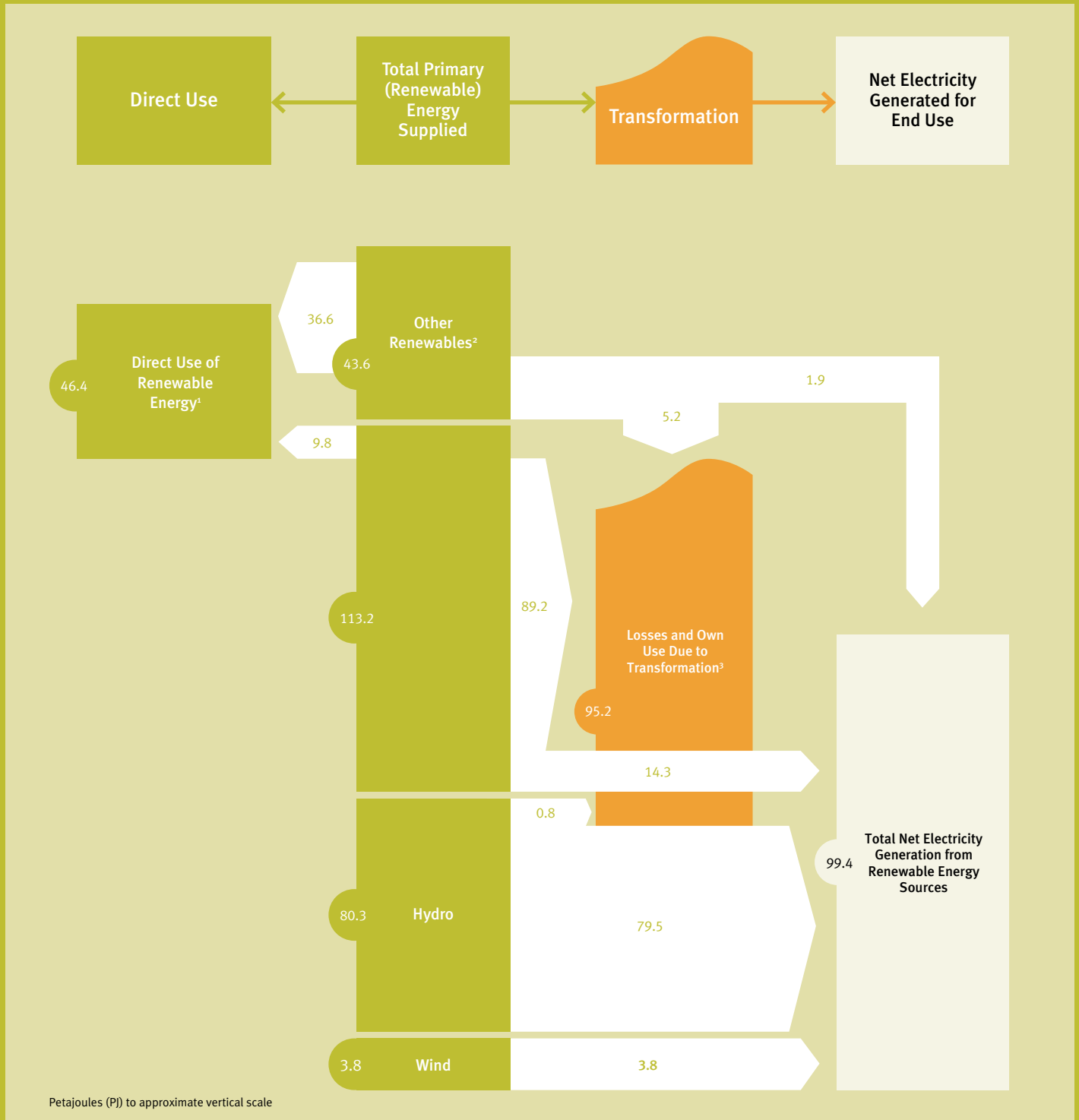


F. Renewables

Figure F.1: Renewable Energy Flow Summary for 2008



Notes to Figure F.1: ¹ Direct use of renewable energy covers mainly heat and biofuel for commercial and industrial applications. ² "Other Renewables" in this instance refers to solar, biogas and landfill gas.

³ For default electrical transformation factors see Table B.1, page 16. Numbers may not add due to rounding.

F. Renewables

Overview of Renewables in New Zealand

Renewable Primary Energy Supply

Renewable energy plays a significant role in New Zealand's primary energy supply with over 30% of New Zealand's total primary energy supply coming from renewable sources. The latest international comparisons show New Zealand has the third highest percentage of renewable primary energy

supply of all OECD¹ countries, behind only Norway and Iceland.²

New Zealand's historically high level of renewable primary energy is largely due to plentiful hydro and geothermal resources. In recent times, there has also been considerable interest and uptake in the use of wind, bioenergy and solar resources.

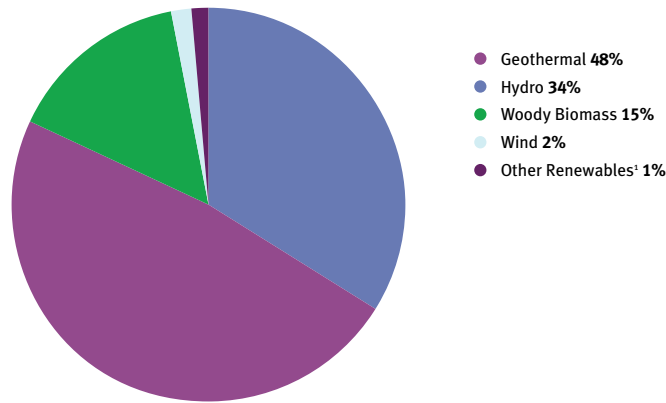
Most of New Zealand's renewable primary energy is used for electricity generation.

Figure F.2 presents the breakdown of renewable primary energy supply for the 2008 calendar year. This covers renewables used for electricity generation (including geothermal and biomass cogeneration) and also direct use of renewable energy.

¹ Organisation for Economic Co-operation and Development.

² Source: IEA Renewables Information 2008.

Figure F.2: Renewable Primary Energy for 2008

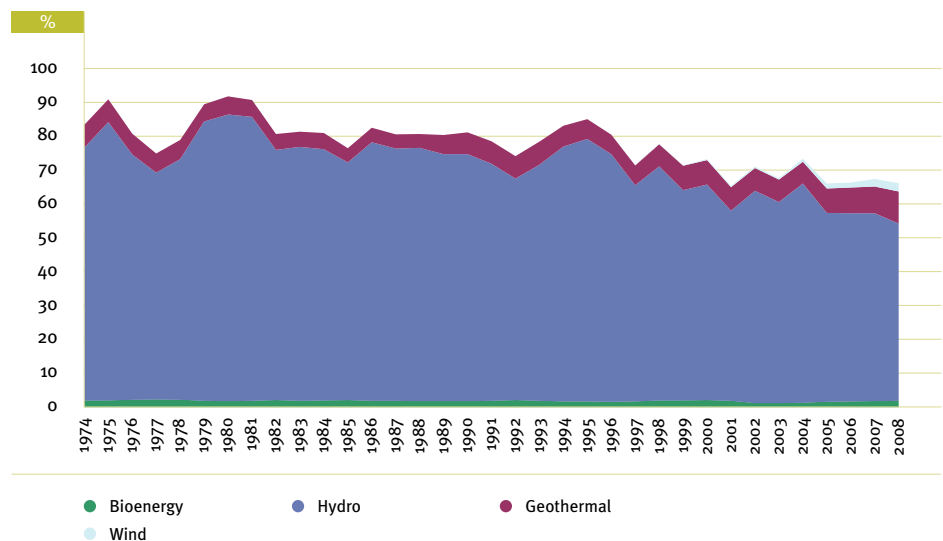


Note to Figure F.2: ¹“Other Renewables” in this instance refers to solar, biogas and landfill gas.

Renewable Electricity Generation

In New Zealand, all renewable energy transformation is from the generation of electricity. Some renewable energy sources such as hydro and wind only feature in the EDF indirectly through energy transformation into electricity. In 2008, a total of 99 PJ of electricity generation came from renewable sources. This equates to 65% of all electricity generated. For further information on generation from renewable sources, see the Electricity section.

Figure F.3: Percentage of New Zealand Electricity Generation from Renewable Sources



Note to Figure F.3: Bioenergy includes wood/woody biomass and biogas.

F. Renewables

Overview of Renewables in New Zealand continued

Renewable Energy Supply and Consumption

Some geothermal, wood and biogas energy is used directly for heating and commercial and industrial applications.

Direct use of geothermal energy occurs as a heat source in small quantities in the central North Island in the timber and tourism industries. It is also used in small quantities for domestic heating.

Woody biomass direct use is mainly in the timber industry, which burns residue wood to provide heat energy. Wood is also burned to heat many private homes in New Zealand.

A small amount of biogas extracted from wastewater treatment plants and landfills is also used in specific scenarios as a fuel source for vehicles and other machinery.

In 2008, total renewable consumer energy was estimated at 46 PJ.

Table F.1: Renewable Energy Supply and Consumption (PJ)¹

Calendar Year	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008
Hydro	70.94	83.46	99.12	87.96	78.04	89.53	85.03	96.94	83.97	84.86	85.10	80.32
Geothermal	78.93	92.65	93.30	81.18	79.40	80.93	80.21	81.55	89.26	92.70	96.87	113.21
Solar	-	-	-	-	-	0.17	0.18	0.21	0.24	0.27	0.30	0.32
Wind	-	-	0.00	0.43	0.50	0.56	0.53	1.30	2.21	2.24	3.35	3.81
Biogas and Landfill Gas	1.30	1.73	2.27	1.47	1.48	1.87	2.45	2.66	2.70	3.02	2.95	2.87
Woody Biomass and Animal Products	28.36	32.11	32.71	35.88	36.20	35.18	35.61	37.92	38.96	38.87	39.81	40.42
Total Renewable Primary Energy Supply	179.53	209.94	227.40	206.92	195.63	208.24	204.02	220.58	217.34	221.95	228.38	240.95
Hydro	70.94	83.46	99.12	87.96	78.04	89.53	85.03	96.94	83.97	84.86	85.10	80.32
Geothermal	67.63	81.27	79.77	71.73	69.86	71.20	70.63	72.01	79.59	82.98	87.09	103.45
Wind	-	-	0.00	0.43	0.50	0.56	0.53	1.30	2.21	2.24	3.35	3.81
Biogas and Landfill Gas	1.26	1.68	2.21	1.32	1.30	1.68	2.27	2.55	2.48	2.76	2.67	2.59
Woody Biomass and Animal Products ²	5.18	5.18	5.18	6.88	5.56	3.31	2.75	3.43	3.83	4.15	4.38	4.42
Total Renewable Energy Transformation (including losses)²	145.01	171.59	186.28	168.32	155.27	166.29	161.22	176.23	172.08	176.98	182.58	194.59
Geothermal ³	11.30	11.38	13.53	9.45	9.54	9.72	9.58	9.54	9.67	9.73	9.78	9.76
Solar	-	-	-	-	-	0.17	0.18	0.21	0.24	0.27	0.30	0.32
Biogas and Landfill Gas	0.04	0.05	0.06	0.15	0.18	0.19	0.18	0.11	0.22	0.26	0.28	0.28
Woody Biomass and Animal Products ⁴	23.18	26.93	27.52	29.00	30.64	31.87	32.86	34.49	35.13	34.72	35.43	36.00
Total Renewable Consumer Energy (Direct Use)	34.51	38.35	41.12	38.60	40.36	41.95	42.80	44.35	45.26	44.98	45.79	46.36

¹ Sources of data include the Ministry of Economic Development's electricity annual questionnaires (MED-E) and Statistics New Zealand.

² In previous editions of the *Energy Data File*, the figure for residential firewood wood use was based on an average use of 4.3 GJ per household. BRANZ recently released their findings (Study Report 141 (2005)) on the Household Energy End-use Project (HEEP), which monitored energy end use in the home including firewood use. For firewood, their studies found that the average annual use was 13.7 GJ per household, and we have adopted this figure in our calculations from 2004 onwards.

³ Revised figures from 2000 based on the report *An Assessment of Geothermal Direct Heat Use in New Zealand*, prepared by Brian White, Executive Officer of the New Zealand Geothermal Association.

⁴ An estimated 0.6 PJ of woody biomass comes from wood pellets. From *Assessment of Possible Renewable Energy Targets – Direct Use: Woody Biomass*, by East Harbour Management Services and SCION (data from 2005).

Revisions: The time series of electricity generation information has been revised in 2009. This has resulted from collaboration with Statistics New Zealand and the Electricity Commission and has greatly improved the accuracy of the published data. This has led to revisions to renewable energy estimates also.