ inland waterways; promoting use of interoperable electronic information systems among transport operators and automatic issuing/processing of documents for real-time monitoring/ transmission to clients of combined transport movements; increasing terminal capacity by offering longer opening hours and more efficient services (e.g., for transhipment operations).

**Facilitate More-Efficient Trade Flows**

Better management of the transport system also involves alleviating other types of bottleneck that impede trade flows. These include: national regulations that inadequately consider international transport and trade; a large number of trade instruments and trade agreements – often poorly coordinated -- in certain regions; lack of mutual recognition of customs organizations and procedures, as well as a multiplicity of border agencies; and

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<td>- Simplification, of trade formalities, processes, procedures;</td>
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<td>- Harmonisation of national trade procedures, operations, documents with international conventions, standards &amp; practices;</td>
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<td>- Standardisation through internationally agreed formats for procedures, documents &amp; information.</td>
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administrative obstacles in obtaining visas for professional drivers. While inadequate infrastructure is frequently over-emphasised as a cause of the trade bottlenecks, institutional reform is often underestimated or even overlooked as a factor.¹

**Obstacles at borders** include inefficient control procedures, inadequate infrastructure and poorly trained staff. According to the World Economic Forum, costs related to border crossing delays amount to some 85 billion USD per year worldwide, or 1.2% of the total value of international trade and 5-10 % of the end price of goods. For this reason border crossing and customs clearance issues have become the centrepiece of transport and trade facilitation initiatives. In Europe, conditions at border crossings vary significantly across countries. Average waiting times at some border crossings continue to be excessive, particularly on the external borders of the EU (as much as 48 hours for road and 60 hours for rail transport) as well as in the Balkan region. Congestion at border crossing points between the United States and Canada and the US frontier with Mexico is likewise a severe problem. US estimates of costs in 2000 to road freight carriers at the Ambassador Bridge between Detroit, Michigan and Windsor Ontario range from USD 150M to USD 200M.² Cost to the US economy in 2005 due to congestion along the California-Mexico border were USD 3.7 billion in output and almost 40 000 jobs.³ Procedures for the distribution and use of visas for international truck drivers is a persistent problem both within and outside Europe, leading to passage delays and subsequent efficiency losses. Measures to simplify visa formalities for professional drivers are still not applied in many cases and differ among modes.

**Integrated Border Management** can improve the efficiency and effectiveness of a country’s border control operations via adoption of international standards, a sound legal framework, joint controls and use of equipment, pre-clearance of people and goods, and harmonisation of documents and data, among others. Recent transport and trade facilitation initiatives have highlighted the need for a holistic approach to customs reform, with focus on cross-border cooperation among border control agencies; among countries along key trade corridors or in a given region; and among authorities and the business community. In addition to these elements, a successful Transport and Trade Facilitation programme requires :a clear vision, strategy and firm political commitment – notably from Transport Ministers; a multi-sector approach including all actors in international trade and transport; adequate financing; and rigorous performance monitoring and evaluation.

**In conclusion:** Better management and use of the transport system both within and across modes is an essential prerequisite to additional investment in capacity. While industry and government both have important roles to play, overcoming regulatory and administrative impediments to congestion reduction is a key factor. And this is one area where Transport Ministries in particular can help.

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1. CEMT/ITF(2007)8: The Implications of Border Crossing Obstacles for Congestion and Impacts on Trade.
3. US Department of Transportation.