Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne
Improving Fuel Economy in Australia

Chair: Stephen Perkins, International Transport Forum
Introduction

• Efficient Government intervention in car market
  – CO₂ emission / fuel economy standards
  – Carbon price / fuel tax
  – Vehicle tax incentives

• Rationale for Government intervention
  – Ambitious de-carbonisation goals
  – Uncertain fuel prices
  – Consumer under-valuation of fuel economy
  – Mitigating risks for manufacturers
Passenger Car Fuel Economy (CO₂ emissions) Regulatory Targets

- Historical performance
- Enacted targets
- Proposed targets
- Unannounced proposal
- Uncertain targets

- US-3%[1]
- US-6%[2]
- California
- Canada
- EU
- Japan
- S. Korea

Source: Passenger Car Fuel Economy (CO₂ emissions) Regulatory Targets
March 2011

[1] Based on 3% annual fleet GHG emissions reduction between 2017 and 2025 in the September 30th NOI.
[2] Based on 6% annual fleet GHG emissions reduction between 2017 and 2025 in the September 30th NOI.
[3] China’s target reflects gasoline fleet scenario. If including other fuel types, the target will be lower.
Improving Fuel Economy in Australia

March 2\textsuperscript{nd} 2011, Melbourne
Structure of Day

• Background on vehicle emissions trends globally
• The current Australian context
• International experience with designing CO2 and fuel economy standards for cars
• Complementary measures
• Roundtable discussion of key issues
Improving Fuel Economy in Australia

March 2\textsuperscript{nd} 2011, Melbourne
Transport, sustainability, and fuel economy: an IEA perspective

Lew Fulton
International Energy Agency
IEA/SPT/ETP February 2011

Improving Fuel Economy in Australia
Melbourne, 2 March 2011
IEA, transport and liquid fuels

Relevant publications

- **Medium term Oil Market Report**
  Horizon 2015, focus on oil
  Scenarios currently based on two different GDP growth assumptions

- **World Energy Outlook** *(WEO)*
  Horizon 2030, all energy sources
  Scenarios depicting different developments on the basis of policy actions
  One underlying assumption for GDP and population growth
  Includes a thorough analysis on the oil supply availability

- **Energy Technology Perspectives** *(ETP)*
  Horizon 2050, all energy sources
  Scenarios that pay particular attention to the role of technology, especially on the demand side
  One underlying assumption for GDP and population growth

- **Transport, energy and CO₂** *(Transport book)*
  Moving towards sustainability
  Horizon 2050, all energy sources
  Builds and expands the work done on ETP
World Energy Outlook 2010

A few highlights…
Global oil production reaches 96 mb/d in 2035 on the back of rising output of natural gas liquids & unconventional oil, as crude oil production plateaus.
Booming demand for mobility in the emerging economies drives up oil use

The global car fleet will continue to surge as more & more people in China & other emerging economies buy a car, overshadowing modest growth in the OECD
International oil price assumptions

The age of cheap oil is over, though policy action could bring lower international prices than would otherwise be the case.
Now A view to transport, based on *IEA ETP 2010*

ETP extends the WEO projections to 2050 and takes a deeper look at technologies for CO$_2$ reduction
In the BLUE Map scenario, transport accounts for 23% of reductions. Additional savings accrue in “transformation”, since less high-CO2 fuels (such as coal-to-liquids) are produced for transport use.
IEA Energy Technology Perspectives 2010: Transport Energy Use by Scenario

- Global transport energy use in Baseline doubles by 2050
- BLUE Shifts achieves a 20% reduction in 2050; BLUE Map achieves 40%, BLUE Map/Shifts achieves nearly 50%
- Nearly 50% of energy is low-CO₂ renewable in 2050
Key Transport steps to achieve BLUE outcomes

- **BLUE Map – technology solutions**
  - 50% reduction in conventional new PLDV (car, SUV) fuel intensity by 2050
  - 30-50% reduction in energy intensity for bus/truck/rail/ships/aircraft by 2050
  - Strong uptake of advanced technology vehicles and Fuels
    - Plug-in Hybrids [PHEVs], starting in 2010-2015
    - Battery electric vehicles [BEVs], starting in 2010-2015
    - Fuel cell vehicles [FCVs], starting in 2025
    - Advanced, low-GHG Biofuels reach 12% of transport fuel use by 2030, 25% by 2050

- **BLUE Shifts – travel solutions**
  - 25% lower level of car and air travel in 2050 compared to Baseline
  - Up to 2x travel by rail, bus (such as Bus Rapid Transit systems)
  - Lower travel demand due to better land use planning, road pricing, ITS, telematic substitution
IEA Fuel Economy Analysis Draft Results, Feb 2011
What have we done?

- Bought Polk vehicle sales/attribute data for 21 countries; detailed database at make/model/configuration level with some other vehicle characteristics.
- Added in vehicle fuel economy data from a range of sources
- Performed various data checking and cleaning activities
- Aggregated the data to obtain national and global averages of key characteristics
- Did a small amount of interpretation
Why?

- Mainly to establish baseline data for the Global Fuel Economy Initiative
- But also to better establish base data for our 22 MoMo countries/regions
- Also to see how things have changed between 2005 and 2008
Results

The global average was about 8 L/100km in 2005. It improved to below 7.7 in 2008. But the rate of change was well less than that needed to hit GFEI targets.

<table>
<thead>
<tr>
<th>Fuel Economy (Lge/100km)</th>
<th>Estimated Global Average</th>
<th>2005</th>
<th>2008</th>
<th>2030</th>
<th>Average Annual Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Global Average</td>
<td></td>
<td>8.07</td>
<td>7.67</td>
<td></td>
<td>2005 to 2008 (actual): -1.7%</td>
</tr>
<tr>
<td>GFEI Base and Objective</td>
<td></td>
<td>8.07</td>
<td></td>
<td>4.03</td>
<td>2005 to 2030 (required): -2.7%</td>
</tr>
</tbody>
</table>
Results by country

There’s a wide range of averages across the studied countries. Non-OECD countries have a lower (better) average than OECD, but improved less (or not at all) between 2005-2008 whereas OECD improved significantly.
Shown another way
Breaking out FE by region and vehicle class is revealing...

**Biggest change is for large LDVs in OECD**
New base data on vehicle fuel type shares
Longer-term look at trends in a few variables in a few countries

France trended toward larger engines until 2000, has since moved toward smaller ones
Conclusions

- Without policy interventions, transport oil use and CO₂ emissions worldwide could double by 2050
- We can change this picture dramatically and cut transport CO2 below current levels via a combination of measures
  - Strong efficiency improvements to all modes must play a key part, and is among the most cost effective measures
- Despite lack of international CO2 price signal, many countries are now moving in the right direction
‘Improving Fuel Economy in Australia’
Melbourne
March 2nd 2011

Sheila Watson
Director of Environment
FIA Foundation

Making Cars 50% More Fuel Efficient by 2050 Worldwide
Baseline

• global vehicle fleet is set to increase from around 800 million to between 2 and 3 billion by 2050. Almost all of this growth will take place in developing countries.

• By 2050 the world will spend another US$ 150 trillion on motor vehicles and another US$ 150 trillion in fuels (all transport modes).

IEA 2009
Interventions

2 billion cars – investment of $150 trillion

Doubling of GHG emissions, major air quality and energy issues

AVOID

SHIFT

IMPROVE fuel economy
(Global fuel economy policies in place; switch to fuel economic vehicles; savings of 1 gt CO2e/ yr; major air, economic and energy benefits)
GFEI - Background

• Established March 2009 at Geneva Motorshow
• Four partners:
  
  [Logos of UNEP, FIA Foundation, IEA, and International Transport Forum]

• Shared question – How do we maximise the benefits of fuel efficiency in LDVs globally, given the projected expansion of the global fleet?
• Each partner brings resources of staff time, plus some external resources
• Advisory panel (4), Consultation group (20)
GFEI - targets

For fuel economy in the ICE - world average targets of:

- 30% reduction in L/100km by 2020 compared to 2005 in all new cars in OECD countries
- 50% by 2030 in all new cars globally
- 50% by 2050 in all cars globally (‘50by50’)

We will also continue to explore global targets such as:

- 4 litres per 100 km (63 MPG, 25 KM/L) by 2030 globally
- 75% by 2050 in all new cars globally
- 50% of all new cars electric by 2050
GFEI - campaigns

Making cars 50% more Fuel efficient (on average) by 2050

Making Cars 50% More Fuel Efficient by 2050 Worldwide
GFEI - activities

3 objectives for GFEI, each with targets:

Policy support to countries and regions via toolkit

Outreach and awareness raising

Data and Analysis

Making Cars 50% More Fuel Efficient by 2050 Worldwide
Making Cars 50% More Fuel Efficient by 2050 Worldwide

Policy Development – 3 phases

**PHASE I - GLOBAL**
- 4 PILOTS & GLOBAL TOOLKIT
- Indonesia
- Ethiopia
- Chile
- Colombia

**PHASE II - REGIONAL**
- REGIONAL PROJECTS – 10-15 COUNTRIES

**PHASE III - NATIONAL**
- GLOBAL ROLL OUT – 40+ COUNTRIES

- Policy Development – 3 phases
Phase 1: Global Toolkit

• **Overviews of policy tools and approaches** to improving fleet-wide fuel economy, stabilize emissions, reduce energy intensity of transport with continued growth

• **Case studies** that depict these approaches from developed and developing countries – India, China, Chile, EU, US, South Africa – Mexico?

• **Designed to answer questions** about the need to set national standards in both developed and developing countries

• **Why, What and How** of considering and designing the right policy interventions for national targets and plans

• **Comparison function** – approaches to setting standards, fiscal and taxation instruments used, traffic measures, institutional structures, etc.

• **Baseline** – analysis as starting point
Global Toolkit

- 90% ready
- Beta version online

- Being used in country projects
- Final first version mid 2011

Making Cars 50% More Fuel Efficient by 2050 Worldwide
Phase II – country projects

- 2-4 country projects per region
- Using Phase I lessons learned
  - Baseline methodology
  - Global toolkit
  - Pilot country experiences (south-south cooperation)
- Interested countries (some already started):
  Morocco, Kenya, Mauritius, Vietnam, Philippines, Montenegro, Russia, Georgia, Armenia, Azerbaijan, Barbados, Jamaica, Costa Rica, Peru, Paraguay
Fuel economy policy: status
GFEI - ACHIEVEMENTS TO DATE:

• Active, engaged partnership of FIA F, IEA, UNEP and ITF – substantial resources

• $2m in supportive funding from GEF, EC and others

• 1 global launch; 6 regional launches - ASEAN, CEE etc

• Endorsements from the MEF, UNECE and WBCSD

• Strong communications and an increasing level of brand awareness with key stakeholders globally, and with media, eg RAC Rally video story on the BBC website.

1. A launch report, and multi-lingual summary document
2. ‘Prospects and Progress’ – launched at the TRB in January 2011
3. Growing working paper series
4. Website
5. Films and Promo materials (on your sticks)

• Conference and Seminar presence
PLANNED EVENTS FOR 2011

<table>
<thead>
<tr>
<th>DATE</th>
<th>EVENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2-4th</td>
<td><strong>Australian GFEI launch</strong> and technical workshop – Melbourne</td>
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<tr>
<td>Early April</td>
<td><strong>WP#4</strong> – Scrappage schemes</td>
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<tr>
<td>Mid April</td>
<td><strong>WP#5</strong> – Mexican Car imports and fuel economy – poss Mexican Launch event</td>
</tr>
<tr>
<td>Mid April</td>
<td><strong>WP#6</strong> – IEA’s analysis of global fuel economy – press</td>
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<tr>
<td>25th-27th May</td>
<td><strong>ITF - Leipzig</strong>, GFEI event</td>
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<tr>
<td>End May</td>
<td>Berlin, <strong>Challenge Bibendum</strong>, GFEI event</td>
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<tr>
<td>June/July</td>
<td><strong>Indonesian case study</strong> workshop</td>
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<tr>
<td>July</td>
<td><strong>WP#8</strong> – Global financing streams and fuel economy – TRL</td>
</tr>
<tr>
<td>Sept</td>
<td><strong>ASEAN workshop</strong> (Jakarta)</td>
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<tr>
<td>Nov</td>
<td><strong>WP#7</strong> - China workshops – Costs of Fuel Economy Technologies China– Ricardo</td>
</tr>
<tr>
<td>Dec</td>
<td>Re-launch GFEI – COP 17 – South Africa</td>
</tr>
</tbody>
</table>
GFEI objectives for today

1. Bring our network of expertise – intellectual and practical – from around the globe, to gather a group together which can help with your own deliberations.
2. To help build understanding of the Australian case and challenges
3. To identify issues around the ‘what’ and ‘how’.
4. To help – with partners – to provide a setting in which stakeholders can have a constructive and ‘non judgmental’ discussion about the options.
5. To launch a willing coalition of the interested to continue beyond today to offer help and support with work on an FE standard.
Contacts:

Thank you!!

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Making Cars 50% More Fuel Efficient by 2050 Worldwide
Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne
Determining Feasible Targets for the Australian Vehicle Fleet

Michael Sutton, General Manager, Land Transport Reform, Surface Transport Policy, Department of Infrastructure and Transport

Improving Fuel Economy in Australia, Melbourne, 2 March 2011
Determining Feasible CO$_2$ Targets for the Australian Vehicle Fleet

1. The Context
2. Determining Targets
3. Designing the Regulatory Framework
4. Next Steps
1. The Context

- CO$_2$ emissions standards are part of Government’s response to climate change
  - With carbon pricing the principal strategy
- Government’s election commitment
  - Mandatory standards
  - Commencing 2015
  - Specific targets to be developed in consultation with stakeholders
- Need to consider international experience and literature
  - While recognising nature of the Australian fleet
2. Determining Targets

- To warrant regulation, targets need to be significantly better than *business as usual (BAU)* for Australian fleet
- EU and US CO₂ emissions targets are informative, but not determinative for Australia
- Australia’s current (2009) position:
  - 218g/km (all light vehicles)
- EU targets (same test method as Australia):
  - 130g/km by 2015 & 95g/km by 2020 (passenger vehicles)
  - 175g/km by 2017 & 147g/km by 2020 (vans)
- US targets (different test method):
  - 139g/km by 2016 (cars)
  - 188g/km by 2016 (light trucks)
Comparison of Current and Future Fuel Economy Standards

2. Determining Targets (cont..)

• If we want better than BAU, what is achievable and cost-effective?

• International analysis suggests improvements around 30% + achievable at low cost in short-medium term
  • Applicability to Australian fleet?
  • Our fleet is 85% imported – but mostly not from EU

• Other factors to consider/debate in setting targets:
  • Estimating BAU for next 10 years
  • Choosing the reference (base) year
  • Setting initial (2015) and later targets
  • Setting separate targets for cars and LCVs
  • Additional credits for “advanced vehicles”
3. Designing the Regulatory Framework

- *Motor Vehicle Standards Act 1989* appears to provide a suitable regulatory umbrella (primary legislation)
  - Some amendments may be required
- Major doubts that current Australian Design Rules (ADR) framework is suitable for sales based standards
- Challenge is to deliver effective, robust & transparent regulations at lowest possible administrative burden
  - International experience suggests parameter/utility based standards, with individual targets for each manufacturer, likely to provide greatest flexibility and equity (albeit at the cost of greater complexity)
  - Government has open mind on the regulatory approach and will work with stakeholders to develop an effective outcome
4. Next Steps

• Will soon commence detailed consultations with key stakeholders

• Ultimately DIT will prepare *implementation* Regulation Impact Statement (RIS) for the Government
  • This RIS is to advise Government on most cost effective means to *implement* the Government’s decision
  • Expect RIS to recommend quantum of target for 2015 and (if applicable) later years, as well as preferred regulatory model
  • Hope to have RIS finalised by mid 2011

• Following Government’s response to RIS, legislation will be drafted for tabling in parliament
  • most likely in 2012
Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne
FEDERAL CHAMBER OF AUTOMOTIVE INDUSTRIES

Global Fuel Economy Initiative
2 March 2011
Bad Data = Bad Policy

Figure 2.2. International assistance to the automobile sector
US dollars per capita PPP, 2007
GOOD DATA = GOOD POLICY

Government Budgetary Assistance to the Automotive Industry, 2008-09 $US / capita 2007 PPP

SOURCE: SAPERE RESEARCH GROUP
BITRE Analysis

Figure 4  Average CO₂ emissions per vehicle for new light vehicles in Australia

Source: BITRE estimates.
FLAWED INTERNATIONAL COMPARISONS

Figure 1: Comparison of Current and Future Fuel Economy Standards

- Solid dots and lines: historical performance
- Solid dots and dashed lines: enacted targets
- Solid dots and dotted lines: proposed targets
- Hollow dots and dotted lines: unannounced proposal
- Shaded area: uncertain targets

Better emissions performance


[1] Based on 3% annual fleet GHG emissions reduction between 2017 and 2025 in the September 30th NOI.
[2] Based on 6% annual fleet GHG emissions reduction between 2017 and 2025 in the September 30th NOI.
[3] China’s target reflects gasoline fleet scenario. If including other fuel types, the target will be lower.
INTERNATIONAL COMPARISONS

2009 CO2 Outcomes:

• UK = 149 Grams of CO2/km

• Australia 219 Grams of CO2/km

• Adjusted for:
  • Market Segment: 199 Grams CO2
  • Fuel Type: 175 Grams of CO2
  • Vehicle Size: 156 Grams of CO2
  • Other factors:
    • Auto Transmissions
    • Fuel Quality
AUSTRALIAN POLICY FRAMEWORK

24 July 2010, Election Commitment:
  • Mandatory CO2 Target.

27 January 2011, PM announced:
  • Abolition of the CCR.
  • Capping of the LPG Vehicle Scheme.
  • Abolition of the GCIF.

24 February 2011, PM announced:
  • A carbon price from 1 July 2012.
  • Transportation fuels incorporated.
Reducing CO₂ Emissions from Motor Vehicles

- Carbon Price (ETS, Carbon tax)
- Fuel Excise
- Green Car Innovation Fund
- Congestion Pricing
- Vehicle CO₂ Emissions Standard
- Fringe Benefits Tax
- Luxury Car Tax

MOTOR VEHICLE CO₂ EMISSIONS: POLICY ELEMENTS
Belt or Braces

Carbon Price Vs Carbon Standard:

• A carbon price can efficiently determine the least cost method of emissions abatement.

• Secondary emission strategies, such as Mandatory Standards, assume that a reduction of one tonne of CO₂ from a passenger motor vehicle is more important than a reduction of one tonne of CO₂ from any other sector of the economy.
NEW VEHICLE FUEL EFFICIENCY

1. History of PMV CO2 Emissions
2. Forecast CO2 Emissions
3. CO2 Price and/or CO2 Standard
4. Design Options for a Standard
5. Taxation Issues
NAFC/NACE Targets

1983 = 9.5 Litres/100km
1990 = 9.0 Litres/100km
2000 = 8.2 Litres/100km
20?? = 6.8 Litres/100km
2010 = 222 Grams of CO2
FUEL CONSUMPTION TARGETS AND RESULTS (PETROL PASSENGER ONLY)
2010 Target = 222 grams of CO2

- All Fuel Types.
- All vehicles under 3.5 tonne.
- 2010 outcome = 212.6 grams of CO2.
HISTORICAL FUEL CONSUMPTION AND CO2 EMISSIONS

- Average Fuel Consumption: Petrol Passenger
- Average CO2: All Fuel Types
CHANGE IN NACE: SEGMENT CHANGE VS VEHICLE TECHNOLOGY (INCLUDING FUEL)

<table>
<thead>
<tr>
<th>Year</th>
<th>Technology</th>
<th>Segment Change</th>
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</thead>
<tbody>
<tr>
<td>2007</td>
<td>3.3</td>
<td>1.1</td>
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<tr>
<td>2008</td>
<td>1.9</td>
<td>1.8</td>
</tr>
<tr>
<td>2009</td>
<td>3.1</td>
<td>0.8</td>
</tr>
<tr>
<td>2010</td>
<td>3.7</td>
<td>2.3</td>
</tr>
</tbody>
</table>
MARKET SEGMENTS BY MARKET SHARE

- Total Passenger
- Total SUV
- Total LCV


Percentage: 0%, 10%, 20%, 30%, 40%, 50%, 60%, 70%
TARGET ACHIEVED, WHAT NEXT?

July 2010:

- Mandatory NACE Target
- 2015 = 190 grams of CO2
- 2024 = 155 grams of CO2
TECHNOLOGY DERIVED EMISSIONS SAVINGS

2008-2015 - 2008-2020

- Petrol direct injection: 2.9% - 2.0%
- Diesel direct injection: 1.3% - 1.0%
- Variable valve actuation: 0.4% - 0.5%
- Smaller capacity engines: 1.7% - 0.8%
- Dual clutch transmission: 0.1% - 0.3%
- Stop-start: 2.5% - 2.0%
- Regenerative braking: 0.0% - 0.1%
- Reduced mech. friction: 0.8% - 0.3%
- Lightweighting: 1.0% - 1.3%
- Low resistance tires: 0.8% - 1.0%
- Improved aerodynamics: 0.8% - 1.0%
MARKET SEGMENT CHANGES

2008 2015 2020

- Petrol passenger: 56.7% 45.3% 39.3%
- Petrol SUV: 13.2% 14.2%
- Petrol LCV: 11.8% 6.8%
- Hybrid: 6.0% 5.6% 3.0%
- LPG: 7.0% 1.3% 1.3%
- Diesel passenger: 0.0% 1.4% 3.7%
- Diesel SUV: 13.8% 14.4%
- Diesel LCV: 6.1% 0.4%
- Electric vehicle: 11.5% 11.2% 0.5% 3.0%

2008 2015 2020
EFFICIENCY GAINS v MASS INCREASES

Technology improvements:
- Lightweighting
- Aerodynamics
- Reduced mechanical friction
- Low friction tyres

Weight gains:
- Safety
- Emissions
- Noise
- Quality
- Comfort

1%

-0.7%
PROJECTED CO2 EMISSIONS: NACE

No change in market segments
Applying market segment projections
CO2 TARGETS: ECONOMY WIDE TARGETS

Australian Government target of 5% to 25% reduction in CO2 emissions by 2020 based on 2000 levels.

- 2000 = 260 g/CO₂
- 25% reduction
- 2020 = 195 g/CO₂
CO2 EMISSIONS COMPARISON: EUROPE AND AUSTRALIA

European % CO2 Reduction

Australian % CO2 Reduction

FLEXIBILITIES

• Credits for:
  1. Low emission vehicles
  2. Eco-technologies
  3. Alternative fuels

• Phase-In from 2015

• Averaging and Pooling

• Make Good Provision (Banking/Borrowing)
OPTIONS FOR BURDEN SHARING

1. Industry Target.

2. Vehicle based approach: Standard set which vehicle must achieve in order to enter the Australian market.

3. Corporate Average: Each brand provided a target CACE:
   • All brands to achieve 195 grams.
   • Uniform Percentage Reduction.
   • Parameter based target.
UNIFORM PERCENTAGE REDUCTION

Grams CO2

- Ford
- Jaguar
- Kia

- 2005
- 2006
- 2009
- 2015 (2005 base)
- 2015 (2006 base)
CORPORATE SPECIFIC MASS TARGET
An integrated approach

1. VEHICLE TECHNOLOGY
   Delivering *majority* of new car CO2 reductions

2. ALTERNATIVE FUELS
   Sustainable production

3. DRIVER BEHAVIOUR
   Reducing congestion

4. INFRASTRUCTURE MEASURES

5. CO₂-RELATED TAXATION
   Influencing demand in a harmonised way
FBT: Kilometres Traveled

Source: SG Fleet.
FBT: Revenue Estimates

The revenue impact has been estimated using different behavioural responses.

<table>
<thead>
<tr>
<th>Option A  Flat 0.20 statutory fraction</th>
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<tbody>
<tr>
<td>Financial Year</td>
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<tr>
<td>---------------------------------------</td>
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<tr>
<td>$m</td>
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<td>Revenue Impact</td>
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<table>
<thead>
<tr>
<th>Option B  Flat 0.15 statutory fraction</th>
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<td>Financial Year</td>
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<tr>
<td>$m</td>
</tr>
<tr>
<td>Revenue Impact</td>
</tr>
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</table>
LUXURY CAR TAX: INCREASING INCIDENCE

- Passenger Cars
- SUV's
- Total PMV & SUV

<table>
<thead>
<tr>
<th>Year</th>
<th>Passenger Cars</th>
<th>SUV's</th>
<th>Total PMV &amp; SUV</th>
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</thead>
<tbody>
<tr>
<td>1979</td>
<td>2.5</td>
<td>16.5</td>
<td>19.0</td>
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<tr>
<td>2003</td>
<td>2.5</td>
<td>6.5</td>
<td>8.9</td>
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<tr>
<td>2007</td>
<td>2.5</td>
<td>9.0</td>
<td>11.5</td>
</tr>
<tr>
<td>2010</td>
<td>2.5</td>
<td>9.0</td>
<td>14.0</td>
</tr>
</tbody>
</table>

## Australia’s Top Selling Luxury Cars

<table>
<thead>
<tr>
<th>Rank</th>
<th>Model Group</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Toyota Prado</td>
<td>15,423</td>
</tr>
<tr>
<td>2</td>
<td>Toyota Landcruiser Wagon</td>
<td>7,273</td>
</tr>
<tr>
<td>3</td>
<td>Holden Commodore</td>
<td>6,749</td>
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<tr>
<td>4</td>
<td>Mercedes-Benz C-Class</td>
<td>6,658</td>
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<tr>
<td>5</td>
<td>Mitsubishi Pajero</td>
<td>5,065</td>
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<tr>
<td>6</td>
<td>BMW 3 Series</td>
<td>4,943</td>
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<tr>
<td>7</td>
<td>BMW X5</td>
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<td>8</td>
<td>Toyota Kluger</td>
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<td>9</td>
<td>Audi A4</td>
<td>2,652</td>
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<tr>
<td>10</td>
<td>Mercedes-Benz M-Class</td>
<td>2,589</td>
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</tbody>
</table>
CORPORATE SPECIFIC MASS TARGET

CO2 grams/km

Mass Kgs

Ferrari
Lamborghini
Aston Martin
Bentley
Rolls Royce
Maybach
Maserati

Land Rover

Lotus
Alfa
Honda
Jaguar
Holden
Porsche
Chrysler
Jeep
Isuzu

Proton
Fiat
Hyundai
Ssangyong

Peugeot
Rolls Royce
Mitsubishi
Mercedes

Smart
CO2 STANDARD: SUMMARY

1. Developed Co-operatively with Industry.
2. Based on reliable data.
3. Recognition of Non-test cycle technologies:
   - Alternative Fuels.
   - GSI, TPM, Air-con gases, Etc.
   - Incentives for emerging technologies.
4. Realistic target consistent with economy wide objectives.
FEDERAL CHAMBER OF AUTOMOTIVE INDUSTRIES

Global Fuel Economy Initiative
2 March 2011
Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne
Design of Greenhouse Gas (GHG) Standards
Learning from international experiences

Anup Bandivadekar
March 2\textsuperscript{nd}, 2011
The mission of the ICCT is to dramatically improve the environmental performance and efficiency of cars, trucks, buses, and transportation systems in order to protect and improve public health, the environment, and quality of life.
## Worldwide Automobile Efficiency/GHG Standards

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Regulated metric</th>
<th>Program details, reduction in CO₂-per-distance emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Union#</td>
<td>CO₂ emissions (CO₂/km)</td>
<td>40% reduction, MY 2008-2020 EU NEDC</td>
</tr>
<tr>
<td>United States</td>
<td>Fuel economy (mi/gal)</td>
<td>24% reduction, MY 2009-2016 U.S. FTP</td>
</tr>
<tr>
<td></td>
<td>GHG emissions (CO₂e/mi)</td>
<td></td>
</tr>
<tr>
<td>Japan#</td>
<td>Fuel economy (km/L)</td>
<td>19% reduction, MY 2010-2015 Japan JC08</td>
</tr>
<tr>
<td>China#</td>
<td>Fuel consumption (L/100km)</td>
<td>14% reduction, MY2008-2015 EU NEDC cycle</td>
</tr>
<tr>
<td>Canada</td>
<td>GHG emissions (CO₂e/mi)</td>
<td>24% reduction, MY 2009-2016 U.S. FTP</td>
</tr>
<tr>
<td>South Korea</td>
<td>Fuel economy (km/L)</td>
<td>12% reduction, MY 2012-2015 U.S. FTP</td>
</tr>
<tr>
<td></td>
<td>CO₂ emissions (CO₂/km)</td>
<td></td>
</tr>
</tbody>
</table>

#: Separate standards established for light-commercial vehicles
Comparison of passenger vehicle GHG standards

- Solid dots and lines: historical performance
- Solid dots and dashed lines: enacted targets
- Solid dots and dotted lines: proposed targets
- Hollow dots and dotted lines: unannounced proposal
- Shaded area: uncertain targets

[1] Based on 3% annual fleet GHG emissions reduction between 2017 and 2025 in the September 30th NOI.
[2] Based on 6% annual fleet GHG emissions reduction between 2017 and 2025 in the September 30th NOI.
[3] China’s target reflects gasoline fleet scenario. The target will be lower when other fuels are included.
Comparison of Light-Commercial vehicle GHG standards

- EU - 2017: fleet average
- EU - 2020: fleet average
- US - 2016: fleet average
- Japan - 2015: medium-weight freight vehicles
- China - 2012: no fleet average for China

CO₂ / GHG emission level [in g/km NEDC]
## Characteristics of Worldwide Standards

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Regulated metric</th>
<th>Attribute</th>
<th>Form</th>
<th>Categories, classes, other provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fuel Economy</td>
<td>Fuel Consumption</td>
<td>CO₂/GHG</td>
<td>Weight</td>
</tr>
<tr>
<td>European Union #</td>
<td>X</td>
<td>X</td>
<td></td>
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</tr>
<tr>
<td>United States</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Japan</td>
<td>X</td>
<td></td>
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<tr>
<td>China</td>
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<tr>
<td>Canada</td>
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<tr>
<td>South Korea</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

* # CO₂ standards complemented by Air-conditioning, tyre pressure monitoring, gear-shift indicators etc.

* FE/CO₂ standards include consideration for tyre pressure monitoring, gear-shift indicators
# Advantages (+) & disadvantages (−) of different standard forms

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Flat</th>
<th>Category /Class</th>
<th>Footprint</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The potential for compliance benefits from given strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powertrain efficiency</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Engine downsizing</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Mass reduction (per-vehicle light-weighting)</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downsizing sales-shift</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Potential disadvantages in loss of intended benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td>−</td>
</tr>
<tr>
<td>Backsliding due to Category sales shift</td>
<td>−</td>
<td></td>
<td></td>
<td>−</td>
</tr>
<tr>
<td>Backsliding due to vehicle sales shift</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Backsliding due to vehicle weight creep</td>
<td></td>
<td></td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td><strong>Potential for equitable technology-based obligated reductions across automakers with different vehicle types and classes</strong></td>
<td>−</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>Simplicity, transparency of standards; outcome certainty</strong></td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>
A size-based standard fully captures benefits of lightweighting

- Size-based design:
  - Efficiency: 11-14 g CO₂/km benefit
  - Lightweighting: 7-8 g CO₂/km actual benefit

- Mass-based design:
  - Efficiency: 11-14 g CO₂/km benefit
  - Lightweighting: only 2-3 g CO₂/km compliance benefit

Considerations for Australia (1)

- One set of standards for all light vehicles should be preferred over separate standards for passenger cars and light-trucks
  - Continuous standards preferred over class/bin-structures
  - Choosing vehicle size as an attribute creates opportunities for vehicle light-weighting, but cannot prevent upsizing

- Setting longer term targets (2020) along-with short/medium term (2015) standards will reduce regulatory uncertainty, as well as provide sufficient lead-time for ambitious targets
  - Longer lead times are becoming a norm, EU and Japan on track to finalize 2020 targets by 2012-2013, US will finalize 2025 standards by 2012
  - 2-3% reduction per year for short-term targets, 4-5% reduction per year possible for longer-term targets
Considerations for Australia (2)

- Yearly targets versus end-goals
  - US, and Canada set yearly targets, whereas Japan sets the end goal
  - EU, China, South Korea have phase-in requirements

- Adequate fiscal penalties needed to ensure compliance
  - Flexibility mechanisms such as banking, pooling, and trading may reduce compliance burden

- Extra-care needed while establishing non-performance based incentives
  - Avoid technology-specific credits, focus on performance-based standards
Anup Bandivadekar

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1225 Eye St. NW
Suite 900
Washington D.C. 20005

anup “at” theicct.org

http://www.theicct.org/
Design: Regulatory Factors and Provisions

- There are many different factors to consider
  - Flat standards
    - No special consideration for any attribute
    - Generally requires corporate- or fleet-averaging
  - Attribute-based
    - Used in EU, US, China, Japan, Canada
    - Weight/mass-indexed (lb or kg) or footprint-indexed (e.g., vehicle size–ft$^2$, m$^2$)
  - Form of the standard
    - Continuous
    - Discrete or using “bins”
  - Other provisions
    - Corporate average vs. per-vehicle limits
    - Gasoline vs. diesel

Most GHG/fuel standards involve a combination of some of these factors
Standard Design: Available Tools

- What *strategies are promoted* by the various standard types?
  - Flat offers the most compliance mechanisms to improve GHG/FE
  - Weight-based standards are the most limited
  - Size/footprint as an attribute is more versatile than weight

- **Vehicle technology**
  - Engine efficiency
  - Transmission efficiency
  - Per-vehicle engine downsizing
  - Per-vehicle mass-reduction

- **Fleet composition**
  - Selling vehicles with smaller engines
  - Selling smaller sized vehicles
Separate CO₂-indexed car and truck standards (with separate slopes)

- By statute (EPCA 1975, EISA 2007), NHTSA must set separate attribute-based car, truck standards
- Assuming no shifts in fleet composition and no trading → -24% gCO₂e/mile from 2008-2016
  - Cars and trucks would reduce gCO₂e/mile by 23% and 26%, respectively, from 2008 to 2016.
  - Excluding 10.6 gCO₂/mile from AC credits, CO₂ reductions are 19% (cars) and 21% (truck)
Vehicle Fuel Economy: Japan

Weight-based fuel economy standard with 16 discrete bins

- Japan’s “front runner” weight-based fuel economy standards
- Target fuel economy improvements (on JC08 test cycle) in each weight class
Vehicle Fuel Consumption: China

Mass-based fuel consumption standards and limits with bins

- **Per-vehicle** limits for MY2010
- **Corporate average** targets: 14-22% lower for MY2015

**Issues with per-vehicle limits:**

- **Relative ineffectiveness:** Set at less stringent levels → only impacts “laggards”
- **Uncertainty** in national outcome: limited and unclear impact on majority of fleet
- **Manufacturer inflexibility:** per-vehicle limits are discrete yes/no; averaging allows flexibility in planning for overall sales of fleet of vehicles
Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne
European Union CO$_2$ emissions regulations from vehicles

Malgorzata Golebiewska
European Commission
DG Climate Action

Melbourne, 2 March 2011
1) Background information
   ° GHG emissions from transport in the EU
   ° EU Strategy to reduce CO₂ from cars and vans
2) Regulation on CO₂/cars
3) Next steps
Background
Transport accounts for 25% of overall EU GHG emissions (excl. international traffic)

Road transport accounts for 71% of EU transport GHG emissions

EU transport emissions growing rapidly from 1990 to 2007:
- total EU27 GHG emissions decreased by 7%
- transport GHG emissions increased by 36%
- road transport GHG emissions increased by 29% - road transport responsible for 61% of transport GHG growth

Source: European Environment Agency
Transport GHG emissions

Source: European Environment Agency
Light-duty vehicles include:

- **passenger cars** (M1: carriage of passengers, no more than 8 seats) and
- **vans / light commercial vehicles** (N1: carriage of goods, maximum mass not exceeding 3.5t)

Passenger cars make up for around 88% of the registrations of new light-duty vehicles, the remaining 12% are vans.

Source: European Commission
EU Strategy on CO₂ from light-duty vehicles

- **1995**
  Communication on CO₂ emissions and fuel economy of cars; announcement of supply-oriented measures, demand-oriented measures, taxation to reduce CO₂ from new car fleet

- **1998/9**
  Voluntary agreements with ACEA/JAMA/KAMA: aiming at 140 g CO₂/km by 2008/9

- **2007**
  No sufficient progress to reach the EU targets i.e. 161 g CO₂/km in 2007, cars on average bigger and heavier – announcement of mandatory standards
Communication on CO$_2$ from cars and light commercial vehicles: the overall target of 120 g CO$_2$/km in 2012 – enforced by regulations

The concept of the ‘integrated approach’:

- 130 g/km achieved by car engine improvements;
- 10 g/km through additional measures on car components and vans:
  - low rolling resistance tyres,
  - more efficient air conditioning,
  - on-board indicators incentivising more efficient driving,
  - CO$_2$ emission standards for vans,
  - increased use of biofuels.
1. The Strategy sets out:
   - supply-oriented measures,
   - demand-oriented measures (CO₂/car labelling/consumer information)
   - fiscal measures (mainly up to EU Member States).

2. Supply-oriented measures:
   - adoption of Regulation 443/2009 on CO₂ standards for new passenger cars – April 2009
   - the remaining measures of the integrated approach already adopted, including regulation on CO₂/vans, with exception of the minimum efficiency requirements for air-conditioning systems
Regulation (EC) 443/2009
setting CO$_2$ emission standards
for new passenger cars
• Entry into force 2012 but full compliance as of 2015
• The target 130 g CO₂/km is a sales-weighted average
• The target of 95 g CO₂/km in 2020 but the details regarding the distribution effort and compliance to be defined by 2013
• New fleet to reduce emissions by 19% as compared to 2006 baseline
• Individual targets are differentiated by the utility parameter – mass (i.e. mass of a vehicle with bodywork in a running order)

• Mass of a vehicle considered as a proxy of its size
  o in practice heavier/bigger vehicles allowed to emit more, lighter/smaller vehicles allowed to emit less

• Other parameters considered: pan area (data of sufficient quality not available for footprint)
Why mass:
- good correlation with CO$_2$ emissions,
- availability of data of good quality,
- the average cost of compliance lower than in case of pan area,
- distribution of effort between manufacturers more even for mass

The downsides:
- easy to manipulate, e.g. increase to obtain a more lenient target (but the slope of the curve minimises this perverse incentive),
- in longer term may limit usage of light weight materials.

Shift to other utility parameters possible in the future

Utility parameter to be monitored to ensure that the target formulae gets adjusted in case of market shifts towards heavier cars otherwise the target may be missed.
Utility parameter

2006 CO2 vs mass

\[ y = 0.117x + 24.81 \]
\[ R^2 = 0.5215 \]
The differentiation of reduction effort between the manufacturers is expressed as a ‘limit value curve’:

- linear relationship
- average CO₂ emissions of the manufacturer’s fleet to be on or below the limit value curve
- slope of 60% (as compared to 2006 market situation) - the effort required from larger cars is greater than from smaller cars; minimises perverse incentive to increase mass
- Phase-in for each manufacturer to ease the transition:
  - 65% in 2012,
  - 75% in 2013,
  - 80% in 2014,
  - 100% from 2015 onwards.
- Pooling between manufacturers to meet their targets jointly
- Compliance mechanism - excess emissions premium of €95 per g/km of exceedence but until 2018 incl. first 3 g cheaper (‘3g corridor’): €5, €15, €25.
Eco-innovation credits for CO₂ reducing technologies outside the NEDC test cycle – a temporary provision until the new test cycle in place

**Derogations for small producers:**
- Individual targets for manufacturers of less than 10 000 cars/year
- A fixed target of 25% reduction from 2007 average emissions for manufacturers of 10 000 to 300 000 cars/year
• **Super-credits** for vehicles emitting below 50 g CO₂/km - each such vehicle shall count as:
  - 3.5 cars in 2012 and 2013
  - 2.5 cars in 2014;
  - 1.5 cars in 2015;
  - 1 car from 2016.

• **Alternative fuel vehicles** (running on E85)
  - The monitored CO₂ emission level reduced by 5% until 31 December 2015,
  - **BUT** certain criteria:
    - supply – at least 30% of the filling stations in a given country to provide this type of fuel
    - compliance with the sustainability criteria (in development).
• In 2013 the Commission will present a revised proposal with detailed provisions of meeting the 2020 target of 95 g CO$_2$/km.

• By 1 January 2013 the Commission shall define:
  o The modalities for reaching the long term target,
  o The aspects of the implementation of that target, including excess emissions premiums.

• The Commission to report on the use of footprint as a utility parameter.
The passenger cars CO$_2$ emissions monitored since 1995;

Clear progress downwards; especially big steps in 2008 and 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
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<tbody>
<tr>
<td>gCO$_2$/km</td>
<td>172.2</td>
<td>169.7</td>
<td>167.2</td>
<td>165.5</td>
<td>163.4</td>
<td>162.4</td>
<td>161.3</td>
<td>158.7</td>
<td>153.6</td>
<td>145.7</td>
</tr>
</tbody>
</table>
Progress in reducing car CO$_2$ emissions

- **Short term target** – 130g CO$_2$/km in 2015 (phase-in from 2012)
  - 52% of new passenger cars registered in 2009 emitted less than 140 gCO$_2$/km
- **Long term target** – 95g CO$_2$/km in 2020
  - 25% of new passenger cars registered in 2009 emitted less than 120g CO$_2$/km
Next steps
Next steps

- Entry into force of regulation on CO₂/vans – final adoption in March
  - Mirrors the cars format;
  - 2 targets: 175 g CO₂/km phased-in from 2014 to 2017 and 147 g CO₂/km in 2020
  - Slope 100% - even distribution of effort between different vehicle classes

- Both regulations to be reviewed by 2014
  - Utility parameter
  - Shape of the limit value curve
  - Flexibilities and compliance
  - New long-term target (2025? 2030?)

- Strategy on CO₂ from Heavy Duty Vehicles
Thank you for your attention

More information on
http://ec.europa.eu/clima/policies/transport
Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne
U.S. Program for Reducing Fuel Consumption and GHG Emissions of Light Vehicles

Julie Abraham, Director
CAFE History

• From late 1970s until 2007, NHTSA regulated Corporate Average Fuel Economy (CAFE) under the Energy Policy and Conservation Act (EPCA)
  – Mandated CAFE standards for cars and light trucks
    • doubled CAFE for cars by 1985 to 27.5 mpg
    • light truck CAFE targets were not specified
  – NHTSA issued separate universal (flat) standards for cars and light trucks
  – Permitted earning and banking of credits for exceeding standards
CAFE History

• EPCA provides that standards must be set at “maximum feasible” level for each model year, based on a balancing of 4 considerations:
  – Technological feasibility
  – Economic practicability
  – Effect of other standards on fuel economy
  – Need of the nation to conserve energy, including environmental effects

• NHTSA has also considered impact of CAFE standards on safety
CAFE History

• In 2002, National Academy of Sciences (NAS) recommended:
  – Switching from flat to attribute based standards
    • Reliance on universal standards to make substantial, continuing improvements in fuel economy:
      – Likely to induce manufacturers to use downsizing as means of compliance, which is expected to have adverse safety effects. Attribute-based standards to reduce likelihood.
      – Treats full line manufacturers less equitably
  – Credit trading to reduce costs
MY 2008-2011 Switch to Attribute-Based Standards

• In 2006, NHTSA switched to attribute-based standards for light trucks (2008 – 11)
  • Attribute-based standards
    – More equitable to manufacturers that produce broad spectrum of vehicles
    – More likely to require fuel economy improvements by manufacturers of mainly smaller vehicles
    – Better reflects consumer choice and demand
    – Promotes greater safety
MY 2008-2011
Selecting Attribute

• Criteria for selecting attribute
  – Related to fuel economy
  – Correlation of consumer utility
    • Seating capacity, interior room, luggage capacity
  – Incentives/disincentives for compliance technologies
  – Susceptibility to gaming
  – Potential impact on safety
MY 2008-2011

Pros/Cons of Footprint as an Attribute

• Footprint = (average track width) x (average wheelbase)

• Pros
  – Correlates well with size related aspects of consumer utility (seats, interior volume, safety)
  – Harder than weight to game
  – Discourages downsizing
  – Has grown only very slightly in recent years

• Cons
  – Does not correlate with fuel economy as well as weight does
MY 2008-2011
Pros/Cons of Weight as an Attribute

• Pros
  – Correlates better than footprint with fuel economy
  – Correlates well with content (vehicle features and options)

• Cons
  – Discourages down-weighting (through smart design and use of light weight materials)
  – More susceptible than footprint to gaming
  – Has grown faster than footprint
MY 2008-2011
Selection of Footprint

• Weight
  – Supported by some manufacturers
  – Relates better to fuel economy

• Footprint better than weight in all other respects
  – Better correlated to most fundamental measure of consumer utility—ability to transport people and cargo
  – More technology neutral and better for safety—size more important than weight and does not discourage smart design and use of lightweight materials
  – Harder to game
Energy Independence and Security Act (EISA)

EISA amended EPCA in 2007

– To require attribute-based standards for cars as well as light trucks
– To require substantial, continuing increases in fuel economy standards
– Standards for 2011 – 2020
  • Max feasible for PC & LT for each model year
  • Achieve industry wide fleet 35 mpg by MY 2020
– Standards for 2021 and beyond
  • Max feasible for PC & LT fleets individually
EISA

- Extended credits for flexible fuel vehicles, but set a phase out schedule
- Authorized the selling and trading of credits between manufacturers
MY 2012 – 2016
CAFE/GHG Rulemaking

May 2009, President Obama announced the National Fuel Efficiency Policy

– To reduce oil consumption and GHG emissions
– NHTSA worked jointly with EPA
  • NHTSA on CAFE standards under EISA
  • EPA on GHG emission standards under the Clean Air Act
– Develop a harmonized and consistent National Program
MY 2012 – 2016
CAFE/GHG Rulemaking

National Fuel Efficiency Policy (continued):

– Overarching goal was developing harmonized federal standards that California would accept as compliance with its GHG standards

– Manufacturers would be able to build a single light-duty national fleet that
  • Satisfies all national and state requirements, and
  • Continues to provide consumers with a full range of vehicle choices

– The joint final rule was issued April 2010
MY 2012 – 2016 CAFE/GHG Rulemaking

Projected industry-wide fleet fuel economy:

<table>
<thead>
<tr>
<th></th>
<th>PC</th>
<th>LT</th>
<th>Comb</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011:</td>
<td>30.4</td>
<td>24.4</td>
<td>27.6</td>
</tr>
<tr>
<td>2016:</td>
<td>37.8</td>
<td>28.8</td>
<td>34.1</td>
</tr>
</tbody>
</table>

GHG equivalent mpg figures slightly higher due to greater EPA authority to provide incentives for improving AC efficiency
MY 2012 – 2016
CAFE/GHG Rulemaking

Attribute based standards:

– NHTSA and EPA
  • Reviewed the pros and cons of NHTSA’s previous decision to use footprint as the attribute for indexing future CAFE and GHG standards, and
  • After considering public comments, reaffirmed that decision.

– NHTSA believes that safety should be one of the criteria explicitly considered in selecting an attribute
MY 2012 – 2016 CAFE/GHG Rulemaking

Attribute based standards (Continued):

- Stringency increases annually for every size of vehicle
- Maintains a reasonable range of consumer choice of vehicle size and utility
- Encourages application of technologies to all vehicles
- Helps promote safety by reducing the incentive for manufacturers to change vehicle size
- Footprint, unlike weight, provides an incentive for manufacturers to rely on smart design and use of light weight materials to reduce mass.
MY 2012 – 2016
CAFE/GHG Rulemaking

CAFE Program flexibilities (EPCA/EISA limit NHTSA’s ability to offer flexibilities)

– Credit banking
  • 5-year carry-forward
  • 3 year carry-back

• GHG Program offers additional flexibilities
MY 2012 – 2016
CAFE/GHG Rulemaking

Program flexibilities (Continued):

– Credit trading and transferring, starting with credits earned in MY 2011, and with some EISA restrictions
  • Trading between manufacturers
  • Transferring between manufacturer’s car and light truck fleets
– Alternative fueled vehicle credits allowed per EISA (example: FFV credits)
MY 2012 – 2016
CAFE/GHG Rulemaking

Science-Based and Transparent

– Agencies’ reference fleet forecast based on information available from public and commercial sources
– Agencies also considered manufacturers’ confidential product plans
– Technology cost and effectiveness estimates were thoroughly reviewed and updated through methods that included teardown studies and vehicle simulation
MY 2012 – 2016
CAFE/GHG Rulemaking

Science-Based and Transparent

– CAFE model to simulate compliance
– Updated functional form of standard (linear rather than logistic)
– The CAFE model and all inputs and outputs are available on NHTSA website
  • http://www.nhtsa.gov/fuel-economy
  • Go to 2012-2016 joint rulemaking
  • CAFE Compliance and Effects Modeling System
2017-2025

• On October 13 and December 8, 2010, NHTSA and EPA jointly published notices regarding plans for proposing further reductions in fuel consumption and GHG emissions by 2025. Notice of Proposed Rulemaking by Sept 1, 2011

• First notice was accompanied by interim joint technical assessment developed in conjunction with the California Air Resources Board

• On February 25, 2011, NHTSA held a public workshop bringing together experts to discuss how different statistical analyses can help in evaluating the effect of vehicle mass and size on safety (www.nhtsa.gov/fuel-economy)
The End

(Thank you)
Improving Fuel Economy in Australia
March 2nd 2011, Melbourne
Fuel Economy Policy for Australia: Policies that Complement Fuel Economy Standards

Steven E. Plotkin
Center for Transportation Research
Argonne National Laboratory
USA

Improving Fuel Economy in Australia
Melbourne, Australia, March 2, 2011
Fuel economy/CO₂ standards can use some help……

- Actions outside the regulatory boundary affect fuel use, CO₂ emissions
- Regulations *always* come with market distortions and loopholes….proper regulatory design is crucial, but watch out if the regulations are fighting the market
- Economic incentives can align the market
  - Getting fuel prices right
  - Get help from vehicle taxes, feebates
  - Make sure the underlying taxation system doesn’t undercut you
In estimating the effectiveness of complementary measures, some skepticism is in order.....

- Generally, multiple forces act on new vehicle fleet fuel economy –
  - Underlying fuel prices
  - Regulatory pressures (sometimes in other markets)
  - Multiple fiscal measures
  - Economic confidence
  - Changes in technology

- Be careful about assigning cause and effect
“Eco-driving” incentives are worth a look

- 5-10% average fuel economy improvements appear to be possible
- Real-time fuel economy meters allow positive feedback for drivers; should we consider awarding fuel economy credits for car manufacturers who install them?
- Role of education/advertising
The choice of replacement tires and maintenance of existing tires are important

- New vehicles often come with high efficiency tires...but what are they replaced with?
- A 10% increase in tire rolling resistance coefficient will increase fuel consumption by ~ 2%.
- Proper tire inflation is crucial as well – U.S. DOT study found that >25% of tires over 4 psi too low..implies > 1% increase in fuel consumption.
- Rules on tire inflation monitors can play a role.
- Shifting from high efficiency tires to (cheaper) lower efficiency tires can cost hundreds of dollars in higher fuel use over tire lifetime....consumer information is critical.
Improvements in tire efficiency can help reduce CO₂ emissions……IF vehicle owners choose them

And claimed tire rolling resistance for Chevy VOLT is 0.0044 (compared to 0.007 to 0.008 for most current tires).
Fuel pricing affects both travel and vehicle efficiency

In U.S., a 10% fuel price increase is estimated to yield:

- 1% decrease in vehicle miles
- 1-2% short-term increase in new car fuel economy (changes in sales mix)
- Up to 2% added increase in fuel economy as automakers redesign their vehicles, depending on stringency of standards
- Shifting costs to fuel prices can increase fuel economy, reduce travel without increasing total travel cost – e.g., “pay at the pump insurance”
Australia’s gasoline taxes are moderate compared to Europe, Japan
“Feebates” provide a market incentive for higher fuel economy

French “bonus/malus” feebates:
- One year 5% drop in average CO\textsubscript{2} emissions from new cars
- Vehicles qualifying for bonus (<130gCO\textsubscript{2}/km): +13% share in one year
- Vehicles hit with “malus” (>160gCO\textsubscript{2}/km): -10% share in one year

U.S. estimate for $20/gCO\textsubscript{2}/mile feebate: 10% reduction in GHGs for new vehicle fleet
Many countries tax vehicle sales and annual use (registration fees) according to CO₂ emissions

- **SALES TAX:** Of 27 EU members,
  - 7 have pure CO₂ taxes on vehicle sales, and
  - an added 4 have “mixed” CO₂ plus “indirect” taxes (e.g., taxes on engine displacement),
  - 3 have indirect taxes only

- **ANNUAL TAX/FEE:**
  - 4 have pure CO₂ taxes,
  - 4 mixed,
  - 10 indirect only
Great Britain’s system of annual vehicle registration fees is an interesting example:

### U.K. Light-Duty Vehicle Tax Rate Schedule for Petroleum-Fueled Vehicles
(in £British, Effective 2010–2011)

<table>
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<th>CO₂ Bin</th>
<th>Emission (gCO₂/km)</th>
<th>First-Year</th>
<th>Annual</th>
<th>Lifetime (est)</th>
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</table>

*Source.* European Automobile Manufacturer’s Association (ACEA, 2009), adapted from Bandivadekar and Hui, 2011, ICCT
Does Australia’s taxation policy on company cars push for higher average GHG emissions?

- Effective tax on a car lease is lower – incentive to purchase a larger, more luxurious car?
- Effective fuel price can be lower – reduced incentive to choose high efficiency?
- Added tax benefit for a sports utility vehicle in business use – so added incentive to buy an SUV rather than a (more efficient) station wagon or large sedan?
Complementary measures can increase the effectiveness of standards and make the resulting vehicles more attractive to potential purchasers. They are well worth considering.
Improving Fuel Economy in Australia
March 2\textsuperscript{nd} 2011, Melbourne