



**TrustPower**  
GENERATION

November 2001

clean renewable energy generation



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## Corporate Profile



TrustPower, based on the outskirts of New Zealand's fastest growing city, Tauranga, had its beginnings as a local power authority in 1924. Following a succession of Government initiated power industry reforms, it became a listed public company in 1994. By 1998 TrustPower had established itself as a successful regional power company encompassing generation, distribution and retailing, with a significant percentage of its retail sales resulting from business won competitively supplying power over other's networks.

In 1999, TrustPower emerged from a further sweeping round of electricity reforms as New Zealand's fourth largest national player in the Generation and Retail Energy Trading sector. Having elected to sell its line network 'distribution' business in order to comply with the new regulations, TrustPower set about expanding its retail customer base from 97,000 to 218,000 through the purchase of nine power companies throughout the North and South Islands, with customer numbers having since grown to more than 280,000 as a result of success in a competitive market environment.

At the same time TrustPower increased its generation portfolio from 300 GWh to 1,800 GWh through the purchase of hydro and wind generation facilities spread throughout New Zealand.

The company, which employs some 300 staff, has annual electricity sales in excess of 5,700 GWh and revenue of \$508 million from assets of \$886 million. It retains a significant level of New Zealand ownership, through share holdings by the Tauranga Energy Consumer's Trust, New Zealand based infrastructure investment company Infracore, and a significant number of individual New Zealand citizens. Two overseas companies, Australian Gas Light and U.S. company Alliant International are also shareholders.



## Generation and the Environment

# The TrustPower Philosophy

As an electricity generator, TrustPower operates a business that is reliant on natural and physical resources to provide the energy needs of communities and businesses throughout New Zealand. As a company it is very conscious of the expectations of its stakeholders, from environmental issues to the well-being of communities that live in that environment, and investors.

As a business, TrustPower must perform to a level that can attract and retain investment. At the same time, it is equally aware of society's environmental performance expectations, and the need to deliver energy at minimal cost to both consumers and the environment.

In New Zealand, the use of resources is governed by the Resource Management Act (RMA). The Act, which has as its goal the sustainable management of natural and physical resources, places an onus on all stakeholders to find a balance that best serves communities and their future dependants in the widest context.

TrustPower has adopted a philosophy of owning and operating a mix of generation investments that it believes can deliver the best overall outcome for all concerned. TrustPower fully recognise the need to balance efficiency with practicality, and is dedicated to integrity and delivery without compromise.

TrustPower respects the environment in which it operates. As a responsible and prudent operator, it has set for itself, and abides by, very high standards. The following Environmental Policy, signed off by TrustPower's Board of Directors after development by those responsible for its day to day implementation, demonstrates the company's environmental commitment.



## Our Policies

<p>TrustPower is one of New Zealand's larger electricity generators. As a consequence, we have a direct and significant inter-relationship with all aspects of 'the environment'. In this respect, we:</p>		
<ul style="list-style-type: none"> <li>• use and, in many instances, modify natural resources to generate our electricity;</li> <li>• own, maintain and enhance/expand a network of significant physical resources;</li> <li>• supply an essential service to commercial and 'domestic' consumers, which in turn enables these parties to provide for their social and economic well being.</li> </ul> <p>As a direct reflection of our inter-relationship with the environment, our operations have the potential to induce both positive and negative environmental effects.</p> <p>TrustPower's goal is to operate in a manner that maximises all potential positive environmental effects, while minimising the incidence and source of negative (or adverse) effects. To achieve this all of our actions that may effect the environment are governed by the following goals and policies.</p>	<p><b>Goal</b></p> <p>To operate in a manner which</p> <ul style="list-style-type: none"> <li>• minimises all potential adverse environmental effects and</li> <li>• maximises (where practical) all potential positive environmental effects.</li> </ul>	
	<p><b>Policies</b></p> <p>We shall operate so as to comply with all of our legal and statutory environmental obligations.</p> <p>In operating, maintaining and enhancing our generation assets we will:</p> <ul style="list-style-type: none"> <li>• Avoid or minimise all adverse environmental effects which our operations may cause;</li> <li>• Liase and work with the community and all potentially affected 'stakeholders' in the identification, mitigation and/or monitoring of any potential environmental effects;</li> <li>• Use and operate the natural and physical resources under our control in an efficient and environmentally appropriate manner;</li> </ul>	<ul style="list-style-type: none"> <li>• Recycle and re-use materials wherever practical and economically feasible;</li> <li>• Ensure that all generation staff and contractors acting on our behalf are aware of (i) the surrounding environment and the potential environmental effects which our operations could induce, and (ii) the contingencies and procedures to be followed in the event of an adverse environmental effect being induced.</li> </ul> <p>By adopting and requiring adherence to the above goal and it's associated policies TrustPower is seeking to promote both continuing environmental awareness and enhanced environmental performance.</p>



## A Commercially and Environmentally Balanced Portfolio

# TrustPower Generation

TrustPower's generation assets consist of 34 generating units, strategically located around New Zealand. These locations ensure that power is generated close to where it is consumed, thereby minimising transmission costs and losses, and at the same time providing some protection against adverse climatic conditions that, in a country like New Zealand, can impact upon individual regions from time to time.

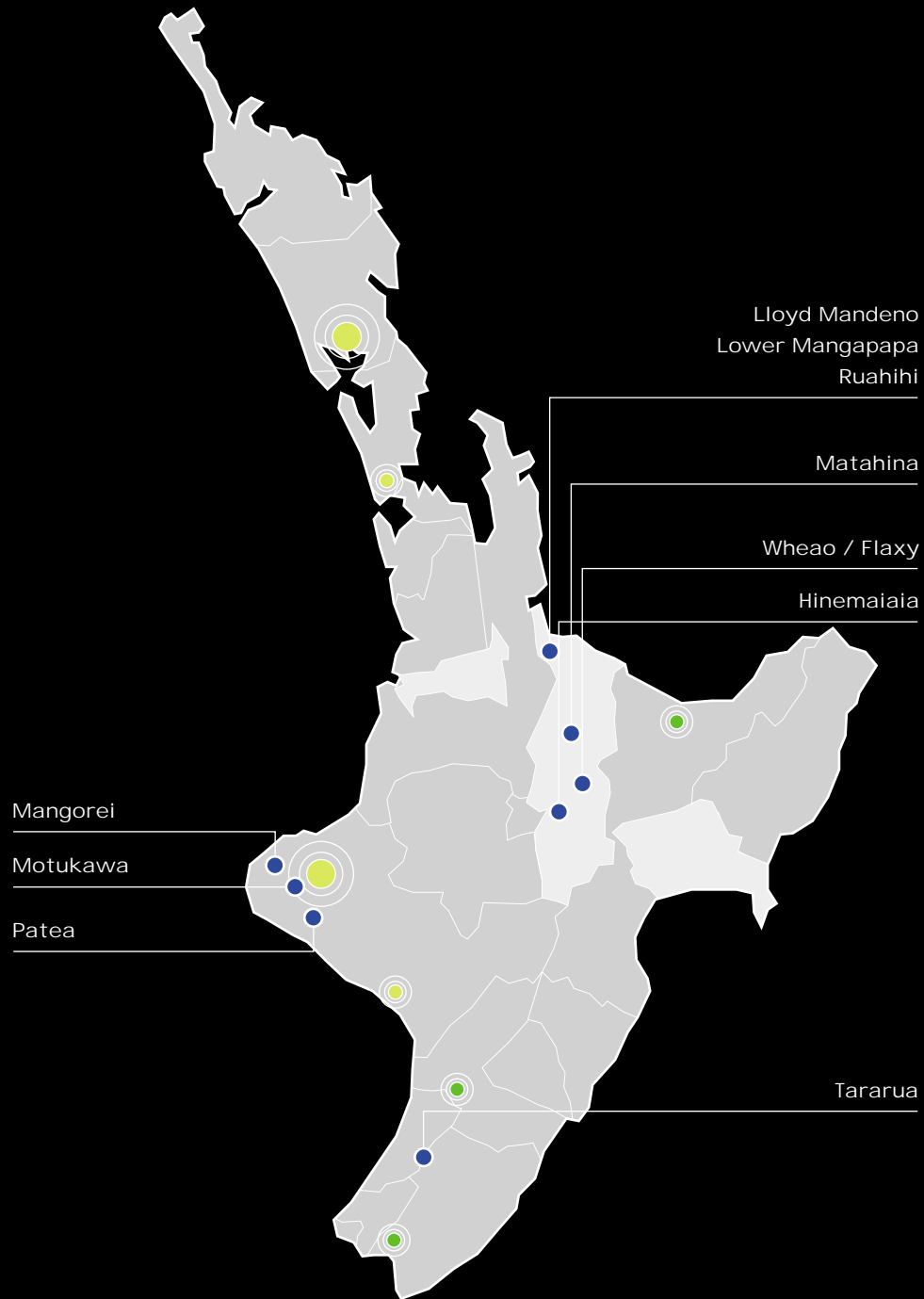
Thirty-three of TrustPower's generation units are small to medium capacity hydro facilities, in some cases integrated with local irrigation, and the other is a medium sized wind farm. The latter, located in the Tararua Ranges in the lower North Island, has an unusually high load factor by international wind farm standards, and can supply the equivalent energy requirements of a small to medium sized New Zealand city.

All of TrustPower's generation is from renewable resources, with no greenhouse gas emissions. This is important as New Zealand moves toward meeting its Kyoto obligation. TrustPower prefers to remain a "green" generator, and to this end is actively involved in the enhancement of existing hydro schemes and the development of new wind farms both in New Zealand and Australia.

The following report outlines each of TrustPower generation schemes, including their location, history, output capacity and environmental impacts.



# North Island Individual facilities and outputs



	Power Station
	TrustPower Incumbant Customer Base
	Commercial and Domestic Customers
	Significant Commercial Customers

Electricity generation in the Wairoa River catchment had its beginnings in 1915 with the construction of a 750 kW plant at Omanawa Falls, followed in 1925 by the commissioning of the McLaren Falls station.

Today, the scheme consists of the 400 kW Kaimai 5 station on a diversion tunnel feeding Lake Mangaonui, the 15,600 kW Lloyd Mandeno station, sited on the west bank of the Mangapapa River, the 6,250 kW Lower Mangapapa station, and 4 km further downstream, the 20,000 kW Ruahihi station. The total annual output of the scheme is 165 GWh.

A further station, McLaren Falls, was decommissioned in 1989 following commissioning of the Ruahihi station, with a bypass installed to allow the release of recreational flows into the Wairoa River on

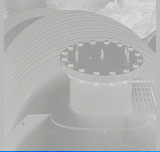
set days each year.

### Environmental

The development of the scheme has resulted in easily accessed recreational fishing grounds. Also, water is released through the McLaren Falls bypass on up to 26 days each year providing high flows for river rafters and the Kaimai Canoe Club.

The occasional spraying of weeds in the Ruahihi Canal is very carefully managed to ensure that any potential adverse environmental effects associated with this action are minimised.

The resource consents for this facility will begin to expire on December 2026.



## Kaimai Scheme (Lloyd Mandeno/Lower Mangapapa/Ruahihi)







## Matahina

The Matahina power scheme has the largest earth dam in the North Island, situated on the Rangataiki River. Construction was approved in 1959 with the scheme finally commissioned in 1967.

After sustaining damage in the Edgcombe earthquake (Richter scale magnitude 6.3) in 1987, the scheme was decommissioned to allow repairs, including a substantial strengthening of the dam to reduce its hazard rating. This work occurred during 1997-98, immediately prior to the TrustPower purchase of the scheme. With a 76 metre gross head of water



behind its 86 metre high dam, the Matahina scheme has two 36,000 kW generators producing an average annual output of 290 GWh. Significant maintenance work was completed on these machines during the decommissioning in 1997-98

TrustPower has constructed an elver pass over the dam. This facility assists young eels - elver - in their upstream migration. Trap and transfer programmes above and below the dam also assist eel migration.

TrustPower is funding further investigation into the downstream migration of adult eels, with the intention of improving trap and transfer programme efficiency.

Existing resource consents for the Matahina Scheme expire in late 2009.

### Environmental

In recognition of the large size of the Matahina dam, and the significance of the eel fishery within the Rangitaiki River to tangata whenua,



## Wheao/Flaxy



The Wheao and Flaxy scheme had its beginnings in 1974, with the scheme being commissioned in 1982. Average yearly production from the scheme is 115 GWh.

Using water from the Rangitaiki River, supplemented with water from the Wheao River and Flaxy Creek, the scheme uses two generators at the Wheao powerhouse delivering 12,000 kW each, with a further 2,225 kW of backup generation from a single induction generator at the Flaxy Power House.

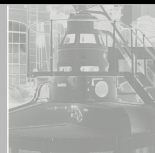
### Environmental

The Rangitaiki canal provides an excellent recreational fishery, and the scheme provides easy access to a fishing ground in the Wheao canal. There is extensive monitoring of epilithic periphyton and water clarity and quality, and a Weed Management Strategy is currently being developed to maintain the fishing grounds in the canal, without inhibiting the flow of water to the station.

Existing Resource Consents for the scheme expire in late 2026.



The Hinemaiaia scheme had its beginnings in 1939 in a quest to develop an electric power supply for Taupo, with power eventually being generated in late 1952, from the HA station (800 kW from a single synchronous generator) and fed into the national grid in 1958. In 1982 a second machine was commissioned in the HA powerhouse, adding 1,450 kW to the output. The HB (1,350 kW) and HC (2,850 kW) stations were commissioned in 1966 and 1982 respectively. Today the scheme provides a annual output of 30 GWh or close to 10% of the power requirements of Taupo.



## Hinemaiaia

into a productive wetland with protection being offered by restricted public access. In addition, the riverbed below the Hinemaiaia B (HB) powerhouse supports a productive trout spawning area. As a reflection of the significance of this stretch of the Hinemaiaia, TrustPower has agreed to maintain three cubic metres per second flow below the HB station, where inflows into the HA Lake permit, to address concerns that the dams may inhibit trout migration up the Hinemaiaia River and that fluctuating levels may contribute to downstream

erosion. To address concerns that periodic dredging of the HA Lake to maintain sufficient storage depth for water storage generates adverse effects, TrustPower has commissioned scientific investigations, the results of which indicated that the dredging has no major long-term effects.

Resource Consent applications have been lodged for all stations in the scheme, with the re consenting process expected to be finished in 2003.

### Environmental

Hinemaiaia A (HA) Lake has developed





## Motukawa

Adopted in April 1923 and commissioned in January 1927. The Motukawa scheme uses 99 metres of an available 122 metre difference in elevation between the Manganui River near Tariki and the Waitara River near Motukawa to drive three generating sets, the last of which was added in 1938. To provide temporary power during construction, a 200-kVA hydro plant, the remains of which still exist today, was constructed at the headworks near Tariki.



With a total capacity of 4,600 kW, the Motukawa scheme has an average annual output of 25.8 GWh.

### Environmental

New gates and race works have reduced flooding of local farmland due to high rainfall, when the diversion canal drains an adjacent catchment, and Lake Rataipiko rises to spilling level during periods of high inflow.

Although eel and other native species are currently unable to pass through the scheme, the planned introduction of fish and eel passes will greatly reduce the magnitude of

this impact.

TrustPower has also agreed to fund extensive riparian planting in catchment areas, to improve water quality and fish habitat.

In 2001 the Environmental Court granted resource consents for the Motukawa scheme, thus allowing the scheme to operate (within the conditions of these consents) for another 20 years.



## Mangorei

Originally constructed in 1904 to use water from the Waiwakaiho River, the Mangorei Power Station first supplied power in 1906 - for street lighting in New Plymouth and 41 customers. A steady increase in demand for electricity resulted in plans to store water for generation purposes behind a dam across the Mangamahoe Stream, with work finally



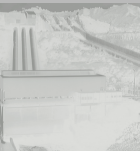
starting in 1930. Said at the time of its completion in 1931 to be the highest earth dam in Australasia, the 25 metre high dam supplies water via two tunnels to three 1,300 kW and one 700 kW horizontal generating sets.

With a total capacity of 4,500 kW, the Mangorei power scheme has an average annual output of 20.9 GWh.

### Environmental

To address the potential environmental effects associated with the scheme, TrustPower has installed a fish pass and initiated a regime to maintain a residual downstream river flow regardless of generation requirements.

Resource consent applications to re-permit the existing scheme were approved by the Tairāhaki District Council in 1998 for a 35 year term.



## Patea

Following the start of construction in May 1979, the Patea Hydro Electric Scheme first produced power in May 1984 after construction difficulties including a six month delay due to wetter than normal conditions. The scheme uses an 82 metre high compacted earth fill dam. The fourth highest dam in New Zealand, it also has the distinction of being the first constructed using tertiary sandstone and siltstone as fill materials. This dam impounds Lake Rotorangi, which is the longest man made lake in New Zealand.

With three 10,400 kW vertical Francis turbine and generator sets, the scheme has a total capacity of

31,700 kW and an average annual output of 118 GWh.

### Environmental

As a reflection of the significant eel fishery up and down stream of Patea Dam, an elver pass has been constructed and commissioned along with a programmed maintenance regime. An active trap and transfer programme, partially funded by TrustPower, is also in operation, and spillway gate operations are timed to facilitate downstream migration of mature eels.

The Resource Consents for the Patea scheme expire in 2006.





## Tararua

Located on 700 hectares of private sheep and beef farming land high in the Tararua Ranges, the Tararua Windfarm was commissioned in 1999 with 48 turbines, and the capacity for future expansion to 103 units.

With average wind speeds of 35 kmh 85 percent of the time, the scheme's performance ranks amongst the best in the world in terms of load factor.

Each turbine is mounted on a steel lattice tower, with three blades each having a length of 23.5 metres. The blades have full automatic feathering capacity to ensure the turbine maintains a relatively constant speed, and the turbines are able to turn on their towers (known as yaw) to capture winds from different directions.

With a rated capacity of 31,700 kW, the Tararua Windfarm has an average annualised output of 136.7 GWh.

A project is planned to expand the Windfarm with the addition of a further 55 turbines.

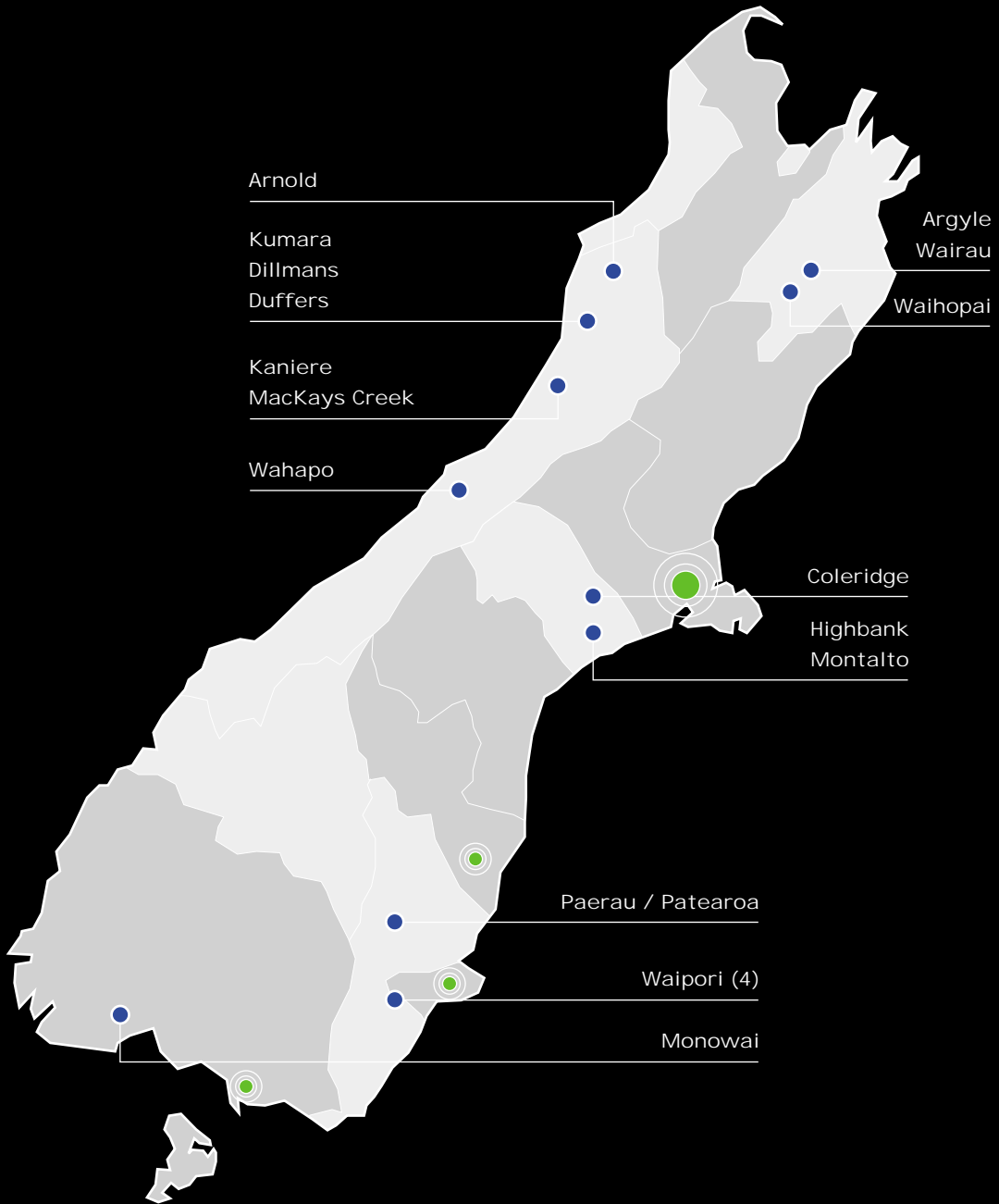
## Environmental

The Tararua Wind Farm is an excellent example of clean, green, renewable energy generation, with the only potential effect being visual impact, due to the appearance of the wind towers on the skyline, and noise made by the turbine blades rotating in the wind. Significantly, during Resource Consent hearings for the scheme, the visual impact of the Tararua Windfarm was adjudged to be minor. Today the Windfarm is a major tourist attraction for the local area and it is well supported by the local community.





# South Island Individual facilities and outputs



	Power Station
	TrustPower Incumbant Customer Base
	Commercial and Domestic Customers
	Significant Commercial Customers



## Waihopai



Construction of the Waihopai power station began in June 1925, with its power output first supplying Blenheim and the surrounding area in August 1927.

Originally of 1,000 kW capacity, and intended to supply the entire Marlborough province, the Waihopai scheme was expanded to meet growing demands for electricity through the installation of diesel generating sets in 1930 and 1937. Plans to increase capacity during 1943 were blocked due to Government wartime import restrictions. In 1996 a new 2,000 kW generator and turbine were installed to replace one of the existing 500 kW units. This and other upgrade work has seen the scheme's maximum output increase from 1,000 kW to 2,500 kW, with an annual generation output of 11.8 GWh.



### Environmental

TrustPower is finalising positive discussions with various interest groups, based on scientific investigations into the effect of this scheme on the upstream and downstream fisheries (both native and exotic). The dam's continued effect on the level of aggregation in the bed of the Waihopai River is also being considered in close consultation with Marlborough District Council and other potentially affected parties, in an effort to determine a fair

and reasonable outcome for all.

These investigations are progressing, and are being used to support the Resource Consent renewal application, lodged on 31 March 2001. The Existing Resource Consents expire on 31 October, 2001.



## Branch River (Wairau/Argyle)



Investigations into the feasibility of Branch River Power Scheme began in 1978, and following a detailed investigation in 1980 finance was approved with construction beginning soon afterwards. Canal filling commenced in March 1983, with generation commencing at the Wairau power-house in June, and at Argyle two months later.

A run of the river scheme with daily storage, the Wairau and Argyle stations have one generator each, giving a combined output of 11,000 kW and an average annual output of 54.3 GWh.

### Environmental

Resource Consent applications seeking a re-permitting of the Branch scheme were lodged in mid

1999. In early 2001 the Marlborough District Council Resource Consents for the scheme for a term of 35 years.

Consent conditions within the new consents, were developed through close and robust consultation to recognise the desire of local fishermen and Fish and Game New Zealand to consolidate the fishery within Lake Argyle, and enhance the fishery upstream of the Branch River intake by re-design of the existing fish pass. The fish pass design has been completed and installation will be completed by the end of November 2001. State of the art video facilities are included to record fish passage events.

A Memorandum of Understanding has been entered into with Tangata



Whenua to ensure an ongoing effort to improve the eel fishery. A further enhancement in the form of an elver pass is to be installed in the near future at the Branch River intake.



## Arnold

The 3,000 kW Arnold power station was commissioned in 1932. Due to high rainfall in the region, the “run of the river” Arnold scheme is able to generate at high capacity all year without any need to control the level of Lake Brunner which feeds it. A dam across the Arnold River provides the increase in water levels required for the station’s turbines.

The Arnold station has an average annual output of 25 GWh.

### Environmental

The scheme provides an excellent recreational fishery upstream of the dam, as well as recreational camping and walking areas. A combination of flow over the spillway gates and residual flow past the Arnold Dam ensures the continued stability of the downstream fishery, and availability of the river for kayaking.

Although Resource Consents for the development of an additional 3 MW installed capacity at the existing dam site remain current, TrustPower’s preferred option is

still to develop a larger 60-72 MW scheme based on a 500 Ha lake established in the valley behind the Dobson township. The Dobson proposal will enable a considerable environmental gain, with a proposed land swap delivering high value podocarp forest land into the Conservation Estate, address worsening supply constraints to the West Coast region and top half of the South Island, and will form part of a credible infrastructural asset base for future sustainable development of the West Coast region.



## Dillmans/Duffers/Kumara

The Dillmans/Duffers/Kumara power generation scheme had its beginnings in 1927, with power being generated for the first time in 1928.

The scheme today consists of the Duffers power house, fed by races that in turn feed Kawhaka Creek, downstream artificial lake storage that in turn feeds the Dillmans power house, and the Kumara power house fed by a race from Dillmans.

With heads of 13 metres at Duffers, 46 metres at Dillmans and 78 metres at Kumara, and capacities of 500 kW, 3,500 kW and 6,500 kW respectively, the scheme has an average annual output of 47.9 GWh. The Scheme remains of critical importance to security of supply within the region, especially when Transpower is undertaking maintenance on one

or the other of the existing circuits to the region.

### Environmental

The Dillmans scheme supports a recreational fishery in the Kawhaka catchment, and in the Kapitea Reservoir which is also used for power boating because of its predominantly wind free nature. The reservoir also acts as a buffer against flood events in the lower catchment, while the Wainihinihi race system supports Wheao or Blue duck breeding pairs.

Overall the scheme has been responsible for the development of excellent roading to provide public access for a wide range of recreational pursuits including fishing, shooting, canoeing, tramping and fossicking. In terms of

environmental impacts, the Kawhaka intake acts as an impediment to the upstream migration of some native species, but the planned future installation of a fish pass will alleviate this. Potential impacts of the occasional draining of the Kawhaka race for maintenance purposes are minimised by close consultation with Fish and Game West Coast, and efforts to carry out this maintenance, whenever possible, outside the spawning season.

The West Coast Regional Council granted Consents resource for a period of thirty five years during March 2001. In keeping with compliance conditions required by the new consents the residual flow at the Kawhaka Creek has been increased to the required level.



## Kaniere Forks/MacKays Creek



Fed from Lake Kaniere via some 9km of races, and discharging into the Kaniere River, the twin generator Kaniere Forks power station was commissioned in 1911 with 60Hz output. At the expense of some output capacity, it was converted to 50Hz in 1931 to allow synchronisation with the nearby MacKays Creek station.

With a rated capacity of 430 kW, the station has an average annual output of 3.75 GWh.

The MacKays Creek scheme is supplied via a weir and race from the Kaniere River. Commissioned in 1931 to supply local gold mining operations, it has a head of 33 metres, with a rated capacity of 1,100 kW and an average annual output of 8 GWh.

### Environmental

The scheme provides an historic walkway, which is shared with the

public and the Department of Conservation.

Existing Resource Consents for the Kaniere Forks/MacKays Creek scheme begin to expire on 26 May, 2010. The Scheme is sited predominantly on Department of Conservation estate. A recent licence agreement entered into with the Department has strengthened the working

relationship between Trustpower and the Department, for the ultimate benefit of the environment.

A recent upgrade of the MacKays turbine resulted in all previously greased bearings and brushings being replaced with environmentally neutral water lubricated elastomeric material.



## Wahapo



The Wahapo Power Station, formerly known as the Okarito Forks Power Station, had its beginnings at a public meeting in June 1957, and was commissioned, using a generator set that had previously been employed at the Homer Tunnel project, in 1960.

During 1990 the scheme was redeveloped on the existing site continuing to utilise the natural storage from Lake Wahapo. The station now has a rated output of 3,100 kW and an average annual output of 14.5 GWh.

The Wahapo Hydro Electric Scheme plays a vital role in ensuring the reliability of supply to South Westland, a challenging responsibility in an area of extreme weather patterns and a rapidly growing and highly

successful mainstream and eco tourism area

### Environmental

Due to the continual degrading of the river invert downstream of the lake outlet and recent extreme flood events, access to the lake Wahapo weir and upstream spawning grounds can prove challenging for native fish, while salmon and trout can become trapped in weir rock work when spilling from the scheme is restricted. This can occur once or twice a year, at which time, Fish and Game West Coast are contracted by TrustPower to undertake recovery operations.

Discussions are continuing with the Department of Conservation and Fish and Game with a view to finding



ways of improving fish access within this difficult environment and dynamic catchment.

Existing Resource Consents for the scheme expire in March 2011.

Studies into the suitability of the Coleridge area for hydro electricity generation were completed in 1906. In 1911, in response to a growing need for electricity, particularly from the city of Christchurch, construction began. The Coleridge scheme was the first major hydro development by the New Zealand Government.

Originally commissioned in 1914 with three turbines, the station was progressively expanded with additional turbines introduced in 1917, 1922 and 1925. In 1930 the Acheron River was diverted into Lake Coleridge, increasing the catchment area to more than 800 square kilometres. In 1977 a diversion of the Wilberforce further increased the amount of water available for electricity generation, boosting the 36,500 kW station's average annual output to 205 GWh.

## Environmental

Lake Coleridge has been identified as a good fishing habitat, while a bypass provides a fish passage past the Wilberforce diversion.

Environmental monitoring includes Macrophytes, Macroinvertebrates, Creel and Otoliths, and monthly monitoring of tailrace water clarity, pH and temperature.

Recent upgrades of three of the larger machines and retiring of four of the smaller less efficient machines has resulted in the energy production capability of the scheme being boosted from 205 GWh/year to 300 GWh/year. These gains are a direct result of more efficient use of the water resource.

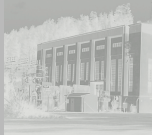
Resource Consents to re-permit the existing scheme were granted in 1998 for a 33-year term.



## Coleridge







## Highbank/Montalto

The Highbank Power station was constructed between 1939 and 1945, as part of a combined project to enhance farm production and generate electricity. Water for the station is collected for the Rangitata River by means of a 66km long irrigation race, which provides water for use by farms in summer, when demand for electricity is lower. In winter, when electricity demand increases, and the demand for irrigation water reduces, the surplus water is used for power generation purposes.

With an installed capacity of 25,200 kW, the Highbank scheme has an average annual energy output of 115 GWh.

The Highbank plant is currently undergoing a substantial electrical and ancillary equipment upgrade including the total rebuild of the 11/66kV switchyard, installation of a hybrid excitation system, 400v local service, 110vDC systems, standby generator, machine circuit breaker, machine protection and generator cooling improvements.

Options for increasing the machine efficiency with the retrofitting of a design optimised runner will be investigated in the near future.

The Montalto scheme had its beginnings in 1958, when design work started on a project to generate electricity utilising the stepped flow of the Rangitata Diversion Race - an irrigation project completed in the early 1940s. Commissioning of the Montalto Power Station, which produces 1,100 kW during the irrigation season and 1,800 kW at other times, was completed in 1982.

Today, the station has an annual output of 12 GWh.

### Environmental

Generation from the Highbank scheme is dependent upon irrigation requirements, which take priority in the irrigation season. The scheme is guaranteed water for four months of the year, but typically generates for between six and eight months, increasing to 11 to 12 months in particularly wet years.

Salmon migrating up the Rakia River can become stranded in Highbank's tailrace in late summer. This is an historical problem, however TrustPower has in conjunction with Fish and Game North Canterbury developed a process, which has every chance of resolving the



matter of fish entrainment.

The current upgrade of the Highbank facility sees a significant reduction of potentially problematic oil on site with the removal of eight significant oil filled transformers. The new single transformer will be fully banded with appropriate monitoring. Potential for spill at the Montalto site too has been removed with the recent control measures installed at that site.

Resource Consents governing the operation of the Highbank and Montalto power schemes expire on 31 October, 2001. Application and associated supporting documentation for Resource Consent applications, to re-permit the schemes for a further 35 years, have been lodged in conjunction with the Rangitata Diversion Race consent. The Rangitata Water Conservation Order hearings are currently in progress. The Tribunal will continue hearings until the end of November 2001. These hearings are likely to determine when the Resource Consent hearings will take place.



## Paerau/Patearoa

The Paerau and Patearoa Power Stations are built within an irrigation scheme that impounds a winter watershed behind the Loganburn dam, for release into the Taieri River during summer. The Power Stations use run of river flows through winter with the Paerau Station passing all irrigation flows through summer, during which time the Patearoa Station is normally shut down.

Commissioned in 1984 along with the Patearoa Station, the Paerau Power Station operates by diverting the

flow of the Taieri River using a substantial weir structure, which maintains the water level in the scheme while allowing floods and minimum river flow to pass. The water flows along an aquaduct and a 1.3km tunnel before reaching the Paerau station and its twin turbines.

Output capacity of the Paerau scheme is 10,000 kW with an average annual output of 50 GWh.

The Patearoa Station draws from a ponding area which also feeds a 35km irrigation scheme, fed by the Paerau Station. When low river flows occur during summer, supplementary flows are released from the Loganburn Reservoir formed adjacent to the

Great Moss Swamp, to ensure minimum river flows are maintained and that sufficient irrigation water is available to the scheme.

With a twin turbine driving a single induction generator, the Patearoa station has a rated capacity of 2,500 kW and an annual average output of 12 GWh.

### Environmental

Resource Consents for the Paerau/Patearoa schemes were approved on 20 April 1999 for a 35 year term. Application of the company's strong environmental policies ensures the operation of this scheme remains full compliance with all consent conditions.





## Waipori



The Waipori Scheme consists of four generation stations. Waipori 1A, delivers 12,000 kW, and Waipori 2A, 3 and 4 deliver 57,000 kW, 7,000 kW and 8,000 kW respectively.

Commissioned in 1902 by the Waipori Falls electric Power Company, the scheme was purchased by the Dunedin City Council in 1904 and delivered its first electricity in 1907.

The scheme has a total average annual output of 215 GWh. As a responsible owner TrustPower is investigating various potential efficiency enhancement options for future consideration.

### Environmental

While supporting a valued sports fishery, Lake Mahinerangi is also recognised as possessing areas of reasonably high amenity value. Downstream of the lake, the Waipori River provides a valuable in-stream habitat for a number of native and exotic fish species.

The existing Resource Consents for the scheme expire on 31 December, 2001. In preparation for lodgement of the permitting application during March 2001 a number of scientific investigations were undertaken and these continue to be developed in consultation with interested parties. These include studies into the productivity of the

lake shoreline, the need to provide sanctuaries for endangered native fish species, recreational assessment, weed management, lake and stream ecology and the need to control downstream the amount of water discharged from the Waipori 4 Station. Community consultation has been extensive and constructive. Ongoing consultation with Tangata Whenua on matters relating to elver transfer, adult eel passage and suitable monitoring remains positive. Public notification of consents is planned for November 2001 with hearings by Otago Regional Council anticipated to occur in early 2002.



## Monowai



With a rated capacity of 6,000 kW, the Monowai station has an average annual output of 34 GWh.

The scheme is undergoing a number of plant upgrades which have included retrofitting of new prime mover controllers and a CITECT data acquisition system to enable remote control functions. Within the current financial year, the Automatic Voltage Regulators on all machines will be renewed providing greater reliability and plant stability.

process has been progressed through a working party approach. Primary issues being exhaustively worked through relate to fish access, eel migration and residual flows. Ultimately the resolution of these issues, together with further potential environmental enhancement programmes, will serve to protect and enhance the values of the area. It is anticipated that Environment Southland will confirm a hearing date during December 2001.

### Environmental

Lake Monowai is regarded as being a sport fishery of some note (with trout being the dominant species available), while also being recognised for its freshwater and terrestrial values. Levels in Lake Monowai are controlled in accordance with guidelines set by the Guardians of Lakes Manapouri, Monowai and Te Anau.

The existing consents for the Monowai scheme expired on 31st October 2000. The re-consenting

Construction of the Monowai Power Station began in 1922, and was completed in late 1924 with the official opening taking place in May the following year. The station initially had two generating sets, with a third being added in 1927.

Fed by the 31 square km Lake Monowai about 8.5km away, the station has a head of 48.2 metres.





