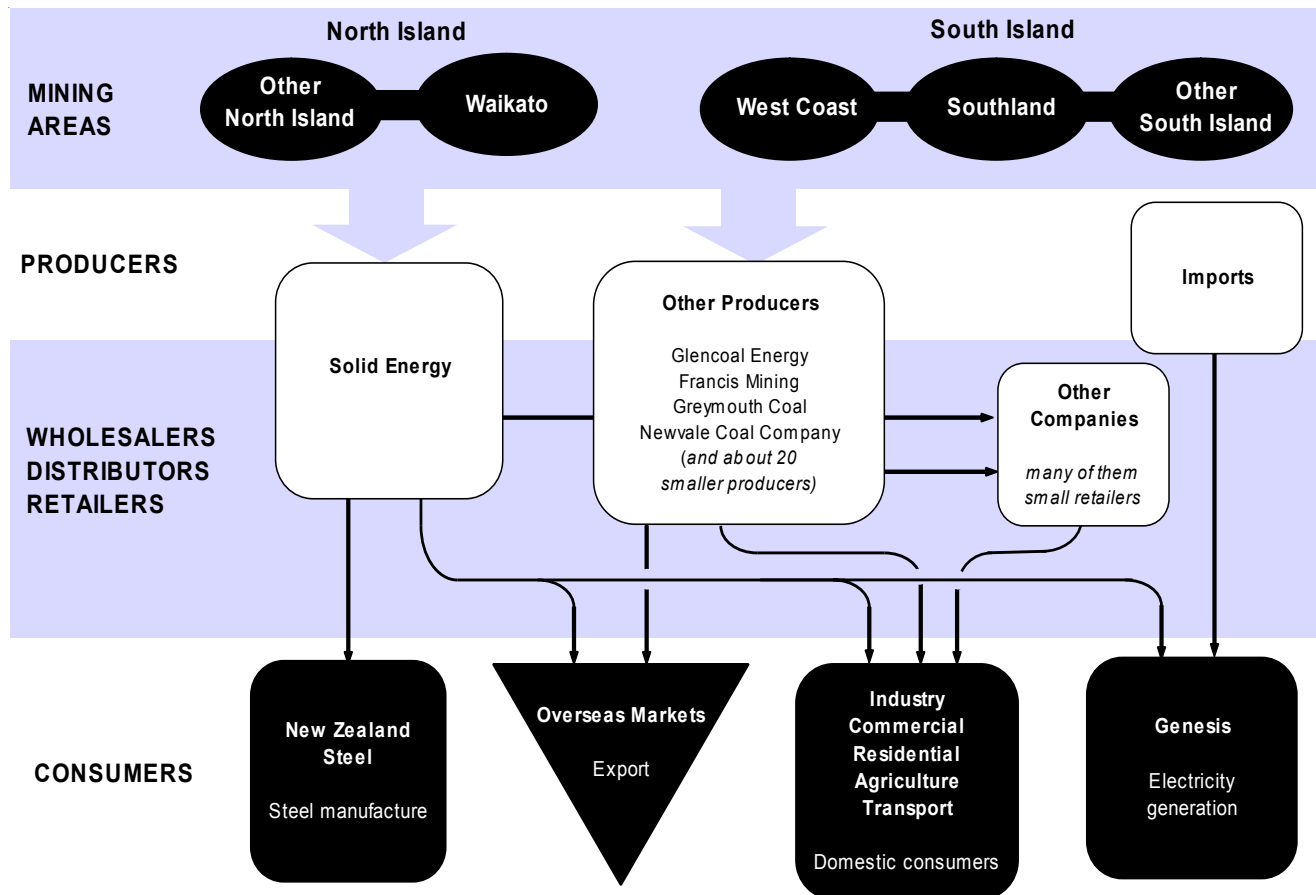


# C. Coal



Figure C.1: Coal Flows for March Year 2005



Company names are listed without the suffixes "Limited" and "New Zealand Limited" where applicable.

# Overview of New Zealand's Coal Industry

## Resources

Coal resources in New Zealand are extensive, with workable seams present in the Northland, Waikato and Taranaki regions in the North Island and in the Nelson, West Coast, Canterbury, Otago and Southland regions of the South Island.

A report commissioned by the Ministry of Commerce in 1994 (Coal Resources of New Zealand) indicated that total in-ground coal resources are estimated at about 15 billion tonnes. Of this, 8.6 billion tonnes (made up of about 80% relatively low-grade lignite, 15% middle-grade sub-bituminous coal and 5% high-grade bituminous coal) is judged to be economically recoverable. Of the economically recoverable resources, about 570 million tonnes or 7% is currently classified as "measured recoverable" reserves. The 1994 report incorporated data from a major Government-funded exploration and mining feasibility programme called the New Zealand Coal Resources Survey (NZCRS). Over 10,000 wells were drilled and evaluated in this study. Recognition of very large resources of lignite in Central Otago and Southland also led to a series of investigations by the Liquid Fuels Trust Board (LFTB). Both of these large studies resulted in substantial increases in knowledge and understanding of coal resources in New Zealand. No major revisions of national coal resources have been made since the 1994 publication.

Investigations have been conducted recently into evaluating the costs of opening old coal mines. This has been coupled with an increasing amount of coal prospecting, exploration and mining permits granted by Crown Minerals since the late 1990s.

Crown Minerals issues three types of permits:

1. Prospecting permits for preliminary geological studies (outcrop sampling, etc)
2. Exploration permits for more intrusive geological studies (drill holes, etc)
3. Mining permits for the commercial recovery of coal.

The table below illustrates the increase in permitting activity. It should be noted that not all mining and exploration activities are conducted on Crown Minerals issued permits and that substantial coal resources exist under privately owned land.

### Permits Granted for Coal

Type of Permit	1999	2000	2001	2002	2003	2004	2005*
Prospecting	0	0	0	0	2	10	0
Exploration	0	0	0	2	10	20	15
Mining	1	2	1	5	2	1	2

\* 2005 year to the end of July

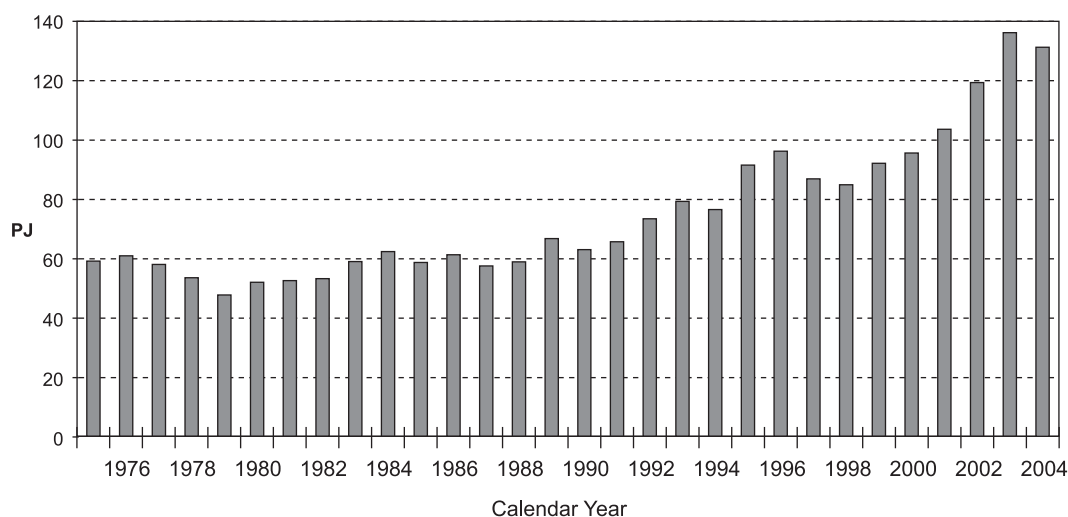
Figure C.1 shows the coal ownership flows in New Zealand for the March year ending 2005.

## Production

Coal production export and consumption statistics in this commentary apply to the **year ended March 2005** unless otherwise stated.

Coal production in the calendar year 2004 reached 4.9 million tonnes, slightly down from the 5.2 million tonnes produced in 2003. Coal production had been increasing steadily from 1998 until 2003, largely driven by export growth (for bituminous coal) and domestic commercial and industrial sectors (Chart C.1a).

**Chart C.1a: Total Coal Production**



Solid Energy produces about 80% of total coal produced in New Zealand while the rest is produced by a number of smaller private coal mining companies.

The demand for sub-bituminous coal has been increasing in New Zealand, especially for its use as feedstock for electricity generation. However, production of sub-bituminous coal has not met this demand. While production of sub-bituminous coal remained steady at about 2.4 million tonnes in the 2005 March year end, an additional 0.9 million tonnes was imported from Indonesia during this period (an 88% increase over the previous period). Imports of sub-bituminous coal started in mid-2003 when the 1,000 MW Huntly facility began to switch from gas to coal as the major feedstock fuel. Production of lignite during this March 2005 year end also remained steady at 248,000 tonnes.

### Export

New Zealand coal is valued internationally for its low ash and sulphur content, its suitability for steel making and high heating value. Demand for coal internationally is predominantly related to steel production. Major international steel producers like Japan, India, South Africa, China, South America and Australia are New Zealand's main customers. Production of premium grade bituminous coal has increased strongly every year since 1999. In 2004 production exceeded the 2003 levels by more than 175,000 tonnes to reach 2,526,000 tonnes. The majority of the bituminous coal produced in New Zealand is from Solid Energy's Stockton mine near Westport. Upgrades to the aerial ropeway system used by Solid Energy at this location have increased the amount of coal available to be delivered to the rail

head at Granity for transportation to Lyttelton Harbour. During the March year ended 2005, export declined by 2% as shown in Chart C.1c. During this period, coal exports accounted for about 46% (63 PJ) of total New Zealand coal production (137 PJ).

Global demand for coal is predicted to grow owing to increased prices for fuel use during the next decade. Increasing global steel production is also predicted to lead to further coal growth. This, together with the emerging "clean coal technologies", to meet climate change emissions requirements, will benefit export sales of good quality, low sulphur bituminous coal from New Zealand.

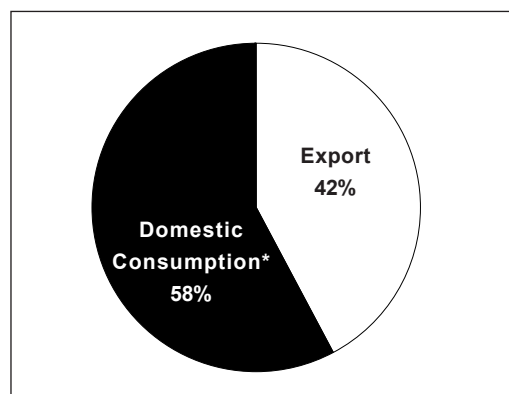
### Consumption

Major domestic coal customers are mainly Pacific Steel, New Zealand Steel and Genesis for its Huntly power station. Other coal users are manufacturing industries, agriculture, transport and residential consumers.

Total domestic consumption (excluding exports) increased 9% for the year ended March 2005 to 84 PJ. Chart C.2 shows that electricity generation (including cogeneration) accounted for 51.6% of observed domestic use, the basic metals sector 20.6%, other industry 17.6%, and the commercial sector 6.2%, while the agriculture (mainly horticulture), transport and residential sectors used the remaining 4.0%. The "other industry" coal use was primarily in cement, lime and plaster, meat, dairy and other food processing, wool, timber, pulp and paper products. Commercial coal use was mainly heating for accommodation and service buildings in central and local government, hospitals, rest homes and educational institutions.

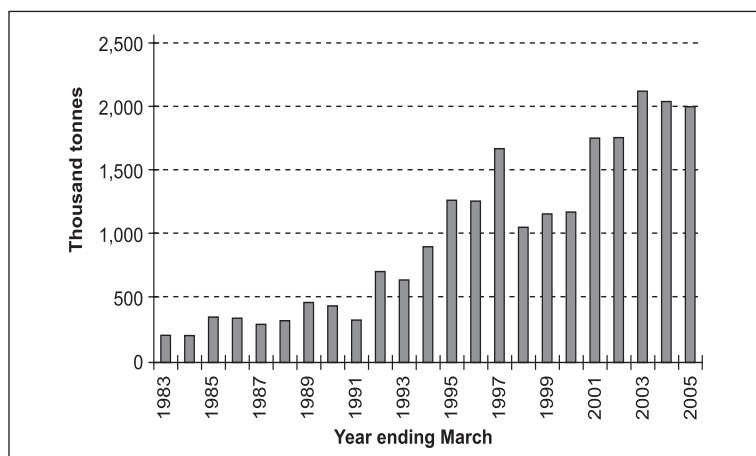
In the year ended March 2005, coal use for electricity

**Chart C.1b: Coal Export and Domestic Consumption March Year 2005**



\* Includes coal used for cogeneration, electricity generation, losses and own use.

**Chart C.1c: Coal Exports for March Years**



generation (excluding cogeneration) increased by 36% to 44.1 PJ from 32.5 PJ in the previous year and accounted for about 10% of total New Zealand electricity generation.

Table C.1 shows coal consumption by sector for March years 2003 to 2005. It shows increasing consumption in the residential sector of 4% in 2005 compared with the previous year and a slight increase of 1% in the commercial sector. Agricultural sector consumption decreased by 4% and coal use in the industrial sector decreased by 13% from 38 PJ to 33PJ. Coal used in transport has been assumed to be steady at 0.08 PJ over the years.

### Clean Coal Technology (CCT)

Clean Coal Technologies, the products of research and development conducted over the past 20 years, are leading to more efficient and more environmentally compatible technologies for electric utilities,

steel mills, cement plants and other industries.

Most advances in clean coal technologies have occurred in two main areas:

- advanced pollution control systems to reduce sulphur dioxide (SO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>) emissions; and
- super-clean, more efficient advanced power generation systems for new coal-based power plants.

In February 2003, the US Department of Energy announced a plan to build a \$1 billion project called "FutureGen" that will lead to the world's first emission-free plant to produce electricity and hydrogen from coal while capturing greenhouse gas emissions. These emissions will then be injected deep underground into geologic reservoirs, where they will be permanently isolated, or sequestered, from the atmosphere.

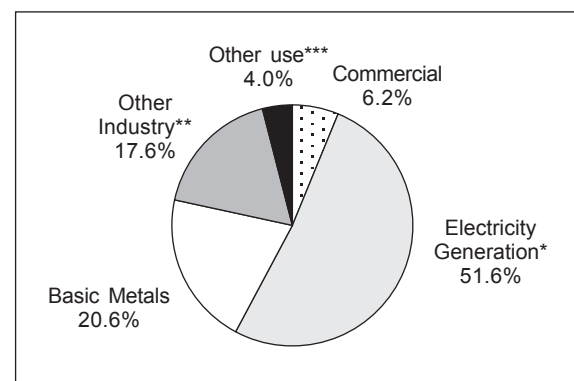
**Table C.1: Summary of Coal Consumption by Sector**

Sector	March Year (PJ)		
	2003	2004	2005
Agriculture	0.64	0.55	0.53
Industrial*	37.36	38.18	33.24
Commercial	5.18	5.35	5.41
Residential	0.63	0.82	0.85
Domestic Transport	0.08	0.08	0.08
Electricity**	19.09	32.52	44.12
<b>TOTAL</b>	<b>62.97</b>	<b>77.50</b>	<b>84.23</b>

\* Includes cogeneration coal.

\*\* Excludes cogeneration coal.

**Chart C.2: Domestic Coal End Use March Year 2005**

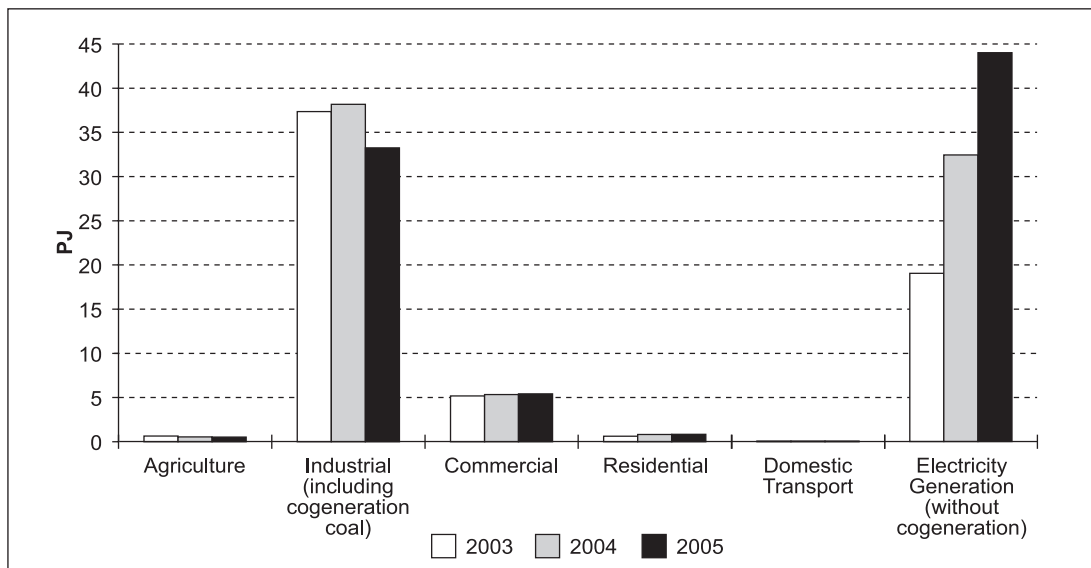


\* Includes cogeneration.

\*\* Includes unallocated manufacturing industries.

\*\*\* Includes agriculture, transport and residential.

**Chart C.3: Comparison of Coal Consumption by Sector for March Years**



**Table C.2: Coal Production, Exports and Imports**

		Gross PJ			Thousand Tonnes		
Calendar Year or Quarter		Total Production	Exports <sup>1</sup>	Imports <sup>2</sup>	Total Production	Exports <sup>1</sup>	Imports <sup>2</sup>
1974		62.80	n.a.	n.a.	2,564.3	n.a.	n.a.
1975		59.10	n.a.	n.a.	2,412.4	n.a.	n.a.
1976		60.90	n.a.	n.a.	2,486.9	n.a.	n.a.
1977		58.00	n.a.	n.a.	2,368.9	n.a.	n.a.
1978		53.50	n.a.	n.a.	2,182.5	n.a.	n.a.
1979		47.70	n.a.	n.a.	1,947.6	n.a.	n.a.
1980		51.97	2.91	n.a.	2,162.6	92.7	n.a.
1981		52.54	3.66	n.a.	2,196.9	116.7	n.a.
1982		53.21	5.29	n.a.	2,244.4	168.7	n.a.
1983		58.97	5.87	n.a.	2,473.5	187.3	n.a.
1984		62.34	11.68	n.a.	2,579.6	372.3	n.a.
1985		58.64	13.04	n.a.	2,390.0	415.8	n.a.
1986		61.24	8.84	n.a.	2,518.0	281.7	n.a.
1987		57.47	9.40	n.a.	2,402.0	299.7	n.a.
1988		58.84	11.44	n.a.	2,438.1	364.8	n.a.
1989		66.73	15.24	n.a.	2,713.0	485.7	n.a.
1990		63.01	10.53	n.a.	2,587.6	335.7	n.a.
1991		65.65	19.12	n.a.	2,684.2	609.4	n.a.
1992		73.40	24.15	n.a.	2,948.5	769.7	n.a.
1993		79.24	24.71	0.02	3,098.6	787.6	0.5
1994		76.48	32.74	0.02	2,997.6	1,043.6	0.6
1995		91.50	42.71	0.00	3,446.0	1,333.8	0.1
1996		96.21	50.90	0.00	3,610.6	1,589.5	0.1
1997		86.85	38.90	0.00	3,370.7	1,243.6	0.0
1998		84.85	34.18	0.00	3,319.2	1,092.8	0.1
1999		92.13	42.27	0.00	3,505.7	1,332.7	0.0
2000		95.60	48.48	0.48	3,585.6	1,528.5	16.2
2001		103.57	56.85	0.91	3,911.4	1,792.4	30.6
2002		119.32	61.27	2.29	4,458.9	1,931.7	76.5
2003		136.16	69.82	11.93	5,179.9	2,210.1	421.7
2004		132.01	59.98	20.04	4,946.5	1,908.4	876.1
2001	Mar	22.63	12.59	0.00	855.0	397.1	0.0
	Jun	28.33	17.16	0.02	1,057.1	541.1	0.8
	Sep	24.88	10.91	0.25	960.4	343.9	8.4
	Dec	27.72	16.18	0.64	1,038.8	510.2	21.3
2002	Mar	23.05	11.50	0.75	863.0	362.6	25.2
	Jun	35.10	18.69	0.00	1,301.7	589.3	0.0
	Sep	30.23	16.27	0.75	1,116.5	513.0	25.2
	Dec	30.94	14.80	0.78	1,177.7	466.8	26.1
2003	Mar	33.89	17.43	1.12	1,289.5	551.8	32.5
	Jun	34.88	19.69	1.92	1,303.6	623.3	65.6
	Sep	35.75	15.81	3.87	1,383.6	500.6	121.9
	Dec	31.65	16.88	5.01	1,203.3	534.4	201.7
2004	Mar	26.58	11.99	3.99	1,003.7	381.4	169.3
	Jun	33.92	14.50	5.62	1,285.5	461.2	250.8
	Sep	36.12	17.00	5.13	1,338.4	540.9	219.8
	Dec	35.39	16.50	5.30	1,318.9	524.9	236.3
2005 <sup>3</sup>	Mar	31.56	14.86	5.59	1,217.4	472.8	240.2
<b>Years Ended</b>	<b>Mar 04<sup>4</sup></b>	<b>128.86</b>	<b>64.37</b>	<b>14.79</b>	<b>4,894.08</b>	<b>2,039.67</b>	<b>558.47</b>
	<b>Mar 05<sup>4</sup></b>	<b>136.99</b>	<b>62.85</b>	<b>21.64</b>	<b>5,160.19</b>	<b>1,999.82</b>	<b>947.08</b>

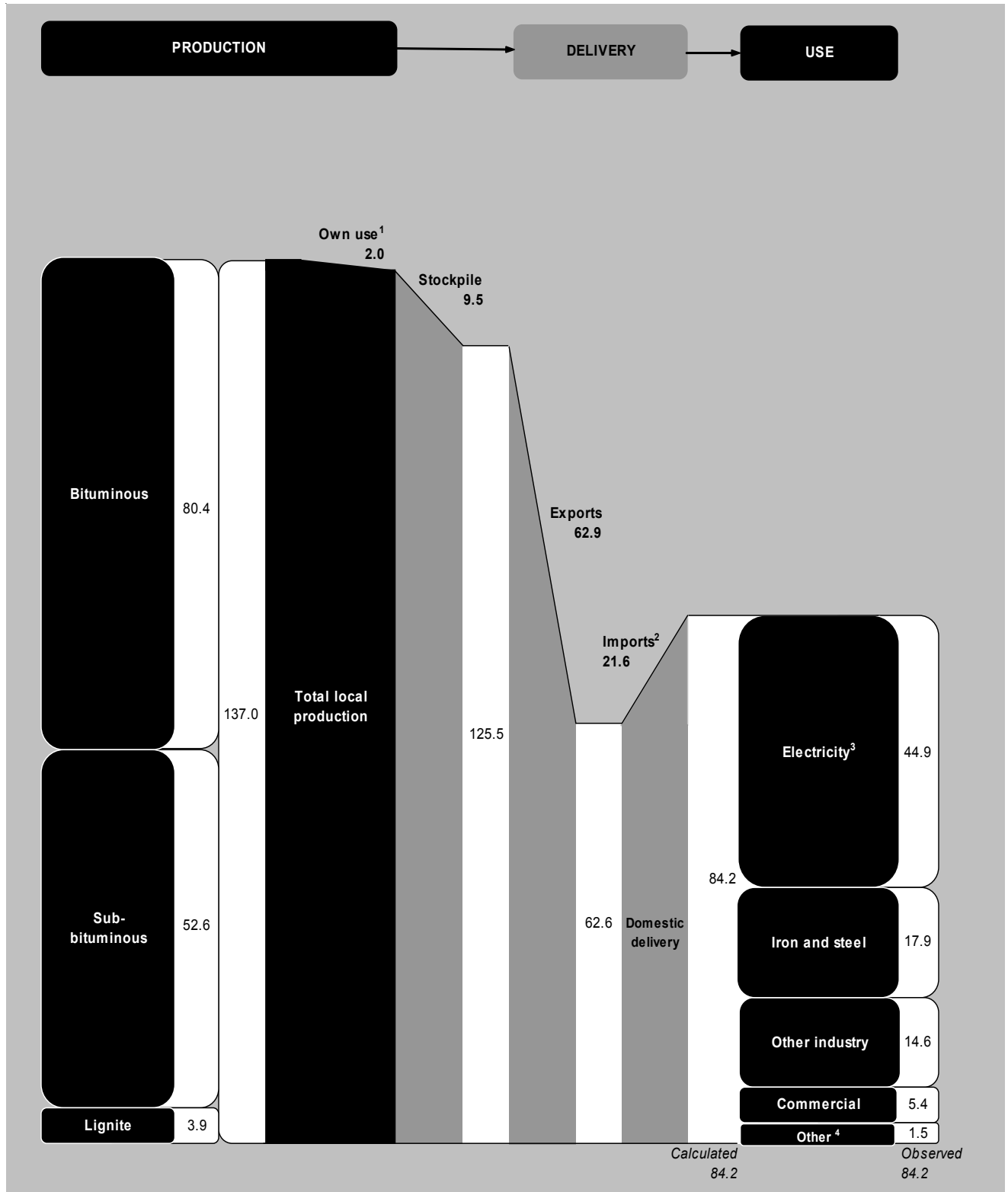
n.a. = not available.

## Notes:

<sup>1</sup> Based on information obtained from Statistics New Zealand (INFOS database). Coal exports are mainly bituminous rank.<sup>2</sup> The import series (mainly bituminous and sub-bituminous coal) exclude peat and coke.<sup>3</sup> Production data for the March 2005 quarter was provided by Statistics New Zealand.<sup>4</sup> Production totals do not include imports of bituminous and sub-bituminous coal.

Figure C.2: Coal Flow Summary for March Year 2005

Petajoules (to approximate vertical scale)



Notes:

- <sup>1</sup> "Own use" includes free use at mines and distribution losses.
- <sup>2</sup> About 1.65 PJ of bituminous and 19.99 PJ of sub-bituminous coal was imported during this period.
- <sup>3</sup> Electricity generation includes cogeneration.
- <sup>4</sup> Residential, agriculture and transport.
- <sup>5</sup> Some totals may not add up due to rounding.