UK Road Pricing Feasibility Study: Modelling the Impacts

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Structure of presentation

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- The economic case for road pricing
- Feasibility Study of road pricing in the UK
- Analysis that was needed for modelling the impacts of road pricing
- Modelling results
- Issues for further research and conclusions

The Economic Case for Road Pricing

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- Long-established case for pricing
  - As a means of funding infrastructure
  - As a means of managing demand
- Economic theory - efficient use of a resource (e.g. road capacity) when **Price = Marginal Social Cost**
- Marginal Social Cost includes **marginal private costs** (fuel, other vehicle operating costs) and **marginal external costs** (costs imposed on other motorists and society in general)

The Case for Road Pricing (2)

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- **Marginal external costs** of motoring include
  - Infrastructure operating and maintenance
  - Congestion (holding up other people)
  - External accident costs
  - Air pollution
  - Climate change emissions (e.g. carbon dioxide)
  - Noise
- The charges motorist face do not currently reflect these costs - so trips are sometimes made when the **costs to society outweigh the benefits** of that trip (and vice-versa)

Feasibility Study of Road Pricing in the UK

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- **Objective: to examine how a new national system of charging for road use could help make better use of road capacity in the UK**
- Set up in July 2003 - reported July 2004
- Study conducted by a Steering Group representing: Government Departments, devolved administrations, experts (academics etc), interest groups (Local Authorities, motoring organisations)
- Method of working:
  - Frequent meetings
  - Commissioned reports/analysis/studies
  - Reviewed evidence
  - Reported to Secretary of State for Transport

Modelling the impacts of road pricing

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1. To segment traffic by time period, area type, road type, direction of flow, vehicle/purpose mix.

2. Provide estimates of the marginal social costs

3. Set prices equal to marginal social costs (MSC) and model the responses
   (re-optimising price at MSC at each iteration)

4. Analyse responses and measure change in economic welfare (change in overall costs and benefits from introducing road pricing)

Estimates of Marginal Social Costs of Road Use

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Marginal external costs and tax paid by motorists

Pence per km	Marginal external cost of congestion [a]	Environmental and safety costs [b]	Fuel duty and VAT on duty [c]	External costs minus charges [d] (a+b)-c
2000	7.3	2.2	5.2	4.3
2010	12.3	1.6	3.9	10.1

- Congestion costs increasing over time (increased values of time, slower speeds on the road)
- Environmental costs and fuel duty per km decreasing over time (improved vehicle efficiency)
- Current charges structure does not reflect marginal social costs

Estimates of Marginal Social Costs of Road Use

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Marginal external costs and tax paid by motorists

Pence per km	Marginal external cost of congestion [a]	Environmental and safety costs [b]	Fuel duty and VAT on duty [c]	External costs minus charges [d] (a+b)-c
2000	7.3	2.2	5.2	4.3
2010	12.3	1.6	3.9	10.1

- "Best" road price would reduce the difference between the charges paid [c] and the external costs [a+b] to **zero**
- NOTE - the values above are **averages**, actual values vary widely place, time, road type, direction of travel and vehicle mix
- Key scenarios modelled included 75 charges and a simplified 10 charges version.

Optimal charge = MSC - MPC

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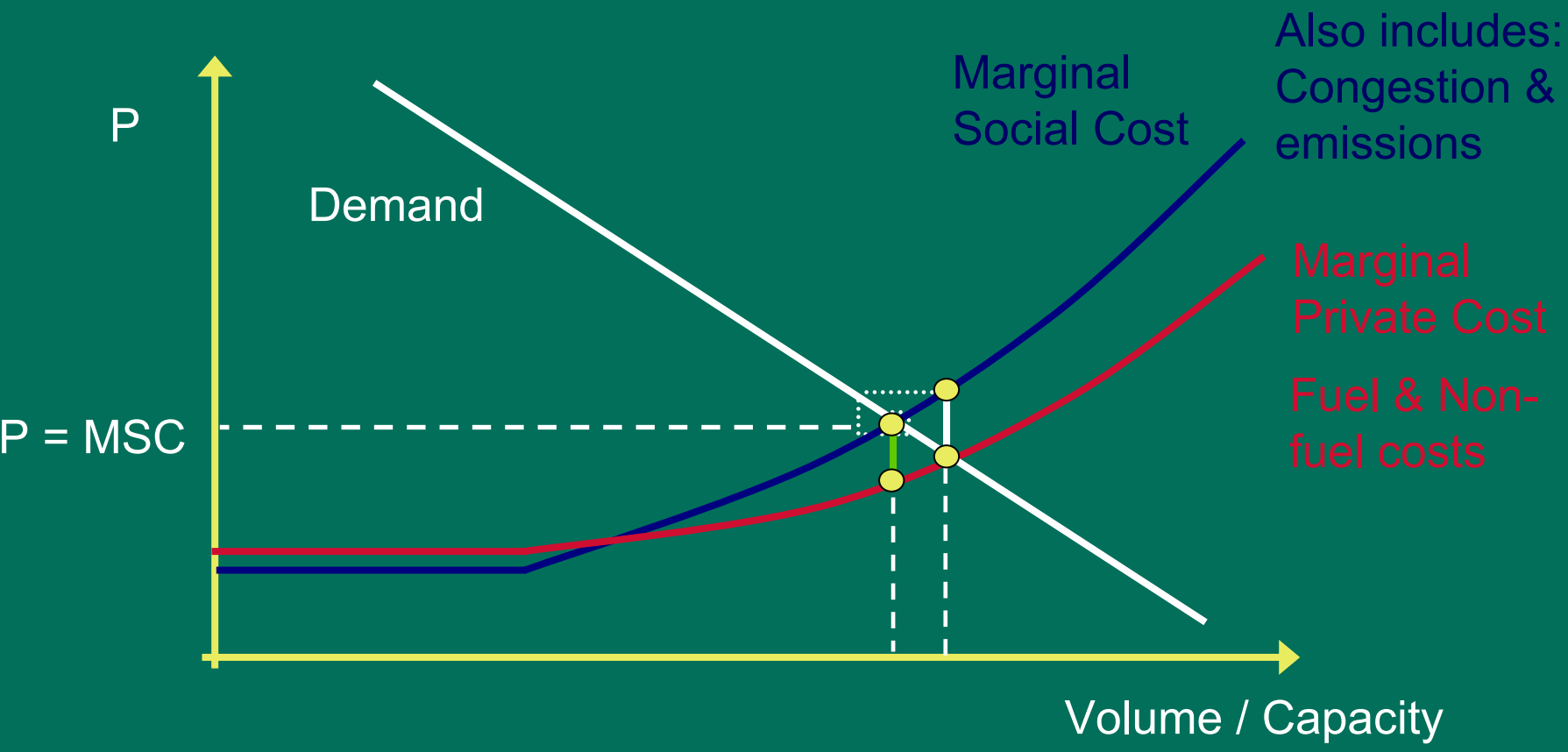

National Transport Model

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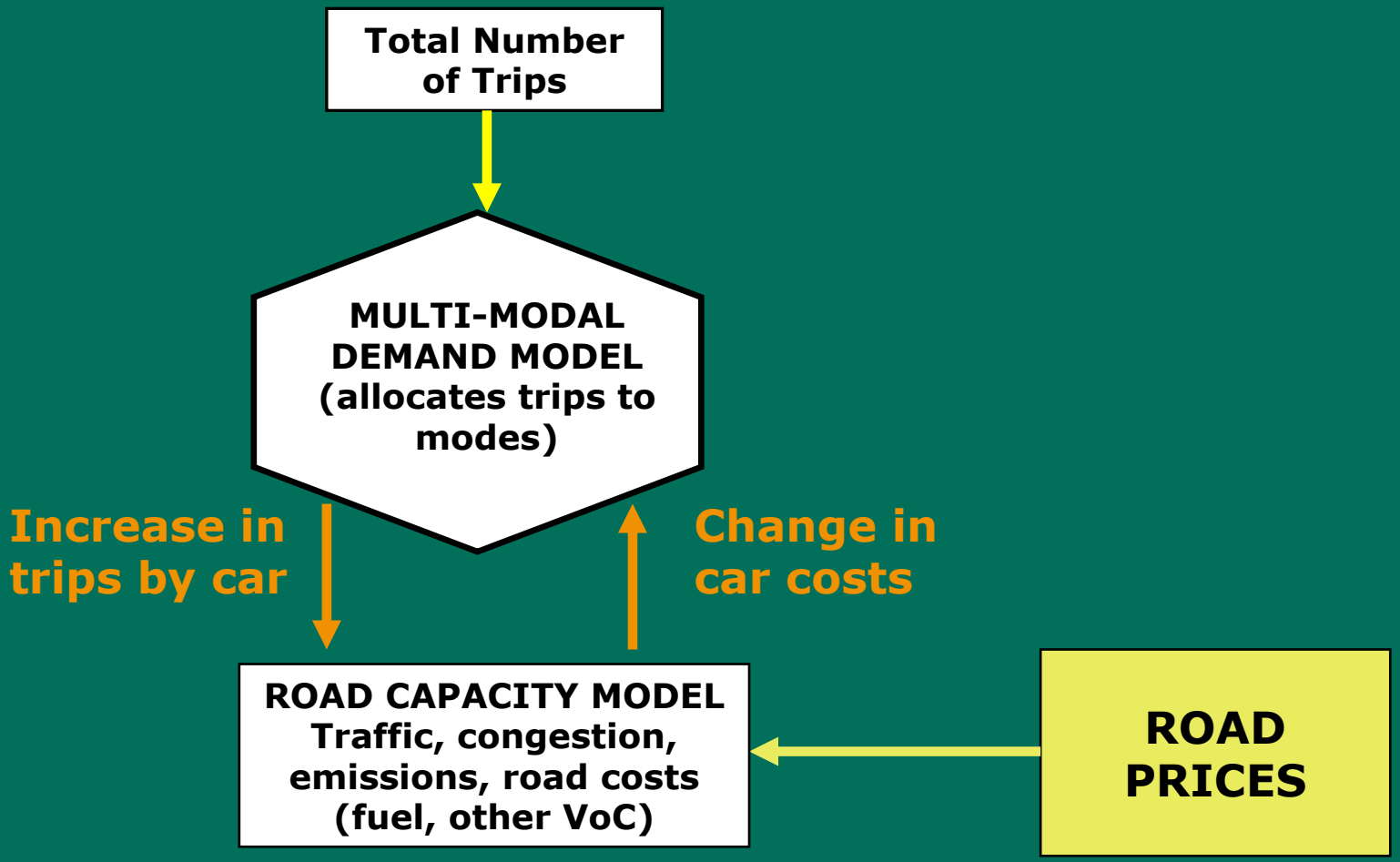

Main Findings

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	Net revenue	Impact on traffic		Impact on congestion
Road pricing	£8.6 bn	Overall traffic: –3% Urban traffic : –9%		Congestion: – 48%

- Well targeted schemes could result in small overall reductions in traffic (some trips are cheaper) with congestion halved in some areas

Main Findings (2)

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	Net revenue	Impact on traffic		Impact on congestion
Road pricing **(Fuel duty kept at same level)**	£8.6 bn	Overall traffic: –3% Urban traffic : –9%		Congestion: – 48%
Road pricing **(Fuel duty reduced to give revenue neutrality)**	Nil	Overall traffic: +2% Urban traffic: -4%		Congestion: – 41%

- Most congestion benefits can be realised even if overall revenue does not increase - the **structure of charges** rather than the overall level of charges is most important

Main Findings (3)

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	Net revenue	Impact on traffic		Impact on congestion
Road pricing	£8.6 bn	Overall traffic: –3% Urban traffic : –9%		Congestion: – 48%
Road pricing **(Fuel duty reduced to give revenue neutrality)**	Nil	Overall traffic: +2% Urban traffic: -4%		Congestion: – 41%
Extra fuel duty	£8.6 bn	Overall traffic: -5% Urban traffic: -5%		Congestion: – 7%

- Increasing overall charges via fuel duty gives significantly less congestion benefit - the **structure of charges** rather than the overall level of charges is most important

Main Findings (4)

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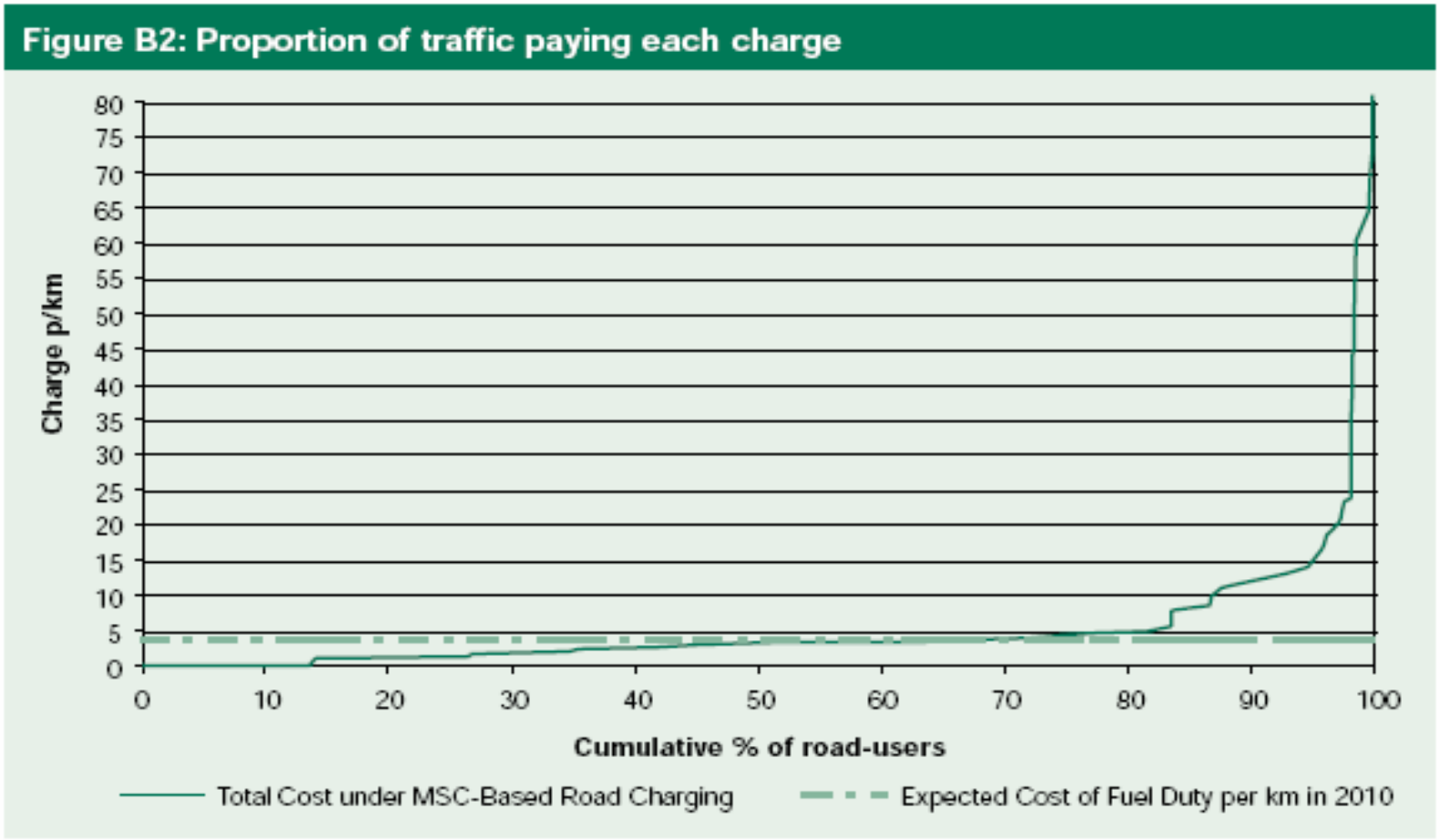
Around two-thirds of all vkms would pay less



Main Findings (5)

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Impact by area type

Figure B11: Change in traffic and congestion and average charge paid by area type (England)

Change on Ten Year Plan in 2010 Area type	Change in traffic	Change in congestion	Average charge paid, p/km
London	-21%	-51%	14p/km[1]
Inner conurbations	-11%	-51%	13p/km
Outer conurbations	-5%	-46%	3p/km
Urban areas >250,000	-4%	-43%	5p/km
Urban areas >100,000	-3%	-41%	5p/km
Urban areas >25,000	-4%	-32%	4p/km
Urban areas >10,000	-1%	-33%	2p/km
Rural highways agency roads	-1%	-32%	0p/km
Rural other roads	-1%	-41%	-1p/km
Total	-4%	-46%	1.9p/km

1. This is in addition to the congestion charge.

Modelled benefits / disbenefits

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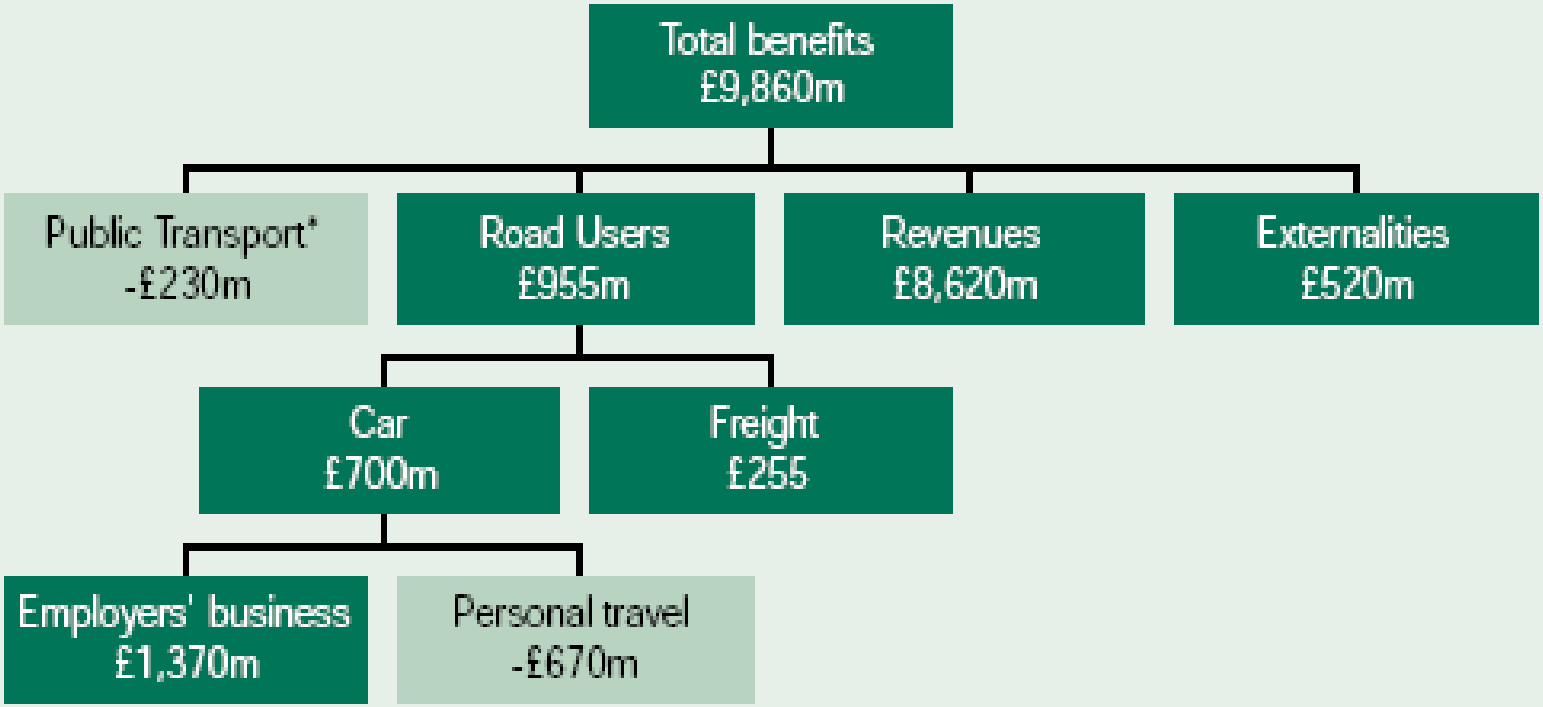
Figure B8. First round benefits arising from a hypothetical charging scheme (£m p.a.)



* paragraph B.104 explains the limitations of these estimates

Issues for further research - Modelling

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- Segmentation of user groups
  - Value of time
- Responses
  - Car Occupancy
  - Public transport operators
  - Effect on land use
- Link / Local modelling

Issues for further research - Technology and Governance

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- Creating a national market would need backing and co-operation from:
  - Devolved authorities
  - Industry
    - Vehicle manufacturers
    - Technology suppliers
    - Back office operations
  - Road Users
- Signals and incentives for investment in new infrastructure

Conclusions

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- The RPFS has further established the economic case for national pricing in the UK
- Moving to a new system of road pricing could lead to total benefits of up to £10bn per year
- But this doesn't take into account the cost of implementation
- There would be some 'losers' with RP - but equity impacts depend on how revenues are spent
- More work will be need on costs, technology, governance, acceptability and further modelling of the impacts
- Until this is done the way forward is probably through more local 'pathfinder' schemes

More Information

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Department for Transport (2004), *Feasibility Study of Road Pricing in the UK: A report to the Secretary of State for Transport*

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