DYNAMIX policy mix evaluation

Reducing transport CO2 emissions in Spain
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List of Abbreviations

CETM Spanish Goods Transport Confederation
CO Carbon monoxide
CO\textsubscript{2} Carbon dioxide
IDAE Spanish Institute of Energy Saving and Diversification (Instituto de Diversificación y Ahorro de la Energía)
1 Resource/Issue

Name of resource targeted (or focus of the case study, if the policy mix is broader than the specific resource(s) we have decided to analyse).

This case study focuses on the freight and passenger transport sector in Spain, examining the extent of decoupling of CO$_2$ emissions from the transport sector from economic growth, and the policies put in place that have contributed to decoupling efforts.

This document sets out the findings from the DYNAMIX WP3 case study on Transport in Spain, examining the extent of decoupling of CO$_2$ emissions from transport from economic growth (and other economic indicators, such as domestic demand), with a specific focus on relevant policies under the Spanish 2005-2007 Action Plan on Energy Saving and Efficiency. The sections and content in this document correspond to the WP3 case study evaluation template provided by IEEP.

2 Geographical area of policy mix coverage

Country name, and region or city if appropriate (if policy mix is applied regionally or locally)

The policy mix explored in this case study covers Spain.

3 Policy context

3.1 The environmental problem and its scope

What is the environmental problem/concern (consider both quantity and quality), e.g. soil erosion, excessive use of non-renewable or renewable resources and the crossing of environmental thresholds/tipping points for impact, resource scarcity concerns?

Are there any economic or social problems related to the issue and environmental problems – e.g. is there important price volatility, (risk of) unavailability of resources for the economy or society?

Who is the target group affected that have been, are or will be beneficiaries of the policy response?

The environmental issues associated with transport include: air pollution (including CO, CO$_2$, NO$_x$, lead, particulate matter, and volatile organic compounds); climate change (predominantly from CO$_2$); and nature, landscape and urban effects (e.g. the impacts of extending transport infrastructure on soil and biodiversity). There are also upstream and downstream impacts such as those associated with the extraction and transportation of fuel for the transport sector, and the disposal of disused transport stock (OECD 2006).
The contribution of the transport sector in Spain to national CO₂ emissions is amongst the highest in Europe. Emissions from transport account for roughly one third of CO₂ emissions in Spain.

In 2008, the total external costs of transport in Spain were estimated to be €983 per inhabitant\(^1\). Road transport accounted for nearly 90 % of these total costs, with 65 % from passengers on roads, and 24 % from road freight (CE Delft, Infras, and Fraunhofer ISI 2011).\(^2\)

Figure 1 below shows the distribution of CO₂ emissions arising from modes of freight and passenger transport in Spain. Freight transport is responsible for a larger share of CO₂ emissions from transport than passenger transport.

**Figure 1: Spanish CO₂ emissions from freight and passenger transport, 1990-2010**


**Geographic scope**

Figures 2 to 5 illustrate the geographical scope of the road, rail and air transport networks in Spain. Across all three modes, transport nodes and networks are more densely concentrated in and around urbanised areas.

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\(^1\) In addition to the external costs from climate change, air pollution, and upstream and downstream impacts, this estimate also includes external costs arising from accidents and noise pollution.
Figure 2: Spanish primary road network


Figure 3: Spanish highway and motorway network

Reducing transport CO₂ emissions in Spain

Figure 4: Spanish railway network


Figure 5: Spanish air traffic (domestic and international)

3.2 Policy context and policy needs

What policy challenge(s) did the problem pose and what policy challenges does it still pose?

What is the policy context related to the policy mix being evaluated? What policies have been put in place to address the issues, what policies are currently in place and which ones are already foreseen for future introduction (e.g. to address past, existing and future objectives)?

What sort of policy response did (and does) the problem call for?


The 2005-7 Action Plan was preceded by a range of local, regional and national policies and initiatives both directly and indirectly affecting the energy efficiency of and CO₂ emissions arising from transport in Spain. These include: the Energy Conservation and Efficiency Plan, which ran from 1991-2000 and aimed to decrease final energy demand without adversely affecting economic activity or welfare; financial incentives such as a reduction in registration tax when scrapping old cars to promote the renovation of the national vehicle stock; policies to encourage the use of electric vehicles in cities such as Madrid, Sevilla, Salamanca, La Coruña; and those to encourage the use of renewable energy alternatives including biofuels (Institute of Studies for the Integration of Systems n.d.).²

In 2011 the Energy Conservation and Efficiency Plan was supplanted by the current 2011-2020 Action Plan which constitutes Spain’s second NEEAP submission to the European Commission in accordance with Directive 2006/32/EC, with the objective to improve final energy intensity by 2 % per year in the period 2010-2020 (Instituto para la Diversificación y Ahorro de la Energía 2011).³

Error! Reference source not found. illustrates a range of policies affecting transport in Spain that were in effect before and after the 2005-7 Action Plan and their respective timeframes.

The policy challenge posed by the transport industry with respect to resource use and environmental impacts may be considered as the need to: (i) internalise the environmental costs associated with transport in Spain (including air pollution, climate change, nature, landscape and urban effects, and other upstream and downstream impacts such as the disposal of disused transport stock); (ii) improve and promote alternative transport modes and technologies with lesser impact; while maintaining overall social and economic welfare.

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² Such as the Renove and Prever plans (Institute of Studies for the Integration of Systems, 2011).

³ For example, see policies SPA5 and SPA6 in the MURE II database (Institute of Studies for the Integration of Systems, 2011).
Figure 6: Timeline of Spanish policies affecting the use of transport

- Renove and Prever plans (SPA2)
- EECP 1991-2000 (SPA3)
- Passenger Car Labelling on fuel economy rating (SPA4)
- Promotion of the Use of Biofuels in the Transport Sector (SPA5)
- Subsidies for Renewable Energy and Energy Efficiency Projects (SPA6)
- ECOTEST (SPA7)
- Ecodriving Europe Programme (SPA8)
- Training Programme for Economic Road Haulage Driving (SPA10)
- Standards for the Technical Inspection of Vehicles (SPA11)
- Promotion of Electric Vehicles (SPA12)
- Action Plan 2011-2020 (SPA30-44)
- Promotion of Biofuels or other Renewable Fuels for Transport (SPA45)
- Fiscal Measures to Promote Car Fuel Efficiency: Emissions-based Registration Tax (SPA46)
- VIVE Plan (SPA47)
- MOVELE (SPA48)
- Integral Strategy to Impulse the EV/PHEV in Spain 2010–2014 (SPA49)
- PEIT 2005-2020 (SPA50)
- Energy Saving and Efficiency Strategy in Spain 2004-2012

Source: Institute of Studies for the Integration of Systems. Mure II Database [cited 11 July 2013. Available from http://www.muredatabase.org/summary1_tr.asp. Codes in brackets refer to the corresponding entry in the ISIS MURE II database where further information may be found.
3.3 Historical performance and projections into the future: Insights on decoupling

What has been the trend vs. GDP (or other economic performance metrics, such as sectoral growth) and what type of decoupling has been achieved?

Figure 7 shows the trends in total CO₂ emissions from domestic transportation and real gross domestic product (GDP) for the period 1990 to 2010 (2008 for emissions), together with the resultant emissions intensity (transport CO₂ per unit GDP) trend.

For the first eight years, CO₂ emissions grew at a slightly faster rate than GDP, with the emissions intensity index rising to around 110 by 1998. For the next ten years, emissions grew at the same rate as GDP, with emissions intensity remaining (approximately) constant. That is, there is no evidence of any relative decoupling over this period.

In 2008 (the last year for which transportation emissions data is available) there was a sharp decline in emissions while GDP continued to rise, with a corresponding reduction in emissions intensity. However, this is most likely an artefact of how the GDP time series is constructed rather than evidence of any absolute decoupling. 2008 was a very unusual year for economies around the world, with economic growth collapsing on an unprecedented scale. While GDP was slightly up on the previous year when averaged over the year as a whole (as shown in Figure 7), economic activity had actually started to turn down during the second quarter (Q2) and by Q4, GDP was almost 1.5 % lower than the corresponding quarter in 2007. Furthermore, for the first half of the year, GDP benefited from an increase in net exports. Domestic demand—which is a more relevant driver for domestic transportation emissions—actually declined in all four quarters of 2008, being 0.5 % down versus 2007 for the year as a whole and almost 4 % down for the final quarter.

Figure 8 compares the trend in CO₂ emissions with the trend in domestic demand averaged over the year, and the trends in GDP and domestic demand based on Q4 figures. When compared to all of these measures, the decline in CO₂ emissions appears to reflect the downturn in economic activity rather than result from absolute decoupling.

This conclusion is reinforced when one looks at the individual trends for freight and passenger transportation—see Figure 9 and

Figure 10. While there had been a significant reduction in specific emissions for freight transportation since 1995, this had flattened off by 2007-8, and the reduction in emissions in 2008 was driven entirely by the significant drop in activity. For passenger transportation, there is some suggestion of a reduction in specific emissions (and absolute decoupling). However, this is based on a continuing increase in passenger activity—which seems questionable given the severity of the economic downturn. For example, the employment rate—which is one of the key drivers of transport activity (see section 5 below)—experienced a 10 % decline between 2007 and 2009.
Reducing transport CO$_2$ emissions in Spain

Figure 7: Spanish domestic transport CO$_2$ emissions versus GDP, 1990-2010

![Graph showing Spanish domestic transport CO$_2$ emissions versus GDP, 1990-2010.]

Figure 8: Spanish domestic transport CO$_2$ emissions versus alternative economic indicators

![Graph showing Spanish domestic transport CO$_2$ emissions versus alternative economic indicators, 1990-2010.]

Source: OECD Website (http://www.oecd.org/) (CO$_2$ emissions, real GDP); EUROSTAT (http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/) (alternative economic indicators)
Figure 9: Spanish freight transport CO$_2$ emissions versus activity

Figure 10: Spanish passenger transport CO$_2$ emissions versus activity

4 Drivers affecting change: resource use/environmental issues

What are the drivers affecting resource use (driving demand for the resource and leading to resource overuse) or other environmental impacts?

Drivers of transport activity

A major driver of transport activity is general economic activity as measured by real GDP. However, as can be seen in Figure 11, both passenger and freight transportation activity have grown faster than the Spanish economy over the past 20 years. In particular, freight transportation activity more than doubled between 1996 and 2007, while GDP grew by only around one third.

**Figure 11: Spanish transport activity versus GDP**


Decomposition of the trend in passenger transportation activity into changes in population, vehicle ownership and vehicle usage shows that the key driver of the increase in activity has been the increase in vehicle ownership (see Figure 12). While population and vehicle usage increased by 15 % and 7 % respectively between 1990 and 2007, vehicle ownership increased by 57 % over the same period – with most of the increase occurring over the first ten years.
Drivers of specific emissions

Changes in the modal composition of transportation can have an impact on specific emissions (i.e. emissions per unit activity). As can be seen in Figure 13 and Figure 14, the shift has been more significant for freight transportation, with the share of freight transported by rail falling from slightly over 10 % in 1990 to around 3.5 % in 2009. The shifts have been less marked for passenger transportation, with transportation by private car increasing its share of the total from around 78 % to 82 % over the same period. This increase came equally at the expense of passenger transport by buses and coach, and passenger transport by rail, which each lost around 2 % points of share.

The increases in specific emissions caused by these modal shifts were more than offset by improvements in the energy efficiency of vehicles. This can be seen in the analysis of carbon emissions undertaken by Mendiluce and Schipper (2011) which decomposed changes in total carbon emissions for passenger and freight transportation into changes in activity, structure (i.e. modal shifts), energy intensity and average carbon factor (see Table 1).
Reducing transport CO₂ emissions in Spain

Figure 13: Spanish modal share of freight transport

![Graph showing the modal share of freight transport in Spain from 1990 to 2005. The graph indicates a significant dominance of road freight, with a slight decrease in the share of rail freight over the years.](image)

Figure 14: Spanish modal share of passenger transport

![Graph showing the modal share of passenger transport in Spain from 1990 to 2005. The graph indicates a dominance of vehicle-based transport, with a minor share of rail transport.](image)

Table 1: Decomposition of Spanish transportation emissions, 1990-2008

<table>
<thead>
<tr>
<th></th>
<th>Passenger</th>
<th></th>
<th></th>
<th>Freight</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>100</td>
<td>143</td>
<td>181</td>
<td>100</td>
<td>105</td>
<td>183</td>
</tr>
<tr>
<td>Structure</td>
<td>100</td>
<td>101</td>
<td>105</td>
<td>100</td>
<td>114</td>
<td>110</td>
</tr>
<tr>
<td>Energy intensity</td>
<td>100</td>
<td>88</td>
<td>93</td>
<td>100</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>Carbon factor</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Total carbon emissions</td>
<td>100</td>
<td>126</td>
<td>175</td>
<td>100</td>
<td>120</td>
<td>153</td>
</tr>
</tbody>
</table>


5 Situation/trend prior to introduction of policy mix

*Information on the baseline situation before the policy mix was introduced.*

*Figure 15: Spanish trend in GDP, transport activity and transport CO₂ prior to 2005 (against 1990 baseline)*

6 Description of policy mix(es)

This section presents the main policy mix that will be the focus of this ex-post assessment.

Lifecycle focus of the policy mix: Transportation

Sector(s) covered: All sectors (including all modes of transport)

Scale of application of policy mix: National level

Implementing body: Spanish Autonomous Communities and the IDAE, Ministerio de Industria, Turismo y Comercio

Objective of policy mix: reduce growth rates in consumption and in energy intensity indicators

The policy mix examined in this case study comprises instruments from the Spanish 2005-2007 Action Plan on Energy Saving and Efficiency, ‘Plan de Acción de la Estrategia de Ahorro y Eficiencia Energética en España’. The 2005-7 Action Plan was implemented as the first of two action plans in the 2004-2012 Spanish Energy Efficiency Strategy, which proposed an overall 87.9 million oil equivalent tonne saving through transport policies, amounting to a total goal of 238 million tonnes of CO$_2$ avoided. The 2005-7 Action Plan was approved by the Council of Ministers in Spain in July 2005 and “set out priority measures to start a process applying pressure to all sectors, so as to reduce growth rates in consumption and in energy intensity indicators” (IDAE, Ministerio de Industria, Turismo y Comercio 2007).

The 2005-7 Action Plan was co-managed jointly by the Spanish Autonomous Communities and the IDAE, and aimed to address a range of different sectors in the economy through a strategy of coordinated and simultaneous measures (IDAE, Ministerio de Industria, Turismo y Comercio 2007).

6a. Supplementary context questions including elements pertinent to paradigm discussions in DYNAMIX

Timeline for the different phases of the policy cycle (i.e. rationale and objective-setting; appraisal; implementation and monitoring).

Description of the government in power during each of the three following policy phases: rationale and objective-setting; appraisal; and implementation and monitoring.

Does the mix contain policies that are unusual or not typical of the country/ies or regional/local administration that implemented it?

Names of resource efficiency concepts, terms, models, ranking/classification systems, accounting methods etc. used or relied upon in each of the three phases of the policy cycle: rationale and objective-setting; appraisal; and implementation and monitoring, and how they were used (e.g.: ‘waste hierarchy’ – used in objective-setting to link policy objectives to more desirable uses for waste).

Policy mix and government timeline (See Error! Reference source not found. Error! Reference source not found.).
6b. Instruments and orientation of policy mix

Instruments in the mix and whether one type of tool (i.e. regulatory, economic, information) is dominant.

For each instrument, what is its aim? What requirements does it place on relevant players (for example, phasing out a certain substance, meeting minimum recycling targets, etc.)? What reporting requirements exist?

The instruments in the policy mix, namely the transport-oriented policies of the 2005-7 Action Plan, are outlined in Table 2 and in Figure 16.

Figure 16: Instruments used in the Spanish transport policy mix and their relationships

Source: Own compilation

6c. Evolution of policy mix

Evolution of the policy mix throughout its existence –details of the introduction of the first policy tool(s), then all subsequent relevant tools, and related revisions/reforms (e.g. progressive increases in rates applied through economic tools, broader extension of regulation requirements, etc.).

Table 3 lists the key events (e.g. reports, consultations, implementation, and changes) associated with the policy mix. Government changes are noted on a national level.
Table 2: Spanish transport policy mix instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Urban Mobility Plans</th>
<th>Transport Plan in Enterprises and Activity Centres</th>
<th>Greater Share of Collective Transport used in Road Transport</th>
<th>Increased Use of Rail Transport</th>
<th>Increased Use of Maritime Transport</th>
<th>Management of Transport Infrastructure</th>
<th>Management of Road Transport Fleet</th>
<th>Management of Aircraft Fleets</th>
<th>Efficient Driving of Private Vehicles</th>
<th>Efficient Driving of Lorries and Buses</th>
<th>Efficient Driving of Aircraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mure II Reference</td>
<td>SPA14</td>
<td>SPA15</td>
<td>SPA16</td>
<td>SPA17</td>
<td>SPA18</td>
<td>SPA19</td>
<td>SPA20</td>
<td>SPA21</td>
<td>SPA22</td>
<td>SPA23</td>
<td>SPA24</td>
</tr>
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<td>Instrument type</td>
<td>Regulatory and planning</td>
<td>Regulatory and planning</td>
<td>Regulatory and planning</td>
<td>Voluntary /cooperation instruments</td>
<td>Information; Regulatory and planning</td>
<td>Information</td>
<td>Voluntary /cooperation instruments</td>
<td>Information</td>
<td>Information</td>
<td>Information</td>
<td>Information</td>
</tr>
<tr>
<td>Objective</td>
<td>Action plan objective for the transport sector: A final saving of 2,984 Mtoe</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geographic scope</td>
<td>Urban</td>
<td>Urban</td>
<td>Inter-Urban, Regional</td>
<td>European, Worldwide</td>
<td>Inter-Urban, Regional</td>
<td>Inter-Urban, Regional</td>
<td>European, Worldwide</td>
<td>Urban</td>
<td>Inter-Urban, Regional, Urban</td>
<td>Regional</td>
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</tr>
<tr>
<td>Target Audience</td>
<td>Collective passengers, Individual passengers</td>
<td>Employers</td>
<td>General Public, Individual passengers</td>
<td>General Public</td>
<td>Individual passengers</td>
<td>General Public</td>
<td>Fleets Owners</td>
<td>Contract Hauliers, Fleets Owners</td>
<td>General Public</td>
<td>Transport companies</td>
<td>Transport companies</td>
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<tr>
<td>Source and more information</td>
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<td>View Detailed Measure Description</td>
<td>View Detailed Measure Description</td>
<td>View Detailed Measure Description</td>
<td>View Detailed Measure Description</td>
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</table>

Table 3: Spanish transport policy mix and government timeline, 1992-2012

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Source</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td>Inauguration of Spanish high-speed rail system (AVE)</td>
<td>(Mendiluce, 2011 #111)</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>1993</td>
<td>Economic slowdown</td>
<td>(Mendiluce, 2011 #111)</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>1996</td>
<td>José María Aznar López takes offices as prime minister</td>
<td><a href="http://www.lamoncloa.gob.es/Presidente/Presidentes/index.htm">http://www.lamoncloa.gob.es/Presidente/Presidentes/index.htm</a></td>
<td>People’s Party</td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Source</td>
<td>Government</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>01 Nov 2003</td>
<td>Introduction of reservation fee to be collected from railway undertakers per volume of traffic per year plus reserve capacity charge plus variable charge per train-km actually used by type of line and type of service.</td>
<td>(Law 39/2003)</td>
<td>People's Party</td>
</tr>
<tr>
<td>2004</td>
<td>José Luis Rodríguez Zapatero takes office as prime minister</td>
<td><a href="http://www.lamoncloa.gob.es/Presidente/Presidentes/index.htm">http://www.lamoncloa.gob.es/Presidente/Presidentes/index.htm</a></td>
<td>Spanish Socialist Working Party</td>
</tr>
</tbody>
</table>
## Reducing transport CO₂ emissions in Spain

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Source</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>The Strategic Plan on Infrastructures and Transport [PEIT] (2005-2020) proposes various measures for the integration of transportation infrastructure such as an intermodal system, more popular public transport, and better resource allocation.</td>
<td>EEA 2011 Survey of Member Countries</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>2008</td>
<td>Economic slowdown</td>
<td>(Mendiluce, 2011 #111)</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>01 Feb 2009</td>
<td>Start of the MOVELE Project on electric mobility which aims to establish 2000 electric vehicles and 500 recharging stations in urban areas between 2009 and 2010.</td>
<td>Appendix I from &quot;Prospective Study&quot; by the Servicio Público de Empleo Estatal</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>13 Feb 2009</td>
<td>The Comprehensive Automotive Programme outlines specific measures to maintain the Spanish automobile industry. One measure includes an increase in the use of hybrid and electric vehicles so 1 million are realized by 2014.</td>
<td>Appendix I from &quot;Prospective Study&quot; by the Servicio Público de Empleo Estatal</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>01 Apr 2009</td>
<td>The Spanish Strategy on Sustainable Mobility (EEMS) outlines 48 measures for the integration of the transportation sector. An efficient and sustainable transport system is the objective. Improvements to infrastructure and urban planning are proposed.</td>
<td>EEA 2011 Survey of Member Countries</td>
<td>Spanish Socialist Working Party</td>
</tr>
</tbody>
</table>
## Reducing transport CO₂ emissions in Spain

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Source</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Mar 2010</td>
<td>The Integral Plan for the Promotion of the Electric Vehicle plans for the introduction of 250,000 electric vehicles into the transport fleet by 2015.</td>
<td>Appendix I from &quot;Prospective Study&quot; by the Servicio Público de Empleo Estatal</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>01 Mar 2011</td>
<td>Spanish government decreases the highway speed limit from 120 km/h to 110 km/h</td>
<td>(Mendiluce and Schipper; 2011)</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>01 Mar 2011</td>
<td>The Sustainable Economy Act consolidates political objectives on sustainable mobility, and promotes efficient and environmentally-friendly transport with little social and environmental cost. Particular attention is given to railway freight.</td>
<td>Appendix I from &quot;Prospective Study&quot; by the Servicio Público de Empleo Estatal</td>
<td>Spanish Socialist Working Party</td>
</tr>
<tr>
<td>2011</td>
<td>Mariano Rajoy Brey takes office as prime minister</td>
<td><a href="http://www.lamoncloa.gob.es/Presidente/Presidentes/index.htm">http://www.lamoncloa.gob.es/Presidente/Presidentes/index.htm</a></td>
<td>People's Party</td>
</tr>
<tr>
<td>01 Jan 2012</td>
<td>Law 1/2012 redefines the total charge an airline must pay for flying in and out of the Madrid-Barajas airport. Also imposes a noise charge for air carriers, in accordance with Directive 2009/12/EC.</td>
<td><a href="http://www.aena-aeropuertos.es/csee/ccurl/655/209/guia%20tarifas%20aena%20aeropuertos%202012">http://www.aena-aeropuertos.es/csee/ccurl/655/209/guia%20tarifas%20aena%20aeropuertos%202012</a> _EN.pdf</td>
<td>People's Party</td>
</tr>
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<td>01 Jan 2012</td>
<td>Law 1/2012 redefines the total charge an airline must pay for flying in and out of the Madrid-Barajas airport. Also imposes a noise charge for air carriers, in accordance with Directive 2009/12/EC.</td>
<td><a href="http://www.aena-aeropuertos.es/csee/ccurl/655/209/guia%20tarifas%20aena%20aeropuertos%202012">http://www.aena-aeropuertos.es/csee/ccurl/655/209/guia%20tarifas%20aena%20aeropuertos%202012</a> _EN.pdf</td>
<td>People's Party</td>
</tr>
</tbody>
</table>
7 Evaluation of policy mix: effectiveness  
(environmental sustainability)

Does/did the policy mix result in a positive environmental outcome?
Were its stated objective(s) met? Were the instruments used sufficient to meet the objectives?
Did other, unforeseen/unintended positive outcomes or impacts (environmental, social, economic) result? Did other such negative outcomes or impacts result?
 Were these objectives set at a level to meet environmental needs (e.g. avoid crossing environmental thresholds/tipping points or achieve more sustainable levels of resource use/extraction (e.g. maximum sustainable yield (MSY) in fisheries)?
Which sectors/actors were identified as having key impacts/influences on the problem/issue? (e.g. specific industrial/business sectors, consumers, economy as a whole?) Did any of the instruments specifically target these key sectors/actors? Was there significant take-up/implementation of (voluntary) instruments by these sectors?
Was the policy mix applied to a sector previously not targeted by policies on the issue under question, or in a new area/issue – thereby aiming to stimulate change?
What were the anticipated and actual outcomes, impacts and effects of the policy mix on the behaviour of sectors and actors targeted? (e.g. reductions in emissions from industry, increased recycling rates, increase/decrease in certain product purchases, etc.).
Relationships between the instruments, identifying positive/negative influences on the overall policy mix or on key instruments in the mix, as well as any positive or negative impacts from changes to the mix (introduction or termination of instrument(s), increase or decrease in tax/levy/charge, etc.). Level of ’connectivity’ (strong, weak) between each instrument and the primary one(s).
Are there any indicators, monitoring systems, review processes or other monitoring mechanisms in place to track progress?

Table 4 provides a summary of the ex-ante assessment of the measures included in the 2005-7 Action Plan, as reported by the Institute of Studies for the Integration of Systems (ISIS) (2011). The Action Plan was expected to deliver energy savings of around 3 mtoe in the final year (2007) and a reduction in CO₂ emissions over the three years (2005-7) of around 14.5 mt CO₂. Based on a semi-quantitative assessment, all of the measures were judged to have high or medium impacts.

Table 4: Spanish energy and CO₂ savings of instruments

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SPA14</td>
<td>Urban Mobility Plans</td>
<td>288</td>
<td>1,640</td>
<td>High</td>
</tr>
</tbody>
</table>
Reducing transport CO\(_2\) emissions in Spain

<table>
<thead>
<tr>
<th>Measure ID</th>
<th>Description</th>
<th>Impact 2008</th>
<th>Impact 2011</th>
<th>Impact 2012</th>
<th>Impact Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPA15</td>
<td>Transport plan in enterprises and activity centres</td>
<td>141</td>
<td>835</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA16</td>
<td>Greater share of collective transport used in road transport</td>
<td>34</td>
<td>172</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA17</td>
<td>Increased use of rail transport</td>
<td>457</td>
<td>1,976</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA18</td>
<td>Increased use of maritime transport</td>
<td>42</td>
<td>230</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>SPA19</td>
<td>Management of transport infrastructure</td>
<td>847</td>
<td>3,512</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA20</td>
<td>Management of road transport fleet</td>
<td>126</td>
<td>829</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA21</td>
<td>Management of aircraft fleets</td>
<td>49</td>
<td>99</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>SPA22</td>
<td>Efficient driving of private vehicles</td>
<td>210</td>
<td>1,144</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA23</td>
<td>Efficient driving of lorries and buses</td>
<td>210</td>
<td>1,443</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA24</td>
<td>Efficient driving of aircraft</td>
<td>40</td>
<td>83</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>SPA25</td>
<td>Updating of the road transport fleet</td>
<td>180</td>
<td>1,105</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td>SPA26</td>
<td>Updating of the aircraft fleet</td>
<td>17</td>
<td>34</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>SPA27</td>
<td>Updating of the shipping fleet</td>
<td>12</td>
<td>58</td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td>SPA28</td>
<td>Updating of the stock of private vehicles</td>
<td>304</td>
<td>1,322</td>
<td></td>
<td>High</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>2,957</strong></td>
<td><strong>14,482</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


For around half of the measures, ISIS provide an estimate of the impacts by year across the three years of the plan. As one would expect, the impacts grow over the period, with around 10 % of the total reduction in CO\(_2\) emissions occurring in year one, 30 % in year two and 60 % in year three. Applying these percentages to the total expected reduction of 14.5 mtCO\(_2\) (and assuming that the reduction in 2008 is the same as in 2007) it is possible to construct a “counterfactual” baseline trajectory for CO\(_2\) emissions (i.e. in the absence of the Action Plan).

The baseline emissions trajectory is shown as the dashed line in Figure 17, along with the actual trajectory and that of domestic demand. While the construction of the baseline relies on the assumption that the ex ante assessment of the impact on emissions is a good approximation of the actual (ex post) impact, comparison of the baseline emissions trajectory with domestic demand before and after 2005 suggests that this is plausible – i.e. there is minimal change in the relationship between the two periods.
Reducing transport CO$_2$ emissions in Spain

8 Evaluation of policy mix: efficiency (economic sustainability)

Is/was the policy mix considered cost-effective?
What has been the level of impact on resource use of the policy mix (the effect)?
What have been the costs of implementing the policy mix for target audience (e.g. business, households, etc.)?
What are the costs (financial, human) of implementing the policy mix for the implementing authority – i.e. the administrative/transaction costs?
Were sufficient resources made available to ensure an effective implementation of the policy-mix?
Was anything foreseen in the policy-mix to address competitiveness concerns (e.g. use of exemptions) or minimise transaction costs (e.g. thresholds below which monitoring wasn’t required)?

Figure 17 Estimated environmental impact of 2005-7 Action Plan


Therefore, to the extent that constructed baseline trajectory is valid, it would appear that while the 2005-7 Action Plan did have an impact on CO$_2$ emissions from transportation, but this was not sufficient to result in absolute decoupling.
Did the policy mix involve providing financial support (e.g. subsidies, low interest loans, tax breaks etc.) to key actors (e.g. sector, households, etc.)?

Did the measures generate revenues (e.g. in the case of taxes) and if so, was revenue recycled/re-injected into the economy, and to what levels and activities? Did revenue recycling have positive amplifying effects?

In synthesis - was the policy mix cost-effective?

What elements of the mix were (un)helpful in improving cost-effectiveness?

How was relative/absolute decoupling achieved?

Were resource limits or other thresholds taken into account and how were they addressed?

### Table 5   Estimated cost of instruments

<table>
<thead>
<tr>
<th>Mure II database reference</th>
<th>Measure</th>
<th>Related investments (M€)</th>
<th>Public Support (M€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPA14</td>
<td>Urban Mobility Plans</td>
<td>807.3</td>
<td>52</td>
</tr>
<tr>
<td>SPA15</td>
<td>Transport plan in enterprises and activity centres</td>
<td>147.0</td>
<td>17</td>
</tr>
<tr>
<td>SPA16</td>
<td>Greater share of collective transport used in road transport</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>SPA17</td>
<td>Increased use of rail transport</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>SPA18</td>
<td>Increased use of maritime transport</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>SPA19</td>
<td>Management of transport infrastructure</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>SPA20</td>
<td>Management of road transport fleet</td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td>SPA21</td>
<td>Management of aircraft fleets</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>SPA22</td>
<td>Efficient driving of private vehicles</td>
<td>5.8</td>
<td>5.8</td>
</tr>
<tr>
<td>SPA23</td>
<td>Efficient driving of lorries and buses</td>
<td>2.7</td>
<td>2.7</td>
</tr>
<tr>
<td>SPA24</td>
<td>Efficient driving of aircraft</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>SPA25</td>
<td>Updating of the road transport fleet</td>
<td>11.2</td>
<td>11.2</td>
</tr>
<tr>
<td>SPA26</td>
<td>Updating of the aircraft fleet</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>SPA27</td>
<td>Updating of the shipping fleet</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>SPA28</td>
<td>Updating of the stock of private vehicles</td>
<td>9.8</td>
<td>9.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1,013.1</strong></td>
<td><strong>127.8</strong></td>
</tr>
</tbody>
</table>

The total cost of investments under the 2005-7 Action Plan has been estimated at around one billion euro, of which around 12% was funded by public support. Based on the estimated reduction in emissions, this equates to 70 euro per tonne of \( \text{CO}_2 \) saved, although figure this takes no account of any continuing savings after 2007.

9 Evaluation of policy mix: welfare (social sustainability)

What social impacts have you found associated with the policy mix? E.g. jobs created, reduced health impacts, distributional impacts etc.

Were social aspects included in an ex-ante impact assessment of the policy mix if one was undertaken? What were these?

Has monitoring of social impacts been included in implementation, to identify actual effects compared to anticipated ones?

Was the policy mix designed to not be socially regressive? What measures were undertaken to ensure this?

Were equity concerns addressed and, in case of re-structuring of the economy/sector, measures in the area of reskilling of the workforce foreseen?

What other public acceptability elements were addressed or considered?

Not available.

10 Overall assessment

What is your overall view on the success(es) or failure(s) of this policy mix?

How did the policy mix enable decoupling?

How could it have been improved to achieve its original objective(s) and to achieve absolute decoupling?

The scope of this case study has been limited to the 2005-7 Action Plan measures focusing on transport, however, there are some methodological challenges associated with this approach. Both the availability of data, perhaps due to how recently the measures were implemented, and the ability to disentangle the impacts of the 2005-7 Action Plan from other polices effective in Spain prior to, during and since the 2005-7 Action Plan (of which some are mentioned in 3.2) are limited.

Nonetheless, the evaluation of the environmental impact of the 2005-7 Action Plan in the previous section suggests that it did result in a reduction in \( \text{CO}_2 \) emissions from the transportation sector, amounting to around 8.5-9.0 mt\( \text{CO}_2 \) in the final year. However, this was not sufficient to induce absolute decoupling. The reduction was achieved at a cost of around
Reducing transport CO\textsubscript{2} emissions in Spain

70 euros per tonne of CO\textsubscript{2}, although this takes no account of any continuing reductions in CO\textsubscript{2} emissions after the end of the Action Plan.

There has not been any official ex-post evaluation of the 2005-7 Action Plan (IDEA 2012).\textsuperscript{8} However, in July 2007 the IDAE and the Spanish Ministry of Industry, Tourism and Commerce published provisional results of the 2005-7 Action Plan in their joint report on the subsequent 2008-12 Action Plan. The following key messages and conclusions were highlighted:

- The co-management system between the IDAE and the 19 Autonomous Communities, which managed the 2005-7 Action Plan and its public funds (of €540.5 M), was considered to be “highly efficient” and successful.

- Value for money was claimed to be achieved by “acquiring high-efficiency equipment in bulk and introducing it to the market (for example: the replacement of traffic lights with LED, the bulk purchase of low-consumption bulbs, etc.)” (IDAE, Ministerio de Industria, Turismo y Comercio 2007)\textsuperscript{9}

- the number of measures implemented has grown continuously: 8 in 2005, 22 in 2006 and 24 in 2007;

- The 2005-7 Action Plan’s training, education and information measures were championed as having “a very active future value”

- Indirect effects induced by the direct measures such as the market elimination of inefficient products and the rate of uptake of new technologies were estimated to be substantial, and as important as the 2005-7 Action Plan’s direct measures themselves.

- Regulatory instruments which aimed to create a more systemic, ‘structural’ change, such as the Technical Building Code, were highlighted as having strong impact.

11 Relevance to the EU and transferability

*Can the policy mix be applied at the EU level? Is it transferable to other Member States/countries?*

*What lessons are there that may be of general interest regarding policy mixes and what issues are there as regards transferability of the insights?*

Given that the majority of instruments in the 2005-7 Action Plan policy mix were information or education campaign measures, there is little challenge to the transferability of these instruments and their success in Spain to other EU member states. In the case of the Action Plan’s measures to increase the use of rail transport, the quality and extent of the existing rail infrastructure in the transfer country in question would be a key factor. With regard to financial measures to incentivise the updating of the road transport fleet and stock of private vehicles\textsuperscript{iv},

\textsuperscript{iv} E.g. MURE II database measures SPA25 and SPA28 (Institute of Studies for the Integration of Systems, 2011)
vehicle registration and ownership taxes vary greatly across Europe, and in many cases are already complex. The transferability of financial incentives for renovating the road transport fleet and stock of private vehicles is therefore more strongly dependent on the transfer country in question and its existing vehicle taxation system (Kunert and Kuhfeld 2007).

12 Stakeholder contribution

What insights did stakeholders provide?
Not available

13 References


Reducing transport CO₂ emissions in Spain


