Appendix A: Selected examples of the determinants of health and wellbeing

Categories of determinants of health	Examples of specific health determinants
Social and cultural factors	Social support, social connectedness Equity Social isolation Participation in community and public affairs Family connections Cultural and spiritual participation Expression of cultural values and practices Links with marae or other cultural resources Racism Discrimination Attitudes to disability Fear of prejudice Relationship with the land and water Level and fear of crime Reputation of community/area Perceptions of safety
Economic factors	Creation and distribution of wealth Income level Affordability of adequate housing Availability and quality of employment/education/training Skills development opportunities
Environmental factors (including living and working conditions)	Housing conditions and location Working conditions Quality of air, water and soil Waste disposal Energy Land use Biodiversity Sites of cultural significance (e.g. sacred or historic sites) A change in the emissions of greenhouse gases Public transport and communication networks Noise Exposure to pathogens
Population-based services Access to, and quality of:	Employment and education opportunities, workplaces, housing, public transport, health care, disability services, social services, childcare, leisure services, basic amenities, and policing
Individual/behavioural factors	Personal behaviours (e.g. diet, physical activity, smoking, alcohol intake) Life skills Personal safety People's belief in the future and sense of control over their own lives Employment status Educational attainment Level of income and disposable income Stress levels Self-esteem and confidence
Biological factors	Biological age, gender

Appendix B: Summary of *Future currents* – Information provided to workshop participants

Future currents: Electricity scenarios for New Zealand 2005–2050

First scenario – *Fuelling the future*

- First scenario based on doing things the way we've done before – influential leaders assume the demand for *electricity* will keep growing as people demand more energy services.
- More generation and transmission infrastructure is needed to maintain security of supply.
- Planning for the future basically involves building more big infrastructure before we need it.
- People remain generally passive energy consumers.

Shane and his family's outcomes – *Fuelling the future*

- Shane's farm electricity connection is under threat as it has become expensive for his line company to maintain. He's paying hefty maintenance charges and they are rising, he might not get his lines fixed after the next storm. He can just afford this, but that's not the case for most of his whanau. His electricity bills are rising to help pay for the major new power stations.
- There are protests over plans to build new power pylons into Auckland, and also over plans for new coal power plants in Waikato. There are similar protests in the South Island – developments go ahead in the national interest, despite community and iwi concerns. Transmission lines and power pylons frame many landscapes.
- Coal mines in some regions are being opened up on productive land (one of them on Shane's grandparents farm that he remembers as a child), but not necessarily close to the power stations. Coal is moved about the country. The coal industry is flourishing.
- Water quality diminishes due to large hydro generation schemes and permitted discharges from thermal power stations. Shane's whanau stop gathering food from their local waterway.
- Best practice technology is used in coal-fired power stations, but there is still public concern over air quality (slow improvement over time). One of Shane's children is injured in a coalmine accident, he didn't have sufficient qualifications to get any other sort of work.
- Pastureland is planted with vegetable oil crops to supply growing margarine and bio-diesel industries (lower carbon impact than dairy and fossil fuel industries). Shane's iwi are attempting to break into the highly globalised market of vegetable oil crops, but they are finding they have no control over the price they get for their crops.

- New hydro schemes are started, most in less than ideal locations. Short term jobs from these are welcome but several settlements are re-located to make way for hydro dams.

Robyn and her family's outcomes – *Fuelling the future*

- New and existing office buildings have few design features to use energy more efficiently.

- There is extensive marketing for coal-fired power stations.

- Large wind farm developers reap major financial rewards, but they have little community trust and windfarms are now encroaching on sensitive landscapes. By 2016 there are no more sites left that the community want developed.

- NZ is under increasing pressures from trading partners not to renege on climate change agreements. With higher fossil fuel emissions from the new power stations, the government has to buy carbon credits from overseas -these are not cheap and taxes have to go up.

- Robyn's house is warm when she gets home as she turned on the electricity well before she arrived home. Her electricity bill is high, and prices are rising. Her grandparents house is not well insulated and they can't afford the power bills to heat it adequately. They only use one room in the house and are regularly cold. Robyn's children don't like visiting or staying-over at the grandparents in winter.

- Robyn's grandparents can't afford the up-front costs of investment in energy efficiency improvements. The Government isn't providing any significant incentives to help households be more energy efficient.

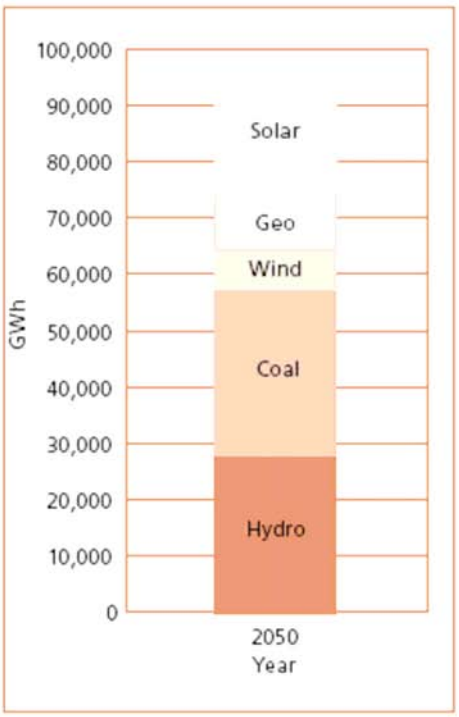
- The electricity system is still designed around the national grid and large scale developments. Lines companies inhibit the uptake of distributed generation by charging large fees to sell surplus electricity from solar cells and other small scale generation, which becomes increasingly cost-effective.

- There are several new coal-fired stations in Auckland and coal is shipped from Waikato and the south island. Lots of coal travels right past Robyn's grandparents rental house as they live beside a major trucking route.

- There is massive public and private investment in techniques to capture the carbon produced from these power stations and bury it underground. Robyn worked on one of these projects for a while.

- Twice as much electricity is required in 2050 as in 2005 and demand for electricity is still rising at 2% per annum.

Figure 6.1 Electricity generation 2050



Electricity use

Up 48% since 2030

Up 137% since 2005

Electricity use per capita

Up 42% since 2030

Up 110% since 2005

Electricity CO_2 emissions per annum

Up 195% since 2005

Up 520% since 1990

NB: Some CO_2 capture and sequestration

Second scenario – *Sparking new designs*

- In the second scenario, as more resources go into environmental education, people slowly become more aware that they don't want *electricity* per se – rather they want energy services. The rising demand for energy services could be met in many ways – such as better building designs, more solar water heaters, using other fuels and investing in energy efficiency.

Planning for the future involves more dialogue and agreement about where we want to go and then aiming to get there in a purposeful way. Communities participate more meaningfully in plans for energy resources and people become empowered to have more of a say in their use of energy.

- The cost of a unit of electricity is the same as in *Fuelling the future*, but less electricity is used. The demand for energy services rises at 2% per year, but it is not met by just by electricity, but more by energy efficiency improvements.

- New electricity supplies are mostly from renewable sources and developed at much smaller scales and more widely dispersed.

Shane and his family's outcomes – *Sparking new designs*

- Faced with an expensive maintenance contract for guaranteeing his power lines Shane installs a bio-generator on his rural property thanks to a favourable financing scheme. He also sells peak electricity back to the lines company and provides credits to his local Marae. Other whanau, many less financially well-off than him, can do the same.

- Shane holds shares in a cooperative wind farm in his district that powers his and other local farms. Local/iwi ownership increases community acceptance of wind farms, particularly compared with large coal-fired power stations. Small to medium size windfarms are common on the landscape, but not in protected areas. National guidelines protect highly valued natural landscapes.

- Shane also installs a biodigester on his farm, which generates power from his recycled farm waste. Water quality improves in his local stream and more fish appear, which he begins collecting for his whanau.

- New hydro schemes are developed, but many of them are micro generation, and the balance are medium sized, and their environmental impacts are low, although there is still a small degree of community resistance. These projects provide short term jobs and an additional source of power for local communities, so communities become more supportive over time.

- Small energy efficiency spring up and offer comprehensive energy audits. Some of Shane's whanau have re-trained and now have their own local auditing company.

- New transmission lines into Auckland are still required, but they were built much later and many new sections were placed underground. Protests about the above ground sections still occurred.

- People are still concerned about security of electricity supply, but over time the diverse range of energy sources boosts the security of the electricity system and reduces the impact of extreme events. Proportionally more power is being generated near to major urban centres.

- Electricity companies become involved in energy demand management initiatives as they find the new market arrangements profitable.

- The progressive roll-out of energy efficiency measures meant that less new generation was required over time. These improvements eventually meant that there was a surplus of generation by 2040 and there was no need to replace some of the large fossil fuel plants that reached the end of their operating life. Generation was almost entirely from renewable sources.

Robyn and her family's outcomes – *Sparking new designs*

- Changes in the way that electricity was priced at different times of the day meant that many families could save money overall, despite peak prices being higher. Robyn's grandparents resisted at first, but a social marketing campaign meant that their and their community's acceptability grew, mainly because they had the flexibility to shift some of their electricity use away from the peak periods when it was more expensive and use it when it was cheaper. They found they could save money this way.

- The building code is progressively strengthened to improve design of buildings, making them warmer, drier and less expensive to heat. There was some initial increase in the cost of these materials, but as they became used more widely the costs came down.

- As they now have solar water heating, Robyn's grandparents have as much hot water as they need and seldom need to use a heater in their house – this is good since they don't have much money. All of the rooms in Robyn's house are warm and dry, including her children's. Everyone sleeps in bedrooms kept at a steady 18^{o}C.

- District plan changes also ensure that new commercial buildings use far less electricity. Smart design proves to be a wise investment for companies of all sizes.

- Robyn signs up to a green power scheme to help fund local wind farms, which supply her local energy needs – power from these farms becomes cheaper than the national energy retailer. Some of the profits support local community projects.

- Her local company doesn't switch off anyone's electricity like the national retailer used to do, although some consumers agreed to have their power reduced or shut off in emergencies in return for a lower tariff.

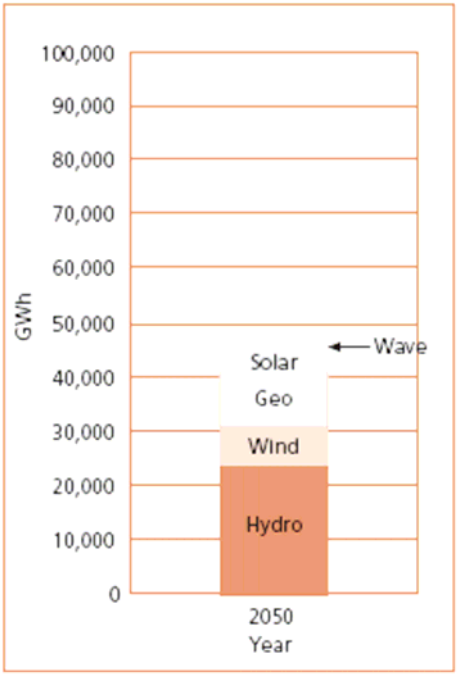
- With more community involvement and acceptance, local protests at wind farms become less frequent. This was also helped by technology improvements reducing turbine noise and people becoming more used to wind farms on the landscape. National guidelines protect highly valued natural landscapes.

- New Zealand comfortably meets its international Climate Change requirements and the impact on the overall economy is small. Many more incentives are in place for research into energy efficiency and renewable technologies. Many job opportunities exist for young people in these fields.

- Robyn's children enjoy the clear blue skies in Auckland as transport and other energy emissions diminish.

- Small and local energy services companies that specialise in energy efficiency (like Robyn's), sustainable technologies and installation of new equipment flourish, and innovative products are exported.

Figure 6.2 Electricity generation 2050



Electricity use

Steady since 2030

Electricity use per capita

Down 4% since 2030

Same as 2005

Electricity CO_2 emissions per annum

Down to no emissions

Appendix C: Major health and social issues of characters – Information provided to workshop participants

Shane and family

Shane – born in 1985, grew up on a farm in the East Cape, and in 2005 completed an agricultural certificate. Shane represents rural people, aged 21 years in 2006, (Maori), educated and working on his rural-farm, with two boys to be born in the future. Shane has no current health issues.

Shane's whanau are living near him on the East Cape, lower-socioeconomic status, rural Maori.

Population information

Housing

- More Maori live with other family members than the total population, which can be positive, but also means that the proportion of families in overcrowded housing is also higher.

Culture and Safety

- The extent to which Maori participate in family/whänau activities and perception of safety is the highest for any ethnic group.

Health

- Maori have poorer health statistics for most diseases than the general population, such as overweight and obesity (64%), asthma (25%), cancer (much of this is due to smoking), infectious diseases and cardiovascular disease.
- Access to services is also a problem, with lower accessibility for GP visits and mental health services, despite higher need.

Education

- 30.5% of Maori 15 years and older complete school to Sixth Form Certificate or higher) compared with 50.1% of the total population. But Maori have a higher proportion of people entering tertiary education than NZ European.

Income

- Economic inequity/exclusion – In New Zealand the income distribution has become more dispersed over the period from 1988 to 2004.
- 29.3% of Maori are in the lowest income 1/5th.

Rural areas with high urban influence represent 2.6 percent of the population and have the highest median and average income and highest average household expenditure of any other areas. Rural areas with moderate urban influence have 3.6 percent of the population, whereas low urban influence rural areas are home to 6 percent of the population. These two areas have relatively high numbers (27-30 percent) of employed people working in agriculture and fisheries occupations. In highly rural/remote areas, 2 percent of the population reside, and 53 percent of these who work are employed in agriculture and fisheries (Statistics New Zealand 2001).

Robyn and family

Robyn – also born in 1985, grew up in the suburbs of Auckland, and in 2005 is studying engineering at university. Robyn is 21 years old and has no current health issues. Robyn represents urban people, aged 21 years in 2006, NZ European, university educated in a professional city-job, with three children to be born in the future.

Robyn's grandparents are New Zealand European, living in Auckland city and are low income.

Population information

Housing

- Social connectedness – The number of NZ Europeans living alone was more than 4 times higher in 2001 than it was in 1991 and 60% of these people are women.

Health

- Inadequate intakes of fruit and vegetables, breads and cereals is common, as is obesity and overweight (6 out of 10).
- One in five NZ European have asthma.
- Higher likelihood of depression or mental illness among lower income NZ European groups.
- ½ of all people who visited a GP had experienced some level of psychological problems in the past year. The most common mental disorders were depressive, anxiety and substance use disorders. These disorders were more common among younger people.
- It is generally accepted in the modern day that stress has a significant effect on health. Excess stress can lead to continuing anxiety, insecurity, low self-esteem, social isolation and a lack of control over home or work life and can result in significant health problems.

Income

- Economic inequity/exclusion – In New Zealand income distribution has become more dispersed over the period from 1988 to 2004.
- Elderly people living alone are more prevalent than would be expected in the bottom income 1/5th.

Main urban areas such as Auckland, Wellington and Christchurch house 70 percent of the population and these areas have the highest percentages of professionals, technicians and clerks indicating a higher income average. It is projected that main urban population areas will increase by 20 percent by 2021. Satellite urban areas house 3 percent of the population and are expected to increase more than the national average by 2021. There is a high child dependency ratio in these areas. Independent urban areas represent 11.7 percent of the population with high proportions of one-person households and small average house sizes. These areas represent the lowest median personal income and average household expenditure. Independent urban areas are projected to decline up to 2021 (Statistics New Zealand 2001).

Appendix D: Workshop outcomes – Matrices

The potential impacts of the proposed actions, populations affected and comments from workshop participants are presented in the matrix below. This summarises the main findings of the HIA, and informed the recommendations.

***Fuelling the future* – economics (rural and urban)**

Part of scenarios assessed: *Fuelling the future*

Robyn

How might the scenario potentially affect economics?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Passive management of energy requirements – tax payer subsidised	Consumers not taking control of their energy requirements. Less control and potentially more cost and less choice about energy spend	Workshop discussion	Affect all, low income in particular who have less opportunity to absorb increases in energy expenditure.	
Greater primary energy spend/cost therefore less discretionary household income for	Colder housing – risk of illness Less money for food,	NZ Stats, household income	Low income people will feel greater impact Higher income groups	

other items	transport, clothing, entertainment		will still have impact on spend but will be able to cope better	
Increase in taxes for carbon charges – this will be offset by decrease in electricity spend	Government	Workshop discussion	Taxpayers	
Greater health costs because passed on to the consumer	Health sector costs higher because of greater electricity spend	Workshop discussion	Everyone will pay greater health costs Lower income groups will suffer more	Government investment in health sector
Health and safety in the workplace will be better with large companies controlling more jobs	Companies are more likely to have health and safety policies and OSH compliance than small businesses therefore fewer accidents and time off work	OSH stats	More likely to be urban or smaller urban centre workers?	OSH regulations
More jobs available in large companies particularly in urban areas	Greater income security in urban areas Population drift to urban centres continues, decreased viability of rural areas	Workshop discussion	Urban dwellers greater income potential. Rural people.	
Centralised energy investment by Government and large industry	Less wastage of small company time (and money in investment and development) –	Workshop discussion		
Increased or maintained	Businesses will be more	Workshop discussion	Workers	

business confidence with status quo	stable if dealing with status quo of electricity delivery therefore job stability and potential growth			
Cost of housing increase	Cost of good houses more expensive so less access to ownership.	Workshop discussion.	Lower income people renting rather than owning own homes Landlords may invest more in energy efficiency to counter increased electricity costs therefore increase rents	
	Better energy efficiency in housing design so better return for money spent on electricity		All benefit	

Shane

How might the scenario potentially affect economics?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, eg, past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Passive management of	Consumers not taking	Workshop discussion	Affect all, low income in	

energy requirements – tax payer subsidised	control of their energy requirements. Less control and potentially more cost and less choice about energy spend		particular who have less opportunity to absorb increases in energy expenditure.	
Greater primary energy spend/cost therefore less discretionary household income for other items	Colder housing – risk of illness Less money for food, transport, clothing, entertainment	NZ Stats, household income	Low income people will feel greater impact Higher income groups will still have impact on spend but will be able to cope better	
Increase in taxes for carbon charges – this will be offset by decrease in electricity spend	Government	Workshop discussion	Taxpayers	
Greater health costs because passed on to the consumer	Health sector costs higher because of greater electricity spend	Workshop discussion	Everyone will pay greater health costs Lower income groups will suffer more	Government investment in health sector
Rural line closures	Loss of electricity access at reasonable cost. Loss of business opportunity and lifestyle change due to altered energy options. Depopulation of rural areas.	Workshop discussion	Rural communities, farms in remote areas	

Loss of local employment opportunities in rural areas	Centralised energy investment and control will mean less local employment	Workshop discussion	Rural, low income	
Pressure on small farming businesses to sell to large corporate ventures which are better able to pay for the electricity and maintain their supply in rural areas	Increase in corporate farming (larger) and decrease in family ownership of farms. Change in economies of scale and numbers of small businesses.	Workshop discussion.	Rural and farming communities, individual farming families	
Large businesses have greater control because of greater capacity to pay for electricity.	Small businesses bought out by big businesses in areas where large companies don't want competition, impacting on national and regional economies	Workshop discussion.	Small town and rural enterprises – family businesses	
Increase in lifestyle ownership in rural areas	Self sufficiency of energy use on lifestyle blocks but owners work in urban areas Less area for farming (stress, land prices increase, pressures on existing farms)	Workshop discussion.	Rural communities, farmers	
Cost of housing increase	Cost of good houses more expensive so less access to ownership.	Workshop discussion.	Lower income people renting rather than owning own homes	

			Landlords may invest more in energy efficiency to counter increased electricity costs therefore increase rents	
	Better energy efficiency in housing design so better return for money spent on electricity		All benefit	

***Fuelling the future* – Housing and buildings (rural and urban)**

Part of scenarios assessed: Fuelling the future

Robyn

How might the scenario potentially affect building and housing?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Building codes- no significant change to regulations.	No incentives to make homes more energy efficient.		Robyn may move to a slightly more efficient house as her career	

	New homes will be insulated but still use a lot of energy if overall design is poor		progresses.	
Proportion of uninsulated houses will drop as housing stock turns over, but not significantly.	Slight overall improvement in energy efficiency of housing stock		Greater impact on those who live in older housing and who are poor.	
Cost of electricity supply likely to rise	Less income available for maintaining health. Cost of keeping house warm will rise		Robyn may have less available alternatives than Shane. Robyn's health likely to be stable but will cost her more to maintain it.	Improved energy efficiency to reduce need for new and expensive supplies
Changing demographics – more elderly	Increasing energy costs to keep warm. Increasing health costs Maybe more elderly living with their children	Stats NZ	Rising inequalities, especially for elderly living alone. Robyn likely to be better off than her parents.	
Changing demographics – more young Maori	Overcrowding may increase. More pressure on health sector, especially treating illnesses.. More overall spending on health	Stats NZ	Rising inequalities for Maori in lower socio-economic cohorts– rising energy costs and health costs.	Reduce economic inequality. More effort into making buildings healthier
Greater use of LPG	Adverse impact on		Greater impact on those	Stricter regs of LPG

heaters, and other alternative fossil fuels for heating	indoor air quality if LPG heaters and to lesser extent open fires		who cannot afford cleaner and more expensive technology.	heaters. Better education of their health impacts and how to avoid them.

Shane

How might the scenario potentially affect building and housing?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Building codes- no significant change to regulations. May be incremental improvements.	No direct incentive to improve energy efficiency of farm buildings (but incentives created by next impact)			Better incentives for improving buildings
Energy use – security of supply not guaranteed after 2014. May have to seek	More time and effort spent on energy needs – added stress. Rural communities may have	Many rural spur lines are long and stringy. Are expensive to maintain and to carry energy to	Rural communities more resilient so might adapt better to changing	Cost of small-scale distributed energy sources could be prohibitive.

alternative energy sources.	to become more independent. May have to use wood more for space heating and hot water heating. Many already use wood burners and wet-backs for space heating, water heating and possibly cooking. This could increase.	remote communities and households.	circumstances.	Availability of local firewood – may not be so readily and freely available in Waikato.
Costs of running the farm will go up	Additional stress and economic cost. Could be more use of horse-power on farm, return to more traditional methods More use of portable oil and gas supplies may be sourced for this.		Elderly may find it tough to collect more firewood, but likely to get family support. For the young and fit, it won't be a problem and might even be beneficial for fitness.	Availability and cost of alternative energy sources.
Candles could be used more for supplementary lighting	Will increase risk of fire	Well documented.	House fires in rural areas that are off-grid - often Maori communities	Improved education of fire risk. Better availability and affordability of alternatives. Connected to grid.
Indoor air pollution	May be an issue if more use of LPG heaters and	Well-documented	Main impact on groups exposed to energy	Regulation of LPG heaters. Improved

	open fires for space heating – dampness could be a problem too		poverty	education of health effects.
When Shane moves to Waikato,	may have local water quality issues with power stations nearby.	Fossil fuel stations require water for cooling. This water often returned to source (river) in a warmed state, which has ecological impacts	May impact anyone who uses the waterways, but main impacts on ecology.	No fossil fuel stations. Stricter consent conditions.

***Fuelling the future* – social connectedness (rural and urban)**

Part of scenarios assessed: *Fuelling the future*

Robyn

How might the scenario potentially affect social connectedness?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Promotes large employers who have the capability to treat employees well if they choose to.	Direct impact on access to healthcare, stress and mental wellbeing from 'no hassle' healthcare. Improved wellbeing from	Existing large energy companies	Lower skilled workers are more likely to miss out on benefits. Those not in the workforce will completely miss out –	Strength of economy and competitiveness for qualified staff.

	job security and regular pay.		older, students, unemployed, etc	
Large companies will take money out of local communities as consumers are treated as 'cash cows'.	Reduced economic wellbeing can negatively affect a communities sense of wellbeing and sense of control. An economically weak community will discourage people from participating in community life. Indirectly impact with the potential to reduce mental health.	Workshop discussion. Both of these are likely to have evidence to support them.	People who are already poor, who already live in cold and damp houses, who are already unwell – will fare far poorer under this scenario. The scale of this negative impact is unknown.	
Rental properties will be last to see any energy efficiency measures. Increased concern for family members living in them, eg elderly relative who needs some assistance.	Indirect impact on mental wellbeing of family members. Increased risk of the person requiring additional family care, social care or institutional care if the house they are living in is cold and damp.	Workshop discussion	Older people, particularly those who already require some form of family or social assistance.	Building codes that apply to all properties, including rentals.

Evidence: Apparently there is a Christchurch study that describes what people spend their money on, of which energy is a variable. Similarly, the Household Economic Survey by SNZ may also have similar data if required.

Shane

How might the scenario potentially affect social connectedness?	Is that a direct or indirect health impact? What's the causal chain?	What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources	Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?	What key factors might encourage or prevent the health impact?
Costs of living in rural communities may increase leading to de-population.	Direct impact on mental and cultural wellbeing – ability for city whanau to return to Turangawaiwai to mentally recharge and connect with family. May lead to 'missing demographics' , such as certain age groups, leading to low school rolls, workforce issues, lack of services etc. Direct impact on sense of community and mental health.	Personal experience. Census data for population shifts over time. SIA on effect of large industries closing down, eg coal mines? See Reece for information on disconnect with Turangawaiwai.	Urban authorities benefit due to population growth. All rural communities suffer, including Maori.	
Large companies will take money out of local communities as consumers are treated as 'cash cows'.	Reduced economic wellbeing can negatively affect a communities sense of wellbeing and sense of control.	Workshop discussion.	People who are already poor, who already live in cold and damp houses, who are already unwell – will fare far poorer under	

	An economically weak community will discourage people from participating in community life. Indirectly impact with the potential to reduce mental health.	Both of these are likely to have evidence to support them.	this scenario. The scale of this negative impact is unknown.	
Rental properties will be last to see any energy efficiency measures. Increased concern for family members living in them, eg elderly relative who needs some assistance.	Indirect impact on mental wellbeing of family members. Increased risk of the person requiring additional family care, social care or institutional care if the house they are living in is cold and damp.	Workshop discussion	Older people, particularly those who already require some form of family or social assistance.	Building codes that apply to all properties, including rentals.
Large projects causing community conflict and protest.	Direct impact on stress, social connectedness and potential for physical and psychological abuse. Has the potential to unite parts of the community together (to fight a proposal) and split others apart.	Makara windfarm experience.	Whole community	
Large projects have the potential to attract tourism and provide	Direct impact on local economy, sense of place and pride of community,	Lake Karapiro, Waitaki, Benmore etc are top holiday and leisure	Whole community	Type of development, loss of what resources when the new resource

leisure resources, for example Lake Karapiro	and physical activity.	destinations. Huka falls when the river is turned on.		is developed.

Evidence: Apparently there is a Christchurch study that describes what people spend their money on, of which energy is a variable. Similarly, the Household Economic Survey by SNZ may also have similar data if required.

***Sparking new designs* – economics (rural and urban)**

Part of scenarios assessed: *Sparking new designs*

Robyn

How might the scenario potentially affect Economics?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, eg, past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Active energy management	Greater individual and local community control. (Economically better, better mental health, sense of ownership)	Workshop discussion.	All benefit. Greater self-reliance	
Less income spent on energy	Greater discretionary income. Income directly impacts on multiple	Workshop discussion.	Lower income, low socio economic	

	health outcomes.			
Cost of housing increase	Cost of energy efficient houses more expensive so less access to ownership. Reduced social connectedness, loss of control, reduced pride of place.	Wgtn School of Medicine Housing study	Lower income people rent rather than own their own homes	Government investment on energy efficiency measures. Landlords may invest more in energy efficiency if regulation requires it
Better energy efficiency in housing design so better return for money spent on electricity	Houses warmer and drier – healthier environments. Direct impact on respiratory illness, hospitilisations and days off school/work.	Wellington School of Med study	All benefit.	Retrofitting of older existing housing stock
	Less money spent on electricity. More money available for other household items such as food, clothing, cigarettes and alcohol.	Workshop discussion.	Those renting and low income benefit more if landlords are required to upgrade houses	Government subsides will assist
Healthier indoor air temperatures and moisture levels. Better ventilation	Less respiratory problems	Wellington School of Med study	Lower income / low socio economic / elderly and children	Government requirements on building codes standards for housing insulation and heating
Decrease in traffic and pollution impacts of coal use	Less respiratory problems from coal air pollution. Less road and rail	Workshop discussion.	Those living near coal works Rural and urban areas where coal burning used	

	transport of coal therefore noise, and fumes (physical and mental health)		as heating	
Decrease in traffic and pollution impacts of coal use	Better health and productivity for people – less time off work and school. Better mental health and stress levels. Less transport noise.	Workshop discussion. Transport evidence base.	Rural and urban areas where coal burning used as heating	
Increasing market – more small businesses around offering energy efficiency advice and expertise, products	Greater choice and increase in quality of energy efficiency products	Workshop discussion.	All benefit. Low income may be better able to afford to make energy efficient decisions around energy efficiency	Government assistance to those unable to afford immediate outlay on improving energy efficiency
Increasing market / Local energy investment (and more productive economy at the macro level)	Greater movement of money in local and smaller markets/areas. Less overseas loss of profit.	Workshop discussion.	Whole economy	
Individual business risk	Greater level of overwork, stress and negative health impacts in smaller businesses / owners more likely to overwork	Workshop discussion.	Small business employers and employees	Support from central government. Small business support both financial incentives, business advice etc
Local and regional business development increase	More jobs in smaller businesses. Greater opportunities for employment. Small	Workshop discussion.	All benefit.	

	family businesses more able to compete			
Increasing market for energy efficiency	Diversifying income / economically self reliant population	Workshop discussion.	Potential benefit to all. Small energy efficiency businesses	
Human capital and export opportunities from small business development	Workers better skilled and working locally in smaller businesses. Small businesses have overseas export opportunities if product development is high standard	Workshop discussion.	Urban workers and rural workers, those with small businesses working in fuel efficiency	
Higher productivity / less spend on electricity	Workers healthier, businesses able to focus on development of key areas of focus and workforce development	Workshop discussion.	Urban and rural workforce and business	
Hazard increase	More smaller businesses – OSH Greater DIY work on improving energy efficiency in homes	Workshop discussion.	Workers Homeowners	
Trades people need to be qualified and up to speed with new technologies	Could impact on ability of businesses and homeowners to improve existing housing stock and in new building practices if required	Workshop discussion.	Could slow progress towards greater fuel efficiency across the board. Greater impact in urban areas due to larger populations?	Government support to training and education (apprenticeships for trade jobs)

	(building codes) Could impact on pricing of trades people's services		Low income may not be able to afford services priced due to lack of competiton (ie, high priced workers)	

Shane

How might the scenario potentially affect Economics?	Is that a direct or indirect health impact? What's the causal chain?	What is the existing evidence for the answers you have given, eg, past experience, facts, research & existing data sources	Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?	What key factors might encourage or prevent the health impact?
Active energy management	Greater individual and local community control. (Economically better, better mental health, sense of ownership)	Workshop discussion.	All benefit. Greater self-reliance	
Less income spent on energy	Greater discretionary income. Income directly impacts on multiple health outcomes.	Workshop discussion.	Lower income, low socio economic	
Cost of housing increase	Cost of energy efficient houses more expensive so less access to ownership. Reduced social connectedness,	Wgtn School of Medicine Housing study	Lower income people rent rather than own their own homes	Government investment on energy efficiency measures. Landlords may invest

	loss of control, reduced pride of place.			more in energy efficiency if regulation requires it
Better energy efficiency in housing design so better return for money spent on electricity	Houses warmer and drier – healthier environments. Direct impact on respiratory illness, hospitilisations and days off school/work.	Wellington School of Med study	All benefit.	Retrofitting of older existing housing stock
	Less money spent on electricity. More money available for other household items such as food, clothing, cigarettes and alcohol.	Workshop discussion.	Those renting and low income benefit more if landlords are required to upgrade houses	Government subsides will assist
Healthier indoor air temperatures and moisture levels. Better ventilation	Less respiratory problems	Wellington School of Med study	Lower income / low socio economic / elderly and children	Government requirements on building codes standards for housing insulation and heating
Decrease in traffic and pollution impacts of coal use	Better health and productivity for people – less time off work and school. Better mental health and stress levels. Less transport noise.	Workshop discussion. Transport evidence base.		
Increasing market – more small businesses around offering energy efficiency advice and	Greater choice and increase in quality of energy efficiency products	Workshop discussion.	All benefit. Low income may be better able to afford to make energy efficient decisions	Government assistance to those unable to afford immediate outlay on improving energy

expertise, products			around energy efficiency	efficiency
Increasing market / Local energy investment (and more productive economy at the macro level)	Greater movement of money in local and smaller markets/areas. Less overseas loss of profit.	Workshop discussion.	Whole economy	
Individual business risk	Greater level of overwork, stress and negative health impacts in smaller businesses / owners more likely to overwork	Workshop discussion.	Small business employers and employees	Support from central government. Small business support both financial incentives, business advice etc
Local and regional business development increase	More jobs in smaller businesses. Greater opportunities for employment. Small family businesses more able to compete	Workshop discussion.	All benefit.	
Increasing market for energy efficiency	Diversifying income / economically self reliant population	Workshop discussion.	Potential benefit to all. Small energy efficiency businesses	
Increase in regional and rural populations with greater disbursement of the population – not just around national grid	Improvement in employment opportunities, education and health services in smaller areas	Workshop discussion.	Smaller and rural centres workforce, young and elderly all benefit	
Human capital and export opportunities from small business development	Workers better skilled and working locally in smaller businesses.	Workshop discussion.	Urban workers and rural workers, those with small businesses working in fuel efficiency	

	Small businesses have overseas export opportunities if product development is high standard			
Higher productivity / less spend on electricity	Workers healthier, businesses able to focus on development of key areas of focus and workforce development	Workshop discussion.	Urban and rural workforce and business	
Increase in small hydro activity	May impact on more waterways therefore loss of recreation opportunities (economy and mental health)	Workshop discussion.	Rural and communities near local waterways	
Hazard increase	More smaller businesses – OSH Greater DIY work on improving energy efficiency in homes	Workshop discussion.	Workers Homeowners	
Decrease in traffic and pollution impacts of coal use	Less respiratory problems from coal air pollution. Less road and rail transport of coal therefore noise, and fumes (physical and mental health)	Workshop discussion.	Those living near coal works Rural and urban areas where coal burning used as heating	

***Sparking new designs* – housing and buildings (rural and urban)**

Part of scenarios assessed: *Sparking new designs*

Robyn

How might the scenario potentially affect Building and Housing?	Is that a direct or indirect health impact? What's the causal chain?	What is the existing evidence for the answers you have given, eg, past experience, facts, research & existing data sources	Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?	What key factors might encourage or prevent the health impact?
Changing demographics – more elderly	Less impacts over time than FTF as buildings become healthier and more energy efficient		Still some distributional impacts but less disparities than FTF.	Greater availability of affordable housing
Changing demographics – more young Maori	Ditto above		Ditto above	Ditto above
Better building regulations.	Household will become warmer over time. Healthier living environment and more of house likely to be heated, e.g. bedrooms.		Likely to be less adverse impacts on vulnerable family members – elderly and children.	

Smarter design	Lower costs of energy over time. Government invests more in smarter and healthier energy choices so lower national health bill over time.			
Greater availability of small-scale distributed energy resources	More solar water heating		Robyn likely to have less need for total self-reliance than Shane, so may have more choices.	Govt support for emerging technologies and energy efficiency.

Shane

How might the scenario potentially affect Building and Housing?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, eg, past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
	Extra stress looking for alternatives, but may		Impact depends on network of community	Uptake of skilled local tradespeople.

Energy use – security of supply not guaranteed after 2014. May have to seek alternative energy sources.	eventually be empowerment as self-sufficiency grows. Extra time and money, especially human and monetary capital. Running costs will decrease over time.		and family support Will be more do-it-yourself, backed up by local handypeople.	
When Shane moves to Waikato,	Local waterways will be cleaner. Running of farm will be more ecologically sustainable. Farm buildings will be more energy efficient		Will be beneficial for those living close to waterways.	Environmental standards. Energy policy choices.
Better insulation and building design	Household will become warmer over time. Healthier living environment and more of house likely to be heated, e.g. bedrooms.			
Greater availability of small scale distributed	Reduced stress if Shane has options		Shane likely to lead the transition for his family	

resources			so greater responsibility	

***Sparking new designs* – social connectedness (rural and urban)**

Part of scenarios assessed: Sparking new designs

Robyn

How might the scenario potentially affect social connectedness?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Investment in local energy efficiency technologies will inject money into local communities	Economic wellbeing can positively affect a communities sense of wellbeing. An economically strong community will help people to participate in community life. Indirectly impact with the potential to improve mental health.	Workshop discussion. Both of these are likely to have evidence to support them.	Local businesses, entrepreneurs, people with the financial and skill mix to set up businesses.	Locally owned and operated companies; availability of workforce and skills for local businesses.

Promote small enterprises and companies	For company owners there is are negative impacts on work-life balance, stress, number of hours worked, feelings of responsibility, annual leave, etc For company owners there are positive impacts on flexible work hours (if controllable), pride about the business, control over what yourself and others do and ability to pass on skills and a 'legacy' to children. Some small business owners would have greater social connectedness through local contacts, others would work too hard and so develop less. Direct impacts on social connectedness, mental health, stress (and associated health outcomes).	Personal experience. Research on economic activity in surveys by SNZ?	Business owners, particularly start-up companies where pressures are greatest, and sole traders doing everything themselves..	Support for setting up and running small businesses. The success or otherwise of the national and local economies greatly impacts on the stress of running a small business. National campaigns that inform consumers about correct products, suppliers and expectations from energy efficiency upgrades. Number of competing small businesses in the same locality.

Increased chance of community development and ownership of energy resources. Developments may face less 'hurdles' on their way to construction and in operation.	Involvement of local people in decision making processes. Increased sense of control over futures. Positive impacts on mental health and stress. Community pressure to conform to development even if some individuals disagree. Negative impacts on mental health and stress, physical violence.	Bluff energy efiiciency project carried out by the Marae Social Services has shown increased ownership, connectedness, and a greater understanding of personal and community benefits. Existing community conflict did not go away, but this gave a neutral task for people to work together. Decisions were hard to take, but a sense of community was strengthened. Makara children who supported the project were believed to be bullied at school, and vice versa. Significant community conflict.	Whole community	Size of communities may be important, though Bluff and Makara are similar, but Wellington population near Makara takes the decision more out of the local hands. Local communities capacity for community development would be key – capacity, skills and resources to undertake such tasks would need development in many areas.
'Take back' might be higher in SND – we need to discuss if this is important or not.				
Investment in energy efficiency installations may not be rolled out equitably – middle	Direct impact on inequalities. Communities composed largely of neglected	Many current policies support equitable roll-out in certain situations, eg HNZ tenants, Health		Appropriate criteria assessing entry of communities or households into any

income, pakeha and/or owner-occupiers may get improvements first	groups may feel further marginalised and unable to participate in society.	Homes schemes, etc. At present tenants in the private sector are likely to be the last to see any benefits as there are perceived to be no incentives for the landlord.		schemes is crucial to ensure inequalities are not widened. Education to landlords about benefits of energy efficiency in rental properties. Building code changes to require improvements will also apply to tenanted properties.
Prescription of building regulations may discourage DIY in NZ.	Negative impacts on mental health due to loss of sense of control, but potential positive impacts through lower injury rates.	ACC figures, OSH data?	Home owners, lower-income owners who cannot afford professional installation.	Schemes to spread the cost of professional installation over many years. It costs about $10K for a decent retrofit on a house.
Increased national pride in being a clean green kiwi	Mental wellbeing and pride of place.	Workshop discussion		
Increased personal and community sense of responsibility for energy supply and energy futures.	Increased use of local expertise leading to increased employment and income. Increased understanding about need to conserve energy.	Workshop discussion that farming sometimes uses a similar technology transfer operating at the 'farm gate'. Workshop discussion		Knowldedge and capacity of the local community to supply services and expertise.

Shane

How might the scenario potentially affect social connectedness?	Is that a direct or indirect health impact? What's the causal chain?	What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources	Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?	What key factors might encourage or prevent the health impact?
Investment in local energy efficiency technologies will inject money into local communities	Economic wellbeing can positively affect a communities sense of wellbeing. An economically strong community will help people to participate in community life. Indirectly impact with the potential to improve mental health.	Workshop discussion. Both of these are likely to have evidence to support them.	Local businesses, entrepreneurs, people with the financial and skill mix to set up businesses.	Locally owned and operated companies; availability of workforce and skills for local businesses.
Distributed energy resources may impact on parochialism.	Increase in local pride but decrease in national unity and concern. Indirect impact on pride of place, mental health.	Workshop discussion.		Presence or absence of other mechanisms to generate local and national pride.

Increased chance of community development and ownership of energy resources. Developments may face less 'hurdles' on their way to construction and in operation.	Involvement of local people in decision making processes. Increased sense of control over futures. Positive impacts on mental health and stress. Community pressure to conform to development even if some individuals disagree. Negative impacts on mental health and stress, physical violence.	Bluff energy efficiency project carried out by the Marae Social Services has shown increased ownership, connectedness, and a greater understanding of personal and community benefits. Existing community conflict did not go away, but this gave a neutral task for people to work together. Decisions were hard to take, but a sense of community was strengthened. Makara children who supported the project were believed to be bullied at school, and vice versa. Significant community conflict.	Whole community	Size of communities may be important, though Bluff and Makara are similar, but Wellington population near Makara takes the decision more out of the local hands. Local communities capacity for community development would be key – capacity, skills and resources to undertake such tasks would need development in many areas.
Prescription of building regulations may discourage DIY in NZ.	Negative impacts on mental health due to loss of sense of control, but potential positive impacts through lower injury rates.	ACC figures, OSH data?	Home owners, lower-income owners who cannot afford professional installation.	Schemes to spread the cost of professional installation over many years. It costs about $10K for a decent retrofit on a house.
Increased national pride	Mental wellbeing and	Workshop discussion		

in being a clean green kiwi	pride of place.			
Increased personal and community sense of responsibility for energy supply and energy futures.	Increased use of local expertise leading to increased employment and income. Increased understanding about need to conserve energy.	Workshop discussion that farming sometimes uses a similar technology transfer operating at the 'farm gate'. Workshop discussion		Knowledge and capacity of the local community to supply services and expertise.

Whole document discussion

Part of scenarios assessed: *Fuelling the future*

Robyn – *Fuelling the future*

How might the scenario potentially affect ……..?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Indoor air quality	LPG heaters may be used more as available and cost known		Lower income	

	Wood burners / fuel switching			
Pollutants and moisture. Less ventilation over time	New houses likely to be more air tight so less ventilation		Higher cost to correct problem – low income affected	Natural ventilation utilised and built into new homes
Natural disasters	Loss of electricity or other energy sources			Contingency plans, risk management
Pollution beyond households – water and air	Quality of air and water affected by pollution – cost to health and economics			
Locally or publicly owned resources therefore increase in tax to Government	More money from tax into health than current spend			Less overseas ownership of businesses
Regional economy – geographical differences. Retain energy intensive economy?				
Transport electrification	Impacts on the system?			
Control and ownership of energy resources	Local, national, overseas implications?			
Power station impacts – health costs vs. environmental	What are the lesser of ‘two evils’?			
Cost of electricity	Lowest 20% can’t be offset under status quo and increasing prices		Urban low income as well as rural low income are already at crisis point	

Shane – *Fuelling the future*

How might the scenario potentially affect ……?	Is that a direct or indirect health impact? What's the causal chain?	What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources	Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?	What key factors might encourage or prevent the health impact?
Natural disasters	Loss of electricity or other energy sources		Less impact on rural people – more resilient	Contingency plans, risk management
Pollution beyond households – water and air	Quality of air and water affected by pollution – cost to health and economics			
Locally or publicly owned resources therefore increase in tax to Government	More money from tax into health than current spend			Less overseas ownership of businesses
Regional economy – geographical differences. Retain energy intensive economy?				
Control and ownership of energy resources	Local, national, overseas implications?			
Power station impacts – health costs vs. environmental	What are the lesser of 'two evils'?			
Status quo – electricity			Maori rural communities	Looking to renewable

supply – marginalises Maori communities				energy supplies already. – geothermal, wind-farms, forestry, economic income and energy supply
Cost of electricity	Lowest 20% can't be offset under status quo and increasing prices		Urban low income as well as rural low income are already at crisis point	

Part of scenarios assessed: *Sparking new designs*

Robyn – *Sparking new designs*

How might the scenario potentially affect ……..?	**Is that a direct or indirect health impact? What's the causal chain?**	**What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources**	**Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?**	**What key factors might encourage or prevent the health impact?**
Costs				Subsidies – put into most needed groups (target these) Reducing disparities very important
Landlords may not do anything to improve	Rental housing costs to landlords passed on to		Offset impact on lowest 20%	Possibly incentives rather than subsidies to

housing because of waiting to get Government help	tenants			landlords to improve housing standards
New and old houses – air quality (pollutants, moisture)	More efficient, need more ventilation Reduction in respiratory disease, asthma, bed mites etc			Better because of better regulations and technology and materials etc
Natural disasters	Loss of electricity or other energy sources Not so urgent as only half the electricity needed to run society		Less likely to have an impact under SND as more self sufficient – e.g., solar	Contingency plans, risk management
More productive economy	Increased energy efficiency increase productivity			
Transport electrification	Impacts on the system?		Better the status quo in urban areas	
Control and ownership of energy resources	Local, national, overseas implications?			
Air quality	Local, national and global – personalising responsibilities		All	
Slow progress on improvements	A potential barrier is a lack of qualified and 'up to speed' trades people			Government encourage training
	Less use of LPG heaters if people have well insulated homes		Lower income	Encourage insulation / ban LPG heaters?
Control and ownership	More trust/share basis to		Greater equity and local	

of energy resources	business ownership		ownership	

Shane – *Sparking new designs*

How might the scenario potentially affect ……?	Is that a direct or indirect health impact? What's the causal chain?	What is the existing evidence for the answers you have given, e.g., past experience, facts, research & existing data sources	Will the impact affect some people more than others? Who will benefit/suffer most? Will inequalities increase or decrease?	What key factors might encourage or prevent the health impact?
Costs				Subsidies – put into most needed groups (target these) Reducing disparities very important
Landlords may not do anything to improve housing because of waiting to get Government help	Rental housing costs to landlords passed on to tenants		Offset impact on lowest 20%	Possibly incentives rather than subsidies to landlords to improve housing standards
New and old houses – air quality (pollutants, moisture)	More efficient, need more ventilation Reduction in respiratory disease, asthma, bed mites etc			Better because of better regulations and technology and materials etc
Natural disasters	Loss of electricity or other energy sources Not so urgent as only half the electricity		Less impact on rural people – more resilient eg, solar	Contingency plans, risk management

	needed to run society			
More productive economy	Increased energy efficiency increase productivity			
Control and ownership of energy resources	Local, national, overseas implications?			
Air quality	Local, national and global – personalising responsibilities		All	
	Less use of LPG heaters if people have well insulated homes		Lower income	Encourage insulation / ban LPG heaters?
More economic control for rural and Maori communities			Maori rural communities	Increased use of renewable energy supplies – geothermal, wind-farms, forestry, economic income and energy supply
Slow progress on improvements	A potential barrier is a lack of qualified and 'up to speed' trades people			Government encourage training
Control and ownership of energy resources	More trust/share basis to business ownership		Greater equity and local ownership	
Alternative energy sources Coal, Wind farms, forrestation, small generation,	Local stress related impacts		Regional and rural impacts on all	

General notes

- **Key driver for change under both scenarios is health first, economics after – especially for low income**
- **Carbon issue vs. coal use.**