

**Certification of dedicated gas buses as Low Carbon Emission  
Buses**  
**Guidance for bus manufacturers**

**1. What is a Low Carbon Emission Bus (LCEB) and what is the Bus Service Operators Grant (BSOG) LCEB incentive?**

A LCEB is a bus that is able to achieve the LCEB target for greenhouse gas (GHG) emissions, which is equivalent to a 30% reduction in its GHG emissions compared to the average Euro 3 diesel bus of the same total passenger capacity.

A vehicle will **not** qualify as a LCEB simply by using a fuel type which allows it to achieve a 30% reduction in its GHG emissions, unless the fuel it uses is 100% biogas.

Existing guidance outlines the definition of a LCEB and details the full testing procedure and is available on the DfT website at:

<http://www.dft.gov.uk/publications/certification-of-a-low-carbon-emission-bus/>

Since April 2009, bus operators have been able to claim the BSOG LCEB incentive of 6p per kilometre for all eligible kilometres operated. Any operator of a bus certified as a LCEB is eligible to claim the BSOG LCEB incentive.

**2. How are greenhouse gas (GHG) emissions for LCEB testing calculated?**

Total GHG emissions for a LCEB are calculated as the combination of a) the tank to wheel emissions and b) the well to tank emissions.

**a) Tank to wheel emissions**

The tank to wheel emissions and fuel consumption are measured by putting the bus through a whole vehicle test using the Millbrook London Transport Bus (MLTB) test cycle as outlined in the LCEB guidance.

The gas values of methane and nitrous oxide are converted to CO<sub>2</sub> equivalent and added to the CO<sub>2</sub> emissions to provide a CO<sub>2</sub> equivalent g/km figure.

**b) Well to tank emissions**

The fuel consumption measured during the MLTB test is used to calculate the CO<sub>2</sub> equivalent emissions of the vehicle on a well to tank basis, using the appropriate emission factor for the fuel intended to be used in service i.e. natural gas or biogas.

The well to tank emissions are determined using an appropriate analysis, such as that used in the CONCAWE study '*Well-to-Wheels analysis of future automotive fuels and powertrains*' which was developed by L-B-Systemtechnik GmbH. An alternative approach can be used subject to approval by the Department for Transport. The results are expressed in grams of carbon dioxide equivalent per MJ of fuel delivered. Knowing the fuel consumption of a vehicle in MJ/km, the well to tank CO<sub>2</sub> equivalent figure can be expressed in g/km.

### **c) Total greenhouse gas emissions – Well to wheel emissions**

The tank to wheel emission figure (a) is added to the well to tank emission figure (b) to give the total well to wheel emission (c) figure with CO<sub>2</sub> equivalent emissions expressed as CO<sub>2</sub> equivalent grams per kilometre.

This total well to wheel emissions figure is then assessed against the LCEB emission target, which is expressed as a function of total passenger capacity and is shown as:

$$\text{CO}_2 \text{ (well to wheel)} = 6.28 \times \text{total number of passengers} + 502$$

If the total well to wheel emissions figure for the bus is equal to, or less than, the LCEB emission target then the bus is awarded full LCEB status.

### **3. How does a dedicated gas bus become fully certified as a LCEB?**

Any bus operating on 100% biomethane will continue to be automatically eligible for the LCEB incentive. Operators will need to supply evidence of the biomethane purchased as part of their BSOG claim.

All dedicated gas buses will be granted **interim** LCEB status until 31<sup>st</sup> March 2013, regardless of the fuel on which they operate.

From 1<sup>st</sup> April 2013, in order for a dedicated gas bus to claim the BSOG LCEB incentive, it will have to have :

1. been awarded **full** LCEB status, based on it passing MLTB cycle testing using 100% methane. Where such a bus passes the test, an operator will be able to claim the LCEB incentive for **all** kilometres operated; or
2. been awarded **full** LCEB status, based on it passing MLTB cycle testing using a set proportion (less than 100%) of biomethane. In such cases, LCEB status is dependent on the bus being operated using **at least** the minimum proportion of biomethane used in the testing. This minimum proportion must be printed on the bus's LCEB certificate which must be submitted with the

- corresponding BSOG claim. In such situations, an operator will be able to claim the LCEB incentive for **all** kilometres operated and must supply evidence that biomethane has been purchased with the BSOG claim; or
3. not been awarded full LCEB status by passing MLTB cycle testing, but has been operated using at least the prescribed minimum level of 50% biomethane. In such situations, an operator will be able to claim the LCEB incentive for the proportion of kilometres operated using biomethane. Evidence of the biomethane purchased will need to be supplied with the BSOG claim.

In order to identify that a particular vehicle has been fully certified as a LCEB, the vehicle's manufacturer will need to issue the bus operator with a certificate confirming that the vehicle has passed the full LCEB testing procedure. At the time of submitting a BSOG claim, operators of dedicated gas buses should supply the relevant LCEB certificate(s), along with evidence of the methane/biomethane used to power the buses.

#### **4. When does interim LCEB status apply to a gas bus?**

Interim LCEB status only applies to gas buses operating on less than 100% biomethane. DfT will grant **interim** LCEB status to any dedicated gas bus until 31<sup>st</sup> March 2013.

From 1<sup>st</sup> April 2013, gas buses which have been awarded **interim** LCEB status may continue to claim the BSOG LCEB incentive if they are proven to be running on at least the minimum 50% proportion of biomethane compared to methane

#### **5. What does full and interim LCEB certification mean in terms of the BSOG LCEB incentive?**

Once a dedicated gas bus has passed **full** LCEB testing, manufacturers will be able to issue **full** LCEB certification and operators will be eligible to claim the BSOG incentive for **all** kilometres operated. The LCEB certificate will state the minimum proportion of biomethane at which LCEB status applies. If the proportion of biomethane in the claim is less than the minimum specified on the LCEB certificate then DfT will not pay the incentive for this claim period.

Where LCEB status is dependent on the bus being operated using the required minimum proportion of 50% biomethane - providing this minimum proportion has been met - the LCEB incentive will be payable for the proportion of kilometres operated by biomethane **only** – so a bus operating using 60% biomethane would attract the incentive for 60% of the kilometres operated in service.