



Clyde Dam development

Impacts on local economy

Report to Contact Energy Limited

21 April 2009

Preface

The New Zealand Institute of Economic Research (NZIER) is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

NZIER was established in 1958.

Authorship

This report has been prepared at NZIER by Johannah Branson. The assistance of Peter Bailey is gratefully acknowledged.

8 Halswell St, Thorndon
P O Box 3479, Wellington
Tel: +64 4 472 1880
Fax: +64 4 472 1211
econ@nzier.org.nz
www.nzier.org.nz

NZIER's standard terms of engagement for contract research can be found at www.nzier.org.nz.

While NZIER will use all reasonable endeavours in undertaking contract research and producing reports to ensure the information is as accurate as practicable, the Institute, its contributors, employees, and Board shall not be liable (whether in contract, tort (including negligence), equity or on any other basis) for any loss or damage sustained by any person relying on such work whatever the cause of such loss or damage.

Executive summary

Electricity generation is a major commercial use of water in Central Otago. Using water in this way has benefits for the operators of a hydro scheme and consumers of its electricity, but also a variety of impacts on the environment and third parties. These third-party impacts include the benefits to the local economy of additional direct and indirect business and employment resulting from the construction and operation of the scheme. They also include impacts on recreational activities on and around the associated river or lake (e.g. fishing, boating, tourism), whether the scheme displaces existing activities or creates opportunities for new activities.

In this brief report, we explore the impacts of the Clyde Dam on population, employment and recreational activities in the surrounding area during and after its construction.

According to census data, during construction of the dam, population and employment in nearby towns grew by more than the number of workers moving into the area to work on the dam. This additional growth was due in part to dam workers bringing their families with them, but also to employment opportunities created in businesses supplying goods and services to dam workers and their families. The flow-on effects, as dam workers spent their incomes in local towns, further boosted economic activity and attracted yet more people to move to the area for work.

Although population and employment in nearby towns fell after construction of the dam was completed, they remained higher than before construction started. It was mainly jobs in building, construction and related sectors that were lost, but some dam workers and their families stayed on in the region. In the years following completion of the dam, the demand for workers grew in other sectors, particularly sales and hospitality, as tourism and recreational activities developed around Lake Dunstan, which was formed as a result of the dam.

These data, although specific to the Clyde Dam and surrounding area, demonstrate how a hydro scheme can have positive impacts on population, employment and recreational activities in the local region, not only during construction of the dam, but also permanently.

Contents

1. Purpose	1
2. Clyde Dam development	1
3. Population	2
4. Employment	3
5. Tourism	5
6. Conclusions	7

Figures

Figure 1 Population of selected Central Otago regions	2
Figure 2 Employment in selected Central Otago regions	4
Figure 3 Employment in three sectors – Alexandra and Cromwell combined	5
Figure 4 Percentage of employment in sales and hospitality	6
Figure 5 Average annual incomes	7

1. Purpose

The principal purpose of a hydro-electric power station is to harness a natural, renewable resource – specifically, water – to create a useful and valuable product – namely, electricity. This has beneficial consequences for the operators of the hydro scheme and consumers of its electricity, but also a variety of impacts on the environment and third parties, of relevance to considerations under the Resource Management Act 1991.

These third-party impacts include the benefit to the local economy of additional direct and indirect business and employment resulting from initial construction and ongoing operation of the hydro scheme. They also include any existing recreational activities displaced, and opportunities for new recreational activities created, as a consequence of the scheme (e.g. fishing, boating, tourism). Locally, the largest impacts are the increase in population and employment during the scheme's construction and the change in available recreational activities on and around the associated river or lake.

Electricity generation is a major commercial use of water in Central Otago.¹ In this brief report, we explore the impacts of the development of the Clyde Dam on population, employment and recreational activities in the surrounding area.

2. Clyde Dam development

The Clyde Dam is New Zealand's third largest hydro-electric dam. It is located on the Clutha River, near the town of Clyde in Central Otago, around 90 kilometres east of Queenstown. The Clyde Dam is owned and operated by Contact Energy Limited. It has a net 60 metre head of water and installed capacity of 432 MW.

The Clyde Dam was built over the period 1977 to 1989. One million cubic metres of concrete were used in its construction. Damming of the river caused the formation of Lake Dunstan in Cromwell, covering 26.4 square kilometres. This lake inundated part of the original township of Cromwell, which was relocated.

Three towns – Alexandra, Cromwell and Clyde – are located within a 20 kilometre radius of the dam. Construction of the dam had major impacts on these three towns through significant growth in population and employment, as well as expansion in recreational activities following the formation of Lake Dunstan.

Statistics New Zealand's five yearly census of population and dwellings has recorded the changes in the region's population and employment. These data show the influence had by the Clyde Dam development on the region's population and employment during and after construction. Census data on employment by industry

¹ See BERL (2008) *Central Otago District Economic Impact Assessment : Commercial Water Use*, report to Central Otago District Council.

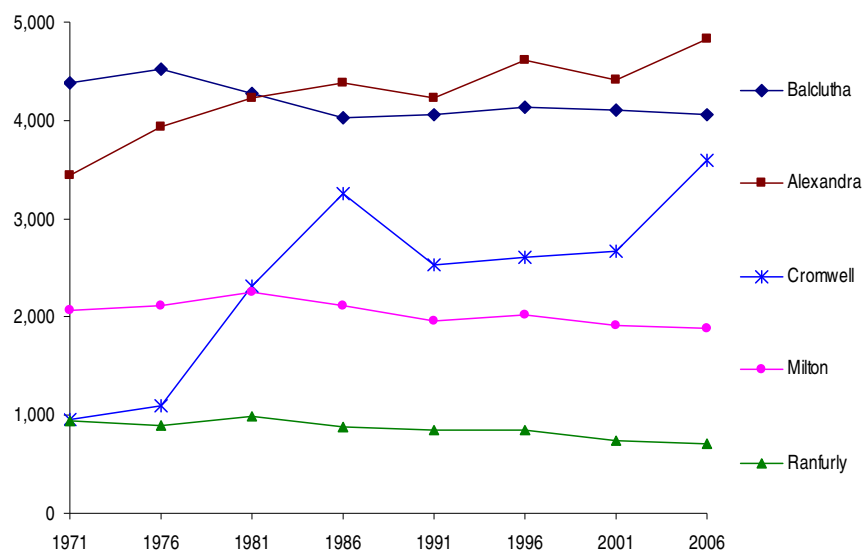
in Cromwell indicate how Lake Dunstan may have influenced the development of a tourism industry based in the town.

3. Population

Most of the people employed to build the Clyde Dam moved there from outside the region in the late 1970s and early 1980s. From before construction in 1976 to the height of construction in 1986, the population of Alexandra grew by 449 people and the population of Cromwell grew by 2,159 people.² Over the same period, the populations of similar Central Otago towns declined slightly, as shown in Figure 1.

Figure 1 Population of selected Central Otago regions

Normally resident population



Source: Statistics New Zealand Census of Population and Dwellings various years, NZIER

The combined population of Alexandra and Cromwell grew by over 2,600 people during construction of the Clyde Dam, yet only approximately 1,000 people were employed to work on the dam at the peak of construction in 1986. This implies that for every person employed to work on the dam, the area's population grew by a further 1.6.

This additional population growth was due in part to dam workers bringing their families with them in moving to the area, but also to employment opportunities created in businesses supplying goods and services to the growing population. The flow-on effects, as dam workers spent their incomes in Alexandra and Cromwell, increased economic activity and encouraged more people to move to the area for work.

² Population data for Clyde were not collected by the census in 1976.

The fear of many local business owners that the area's population and economy would shrink following completion of the dam proved to be largely unfounded in Alexandra, but true to some extent in Cromwell and Clyde. Between 1986 and 1991, about 160 people or 4% of Alexandra's population left the town. By 1991, the population of Cromwell, where most of the dam's workers had accommodation, had fallen by about 700 people or 28%. Clyde's population fell by around 150 people or 17% in the five years to 1991.³

Although the populations of Cromwell and Clyde, and to a lesser extent Alexandra, shrank following completion of the dam, at no time have the normally resident populations of any of these towns been smaller than they were before work on the Clyde Dam commenced. Alexandra's population grew a net 40% between 1971 and 2006. Cromwell's population is estimated to have almost trebled in the 30 years to 2006. The population of Clyde in 1996, at its lowest level post completion of the dam, was still over double what it was in 1976. Of the estimated 2,600 people to arrive in the three towns in the 1970s and 1980s, fewer than 1,100 had left by 1991 – a net gain of over 1,500 residents. Over the same period, the population of the whole of Otago grew by 6%, with many towns of a similar initial size as Alexandra and Cromwell declining in size.

Possibly an important factor encouraging people to stay in the region after the dam's construction was the lack of employment opportunities elsewhere in New Zealand. At the time that Clyde Dam construction workers were completing their contracts, unemployment around New Zealand was rising. By December 1990, the national unemployment rate was 8.6%. From June 1991 to March 1993, unemployment remained above 10%. It is likely that many Clyde Dam workers found it difficult to find employment elsewhere in New Zealand and therefore stayed on in Alexandra, Cromwell or Clyde.

4. Employment

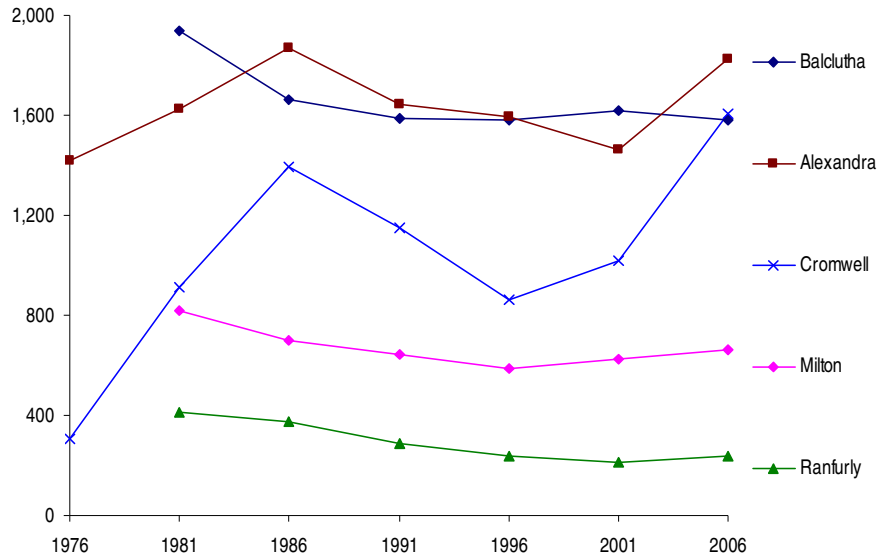
The number of people in full-time employment in Alexandra, Cromwell and Clyde increased along with population as the Clyde Dam was constructed. In Alexandra, the number of people in full-time employment rose by an estimated 447 between 1976 and 1986. In Cromwell, the number of people in full-time employment rose by an estimated 1,088 over the 10 years to 1986.⁴ Employment data for these and other Central Otago towns are displayed in Figure 2. The impacts of the Clyde Dam development on employment in Alexandra and Cromwell are clear.

³ The dam was opened in 1989, generation was commissioned in 1992 and officially opened in 1994; Young, R., Smart, G. and Harding, J.S. (2004) Impacts of hydro-dams, irrigation schemes and river control works, in Harding, J.S., Mosley, P., Pearson, C. and Sorrell, B. (eds) *Freshwaters of New Zealand*, New Zealand Limnological and Hydrological Societies, Christchurch..

⁴ We use the change in population for 1976 to 1981 and the ratio of population growth to employment growth from post 1981 to estimate the change in employment between 1976 and 1981 in Alexandra and Cromwell.

Figure 2 Employment in selected Central Otago regions

Number of people employed



Notes: 1976 values estimated for Alexandra and Cromwell

Source: Statistics New Zealand Census of Population and Dwellings various years, NZIER estimates

Employment growth in Alexandra and Cromwell followed a similar trend as population growth. The number of people in full-time employment in Alexandra and Cromwell increased by an estimated 1,535 in the 10 years to 1986 and then fell by 801 in the 10 years to 1996 – a net gain of 734 full time jobs between 1976 and 1996.

Over the same 20 year period, full-time employment increased in many regions of New Zealand. The net employment growth between 1976 and 1996 in Alexandra and Cromwell relative to the 1976 population was 42%, whereas national growth in full-time employment over the same period was a much smaller 22%.⁵ Over the last five years, employment in these two towns has again grown considerably more than in similar regions around Otago.

The observed growth in full-time employment in these two towns from the late 1990s is undoubtedly partly due to the region's growth in popularity as a domestic tourist destination. Tourism and many of the region's recreational activities have developed around Lake Dunstan, formed as a result of the Clyde Dam.

⁵ We are unable to compare employment growth in Alexandra and Cromwell with employment growth in similar sized Central Otago towns due to a lack of employment data for before 1986.

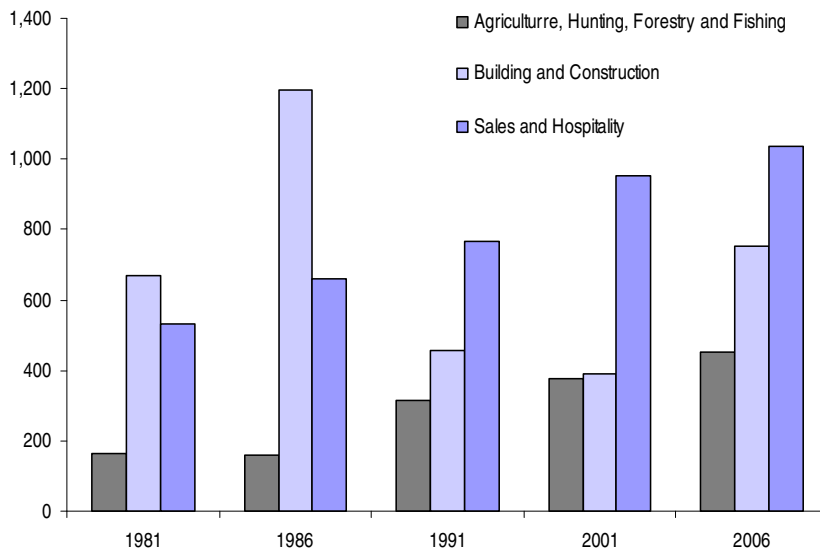
5. Tourism

In 1986, over 15% of all people working in Alexandra and 60% of all people working in Cromwell were employed in building and construction. As a comparison, in Balclutha in 1986, about 8% of the working population were employed in building and construction. On completion of the Clyde Dam, it was mainly construction and related jobs that were lost. By 1991, the number of people employed in building and construction had fallen to around 9% of people employed in Alexandra and 22% in Cromwell.

In the years following completion of the Clyde Dam, the demand for workers grew in other sectors in Alexandra and Cromwell. The sector showing the largest increase in employment in the 20 years to 2006 was sales and hospitality (comprising wholesale and retail sales, accommodation, cafes and restaurants). The number of people employed in this sector rose by 105 between 1986 and 1991 and a further 186 between 1991 and 2001, as shown in Figure 3.

Figure 3 Employment in three sectors – Alexandra and Cromwell combined

Number of people employed



Source: Statistics New Zealand Census of Population and Dwellings various years, NZIER

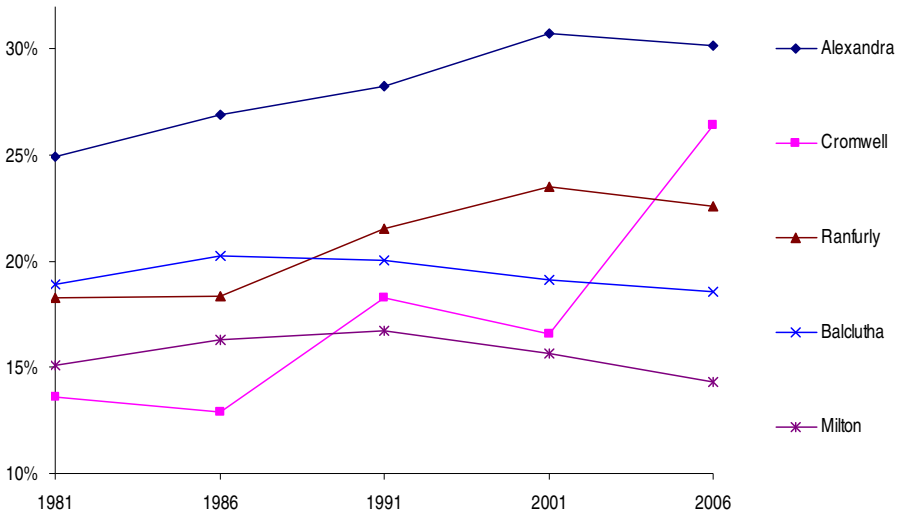
The growth in sales and hospitality indicates the growth in importance to the region of tourism. A large number of the region's visitors appear to be families from the surrounding areas, returning during holiday periods and for weekend breaks. The 2005 Clyde community plan estimates that as many as 40% of the houses in Clyde originally constructed to accommodate Clyde Dam employees are now used as holiday homes.⁶ It appears that the area had enough attractions, and possibly houses

⁶ Central Otago District Council (2005) *Clyde Community Plan*, www.codc.govt.nz/assets/pdfs/documents2006/clyde_plan_final_with_photos.pdf

were sufficiently cheap, for families to purchase holiday homes in the town. A similar combination of recreational activities on Lake Dunstan and cheap houses in the years after completion of the Clyde Dam has attracted families to buy houses in Cromwell and, to some extent, Alexandra.

The growth of sales and hospitality employment is shown more clearly in Figure 20.

Figure 4 Percentage of employment in sales and hospitality



Source: Statistics New Zealand Census of Population and Dwellings various years, NZIER

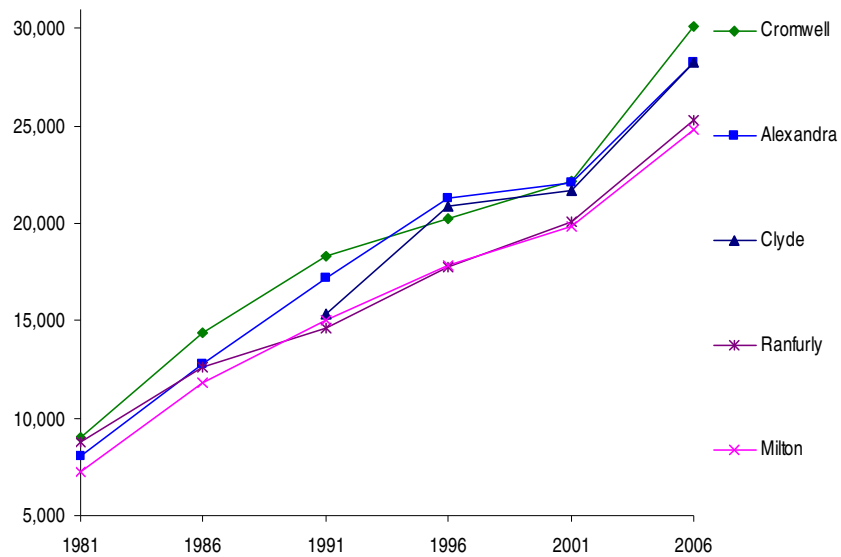
Incomes in Cromwell grew rapidly, as employment in sales and hospitality grew in the five years to 2006, as shown in Figure 5.

Although it is possible that tourism would have developed in the region without the influence of the Clyde Dam development, it is very unlikely to have developed to nearly the same extent. Other regions, which have many of the same attractions as Cromwell with the exception of the lake, attract far fewer visitors. It seems that many of the non-resident visitors to the region are attracted by the lake or the ambience it creates.

The attractiveness of the lake would have had both direct and indirect positive benefits for the region's population and employment. The availability of recreational activities would have encouraged people to settle or to holiday in the region. This, in turn, would have had a positive impact on employment opportunities in the tourism industry, attracting further people to the region.

Figure 5 Average annual incomes

\$



Source: Statistics New Zealand Census of Population and Dwellings various years, NZIER

6. Conclusions

The data presented in this brief report, although specific to the Clyde Dam and surrounding area, demonstrate how a hydro scheme can have positive impacts on population, employment and recreational activities in the local region, not only during construction of the dam, but also permanently.