



# **SRF Optimiser**

**Version: ESOS Format Report**

**User Guide – 2015**

*24 November 2015*

## SRF Optimiser – User Guide

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This tool models current and future greenhouse gas emissions (GHG) and their associated financial/energy implications for a company's road freight transport operation. These emissions can be reduced by the application of a range of technologies and management practices. A total of 29 carbon-reducing measures have been identified using existing research and company experience. By modelling the effects of these measures individually and in various combinations, the tool allows you to prioritise carbon-reducing measures and thus help you to develop a 'decarbonisation strategy' for road freight transport operations.

This version of the tool provides an **energy savings report to help with the requirements of the Energy Savings Opportunity Scheme (ESOS)**, which is a mandatory energy assessment scheme for organisations in the UK that meet the qualification criteria.

A step by step guidance on how to navigate across the tool is presented in this user guide. There are mainly four pages where a user can access/enter/change information:

- 1) **Members Login:** Create login profile
- 2) **Data Input:** Enter fleet profile
- 3) **Calculator:** Displays prioritised list of carbon-reducing measures with their associated carbon, fuel and energy savings
- 4) **Reporting:** Generates ESOS format report based on selected carbon-reducing measures

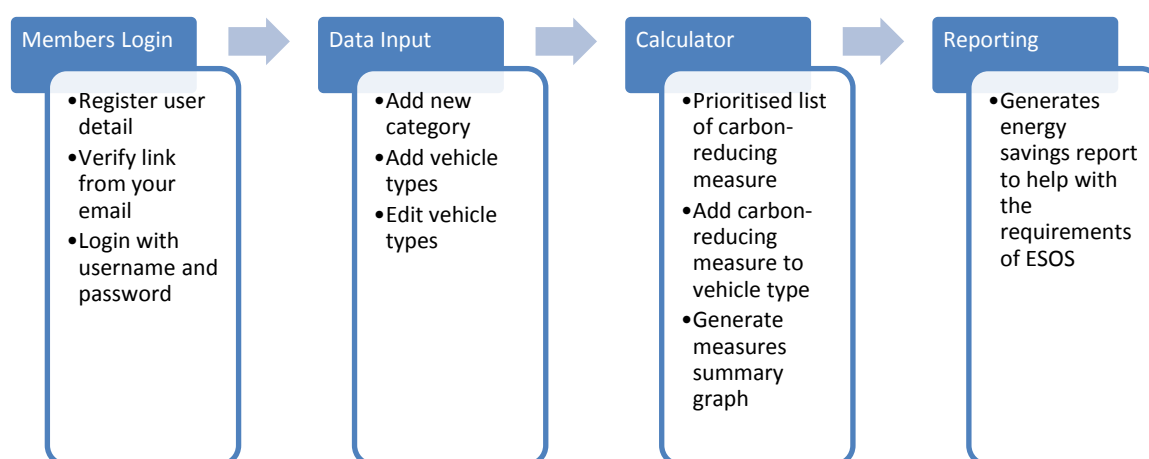


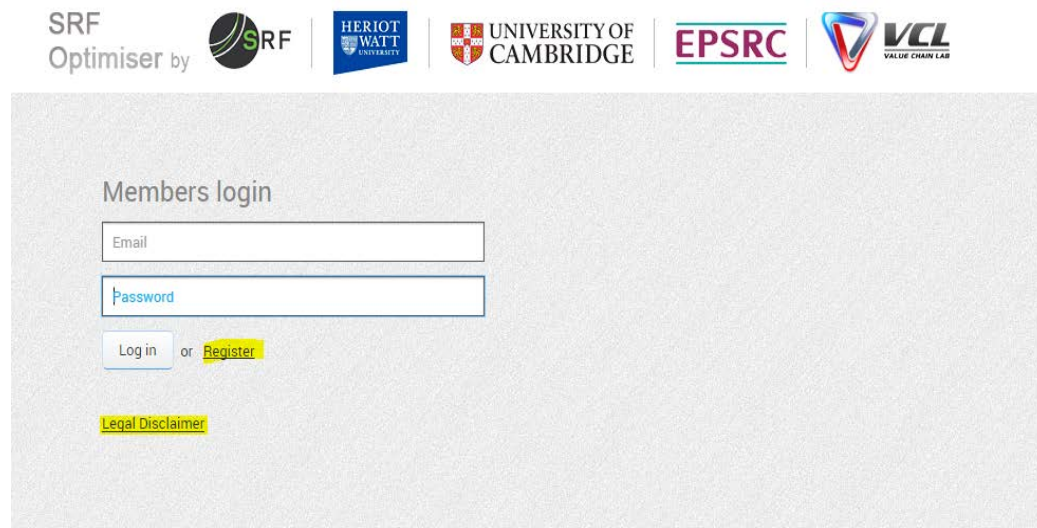
Figure 1: General steps






**Browser compatibility:** Google Chrome, Internet Explorer 10 or higher, Safari, Mozilla Firefox

## 1. Members Login:

A user can create their user profile on this page. Step by step guidance is given below:

1.1 Click on **'Register'** link (see Screenshot 1).



SRF Optimiser by  |  HERIOT WATT UNIVERSITY |  UNIVERSITY OF CAMBRIDGE |  EPSRC |  VCL VALUE CHAIN LAB

Members login

Email

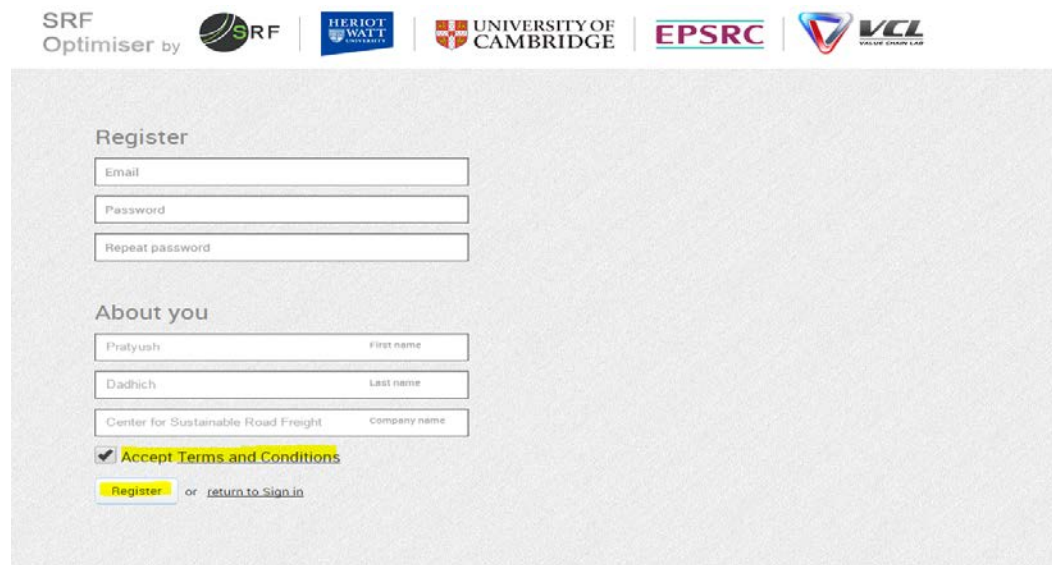
Password






or

[Legal Disclaimer](#)

Screenshot 1: User registration

1.2 Enter registration details (See Screenshot 2).



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Register

Email

Password

Repeat password

About you

Pratyush  First name

Dadhich  Last name

Center for Sustainable Road Freight  Company name

[Accept Terms and Conditions](#)

or [return to Sign in](#)

Screenshot 2: Register Page

1.3 Read **'Terms and Conditions'** by clicking on the link.

1.4 If you accept terms and conditions, click on checkbox **'Accept Terms and Conditions'**.

1.5 Click on **'Register'** button to receive a verification link on your email ID.

1.6 Verify user details by clicking on the link in your mail.

1.7 The web link will direct you to the 'Members Login' page.

1.8 Enter your email ID and password.

1.9 Click on **'Login'** button to access the SRF Optimiser tool.

## 2. Data Input

On successful members login, the tool will direct user to 'Data Input' page (see *Screenshot 3*). All the information entered in the SRF Optimiser tool will be saved automatically in this profile and can be accessed at any stage by logging in. The user can see their profile name on the top right of the screen. Also, a user can logout at any stage by clicking on 'Logout' link. Step by step guidance on how to enter data on this page is given below:

Screenshot 3: Data Input

**2.1 Fuel Cost Input** – This section provides default fuel cost values for Diesel (£ per litre), Bio diesel (£ per litre), Electric (£ per kWh), CNG (£ per Kg) and LNG (£ per Kg) from secondary sources. The values can be changed by clicking on the default cost provided.

**2.2 Macro Input** - Default discount factor (The percentage rate required to calculate the present value of a future cash flow) is provided from a secondary source, user can overwrite their values by clicking on default percentage. The other Macro Inputs - *Prioritisation, Period, Carbon targets, Fuel consumed, Total distance and Fuel economy* are currently disabled in this version.

**2.3 Add new category** – Clicking on 'Add new category' will allow users to give a name to their fleet. Naming a category helps in identifying the fleet. For example, a user can name fleets being operated from various depots in the country such as depot A

(Manchester), depot B (Livingston) and depot C (Milton Keynes). The name of the new category will appear on the 'Data Input' page. This name can be edited by clicking on 'pencil' mark or deleted by clicking on 'x' button. The number displayed before the category name shows the number of vehicle types in that category.

2.4 **Add vehicle type** – Under a category, user can add their fleet information by clicking on 'Add vehicle type' button. This will open a form on the right side of the screen to enter fleet profile. The user can specify the characteristics of the fleet in various ways. At the most aggregated level, the user can treat it as a single entity and enter only one row of values. If the fleet comprises one type of vehicle undertaking very similar delivery operations this would be the most suitable option. If, however, the user operates a mixed fleet engaging in different types of distribution, it would be advisable to differentiate the various classes of vehicle and/or distribution operation by clicking 'Add vehicle type'. If the user operates a small fleet, they may even wish to enter data for individual vehicles, each listed on a separate row by adding more vehicles through 'Add vehicle type'. Table 1 provides more details on vehicle type inputs below:

|                                     |  |
|-------------------------------------|--|
| Name                                | Enter a name to describe vehicle type  |
| Vehicle Type                        | Select a vehicle type from dropdown box  |
| Emission Standard                   | User can identify their emission standard from dropdown box. This selection is used as text only.  |
| Tyres                               | Enter number of tyres used in a single vehicle   |
| Transmission Type                   | Enter transmission type used in a single vehicle   |
| Type of Operation                   | Enter type of operation. If your fleet is involved in a mix of operations then select regional distribution.   |
| Number of vehicles                  | Enter number of vehicles in this vehicle type  |
| Fuel Type                           | Enter type of fuel from dropdown box   |
| % of Diesel used                    | <p><b>Diesel:</b> Enter 100% (includes standard biofuel mix)</p> <p><b>Biodiesel:</b> if 5% bio, enter diesel used as 95%. Similarly, if 10% bio, enter diesel used as 90%.</p> <p><b>CNG:</b> Enter 0% diesel</p> <p><b>LNG:</b> Enter 0% diesel</p> <p><b>Diesel + CNG:</b> Enter % of diesel substitution. Default substitution is 40-50% diesel.</p> <p><b>Diesel + LNG:</b> Enter % of diesel substitution. Default substitution is 40-50% diesel.</p> <p><b>Hybrid:</b> Enter 100% of diesel</p> |
| Total fuel consumption              | Annual fuel consumption by all vehicles in a vehicle type  |
| Total distance                      | Annual distance travelled by all vehicles in a vehicle type  |
| % increase over total distance/year | Expected increase in vehicle kms in next year or in three years. If you don't expect any increase in kms, enter 0%.  |

Table 1: Vehicle Type Input

2.5 Click **'submit'** to enter a vehicle type or **'cancel'** if you don't want to enter a vehicle type.

2.6 A vehicle type can be edited by clicking on **'pencil mark'** or deleted by clicking on **'x'**.

2.7 Once the user has entered the data in the 'Data Input', the next step is to click **'Calculator'**.

### 3. Calculator

This page generates a list of carbon-reducing measures based on the input given by the user in the **'Data Input'** section. This page displays a list of prioritised carbon-reducing measure based on Net Present Value (NPV) under each vehicle type generated using the secondary data of each carbon-reducing measures (*Screenshot 4*). The values associated with the carbon-reducing measures are calculated independently. The selected saving measures summary on the right side of the screen shows cumulative values from selected carbon-reducing measures.

The screenshot displays the SRF Optimiser Calculator interface. At the top, there are logos for SRF Optimiser, Heriot Watt University, University of Cambridge, EPSRC, and VCL Value Chain Lab. The user's name, Pratyush Dadhich, and a Logout button are also visible.

The interface is divided into several sections:

- Data Input:** Includes Reporting, Calculator, Fuel Cost Input (Electric kWh, Diesel, Bio diesel, CNG, LNG), Macro Input (Discount rate, Carbon targets), and Fuel consumed/Total distance/Fuel economy.
- Carbon-saving Measures Table:** A table with columns for #, Carbon-saving Measures, Net Present Value (£), Cost Savings per annum (£), CO<sub>2</sub> Savings per annum (KgCO<sub>2</sub>), Fuel Saved (Litres), Payback period (Years), Include intervention, and Advanced Tuning. The table lists 9 measures, with the first three selected.
- Selected saving measures summary:** A graphical summary showing annual savings of 11.1% for Fuel cost, Fuel Volume, Energy, and CO<sub>2</sub>. It also provides a table of financials: 3 yr savings (£6K), Investments (£1.1K), NPV (£7.8K), and Payback (0.53 yrs).

| # | Carbon-saving Measures   | Net Present Value (£) | Cost Savings per annum (£) | CO <sub>2</sub> Savings per annum (KgCO <sub>2</sub> ) | Fuel Saved (Litres) | Payback period (Years) | Include intervention                | Advanced Tuning |
|---|--|-----------------------|----------------------------|--|---------------------|------------------------|-------------------------------------|-----------------|
| 1 | Increase the proportion of off-peak, evening and night-time deliveries   | £3.6K                 | £748.8                     | 1.7K   | 640.0               | 0.0                    | <input checked="" type="checkbox"/> |                 |
| 2 | Reduce engine idling   | £2.6K                 | £748.8                     | 1.7K   | 640.0               | 0.7                    | <input checked="" type="checkbox"/> |                 |
| 3 | Monitor and manage driver fuel performance (including use of telematics) | £1.5K                 | £655.2                     | 1.4K   | 560.0               | 0.9                    | <input checked="" type="checkbox"/> |                 |
| 4 | Reduce vehicle tare weight   | £1.3K                 | £748.8                     | 1.7K   | 640.0               | 1.6                    | <input type="checkbox"/>            |                 |
| 5 | Use telematics to optimise vehicle routing                               | £1.1K                 | £561.6                     | 1.2K   | 480.0               | 1.3                    | <input type="checkbox"/>            |                 |
| 6 | Increase use of biodiesel vehicles                                       | £837.2                | £172.0                     | 4.1K   | 0.0                 | 0.0                    | <input type="checkbox"/>            |                 |
| 7 | More regular tyre inflation checks                                       | £364.5                | £74.9                      | 165.4  | 64.0                | 0.0                    | <input type="checkbox"/>            |                 |
| 8 | Set vehicle speed limiters at lower speeds                               | £113.9                | £23.4                      | 51.7   | 20.0                | 0.0                    | <input type="checkbox"/>            |                 |
| 9 | Give drivers training in fuel efficiency                                 | £62.2                 | £374.4                     | 826.8  | 320.0               | 0.8                    | <input type="checkbox"/>            |                 |

| Selected saving measures summary       |             |        |                 |
|--|-------------|--------|-----------------|
| Annual savings                         |             |        |                 |
| Fuel cost                              | Fuel Volume | Energy | CO <sub>2</sub> |
| 11.1%                                  | 11.1%       | 11.1%  | 11.1%           |
| Cost saving current yr, in £'K         | £2.1K       |        |                 |
| Cost saving over 3 yrs, in £'K         | £6.2K       |        |                 |
| Fuel saving, in K liters               | 1.8K        |        |                 |
| Energy saving, in K kWh                | 18K         |        |                 |
| Reduction in CO <sub>2</sub> , in K Kg | 4.6K        |        |                 |
| Selection financials                   |             |        |                 |
| 3 yr savings, in £'K                   | £6K         |        |                 |
| Investments, in £'K                    | £1.1K       |        |                 |
| NPV, in £'K                            | £7.8K       |        |                 |
| Payback, in yrs.                       | 0.53        |        |                 |

*Screenshot 4: of Prioritisation of Interventions*

Step by step navigation on this page:

3.1 The user can include measures for reporting by clicking on the **checkbox** under 'Include Intervention'.

3.2 Selection of carbon-reducing measures will generate a graphical summary on the right side of the screen. This summary displays cost saving current year (£) cost saving over 3

years (£), fuel saving per year (litres), energy saving per year (kWh) and reduction in carbon emission (KgCO<sub>2</sub>) associated with all vehicle types.

3.3 At any point, the user can remove selected carbon-reducing measures by de-selecting carbon-reducing measures **checkbox**.

3.4 A description of carbon-reducing measure can be found by clicking on **'Question Mark'** next to a carbon-reducing measure (see screenshot 5).

The screenshot displays the SRF Optimiser interface. At the top, there are logos for SRF, Heriot-Watt University, University of Cambridge, EPSRC, and VCL. The interface is divided into several sections: Data Input, Reporting, Calculator, Fuel Cost Input, Macro Input, and Fuel consumed. The main table lists carbon-saving measures with columns for Net Present Value (£), Cost Savings per annum (£), CO<sub>2</sub> Savings per annum (KgCO<sub>2</sub>), Fuel Saved (Litres), Payback period (Years), Include intervention, and Advanced Tuning. A tooltip for measure 2 provides a detailed description: 'Approximately 20% of lorry-kms in the UK are run between 8pm and 6am when traffic levels are relatively low and vehicles can more easily achieve their most fuel efficient speed. Stop-start operations on congested roads are very fuel inefficient. For example, where a 40 tonne truck, running at an average speed of 50 km per hour, has, on average, to stop twice per kilometre because of congestion, average fuel consumption rises steeply from about 28 to 84 litres per 100km. Rescheduling freight deliveries into off-peak periods can offer significant energy and emission savings. Research at Heriot-Watt University has found that, on the basis of a sample of 56 vehicle routes across the UK, altering the departure times of freight deliveries to avoid congestion on the trunk road network can reduce fuel consumption and CO<sub>2</sub> emissions by around 5.6%. Given the need to synchronise delivery operations with production and distribution activities, in practical terms the opportunities for rescheduling can be quite limited.'

On the right side, there is a 'Selected saving measures summary' section with a bar chart showing annual savings of 11.1% for Fuel cost, Fuel Volume, Energy, and CO<sub>2</sub>. Below the chart, the following summary statistics are provided:

|  |              |
|--|--------------|
| Cost saving current yr, in £'K         | <b>£2.1K</b> |
| Cost saving over 3 yrs, in £'K         | <b>£6.2K</b> |
| Fuel saving, in K liters               | <b>1.8K</b>  |
| Energy saving, in K kWh                | <b>18K</b>   |
| Reduction in CO <sub>2</sub> , in K Kg | <b>4.6K</b>  |

Below this, the 'Selection financials' are listed:

|                      |              |
|----------------------|--------------|
| 3 yr savings, in £'K | <b>£6K</b>   |
| Investments, in £'K  | <b>£1.1K</b> |
| NPV, in £'K          | <b>£7.8K</b> |
| Payback, in yrs.     | <b>0.53</b>  |

Screenshot 5: Measure Description

3.5 To edit the default values associated with the carbon-reducing measures, click on **'Advance Tuning'** tool (see screenshot 6). The user can see the default values of each measure, customise the results by overwriting default figures by adding their own cost and carbon figures. The carbon-reducing measures related to following alternate fuel vehicles are calculated using base vehicle type entered in the 'Data input'.

- Increase use of electric vehicles
- Increase use of hybrid vehicles
- Increase use of biodiesel vehicles
- Increase use of dual-fuel vehicles (Diesel + CNG)
- Increase use of dual-fuel vehicles (Diesel + LNG)
- Increase use of dedicated natural gas vehicles (CNG)
- Increase use of dedicated natural gas vehicles (LNG)

In order to change default fuel substitution, the user can overwrite expected primary fuel% substitution in 'Primary Fuel %' textbox for biodiesel and dual-fuel vehicles. Click on **'Submit'** to save new figures.

The screenshot shows the SRF Optimiser interface. At the top, there are logos for SRF, Heriot Watt University, University of Cambridge, and VCL. The interface is divided into several sections: 'Data Input', 'Reporting', 'Calculator', 'Fuel Cost Input', 'Electric (kWh)', 'Macro Input', and 'Fuel consumed'. The 'Calculator' section contains a table of carbon-saving measures. The 'Selected saving measures summary' bar chart shows annual savings for Fuel cost (5.6%), Fuel Volume (4.3%), Energy (4.3%), and CO2 (5.0%). An 'Efficiency' dialog box is open, allowing users to adjust the tuning value for 'Long Haul' from 9.0% to 9.0%.

| # | Carbon-saving Measures   | Net Present Value (£) | Cost Savings per annum (£) | CO <sub>2</sub> Savings per annum (kgCO <sub>2</sub> ) | Fuel Saved (Litres) | Payback period (Years) | Include intervention                | Advanced Tuning |
|---|--|-----------------------|----------------------------|--|---------------------|------------------------|-------------------------------------|-----------------|
| 1 | Increase use of biodiesel vehicles                                       | £401.4K               | £81.4K                     | 171.8K   | 66.0K               | 0.0                    | <input type="checkbox"/>            |                 |
| 2 | Use tear-drop trailer  | £114.1K               | £30.9K                     | 68.7K  | 26.4K               | 0.6                    | <input checked="" type="checkbox"/> |                 |
| 3 | Give drivers training in fuel efficiency                                 | £107.0K               | £25.3K                     | 56.2K  | 21.6K               | 0.1                    | <input checked="" type="checkbox"/> |                 |
| 4 | Monitor and manage driver fuel performance (including use of telematics) | £105.2K               | £25.3K                     | 56.2K  | 21.6K               | 0.1                    | <input checked="" type="checkbox"/> |                 |
| 5 | Install side skirts  | £58.5K                | £14.0K                     | 31.0K  | 11.6K               | 0.5                    | <input type="checkbox"/>            |                 |
| 6 | Use telematics to optimise vehicle routing                               | £52.9K                | £14.0K                     | 31.0K  | 11.6K               | 0.5                    | <input type="checkbox"/>            |                 |
| 7 | Install cab roof fairing   | £52.3K                | £12.6K                     | 28.0K  | 10.4K               | 0.5                    | <input type="checkbox"/>            |                 |
| 8 | Install boat-tails   | £49.4K                | £12.9K                     | 28.0K  | 10.4K               | 0.5                    | <input type="checkbox"/>            |                 |
| 9 | Reduce height of trailer   | £34.6K                | £7.0K                      | 15.0K  | 5.4K                | 0.6                    | <input type="checkbox"/>            |                 |

Screenshot 6: Advance Tuning







#### 4. Reporting:

The selected carbon-reducing measures in 'Calculator' page are displayed as a report. The user should click on the 'Reporting' button to access the report (Screenshot 7). This report displays results in the ESOS template format below:

- Total organisational energy consumption (from all vehicles entered in kWh)
- Total cost-effective energy saving potential identified (cumulative sum of selected carbon-reducing measures in kWh)
- Total cost-effective financial saving identified (cumulative sum of selected carbon-reducing measures in £)
- Net Present Value (£) (LCCA: Life-cycle cost analysis)
- Payback Period (Years) (SPP: Simple payback period)
- Identified Energy Savings (£)
- Identified Cost Savings (£)

**Note:** "<Total cost-effective energy saving potential identified (in energy)> and <total cost-effective financial saving identified> shows the cumulative savings of selected measures. This will differ from the values of selected individual measures which are calculated independently".



Pratyush Dadhich  
× [Logout](#)

Data Input

Reporting

Calculator

Fuel Cost Input

|                    |       |                |       |
|--------------------|-------|----------------|-------|
| Diesel (litre)     | £1.17 | Electric (kWh) | £0.13 |
| Bio diesel (litre) | £1.05 | CNG (kg)       | £0.85 |
|                    |       | LNG (kg)       | £0.92 |

Macro Input

|               |       |                |               |
|---------------|-------|----------------|---------------|
| Discount rate | 10.0% | Prioritisation | Payback + NPV |
| PERIOD        | 2015  | Carbon targets | 2.5%          |

Fuel consumed: Diesel litre

Total distance: in km

Fuel economy: l/100 km

ESOS report | annualised for 2015 Export to XLS

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Energy Savings Opportunity Scheme Assessment Report

|  |                       |
|--|-----------------------|
| Name of Organisation:  | <<Your company name>> |
| ESOS compliance deadline:  | 5 December 2015       |
| Total Organisational energy consumption:                             |                       |
| Total energy consumption assessed (that is, minimum 90%):            | <<Please enter>>      |
| Total cost-effective energy saving potential identified (in energy): |                       |
| Total cost-effective financial saving identified:                    |                       |

Assessment Findings

|           | Detail of measures identified  | Assessed via      | Applicability                 | Identified energy savings | LCCA or SPP?* | Identified cost savings |
|-----------|--|-------------------|-------------------------------|---------------------------|---------------|-------------------------|
| Measure 1 | Monitor and manage driver fuel performance (including use of telematics) | ESOS energy audit | 3.5 tonne to 7.5 tonne rigids | 4,573 kWh                 | LCCA          | £1,206                  |
| Measure 2 | Use telematics to optimise vehicle routing                               | ESOS energy audit | 3.5 tonne to 7.5 tonne rigids | 2,541 kWh                 | LCCA          | £456                    |
| Measure 3 | More regular tyre inflation checks                                       | ESOS energy audit | 3.5 tonne to 7.5 tonne rigids | 641 kWh                   | LCCA          | £364                    |

Screenshot 7 ESOS Report Format

This report can be customised by adding ‘Name of Organisation’ and ‘Total energy consumption assessed’. Upon entering the customisation details in the fields marked “please enter”, a user can then download the report by clicking on ‘Export to XLS’. This will create a spreadsheet for filing and further use.