5. QUEEN ELIZABETH II PARK POOLS REDEVELOPMENT ENERGY SOURCE

RR 10238

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The purpose of this report is to advise members of the Projects and Property Committee of the options for a thermal energy source for the project and to seek confirmation for the use of a combined heat pump/ diesel boiler installation.

BACKGROUND

The options for fuel sources for the production of thermal energy for the QEII Pools Redevelopment project were considered in two reports: G A Still & Partners Ltd's report "The New QEII Development Thermal Energy Study" dated June 1998 and Beca Carter Hollings & Ferner Ltd's report "QEII Pools Redevelopment Production of Thermal Energy Review of Options" dated January 1999. (G A Still & Partners Ltd were the Mechanical Services Consultants who carried out the initial work on the project, and Beca Carter Hollings & Ferner Ltd are the Mechanical Services Consultant for the project.)

In essence these reports concluded that coal (the fuel used in the existing QEII boiler) is the lowest cost fuel source.

After taking into account the adverse environmental effects of coal and following discussion and review by the Council's Energy Manager, it was recommended by Beca Carter Hollings and Ferner Ltd that a "boiler only" installation be rejected and a more energy efficient and environmentally friendly combined heat pump/ boiler installation be used. It was further recommended that an installation comprising two diesel boilers should be used rather than LPG boilers because of the lower cost and ease of storage of fuel.

The capital cost for diesel and LPG installations is similar but LPG is more expensive in operating costs.

In May 1999, Rockgas approached the Council with a revised offer for the supply of LPG. The revised offer means that for the QEII pools LPG is approximately 15% more expensive in operating costs than diesel. This equates to approximately $35,000 per annum.

The Projects & Property Committee, at its meeting held on 11 June 1999, requested that the option of using LPG rather than diesel as the energy source should be reviewed.

Following this request, the Energy Manager and Principal Environmental Health Officer were asked for their comments and recommendation.

ENERGY MANAGER'S COMMENTS

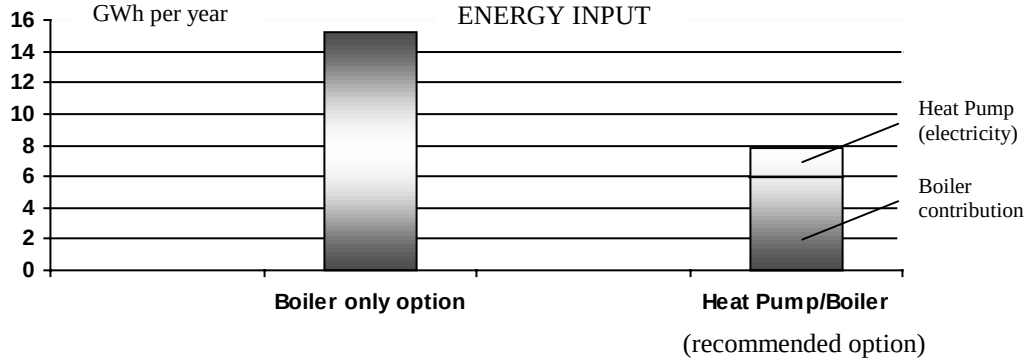
Dr Leonid Itskovich, the Council's Energy Manager reports:

"The following Council's policy (adopted 26.11.1997*)* should be applied for the selection of energy sources:

Conservation of Energy. *The Council will follow energy strategies which minimise energy consumption, select sustainable energy supplies and minimise impacts on the environment.*

To meet the objectives of this policy, it has been recommended in February 1999 by the Consultant and the Energy Manager ***that a combined <u>Heat Pump/Boiler</u> installation is used to provide heating energy for the redeveloped complex.***

The benefits of this energy efficient and environmentally responsible option can be seen from the comparative graph below. Energy from the heat pump will substitute 62% of the total quantity; the boiler will need to provide only 38%.



It has been further recommended that the boiler fuel for the recommended option be either diesel oil or LPG (coal has been excluded from further consideration because of environmental reasons). The question is now which of the two will better meet the requirements of the Council's policy.

(a) Minimising energy consumption

Both diesel and LPG options provide equal combustion efficiencies.

(b) Sustainable energy supplies

I agree with the Consultant that diesel fuel seems to have an advantage over LPG in this respect. See attached information on future gas availability and prices. The information was extracted from a report by the Ministry of Commerce and the NZ Institute of Economic Research (refer attachment). The report indicates that prices for gas are likely to rise after the Maui field is depleted in the foreseeable future.

(c) Minimising impact on the environment

LPG has an advantage. The magnitude and significance of this advantage should be advised by the Council's Principal Environmental Officer.

Apart from the above factors, diesel fuel has a cost advantage. Also, diesel fuel has an advantage of being available from a number of competing suppliers so the Council would always have a choice to purchase at the best price and best reliability of supply. Another technical advantage is that with diesel fuel there will be lesser constraints on spatial requirements for storage."

PRINCIPAL ENVIRONMENTAL HEALTH OFFICER'S COMMENTS

Terry Moody, the Council's Principal Environmental Health Officer, reports:

"I have been asked to comment on the environmental aspects of the choice between LPG and diesel fired boilers to replace the coal fired boilers at the Queen Elizabeth II Pools complex.

I am aware of the proposals to improve the energy efficiency and reduce energy requirements from the fossil fuel burning plant.

While LPG has some advantages from an air pollution point of view, vis nil or negligible particulate emissions and nil or negligible sulphur dioxide emissions, diesel fuel burnt in an efficient boiler would not create a significant problem in these circumstances. These comments are made on the basis of information available but there has been no attempt to undertake any modelling of the emissions as would probably be required for the purposes of a resource consent application. That is a matter that would need to be addressed once a decision is made on the choice of fuel.

In regard to particulate emissions. The Canterbury Regional Council has set an **ambient air** quality guideline for PM_{10} of 50 $\mu g/m^3$ not to be exceeded more than once per year (averaged over three years). Under Rule 11 of the Canterbury Regional Council's Draft Natural Resources Regional Plan, Part A:AIR it is stated that subject to appropriate controls on stack heights and operation and maintenance the use of diesel fired fuel burning boilers would cause only minor adverse effects. The relatively low emission rates of both particulates [PM_{10}] and sulphur dioxide are unlikely to significantly add to exceedances of the ambient air quality guidelines. It is probable that the use of diesel oil, in an adequately maintained and operated boiler installation with a flue at a suitable height for adequate dispersal would reduce particulate emissions, compared with a coal fired boiler, by about 95%. The fuel should have a sulphur content not exceeding 0.35%.

In general terms the ambient air levels of sulphur dioxide in Christchurch are generally not a matter of significant environmental concern. The selection of a low sulphur fuel such as diesel would avoid any local problems particularly in the area of Queen Elizabeth II Park where there are no other immediately adjacent sources of emissions.

In my opinion there are no significant differences, from an environmental impact point of view, between the use of LPG and diesel oil fired boilers to provide heating at the Queen Elizabeth II Complex, subject to proper installation, operation, and maintenance of the fuel burning plant. There may be other physical environmental and financial differences relating to fuel costs and the provision of storage facilities which should be taken into account."

STORAGE FACILITIES

Storage facilities for LPG, will have a greater visual impact than those required for diesel oil.

LPG storage tanks are normally installed in an above-ground storage compound. This would need to be located 17m to the east of the new boiler house. Alternatively a concrete masonry wall (approx 25m long x 3m high) could be installed approximately 9m from the boiler house with the storage tanks located behind the wall. LPG tanks could possibly be installed below ground, but there would be considerable additional cost.

The proposed diesel storage tanks would be located underground.

Vic Davies Architect Ltd/ Ross Maguire Architects, the Project Architect, has reviewed the option to use LPG and commented that "The separation distances isolate the proportionately smaller structure of the tank and this incongruity will compromise the open space between the 51m pool and future development of cricket facilities. Careful siting and landscaping could mitigate the undesirable visual impact."

SOLAR WATER HEATING/ OTHER ALTERNATIVE ENERGY OPTIONS

The Energy Manager reports:

"Solar energy can be a good energy source for this project.

The solar energy source can neither be considered as a substitute for the oil or LPG boiler installation nor as a means of reducing the size of the boiler plant.

The solar contribution to water heating would reduce the fuel consumption by the boiler.

The solar heating plant would incur additional capital and maintenance costs. Apart from an extra capital cost of the mechanical services plant, structural reinforcement may be required if a substantial load of solar collectors is imposed on the roof of the building.

The Energy Manager recommends that the Mechanical Services Consultant be asked to explore solar water heating and quantify additional costs associated with the solar heating plant (including structural modifications to the building), and that these costs be then assessed in conjunction with environmental benefits of solar heating."

The Mechanical Services Consultant will make a brief presentation at the meeting on solar water heating and other alternative energy options.

SUMMARY

- LPG and diesel oil provide equal combustion efficiencies.
- Diesel oil is approximately 15% ($35,000 per annum) cheaper than LPG in operating costs.
- Diesel oil seems to have an advantage over LPG as a sustainable energy supply. Indications from the Ministry of Commerce and the NZ Institute of Economic Research are that the price of gas is likely to rise after the Maui field is depleted in the foreseeable future.
- Diesel oil has the advantage of being available from a number of competing suppliers.
- There are no significant differences from an environmental impact point of view between the use of LPG and diesel fired boilers.
- LPG storage facilities have a greater visual impact than those required for diesel oil.
- For the above reasons, diesel oil is the energy source recommended by Beca Carter Hollings & Ferner Ltd, the Mechanical Services Consultant.
- A brief presentation on solar water heating and other alternative energy options will be made at the meeting.

Recommendation: That diesel oil be confirmed as the energy source for the combined heat pump/ boiler installation at the QEII Pools Redevelopment.

Chairman's Recommendation: That the above recommendation be adopted.