1. **INTRODUCTION**

Improving environmental quality and fostering the green economy are two issues that are closely intertwined. The government has a number of tools and instruments available to it, including public contracting and procurement.

Catalonia's Strategy for Smart Specialisation (RIS3CAT) provides for the deployment of innovative, sustainable public procurement programmes as one of the public policies to be developed to put innovation at the service of the green economy.

The Catalonia 2020 Strategy (ECAT 2020), approved by the Catalan Government Agreement of 8 May 2012, is a strategic agreement to increase the Catalan economy's competitiveness and improve employment, moving towards a more competitive, more sustainable and more inclusive production model in which provision is made for the integration of green economy parameters in public spending and contracting.

The Action Plan for Air Quality Improvement, approved in 2014, includes green vehicle procurement among the actions to be implemented by the Catalan Government in the field of road transport and mobility, in accordance with the criteria defined in this guide.

The aim of this guide is help contracting authorities include environmental requirements in the procedure for contracting the vehicles themselves and the maintenance services that may be attached to the contract.

Accordingly, the central part of the guide contains the environmental criteria and clauses to be included in the contract specifications. For their part, the appendices include recommendations for fleet diversification, depending on the conditions of use, and a series of good practices to be followed in the procurement and use of vehicles.

The document is intended for the staff involved in vehicle contracting or procurement and follow-up and also the staff that use these vehicles. However, it is also useful for contracting any service that implies or entails the use of vehicles. The goal is to endow people with the necessary knowledge to enable them to benefit from the advantages offered by new technologies, safely and simply incorporate environmental criteria and, by this means, gain economic and environmental benefits.

This guide is a revised and partly expanded version of the guide approved in 2011 that takes into account certain legislative changes and data on market developments. However, it retains the structure and most of the original content.

The guide focuses particularly on M1 and N1 class vehicle fleets – cars and light vans (see glossary) – because:

1. Organisations are often not aware of the potential for money and fuel savings that can be achieved by improving the energy efficiency of small vehicle fleets.

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1 In large fleets, the environmental issues related with controlling consumption and improving efficiency are often taken into account as they have a significant economic impact (up to 30% of total operating costs in large fleets of long-distance, heavy vehicles) but in small, short-distance fleets, this effect is less, although by no means insignificant.
2. Most trips by car and van fleets take place in urban areas where they have severe impacts on air quality and people’s health.

Public transport vehicles and heavy goods carriage vehicles are therefore excluded, as there are other tools, instruments and programmes for them, including those offered by the Government of Catalonia.²

It also includes information about class L vehicles (mopeds, motorcycles, tricycles and light quadricycles).

**Environmental impacts by vehicles**

In order to understand the significance of the environmental improvements proposed, the first step is to know the main vehicle-related environmental effects, which will give us the environmental criteria and actions that must be included in the procurement and contracting procedure in order to minimise them. The main environmental impacts during the vehicles’ life cycle are given below:

**Manufacture phase**

- **Energy consumption and pollutant emissions**
  The energy consumption, and the associated emissions, attributable to the manufacture of vehicles make up a considerable part of total energy consumption and emissions during their full life cycle. It is estimated that manufacture accounts for about 20%³ of the emissions generated during the vehicle’s entire life cycle.

Even though these impacts are very significant, the lack of standardised information and the legal impediments regarding its use make it difficult to consider it as a criterion for public procurement specifications.

- **Natural resource consumption (materials)**
  Vehicles and their components are composed of a highly varied quantity of materials and substances such as metals (aluminium, iron, steel, copper), plastics, glass or fluids (lubricating oils, refrigerant gases, brake fluids, etc.).

  Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles establishes in its section on prevention (Art. 4) the need to limit the use of hazardous substances, to design new vehicles in such a manner as to facilitate their recovery and to integrate an increasing quantity of recycled materials. However, except for regulating certain hazardous substances, no quantitative objectives are established regarding recyclability or the integration of recycled materials. Instead, progress in these areas is confined to concluding agreements and undertakings with the industry and the manufacturers operating in it.

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² Catalan Energy Institute (ICAEN): Efficient driving and industrial vehicle fleet management courses. Subsidies for implementing energy management technologies and the Industrial Vehicle Fleet Management Audit Programme. For further information: www.icaen.cat

Thus, these aspects are still not defined in any type of formalised, documented or certified procedure, so it is difficult to translate them into objectively verifiable criteria.

Use phase

- **Energy consumption**
  Automobiles are machines that are capable of independent movement. However, in order to move, they need a source of energy and, in order to increase their range, they need to have an energy store from which the engine can supply itself while operating.

  Internal combustion vehicles (which we will call thermal vehicles) consume fuel (usually fossil fuel) and, more recently, a new generation of fuels (biofuels). Electric vehicles consume electricity that may come from renewable or non-renewable energy sources, depending on how the batteries are charged.

  Energy consumption is in itself an environmental variable insofar as it entails consumption of an energy resource, and indirectly it is a source of pollutant emissions obtained from the transformation of energy. Vehicles with internal combustion engines generate a large part of their pollutant emissions directly while they are operating. Hybrid or completely electric vehicles, on the other hand, generate less or no emissions, respectively, during use. This does not mean that they do not generate emissions but that any such emissions take place at source (at the point of generation of the electricity).

  The energy consumed while a vehicle is running depends primarily on its weight, power and engine efficiency and is measured using a standardised test, which means that it can be readily translated into a procurement criterion.

- **Atmospheric pollutant emissions**
  As has already been mentioned, fuel consumption, particularly when the fuel is used as a propellant, generates pollutant emissions. The quantity of emissions generated depends on the vehicle's consumption, the type of fuel consumed (petrol, diesel, LPG, natural gas or biofuels such as ethanol or biodiesel) and the vehicle's age.

  The main pollutants emitted while vehicles are running are:
  - Ozone precursors (CO, NOx, NMVOCs)
  - Acidifying substances (NH₃, SO₂)
  - Particulate matter (PM)
  - Volatile organic compounds (VOCs)
  - Dioxins and furans (PCDD/PCDF)
  - Heavy metals

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The emission levels for certain pollutants are regulated for all of Europe by the Euro standard (see glossary), and included in the vehicles’ documentation.

There are also pollutant emissions originating from tyre wear, friction and resuspension caused by the wheels’ action on the road surface, causing dust to form from the road surface material, which deteriorates air quality. These emissions are much less than those caused by combustion but they are becoming more significant as technology improves and engine emissions decrease. Furthermore, they are independent of the engine type and, therefore, are common to all vehicle types, including electric vehicles.

- **Greenhouse gas emissions**
  Vehicles are also a significant source of atmospheric emission of this type of gas, particularly CO$_2$. CO$_2$ emissions are not limited in any regulation in any specific vehicle. However, what is regulated is that these levels must be notified to buyers through the mandatory labelling (see glossary).

However, there are other types of emissions, such as possible leaks of refrigerant gases from the air conditioning, which have a high climate change potential (see 4.2).

- **Noise pollution**
  Traffic is the main cause of ambient noise and a serious problem in urban environments. Vehicle noise comes from three sources:
  - The propulsion system (engine, exhaust pipe, etc.), particularly at low speeds (<30 km/hour in cars and vans), except in electric vehicles or hybrid vehicles in electric mode as they do not emit any engine noise.
  - The contact between wheel and paving, particularly at speeds above 30 km/hour.
  - Aerodynamic noise, which increases as the vehicle's speed increases.

The maximum engine noise levels allowed for authorisation of vehicles is regulated and, normally, it is only stated in the vehicle's type-approval certificate (held by the manufacturer). Consequently, it is not stated routinely in the documentation held by the user.

- **Material consumption and waste generation**
  In addition, vehicles consume other products that must be replaced either because they are consumed or because they wear out. Thus, vehicles consume additional products and generate waste as a result of their use and maintenance that will vary depending on the type of vehicle and the maintenance requirements. The main products are engine oils, batteries and tyres, special or hazardous products that must be processed at authorised centres so that they can be regenerated (to produce new lubricants), recycled or retreaded (to make new tyres or rubber products). And if recycling and reuse is promoted for waste processing, procurement of the resulting products must also be promoted during the vehicle's maintenance.

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Replacement of the air conditioning system's refrigerant gases may also entail additional consumptions and impacts, and it must be done in establishments having the necessary equipment to prevent emissions into the atmosphere.

Disposal phase

- **Waste generation by end-of-life vehicles**

At the end of its service life, when the vehicle is in very bad condition or has a fault that is difficult to repair, it becomes a waste product that must be deregistered and dismantled in a treatment centre for end-of-life vehicles to decontaminate it (removal of toxic fluids and components) and recover the maximum quantity of materials for recycling.

The type of use and maintenance waste such as that generated during scrapping is again one of the features that most differentiates thermal and electric vehicles.

To this must be added the main impacts associated with transport infrastructures, but they are not taken into consideration as they are outside the scope of this guide.

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8 For further information: *Guia de bones pràctiques per al reciclatge de vehicles fora d’ús a Catalunya* [Good practices guide for recycling end-of-life vehicles in Catalonia]. Waste Agency of Catalonia (ARC), 2009.

2. FEATURES OF VEHICLE PROCUREMENT

The purpose of vehicle purchase and/or leasing by the government is to cover travel needs in the performance of those aspects of public service that require it. These needs include the following:

- Transportation of government officials: mid-sized, large or top-of-the-range cars.
- Visits, inspections by technical personnel: small or mid-sized cars, possibly even motorcycles.
- Carriage of materials or parcels: trucks and vans.
- Carriage of small groups of people: large people carrier-type vans.
- Mobility of public forces (police, forest rangers, etc.): patrol cars, all-terrain vehicles, motorcycles.

In general, except for official cars, the vehicles are purchased without driver.

The purchase is always based on certain vehicle features defined in the technical specifications, depending on the vehicle's intended use. These normally include:

- Engine type: petrol / diesel.
- Bodywork: 3/5 doors, possible chassis height, boot space, etc.
- Accessories required (for example, hands-free systems).
- Cubic capacity and power.
- Possibly wheel type, if it is relevant for the purpose.
- Detailed description of the vehicle's equipment.

Market developments in areas that are environmentally significant, the availability of new engine types—electric, hybrid and, in the near future, hydrogen—the availability and possibility of using new fuels—LPG, CNG, biofuels—require taking into consideration an increasing number of aspects in the stage prior to procurement, i.e. when deciding what type of vehicle is the most suitable and, depending on that, what technical features it should have.

Consequently, this guide:

- Provides guidelines to be used in the stage prior to deciding the vehicle type (section 4.1).
- Provides information about other aspects to be considered (section 4.2).
- Outlines the environmental criteria to be included in the administrative clauses or documents that govern the tendering process, depending on the type of vehicle chosen, and criteria related with their maintenance, for those cases in which this is one of the items included in the contract (section 3).
- Provides a checklist to make it easier for companies to submit quotes and also for the government to assess them (section 4.3).
- And it also includes a glossary with terminology and concepts to be taken into account (section 4.4).
3. ENVIRONMENTAL CRITERIA TO BE INCLUDED IN THE SPECIAL ADMINISTRATIVE CLAUSES AND TECHNICAL SPECIFICATIONS FOR VEHICLE PROCUREMENT

The revised text of the Law on public sector contracts, approved by Legislative RD 3/2011 of 14 November, lists several procurement procedures. In any case, the technical specifications, which include the vehicles' technical features, are an element that is common to any procedure (in minor contracts as well) and, therefore, the criteria given are applicable to any one of them.

The tables below compile the environmental criteria to be included in the special administrative clauses and technical specifications, depending on the contract's purpose.

In total, the criteria are grouped in 5 tables identified by a colour code explained below:

- **Table 1. Thermal cars and non-plug-in hybrids: blue**
- **Table 2. Electric cars and plug-in hybrids: green**
- **Table 3. Thermal motorcycles: orange**
- **Table 4. Electric motorcycles: yellow**
- **Table 5. Maintenance: brown**

There is also a table with the reference values that complement the previous tables:

- **Table 6. Reference values for the other tables: grey**

In order to determine how to include each of the environmental criteria, it has been decided to include as technical specifications certain minimum values that are achievable by companies operating in the industry, and as award criteria the most innovative environmental criteria and values that improve on the previous minimum criteria.

In the case of leasing or renting contracts, in which maintenance is carried out by the lessor, certain basic maintenance-related aspects have been included as special performance conditions.

This guide takes into account and complies with the requirements set forth in Law 2/2011 on sustainable economy, concerning vehicle procurement by governments.

*Article 106. Procurement by the contracting authorities of clean, energy-efficient road transport vehicles.*

1. In their road transport vehicle purchases made after 4 December 2010, the entities indicated in the previous article must take into account the energy and environmental impact of use during the vehicle’s service life, as provided in section 2, and must apply one of the options indicated in section 3 of this article.

2. The energy and environmental impact of use that must be taken into account must include at least the following:
   a) Energy consumption.
   b) CO₂ emissions.
   c) NOₓ, NMHC and particulate matter emissions.

3. The requirements of sections 1 and 2 must be fulfilled in accordance with one of the following options:
a) establishing technical specifications for energy and environmental performance in the road transport vehicle procurement documentation for each of the impacts considered, and for any other additional environmental impacts, or

b) including the energy and environmental impact in the purchase decision, so that:

1. In those cases in which a public procurement procedure is implemented, these impacts must be taken into account as award criteria.
2. In those cases in which these impacts are quantified to include them in the purchasing decision, the methodology described in Additional Provision Six must be used.

Thus, the criteria tables explicitly include the parameters defined in the Sustainable Economy Law: energy consumption, CO$_2$ emissions, NOx, NMHC and particulate matter emissions, the latter by means of the engine's Euro standard parameter which includes all three variables.

As regards the options offered by the Law to comply with the requirements, the guide opts for the option defined in Art. 106.3a), that is, including them in the technical specifications. This requires all specifications to stipulate maximum energy consumption and CO$_2$ emissions (for which reference values are given in Table 6), and a mandatory Euro standard.

However, if the contracting authority prefers to include the energy and environmental impact requirements in the purchasing decision, it can do this by applying the methodology described in Additional Provision Six, as stated in the Law itself.

Having fulfilled the requirements of the Sustainable Economy Law, the guide considers other environmental improvement aspects and gives the possibility of including them as award criteria.

It should be remembered that the contracting authority that draws up the specifications must define the score that it will give to fulfilment of each of the environmental award criteria, taking into account the other award criteria included and the weight attributed to the price. However, the value given to the environmental criteria must be sufficient to make it interesting for the tenderer; 10% may be sufficient.

In addition, the contracting authority, taking into account technical criteria and the evolution of the motor vehicles market, may determine a characterisation of certain environmental criteria that is different from that proposed in this guide and include new aspects, which are described in section 4.2 of this guide. Thus, the criteria listed in the tables below should be considered to represent a basic level of greening that can be complemented with others described in section 4.2 in order to attain a more advanced level of greening.

In addition, contracting officers can use tenders to gather information about specific environmental aspects (for example, the % of biofuel that the vehicle quoted can use) and gain an overview of the market situation that can be used when preparing future tenders.

<table>
<thead>
<tr>
<th>Table 1. THERMAL CARS AND NON-PLUG-IN HYBRIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PURPOSE OF THE CONTRACT</strong></td>
</tr>
<tr>
<td>Procurement of [define the vehicle with its environmental features, following the recommendations given in section 4.1] with low emission and consumption levels.</td>
</tr>
<tr>
<td><strong>ENVIRONMENTAL CRITERIA TO BE INCLUDED IN THE TECHNICAL SPECIFICATIONS</strong></td>
</tr>
<tr>
<td>Criterion</td>
</tr>
<tr>
<td>The M1 and N1 class I vehicles must comply with the pollutant gas emission levels given in the <strong>EURO 6</strong> standard</td>
</tr>
</tbody>
</table>
The N1 class II and III vehicles [until the date when they are aligned with the rest of the class*] must comply with the pollutant gas emission levels given in the **EURO 5** standard.

- The vehicles’ CO$_2$ emissions must not exceed [see Table 6.1. reference values] $g/km$
- The vehicles’ fuel consumption must not exceed [see Table 6.1. reference values] l/100 km.
- [As an alternative to consumption as such] The vehicles must have been given an energy efficiency classification of at least C.

<table>
<thead>
<tr>
<th>ENVIRONMENTAL CRITERIA TO BE INCLUDED AS AWARD CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic criterion</strong></td>
</tr>
<tr>
<td>[For N1 class II and III vehicles, until the date when they are aligned with the rest of the class*] Have lower pollutant gas emission levels, corresponding to the <strong>Euro 6</strong> standard.</td>
</tr>
<tr>
<td>Have lower CO$_2$ emissions (g CO$_2$/km).</td>
</tr>
<tr>
<td>Have lower fuel consumption levels.</td>
</tr>
<tr>
<td>[As an alternative to consumption as such] Have a higher energy efficiency (B/A).</td>
</tr>
</tbody>
</table>

*See glossary: Categories of 4-wheel vehicles and vehicle regulations concerning the limitation of pollutant emissions.

Other criteria

Technical improvements that can also be included as award criteria are described in section 4.2.a., for example: have a start-stop mechanism, be fitted with high fuel efficiency and/or low-noise tyres, etc.

The points awarded in the evaluation of lower emission or consumption levels must be clearly indicated in the administrative clauses (for example, in table format) so that the tenderers can align their quotations more closely to the evaluation and also so that the contracting authorities can perform the evaluation correctly.
Table 2. ELECTRIC CARS AND PLUG-IN HYBRIDS

PURPOSE OF THE CONTRACT
Procurement of [define the type of electric vehicle].

ENVIRONMENTAL CRITERIA TO BE INCLUDED IN THE MINIMUM TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Means of accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vehicles must have an electricity consumption not exceeding [see Table 6.2, reference values] Wh/km.</td>
<td>Vehicle data card stating this or Movele Catalogue data card.</td>
</tr>
<tr>
<td>Have a standardised range [between __ and __ see Table 6.2, reference values] km.</td>
<td>Vehicle data card stating this or Movele Catalogue data card.</td>
</tr>
<tr>
<td>Be fitted with batteries having a minimum service life of 2 years or 1,000 charge cycles.</td>
<td>Documentation of the vehicle's battery or warranty of the battery offered by the tenderer.</td>
</tr>
</tbody>
</table>

ENVIRONMENTAL CRITERIA TO BE INCLUDED AS AWARD CRITERIA

<table>
<thead>
<tr>
<th>Basic criterion</th>
<th>Means of accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have lower electricity consumption levels.</td>
<td>Vehicle data card stating this or Movele Catalogue data card.</td>
</tr>
<tr>
<td>Furnish a guarantee that the battery's charging capacity will be a minimum of 70% (or greater) after 100,000 km or 5 years.</td>
<td>Documentation of the vehicle's battery or warranty of the battery offered by the tenderer.</td>
</tr>
<tr>
<td>Be equipped with a regenerative braking system*.</td>
<td>The vehicle's technical documentation.</td>
</tr>
<tr>
<td>Be equipped with an energy efficiency indicator*.</td>
<td>The vehicle's technical documentation.</td>
</tr>
</tbody>
</table>

* These two criteria will become considered technical features in the vehicle's description as more and more models that include it become available.

Other criteria

Technical improvements that can also be included as award criteria are described in section 4.2.a.

Table 3. THERMAL MOTORCYCLES

PURPOSE OF THE CONTRACT
Procurement of [define the type of motorcycle] with low emission levels.

ENVIRONMENTAL CRITERIA TO BE INCLUDED AS AWARD CRITERIA

<table>
<thead>
<tr>
<th>Basic criterion</th>
<th>Means of accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comply with the pollutant gas emission levels stipulated in the Euro 4 standard.</td>
<td>The vehicle's technical documentation or type-approval certificate.</td>
</tr>
</tbody>
</table>

[The requirement level will be adapted to technical progress, establishing Euro 4 as the technical specification and the higher standards as award criterion. See glossary]

Other criteria

Technical improvements that can also be included as award criteria are described in section 4.2.a.

Table 4. ELECTRIC MOTORCYCLES

PURPOSE OF THE CONTRACT
Procurement of [define the type of electric motorcycle].

### ENVIRONMENTAL CRITERIA TO BE INCLUDED IN THE MINIMUM TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Means of accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The vehicles must have an electricity consumption of [see Table 6.2. reference values] Wh/km.</td>
<td>Vehicle data card stating this or Movele Catalogue data card.</td>
</tr>
<tr>
<td>Have a standardised range [between __ and __ see Table 6.2. reference values] km.</td>
<td>Vehicle data card stating this or Movele Catalogue data card.</td>
</tr>
<tr>
<td>Be fitted with batteries having a minimum service life of 2 years or 1,000 charge cycles.</td>
<td>Documentation of the vehicle's battery or warranty of the battery offered by the tenderer.</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL CRITERIA TO BE INCLUDED AS AWARD CRITERIA

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Means of accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnish a guarantee that the battery’s charging capacity will be a minimum of 70% (or greater) after 100,000 km or 5 years.</td>
<td>Documentation of the vehicle's battery or warranty of the battery offered by the tenderer.</td>
</tr>
</tbody>
</table>

### Table 5. VEHICLE MAINTENANCE *

<table>
<thead>
<tr>
<th>PURPOSE OF THE CONTRACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle supply contract [define the type of contract: renting/leasing] including criteria and environmentally friendly management tasks.</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL CRITERIA TO BE INCLUDED AS AWARD CRITERIA

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Means of accreditation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use engine oils with a high % of recycled or second refined oils. [The scoring could be done by % of recycled oil.]</td>
<td>Identifying data of the workshop where the vehicle maintenance will be performed + List with reference no. of the oils and % recycled or second refined.</td>
</tr>
<tr>
<td>Use high fuel-efficiency tyres, minimum classification:</td>
<td>Accredit by means of the tyre's mandatory label.</td>
</tr>
<tr>
<td>- B, for cars.</td>
<td></td>
</tr>
<tr>
<td>- C, for vans and all-terrain vehicles. [The scoring could be done by tyre classes C/B/A.]</td>
<td></td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL CRITERIA TO BE INCLUDED AS SPECIAL CONDITIONS FOR CONCLUSION OF THE CONTRACT

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Verification</th>
</tr>
</thead>
<tbody>
<tr>
<td>The workshops performing maintenance of the vehicle must guarantee correct waste management during performance of the contract:</td>
<td>The company must submit the records proving conformance, in accordance with their waste management system.</td>
</tr>
<tr>
<td>- Hazardous, which includes separation at source, placing in a suitable container, adequate storage and delivery to a waste management centre, pursuant to current legislation.</td>
<td></td>
</tr>
<tr>
<td>- Non-hazardous, pursuant to current legislation.</td>
<td></td>
</tr>
<tr>
<td>The workshops performing maintenance of the vehicle must guarantee correct management of atmospheric emissions during performance of the contract, particularly with respect to combustion gases from the engines,</td>
<td>Gas analysis records or sworn statement by the workshop.</td>
</tr>
</tbody>
</table>
volatile organic compounds (in the painting operations) and dust.

The workshops performing maintenance of the vehicle must guarantee, during performance of the contract, that process wastewater will not be mixed with sanitary water and also that the former will be discharged with a hydrocarbon content of less than 5 ppm.

Discharge analysis records or sworn statement by the workshop.

If the workshop that will carry out the vehicle maintenance has the Emblem of Guarantee of Environmental Quality for workshops, furnishing the Emblem will be sufficient to accredit all the above performance criteria.

* The desirability of including these criteria will depend on the extent to which it is planned to carry out the maintenance in certain workshops. It is common for workshops to not meet these criteria at the time of making the tender. Consequently, the only way to apply the criteria would be to accept a letter of intent by the company and then check fulfilment by the company awarded the contract.

### Table 6. REFERENCE VALUES FOR CONSUMPTION AND CO₂ EMISSIONS

#### Table 6.1. REFERENCE VALUES FOR THERMAL 4-WHEEL VEHICLES

<table>
<thead>
<tr>
<th>Vehicle types by market segment (1,2)</th>
<th>Consumption 1/100 km</th>
<th>CO₂ emissions in g/km</th>
<th>Consumption 1/100 km</th>
<th>CO₂ emissions in g/km</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>petrol</td>
<td>diesel</td>
<td>petrol</td>
<td>diesel</td>
</tr>
<tr>
<td>- Mini</td>
<td>5.1</td>
<td>120</td>
<td>4</td>
<td>105</td>
</tr>
<tr>
<td>- Small</td>
<td>5.5</td>
<td>130</td>
<td>4</td>
<td>105</td>
</tr>
<tr>
<td>- Mid-size sedan or station wagon</td>
<td>6.6</td>
<td>155</td>
<td>6</td>
<td>160</td>
</tr>
<tr>
<td>- Large sedan or station wagon</td>
<td>7.5</td>
<td>175</td>
<td>6.2</td>
<td>165</td>
</tr>
<tr>
<td>- Mid-size minivan</td>
<td>7</td>
<td>165</td>
<td>6</td>
<td>160</td>
</tr>
<tr>
<td>- Large minivan</td>
<td>7.6</td>
<td>180</td>
<td>7</td>
<td>180</td>
</tr>
<tr>
<td>- Luxury</td>
<td>10</td>
<td>235</td>
<td>7.2</td>
<td>195</td>
</tr>
<tr>
<td>- Small van</td>
<td>7.3</td>
<td>170</td>
<td>5.7</td>
<td>150</td>
</tr>
<tr>
<td>- Large van</td>
<td>11</td>
<td>250</td>
<td>8.5</td>
<td>225</td>
</tr>
<tr>
<td>- Small all-terrain</td>
<td>7.3</td>
<td>170</td>
<td>5.4</td>
<td>142</td>
</tr>
<tr>
<td>- Mid-size all-terrain</td>
<td>8</td>
<td>190</td>
<td>6.3</td>
<td>164</td>
</tr>
<tr>
<td>- Large all-terrain</td>
<td>10.5</td>
<td>245</td>
<td>7.6</td>
<td>200</td>
</tr>
</tbody>
</table>

Source: Ecolinstut Barcelona.

1. Hybrid vehicles: There are a small number of vehicles distributed among the different typologies. In all cases, they are an improvement on the values given both for consumption and for emission, with a minimum of 15% for low or high-powered vehicles and up to 40% for mid-size vehicles.

2. Vehicles with alternative fuels: There are a small number of vehicles distributed among the different typologies. Consumption varies compared with the tables (in the case of gases, also the units, kg/100 km), but being cleaner, the emissions per km are less, so that emission values are always less than those given.

The data are approximate and have been estimated from the CO₂ emissions listed in the IDAE’s car database (http://www.idae.es/coches).

In commercial terms, and in the IDAE database, the division between small, mid-size and large refers to the vehicle’s size, so there are small, high-powered vehicles. In order to establish the consumption and emission reference values, we have introduced a significant constraint: we use segments in which
size and power are related, roughly as follows:
- small: < 85 hp
- mid-size: 85-150 hp

Thus, the threshold reference values are not values that correspond to arithmetic means of the values listed for all cars included in a given market segment but values that are normally in the middle/bottom of each segment's energy efficiency class C.

If the tender is for a type of vehicle with special performance or power requirements, the values may not be suitable. In this case, it is recommended to go to the IDAE website and use the advanced search option to enter the specific requirements and readjust the values. It is also recommended to not oversize the power, especially in small and mid-size vehicles, and to specify lower power requirements that will enable the maximum values in the table to be lowered.

In line with the evolution of the vehicle market, and the vehicles' technical features, the database is updated each year with the data of the new commercial models. The Directorate-General for Environmental Quality will periodically review the table's data to keep it up-to-date.

Table 6.2. REFERENCE VALUES FOR ELECTRIC VEHICLES

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>Max. power kW/HP</th>
<th>Range km</th>
<th>Consumption Wh/km</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Motorcycle (moped)</td>
<td>3-7/4-9.5</td>
<td>60-120</td>
<td>30-50</td>
</tr>
<tr>
<td>- Motorcycle</td>
<td>8-11/10.4-14.4</td>
<td>70-140</td>
<td>40-60</td>
</tr>
<tr>
<td>- Passenger/goods quadricycles</td>
<td>~ 12/18</td>
<td>50-120</td>
<td></td>
</tr>
<tr>
<td>- Mini car</td>
<td>up to 15-55/20-75</td>
<td>130-145</td>
<td>90-150</td>
</tr>
<tr>
<td>- Small car</td>
<td>50-60/67-90</td>
<td>130-195</td>
<td>117-165</td>
</tr>
<tr>
<td>- Mid-size car</td>
<td>80-90/105-120</td>
<td>175-300</td>
<td>150-210</td>
</tr>
<tr>
<td>- Small van</td>
<td>10-30/14-45</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>- Mid-size van</td>
<td>45-60/60-80</td>
<td>170</td>
<td>155-177</td>
</tr>
<tr>
<td>- Large van</td>
<td>60-80/80-110</td>
<td>85-160</td>
<td></td>
</tr>
<tr>
<td>- Plug-in hybrid electric vehicle (PHEV)</td>
<td>96-150/130-200</td>
<td>(in electric mode) 25-50</td>
<td>62-130</td>
</tr>
<tr>
<td>- Range-extended electric vehicle (REEV)</td>
<td>100-125/150-170</td>
<td>(in electric mode) 80-170</td>
<td>115-130</td>
</tr>
</tbody>
</table>

The table gives the power range to show that, in general, pure electric vehicles (which are not PHEV or REEV) have lower power ranges than thermal vehicles (except for some exceptional cases). This is an aspect to be considered when replacing thermal vehicles with electric alternatives.

The range to be included in the tender specifications will be determined from the data available concerning km travelled per day. The vehicle's technical data give the range obtained in the standard-cycle type-approval, which is not the real range\(^{10}\). Therefore, the standardised range to be specified in the technical specifications must be between 25 and 50% higher than the actual range required.

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\(^{10}\) 2012 study performed by the Cetelem Automobile Observatory.
The data are approximate and have been obtained from the vehicle data sheets available in the Movele Catalogue (http://www.movele.es).

Unlike thermal vehicles, in this case, the values are purely for guidance and to acquaint procurement and contracting staff with these vehicles' features. They should not be taken or used rigidly as criteria: in a developing market and technology like this, establishing contracting criteria should serve to support it and not to hinder or prevent its development.
APPENDICES

4. APPENDICES

4.1 GUIDANCE FOR DIVERSIFYING PUBLIC OR PRIVATE CORPORATE Fleets TOWARDS LOW-EMISSION VEHICLES

4.2 OTHER GOOD PRACTICES FOR VEHICLE PROCUREMENT AND USE

4.3 CHECKLIST

4.4 GLOSSARY grouped by subjects
4.1 GUIDANCE FOR DIVERSIFYING PUBLIC OR PRIVATE CORPORATE FLEETS TOWARDS LOW-EMISSION VEHICLES

Even though normally diesel or petrol vehicles are bought or rented, they are not always the most suitable for all uses (neither from the economic or environmental viewpoints). Accordingly, this section provides guidelines and recommendations for the various agents involved in vehicle procurement decision-making to help them decide between:

- the various contracting options available for vehicles, and
- the different types of vehicle available, depending on the use that will be made of each one.

**What type of contracting is to be used?**

When considering the type of contracting, try to answer the following questions:
- Is it really necessary to own the vehicle?
- Are vehicles having different performance features needed on different days?
- Is the vehicle needed every day or is vehicle use less frequent?
- Are predominantly short trips made?

If short trips are made, vehicles with different features are required on different days, vehicle use is moderate and it is not necessary to own them, the first option to consider is a **car-sharing** contract.

On the other hand, if a more permanent, larger fleet is needed, the contractual options are the following:
- **leasing**, if you do not need to own the vehicles from the beginning,
- **purchase**, if you need to own the vehicle.

Renting and leasing contracts allow you to use the vehicle without having to make a large up-front investment and also include maintenance expenses and the vehicle's residual value. Expenditure is distributed more evenly over time and financial management is easier. Use of one or other form may be determined by instructions given by financial managers.

Purchase may make better sense for heavily used, highly customised vehicles with a high annual mileage (more than 150,000 km).

In the case of car-sharing, the environmental criteria to be included in the specifications will depend on the practices and materials to be used for the cars' maintenance by the company and, if it is wished to be stricter, the fleet's or the vehicles' environmental friendliness will also be evaluated when the contract includes the provision of vehicles. The assessment criteria may be those that have already been mentioned, namely, consumption, CO₂ emissions and Euro standard or even the diversity of vehicle types for different uses in terms of environmental quality, as explained further on.

For the other procurement options, the specific types of vehicle to be procured and each one's environmental criteria must be defined. Furthermore, in the renting or leasing contracts in which maintenance is carried out by the contracted company, criteria concerning these tasks' environmental quality could be added.
When defining vehicle types, you should attempt to diversify the fleet as much as possible, choosing the vehicles that are best suited for each need and have a lower environmental impact. The first step in this process is to assess the engine type required for each use.

- **The value of power**
  We have already mentioned in the considerations of Table 6.1 that one aspect that enables emission levels to be reduced is to have the right amount of power for the job.

When establishing the power requirements in the definition of each of the vehicle's technical features, it is very important to take into account the intended use. It is advisable to group separately the vehicles that have special uses (and therefore special requirements). This avoids ending up having a fleet with power ratings that are too high for the actual conditions of use.

As well as environmental advantages, this also has significant favourable economic implications:
- Lower-powered vehicles consume less so their running expenses are lower.
- In renting contracts, the monthly instalment varies depending on the power, so less power enables significant savings to be made.

- **What vehicle types should be chosen for the different uses?**
  When choosing the type of vehicle to be bought or rented, the people responsible for its use should consider the following issues:

  1. In what environment are most trips made (urban, interurban or mixed)?
  2. Is this environment located in or does it pass mostly through areas classified as special atmospheric environment protection areas (ZPE, see glossary)?
  3. Will the vehicle(s) be parked (both at their own facilities and when they travel 'outside') in places where they can be easily plugged in?
  4. With what frequency are the trips made and what is the availability, during the trips, of alternative fuel supply points?

Depending on the answers to each of these questions, the vehicle fleet can be diversified as follows (see glossary for the features of each vehicle type):

**100% electric vehicle**
- if the trips are made within urban areas and/or consist of short distances,
- the vehicle 'spends the night' in a place where there are charge points readily available, and
- when trips are made 'outside', it is mostly to places where the car can be plugged in.

The option of buying electric vehicles can be studied. To choose the model best matched to needs, see the Movele initiative's database of electric vehicles (http://www.movele.es/) and section 3 of this guide to define the environmental criteria applied to procurement/contracting.

**Extended-range electric vehicle (EREV)**
If pure electric vehicles are ruled out because:
- even though most of the trips are made in urban areas or special atmospheric environment protection areas (ZPE),
- from time to time, long interurban trips must be made, and
- it is not known whether parking facilities equipped with a charge point will be readily available in these trips.
The EREV\text{s are still fairly uncommon but it seems that they will grow rapidly. Consequently, it is
a market to be watched closely. They are also plug-in, so they meet the needs of the previous
case.

**Plug-in hybrid vehicle**
If the electric vehicle is ruled out but:
- most of the trips are made in metropolitan urban areas, special atmospheric environment
  protection areas (ZPE), and
- parking facilities equipped with a charge point are readily available.

The plug-in hybrid vehicles are a vehicle type that generates fewer emissions in these sensitive
environments and have low consumption levels, and while they are parked, the battery can be
charged by connecting to a charge point.

**Non-plug-in hybrid vehicle**
If the electric vehicle and the plug-in hybrid vehicle are ruled out because there are no parking
places equipped with a charge point but:
- most of the trips are made in metropolitan urban areas and special atmospheric environment
  protection areas (ZPE).

The vehicle type that generates the least amount of emissions in these environments is the
power-split hybrid vehicle, which uses the electric motor when running at low speeds (see
glossary).

**Gas vehicle (including bi-fuel)**
If electric and hybrid vehicles have been ruled out but:
- most of the trips are made in urban and/or special atmospheric environment protection areas
  (ZPE),
- normally the same routes are used, and
- along the way and/or in the immediate area, there are service stations that provide CNG or
  LPG.

The most suitable option are the gas vehicles. Among these, even though they are comparable in
terms of pollutant emissions, if we consider the CO\textsubscript{2} emissions, the environmental performance
of the natural gas vehicles is better so, if the supply possibilities allow, it is recommended to
choose vehicles with CNG.

**Petrol or flexi-fuel vehicle**
If the above options have been ruled out:
- because of difficulties in accessing CNG or LPG supply stations,
- but most of the trips are still made in urban and/or special atmospheric environment
  protection areas (ZPE).

The next option are the petrol or flexi-fuel vehicles, preferably if the same routes are repeated
and there are service stations along the way that supply bioethanol.

**Diesel or biodiesel vehicle**
If all the above options have been ruled out because mobility is mixed, or mostly interurban and in non-ZPE areas, there remains the option of diesel vehicles, which can also run on biodiesel if the same routes are repeated and there are service stations along the way that supply biodiesel.

The table below summarises the various options and the conditions for choosing a given vehicle. Apart from limited-range pure electric vehicles, the other vehicles are suitable for a range of situations. The table only indicates in which situation it is particularly important to consider the technological alternatives available:

<table>
<thead>
<tr>
<th>Environment</th>
<th>ZPE Protection Area</th>
<th>Possibility of Plugging in (On-Site/Off-Site)</th>
<th>Availability of Alternative Fuels</th>
<th>Recommended Vehicle Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban and/or short trips</td>
<td>Yes</td>
<td>Yes/Yes</td>
<td>n.a.</td>
<td>Electric vehicle</td>
</tr>
<tr>
<td>Urban and/or possibility of long trips</td>
<td>Yes</td>
<td>Better yes, but not important</td>
<td>n.a.</td>
<td>Extended range electric vehicle</td>
</tr>
<tr>
<td>Urban / Mixed</td>
<td>Yes</td>
<td>Yes/Not important</td>
<td>n.a.</td>
<td>Plug-in hybrid vehicle</td>
</tr>
<tr>
<td>Urban / Mixed</td>
<td>Yes</td>
<td>No/No</td>
<td>n.a.</td>
<td>Non-plug-in hybrid vehicle</td>
</tr>
<tr>
<td>Urban / Mixed</td>
<td>Yes</td>
<td>No/No</td>
<td>Yes</td>
<td>Bi-fuel gas vehicle, depending on availability, if possible CNG</td>
</tr>
<tr>
<td>Mostly urban</td>
<td>Yes</td>
<td>No/No</td>
<td>No/Yes</td>
<td>Petrol or flexi-fuel vehicle</td>
</tr>
<tr>
<td>Mixed or mostly interurban</td>
<td>No</td>
<td>No/No</td>
<td>No/Yes</td>
<td>Diesel or biodiesel vehicle</td>
</tr>
</tbody>
</table>

Although the charging/refuelling infrastructure for alternative fuel or electric vehicles is still limited, highly localised and it is difficult for the private user to find information, this type of vehicle is perfectly viable in captive fleets—public or private—and therefore, for new vehicles when it is possible to use these fleets' facilities.

Having chosen the engine type for the vehicles it is wished to purchase (always pursuing fleet diversification whenever possible), see section 3 with the criteria tables for each vehicle type and for the maintenance tasks, if they are included in the leasing contracts, to identify the environmental criteria to be included in the specifications or documents governing procurement procedures.

**Support actions within the framework of the Action Plan for Air Quality Improvement in Special Atmospheric Environment Protection Areas**

The plan addresses actions in 8 areas, the first of which is road transport and mobility. In this area, the plan proposes various goals and defines different types of actions to foster low-emission vehicles and energy diversification. As regards public procurement, the plan provides the following:

- **Green vehicle procurement:** The Government of Catalonia's ministries and public enterprises must include the environmental criteria defined in the guide for the green public procurement of vehicles in the tender documents for the procurement of vehicles.

As regards the option between vehicles that run on traditional fuels (diesel and petrol), it is provided that the contracting authorities will establish an order of priorities depending on the
type of trips to be made: when most of the trips are within urban areas, priority will be given to petrol; however, when most of the trips are interurban, priority will be given to diesel.

The plan also provides for a series of actions and objectives that are closely related with issues that are addressed in this guide, among others:

- Non-technological actions aimed at reducing the number of vehicles on the road, such as the BUS-HOV lanes or modulating the cost of certain tolls on the basis of vehicle occupancy and their pollutant gas emissions (see EcoviaT in the glossary).
- The objective is that by the year 2020, 70% of the new urban motorcycles and mopeds bought in the special protection areas will be electrically powered.

This latter aspect is an issue that should be taken very much into account when purchasing this type of vehicle for urban use, as motorcycles may be an important factor for air quality in the cities.\(^{11}\)

\(^{11}\) According to recent studies, motorcycles generate 10% of NOx emissions and up to 27% of particulate matter (PM) emissions in Barcelona, source: Barcelona Regional.
4.2 OTHER GOOD PRACTICES FOR VEHICLE PROCUREMENT AND USE

In section 4.1, guidelines were provided for deciding the most suitable vehicle types for each situation, from an environmental perspective and prior to preparing a tender, with the added aim of encouraging fleet diversification.

In section 3, the guide listed the environmental criteria to be included in tender documents depending on the vehicle type and whether or not maintenance tasks are included in renting or leasing contracts.

This section complements the guide's contents with a series of considerations pursuing a twofold purpose: on one hand, issues related with the vehicles themselves and the technological improvements that can be included in their equipment; on the other hand, considerations related with vehicle use and management. Both are considerations that either have an indirect influence on fuel consumption and contribute to decreasing pollutant emissions, or they are related with production and improve the vehicle's overall ecological balance sheet.

It should be remembered that electric or hybrid vehicles already represent in themselves a substantially greater improvement than any improvement that could be made to conventional vehicles.

Furthermore, electric or hybrid vehicles can include improvements that make them even more recommendable, some of which may be common to conventional vehicles, as they are not related to the engine type but to other components such as wheels or the electronics. In any case, and particularly in the case of electric vehicles, so that the inclusion of improvements does not hinder market development and deployment, they should be included in the tenders as optional (evaluable) criteria.

a. Considerations related with the vehicles themselves

The automotive industry is constantly evolving. Particularly with respect to environmental issues, there is a constant flow of technological improvements which, when integrated in the vehicle, enable reductions to be achieved in consumption, and therefore in emissions. When starting a procurement procedure for one or several vehicles, the possibility of including some of these improvements as award criteria should be assessed. This may help consolidate these technologies so that manufacturers see the need to routinely include them in an increasing number of models. It is particularly important to do this in thermal vehicles.

Some of the improvements currently available are the following:

- **Automatic tyre-pressure monitoring system (TPMS):** monitoring the tyre pressure helps drivers ensure adequate maintenance of their vehicle's wheel rims, improves the vehicle's road safety and helps improve fuel performance.

- **High fuel-efficiency tyres** (class C or higher in the tyre labelling regulation, see glossary): these tyres have a low rolling coefficient, which reduces heat and friction-induced energy losses and, consequently, also reduces the fuel consumption required to move the vehicle. The European Commission has estimated that the difference may amount to up to 9% of total fuel consumption. According to the tyre manufacturers themselves\(^\text{12}\), improving the tyre class reduces fuel consumption between 2.5 and 4.5% and can be up to 7.5%.
- **Automatic gear shift indicator system** (for thermal and hybrid vehicles): this system may enable more efficient driving, thereby reducing the associated CO₂ emissions, which can be further improved by applying eco-driving practices.

- **Efficiency indicator** (for electric vehicles): It is the equivalent to the previous system for thermal vehicles, as electric vehicles do not have gears. The indicator is very precise and improves management of the energy that is still stored in the batteries and increases the remaining range. It is a common feature in electric vehicles.

- **Start-stop system** (for thermal vehicles): this is an electrically managed system that turns off the engine when the vehicle is stopped and starts it again quickly and silently when we want to move again. Depending on the manufacturer, the driver controls the system with the brake pedal or with the clutch. Thus, the car reduces its fuel consumption to 0 while it is stopped and, according to manufacturer data¹², total consumption is reduced between 5-10% depending on the circumstances of use. In power-split hybrid vehicles, this happens whenever the vehicle starts with the electric motor, provided there is sufficient charge in the battery.

- **Catalytic converters or filters added to the standard equipment** (for thermal vehicles): the industry also develops devices that, while not included as standard equipment in the vehicles, can be retrofitted to reduce pollutant emissions from the engine. This is an aspect to be considered particularly in high-power vehicles.

- **Regenerative braking**: this is a mechanism that enables part of the energy generated during braking to be recovered to partially charge the battery, increasing the energy stored and the vehicle's efficiency.

All of these improvements lead to reductions in energy consumption or the resulting emissions. This is the main goal of this guide but, as was pointed out in the introduction, vehicles have other environmental impacts that are by no means insignificant and which can also be considered in the procurement procedure to favour those manufacturers that have included technological improvements in production.

In response to the need to establish prevention measures, as provided in Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles, some manufacturers have implemented measures in the design and production procedure that improve the vehicles' environmental balance sheet. Specifically, the following can be considered, for example:

- **Surface treatments and paints**: in particular, the use of paints that do not contain heavy metals such as lead, chromium VI or cadmium could be assessed as an improvement in production, and therefore in the vehicle's acquisition, and also later in its maintenance.

¹² Data given in various manufacturers' websites.
• **Recycled materials**: in particular, everything related with the vehicle’s plastic components. By this means, the automotive industry contributes to improving plastic waste management.

• **Low global-warming-potential refrigerant gases in the air conditioning**: the global warming potential (GWP) is a parameter that defines the integrated warming effect over time produced today by an instant release of 1 kg of a greenhouse gas, compared with that caused by CO$_2$. As this potential can be tens or even thousands of times greater$^{13}$, it can be specified that the air conditioning system must use a gas having a low GWP(100years)$<150$.

If a mixture of gases is used, the GWP is calculated using the following formula:

$$GWP = \sum (\% X * GWP_x) + (\% I * GWP_y) + .. (\% N * GWP_n).$$

### b. Considerations related with use and management of the vehicles

This section covers other aspects that are not related with the vehicles as such, but with their use and management. They are aspects, therefore, that are not included in the vehicles' technical specifications but which may be important when managing the fleet or when there are third-party contracts related with the fleet.

• **Environmental improvements in management and maintenance**: good environmental practices can be included at two levels:
  - in the management of the vehicle fleets, and
  - in the workshops and vehicle maintenance facilities.

The Government of Catalonia offers efficient fleet management courses, including for small light vehicle fleets. The goals are to foster efficient fuel management and adequate route planning and improve energy efficiency$^{14}$.

The integration of new technologies in management is an improvement element that may bring significant environmental benefits. With the development of new, more affordable systems that companies can easily manage, they will become increasingly commonplace. The following should be considered:

- Telematic fleet location and management systems.
- Telediagnostics systems for vehicle maintenance management.

If it is necessary to manage a fleet of electric vehicles (especially large fleets), it is important to have a smart charging and monitoring system to always enable normal/night-time charging and avoid fast charging, which is much less efficient and should only be considered as a resource for exceptional situations.

A number of basic environmental specifications about maintenance have been added to the criteria tables in section 3 as special performance conditions. The Government of Catalonia has developed criteria for granting the Emblem of Guarantee of Environmental Quality for 'Vehicle workshops’ that include a series of good practices that must be implemented. It is also studying a new category, 'Vehicle fleets'$^{15}$.

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$^{13}$ More information about the GWP of different gases at: [http://www.grida.no/climate/ipcc_tar/wg1/248.htm](http://www.grida.no/climate/ipcc_tar/wg1/248.htm)

$^{14}$ For further information: Energy and transport: Vehicle fleet management courses, ICAEN. Government of Catalonia

$^{15}$ For further information: Directorate-General for Environmental Quality, or visit the Ministry of Territory and Sustainability website: [http://mediambient.gencat.ca/05_ambits_dactuacio/](http://mediambient.gencat.ca/05_ambits_dactuacio/), section Medi ambient i sostenibilitat
Various authorities, and also services companies, have implemented **environmental management systems** (EMS) in their offices and departments. Even with small service vehicle fleets, both the fleet and the maintenance facilities and workshops are areas to be included in the EMS.

Irrespective of whether or not an EMS has been put in place, a basic aspect for good management is to have **indicators for monitoring environmental indicators** that, under currently used protocols, keep track of the annual consumption of fuel, engine oils, etc.

Washing is also related with vehicle maintenance. This should be done in **car wash facilities with low water consumption**, that can use pressurised steam systems and which have water recovery systems.

- **Guarantees concerning the batteries** (for electric vehicles). Perhaps more than battery durability, one of the aspects that generates most uncertainty when buying electric vehicles is the risk of sudden drainage during a trip.

  For greater security, inclusion of a technical support insurance policy covering battery drainage should be considered explicitly, particularly in the event of purchase, as this is normally included in the technical support provided in renting contracts (although this should be confirmed).

  On the other hand, some suppliers and market operators offer the option of specific renting contracts for batteries, as a contract that is separate from purchase. This type of contract is interesting insofar as the battery is possibly the component in this type of vehicle where most significant progress is expected.

- **Eco-driving**: Efficient driving can reduce fuel consumption by up to 20%. It is advisable that the people who must regularly use corporate vehicles take an eco-driving course as part of their training. This can be done in-house, using the large amount of information available,\(^\text{16}\) or one can sign up for courses organised by the Government of Catalonia in partnership with driving schools and training centres\(^\text{17}\).

  Furthermore, it must be remembered that in most situations, applying the rules for efficient driving helps increase road safety, so taking the courses offers a twofold benefit.

- **Offsetting emissions**: Having included all the environmental criteria in the procurement process and applied all possible environmental improvement measures, we can still take one last measure to offset the CO\(_2\) emissions generated by corporate vehicles.

  If the vehicles are leased through a renting or leasing contract, it could be stipulated as one of the award criteria, or even as a special performance condition, that the contracted company have a programme that enables the tender organiser, as customer, to offset annually the CO\(_2\) emissions by the vehicle fleet that is the subject of the contract.

  In any case, it should be known that the Catalan Office for Climate Change (OCCC) has a Voluntary Agreements programme in which a methodology and certain criteria are defined and tools are provided for calculating, monitoring and implementing measures that help

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(Enterprise and sustainable production / Ecoproducts and ecoservices).

\(^\text{16}\) Among others, you can use the manual: *Conducció Eficient, per conductors de turismes* [Efficient Driving, for car drivers], ICAEN/IDAE, 2009.

\(^\text{17}\) For further information: Energy and transport: Efficient driving courses. ICAEN. Government of Catalonia
reduce emissions. It is therefore recommendable that the offset programme used by the tenderer complies with the OCCC’s GHG emissions offset criteria 18.

- **Review of supply contracts:** In the case of owned vehicles, certain aspects related with the energy supply for these vehicles must be guaranteed:
  - In fuel supply contracts: in order to move toward a fleet diversification policy, measures must be taken to ensure supply of all types of fuel. Thus, the possibility must be included in the supply contract of either actually receiving or guaranteeing supply, if requested, of alternative fuels: LPG, CNG and/or biofuels.
  - In electricity supply contracts: when the corporate fleet has electric vehicles that are charged at charge points located in its own facilities, it is important to guarantee that the electricity comes from renewable energy sources. There are two strategies for this: one is to review the general electricity supply contract and include in the next tender an estimate of the % of renewable energy provided by the supplying company. The other possibility is to draw up a specific contract for supplying the vehicle charge points, establishing that all the electricity must come from renewable sources.

- **Management of old vehicles:** when the vehicles are purchased or the right to purchase is exercised at the end of a lease contract, the vehicles become the property of the buyer and it will be the buyer's responsibility to adequately manage the disposal process. In many cases, after a few years' use, the vehicles lose so much market value that the resale option is not worth using. In this case, the vehicles must be handled correctly, as provided in the End-of-life Vehicles regulations 19, and it must be ensured that the vehicle is taken to a duly authorised waste manager.

All of the above aspects refer to the situation in which it is necessary to have and use vehicles. But whenever possible, vehicle use should be avoided for very short trips. And for long trips to specific locations, there are also organised car-pooling systems (see glossary) that offer services on the Internet and allow seats to be booked via the website. Fostering carpooling is also a measure described in the Employment Improving Air Quality 2011-2015, which also includes the new toll tariffing system with discounts for high-occupancy vehicles (HOV). Likewise, the Bus-HOV lanes allow vehicles with a minimum number of occupants on fast access lanes.

Some aspects, such as training in efficient driving, car-sharing or carpooling, can be included and specified in the company's mobility plan.

4.3 CHECKLIST

It is important that the government be able to evaluate the good practices that have been implemented and identify those points where action is required to improve the environmental quality of the vehicles that have been acquired. A list of questions is given below to help determine to what degree environmentally responsible practices have been implemented. The items in the checklist that are not answered indicate the need to look for alternatives in order to achieve improvement in that specific area.

### DEGREE OF IMPLEMENTATION OF ENVIRONMENTAL ASPECTS

<table>
<thead>
<tr>
<th>Compulsory criteria</th>
<th>Yes</th>
<th>No</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>[For thermal cars and non-plug-in hybrids] The vehicles comply with the pollutant gas emission levels of the Euro 6 standard (5).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For thermal cars and non-plug-in hybrids] The vehicles have CO₂ emissions below the maximum stipulated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For thermal cars and non-plug-in hybrids] The vehicles have a fuel consumption below the maximum stipulated or energy class C.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For electric vehicles] The vehicles have the required level of electricity consumption.</td>
<td></td>
<td></td>
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<tr>
<td>[For electric vehicles] The vehicles have the required distance range.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>[For electric vehicles] The vehicle's batteries have the required warranty or minimum service life.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessable criteria</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>[For NI class II and III thermal cars and non-plug-in hybrids] The vehicles comply with the emission levels of the Euro 6 standard.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For thermal cars and non-plug-in hybrids] The vehicles have lower CO₂ emission levels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For thermal cars and non-plug-in hybrids] The vehicles have lower fuel consumptions or a higher energy class.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For thermal motorcycles] The vehicles comply with the pollutant gas emission levels of the Euro 4 standard.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For electric vehicles] The vehicles are equipped with batteries with a charging capacity maintenance guarantee of 70% (100,000 km or 5 years).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For electric cars] The vehicles are equipped with a regenerative braking system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[For electric cars] The vehicles are equipped with an energy efficiency indicator.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other assessable criteria for thermal cars, according to section 4.2 (examples)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The vehicles are equipped with gear shift indicators (cars, vans, all-terrain vehicles, motorcycles).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The vehicles are equipped with an automatic tyre-pressure monitoring system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The vehicles are equipped with a start-stop device.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 GLOSSARY

This section identifies a series of terms whose understanding will improve the greening of vehicle supply:

- **Vehicle lease and use typology**
  - Rental: a contract by which one of the parties, the lessor, undertakes to convey use of the good to the other party, the lessee, in exchange for payment of a given price. In the case of vehicles, rental can be used for sporadic cases, but when regular use is planned, one of the financial leasing formulas is used: renting or leasing, if it is wished to exercise the right of purchase.
  - Leasing: a contract by which the lessor (the leasing company) conveys the right to use a good in exchange for payment of a (normally) monthly instalment during a particular period. In addition to the right of use, the contract may also include the provision of certain additional services such as maintenance and insurance of the good. At the end of the contract period, the lessee has the option of purchasing the leased good by paying a given price, returning it or renewing the contract.
  - Renting: a rental contract for a certain type of good, normally one that depreciates at a high rate, in exchange for a monthly instalment for the established period, which can also include a series of services such as insurance, maintenance and repairs, wheel changes, road tax payments, a replacement vehicle, etc.
  - Car-sharing: a car rental model based on the user community. In order to have the right of use, it is first necessary to register with the service, paying a deposit and an annual instalment. From then on, the user will pay a fee for each use. Unlike the other schemes, in this case there is no exclusive right of use but rather it is shared. However, the user can choose from different types of vehicle depending on use requirements. The car-sharing may be organised by a company or by a group of users who have formed a democratically run association. The organisation takes care of managing the service and also maintenance, insurance for the vehicles and, normally, also of contracting a breakdown service.
  - Carpooling: this is not a type of lease but a practice: sharing a vehicle between two or more people to make the same trip, often to commute to work. Generally speaking, all the participants are owners of a vehicle and alternate use of the vehicle among them to save travel expenses. They are often motivated by the wish to help reduce traffic congestion and, indirectly, to reduce air pollution.

- **Atmospheric pollutants**

  Atmospheric pollutant is a term that refers, on one hand, to those substances that are not part of the atmosphere and also to those that are part of the atmosphere but are present at concentrations higher than the natural concentrations.

  The most intensely studied pollutants are the following:
  - Particulate matter: depending on the size, settleable (> 30 µm), suspended (< 30 µm), respirable (< 10 µm), or fumes (< 1 µm).
  - Sulphur compounds: SO₂, H₂S, H₂SO₄, mercaptans, sulphides
  - Nitrogen compounds: NO, NO₂, NOₓ, NH₃
  - Carbon compounds CO, CO₂, CH₄, HCT
  - Halogens and halogenated compounds: Cl₂, HCl, HF, CFC
- Photochemical oxidants: O₃, peroxides, aldehydes

The origin of these compounds is not always attributable to human activity. There are natural actions such as volcanic eruptions, sandstorms, etc., that, in certain meteorological circumstances, may cause atmospheric pollution in specific areas. However, as a general rule, when talking about atmospheric pollution, we are referring to anthropogenic sources. However, these substances can come from different sources. The table below lists the main sources for different substances:

<table>
<thead>
<tr>
<th>Principals fonts emissores antropogèniques</th>
<th>SO₂</th>
<th>NO₂</th>
<th>CO</th>
<th>H₂S COV's</th>
<th>HCl</th>
<th>Cl₂</th>
<th>PST</th>
<th>Pb</th>
<th>Altres metalls pesants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centrals tèrmiques</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<tr>
<td>Cimenteres</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td>x</td>
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<tr>
<td>Cremacions agrícoles</td>
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<tr>
<td>Depuradores d'aigües residuals</td>
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<td>x</td>
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<td>Extracció d'àrids i mineria</td>
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<td>Fàbriques de ceràmica</td>
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<td>Fàbriques de vidre</td>
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<tr>
<td>Fabricació de pintures</td>
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<tr>
<td>Fabricació de pasta de paper</td>
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<td>Foneries</td>
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<tr>
<td>Incineradores</td>
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<tr>
<td>Indústria de Curtits</td>
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<tr>
<td>Indústria química</td>
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<tr>
<td>Indústria que utilitza disolvents</td>
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<td>Plantes asfàltiques</td>
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<td>Processos de combustió:</td>
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<td>● gas natural</td>
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<tr>
<td>● combustibles líquids i sòlids</td>
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<tr>
<td>Processos de molturació</td>
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<tr>
<td>Refineries</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Transport:</td>
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<td></td>
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<tr>
<td>● gasolina</td>
<td>x</td>
<td>x</td>
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<tr>
<td>● GLP</td>
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<td>x</td>
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<td>● GN</td>
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<tr>
<td>● Biodiesel</td>
<td>x</td>
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<tr>
<td>● Bioetanol</td>
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<td>x</td>
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</tr>
</tbody>
</table>


The table only shows the main sources of pollutant emission into the air and the most significant pollutants emitted, and does not include the existence of other emission sources and other pollutants emitted that are less significant.

As we can see, transportation is one of the main identified sources of atmospheric pollutants. Consequently, one of the main lines of action undertaken by the European Union has been to regulate vehicle emissions.

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20 For more information about other emission sources and their emission factors, see the EMEP/EEA air pollutant emission inventory guidebook, published by the European Environment Agency.
• Categories M and N of 4-wheel vehicles

Directive 2007/46/EC repeals previous directives and creates the new framework for the approval of motor vehicles and the trailers, systems and independent technical units intended for such vehicles. According to this Directive, and the subsequent amendments made by Regulation (EU) no. 678/2011, the vehicles included in this guide are classified in the following categories:

<table>
<thead>
<tr>
<th>Category M:</th>
<th>Motor vehicles with at least four wheels designed and constructed for the carriage of passengers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category M1:</td>
<td>Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat.</td>
</tr>
<tr>
<td>Category M2:</td>
<td>Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 tonnes.</td>
</tr>
<tr>
<td>Category M3:</td>
<td>Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass exceeding 5 tonnes.</td>
</tr>
<tr>
<td>Category N:</td>
<td>Motor vehicles with at least four wheels designed and constructed for the carriage of goods.</td>
</tr>
<tr>
<td>Category N1:</td>
<td>Vehicles designed and constructed for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes. (A distinction is made between classes I &lt; 1305 kg, II between 1305-1760 kg and III &gt;1760 kg.)</td>
</tr>
<tr>
<td>Category N2:</td>
<td>Vehicles designed and constructed for the carriage of goods and having a maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes.</td>
</tr>
<tr>
<td>Category N3:</td>
<td>Vehicles designed and constructed for the carriage of goods and having a maximum mass exceeding 12 tonnes.</td>
</tr>
</tbody>
</table>

• Category L of 2/3/4-wheel vehicles

This class encompasses a large variety of motor vehicles which are defined and classified in accordance with Directive 2002/24/EC and Regulation (EU) 168/2013 in the following categories and subcategories:

<table>
<thead>
<tr>
<th>L1e</th>
<th>Light two-wheel powered vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1e-A:</td>
<td>Powered cycle</td>
</tr>
<tr>
<td>L1e-B:</td>
<td>Two-wheel moped</td>
</tr>
<tr>
<td>L2e</td>
<td>Three-wheel moped</td>
</tr>
<tr>
<td>L3e</td>
<td>Two-wheel motorcycle</td>
</tr>
<tr>
<td>L4e</td>
<td>Two-wheel motorcycle with sidecar</td>
</tr>
<tr>
<td>L5e</td>
<td>Powered tricycle</td>
</tr>
<tr>
<td>L6e</td>
<td>Light quadricycle</td>
</tr>
<tr>
<td>L7e</td>
<td>Heavy quadricycle</td>
</tr>
</tbody>
</table>

In the case of 2-wheel vehicles, the Directive excludes what is considered to be 'cycles with pedal assistance' which it defines as those equipped with an auxiliary electric motor having a maximum continuous rated power of 0.25 kW, of which the output is progressively reduced and finally cut off as the vehicle reaches a speed of 25 km/h, or sooner, if the cyclist stops pedalling.

For higher-performing vehicles, it establishes the category called 'powered cycle' (L1eA) for vehicles with an auxiliary engine of power not exceeding 1 kW, above which we find the 'moped' (L1eB) as such with (among others things) a maximum net or rated power output not exceeding 4 kW.

In the case of 4-wheel vehicles, the Directive is applied to the 'quadricycles': 4-wheel vehicles with (among other things) a maximum design speed not more than 45 km/h, and an engine cylinder capacity not exceeding 50 cm³ or a maximum net engine power output not exceeding 4 kW (for the category L6e of light quadricycles) or a maximum net engine power not exceeding 15 kW (for the higher category L7e of heavy quadricycles).
Higher-performing vehicles belong to categories M or N and are regulated by the directive corresponding to them.

- **Special air quality protection areas (ZPE)**

Pursuant to Decree 226/2006, of 23 May, and the Government Agreement GOV/82/2012, 40 municipalities in the districts of El Baix Llobregat, El Vallès Occidental and El Vallès Oriental, have been declared special atmospheric environment protection areas for the pollutants NO\textsubscript{2} and PM10. These municipalities are:

Badalona, Barcelona, L' Hospitalet de Llobregat, Sant Adrià de Besòs, Santa Coloma de Gramenet, Castelldefels, Cornellà de Llobregat, Esplugues de Llobregat, Gavà, Molins de Rei, El Prat de Llobregat, Sant Feliu de Llobregat, Sant Joan Despí, Sant Just Desvern, Sant Vicenç dels Horts, Viladecans, Martorell, El Papiol, Pallejà, Sant Andreu de la Barca, Badia del Vallès, Barberà del Vallès, Castellbisbal, Cerdanyola del Vallès, Montcada i Reixac, Ripollet, Rubí, Sabadell, Sant Cugat del Vallès, Sant Quirze del Vallès, Santa Perpètua de Mogoda, Terrassa, Granollers, La Llagosta, Martorelles, Mollet del Vallès, Montmeló, Montornès del Vallès, Parets del Vallès, and Sant Fost de Campsentelles.

The primary objective of the Government of Catalonia’s Action Plan for Air Quality Improvement in Special Atmospheric Environment Protection Areas\textsuperscript{21} is to reduce these pollutant emissions to restore air quality and comply with the limit values currently required in European legislation.

- **Vehicle regulations limiting pollutant emissions**

European regulations on vehicle emissions date back to the 1970s. Since then, a body of regulations has been built up that regulates acceptable limits for combustion gas emissions by vehicles.

- **Euro standards (categories M and N):** The Euro standard was introduced in 1992 as a compulsory emissions standard for new 4-wheel vehicles (see the 4-wheel vehicles categories) sold in the Member States of the European Union. These standards are reviewed and redefined in a series of progressively implemented directives and regulations that establish increasingly restrictive limit values. At present, emissions of nitrogen oxides (NO\textsubscript{x}), hydrocarbons (CH), carbon monoxide (CO) and particulate matter are regulated for most vehicle types (cars, lorries, trains, tractors and similar machines, and barges). Different standards are applied for each vehicle type. Starting with Euro 2, the EU regulations enforce different emission limits for diesel and petrol vehicles. Diesel vehicles have stricter CO standards but they are allowed to have higher NO\textsubscript{x} emissions. Petrol vehicles are exempt from PM standards until Euro 4.

Regulation (EC) No. 715/2007 introduces the values of the Euro 5 and Euro 6 standards for cars and light commercial vehicles intended for the carriage of both passengers and goods and establishes the corresponding dates of enforcement. The standard was subsequently amended by Regulation (EC) No. 692/2008 and Regulation (EU) No. 459/2012:

- the **Euro 5** standard has been applied since 1 September 2009 for type-approval and since 1 January 2011 for registration and sale of new vehicle classes, although it was deferred until January 2013 for certain diesel vehicle classes;

- the **Euro 6** standard is applicable to M1 and N1 class 1 vehicles from 1 September 2014 for type-approval, and from 1 September 2015 for registration and sale of new

\textsuperscript{21} Through the Directorate-General for Environmental Quality, Ministry of Territory and Sustainability, which is the body responsible for evaluating air quality in Catalonia.
vehicle classes; in the case of N1 class II and III vehicles, it is expected to be applicable from 1 September 2015 for new type-approvals and from September 2016 for all vehicles.

The limit values for the different pollutants are given in the tables below. These values vary depending on whether they refer to vehicles with spark or positive ignition (PI) engines—petrol, bioethanol, CNG, LPG and petrol hybrids—or vehicles with compression ignition (CI) engines—diesel, biodiesel and diesel hybrids:

### Euro 5 emission limits

<table>
<thead>
<tr>
<th>Pollutants (unit)</th>
<th>M and N1 class I</th>
<th>N1 class II</th>
<th>N1 class III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PI</td>
<td>CI</td>
<td>PI</td>
</tr>
<tr>
<td>CO (g/km)</td>
<td>1.0</td>
<td>0.5</td>
<td>1.81</td>
</tr>
<tr>
<td>HCT (g/km)</td>
<td>0.1</td>
<td>-</td>
<td>0.13</td>
</tr>
<tr>
<td>HCNM (g/km)</td>
<td>0.068</td>
<td>-</td>
<td>0.09</td>
</tr>
<tr>
<td>NOx (g/km)</td>
<td>0.06</td>
<td>0.18</td>
<td>0.075</td>
</tr>
<tr>
<td>HCT+NOx (g/km)</td>
<td>-</td>
<td>0.23</td>
<td>-</td>
</tr>
<tr>
<td>PM * (mg/km)</td>
<td>5.0/4.5</td>
<td>5.0/4.5</td>
<td>5.0/4.5</td>
</tr>
<tr>
<td>NP * (#/km)</td>
<td>-</td>
<td>6x10^{11}</td>
<td>-</td>
</tr>
</tbody>
</table>

* for PI vehicles, it only applies to direct injection engines.

### Euro 6 emission limits

<table>
<thead>
<tr>
<th>Pollutants (unit)</th>
<th>M and N1 class I</th>
<th>N1 class II</th>
<th>N1 class III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PI</td>
<td>CI</td>
<td>PI</td>
</tr>
<tr>
<td>CO (g/km)</td>
<td>1.0</td>
<td>0.5</td>
<td>1.81</td>
</tr>
<tr>
<td>HCT (g/km)</td>
<td>0.1</td>
<td>-</td>
<td>0.13</td>
</tr>
<tr>
<td>HCNM (g/km)</td>
<td>0.068</td>
<td>-</td>
<td>0.09</td>
</tr>
<tr>
<td>NOx (g/km)</td>
<td>0.06</td>
<td>0.08</td>
<td>0.075</td>
</tr>
<tr>
<td>HCT+NOx (g/km)</td>
<td>-</td>
<td>0.17</td>
<td>-</td>
</tr>
<tr>
<td>PM * (mg/km)</td>
<td>4.5</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>NP * (#/km)</td>
<td>6x10^{11}</td>
<td>6x10^{11}</td>
<td>6x10^{11}</td>
</tr>
</tbody>
</table>

As well as complying with the limits established in the standard, manufacturers must assure the durability of the pollution control devices for a distance of 160,000 km and it must be possible to verify conformance during use after 5 years or the equivalent at 100,000 km.

- **Euro** standards (category L): Although Directive 2002/51/EC of the European Parliament and of the Council of 19 July 2002 on the reduction of the level of pollutant emissions from two- and three-wheel motor vehicles established emission limits for CO, CH and NOx for type-approval of these vehicles, subsequent regulation has not advanced at the same pace for the other vehicles.

Lastly, Regulation (EC) No. 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles establishes the **Euro 4 and Euro 5** standards, referred to L-category vehicles, with the following enforcement dates:

- The **Euro 4** standard will be applicable as of 1 January 2016.
- The **Euro 5** standard is expected to be applicable from 1 January 2020.

- **EEV** standard: This is the acronym for ‘enhanced environmentally friendly vehicle’. It is a term used in the European standards on emissions, referring to the categories over 3500 kg—heavy vehicles for the carriage of passengers and goods, including buses—to designate the vehicles with the strictest emissions standard.
It is used for vehicle categories that are not included in this guide and, therefore, it has not been included as a reference to environmental criteria.

- **Vehicle regulations: CO\(_2\) emissions**
  
  With the goal of reducing the contribution made by road transport to global warming, the EU has established standards that regulate the CO\(_2\) emissions that the vehicles marketed in the European area cannot exceed: Regulation (EC) No. 443/2009 setting CO\(_2\) emission performance standards for new passenger cars, and Regulation (EU) No. 510/2011 setting emission performance standards for new light commercial vehicles.
  
  The regulations impose limits on CO\(_2\) emissions by new vehicles with enforcement in two stages:
  
  - For passenger cars: 130 g of CO\(_2\)/km by 2015, and 95 g of CO\(_2\)/km applicable after 2020.
  - For vans: 175 g of CO\(_2\)/km by 2017, and 147 g of CO\(_2\)/km after 2020.

- **Car labelling regulations**
  
  Royal Decree 837/2002, of 2 August, regulating the information concerning fuel consumption and CO\(_2\) emissions by new passenger cars sold or made available for financial leasing in Spain, which incorporates Directive 1999/94/EC of the European Parliament and of the Council of 13 December 1999 relating to the availability of consumer information on fuel economy and CO\(_2\) emissions in respect of the marketing of new passenger cars, provides for two types of label:

  - The mandatory label: which must provide the consumer with information about the vehicle's fuel consumption and CO\(_2\) emission generation per kilometre in a visible place in each new car model. The label has an established format with predefined texts, complying with the requirements set forth in Annex I.1. of the Royal Decree.

  - The voluntary label: in addition to the fuel consumption and CO\(_2\) emission values, a comparative, weighted evaluation system is introduced which classifies all vehicles in terms of their energy efficiency, on a scale from A to G. The evaluation is made with respect to the average emissions among all vehicles marketed with the same surface area and fuel type. The cars that consume less fuel than the average are classified as A, B, C (green), and the cars that consume more than the average are classified as E, F and G (red). Class D cars (yellow) have average fuel consumption for their category. The label has an established format with predefined texts and colours, complying with the requirements set forth in Annex I.2. of the Royal Decree.

  All of the information about these labels, the data for each of the vehicles and comparisons for all the models sold on the Spanish market can be found at the IDAE website: www.idae.es/coches.

- **Tyre labelling regulations**
  
  With the enactment of Regulation (EC) 1222/2009 of the European Parliament and of the Council of 25 November 2009 (and subsequent amendments), as of 1 November 2012, tyres must be obligatorily labelled with information about 3 aspects:
- Fuel efficiency: ranked on a scale from A to G
- Wet grip performance: ranked on a scale from A to G
- External rolling noise: classified in 3 groups and declaring the noise levels in dB

A series of measures have also been established for progressively improving the tyres' energy efficiency, so that sale of tyres in the less efficient classes G and F is progressively phased out.

- **Alternative fuels**

The term ‘alternative fuels’ is used to refer to energy products that can replace conventional fuels in thermal engine (petrol or diesel) vehicles.

- **Gas fuels:** they offer the advantage over conventional fuels of a cleaner combustion with less pollutant emissions, particularly nitrogen oxides and particulate matter. For this reason, they are considered a particularly suitable alternative for vulnerable areas, such as city centres or, in general, large cities and their surroundings. They require modifications to the fuel tank and refuelling facilities. There are two types:
  - Compressed natural gas (CNG): it is used as an alternative fuel in adapted engines. This is a gas composed mostly of methane and normally of fossil origin. It is obtained from natural gas fields in the subsoil, although it has potential as a renewable source (see biogas).
  - Liquefied petroleum gas (LPG): it is a mixture of butane (max. 80%) and propane (min. 20%) which is used as an alternative fuel in petrol engines. Its name refers to its origin as a product of crude oil refining, although it can also come directly from natural gas fields.

- **Biofuels:** fuels produced from organic matter that can come from very diverse sources (agricultural products, different types of organic waste, algae, etc.). They offer a number of advantages over conventional fuels: first of all, they save fossil energy when they are used; also their very low sulphur content avoids emission of sulphur oxides during combustion, which are the main cause of acid rain; and lastly, in terms of CO₂, they are recirculated in a capture and release cycle that does not increase the gas's content in the atmosphere. They can be used as they are in adapted engines or in blends added to conventional fuels. The following are used:
  - Bioethanol: this is a plant-based alcohol that is produced from crops rich in sugar or starch, mostly beet, sugar cane or cereals. It has a consolidated use in petrol engines as an additive (ETBE) to replace lead. In blends up to 5%, it can be used in any vehicle, and up to 10% in most vehicles without any modifications being required, although in these cases, it is required by regulation that the fuel be labelled (e10). The manufacturers have developed adapted vehicles called FFV (flexible-fuel vehicles), which accept blends with up to 85% bioethanol.
  - Biodiesel: it is obtained from oil-bearing plants (rapeseed, soy, sunflower, palm, etc.) or from recycling used vegetable (not mineral) oils. It is used in diesel engines. In blends up to 5%, it can be used in any vehicle. At higher percentages, the fuel must be labelled and the blend must be stated (B10, B12, B20 and B30). Although several tests show that they can be used without problems at higher blends, manufacturers only accept B5 and often make the vehicle’s warranty conditional upon it. However, vehicles are now being marketed that specifically accept higher blends, which are
rated as B30. It can also be used pure as a fuel, B100, and a few lorry models and some farm machinery equipped with engines that accept Biodiesel 100 are now available.

- Biogas: it is obtained by methanizing organic matter obtained from different sources as a substitute in compressed natural gas (CNG) engines.

**Alternative technologies**

In the context of vehicles, we talk about alternative technologies to refer to engine types other than the internal combustion engine. Basically, we are talking about electric motors and the difference is in how they are powered.

- Electric vehicles: vehicles equipped with an electric motor supplied by batteries that are charged externally by connecting them to an external electricity supply. This electricity supply may take various forms, from the general mains supply to an exclusive charging network. When the battery is supplied either directly or indirectly by connecting to a network consisting solely of solar panels, they are called solar vehicles.

- Hybrid vehicles: a term for vehicles that can be run with two different energy sources and which is currently used to designate the vehicles that combine a conventional combustion engine (normally petrol, although it could be any other) with an electric motor. Depending on how the transmission of the traction to the wheels is configured, there are different options, from vehicles where the electric motor enhances the thermal engine during periods of peak power demand (non-power-split), vehicles where the engines can be alternated (the so-called power-split) and which can be run in electric mode (normally at low speeds) or in thermal mode, to vehicles where traction is exclusively electric and the thermal engine acts as an electricity generator in the event of a low battery charge (also called extended-range electric vehicles). In all cases, the electric motor is supplied by batteries, normally internally charged (from the combustion engine), although the manufacturers are working on plug-in hybrid vehicles which allow external battery charging from the mains supply.

- Hydrogen vehicle: a vehicle equipped with an electric motor and an electrochemical system to generate electricity (fuel cell), which uses the electrochemical reaction between hydrogen (used as fuel) and the oxygen present in the air. The hydrogen can be produced by dissociation of this element from several resources, which can be renewable (biomass or water) or non-renewable (fossil fuels).

**Live platform**

The Live (Logistics for Implementation of the Efficient Vehicle) platform is a public-private sector platform promoting electric and gas vehicles as an opportunity for transforming the Barcelona area and Catalonia into a world-class innovation hub in sustainable mobility.

**EcoviaT**

On 1 January 2012, the Government of Catalonia introduced a new discounts scheme on the toll motorways owned by it. One of the aspects included is EcoviaT, a discount to support low-polluting vehicles. The discount, amounting to 30%, is applied from Monday to Friday on vehicles considered authorised low-emission ecological vehicles and with an accreditation sticker on the windscreen, which are the following:

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- electric vehicles, LPG, natural gas, hydrogen: all
- diesel and biodiesel vehicles: CO$_2$ emissions below 108 g/km
- vehicles using petrol, bioethanol and the other fuels: CO$_2$ emissions below 120 g/km

The discount is applied automatically using the ViaT telepayment system, with prior registration required at the www.ecoviat.com portal.

Furthermore, accredited vehicles are also authorised to use the Bus-HOV lane on the C-58.

- **Ecoproducts and ecoservices**

Ecolabels are emblems whose purpose is to mark those products or services that meet 'environmental goodness' so that consumers can identify them and, therefore, improve their market positioning.

In many cases, ecolabelling processes are led, guided or sponsored by government agencies. These are the public ecolabels, which guarantee the criteria's objectiveness and implementation and maintenance of a verification process for the ecolabelled articles.

The Government of Catalonia has developed an ecolabel of its own, the Emblem of Guarantee of Environmental Quality, and is also the authorised body in Catalonia for the European Union Ecolabel$^{23}$.

Furthermore, with the free movement of goods within the EU, it is possible to find on the market and acquire ecolabelled products with other official European emblems.

There are all manner of ecolabelled products, and some of them are directly related with vehicles. The table below gives those that can be found under the most important official ecolabels:

<table>
<thead>
<tr>
<th><strong>Logo</strong></th>
<th><strong>Name of the ecolabel</strong></th>
<th><strong>Product /service category</strong></th>
</tr>
</thead>
</table>
| ![Emblem of Guarantee of Environmental Quality (Catalonia)](image) | Emblem of Guarantee of Environmental Quality (Catalonia) | - Regenerated base oils and products that contain them  
- Retreaded tyres  
- Vehicle workshops  
- Service stations and supply units  
- Vehicle pools  
- Vehicle fleets |
| ![Blue Angel (Germany)](image) | Blue Angel (Germany) | - Tyres  
In addition to categories for service vehicles and machinery. |
| ![Nordic Swan (Nordic Council of Ministers)](image) | Nordic Swan (Nordic Council of Ministers) | - Tyres  
- Biofuels  
- Vehicle-washing facilities  
As well as service machinery. |

$^{23}$ For further information: www.gencat.cat/mediamb/ecoetiquetes.
This guide has been endorsed by the Public Procurement Advisory Board at the plenary meeting held on 23 July 2015.

Countersigned

The Secretary

The President