



Energy Futures Report from Shaping Our Future

March 2015

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Background to this Report

The Energy Futures Task Force was established under the umbrella of Shaping our Future (SOF), following a public forum in February 2013. A description of Shaping our Future is attached as an appendix.

The Task Force was charged with considering the energy resilience of the district into the future and to accordingly prepare recommendations for the agencies responsible. The public forum reconvened in August 2013 to discuss the Task Force's draft report and feedback was provided. The Steering Group received a revised draft in November 2013 and advised that more work was required. In June 2014, the Steering Group received the final draft from the Energy Future Task Force. That report can be viewed [here](#). That Report was then circulated to all members of the original forum for consideration. Feedback was incorporated with help from the Energy Efficiency and Conservation Authority (EECA) to produce this Final Draft Report which is now submitted to the Queenstown Lakes District Councillors for their consideration. Any response will be considered by the Steering Group and Task Force. A new Energy Futures forum will be convened in due course to consider any further recommendations.

Initial Task Force

Alan Huntington, Queenstown (Southern Architecture Ltd); Hunter Leece, Arrowtown (Consulting Engineer); Maggie Lawton, Wanaka (Future By Design Researcher and Consultant, Green Star Accredited Professional and Home Star Assessor); Richard Hastings, Queenstown (Contact Energy); Martin Barrett, Arrowtown (Consulting Engineer); Rob Greig, Queenstown (Pinewood Lodge); Warwick Goldsmith, Queenstown (Anderson Lloyd Lawyers); Vaughn Crowther, Arrowtown (Rationale Infrastructure Consultancy); Steve Henry, Hawea (Centre for Sustainable Practice Otago Polytechnic) (facilitating); Jay Cassells, Queenstown (a bit of everything); Briana Pringle, Queenstown (QLDC); Gerry Essenberg, Queenstown (prev. QLDC); and Scott Jones, Wanaka (Grid Tied).

Particular thanks to Maggie Lawton of Future by Design and Vaughn Crowther of Rationale for their sustained input into the process.

Terms of Reference

The TOR for the Energy Futures Task Force were to:

1. Lead the district's Shaping Our Future Forum discussions on Energy Futures and, in consultation with the public, recommend measures that may be taken by appropriate agencies with respect to energy use and generation in the district that are consistent with the Shaping Our Future vision.
2. Prepare an Energy Futures Strategy report (this document) that develops a vision for the energy future of the district and sets out options and recommendations towards that vision for consideration by QLDC, the Otago Regional Council, and other relevant agencies.

Executive Summary

Our standard of living is hugely influenced by our unique geographic place in the world. Visitors, workers, food and goods travel very long distances to our district, this has always been so. People are drawn by the unique and extreme lifestyle amidst the Southern Alps. It is our uniqueness that sets us apart and which influences our standard of living. So our future prosperity depends on how well we plan and build our communities around these constants of remoteness and temperature extremes.

The Energy Task Force identified many challenges and opportunities for the district. The energy debate for our district has drawn discussion on an array of problems, priorities and solutions. A Strength, Weaknesses, Opportunities, Threats (SWOT) analysis was undertaken, measures of success defined and a series of recommendations suggested for presentation to the Queenstown Lakes District Council and the Otago Regional Council. The initial report went through a series of iterations resulting from public consultation. This was a drawn out process, reflecting the range of views within the district. It was eventually agreed that to progress in a meaningful and sustainable way, the task force recommendations needed to focus on the areas of greatest influence on our standard of living. The report adjusted and aligned its recommendations under two areas: Stationary Energy and Transport Energy. Stationary Energy is what we use in buildings – mostly electricity in NZ but also wood fuels and natural gas. Transport Energy, which is used for daily commuting and to support the wider movement of people and goods into the district. Transport energy is almost exclusively from fossil fuels. The Task Force set a vision and acknowledged inherent challenges and opportunities within it.

Key recommendations

1. Amend QLDC District Plan to consider the public and private benefits of energy efficient buildings and intensification of urban areas. (this affects both Stationary and Transport energy)
2. QLDC to work with other agencies (including NZTA, ORC, and AA to support energy efficiencies in transport sector.
3. QLDC to work with agencies such as EECA to educate stakeholders about the specific benefits of energy efficiency. Good planning now, saves energy use in the future. Where a building is located affects transport energy, the quality of the building affects energy costs over the life of the building.
4. QLDC begin work to prepare a detailed energy profile for the district that would inform use, needs and future planning. This recommendation asks the QLDC do whatever it can within its own sphere of influence to prepare a profile.
5. QLDC to investigate ways to require landlords to improve the energy efficiency of rental accommodation towards providing warm, efficient and healthy housing.
6. Engage and collaborate with other councils and other parts of the world to find solutions.

7. QLDC to formally recognise the influence that energy costs have on the standard of living in the district and establish proportionate representation for the community.
8. That the energy vision is received and adopted by the QLDC.

Energy Futures Vision:

The district will be known for its innovative and efficient energy use. By 2035, new buildings in the Queenstown Lakes District will be built to the highest standards of energy efficiency. Housing will be warm and dry through effective energy use rather than high energy use. Transport systems will efficiently move people and goods and avoid inefficient use of fossil fuels.

Challenges to meeting the vision:

- The district's demand for electrical and fossil-fuelled energy continues to rise along with the increase in its population and lifestyle expectations.
- Developers and existing residents who will resist potentially higher up-front costs of higher quality buildings.
- The district relies heavily on fossil-fuelled transport as tourists and most goods must be transported long distances into and out of the district.

Inherent opportunities:

- Initial demand reduction measures (such as improved energy efficiency across all demand sectors) are well known and relatively easily implemented
- More efficient use of electrical energy in households and commercial buildings through increased energy efficient design will reduce energy demand with a wide variety of private, public and community benefits.
- Consumer demand is building among increasingly discerning visitors for a reduced energy related footprint.
- Collectively, district residents want to create a clean energy future and are likely to respond to opportunities to use energy efficiently and generate cost efficient renewable energy locally.
- Improving efficiency of energy use is an economic opportunity for the district.
- Finding efficiency in the transport network would reduce energy use and resolve other related issues (such as congestion).
- Alternative energy sources especially photovoltaics, solar water heating and wind power, are well suited to our climate and offer economic opportunity as well as energy resilience.
- Electricity costs - Costs of operating the national grid will remain high as established infrastructure ages and requires replacement over the next 30 years. This is a risk and an opportunity.

Our process for arriving at the visions and recommendations were a high level SWOT analysis

SWOT Analysis of the Energy Sector

Strengths

- Excellent Active & Passive¹ solar potential (water heating and PV) in most areas other than those with solar shading. Active Solar panels can be installed on houses and commercial buildings, and on farm buildings and dairy sheds, or as stand-alone generation plants.
- Reasonable wind potential.
- Lake heat source potential.
- A transient and growing population, who are often either from overseas or are well travelled New Zealanders and have experienced higher building standards with better levels of energy efficiency and increased internal thermal comfort levels and are demanding more.
- A receptive population in touch with the district's unique environment, with a level of collective knowledge to respond to opportunities to conserve energy and generate clean energy locally.

Weaknesses

- Large reliance on individual transportation, due to increasing urban sprawl (growth of sub-divisions rather than increased urban density). And poor public transport networks.
- Large number of stand-alone, poor quality dwellings and few apartment or urban living opportunities for a largely youthful population who don't need to live in a three bedroom, stand-alone house with a garden.
- Location - long distance from principal suppliers/ports. This aggravates the national/global issue of high reliance on liquid fuels for transport and high cost of liquid fuels.
- Limited local storage of liquid fuels and gas, as well as food, in the event of disruption to the supply chain.
- QLDC policies add consenting costs, discouraging the use of alternative renewable energy options.
- Reliance on the NZ Building Code (Part H1) as a standard for achieving energy efficiency in our region, and limited knowledge/education within the community for an energy efficiency standard more suited to our climate in residential and commercial buildings.
- Insufficient public transport and park and ride options.

¹ Active Solar: Energy from the sun's radiation, collected and transferred, then distributed or stored for use as needed.

Passive Solar: Using the sun's energy to heat a building; the windows, walls, and floors can be designed to collect, store, and distribute solar energy in the form of heat in the winter (and also to reject solar heat in the summer)

- Opportunities for micro hydro and wind generation or utilisation of the lake as a heat pump not yet assessed or well understood.
- ORC clean air and discharge requirements have cost implications for some residential and rural residential areas through requiring upgrades to existing solid wood burners.
- Limited buy-back tariffs from power companies for energy generated through photovoltaics or on-site wind energy – a national issue that has a negative local effect.
- No guidelines to incentivize energy efficient solutions for new buildings.
- Little understanding by QLDC and ORC of current demand or the rate of growth of use of energy by sector or form, or the extent of energy poverty, so we have little understanding of the district's energy vulnerabilities.
- Natural topography and orientation of the Queenstown means large areas are predominantly shaded in the winter and pointing away from any potential Passive Solar gains

Opportunities

- Growing population and requirement for new buildings (commercial and residential). This provides an excellent opportunity to greatly influence future energy usage through best practice energy efficiency design.
- Many forms of locally derived renewable energy that could be harnessed.
- High winter demands and high energy costs can be addressed by more energy efficient design and the uptake of alternative renewable energy sources provided they are financially viable.
- QLDC could provide guidance on energy efficiency benchmark levels for buildings and make a note on the Building Consent file whether the benchmark is achieved. This is useful for anyone looking to purchase the building in the future.
- A wider range of alternative heat sources could be considered for energy and cost-efficiency.
- The proposed new Conference Centre is a good opportunity for QLDC to lead by example by mandating a Specific Heat Energy Demand of 30 kWhr/m² per annum or less for the building.
- A conference centre would mean increased requirement for worker accommodation, which could be provided in a mixed use or urban apartment facility.
- Relatively low density town centre with large areas of brownfield land² (such as the campground) and poor quality existing buildings on high value land which are likely to be re-developed in the near future, and could be incentivised to use energy efficient designs.
- Local renewable energy installations would generate considerable economic activity and employment.
- Overseas marketing the district as an innovative, environmentally conscious destination.
- Potential for developing solutions to energy-related concerns, including transport and social issues (energy poverty).

² Brownfield land: land previously used for industrial purposes or some commercial uses

- Incentivisation to build above current Building Code Minimum Standards to a minimum level of energy efficiency. This would relatively easily have a large effect on the current poor situation if the local population is provided with best practice guidelines, information and incentives.

Threats

- Increasing population with little current drive towards energy efficient solutions for buildings and town planning, if not addressed will rapidly increase an already big problem.
- Vulnerability due to high dependence on imported energy.
- Dependence on tourism which will be influenced by transport fuel cost and uncertain future availability.
- Access to Queenstown for fuel (liquid, gas, solid), food, and equipment easily cut in significant weather or seismic events.
- Landlords & Developers of residential and commercial buildings have insufficient incentives to invest in better insulation and other energy saving measures.
- Lack of promotion and public knowledge about the pros and cons of renewables.
- Low income levels in region (low wage economy) impact on affordability vis-à-vis the additional costs associated with best technology.
- New buildings often have interstitial condensation and mould issues.

Main issues: Stationary Energy

1. **Housing stock for rent is generally old or poorly built and highly energy inefficient.**

The Task Force noted with particular concern the plight of renters in older houses with minimal insulation. Not only is heating costly (especially for those on low wages), but inadequate heat predicated cold, damp houses, which in turn lead to bad health outcomes, particularly in children. Because landlords do not pay for the electricity, they have little incentive to make the energy-saving investments. This is an issue that is addressed in the recommendations below and one that the Task Force urges the Council to address promptly.

2. **The district is cold and endures climatic extremes that much of the rest of the country doesn't so nationalised standards don't suit it well.**

Because the district is centrally located in the South Island and can be especially cold in winter, there is good reason for the Council to establish/encourage or incentivise the use of higher energy efficiency standards than those currently promoted by the Building Code

Buildings (residential and commercial) account for almost 40% of the final energy use in the World.³ Buildings in New Zealand are constructed for a 50 year lifetime, but many will be in existence for more than 100 years. Improvements of a building's efficiency at planning stage is relatively simple while improvements after initial construction is much more difficult. Increasing standards for new buildings is therefore among the most important single

³ International Energy Agency Paper: Energy Efficiency requirements in Building Codes, Energy Efficiency policies for New Buildings March 2008

measures for energy efficiency. *This is the reasoning behind the recommendations for the QLDC to remove barriers to efficiency and incentivise high efficiency building practice.*

The importance of energy efficiency requirements extends beyond their role in new buildings. Building codes and efficiency standards often serve as the efficiency target for refurbishment or other improvements of existing buildings. Buyers and renters of buildings or units will often compare new and existing buildings. Higher requirements for efficiency will therefore spur the demand for refurbishment or general improvements of existing buildings.

Apartment buildings or town houses are inherently more energy efficient as they share walls. This is a key initiative that could encourage reduced reliance on transport, easily achieved energy efficient (or low complexity) design and affordable housing for workers or young professionals affording them access to healthier living with lower energy bills.

Stationary Energy Needs and Use

New Zealand housing is perceived as notoriously bad. Most Europeans and North Americans tell us this. Cold, damp, unhealthy and expensive to heat is the general description of our housing stock. While our District claims a higher percentage of newer homes than most, it is only recently that the Building Code for new housing has required double glazing which by world standards is still not sufficient.

The main considerations are:

- The energy needs of buildings at the design phase.
- Potential to develop incentivisation schemes to achieve better quality new housing and upgrading of old.
- Obtaining better information during the consenting phase to enable to design to be benchmarked.
- Education and encouragement of buyers to demand energy efficient housing.

Main Issues: Transport Energy

The Queenstown Lakes District is heavily dependent on Transport Energy for almost every sector of its economy. Almost all food, tourists and products are transported to the region from far away ports.

The Task Force noted that there were immediate opportunities for the Lakes District Council and Otago Regional Council to expand public transport (park and ride from Frankton), make better use of private vehicles through car-pooling, and introduce charging facilities for electric vehicles.

- 1. District Planning allows for urban growth with inadequate consideration of the transportation costs being imposed on current and future residents. Urban growth planning should give much greater prominence to the transport energy demand it creates.**

Transport Energy Requirements and Use

While a full exploration of opportunities in transport energy is outside the scope of this study, the Task Force noted that food, goods, and raw materials are transported long distances to the district from the main sources of supply. Visitors also travel long distances to and from Queenstown and Wanaka, by air and by road. Recyclable waste is transported out over similarly long distances. It follows that the “energy intensity” in food, goods, and raw materials brought to the district is higher than for many urban areas in New Zealand. The cost of fuel at the pump is also among the highest of any locations in New Zealand.

Transportation fuels are essential for the district’s main economic activity - tourism. As such, the cost of fuels affects the viability of the local economy. It also contributes substantially to the district’s high cost of living, which has a major impact on living affordability. This contributes to the reasoning behind the recommendation to develop a Transport Strategy that contemplates and reflects these issues and the opportunities around alternative energy transport fuels.

Alternative fuels for transport in use around the world include natural gas, ethanol, methanol, propane, methane from landfills, hydrogen, biodiesel, and electricity. Rapid advances are also being recorded for solar power in hybrid configurations with other fuels. Eventually these fuels may be applied to a range of transport types, from planes to trains, trucks, buses and cars.

Distribution systems and scale will require research and analysis, local and external partners, and sometimes investors and entrepreneurs.

The Transport Strategy should consider plans for new housing and travel demand drivers such as proximity to schools, places of work and retail. The district should aim to be an early adopter of new, energy efficient technologies in its transport sector. In the meantime, QLDC should explore options for expanding public transport and car-pooling in the Wakatipu and Wanaka, and introducing some electric vehicles (for QLDC use). QLDC should also incentivise increased urban density/mixed use buildings to allow young professionals and workers to live in Queenstown or Wanaka without the need for a car.

The main considerations are:

- Public transport – limited and faces cultural resistance. QLDC would need to coordinate the approach.
- Private transport – Opportunities to make better use of private vehicles and carpooling arrangements.
- Increasing rural sub-divisions for cheaper housing impacts on transport energy.
 - Transport to and from the district for residents and visitors.
 - Transport for goods and raw materials in and out of the district – High levels of embedded carbon in importing.
 - Increasing cost of fossil fuels.

Measures for success in Energy Futures

- A measure of success of the community's energy futures initiative will be the extent to which the recommendations are achieved. 1. Better warmer more energy efficient housing and 2. Lower cost, lower CO2 transport.
- Increase in the use of on-site energy generation.
- An energy efficient benchmark for the district so efficiency can be measured.
- New buildings target 50kWhr/m² specific heat energy demand.
- Energy intensity of the district economy. It is calculated as the units of energy per unit of GDP. High energy intensities indicate a price or cost of converting energy into GDP.
- Reduction in the local energy spend allows other areas of the economy to be further stimulated.
- Reduction in per capita and total carbon emissions.

Recommendations to Agencies

To the Queenstown Lakes District Council

Several actions were identified by the Task Force, which either depend on or involve QLDC. Some to be actioned immediately, while others may be achieved in the medium term.

- Recognise our uniqueness and collaborate with other councils with similar climates and economic profiles around the world to find solutions.
- QLDC to formally recognise the influence that energy costs have on the standard of living in the district and establish proportionate representation for the community.
- QLDC to consider transport and housing energy implications in its District Plan.
- QLDC to begin to prepare a profile of energy use in the district to inform energy strategy development, monitor progress towards increased efficiency in the use of energy and its affordability, and guide preparation of the next and subsequent Long Term Plans.
- QLDC to lead by example. It could show-case energy efficiency for new buildings in which it has an interest, and aim for best practice – Passive House Design/ Zero Energy Design/ Or Energy + design.⁴ This will send a clear message to the community and overseas that Queenstown Lakes region is setting and achieving international best practice.

District Plan

⁴ More information on these international best practice standards can be found in the International Energy Agency Paper: Energy Efficiency Requirements in Building Codes, Energy Efficiency policies for New Buildings. March 2008

The immediate opportunity to ensure higher energy efficiency in housing and commercial buildings in the district through an energy efficiency design guide document and setting of performance benchmarks.

District Plans are being used elsewhere to encourage development of alternative renewable energy sources and reduce the energy employed for transport, especially fossil fuels. Energy use could be reduced if development to outer areas was limited and there was more centralisation. This would encourage more pedestrian and cycle access through shorter travel distances.

The Task Force recommends to QLDC the following short-term measures for inclusion in the District Plan.

Building Design - Regulatory

Immediate consideration in relation to the District Plan Review:

- QLDC should incentivise systems that will reduce demand for transport energy. For example plan for higher density and mixed use development within easy walking distance of the town centres. Schools and highly frequented destinations.
- Incentivise developers or home builders who are achieving recommended minimum levels of Energy Efficiency. This could be done by reducing the building consent fees. This would send a clear message to the market and ensure the development of good solutions.
- QLDC should identify and remove any unnecessary or inappropriate regulatory barriers to the installation of alternative renewable energy generation technologies for residential and commercial buildings - principally solar hot water, photovoltaic panels, and wind turbines – as part of its District Plan review. In addition, QLDC should remove or waive any associated consenting fees and provide advice on the effectiveness and cost effectiveness of alternative energy use.
- Consideration of form and orientation (for sun) of buildings as part of consenting process for new subdivisions in the parts of the district where this is possible and appropriate. Where it is not, (e.g. parts of downtown Queenstown) it should prioritise consideration of heating/ventilation systems that mitigate south-facing and shaded sites. QLDC should work with ORC to ensure energy futures aspirations are reinforced by the Regional Policy Statement and other ORC mechanisms.

Building Design - Education

- QLDC should prepare a design guideline that indicates why a Code Minimum design house is generally not suitable for the region, and provide a suitable performance benchmark that can be used by designers, builders, developers and homeowners. (Socialising beyond compliance)
- QLDC should develop an education and information system that builds awareness of the advantages of energy efficiency of residential and commercial buildings, including measures to conserve and use energy more efficiently.

- QLDC should work with partners such as EECA and others with existing resources to provide energy efficiency advice to local design practitioners and construction industries, including examples for residential and commercial buildings of the financial benefits and costs of new and retrofit installations of alternative renewable energy technologies.
- QLDC should celebrate good examples and best practice of energy efficient homes and commercial buildings to raise awareness and understanding of the benefits of efficient energy use and conservation.

Building Design -Other recommendations

- QLDC should encourage developers to consider the inclusion of alternative renewable energy generation options in their new developments.
- As necessary, QLDC should partner with EECA to ensure that the details of these Task Force recommendations are crafted in a manner to be S.M.A.R.T Specific, measurable, achievable, realistic and time-bound.
- QLDC should investigate the introduction by power companies of smart meters in new homes and incorporate energy efficiency benchmark comparisons into LIM reports and in consenting processes.
- QLDC should explore the viability of harvesting methane from its Victoria Flats landfill and using the gas for heating and/or renewable energy generation.

Transport

QLDC, ORC, NZ Transport Agency and other public and private agencies should work together to develop a far reaching Lakes District transport strategy that would drastically reduce the district's reliance on transport energy, particularly fossil fuels.

At a minimum the strategy should cover:

- Provide viable alternatives to private car use through adequate public transport, car-pooling, good urban design and innovative solutions – eg driverless cars.
- Incentivising development that reduces reliance on individual transportation.
- Identifying potential non-fossil fuel energy sources such as electric and waste products and considering the necessary infrastructure to support them.
- Specifically considering visitor transport efficiency improvements.
- Specifically considering reducing energy requirements for the transport of goods in and out of the District through inter alia, more local produce production and processing.

Long Term Plan

- Assisting the district in developing strategies with the aim of becoming increasingly energy efficient. QLDC should develop a district-wide energy profile, including areas or forms of energy poverty (if any), as an information base for preparation of future LTPs.

To the Otago Regional Council

- Collaborate with QLDC in removing or waiving consenting and fee barriers for proposals for alternative renewable energy installations.
- Collaborate with QLDC in incentivising development that achieved performance benchmarks.
- Collaborate with QLDC in developing a comprehensive energy reducing Transport Strategy.