

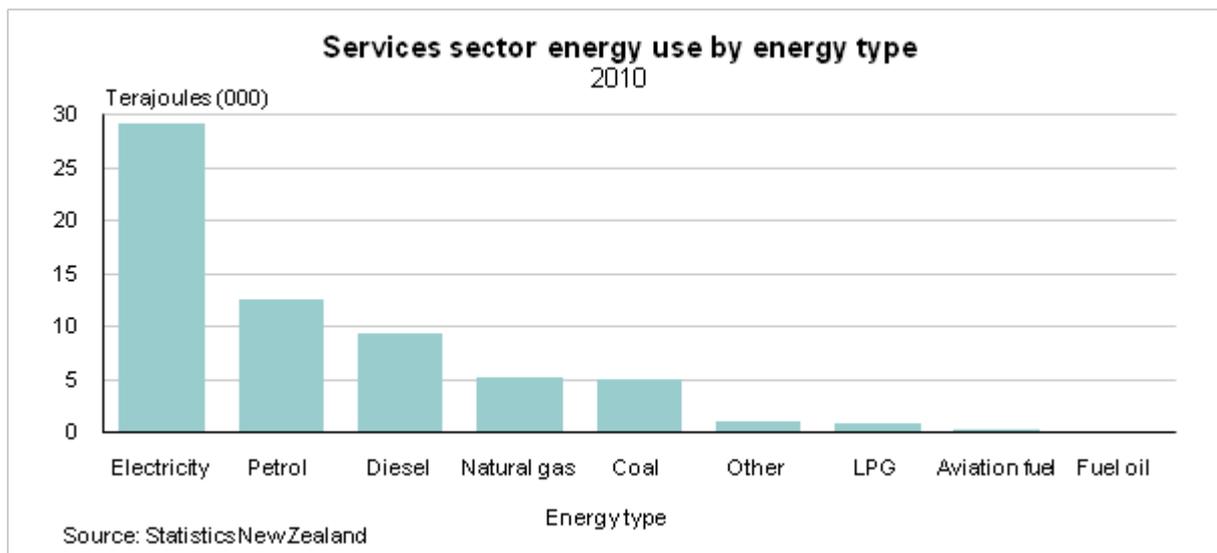
# Energy Use Survey: Services sector 2010

Embargoed until 10:45am – 13 October 2011

## Key facts

In 2010:

- the services sector used almost 64,000 terajoules (TJ) of energy
- electricity was the most common type of energy used by the services sector, accounting for nearly half of the total energy use



- the industries with the largest energy use were the rental, hiring, and real estate services, and the public administration and safety industries.

This 2010 survey completes Statistics NZ's programme of energy use surveys for the entire economy. Adding the results from the three-year cycle estimates the New Zealand economy's energy use (excluding households) at almost 393,000 TJ.

Geoff Bascand  
Government Statistician

13 October 2011  
ISSN 1179-3287

# Commentary

## Services sector energy use equals household use

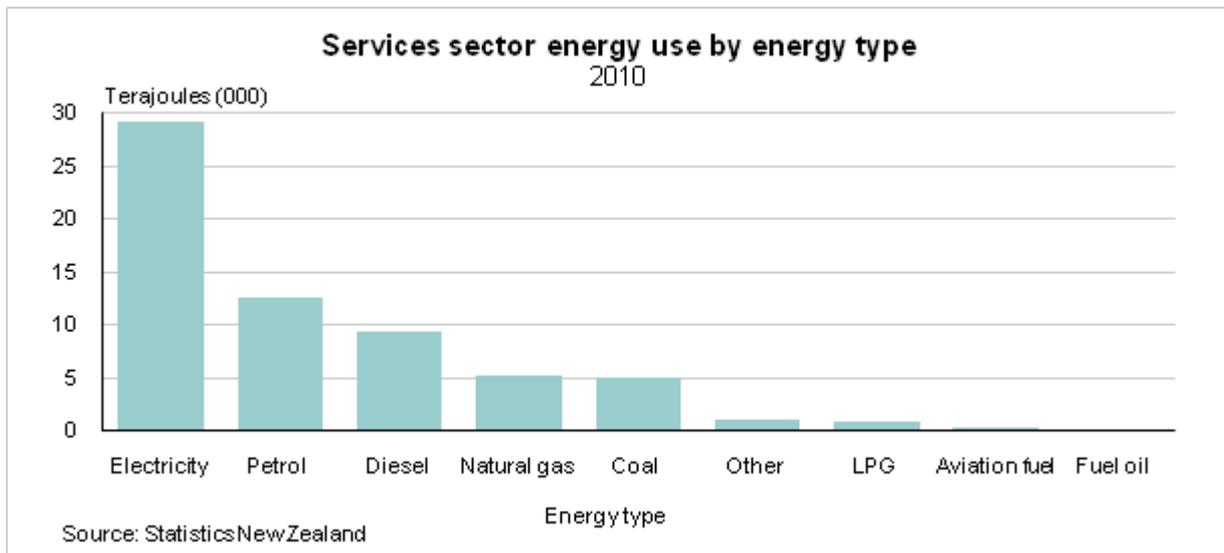
The services sector in New Zealand used almost 64,000 terajoules (TJ) of energy in 2010. This total is roughly equivalent to the energy used inside all New Zealand homes each year. One terajoule of energy roughly equates to filling an average car's petrol tank twice a day, every day, for a year.

## Electricity is the most-used energy type

The two main energy types making up the 64,000 TJ total were:

- electricity, accounting for nearly half the total
- petrol and diesel, accounting for one-third of the total energy.

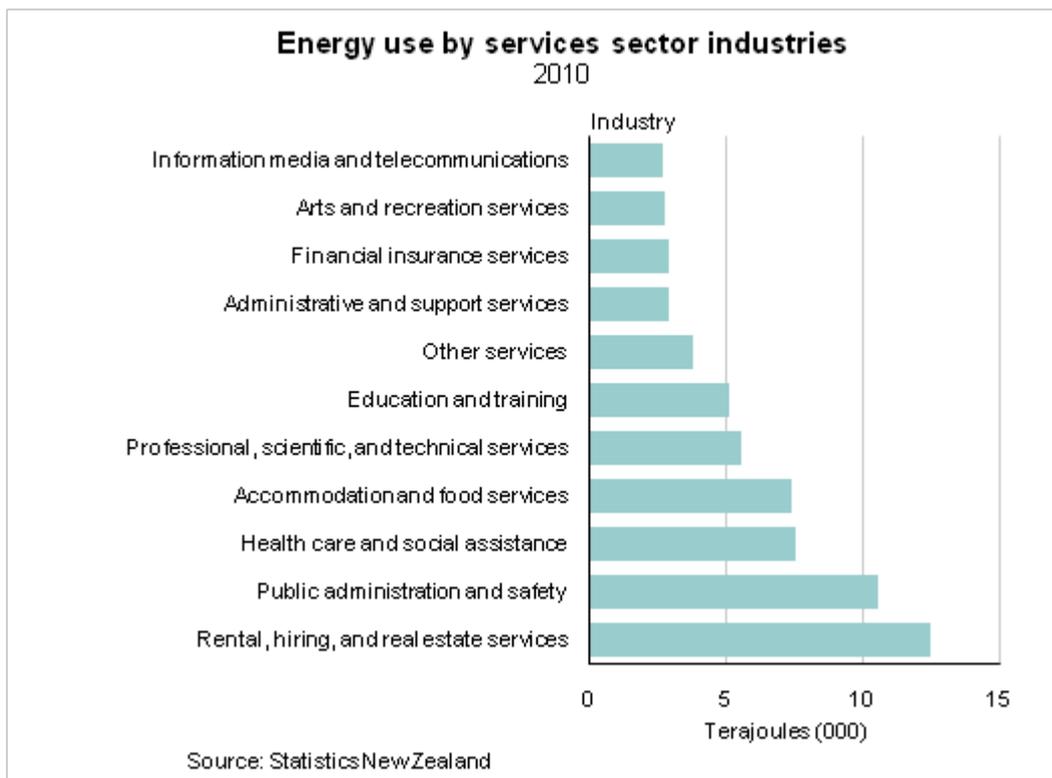
These fuels are used by most organisations, small or large. The services sector has a large number of smaller organisations, which together contributed a relatively high proportion towards the overall fuel use. However, many of the larger organisations in the services sector used a relatively low amount of energy. This is because most service activities are provided through a person's expertise rather than through highly energy-intensive activities, such as manufacturing or transport.



## Energy use varies by industry

The energy used by the different types of service organisations is summarised below.

- Rental, hiring and real estate was the industry with the largest energy use – due to the industry having many small users, which combined to a large total.
- The public administration and safety industry had the second-largest energy use – with a small number of large users.
- Accommodation and food services included a large number of small users.
- Health care and social assistance included a relatively small number of large users.
- Arts and recreation services, and administrative and support services, are industries that reported low energy use.



## Liquid fuel used more than solid fuel

### Liquid fuels

As for other sectors, service organisations were more likely to purchase petrol and diesel from a petrol station than have it directly delivered (95 percent for petrol, and 70 percent for diesel). Roughly the same ratios existed for how petrol and diesel was used by organisations – the majority was used by vehicles on public roads (93 percent of petrol and 67 percent of diesel). For LPG, 85 percent was used for heating or cooking – and more than half the total LPG was used by the accommodation and food services industry. While fuel oil was largely used by stationary machinery off public roads, the total amount of fuel oil used by the services sector was very small.

For more detailed data from this release, see the Excel tables in the 'Downloads' box.

## **Solid fuels**

Services sector organisations used relatively small amounts of solid fuel, compared with other sectors (primary, and industrial and trade). Most organisations were not sure of the form these fuels were in – particularly what form of coal they used. However, for wood it was clear that the two most-commonly used forms were sawmill residue or fuel wood, and oven-dry wood or pellets.

## **Most organisations manage their energy use**

Approximately 60 percent of organisations indicated they had current energy-management initiatives in place (eg monitoring energy use or cost). The public administration and safety industry had the highest rates of energy-management initiatives – 9 out of 10 organisations had initiatives in place.

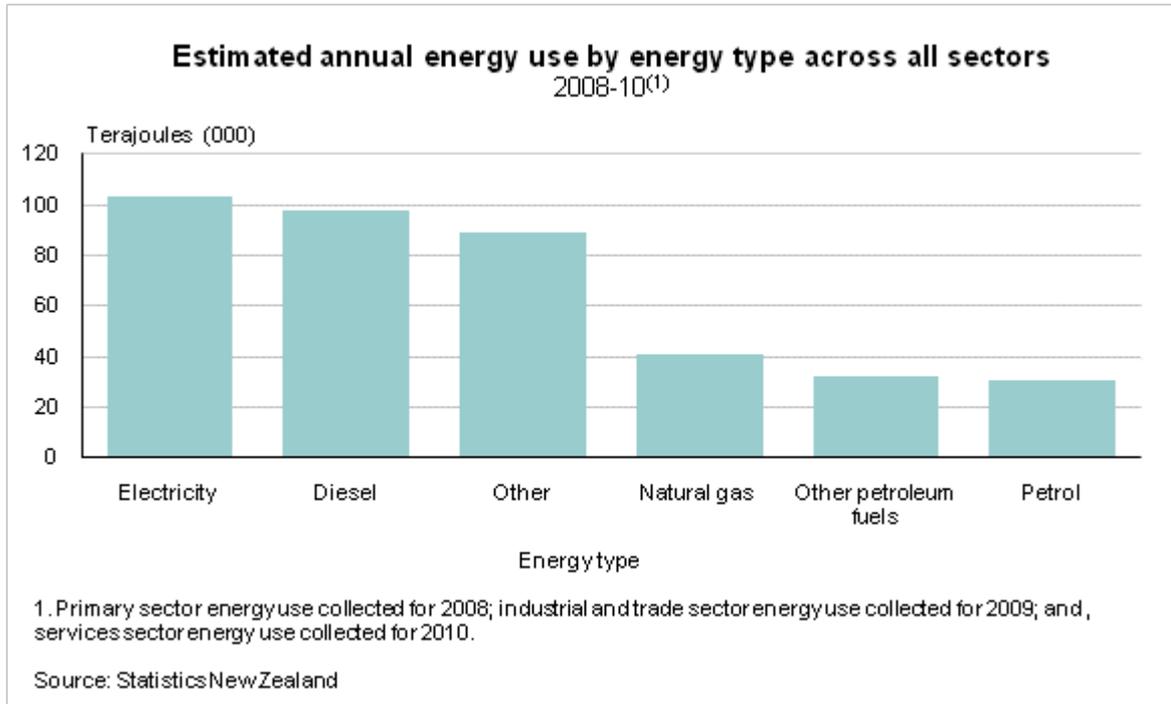
About 60 percent of all organisations said they had room for further energy savings. Nine out of 10 organisations in public administration and safety reported further savings were possible. Results showed that organisations with energy-saving initiatives in place were more likely to see opportunities for further savings, while those that had not thought of energy savings before didn't see a place for them in the future.

## **Energy use in New Zealand's economy estimated**

The data collected for the services sector in 2010 completes a three-year programme across the entire economy – the services, industrial and trade (2009), and primary (2008) sectors. Adding results from the three-year survey cycle estimates the New Zealand economy's energy use (excluding households) at 393,000 TJ annually.

Electricity is the most-used energy type although it is followed closely by diesel. Natural gas and coal are the next most-common, both being used a similar amount throughout the economy. These four energy types show varied usage patterns.

- Electricity is used by most organisations in all industries.
- Diesel is used by quite a large number of organisations, with some using a lot of it. For example transport, postal, and warehousing used 39 percent of the total diesel used, and agriculture, forestry, and fishing used 17 percent.
- Natural gas is used in large quantities by specific industries. For example the manufacturing industry used 60 percent of the total natural gas.



For more detailed data from the previous releases, see the Excel tables in the 'Downloads' boxes of [Energy Use Survey: Primary industries 2008](#) and [Energy Use Survey: Industrial and trade sectors 2009](#).

# Definitions

## About the Energy Use Survey

The Energy Use Survey collects and publishes statistics detailing the energy used by three sectors of New Zealand economy – the primary, industrial and trade, and services sectors. Organisations provide information on how much energy they use, which allows us to publish data at industry and national levels for different energy types. The energy types include electricity, petrol, diesel, coal, natural gas, and renewable energy types.

## More definitions

**ANZSIC06:** Australian and New Zealand Standard Industrial Classification 2006.

**Business Frame:** A register of all economically significant units operating in New Zealand.

**Economically significant:** An economically significant organisation meets at least one of these criteria:

- has greater than \$30,000 annual GST expenses or sales
- 12-month rolling mean employee count of greater than three
- is part of a group of enterprises
- is registered for GST and involved in agriculture and forestry
- over \$40,000 of income recorded in the IR10 annual tax return (this includes some units in residential property leasing and rental).

**Enterprise:** A unit or business entity operating in New Zealand. It can be a company, partnership, trust, estate, incorporated society, producer board, local or central government organisation, voluntary organisation, or self-employed individual.

**Kind-of-activity unit (KAU):** A subdivision of an enterprise engaged in predominantly one activity and for which a single set of accounting records is available.

**Rolling mean employment (RME):** A 12-month moving average of the monthly employee count (EC) figure. The EC is obtained from taxation data.

**Calorific value:** The energy contained in a fuel, determined by measuring the heat produced by the complete combustion of a specified quantity of it. Different values were used to convert different energy types into comparable units (MJ)

**Joule (J):** A unit for measuring energy. The main unit used in the release is the terajoule where 1TJ is approximately equal to the total electricity used by 35 households in one year.

Name	Symbol	Multiple
Joule	J	1J
Kilojoule	kJ	10 <sup>3</sup> J
Megajoule	MJ	10 <sup>6</sup> J
Gigajoule	GJ	10 <sup>9</sup> J
Terajoule	TJ	10 <sup>12</sup> J
Petajoule	PJ	10 <sup>15</sup> J

## **Related links**

### **Upcoming releases**

New Zealand's *Energy Use Survey: 2011* figures will be released in October 2012.

The [release calendar](#) lists all our upcoming information releases by date of release.

### **Past releases**

See [New Zealand Energy Use Survey – Information releases](#) for more information on our previous releases.

### **Related information**

See [Information about the survey](#) for a detailed description of New Zealand Energy Use Survey.

See [Questionnaires and forms](#) for the questionnaire sent to respondents.

[Energy Efficiency and Conservation Authority](#) – provides information on understanding and overcoming the barriers to being more energy efficient and using more renewable energy.

[Ministry of Economic Development - Energy Data](#) – provides information on supply and demand of energy by fuel types, pricing information and energy balance tables.

[BRANZ - Building Energy End-use Survey](#) – The BEES study, undertaken by BRANZ, monitors and analyses energy (and water) use within entire non-residential buildings. This differs from the Energy Use Survey, which analyses energy use by entire organisations (which may be spread over several buildings, or may be sharing a building).

[Christchurch Agency for Energy](#) – CAfE was set up to analyse energy use in Christchurch, and introduce energy saving and sustainability initiatives. CAfE has some data related to the 2010/11 Canterbury earthquakes and energy use through that time. Data collected for the Energy Use Survey does not provide accurate regional estimates, and due to the timing of the collection may not include energy use at the time of the earthquakes.

## Data quality

The data quality section provides period-specific and general information about the data.

### Period-specific information

This section has information about data that has changed since the last release.

- [Reference period](#)
- [Effect of Canterbury earthquakes](#)
- [Response rate](#)
- [Sampling error for 2010 survey](#)
- [Target population](#)
- [Survey population](#)

### General information

This section contains information about data that does not change between releases.

- [Data source](#)
- [Target population for three years of survey](#)
- [Survey population](#)
- [Sample design](#)
- [Population v sample estimates](#)
- [Measurement errors](#)
- [Non-response and imputation](#)
- [Energy units standardised](#)
- [More information](#)

## Period-specific information

### Reference period

The survey was posted out in April 2011, with a reference period of the last financial year for which the organisation had results available in May 2011. The majority of respondents had a 31 March 2011 balance date. However a significant number of respondents had either a June 2010 or a December 2010 balance date. A small number stated other dates. No adjustment has been made to produce figures for a single consistent time period.

### Effect of Canterbury earthquakes

The Energy Use Survey for 2010 was the first collection since the September 2010 and February 2011 Canterbury earthquakes. A small number of units in the sample were affected by at least one of the earthquakes. These organisations were excluded from the survey under 'compassionate exclusion'. Checks were done to see if certain industries were affected more than the others, however no such impact was found.

### Response rate

The survey was sent to just over 5,000 units and the required overall response rate was 80 percent. The response rate achieved was 83 percent. The response rate achieved for key units was 100 percent, which met the target.

## Sampling error for 2010 survey

The sample design for the Energy Use Survey: Services sector 2010 aimed to control and reduce the relative sampling errors (RSEs), specifically for key energy types. These energy types were:

- total energy use in each industry
- electricity use in each industry
- combined petrol and diesel use in each industry
- natural gas for the accommodation and food services, and health care and social assistance industries.

The RSE estimates are larger than the design RSE targets for some energy types. This is due to higher variability in the responses than was expected in the sample design process.

### How to read the sampling errors

Sampling errors for this survey were calculated using the RSE measure. RSEs are the sampling error as a percentage of the estimate. The sampling errors are estimates at the 95 percent confidence level. For example, the estimated energy use by the total services sector for 2010 is 64,000TJ. This estimate is subject to an RSE estimate of approximately 5.2 percent. This means that 95 percent of the possible samples of the same size will produce an estimate between 64,000 - 3,328 and 64,000 + 3,328; that is, between 60,672 and 67,328 TJ.

The following table shows the actual RSEs for each industry in the 2010 survey.

<b>Relative sampling errors (RSEs) by industry</b>	
Industry	Final RSE for total energy use (%)
Accommodation and food services	15.8
Information media and telecommunications	8.1
Financial and insurance services	16.9
Rental, hiring and real estate services	16.8
Professional, scientific and technical services	14.3
Administrative and support services	20.1
Public administration and safety	22.6
Education and training	7.4
Health care and social assistance	10.9
Arts and recreation services	19.9
Other services	6.6
Total for service sector	5.2

## Target population

The 2010 survey covered the following services industries of New Zealand's economy:

- accommodation and food services (H)
- information media and telecommunications (J)
- financial and insurance services (K)
- rental, hiring, and real estate services (L)
- professional, scientific, and technical services (M)
- administrative and support services (N)
- public administration and safety (O)

- education and training (P)
- health care and social assistance (Q)
- arts and recreation services (R)
- other services (S).

The target population included all economically significant units in the Australian and New Zealand Standard Industrial Classification 2006 (ANZSIC06) categories H and J to S that were live at the time of selection.

## Survey population

The collection unit for the survey is the kind-of-activity unit (KAU). Altogether, 263,000 enterprises had KAUs that meet the requirements above for the 2010 collection.

The survey sample was designed to produce results for the industries listed under target population.

## General information

### Data source

The New Zealand Energy Use Statistics Programme is a product of the Energy Domain Plan that was published in 2006. The Energy Domain Plan was produced by Statistics NZ in collaboration with the Energy Efficiency and Conservation Authority (EECA), and the Ministry of Economic Development (MED). The domain plan identified energy use statistics as a key gap in energy information and prioritised a suite of energy use surveys.

The Energy Use Survey delivers information to help fill gaps in current energy statistics and provides a benchmark of energy use information for New Zealand's economy, excluding households. Data from the survey will also feed into modelling systems that give current energy-use estimations and future demand forecasts (eg MED's Energy Data File). Modelling assumptions can then be updated, which will improve the accuracy of modelled information.

### Target population for three years of surveys

In the first stage of this three-year cycle (2008), the target population was the primary sector (ANZSIC06 A and B).

[http://www.stats.govt.nz/browse\\_for\\_stats/industry\\_sectors/Energy/EnergyUseSurvey\\_HOTP2008.aspx](http://www.stats.govt.nz/browse_for_stats/industry_sectors/Energy/EnergyUseSurvey_HOTP2008.aspx)

In the second stage (2009), collection covered the industrial and trade sectors (ANZSIC06 C to G and I).

[http://www.stats.govt.nz/browse\\_for\\_stats/industry\\_sectors/Energy/EnergyUseSurvey\\_HOTP2009revised.aspx](http://www.stats.govt.nz/browse_for_stats/industry_sectors/Energy/EnergyUseSurvey_HOTP2009revised.aspx)

## Survey population

The KAU was chosen as the selection unit to allow the uses of energy to be associated with an activity as closely as possible. KAU data allows energy use to be separated for larger units with multiple branches involved in different activities (multi-KAU).

## Sample design

The sample design was a two-way, one-stage stratified random sample. The stratification and design variables were ANZSIC06, GST sales, and rolling mean employment.

The 2010 survey collected information from New Zealand's services sector on the following commodities (the same was done for the primary, and industrial and trade sectors in previous surveys):

- electricity – all electricity purchased from the national grid and energy sources used for input into electricity generation and cogeneration
- electricity generated in the unit – electricity generated within the operations of the unit (this figure is not included in total energy used, to avoid double counting)
- petroleum products – energy products derived from the refining process of crude oil including:
  - petrol – an aggregated figure of 96 and 91 octane petrol
  - fuel oil – an aggregated figure of the major intermediate products, notably light fuel oil and heavy fuel oil
  - diesel
  - liquefied petroleum gas (LPG)
  - aviation fuel
- natural gas
- coal – including all ranks
- wood and wood waste – used for energy purposes.

The survey also collected information on energy management practices.

## Population vs sample estimates

The tables and numbers providing estimates of energy use, in this release, were weighted to account for the whole industry or sector. The sample was designed to be able to provide estimates of the whole sector's energy use, based on the sampled organisations. The tables and percentages providing estimates of energy management initiatives and perceptions were not weighted to account for the whole sector. These figures are calculated only on organisations that actually responded to the survey. While the responded organisations are representative of the whole sector, the data was not designed specifically for the analysis, so weighting was not applied before calculating percentages. When comparing these tables, readers need to remember that the energy-use numbers are estimates of use by the whole sector, while the energy-management numbers are specific responses from representative organisations.

## Measurement errors

The survey results are subject to measurement errors, including both non-sample and sample errors. These errors should be considered when analysing results.

## Sampling error

Sampling error is a measure of the variability that occurs by chance because a sample, rather than the entire population, is surveyed. The level of sampling error for any given estimate depends on the number of sampled individuals, the variability of the estimate, and the sample size. Due to the random nature of the sample selection the error will differ for different samples.

## **Non-sampling errors**

Given the nature of the data collected, there are limitations on the level of accuracy that can be expected from the survey. Records may not be kept in the form required for the survey, some estimation by the respondent may be required and non-sampling error may occur. Non-sampling errors include mistakes by respondents when completing questionnaires, variation in the respondents' interpretation of the questions asked, and errors made during the processing of the data. Statistics NZ has extensive procedures to minimise these types of error, but they may still occur and are not quantifiable.

## **Non-response and imputation**

### **Unit non-response**

Unit (or complete) non-response occurs when units in the sample do not return the questionnaire. The initial selection weight of the remaining units in the stratum was adjusted to account for the unit non-response (no item non-response imputation would occur for the units that did not return the questionnaire).

### **Item non-response**

Item (or partial) non-response is when units return the questionnaire but some questions are not answered. Item non-response imputation was carried out for units that answered some but not all of the questions they were required to (based on questionnaire routing rules). Respondents who did not answer any of the questionnaire were classified as unit non-responses and the weights were adjusted accordingly. Item non-response was imputed for and the methods used are as follows:

### **Imputation of numeric variables**

The imputation method for numeric variables was random donor imputation. In this method, the responses of a randomly selected donor from within the same imputation cell as the non-respondent are imputed in the recipient unit. Donor imputation was used so that the distribution was maintained.

### **Imputation of categoric variables**

The imputation method for categoric variables was random donor imputation. The donor supplied responses for all categoric variables requiring imputation. If the donor unit did not respond to any of the variables requiring a response, then the next best donor was selected to supply this information. This was continued until all of the variables had a response.

## **Energy units standardised**

Information on energy usage was collected in the unit that applies to each commodity; for example, litres for petrol and kilowatt hours (kWh) for electricity. These units were converted to a standard unit (joules) for reporting. This conversion enables the energy contained in different forms to be compared directly. The conversions were carried out by applying a calorific value (enthalpy value) to each energy type and form. The calorific values were sourced or derived from MED's Energy Data File 2010. See the table below for the calorific values used for each energy type.

<b>Energy types and their calorific values</b>		
Energy type	Details	Calorific value
Electricity	Electricity's standard universal unit, the watt, is defined as one joule per second	3.6 MJ per kWh
Petrol	Two main forms of petrol are in the market, regular and premium, and each has a slightly different conversion factor. The factor used in the Energy Use Survey is a weighted average of the two values, according to their current prevalence in the market	35.1 MJ per litre
Fuel oil	There are two types of fuel oil: light fuel oil and heavy fuel oil. The conversion factor used in the Energy Use Survey was derived using a weighted average of the two, according to their current prevalence in the market	40.7 MJ per litre
Diesel	The value used is that of regular diesel	37.8 MJ per litre
LPG	Liquid petroleum gas. LPG figures were provided in both litres and kilograms	26.4 MJ per litre 49.5 MJ per kg
Aviation fuel	There are two major forms: jet fuel and aviation gasoline	37.3 MJ per litre 33.9 MJ per litre
Natural gas	Most natural gas figures were provided in joules, although some were in kilowatt hours	3.6 MJ per kWh
Coal	Bituminous	29,240 MJ per tonne
	Sub-bituminous	21,720 MJ per tonne
	Lignite	15,300 MJ per tonne
	Where the type was not known, the conversion factor was an average of the lignite, sub-bituminous and bituminous coal values	22,087 MJ per tonne
Wood and wood waste	Hog fuel or bark	7,000 MJ per tonne
	Sawmill residues or fuel wood	10,300 MJ per tonne
	Black liquor	8,600 MJ per tonne
	Joinery, building, or furniture residues	16,300 MJ per tonne
	Oven-dried wood	19,200 MJ per tonne
	The conversion factor where the wood type was not known was an average of the other types.	12,280 MJ per tonne

## More information

More information about the Energy Use Survey is available on our website.  
[http://www.stats.govt.nz/surveys\\_and\\_methods/completing-a-survey/faqs-about-our-surveys/nz-energy-use.aspx](http://www.stats.govt.nz/surveys_and_methods/completing-a-survey/faqs-about-our-surveys/nz-energy-use.aspx)

## Liability

While care has been used in processing, analysing, and extracting information, Statistics NZ gives no warranty that the information supplied is free from error. Statistics NZ shall not be liable for any loss suffered through the use, directly or indirectly, of any information, product, or service.

## Timing of published data

Timed statistical releases are delivered using postal and electronic services provided by third parties. Delivery of these releases may be delayed by circumstances outside the control of Statistics NZ. Statistics NZ accepts no responsibility for any such delays.

## Crown copyright©



This work is licensed under the [Creative Commons Attribution 3.0 New Zealand](#) licence. You are free to copy, distribute, and adapt the work, as long as you attribute the work to Statistics NZ and abide by the other licence terms. Please note you may not use any departmental or governmental emblem, logo, or coat of arms in any way that infringes any provision of the [Flags, Emblems, and Names Protection Act 1981](#). Use the wording 'Statistics New Zealand' in your attribution, not the Statistics NZ logo.

## **Revisions**

A new calculation method was applied to the energy management tables for the services sector (2010).

To ensure comparability, the energy management tables for the industrial and trade sector (2009) were recalculated using the same method. They are available as supplementary tables, in Excel format, from the 'Downloads' box.

## **Contacts**

### **For media enquiries contact:**

Jean Watt  
Wellington 04 931 4600  
Email: [info@stats.govt.nz](mailto:info@stats.govt.nz)

### **For technical information contact:**

Andrew Neal  
Wellington 04 931 4600  
Email: [info@stats.govt.nz](mailto:info@stats.govt.nz)

### **For general enquiries contact our information centre**

Phone: 0508 525 525 (toll free in New Zealand)  
+64 4 931 4600 (outside of New Zealand)  
Email: [info@stats.govt.nz](mailto:info@stats.govt.nz)

## Tables

The following tables are included with this release. They are available in Excel format from the 'Downloads' box of Energy Use Survey: Services sector 2010 on the Statistics New Zealand website.

If you do not have access to Excel, you may use the [Excel file viewer](#) to view, print and export the contents of the file.

1a	Energy use, by fuel type and industry, 2010
1b	Energy use, by fuel type and industry and physical unit, 2010
2	Petrol purchasing, by industry, 2010
3	Petrol end use, by industry, 2010
4	Diesel purchasing, by industry, 2010
5	Diesel end use, by industry, 2010
6	Energy saving initiatives, by industry, 2010
7	Areas where greater energy savings could be made, by industry, 2010
8	Energy saving areas for priority, by industry, 2010
9	Total energy use across all sectors, by fuel type and industry, 2008–10

## Supplementary tables

These 2009 energy management and energy-saving related tables have been recalculated. The calculation method has changed slightly, to make them easier to read and comparable with similar tables in the 2010 release.

1	Energy saving initiatives in the industrial and trade sector, 2009
2	Areas where greater energy savings could be made in the industrial and trade sector, 2009
3	Energy saving areas for priority in the industrial and trade sector, 2009