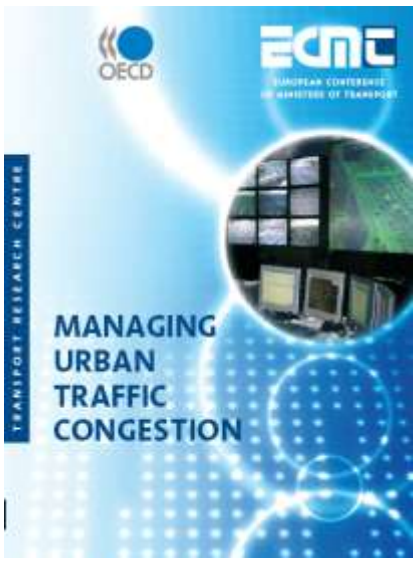
International Transport Forum | Joint Transport Research Centre | OECD

Managing CONGESTION in large urban areas

Philippe Crist, Administrator,
Working Group on Managing Urban Traffic Congestion in Large Urban Areas
OECD-ITF Transport Research Centre

International Transport Forum | Joint Transport Research Centre | OECD



- Joint Transport Research Group Working Group
- Chaired by Mr. Tom Worsley (UK DFT)
- 36 experts from 14 countries

International Transport Forum | Joint Transport Research Centre | OECD

What is Congestion?

Don't we all know?

- Absolute vs. relative phenomenon?
  - *Demand for road space exceeds supply*
  - *Difference between road users expectations and how the system actually performs*
- Users vs. Road Managers?
- Negative outcome of Agglomeration (positive)
- Something to be eradicated… or something to be managed?
- Avoiding excessive congestion….

International Transport Forum | Joint Transport Research Centre | OECD

When is Congestion Excessive?

Two Answers:

- When people say it is – but what about the cost of delivering improved road performance?
- Congestion is excessive when the marginal costs of efforts to reduce congestion are lower than the marginal costs to society of congestion itself.

International Transport Forum | Joint Transport Research Centre | OECD

How Should Congestion be Measured?

- Different metrics for different audiences
- Road managers interested in speed, flow queue length, etc., road users interested in predictability of travel times and trip quality.

International Transport Forum | Joint Transport Research Centre | OECD

Duration

Speed

Reliability

Causes

Trends

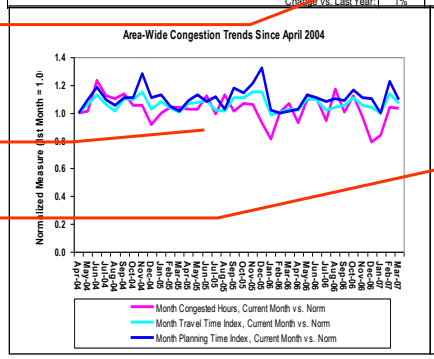
Spread

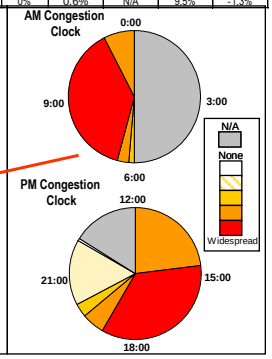
URBAN CONGESTION REPORT
January 2007 - March 2007

Chicago, IL
Metropolitan Area Executive Summary

UCR Congestion Indicators

YEAR	Congested Hours (Weekday) Total	AM	PM	Weekend	Travel Time Index (Weekday Peak) Total	AM	PM	Planning Time Index (Weekday Peak) Total	AM	PM	Data Quality: % Available Data:	Useable Days	Contributing Factors (Peak Period): Weather [1]	Work Zone [2]	Incidents [3]	Travel Demand K [4]
	1.3%				5.3%			9.5%								
2007	12.35	5.36	6.99	1.9	1.483	1.45	1.52	2.080	1.94	2.22	97%	31 of 31	9.8%	N/A	184.3	24.6
2006	12.51	5.48	7.04	1.7	1.408	1.38	1.44	1.899	1.75	2.05	96%	31 of 31	9.2%	N/A	168.3	24.9
Change vs. Last Year:											1%	0%	0.6%	N/A	9.5%	-1.3%



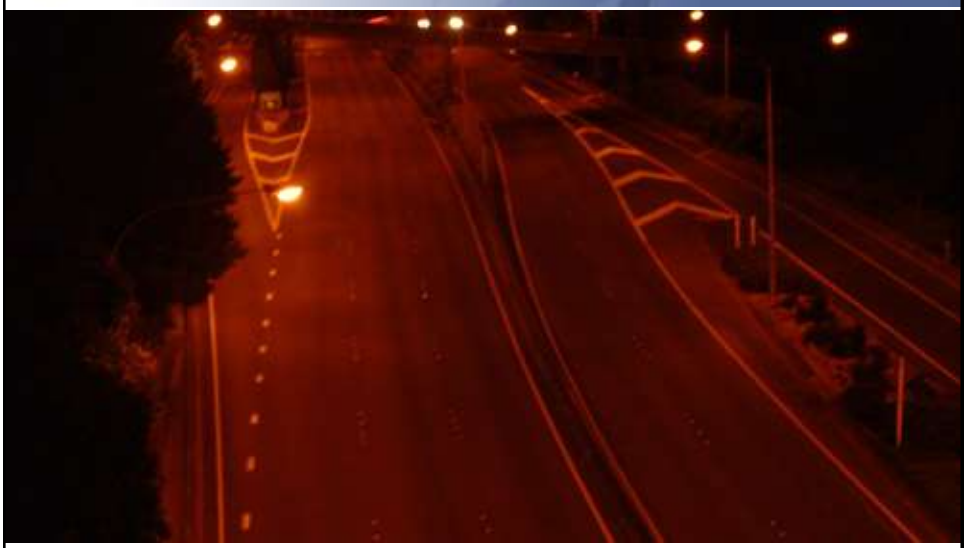


International Transport Forum | Joint Transport Research Centre | OECD

How Should Congestion be Measured?

- Different metrics for different audiences
- Road managers interested in speed, flow queue length, etc., road users interested in predictability of travel times and trip quality.
- Indicators should be policy-neutral:
  - free-flow speeds should not be used as a direct benchmark to measure congestion policy outcomes.

International Transport Forum | Joint Transport Research Centre | OECD



Free-flow? Who expects it at rush hour and who can afford it?

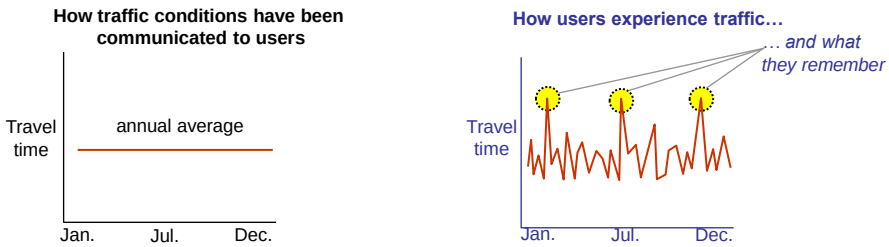
International Transport Forum | Joint Transport Research Centre | OECD

How Should Congestion be Measured?

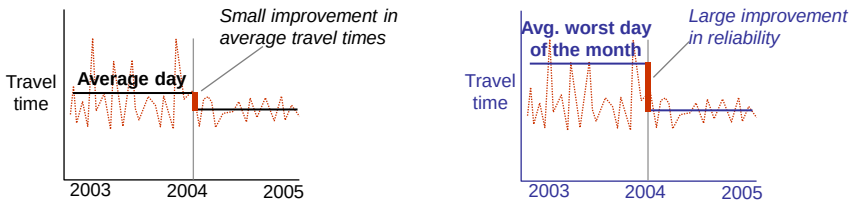
- Different metrics for different audiences
- Road managers interested in speed, flow queue length, etc., road users interested in predictability of travel times and trip quality.
- Indicators should be policy-neutral:
  - free-flow speeds should not be used as a direct benchmark to measure congestion policy outcomes.
- Reliability indicators are crucial for road users.

International Transport Forum | Joint Transport Research Centre | OECD

I. Average vs. real system performance



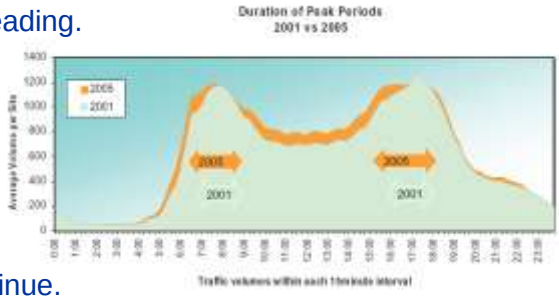
II. Road user perception of improvements: travel time vs. travel reliability



International Transport Forum | Joint Transport Research Centre | OECD

Is Congestion Getting Worse?

- Travel times are increasing in many urban areas (alongside with urban economic activity)
- Travel time variability increasing in some urban areas.
- Peak hours are spreading.

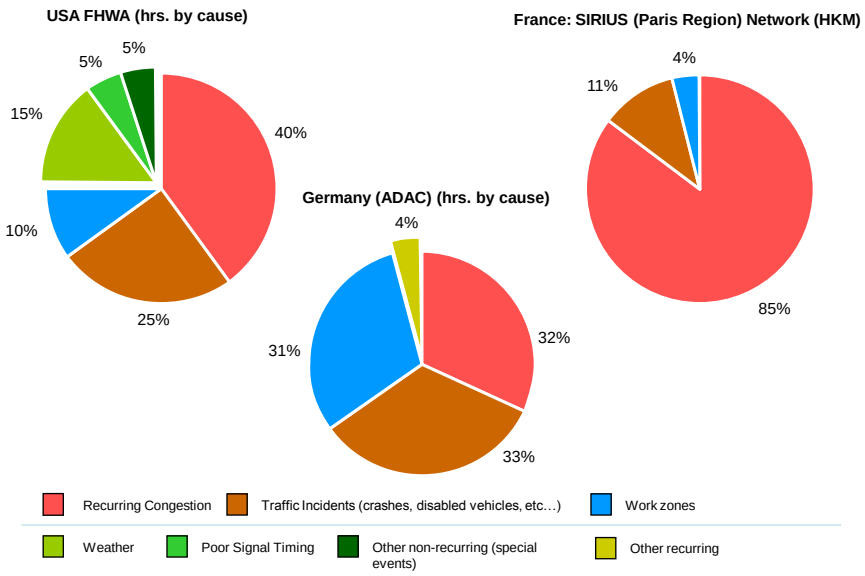


- Trends likely to continue.

International Transport Forum | Joint Transport Research Centre | OECD

What Should Policy-Makers Know about the Causes of Congestion?

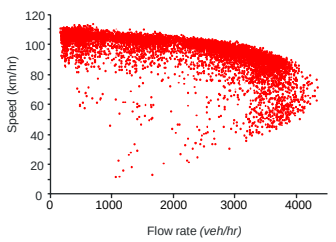
- Congestion is *triggered* on the road but is *driven* by macro-level factors (contributing to overall travel demand)
  - *While congestion takes place on the roads, its long-term management is not only, nor necessarily primarily, a traffic engineering problem.*
- Recurrent vs. non-recurrent congestion.



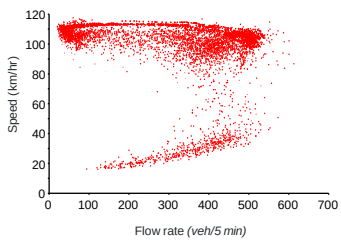
International Transport Forum
Joint Transport Research Centre
OECD

Conceptual Approaches to Managing Congestion

- Maximise Flows: (can lead to inherent instability and sudden phase switches into congested flow)



Autobahn A-40 Bochum, Germany (x lanes)



Interstate 10 East, Los Angeles, USA

- Optimise flows taking into account the balance between supply and demand as arbitrated by people's willingness to pay for better performance (technical vs. economic optimisation – need new hybrid approaches)

International Transport Forum | Joint Transport Research Centre | OECD

What Can We do Now to Better Manage Congestion?

Strategic principles to guide policy

1. Manage congestion in the context of the *urban area*: integrated transport and urban planning
2. "*Lock-in*" the benefits of congestion policies
3. Deliver *reliable and predictable* travel conditions

Integrate these principles into congestion management policies

- All policies should address desired urban outcomes, manage demand & supply and take account of user expectations

International Transport Forum | Joint Transport Research Centre | OECD

Principle #1: Align Congestion Management Policies with Land Use and Planning Processes

Land Use & Urban Form: Key Driver of Demand

- Adopt and implement sustainable land-use policies
- Integrate transport decision-making and land-use planning
- Traffic outcomes should be compatible with citizens' wishes for, and visions of, life in the urban area

International Transport Forum | Joint Transport Research Centre | OECD

Principle #2:
"Lock-in" the Benefits of Congestion Measures

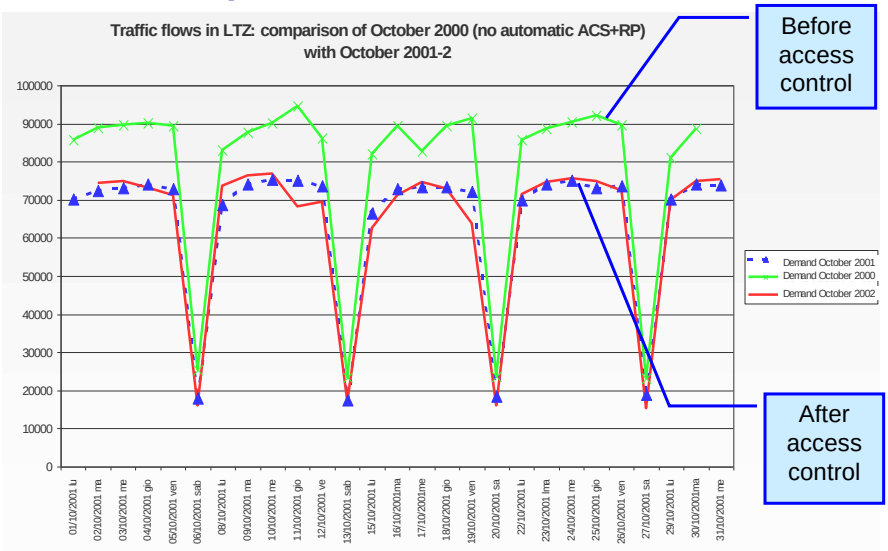
- "Traditional fixes" = More capacity (released or new),
- More capacity = More traffic (Induced traffic) – declining effect?
- More traffic = More congestion

Three Types of Policies Qualitatively Different re. Outcomes:

1. Access Management
2. Parking Management
3. Road Pricing

International Transport Forum | Joint Transport Research Centre | OECD

Rome: Impacts of Automatic Access Control



International Transport Forum | Joint Transport Research Centre | OECD

Re-allocation of Roadspace: Paris Southern Orbital Tramway

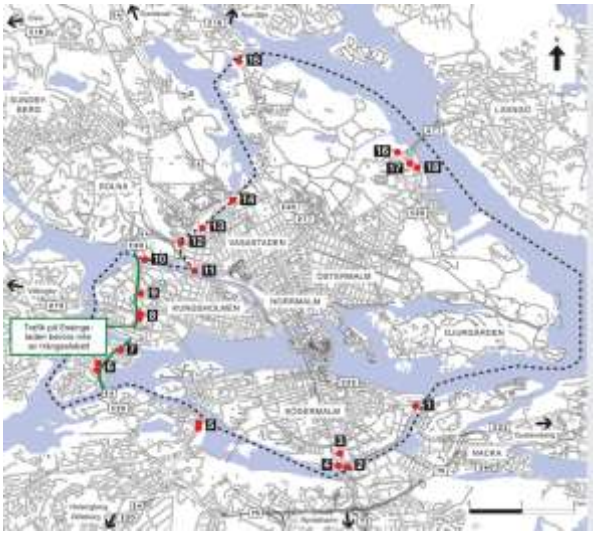
International Transport Forum | Joint Transport Research Centre | OECD

Road Pricing

- **Double consensus**
  1. Analysts and academics all for,
  2. Politicians against
- **New Developments in Stockholm and London**

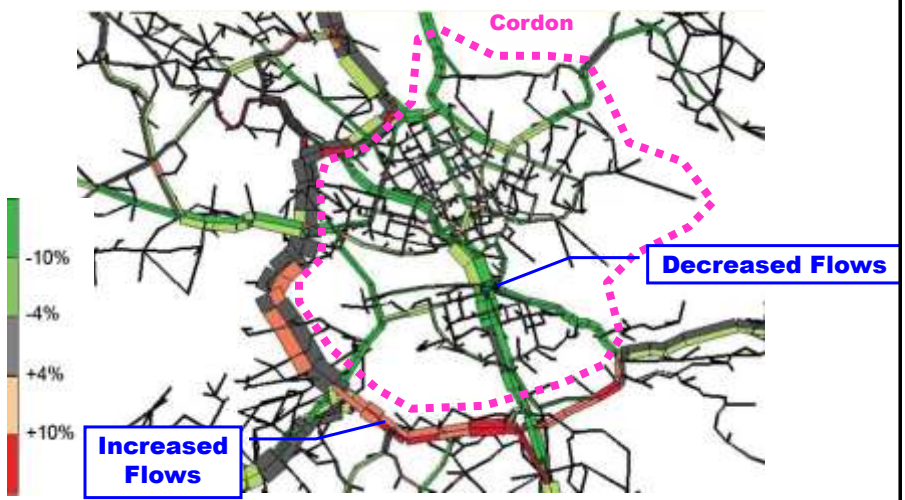
International Transport Forum | Joint Transport Research Centre | OECD

Stockholm Charging Cordon



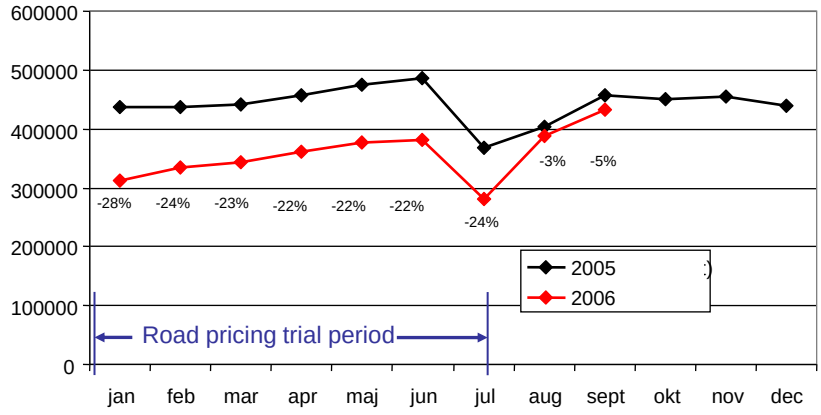
International Transport Forum | Joint Transport Research Centre | OECD

Stockholm Charging Cordon: Impact on Flows



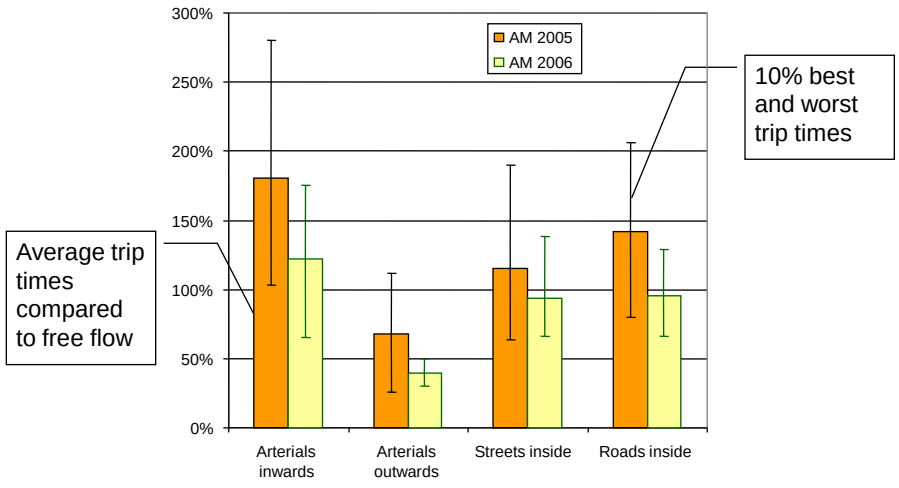
International Transport Forum | Joint Transport Research Centre | OECD

Did the Stockholm Charge Work?
Vehicles crossing cordon on weekdays:
22% drop in traffic



International Transport Forum | Joint Transport Research Centre | OECD

Delays Reduced, Reliability Improved



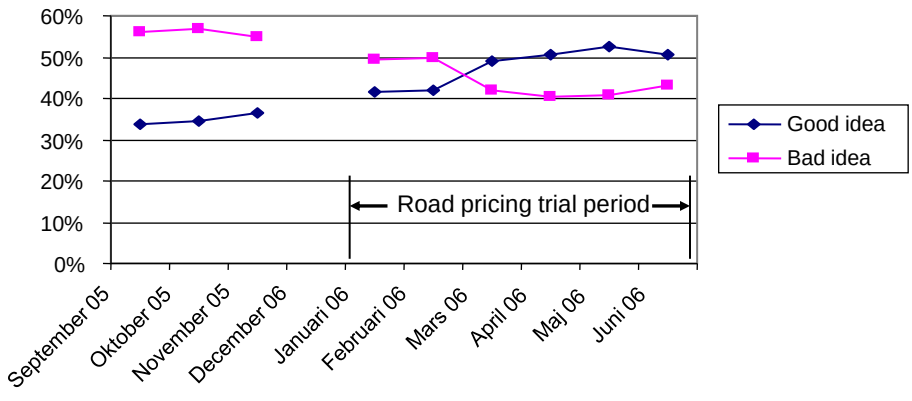
International Transport Forum | Joint Transport Research Centre | OECD

Stockholm: Economic Assessment

- Positive
- Assuming emissions reductions are added to congestion relief
- Assuming bus capacity expansion is not an integral part of scheme, as there was spare capacity
- Result is very sensitive to differentiation of values of time assigned to users
- Note, technology performed better than expected and 2008 version will reduce costs by eliminating redundancies

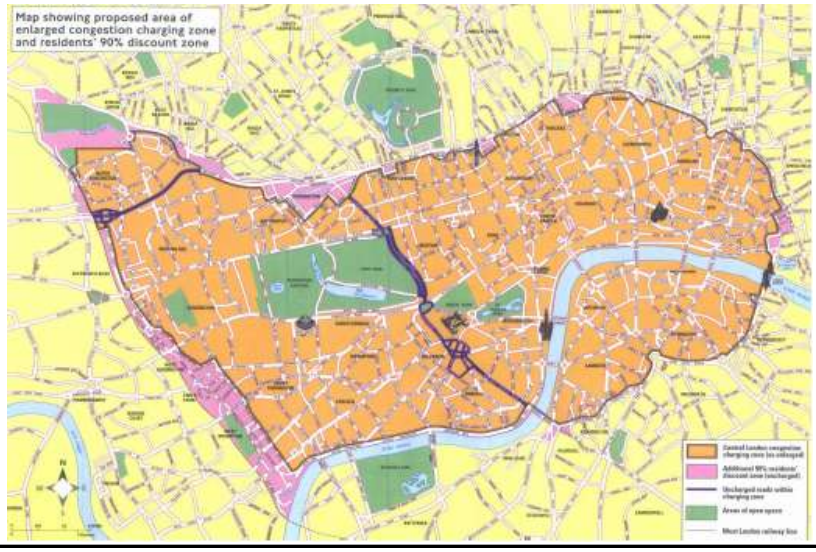
International Transport Forum | Joint Transport Research Centre | OECD

Acceptance: Seeing is believing
Public opinion in Stockholm



International Transport Forum | Joint Transport Research Centre | OECD

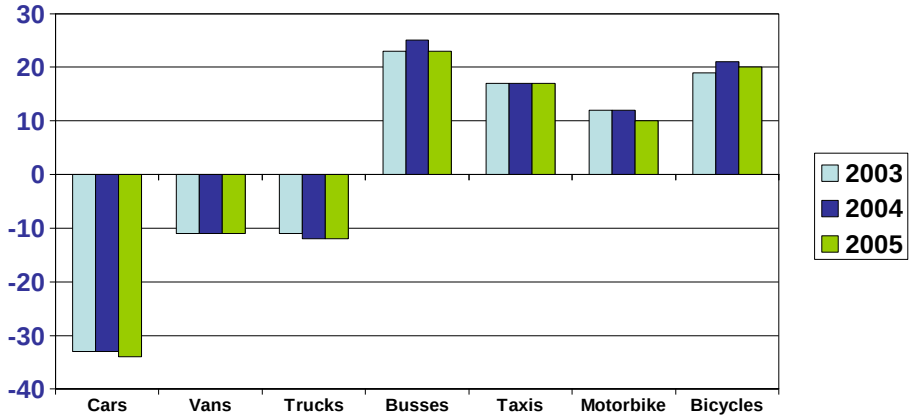
London Congestion Charge



International Transport Forum | Joint Transport Research Centre | OECD

Impact on traffic in City zone: Delays down 30%

Vehicles entering the zone - % change over 2002



International Transport Forum | Joint Transport Research Centre | OECD

Charge relative to cost of congestion

- Oxford University Transport Studies Unit, G. Santos, supportsTfL modelling that charge about right but:
- Cars over-charged
- Trucks under-charged
- Vans about right at 8 pounds – undercharged at previous 5 pounds level
- Residents “priced on to roads”

International Transport Forum | Joint Transport Research Centre | OECD

Western Extension

- 10-14% veh-km decrease forecast by TfL
- 2/3 vehicles pay no additional charge:
  - Paid already for City zone
  - Residents
  - Buses, taxis etc.
- Congestion impact and cost effectiveness less than for City zone

International Transport Forum | Joint Transport Research Centre | OECD

US: Value Pricing

- Two examples in Southern California.
- Offers a choice: toll and fast travel, or no toll and slow travel ("product differentiation"), also "instant" pricing.
- Value pricing is facility pricing (US way), different from cordon pricing (European way).
- Attractiveness of toll lanes relies on considerable congestion on free lanes.
- Assesments:
  - Value pricing is better than no pricing,
  - Gains in reliability as important as reduction of average travel time.

International Transport Forum | Joint Transport Research Centre | OECD

Principle #3:
Improve the Reliability and Predictability of Travel Time

Reliability and Predictability: User focus

- Identify causes of irregular delays
- "Low-hanging" fruit
- Delivers tangible benefits for (relatively) small investments
- Co-ordination and management (e.g. road works, incident response) – often outside of road management authority
- Targets

International Transport Forum | Joint Transport Research Centre | OECD

How Can We be More Effective in Managing Congestion than We Have Been in the Past?

Four Principal Options

1. Operations and traffic management

International Transport Forum | Joint Transport Research Centre | OECD

Rate of Return: Integrated Traffic Management Systems in France

(million Euros)	Lille (Alegro)	Grenoble (Gentiane)	Bordeaux (Alienor)	Strasburg (Gutenberg)
Annual Benefits	12.80	3.65	3.40	1.70
Annual Operating Costs	3.80	0.95	1.42	0.77
Net Benefits	9.00	2.70	1.99	0.95
Investment/Capital Costs	50.40	15.11	16.00	9.70
Immediate Rate of Return	19.6%	17.9%	12.4%	9.8%

19.6 %

17.9 %

12.4 %

9.8%

International Transport Forum
Joint Transport Research Centre
OECD

How Can We be More Effective in Managing Congestion than We Have Been in the Past?

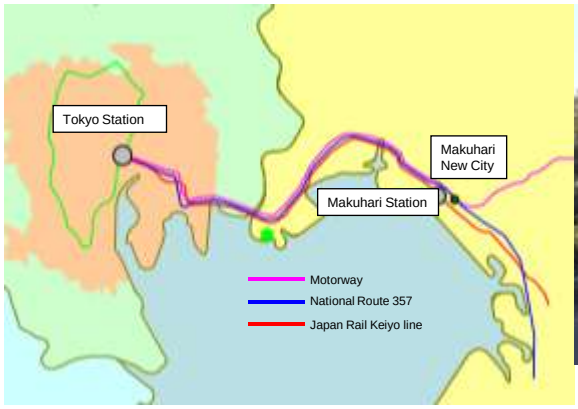
Four Principal Options

1. Operations and traffic management
2. Public transport

International Transport Forum | Joint Transport Research Centre | OECD

Combined Public Transport/Road/Parking Information

(National route 357 at Makuhari, Tokyo Region)



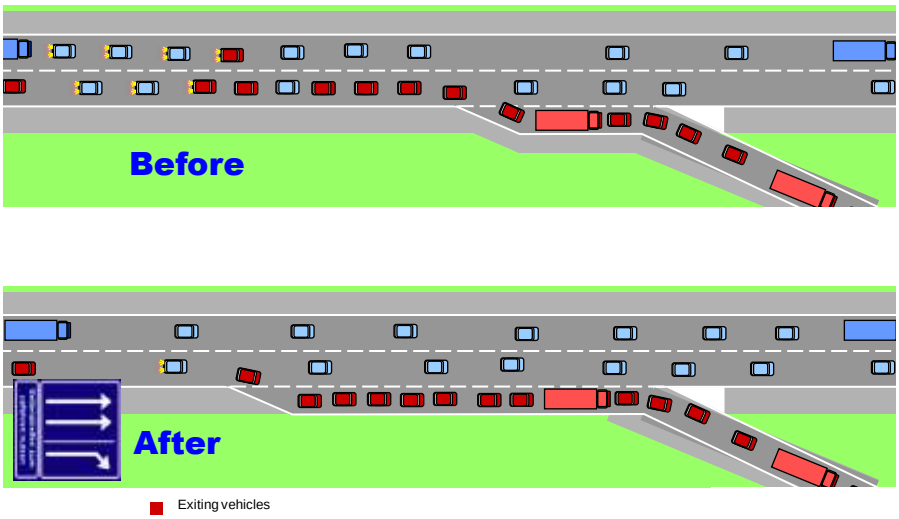
International Transport Forum | Joint Transport Research Centre | OECD

How Can We be More Effective in Managing Congestion than We Have Been in the Past?

Four Principal Options

1. Operations and traffic management
2. Public transport
3. Mobility management
4. Infrastructure modification

International Transport Forum | Joint Transport Research Centre | OECD



On-ramp/Off-ramp Lengthening: Stauventil (Germany)

International Transport Forum | Joint Transport Research Centre | OECD

How Can We be More Effective in Managing Congestion than We Have Been in the Past?

Four Principal Options

1. Operations and traffic management
2. Public transport
3. Mobility management
4. Infrastructure modification

Above Measures Free-up Existing Capacity

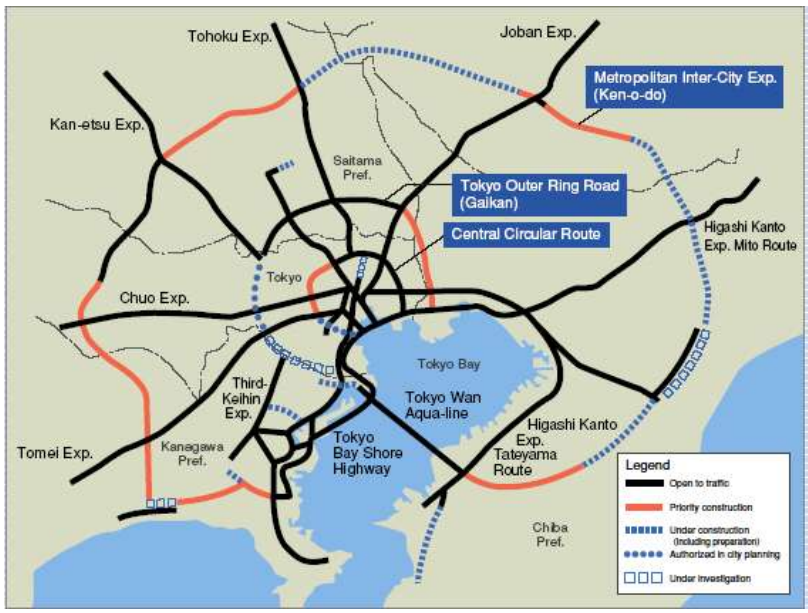
- Manage traffic to preserve capacity
- Consider alternative use/allocation of capacity
- Provide alternative modes

Road Construction/Expansion Often Constrained in Urban Areas – But Can be Effective

When and Where Does it make Sense?

- By-passes to remove through traffic
- Incomplete orbital networks
- Pinch points – tunnels,river crossings
- Cost benefit assessment is key
- Again, consider options for use of new capacity

Incomplete Orbital Road Network (Tokyo)



International Transport Forum | Joint Transport Research Centre | OECD

How Should I Implement My Congestion Management Policy?

Matching the Policy Response to the Problem

- Involving key actors
- Including the public (urban areas complex with many interactions)
- Aligning incentives and powers to act with agents responsible for delivery
- Aligning scope of policy response to geographic scope of congestion (travel-to-work area)
- Funding may only be available for specific (not necessarily best-suited) responses – address this

Ex-post Assessment (Improve/build on Past)

International Transport Forum | Joint Transport Research Centre | OECD

www.internationaltransportforum.org
www.cemt.org

Philippe Crist, Administrator,
Working Group on Managing Urban Traffic Congestion in Large Urban Areas
OECD-International Transport Forum Research Centre