

The Treasury

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Chair
Cabinet Economic Growth and Infrastructure Committee

Driving Economic Growth by Delivering on the Potential of Irrigation

Proposal

1. This paper reports back to Cabinet with advice on the economic opportunity arising from irrigation infrastructure investment and provides further advice on:
 - a). the form of the government's involvement in major irrigation projects (for example, in terms of leadership, facilitation and funding);
 - b). the likely scale of the government investment that will be required, and the potential timeframes involved;
 - c). possible funding models and investment options, including the potential for Public Private Partnerships, and opportunities for local government, private sector and Iwi investment;
 - d). benefits and risks;
 - e). how the proposed programme fits within the broader context of the work currently being undertaken on water-related issues (including the work of the Land and Water Forum).
2. This paper outlines the rationale for Government intervention in the development of water storage and irrigation infrastructure, and proposes a two staged approach to accelerate realising economic growth through irrigation. The first stage would target advancing proposals to the 'investment- ready' prospectus stage. The subsequent stage would potentially see Crown involvement in part-financing the construction of schemes where barriers to raising capital exist.
3. The paper responds to Cabinet Strategy Committee Minute STR Min (10) 11/1.

Executive Summary

4. Agriculture, and the water resources that underpin it, are of key strategic importance to our economy. There is significant potential for further irrigation, with 14 major schemes in development across New Zealand. If all of these proceed they would deliver new irrigation to 347,000ha

nationwide, including 270,000 ha in Canterbury over the next 15 years. The total capital investment required to support this development is about \$9 billion - off farm construction costs of about \$2.7 billion and on-farm capital development costs (including on farm irrigation equipment, milking shed, livestock, Fonterra shares etc), of about \$6.4 billion.

5. This development will require water harvesting and involve storage and distribution networks that are larger in scale, cost and complexity than existing local schemes. Private sector financing will be necessary requiring appropriate returns on investment.
6. None of the 14 schemes currently being investigated are yet at a stage of requiring investment capital for construction - substantial work is required to get these proposals to an investment ready stage.
7. Officials have identified the following barriers to getting these irrigation proposals to an investment ready stage:
 - a). There is a problem in co-ordinating interested parties (farmers, regional authorities, banks, third party investors) to agree to participate in a particular project so that it has critical mass;
 - b). A step change from current practice in many local scheme developments to high standards of commercial governance, scheme financing and commercial practice.
8. In addition, officials have identified the following challenges to getting investment ready irrigation schemes financed through the construction phase:
 - a). The regional scale scheme proposals will require third party investment, and probably multiple investors;
 - b). Water storage and irrigation infrastructure is not well understood by financial markets.
9. Prima facie there are indications that many of the potential irrigation schemes would increase agricultural productivity resulting in increased exports and are worth investigating further. Officials' advice is that the Government could play a useful role in overcoming the above impediments to projects reaching the starting line.
10. General equilibrium modelling suggests that additional irrigation has the potential to increase our agricultural exports by over \$4 billion p.a. by 2026. The modelling also suggests that by 2035 GDP would be 0.8% p.a. above what it would have been without this development.
11. While considerable effort was put into developing the analysis supporting the preparation of this paper MAF advises caution about using these results as business cases for individual schemes. Robust economic and

financial analysis is required on a scheme by scheme basis before decisions to proceed to construction – it is likely that some of the current propositions may not be proven to be commercially viable.

12. Large scale irrigation schemes are an immature financial asset class in the sense that financiers do not understand the demand (farmers uptake of irrigation water) and supply (hydrological, regulatory and ownership issues) risks and therefore are likely to look to a public partner to underwrite these risks. These crucial issues will need to be addressed on a case by case basis when the economic and financial viability of individual schemes are established.
13. It is important that any development be undertaken sustainably and within Local Government regional water strategies that provide for the integrated management of regional water resources to balance economic development opportunities with cultural, environmental, fisheries and recreational values.
14. Any Government activity in this area therefore needs to be very carefully applied, so as not to disrupt or cut across existing activity by affected communities and Local Government. Institutional arrangements (i.e. how any Government activity would be governed, managed and implemented) will also need to be carefully thought through in the very near future. It would also need to crowd in rather than crowd out private sector investment.
15. There are a number of regulatory and environmental issues that are being addressed as part of the New Start for Fresh Water programme and the Land and Water Forum process. While this work will help address some of the issues around further irrigation development, it will not address the issues identified in this paper around the need for new business models.
16. A two staged initiative to accelerate realising economic growth through increased water storage irrigation is proposed. The first stage would see funding target advancing proposals to the 'investment-ready' prospectus stage. The subsequent stage would potentially see Crown involvement in part-financing construction of schemes where barriers to raising capital exist.
17. The first stage would involve a funding programme, matched 50/50 with the private sector, to obtain high quality technical and financial advice to create a step change in the governance and the quality of proposals (including detailed financing options). This intervention reflects the scale and complexity of regional scale rural water infrastructure developments which are greater than previous schemes and which would necessarily require third party finance. Some of the wider objectives of the current Community Irrigation Fund, including support for the development of regional water management strategies, would be retained.

18. Subsequent to schemes becoming ‘Investment Ready’ Crown equity participation in construction is proposed for qualifying proposals. The extension to the Crown taking an equity stake recognises that irrigation schemes are an immature asset class. The Crown providing an early signal that it is prepared to invest in schemes that are demonstrably economic and financially viable might encourage a wider range of equity investors (irrigation proponents, local government, iwi, third party financiers) to participate. That is, Crown involvement might ‘crowd in’ other investors. The extent to which Crown investment would ‘crowd in’ or ‘crowd out’ investment is uncertain at this time. There is a trade off between fiscal cost and opportunity cost of using Crown funds for this purpose and the likelihood that Crown investment will accelerate scheme development and thereby drive economic growth.
19. Subject to Ministers’ decision further work will be required on institutional and governance structures, how best to influence existing regional processes already in train, and on identifying the Government’s investment criteria for assessing potential projects.

Context for Irrigation

20. The agriculture sector is of strategic importance to our economy. The sector is our largest export earner and its success underpins our national prosperity. Global demand for food is increasing at the same time as global food production is being constrained by restricted access to water and other inputs. Water is a critical determinant of productivity in the agriculture sector and increased productivity from the sector would contribute positively to the Government’s Economic Growth Agenda. Unlocking reliable water resources, through well designed water storage and irrigation infrastructure would drive economic growth.
21. Investment in irrigation infrastructure has the potential to deliver this through:
 - a). Increased production and better utilisation of existing resources;
 - b). Diversified land use and a wider range of high value crops;
 - c). Certainty of production and access to high value markets;
 - d). Improved farm business risk management;
 - e). Providing a buffer for regional and national economic shocks from droughts and climate change;
 - f). More economic and competitive use of value-added processing facilities.

22. The currently irrigated area throughout New Zealand is approximately 620,000 ha¹. This area comprises a combination of individual irrigators and local community-based irrigation schemes. Water is sourced mainly from run-of-river and groundwater resources, which in most places with major irrigation potential, has reached or is reaching the limits of allocation, and is often unreliable in dry weather.
23. Irrigation development also has associated environmental impacts. Direct impacts include changes in river flows and ground water levels. Changes in land use and the intensification of production systems associated with irrigation risk adverse effects on water quality.
24. Appropriate management of these environmental impacts is a necessary pre-condition for irrigation development. How water is used in future will be heavily influenced by the environmental impacts of different use with some uses constrained in some catchments. High standards of infrastructure design, construction and operation along with good land management practice are required to mitigate and manage these effects.

Recent Irrigation Development

25. The area of irrigated land in New Zealand has expanded by about 150,000 ha in the period from 2000. Individual farm scale development accounts for approximately 90% of this area, with very little involving water storage.
26. The balance of this area is in a small number of local community based irrigation schemes², again with limited water storage. These schemes have progressed with a mix of farmer equity, local government, local investment partners and debt funding, with limited assistance from Central Government.

Further Development Opportunity

27. There is significant unrealised potential for further irrigation development - the area of irrigable soils far exceeds the current water resource. Water resources from both run of river flows and groundwater extraction are, or are approaching full allocation in much of New Zealand³, particularly the dry east coast regions.
28. Further development of irrigation will require access to 'new' water through:

¹ Source – Statistics New Zealand, Agricultural Production Census 2007 – “Total Area Equipped for Irrigation as at 30 June 2007”

² Including North Otago Irrigation Company – Stage 1 and the Southern Valleys Irrigation Scheme. Current scheme construction by the Acton Farmers Irrigation Co-operative, the Barrhill Chertsey Irrigation Company and Rangitata South Irrigation Limited will provide a further 25,000ha of irrigated area.

³ The Clutha River is the only major river with significant future run of river development potential.

- a). Improved use and management of water resources currently allocated for irrigation use including capital upgrades of existing irrigation scheme infrastructure; and
 - b). New infrastructure development, particularly for water harvesting, storage and distribution.
29. The opportunity from improved utilisation and capital upgrades of existing schemes is significant in its own right. Irrigation New Zealand has estimated that the combination of improving on farm technical and management efficiency⁴ and replacing open irrigation races with piped distribution systems⁵ could provide for an extension of up to 30,000ha (an extra 5% in area) within current local community irrigation schemes in Canterbury and North Otago.
30. Delivering the major part of the unrealised development opportunity will, however, depend on new well-designed, regional-scale water storage and distribution infrastructure. Capital requirements are consequently an order of magnitude larger than requirements for previous water infrastructure developments.

Related Work Programmes

31. Cabinet's decision in June 2009 provided a new policy direction for water management in New Zealand, CAB Min (09)20/12 refers. Cabinet agreed that this new policy direction should ensure that water contributes to New Zealand's economic growth and environmental integrity. Specific elements include:
- a). Providing stronger leadership and national direction;
 - b). Identifying the contribution water infrastructure (including storage) can make to improved water use;
 - c). Developing management measures to;
 - d). Set limits to manage quality and quantity issues, and to get the most value from finite water resources;
 - e). Develop finite allocation models which first set ecological bottom lines and make allocations to public purposes, and then

⁴ Water use efficiencies technologies are readily available which, in comparison to new greenfields projects, involve modest costs while production benefits accrue rapidly following investment.

⁵ For example, the Morven-Glenavy Irrigation Scheme has increased the irrigated area by in excess of 2,000ha. The Mayfield – Hinds and Ashburton Lyndhurst Irrigation Schemes are currently investigating capital upgrades that would increase their irrigated areas by 6,500ha and 4,000 ha respectively.

maximise the economic return from the remaining water available for consumptive use;

- f). Address the impacts of the intensification on water quality;
- g). Improve the management of water demand in both urban and rural contexts.

- 32. This decision and new direction is being progressed with the New Start for Fresh Water officials work programme and the Land and Water Forum.

New Start for Fresh Water – officials work programme

- 33. Phase 2 of the officials' work programme on water reform is commencing, with a cabinet paper setting out possible direction for Ministers' review in April 2011. Aspects such as water allocation, limit setting, and governance are likely to be addressed by this programme of work. Specific details of the full package may not be decided until 2012.
- 34. The Ministry for the Environment, with input from MAF, is developing a draft National Policy Statement (NPS) for Freshwater Management. The NPS may include policy which will have an impact on the regulatory environment for water allocation and use.
- 35. Included in this work is a programme of engagement with iwi. Maori have both environmental stewardship and economic development interests in irrigation infrastructure. Iwi in regions where irrigation infrastructure development is most promising have indicated an interest in co-investing with local and/or central government partners. While only preliminary discussions have occurred it appears that there are positive opportunities for the Crown to facilitate deep involvement by Maori in this area.

The Land and Water Forum (LaWF)

- 36. LaWF released its report in September 2010. The report sets out recommendations for potential freshwater management reform including with respect to water infrastructure management that "improved rural water infrastructure can provided a range of possible advantages for both the economy and the environment". The Forum also provides the caveat that "there are also disadvantages to be avoided or mitigated, including damage to the continuity of rivers and their ecologies, and increased rates of contamination resulting from the intensification of land use" before noting that "we think it is possible to find a way forward for rural infrastructure which avoids expensive stalemates and destructive outcomes....".

Alignment to a Freshwater Cleanup Assistance Fund

37. The proposals in this paper are aligned with the Minister for the Environment's proposal for a Freshwater Cleanup Assistance Fund which is progressed through a separate but parallel paper.
38. This proposition recognises that a number of waterbodies in New Zealand are already contaminated from historical land and water management and practices, or are expected to deteriorate to an unacceptable standard in the future as historic nutrient run-off reaches the water (a process that can take decades). Many of these degraded waterbodies require additional funding, beyond that which the local or regional community can afford, in order to begin the remediation process to restore these waterbodies to a standard expected by New Zealanders.
39. Under some circumstances, the development of new irrigation infrastructure can also provide opportunities to address environmental degradation, particularly where current water abstraction has led to low flows (which can in turn exacerbate quality problems). For example, storage capacity can be designed and built to provide for augmented environmental and recreational flows.

Regional and Strategic Approach to Irrigation Development

40. Future irrigation development will, for the most part, draw on more complex water resources and involve civil engineering structures and distribution networks that are larger in scale and cost than existing local community scheme developments⁶. This increase in scale and complexity has resulted in a recent change in development practice. There has been a shift away from local community farmer led proposals to larger propositions nested within local government-led regional strategic water management initiatives.
41. These regional strategic water management initiatives respond to pressures of the cumulative effects of land use and run of river and ground water abstractions on ecosystems and environmental flows, declining water quality, loss of cultural and recreational opportunities and the availability, and reliability, of water for consumptive use, particularly for agriculture. These initiatives draw on extensive scientific and technical analysis and community consultation to identify the best way in which to sustainably use and manage water for future generations.
42. Advantages of strategic initiatives include:
 - a). Providing for the integrated management of regional water resources to balance economic development opportunity with cultural, environmental, fisheries and recreational values;

⁶ The Rangitata Diversion Race that runs for 67 km between the Rangitata and Rakia Rivers that provides for the conveyance and distribution of irrigation water to the Mayfield-Hinds, Valetta, Ashburton-Lyndhurst irrigation schemes and, more recently, the Barrhill-Chertsey Irrigation Schemes provides the scale of infrastructure that is anticipated in future regional and strategic development.

- b). Managing potential adverse environmental effects of irrigation development and of land use intensification in a comprehensive manner that is consistent with wider regional water management objectives; and
 - c). Identifying opportunities for wider economic benefits, particularly for irrigation and for hydro-electricity generation.
43. In this context the approach to irrigation scheme development will require a focus on good science, high standards of design and construction. Irrigators will be required to adhere to good industry practice demonstrated through audited self management schemes, including sanctions for non performance.

Current Investigations / Propositions

44. Regional and strategic rural water infrastructure investigations are currently being progressed throughout much of New Zealand. Current work in Canterbury, the Waimea Plains, Hawkes Bay and the Wairapapa is investigating proposals that could provide for the potential development of a further 347,000 ha of new irrigation. Fully allocated, and nearly fully allocated, catchments feature in all of these investigations.
45. These investigations involve 14 distinct scheme components and anticipate, subject to the availability of finance and technical capability, staged development through to 2024.
46. An overview of current investigations and an indicative timeline to construction is provided in Annex One.
47. Early stage regional investigations are also being progressed in the Waikato, Bay of Plenty, Gisborne, Taranaki and Southland. It is likely that these investigations will result in further irrigation development proposals. As a consequence of current and recent droughts interest may also arise in other parts of the country.

New Business Models Required

48. This shift from local community scale to larger regional scale developments will require a consequential change in governance, scheme financing and commercial practice. In short, new business models will be required.
49. Earlier this year MAF engaged PricewaterhouseCoopers to undertake case studies of existing local community schemes to understand what barriers they faced in their development. More recently Deloitte were

engaged to review commercial aspects of the regional scale developments currently being investigated.

50. These studies provided two key conclusions:
- a). That the practice of local community scale developments has been to deliver irrigation water to the farm gate at least cost. Return on investment has accrued on farm through increased production and increases in land value. There has also been a strong imperative for local farmer control of scheme investment and operational decisions. These drivers have negatively affected the ability of scheme proponents to attract outside investment.
 - b). That the scale, complexity and capital requirements of the regional scale scheme proposals will require third party investment, and probably multiple investors. High standards of commercial governance will be required, which in many cases is currently lacking – the current model of local farmer control and least cost to the farm gate is not a commercially viable option. Return on investment will need to accrue to both infrastructure investors and irrigating farmers.
51. Internationally similar scale rural water infrastructure developments have required substantial public investment – funded by governments or international development agencies. Neither officials nor Deloitte and PricewaterhouseCoopers have been able to identify significant private sector led developments overseas of the scale and nature comparable to the future developments currently being investigated in New Zealand. The approach adopted in Tasmania is outlined in Annex Two.
52. Advice from institutional investors and funders is that these types of development are not suited to public – private partnership funding models unless both demand (farmer uptake of irrigation and demand for water) and supply side (hydrological, regulatory and ownership issues) risks have been properly managed (e.g. through off-take contracts) or are underwritten by a public partner (either local or central government).
53. Regional scale rural water infrastructure developments are therefore an immature asset class. The risks associated with this type of investment are not transparent or easily understood by institutional investors. Until market pricing and risk are transparent and understood institutional investors are likely to either not commit or to require risk premiums that challenge rural water infrastructure project viability. These issues will need to be addressed but are better addressed when the economic and financial viability of individual schemes is established – this stage will occur progressively (beginning in 2012/13) as development investigations move to conclusion.

Economic Benefit to New Zealand from Additional Irrigation

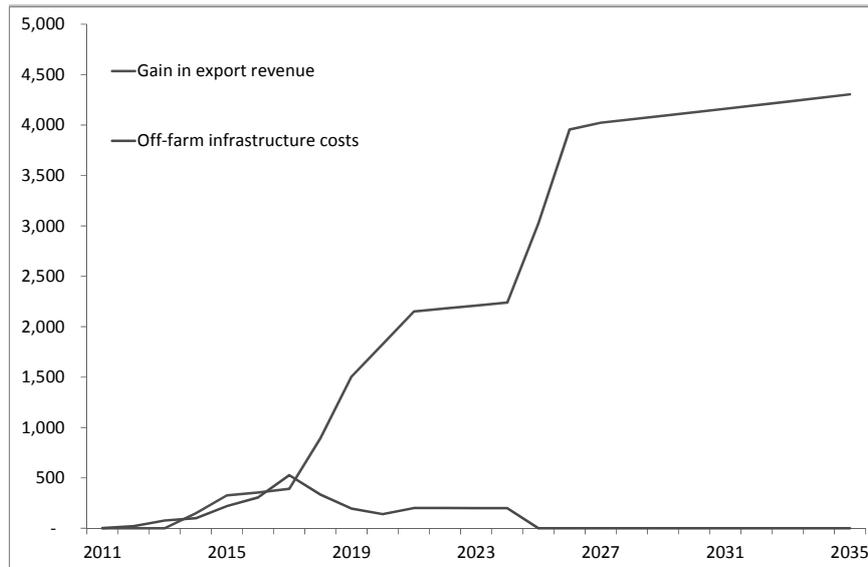
54. The New Zealand Institute of Economic Research (NZIER) was commissioned to estimate the economic impact on 'New Zealand Inc' of the regional and strategic rural water infrastructure investigations currently being progressed in Canterbury, the Waimea Plains, Hawkes Bay and the Wairapapa⁷. If fully developed these propositions would deliver an increase in irrigation area of 347,000 hectares, predominantly in Canterbury (80% of the new irrigated area).
55. NZIER's analysis utilised a dynamic Computable General Equilibrium, CGE, model of the NZ economy. The model uses an input-output database to capture how transactions flow through the economy, and addresses the key limitation of the simpler multiplier approaches by considering price impacts and resource constraints.
56. The modelling assumes that the resulting land use change would see 42% of this area go to dairy, 16% to mixed livestock, 27% to arable, 11% to dairy support and 4% to horticulture. The modelling includes a total capital investment required to support this development of about \$9 billion - off farm construction costs of about \$2.7 billion and on-farm capital development costs (including on farm irrigation equipment, milking shed, pasture development, capital fertiliser, livestock, Fonterra shares etc) of about \$6.4 billion.
57. Social and environmental impacts were not considered as part of this analysis.
58. NZIER found that this additional irrigation would provide a significant benefit to New Zealand Inc., through:
 - a). Increases of agricultural exports by \$1.4 billion pa by 2018 and \$4 billion p.a. by 2026 in real 2010 prices (see Figure 1). This would be a significant increase on the \$23 billion in agricultural and horticultural exports from New Zealand in 2008-09.
 - b). Increases in GDP (or total production in the economy) of 0.8% by 2035 over what it otherwise would have been.
 - c). Increases in national welfare (defined by increases in public and private consumption) in 2035 by \$2 billion p.a.
 - d). Over 25 years, generating a present value gain in national welfare of \$8 billion⁸.
59. The economic gains quantified in this analysis assume that development proceeds in the shortest practicable timeframe unconstrained by finance or access to appropriate skills.

⁷ The modelling providing this estimate is based on conservative assumptions, eg a milk price of \$5.50 kg/ms.

⁸ At a discount rate of 8%.

60. The increase in irrigation impacts the economy in three key ways: first, there is an increase in off-farm capital infrastructure investment and associated economic activity; second, there is an increase in on-farm capital investment and associated economic activity, and third, there is an increase in agricultural production, downstream and added value processing, and associated economic activity.

Figure 1: Costs of off-farm infrastructure and gains in export revenue (NZ\$ million)

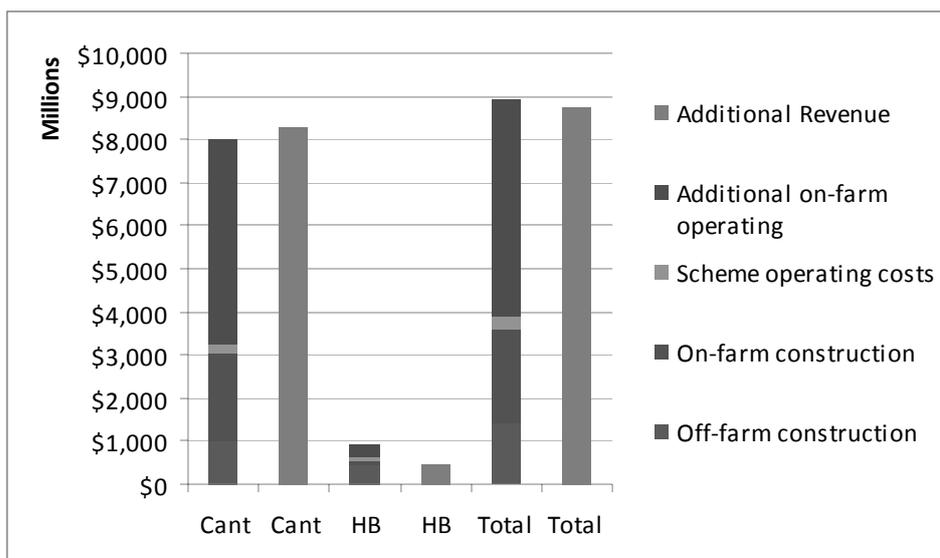


Source: NZIER

Farm Gate Analysis

61. In addition to the CGE modelling a farm gate analysis was also undertaken on the aggregated irrigation scheme propositions. This analysis looks at the benefits at the farm gate less the costs of on, and off, farm construction, and the costs of production. It does not account for downstream processing and other economic activity. This is similar to a business case that may be developed from a farmer only perspective.

Figure 2: Additional costs and farm gate revenue in NPV terms (at 8%)



62. The analysis to date suggests that when grouped together and averaged the Canterbury schemes, which are 80% of the area modelled, provide benefits in excess of costs, and have an Internal Rate of Return (IRR) of 11.5% at the farm gate. However when all 14 scheme components modelled in the CGE analysis are aggregated the present value of costs slightly exceeds the present value of farm gate benefits, but still have an IRR of 6.4%.
63. Additional information on the economic impact of increased irrigation is provided at Annex Three.

Further Economic and Financial Analysis Required

64. While considerable effort was put into developing the inputs into both the CGE analysis and the farm gate analysis the results do not provide for the assessment of the business cases for individual schemes⁹.
65. The investigation work programmes that are currently underway target the development of firm and detailed development proposals. Good practice would require that the development work programmes include robust financial and wider economic analysis to provide a basis for investment decision.

Accelerating Irrigation Development

66. Both the NZIER and the Farm Gate analyses identify that irrigation development has the potential to provide substantial economic growth, but that further scheme design and planning is required to identify more

⁹ This caution reflects the fact that all modelled scheme development propositions have yet to reach the stage of firm and detailed proposals – many of these propositions are at an early stage of investigation. The input data available for Canterbury is more robust than that available for Wairarapa and Hawkes Bay - this reflects the situation of irrigation being well established in Canterbury.

precisely where, and by how much, this potential exists. There is a case for a Government intervention to advance well founded projects to deliver the identified economic growth potential. The analysis supporting this proposition is informed by the commercial and technical investigations conducted by officials in partnership with PriceWaterhouseCoopers and Deloitte.

67. A new programme that includes two distinct stages - an Investment Ready Stage and a Crown Equity Participation Stage - is proposed. This two stage approach would maintain a clear separation in the Crown's role in supporting scheme development and in investment decisions.
68. The Investment Ready Stage, would include support for concept, pre-feasibility and feasibility studies, raising investor support and detailed design. It would be managed by MAF drawing upon experience with the existing Community Irrigation Fund (CIF) and Sustainable Farming Fund, albeit with more rigorous qualifying criteria and monitoring requirements.
69. The Investment Ready Stage would target advancing potential projects to the stage where a prospectus is ready to be marketed to investors. The programme would be designed to reflect the scale and complexity of regional scale rural water infrastructure developments. Some of the wider objectives of the current Community Irrigation Fund, including support for the development of regional water management strategies, would be retained. Direct costs associated with resource consent and litigation activity would be specifically excluded.
70. While specific and detailed programme design would be subject to further work pending Cabinet direction, specific characteristics envisaged for the Investment Ready Phases include:
 - a). Adherence to, and meeting of, pre agreed development milestones and outputs that exhibit positive investment characteristics consistent with achievement of preparing an investment ready proposal;
 - b). Best practice governance, management and reporting – the competency and processes around board operation would be a critical determinant of acceptance or otherwise for investment from the fund;
 - c). Appointment of specialist technical, environmental, hydrological, legal, engineering, and financial / economic advisors;
 - d). Scheme design requiring a commitment to managing the land use effects of scheme development through the application of good industry practice, particularly water use efficiency and nutrient management, assured through audited self management schemes, including sanctions for non performance.

71. The Investment Ready Stage financial instruments could be tailored as;
- e). Grants based upon satisfaction of key criteria and potential to meet defined financial and economic growth objectives; or
 - f). Grants with Conversion Rights providing for conversion to equity; or
 - g). Convertible Notes as interest bearing notes with defined triggers for conversion to equity.
72. Officials will provide further advice on the funding instrument, criteria and operational design for this Investment Ready Stage.
73. The Crown Equity Participation Stage would provide for participation in the construction and operation of water harvesting, storage and off-farm distribution infrastructure. This is a consideration that is subsequent to schemes becoming ‘Investment Ready’.
74. The extension to the Crown taking an equity stake recognises that irrigation schemes are an immature asset class. The Crown providing an early signal that it is prepared to invest in schemes that are demonstrably economically and financially viable might encourage a wider range of equity investors (irrigation proponents, local government, iwi, third party financiers) to participate. That is, Crown involvement might ‘crowd in’ other investors¹⁰. The extent to which Crown investment would ‘crowd in’ or ‘crowd out’ investment is uncertain at this time. There is a trade off between fiscal cost and opportunity cost of using Crown funds for this purpose and the likelihood that Crown investment will accelerate scheme development and thereby drive economic growth.
75. The intention would be that any Crown equity stake would provide an appropriate return on investment and would be sold off over time. This approach assumes that the Crown would be an investor for the short to medium term. Exit rights would be well specified. The Crown would be able to invest, hold, sell down, or exit at specified stages in a scheme’s development. Where appropriate the model would be open to Iwi co-investment.
76. Officials will provide further advice on key investment principles, institutional form and maintaining a clear separation in accountabilities between developers and investment decision makers.

Resourcing Requirement

¹⁰ Advice to MAF from Westpac and PricewaterhouseCoopers suggests that financiers view water storage and irrigation schemes as an immature asset class because they do not understand the demand (farmer uptake of irrigation water) and supply (hydrological, regulatory and ownership issues) risks.

77. The new funding programme proposed in this paper will require an immediate funding component for the Investment Ready Stage and potentially the provision of a capital allowance for the Crown Equity Participation Stage from 2013.
78. The Investment Ready stage funding requirement is estimated to be \$35 million over the five years beginning in 2011/12. This sum would accommodate foreseeable demand on a matched funding basis. Operating costs of a further \$5m through this five year period will be reprioritised from within MAF's baseline. It is proposed that \$5m would be identified in the current financial year and transferred to out years through the appropriate budget process as part of Cabinet decisions.
79. Scheme developments likely to become investment ready in the 10 year period beginning 2011/12 will involve an estimated construction cost of approx \$2 billion. A 35% Crown equity stake would require a Crown capital provision of between \$300m - \$400m. The first call on capital in this option would not be expected until 2013/14, at the earliest.

Financial Implications

80. The paper seeks an in-principle decision to assist water storage and irrigation schemes to become investment ready. The estimated costs of such assistance is \$35 million as a multi year appropriation over five years, plus an additional \$5 million that MAF expects to generate from across departmental operating surpluses from Revenue Crown funded activities in the 2010/11 year. Approval for this funding will be sought as part of the final Budget 2011 package in April 2011.
81. The paper also notes that the provisioning of \$400m capital expenditure maybe required for future equity investment after 2013.

Human Rights

82. The proposal does not contravene nor is implicated by the New Zealand Bill of Rights Act 1990 and/or the Human Rights Act 1993.

Legislative Implications

83. Not required.

Regulatory Impact Analysis

84. There are no material regulatory impacts involved in this paper that requires a Regulatory Impact Analysis.

Gender Implications

85. Not applicable.

Disability Perspective

86. Not applicable.

Publicity

87. It is intended that an announcement will be made in May by the Prime Minister in co-ordination with the Minister of Agriculture, Minister of Finance and the Minister for the Environment.

Treasury Comment

88. There are undoubted agricultural productivity improvements, increased exports and wider economic benefits arising from increased irrigation. What is less clear is whether those benefits outweigh the significant costs (estimated by MAF at around \$6 to 9 billion) arising from the necessary off-farm and on-farm investment. Currently, none of the 14 potential projects is in a state where a well-informed decision to invest can be made, although it is clear that some are more viable than others.
89. On balance however, given the potential gains from good projects and the identified barriers to some of these projects being brought to investment ready state, there is a case for Government intervention as a circuit breaker. The initial key effort needs to identify schemes with the best potential returns and highest commercial viability, and on working up business cases towards investment ready status (including resolving the contributions of regional and Local Government and building farmer and community support).
90. What role the government might play once individual schemes are investment ready, including the extent to which it is an active or passive participant, needs careful consideration and is the subject of the further work recommended. Government involvement is not without risks. Such involvement will need careful management so as not to cut across or disrupt locally-driven processes. It also needs to be clearly pitched so as to focus projects on maximising private sector involvement, rather than on maximising government involvement in financing those projects.
91. We also advise caution in placing too much emphasis on the high level economic modelling of this opportunity. Investment decisions will ultimately need to rest on the viability and the justification of individual projects.

Recommendations

The Minister of Agriculture recommends that the Committee:

1. **Note** that well designed water storage and irrigation infrastructure has the potential to drive significant economic growth.
2. **Note** that the further development of irrigation will require:
 - a). Improved use and management of water resources currently allocated for irrigation use;
 - b). Capital upgrades of existing irrigation scheme infrastructure;
 - c). New infrastructure development, particularly for water harvesting, storage and off-farm distribution systems.
3. **Note** future irrigation infrastructure development will draw upon more complex water resources and involve schemes that are larger in scale and cost than existing local scheme developments.
4. **Note** that officials have identified barriers to getting these irrigation proposals to an investment ready stage:
 - a). There is a problem in co-ordinating interested parties (farmers, regional authorities, banks, third party investors) to agree to participate in a particular project so that it has critical mass;
 - b). A step change from current practice in many local scheme developments to high standards of commercial governance, scheme financing and commercial practice.
5. **Note** that officials have identified challenges to getting investment ready irrigation schemes financed through the construction phase:
 - a). The regional scale scheme proposals will require third party investment, and probably multiple investors;
 - b). Water storage and irrigation infrastructure is not well understood by financial markets.
6. **Note** that accelerating the realisation of the economic potential associated with irrigation development will require Government assistance.
7. **Note** that assisting scheme proposals to become investment ready, in order to encourage third party investment and enable robust decisions about any Crown investment, will require additional resources and more comprehensive approach than the current Community Irrigation Fund.
8. **Note** that the costs of assisting scheme proposals to become investment ready are estimated at \$35 million operating over five years.

9. **Agree** in principle to the proposal to assist scheme proposals to become investment ready subject to suitable sources of funding being identified as part of the final Budget 2011 package.
10. **Note** that a final decision on the proposal, including agreement to financial recommendations, will be made when the Minister of Finance presents the final Budget 2011 package to Cabinet in April 2011.
11. **Note** that MAF expects to generate an across department operating surplus from Revenue Crown funded activities of \$5 million in the 2010/11 year and approval will be sought to allow this surplus to resource fund administration and proposal development.
12. **Note** that the design of this new funding programme would:
 - a). Reflect the scale and complexity of regional scale rural water infrastructure developments;
 - b). Require a commitment in scheme design to the application of good industry practice, particularly water use efficiency and nutrient management, assured through audited self management schemes, including sanctions for non performance;
 - c). Retain some of the wider objectives of the current Community Irrigation Fund, including support for the development of regional water management strategies;
 - d). Require best practice governance, management and reporting;
 - e). Require adherence to, and meeting of, pre agreed development milestones and outputs consistent with achievement of preparing an investment ready scheme;
 - f). Require the appointment of specialist technical, environmental, hydrological, legal, engineering, and financial / economic advisors in the completion of technical investigations and community engagement;
 - g). Specifically preclude funding the direct costs associated with resource consent and litigation activity.
13. **Note** that once scheme proposals become investment ready it is likely that some or all will have challenges in raising investment capital, and therefore achieving acceleration in irrigation development may require the Government to provide short to medium term equity of up to 35% in order to help crowd in other investors.

14. **Agree** the Government is prepared to invest in assisting in the construction of water storage and off-farm irrigation infrastructure, subject to the report back on the development of appropriate investment criteria, including exit criteria.
15. **Note** that the provisioning of \$400m capital expenditure may be required for future equity investment after 2013 in water harvesting, storage and off-farm distribution infrastructure and that this will be subject to a future budget bid.
16. **Invite** the Minister of Agriculture to report back to the Cabinet Economic Growth and Infrastructure Committee by [2] to confirm the work programme, funding criteria and operational design required to give effect to any decision to establish a new Non-Departmental Other Expense “Water Storage and Irrigation Development Proposals” to proceed to develop a new funding programme for advancing potential irrigation development projects to an investment ready stage.
17. **Invite** the Minister of Agriculture to report back to the Cabinet Economic Growth and Infrastructure Committee by [2] with further advice (including in regard to key investment principles, institutional form and maintaining a clear separation in the Crown’s role in supporting scheme development and in investment decisions) on how to structure any future Crown equity participation in the construction and operation of water harvesting, storage and off-farm distribution infrastructure.

Hon. David Carter
Minister of Agriculture

_____ / _____ / _____

Annex One: An overview of current investigations and an indicative timeline to construction

Substantial work programmes investigating strategically focused regional initiatives are currently underway. The stages of development and indicative cost structures are outlined in the graphic **Regional and Strategic Proposals – Best Case Development Timeline** which is included within this Annex.

These initiatives are summarized below – the initiatives are presented here in the order of their stage of development.

Tasman District:

Lee Valley Community Water Augmentation Storage Dam, up to 5,800 ha
Waimea East Water Augmentation Committee and Tasman District Council

This proposal responds to the increasing unreliability of water supply from the Waimea River – summer low flows are impacting on irrigation takes, individual domestic takes and urban water supply. Summer low flows have negative impacts on in stream values, recreation and freshwater fisheries.

The Waimea Water Augmentation Committee is widely representative of the community – the Committee has completed significant community engagement in the development of the Lee Valley proposal.

The Lee Valley Dam is designed to provide reliable irrigation to 3,800 of currently irrigated lands as well as providing for a further 2,000 ha of highly fertile soils – horticulture is the dominant land use. The Dam also provides for domestic water supply to Brightwater and Richmond along with providing improved summer flows for instream values, recreational and fisheries purposes. Future water supply for Nelson City is also provided for.

The proposal final design and consenting ready – construction is expected to be completed for the 2014/15 summer.

Canterbury:

Canterbury Water Management Strategy – 270,000 ha
Canterbury Mayoral Forum and Environment Canterbury

The Canterbury Water Management Strategy proposes the development of an integrated approach to managing the regions water resources. The Strategy anticipates the development of substantial water harvesting, storage and subsequent distribution infrastructure.

This overall infrastructure development anticipates utilising the storage capacity of Lake Coleridge, a new dam in the Ashley Gorge creating storage in Lees Valley and new storage developed in the Hurunui – Waiau. Regional Distribution would be required, similar to the current Central Plains Water and Hurunui Water Project and Hunter Downs propositions.

Hawkes Bay:

Hawkes Bay Regional Water Management Strategy – 40,000 ha total.
Hawkes Bay Regional Council, and sub regional water user groups.

The Hawkes Bay Regional Council is in the early stages of developing a Regional Water Management Strategy for the region. This Strategy will provide an overall direction for the integrated management of the region's water resources. The Council expects to complete this Strategy in 2011.

Water harvesting and storage will be integral to the implementation of the Strategy once it is finalised. Storage will provide for the replacement of current ground water and surface water takes to reduce pressure on summer low flows, improve the reliability of current irrigation and provided for a substantial expansion of irrigation onto fertile soils.

Investigations have advanced to the feasibility stage in the Ruataniwha Plains (Tukituki Catchment). The Council's intention is to progress investigations in the Ngaruroro Catchment (including the Heretaunga Plains) and then into the Tutaekuri Catchment.

A 10 – 15 year staged development period is anticipated.

Wairarapa/Wellington:

Wairarapa Regional Irrigation Scheme - 30,000ha
Greater Wellington Regional Council - Wairarapa Regional Irrigation Trust

Current work is revisiting an earlier feasibility study based on storage and a fully piped and pressurised system. Following extensive investigations Meridian concluded that a combined irrigation and generation scheme could not provide an appropriate rate of return.

The Greater Wellington Regional Council and the recently established Wairarapa Regional Irrigation Trust are revisiting this earlier work with a view to identifying a simpler storage and run of river distribution scheme. A lower cost structure would have a significant effect on the value proposition for irrigation development.

The results of this further work will determine whether, or not, the Scheme should proceed.

Regional and Strategic Proposals – Best Case Development Timeline Spread sheet here

Annex Two: What the Tasmanians Are Doing

In 2008 the Tasmanian Government established the Tasmanian Irrigation Board to progress a suite of regionally significant irrigation projects in Tasmania through a form of public-private partnership. The Board was established in “recognition that regionally significant irrigation is, in most cases, beyond the resources of farmers alone”.

It is an expertise-based Board well qualified and experienced in major infrastructure projects, governance, negotiation and finance. The Board progresses the schemes from pre-feasibility assessment through to scheme construction and commissioning.

The cost of schemes investigation and construction is shared between the community and private sector. A total of \$220m has been earmarked by the Tasmanian and Australian governments to progress irrigation development – this funding is in effect a grant contribution. The Australian Government view is that “public funding contribution recognises that the regional communities in which the schemes are located will gain a general socio-economic advantage from increased activity and employment over time.”

Private capital contributions are made through the purchase of tradable water entitlements to a particular scheme by the beneficiaries of that scheme. The Board and individual irrigators enter into contracts to take irrigation water when at least the minimum water uptake for scheme viability is achieved, the Tasmanian Government has approved scheme construction and an irrigation district has been declared.

Operating costs are met by an annual charge on water entitlement holders.

Annex Three: Additional Information on the Economic Impact of Increased Irrigation

The New Zealand Institute of Economic Research (NZIER) was commissioned to estimate the economic impact on 'New Zealand Inc' of the regional and strategic rural water infrastructure investigations currently being progressed in Canterbury, the Waimea Plains, Hawkes Bay and the Wairapapa. If fully developed these propositions would deliver an increase in irrigation area of 347,000 hectares, predominantly in the Canterbury (80% of the area) and Hawkes Bay regions.

NZIER's analysis utilised a dynamic CGE model of the NZ economy. The model uses an input-output database to capture how transactions flow through the economy, and addresses the key limitation of the simpler multiplier approaches by considering price impacts and resource constraints.

NZIER found that this additional irrigation would provide a significant benefit to New Zealand Inc., through:

- Increases of agricultural exports by \$1.4 billion pa by 2018 and \$4 billion p.a. by 2026 in real 2010 prices (see Figure 1). This would be a significant increase on the \$23 billion in agricultural and horticultural exports from New Zealand in 2008-09;
- Increases in GDP (or total production in the economy) of 0.8% by 2035 over what it otherwise would have been;
- Increases in national welfare, (defined by increases in public and private consumption) in 2035 by \$2 billion (see Figure 2 – the drop in consumption in 2025-2030 reflects the paying back of the off-shore borrowing for construction); and
- Over 25 years, generating a present value gain in national welfare of \$8 billion.

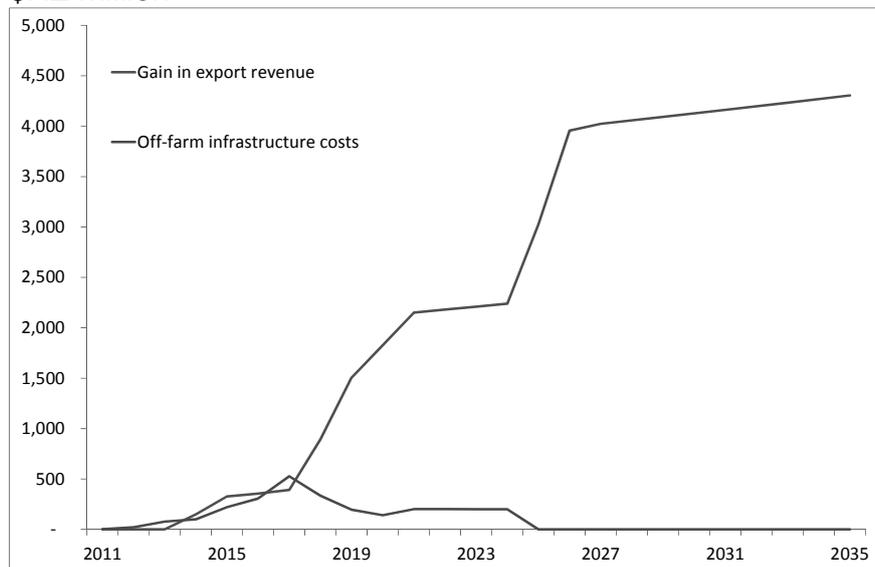
Social and environmental impacts were not considered as part of this analysis.

The economic gains quantified in this analysis assume there are no barriers to progress – that is, that development proceeds in the shortest practicable timeframe unconstrained by finance or access to appropriate skills.

The increase in irrigation impacts the economy in three key ways: first, there is an increase in off-farm capital infrastructure investment and associated economic activity; second, there is an increase in on-farm capital investment and associated economic activity, and third, there is an increase in agricultural production, downstream and added value processing, and associated economic activity.

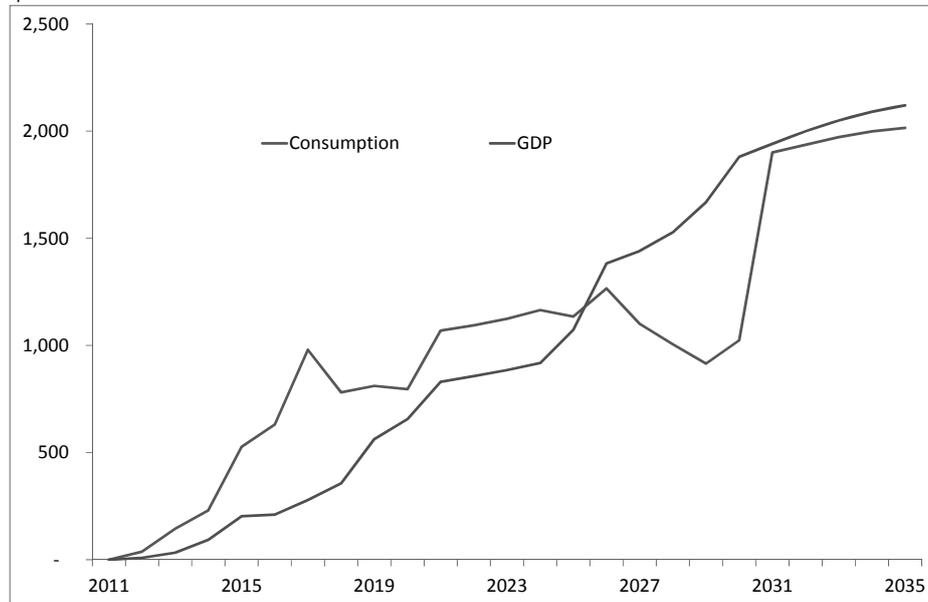
The results suggest that the majority of impacts result from the increased production and that they are robust to reasonable changes in the inputs. For example, a 20% reduction in the returns to irrigation has a direct negative impact on the net present value of consumption gains by around 25% or \$2billion. However, a 25% increase in off-farm construction costs has a relatively small impact on consumption (approximately \$100 NPV) because the debt costs are small relative to the gain in productivity and there is also an associated economic stimulus due to the construction. Figure 1 also illustrates that the off-farm construction cost are small relative to the increase in exports.

Figure 2 Costs of off-farm infrastructure and gains in export revenue
\$NZ million



Source: NZIER

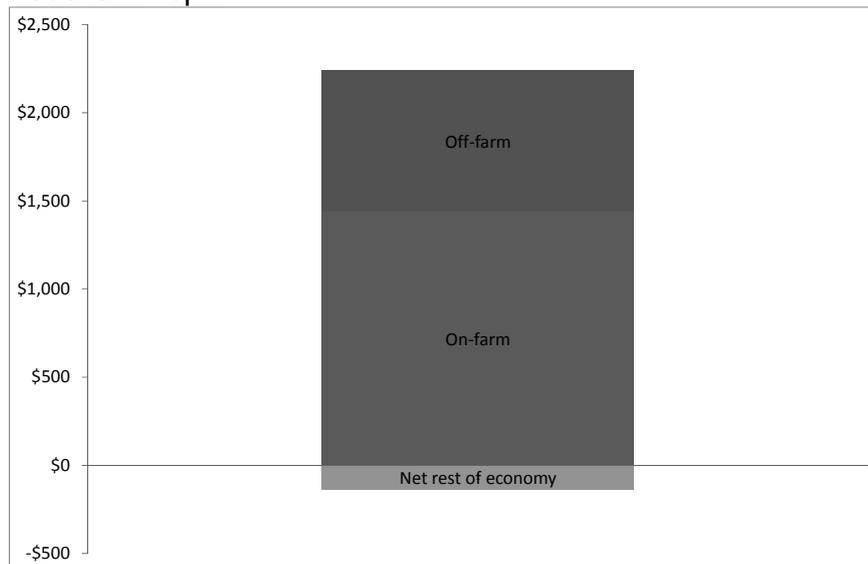
Figure 3 Economic gains resulting from increased irrigation
\$NZ million



Source: NZIER

Finally, the NZIER analysis allows an assessment of where in the economy the gains to NZ arise from. The majority of the gains in GDP come through increased agricultural production at the farm level, but there are significant gains on the processing sector as output at the farm gate comprise only 50% of the total output value (see Figure 3). Figure 3 also demonstrates the flow-on effects to other parts of the economy. Firms including processors, transport operators, agribusinesses and retailers will all benefit from the increased economic activity. However other industries such as competing exporters are negatively impacted, as resources are drawn away, factor prices increase and the exchange rate appreciates.

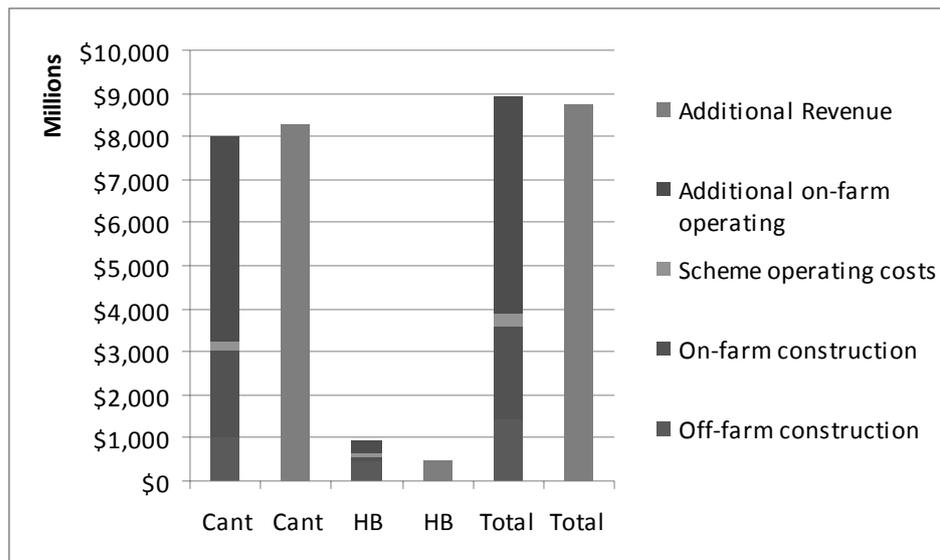
Figure 3 Breakdown of results
2035 GDP split



Source: NZIER

Farm Gate Analysis

In addition to the CGE modelling a farm gate analysis was also undertaken on the aggregated irrigation scheme propositions. This analysis looks at the benefits at the farm gate less the costs of on, and off, farm construction, and the costs of production. It does not account for downstream processing and other economic activity. This is similar to a business case that may be developed from a farmer only perspective.



The analysis to date suggests that when grouped together and averaged the Canterbury schemes, which are 80% of the area modelled, provide benefits in excess of costs, and have an Internal Rate of Return (IRR) of 11.5% at the farm gate. However when all 14 schemes nationally are aggregated the present value of costs slightly exceeds the present value of farm gate benefits, but still have an IRR of 6.4%. This highlights that some schemes are going to be more beneficial than others and that increased productivity is a key driver in the success of any scheme.

A highly regarded farm consultant was engaged to develop detailed budgets for farm enterprises for Canterbury and was based on conservative assumptions (eg milk solid payout of \$5.5/kg compared to Fonterra's forecast for the 2010/11 season of \$7.50/kg) The Hawkes Bay and Wairarapa data was less well developed and in all likelihood underestimated the productivity gains from irrigation in those regions. For example, land-use change generates a farm-gate net revenue gain of approximately \$6,000 per hectare in Canterbury but only \$1,300 per hectare in Hawkes Bay and Wairarapa.

To put this in perspective, the Hawkes Bay and Wairarapa represent 20% of the potential irrigated area, 30% of the total off-farm construction costs, yet only 5% of both the farm gate revenue and the consumption benefits calculated by NZIER using the CGE analysis.

While considerable effort was put into developing the inputs into both the CGE analysis and the farm gate analysis MAF would caution about using these results as business cases for individual schemes. The data for Wairarapa and Hawkes Bay is highly preliminary and would need to be considerably refined as the first step of any future analysis.

Background information

NZIER used a Computable General Equilibrium (CGE) Model which captures the flow-on impacts across the wider economy. CGE modelling, in contrast to cost-benefit analysis, explicitly considers impacts on exchange rates, net foreign liabilities and the current account balance, as well as the impacts on factor prices and indirect impacts (both positive and negative) on other industries. This is particularly important when considering large export shocks such as being modelled here.

Off-farm infrastructure costs were developed in consultation with scheme proponents and it was estimated that the total cost would be \$2.7 billion spread over 2012 and 2024 peaking at \$527 million in 2017. In undertaking the CGE modelling it was assumed that this construction was financed through government borrowing at seven per cent interest per annum, and repaid in five years upon completion of the last irrigation scheme.