ASSESSMENT OF THE ECONOMIC BENEFITS AND COSTS OF USING TRANSPOWER'S PROPOSED APPROACH TO IMPLEMENTING POLICIES 10 AND 11 OF THE NATIONAL POLICY STATEMENT ON ELECTRICITY TRANSMISSION IN DISTRICT AND CITY PLANS

Prepared for

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INTRODUCTION

Background

1 Territorial authorities (*TAs*) throughout New Zealand are required to give effect to the National Policy Statement on Electricity Transmission 2008 (*NPSET*) in their district and city plans as they come up for review or by way of a specific plan change.

2 The objective of the NPSET is:

> *To recognise the national significance of the electricity network by facilitating the operation, maintenance and upgrade of the existing transmission network and the establishment of new transmission resources to meet the needs of present and future generations, while:*
>
> - *managing the adverse environmental effects of the network; and*
> - *managing the adverse effects of other activities on the network.*

3 Including provisions within district and city plans giving effect to the NPSET ensures that, in recognising the national and local economic and social significance of the electricity transmission network, the existing transmission assets within a district or city can be operated, maintained, replaced and upgraded efficiently. This provides a range of economic benefits at a national, regional and local (district or city) level. However such provisions in district and city plans may also give rise to economic costs.

4 Transpower New Zealand Limited (*Transpower*), as the owner and operator of the transmission system (or "National Grid"), is clearly an interested party when TAs give effect to the NPSET in district or city plan reviews or in proposed plan changes. Nationwide, Transpower is advocating for an approach to managing activities around transmission lines in order to implement the Objective and Policies 10 and 11 of the NPSET which manage the adverse effects of third party activities on the National Grid. The key components of Transpower's approach are:

(a) A transmission yard of 12 metres either side of the centreline of transmission lines[1] and a 12 metre setback from the outer edge of transmission support structures[2];

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[1] Transpower proposes a 10 metre yard for single pole lines.

[2] Although horticultural structures are permitted between 8-12 metres from any pole provided they do no restrict maintenance activities.

(b) Within this 12 metre yard "sensitive activities" (defined in the NPSET to include residential buildings, schools and hospitals) are given "non-complying" resource consent activity status;

(c) Within this 12 metre yard, earthworks are permitted if they comply with the New Zealand Code of Practice for Electrical Safe Distances 2001[3] (*NZECP34:2001*). Otherwise they are given non-complying resource consent activity status;

(d) On existing urban sites, new buildings associated with sensitive activities and new sensitive activities in existing buildings are given non-complying resource consent status within the 12 metre yard. Other buildings and uses are permitted.

(e) On all other sites, all new sensitive activities and buildings are given non-complying resource consent status within the 12 metre yard with the exception of un-inhabitable farm buildings (not for intensive farming activities) and horticultural structures in rural areas.

(f) Car-parking, non-intensive farming activities, non-inhabitable accessory buildings, crop protection structures, small sheds and fences are generally permitted;

(g) Utilities including roads are permitted activities within the 12 metre transmission yard;

(h) Vegetation is not restricted within the 12 metre transmission yard, but it must comply with the Electricity (Hazards from Trees) Regulations 2003, under the Electricity Act 1992;

(i) Outside of the district and city plans, all activities, whether inside or outside the 12 metre yard, would need to comply with NZECP34:2001. Transpower is seeking an advice note be placed in plans in relation to compliance with NZECP34:2001;

(j) An electrical transmission corridor of between 14-39 metres either side of the centreline of transmission lines depending on asset type;

(k) Within this electricity transmission corridor, only subdivision is regulated. Subdivision is given "restricted discretionary" resource consent activity status where possible building platforms are located outside of the 12 metre yard otherwise

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[3] NZECP34:2001 is a mandatory code of practice under the Electricity Act 1992 and which sets minimum safe distances from transmission lines to protect persons and property (including vehicles and mobile plant) from harm or damage from electrical hazards. The Code establishes clearance distances from transmission lines to buildings and structures, the ground, and other lines. It also restricts how close building, structures and excavations can occur to transmission poles and towers. The Code became mandatory in 2001, but an earlier version has been in existence for some time.

they are given non-complying resource consent activity status.

5 As noted, Transpower's proposed approach does not require the removal or modification of existing buildings and structures, subdivisions or earth formations but seeks to control future development which may compromise the operation, maintenance, replacement or minor upgrading of its transmission network.

6 Some District and City Plans, prior to changes being made to give effect to the NPSET, already have included in them restrictions on activities under or near to transmission lines and support structures. In some instances, what Transpower is proposing is more permissive than the provisions contained in these operative plans.

7 The rules Transpower seeks do not cover the authorisation of new transmission lines and facilities. For these, Transpower will obtain approvals under the Resource Management Act 1991 (*RMA*). It will still be required to negotiate access arrangements and compensation payments with affected land owners. Where there is no satisfactory outcome to these negotiations the provisions of the Public Works Act would continue to apply and this requires land owners to be paid compensation, including provision for injurious effects on associated business activities.

8 Transpower's approach does not assign additional property rights to Transpower. The provisions in District and City Plans which Transpower is seeking will not influence existing or future access arrangements between Transpower and affected land owners.

Report Objective

9 This report examines, in a general sense, the nature and extent of the economic benefits and costs of Transpower's suggested approach to implementing the Objective and Policies 10 and 11 of the NPSET (Transpower's proposed approach), recognising that the significance of the benefits and costs will vary from one district or city to another. This is because:

(i) Whilst Transpower is seeking to apply a consistent approach nationwide, there will be variations in the detail of provisions contained within each district or city council's proposed plan revisions or plan changes;

(ii) Some districts and cities already have provisions within their operative district or city plans restricting activities within transmission corridors, whilst others do not. For those districts or cities with existing provisions, the level of constraint on economic activities varies from one plan to the next;

(iii) The length of transmission lines and the number and size of support structures vary from one district or city to the next;

(iv) Each district and city will have a different mix of economic activity within the transmission corridors and that will be potentially affected by what Transpower proposes. For example, in some districts, rural activities will be those predominantly affected, but in other districts and cities, urban activities will be predominantly affected.

10 The intention is that this report will be of assistance in identifying and assessing economic benefits and costs of proposed provisions in district and city plans giving effect to the NPSET.

Report Format

11 This report is divided into 5 parts (in addition to this introductory section). These cover:

(i) An executive summary;

(ii) A consideration of the relevance and interpretation of economic benefits and costs under the RMA;

(iii) The economic benefits of Transpower's proposed approach;

(iv) The economic costs of Transpower's proposed approach; and

(v) Some overall conclusions.

SUMMARY OF REPORT

12 TAs throughout New Zealand are required to "give effect" to the NPSET.

13 The supply of electricity via Transpower's transmission system (the National Grid) is essential to the economic and social wellbeing of all New Zealand residents and businesses.

14 Transpower's proposed approach to implementing the NPSET recognises the national, regional and local economic and social significance of the National Grid and seeks to ensure it can be operated, maintained, upgraded and developed efficiently.

15 Transpower's approach does not cover the authorisation of new transmission lines or substations, although the significance of new infrastructure is recognised in the NPSET. Transpower will continue to be required to negotiate access arrangements for new lines with land owners as at present. Existing access arrangements are not affected by Transpower's approach.

16 Plan Changes giving effect to Transpower's approach will provide a number of economic benefits including:

(i) Reduced costs for inspection, operation, maintenance, replacement and upgrading of the National Grid;

(ii) Reduced electricity supply outages;

(iii) Improved safety to persons and property; and

(iv) Reduced process costs for Transpower.

17 The undergrounding of the transmission network is only in very limited circumstances a realistic alternative to overhead transmission lines. It is substantially more expensive, much less reliable because of the time taken to repair faults and still requires land use restrictions to enable access for emergency repairs and periodic maintenance. Land use activities will need to be restricted near underground cables, in order to protect them and allow access for maintenance and emergencies. Therefore undergrounding will not always be a realistic alternative to Transpower's approach to implementing the NPSET.

18 Transpower's proposed approach will lead to economic costs to the extent landowners' flexibility of land use is restricted. However in assessing any such costs it is any loss of profits compared to the next best compatible alternative use that needs to be identified, not losses in revenue. There may also be "spill over" costs for the broader community to the extent there is a reduction in the overall level of economic activity, but not where economic activity in one location is only transferred elsewhere within the local economy.

19 Potential economic costs arising from Transpower's approach will be limited in that:

(i) Non-sensitive activities will generally still be permitted throughout the proposed transmission corridor areas. In urban areas these include commercial and industrial activities not involving "sensitive activities" – i.e. residential development, schools, childcare and hospitals. In rural areas non-sensitive activities include most agricultural and horticultural buildings and activities such as crop protection and support structures but exclude milking sheds and other intensive buildings such as piggeries.

(ii) Only new development and alterations and extensions to existing sensitive development that occur close to the centreline or the outer edge of a support structure will be restricted within the 12 metre transmission yard;

(iii) Even within the 12 metre transmission yard proposed by Transpower, consent for any land use, including sensitive land uses, can be applied for and may be granted; and

(iv) The Electricity Act and a number of operative district and city plans already have provisions, which restrict development under or near the National Grid. These limit the incremental economic costs of Transpower's proposed approach.

20 The specific provisions and the incidence of economic benefits and costs of Transpower's proposals to give effect to the NPSET in district and city plans will vary from one district or city to another. However having regard to the economic benefits and the limits on the extent of economic costs identified in this report, it is likely that Transpower's proposed approach is consistent with economic wellbeing and the efficient and effective use of resources from a district (or city), regional and national viewpoint.

ECONOMICS AND THE RMA

Section 32 Analysis

21 Section 32(3) of the RMA requires councils in considering proposed changes to their district or city plans to examine:

(a) *The extent to which each objective is the most appropriate way to achieve the purpose of this Act; and*

(b) *Whether, having regard to their efficiency and effectiveness, the policies, rules, or other methods are the most appropriate for achieving the objectives.*

22 This examination is required to take into account the benefits and costs of proposed plan changes (section 32(4)(a)). Benefits and costs can be monetary or non-monetary (section 2). This report's identification of the economic benefits and costs and discussion of their likely significance is therefore relevant to a local authority's evaluation under section 32.

Community Economic Wellbeing

23 Economic considerations are intertwined with the concept of the sustainable management of natural and physical resources, which is embodied in the RMA. In particular, Part 2 section 5(2) refers to enabling "*people and communities to provide for their … economic ... well being*" as part of the meaning of "*sustainable management*", the promotion of which is the purpose of the RMA.

24 As well as indicating the relevance of economic effects in considerations under the RMA, section 5 also refers to *"people **and communities**"* (emphasis added), which highlights that, in assessing the effects of proposed changes to district or city plans, it

is the impacts on the wider community and not just particular individuals or organisations, that must be taken into account. This is underpinned by the definition of *"environment"* which also extends to include people and communities. Economic effects include those having low probability but high impact.

Economic Efficiency

25 Part 2 section 7(b) of the RMA directs that, in achieving the purpose of the Act, all persons *"shall have particular regard to ... the efficient use and development of natural and physical resources"* which includes the concept of economic efficiency.[4] Economic efficiency can be defined as:

> *the effectiveness of resource allocation in the economy as a whole such that outputs of goods and services fully reflect consumer preferences for these goods and services as well as individual goods and services being produced at minimum cost through appropriate mixes of factor inputs.*[5]

26 More generally, economic efficiency can be considered in terms of:

(i) Maximising the value of outputs divided by the cost of inputs;

(ii) Maximising the value of outputs for a given cost of inputs;

(iii) Minimising the cost of inputs for a given value of outputs; and

(iv) Minimising waste.

Viewpoint for Economic Assessment

27 An essential first step in carrying out an evaluation of the positive and negative economic effects of a proposal under the RMA is to define the appropriate viewpoint that is to be adopted. This helps to define which economic effects are relevant to the analysis. Typically a district or wider regional viewpoint is adopted and sometimes a national viewpoint might be considered appropriate.

28 For considering the economic effects of Transpower's proposed approach to implementing the Objective and Policies 10 and 11 of the NPSET in district or city plans, the district or city is the relevant community of interest, because the economic effects of the proposed plan provisions will largely (but not solely) impact on the residents and businesses in that district or city.

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[4] See, for example, in *Marlborough Ridge Ltd v Marlborough District Council* [1998] NZRMA 73 at [86], the Court noted that all aspects of efficiency are "*economic*" by definition because economics is about the use of resources generally.

[5] Pass, Christopher and Lowes, Bryan, 1993, *Collins Dictionary of Economics* (2nd edition), Harper Collins, page 148.

29 However, Transpower's transmission network assets within a district or city are part of the National Grid network throughout New Zealand and therefore their efficient operation, maintenance, development and upgrade is important to residents and businesses elsewhere in New Zealand, but particularly in adjacent and nearby districts. This implies a regional viewpoint is also relevant.

30 In addition, there are a number of reasons why a national viewpoint is also relevant:

(i) Transmission system failures or delays in transmission capacity improvements can have cost implications for electricity consumers elsewhere on the network because of the elongated and cross-boundary characteristics of the National Grid;

(ii) Increased costs for Transpower are eventually passed on to all electricity consumers throughout the country because of Transpower's national average cost pricing model[6] and Transpower being subject to price control regulations under the Commerce Act;[7]

(iii) Transpower is a state owned enterprise (SOE) and therefore owned by all New Zealand residents and businesses;

(iv) It is the "inter-connectedness" of the National Grid that has led to the preparation of the NPSET and the requirement that district and city plans give effect to the NPSET's provisions.

ECONOMIC SIGNIFICANCE OF ELECTRICITY SUPPLY AND THE NATIONAL GRID

National Electricity Supply[8]

31 The supply of electricity is essential to the economic and social wellbeing of all New Zealand residents and businesses. It provides essential services such as light and heating to homes as well as meeting some emergency needs. Most businesses are reliant on electricity for aspects of their operation and therefore the supply of electricity is essential for employment and economic prosperity at the national, regional and district or city levels.

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6 See National Policy Statement on Electricity Transmission, Evaluation under Section 32 of the Resource Management Act; Ministry for the Environment; March 2008; (Section 3.1.2).

7 See under Regulated Industries, Commerce Commission website (www.comcom.govt.nz/).

8 Data and information in this section from Transpower New Zealand Limited Simplified Disclosure Prospectus; 17 August, 2012; and Transpower New Zealand Limited 2012 Financial Accounts.

32 Transpower is the SOE that has two main functions with respect to the operation and development of New Zealand's electricity system. Firstly, it is the owner and the operator of the high voltage electricity transmission system (the National Grid). In this capacity Transpower plans, builds, maintains, upgrades and operates the National Grid. Secondly, it provides co-ordination and security functions for the electricity system (the System Operator).

33 The National Grid is the physical link between generators, local lines businesses and 'direct connect' customers. It consists of approximately 11,800 kilometres of high voltage alternating current (HVAC) transmission lines and the high voltage direct current (HVDC) link which crosses Cook Strait by submarine cables, linking the South Island and North Island electricity systems. The National Grid also has 182 substations.[9]

34 The NPSET Evaluation under Section 32 of the RMA states:[10]

> *"Demand for electricity is increasing with population growth, rising incomes and new technology powered by electricity. The combination of growing demand and the need to provide electricity in environmentally sustainable ways gives increased importance to the improvement, upgrade and extension of the New Zealand electricity transmission network, or national grid."*

35 New Zealand's transmission network is regarded as narrow and longitudinal, with areas of demand (load) commonly some distance from the areas of significant generation. Consequently, the transmission network is essential in complementing generation to bring the power to where it is needed. Without the National Grid power stations would need to be built within or nearby areas of demand. This would prove to be extremely costly, resulting in significantly higher electricity prices and a reduction in New Zealand's economic competitiveness.

36 A particular feature of the National Grid, and a key benefit for a sustainable New Zealand, is its ability to provide New Zealanders with access to renewable generation. Typically, the remote areas of generation connected by the National Grid are renewable (e.g. hydro in the Lower South Island, wind in the Lower North Island, and hydro and geothermal in the Central North Island). This enables lower cost sources of electricity generation to be utilised and enables economies of scale in generation to be realised. It also lowers New Zealand's carbon emission liabilities.

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[9] Submission by Transpower New Zealand Limited on Whangarei District Council Proposed Plan Change 123A.

[10] National Policy Statement on Electricity Transmission, Evaluation under Section 32 of the Resource Management Act; Ministry for the Environment; March 2008; (Executive Summary, page 10).

37 Many of New Zealand's larger population centres are located in the North Island, while a significant amount of hydro generation is located in the South Island. Power flow tends to be from south to north during normal rainfall years, delivering power from the hydro generation in the South Island to the North Island through the HVDC link, which also balances demand between the islands.

38 Most of New Zealand's population is located in regions where local generation is well short of the local demand – for example Northland, Auckland, Bay of Plenty, Hawke's Bay, Wellington, Marlborough, Nelson and the West Coast. Even those regions which produce surplus power have major population centres distant from the sources of electricity supply (e.g. Hamilton in Waikato, Christchurch in Canterbury, Dunedin in Otago and Invercargill in Southland). Therefore most of the country's power requirements must be transported some distance to the points of demand for residential and commercial use. Without the National Grid, electricity prices for most consumers would be considerably higher.

39 Nearly two million New Zealand households and businesses purchase more than $6 billion of electricity annually. Of these, approximately:

(i) 1.7 million or 86% are residential consumers;

(ii) 160,000 or 8% are commercial consumers;

(iii) 75,000 or 4% are rural[11] consumers;

(iv) 40,000 or 2% are industrial consumers.

About 34% of the total electricity consumed in New Zealand is purchased by residential consumers, 36% by industrial consumers, 25% by commercial consumers and 5% by rural consumers.[12]

40 Growth in national electricity demand is expected to average 1.7% per annum over the next 15 years.[13]

41 The value of Transpower's property, plant and equipment is listed in its 2011/12 financial accounts as $2,721 million, whilst capital work in progress in 2011/12 was valued at $1,288.6 million.

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[11] Agricultural, forestry and fishing.

[12] Electricity Authority: http://www.ea.govt.nz/consumer/industry-overview/

[13] Source: Annual Planning Report Incorporating the Grid Reliability Report and the Grid Economic Investment Report; Transpower New Zealand Limited; March 2012.

42 Transpower has a significant investment programme underway building new capacity and refurbishing and replacing existing assets. Current (August 2012) projections are for Transpower to spend between $4 billion and $5 billion over the next 10 years, with more than half of this (approximately $2.7 billion) spent in the next 5 years. Some of this work will involve Transpower building new transmission lines and facilities. Transpower's proposed approach to implementing the NPSET will not facilitate investment in these new transmission lines and facilities. However, Transpower's proposed investment programme also includes replacement of existing lines and equipment and increasing the capacity of parts of the existing network, and this work will be facilitated by the protection of transmission corridors for existing lines and support structures.

43 Transpower recovers its transmission costs via line company charges. For domestic consumers, transmission charges represent around 8% of their total electricity bills or about 2.25 cents per kwh[14] and around 20% of their line charges. For larger consumers, transmission is a very much more significant component of line charges and a number of the country's major electricity consumers are supplied directly by the transmission system – e.g. the Tiwai Point aluminium smelter, the Kinleith Mill, and Glenbrook Steel.

44 Large consumers within each region, district or city include hospitals, ports, retail and business centres, agricultural product processing plants and other industrial plants. Whilst the National Grid is important for all businesses and households, they are especially significant for these large consumers, who provide essential services and are the key drivers of employment, incomes and economic activity at the local, regional and national level.

45 The national, regional and district or city level economic benefits of the National Grid are significant, and Transpower's proposed approach to implementing the NPSET, designed to enable the efficient inspection, operation, maintenance, development and upgrade of the National Grid, will assist with the continuation of those benefits.

ECONOMIC BENEFITS OF TRANSPOWER'S PROPOSED APPROACH TO IMPLEMENTING THE NPSET

46 The key economic benefits of Transpower's proposed approach are:

(i) Reduced inspection, operation, maintenance, replacement and upgrade costs;

(ii) Reduced outages;

[14] Based on data from Quarterly Survey of Domestic Electricity Prices, Ministry of Economic Development website 28 September, 2012.

(iii) Improved safety to persons and property; and

(iv) Reduced process costs for Transpower.

Reduced inspection, operation, maintenance, replacement and upgrade costs

47 Nationwide Transpower spends a significant amount each year on inspection and maintenance of its transmission lines. It also has additional capital expenditure costs for the replacement and upgrading of the existing transmission network. Such costs are recovered via line charges included in the electricity bills for residential and business customers.

48 Transpower's proposed approach will help to prevent such costs from increasing. Inappropriate development within transmission corridors will add to costs by making inspection, operation, maintenance, development and upgrade work more difficult and therefore more expensive. These cost increases will eventually be passed through to residential and business electricity consumers via higher line charges.

Reduced outages

49 Under-building of transmission lines is a major risk to maintaining electricity supply from the National Grid. The more development and activity allowed under and in close proximity to transmission lines, the greater the frequency and risk of outage incidents and the severity of their costs.

50 Transpower's records show that "third-party incidents" (i.e. those relating to development or activities by parties other than Transpower or electricity consumers) resulted in supply interruptions equating to 311 MWh of electricity non-supply, nationally, over the period 1996 to 2006.[15]

51 For residential consumers, outages as a result of transmission failures are likely to be sufficiently brief to cause only minor inconvenience. However for business customers with high electricity reliance or consumption the costs can be more significant – either in terms of lost production or the requirement to invest in expensive back-up sources of electricity supply.

52 By way of example, for the approximate 2 month period between 18 March and 23 May 2006 there were 5 outages to transmission supply to Westpower's customers on the West Coast of the South Island. A survey by Westpower established that these 5 outages led to estimated losses totalling $352,000 for 32 out of 34 businesses

[15] Source: Appendix I of *Further Guidance on Risks of Development Near High Voltage Transmission Lines*. From Ministry for Environment website: http://www.mfe.govt.nz/publications/rma/nps-electricity-transmission-further-guidance-jan2010/appendix1.html.

surveyed. In addition, survey respondents had spent an additional $736,000 on back-up equipment to protect against losses from future outages.[16]

53 More significant transmission outages have occurred in Auckland. In 1998 the failure of Mercury Energy's 110 kV transmission cables led to power supply to downtown Auckland being cut with an estimated long term economic cost equivalent to 0.1 to 0.3 per cent of New Zealand's Gross Domestic Product.[17]

54 In 2009 electricity was cut to about 280,000 people in Northland and parts of Auckland when a forklift hit one of two transmission circuits whilst the other was out for maintenance. This outage caused New Zealand's only oil refinery at Marsden point to temporarily close.[18]

55 These transmission outages were not as a consequence of under-building of transmission lines, although, the 2009 outage may have been able to be avoided through design.[19] These outages give an indication of the significant costs that are incurred especially by industrial consumers when electricity supply outages occur. Production runs must sometimes be halted, sales may be lost, raw materials and other inputs may be wasted and staff may need to be stood down for a period of time.

56 A transmission system outage may also cause an increase in the price of electricity. Depending on the location of the fault and the affected equipment, more pressure is placed on the remaining in-service parts of the transmission system. A reduction in the level of transmission equipment available to the electricity market could result in binding transmission constraints and, consequently, increased electricity prices.

57 Transpower faces increased costs in responding to outages both in its capacity as the owner and operator of the National Grid and in its capacity as the System Operator. It needs to respond to the fault to ensure the security of scheduling and dispatch is not compromised. Time is also taken to reassess the security of planned outage and commissioning work in light of the fault. Afterwards, Transpower, as the System Operator, reviews the circumstances surrounding events that have had a material impact on its operations to

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16 Dollar amounts in 2006 price terms. Source: Report on Survey Results into Economic Effect of Westpower Customer Power Outages between 18 March and 23 May 2006; Westpower Limited; July/August 2006.

17 See Auckland Council website – Natural hazards and emergencies; infrastructure failure.

18 See Auckland Council website – Natural hazards and emergencies; infrastructure failure.

19 I.e. through appropriate constraints imposed on the design and layout of new subdivision development.

determine appropriate process improvements and other actions to reduce the likelihood and impact of a recurrence.[20]

58 Again all of Transpower's costs associated with transmission outages are eventually passed through to electricity consumers.

Improved safety to persons and property

59 Development near high-voltage transmission lines creates low probability, high consequence risks. Unless activities under and in close proximity to transmission lines are managed, there is an increase in the probability and consequences of risks from:

(i) Arcing, flashovers, earthing issues, and coming into direct contact with lines (e.g., TV aerials or water overflow pipes inducing current under the lines);

(ii) Acts of God (e.g., a conductor (line) may fall after a storm event, which could have significant effects);

(iii) Loss of power supply (e.g., an event in October 2009 where third party activity involving mobile plant carrying shipping containers came into contact with the Henderson-Otahuhu A 220kV line in Auckland resulting in the loss of supply to approximately 280,000 consumers);

(iv) Contact with lines, resulting in an operational fault or outage; and

(v) Death or injury to line workers from more hazardous work places.[21]

60 The increases in the probability and consequences of these risks have both economic and non-economic dimensions. Greater risks to personal safety have potential costs from losses in wages, reduced output and private and public sector health costs. Greater risks to property have potential costs in terms of losses in wages, reduced output and replacement costs.

Reduced process costs for Transpower

61 Without provisions in district or city plans such as those Transpower seeks, Transpower will be faced with significant additional costs in relation to under-building and encroachment issues (particularly for

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20 See: *Further Guidance on Risks of Development near high voltage transmission lines*. From Ministry for Environment website: http://www.mfe.govt.nz/publications/rma/nps-electricity-transmission-further-guidance-jan2010/appendix1.html

21 See: *Further Guidance on Risks of Development Near High Voltage Transmission Lines*. From Ministry for Environment website: http://www.mfe.govt.nz/publications/rma/nps-electricity-transmission-further-guidance-jan2010/appendix1.html

high density residential development). These cover legal, consultant and staff costs relating to:

(i) Reviewing and responding to notified consents, negotiating conditions and appealing decisions under the RMA. While these tasks will still be required with a yard setback incorporated into plans, they are likely to be more efficiently performed as the effects on the National Grid will have been considered at the application stage;

(ii) More complex liaising and coordinating with property owners for access for machinery and staff to properties for transmission system inspection, repair, maintenance, replacement and upgrading activities;

(iii) Involvement in stop-work procedures under the RMA and non-compliance with NZECP34 under the Electricity Act;

(iv) Increased inspection costs and field officer costs because of greater risks of encroachment or other threats to transmission system operation; and

(v) Increased risk of reverse sensitivity issues (e.g., more people living nearby, which leads to complaints about the operation of the grid, such as objections to resource consents, requirements for electric and magnetic field (EMF) readings, or health and safety assessments).[22]

Undergrounding of transmission lines

62 The undergrounding of transmission lines is sometimes suggested as an alternative to managing activities under and in close proximity to transmission lines. Whilst underground transmission cables have been used in New Zealand, this is for only a very small part of the National Grid. Undergrounding is substantially more expensive - up to 15 times the cost of overhead transmission lines depending upon capacity.[23]

63 Also underground cables are less reliable than overhead lines due to fault repairs taking a significantly greater time. For example, when the Auckland CBD blackout occurred in 1998 after four 110 kV underground cables failed in quick succession, the CBD was left without electricity for almost three weeks. Supply was eventually

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[22] Source: Appendix I of *Further Guidance on Risks of Development Near High Voltage Transmission Lines*. From Ministry for Environment website: http://www.mfe.govt.nz/publications/rma/nps-electricity-transmission-further-guidance-jan2010/appendix1.html

[23] Source: Statement of Evidence of Hugh Robert Kelsey Wildash re Applications for Resource Consent and Notices of Requirement by Transpower New Zealand Limited for the North Island Grid Update Project; 31 January, 2008.

restored, not by repair of the faulty underground cables, but by construction of a temporary overhead line.[24]

64 Finally, underground transmission cables still require restrictions on land use above and adjacent to the cable to enable access for vehicles and other plant and equipment to undertake repairs and periodic maintenance work.

ECONOMIC COSTS OF TRANSPOWER'S PROPOSED APPROACH TO IMPLEMENTING THE NPSET

65 Transpower seeks to incorporate the objective and policies 10 and 11 of the NPSET into district and city plans with the purpose of providing economic (and other) benefits not just for Transpower, but also the general community made up of the residents and businesses of the district or city as a whole. However provisions in district and city plans giving effect to the NPSET as sought by Transpower may lead to costs for some individual landowners with property within the transmission corridors. In certain instances this could have additional "spill over" costs for the wider community.

66 This section of the report discusses the nature of these costs for affected individual landowners and the wider community and identifies a range of factors which are likely to limit the significance of such costs.

Economic costs from land use restrictions

67 Restrictions on land use arising from Transpower's proposed approach will give rise to economic costs to the extent that landowners' flexibility of land use is affected. The significance of such costs will vary from one affected land owner to another. It should not be automatically assumed that because a particular activity cannot take place within transmission corridors the landowner is denied the opportunity of that particular activity. It may be possible to still locate new buildings and structures on the land holding outside of the transmission corridor and, if this is the case, it is only any additional costs associated with this alternative arrangement of activities that are economic costs of Transpower's proposed approach.[25]

68 Even where Transpower's proposed approach prevents a landowner from engaging in a particular activity, any loss of profits needs to be

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[24] Source: Statement of Evidence of Hugh Robert Kelsey Wildash in rebuttal re Applications for Resource Consent and Notices of Requirement by Transpower New Zealand Limited for the North Island Grid Update Project; 7 April, 2008.

[25] In certain situations it may be possible for Transpower and landowners to co-ordinate their respective requirements such that no relocation or loss of activity occurs. For example in the case of some horticultural land, routine maintenance work on transmission lines can be timed after harvesting of crops and before replanting commences.

measured relative to the next best alternative compatible use of the land. For example, where vacant land within the 12 metre yard is not permitted to be developed for commercial offices, the land could perhaps be used for car parking. The loss of profits in this example is the difference in return from these two activities and not the loss of profits as measured by the projected return from the commercial office development compared to the returns from the land remaining vacant.

69 From a broader "community" perspective displaced economic activity, as a consequence of provisions in a district or city plan protecting transmission corridors, only leads to an economic cost if it is lost to the district or city. Transfers of economic activity (e.g. a new retail centre) from one landowner to another within the district or city, is not lost from a district or city perspective. Only to the extent the relocated economic activity is less efficient in its alternative location is there a cost from a community perspective. It is this loss in efficiency, not the value of the activity displaced, that needs to be assessed.

70 Also in assessing the significance of economic costs from restricting activities within transmission corridors it is necessary to focus on losses in profitability and not losses in revenue. Losses in revenue (or losses in the value of output or production) are overstatements of losses in economic wellbeing or economic efficiency. The production of goods and services requires inputs of labour, raw materials and other resources. It is only the loss in profits (or net economic benefits), which provides a measure of the reduction in economic wellbeing or economic efficiency as a consequence of provisions in district or city plans restricting activities within transmission corridors.

71 Reductions in revenue (or output or production), where it leads to a reduction in overall economic activity (e.g. expenditure, employment and incomes) within a local, regional or national economy may have associated with it reductions in economic welfare or economic wellbeing. These relate to for example reductions in economies of scale or increases in unemployment of resources (including labour). However such "spill over" effects depend upon the type of activity involved (e.g. constraints for use of rural residential lifestyle land on the edges of urban areas are unlikely to generate such effects). Also these effects will not arise where reductions in economic activity in one location are transferred elsewhere, rather than lost from the local, regional or national economy.

72 In assessing the significance of land use constraints as a consequence of Transpower's proposed approach, any reductions in land values are a reflection of, and not in addition to, any reductions in profits. The change in property value effect does not materialise

unless and until an owner sells the property. At this point there is a wealth loss to the seller, but no ongoing reduction in business profitability to be borne by the seller. The purchaser of the property gains by potentially having to pay a lesser price for the property but incurs the costs of the ongoing reduced profitability. From a community perspective the loss in land value "nets out". To include both the reduced profitability and the loss in land value would involve "double-counting" of the costs.

73 Any additional costs for land owners in terms of reductions in profitability (or property value reductions) need to be assessed in the context of the benefits in terms of more efficient provision of transmission services. Some of these benefits are in the form of cost savings to Transpower - e.g. reduced inspection, operation, maintenance, development and upgrade costs; some of the savings from reduced outages; some of the improved safety benefits; and reduced process costs for Transpower. Other benefits accrue directly to local residents and businesses - e.g. some of the savings from reduced outages; and some of the improved safety benefits. However even the benefits in the form of cost savings to Transpower are eventually passed through to local residents and businesses in the form of lower line charges.

74 At the national level, the summary of the costs and benefits of the NPSET's Section 32 report[26] shows benefits to Transpower alone of $10.0 million (and there are additional benefits to consumers, Government and others), and more than 3.5 times the additional costs to land owners of $2.7 million (and these additional costs also include additional consenting costs for land owners).

Factors limiting significance of economic costs

75 A number of safeguards are built into what Transpower is proposing to limit economic costs for affected land owners. These include:

(i) The policy generally provides for non-sensitive permitted activities throughout the transmission yard and transmission corridor (subject to compliance with ECP34:2001). In urban areas, these would include many commercial and industrial activities as well as site fences, small sheds, yards, parking, storage areas and landscaping. In rural areas, these would include the majority of rural buildings (except intensive buildings such as milking sheds), paddocks, fencing (as high as deer fences) and landscaping.

(ii) Transpower's approach relates to new development and alterations that expand the footprint or height of existing

[26] National Policy Statement on Electricity Transmission, Evaluation under Section 32 of the RMA 1991; Ministry for the Environment, March 2008 (Table 16, page 58).

sensitive activities within the transmission line corridors around transmission lines and support structures. The new provisions do not require the removal or reduction in footprint or height of existing development; and

(iii) Transpower's approach does not prohibit outright new development within the transmission line corridors and "non-sensitive" activities would be permitted. Within the 12 metre transmission yard, new buildings and structures for sensitive activities, new subdivision building platforms and earthworks that do no comply with NZECP34:2001 require anon-complying activity consent. In the 14-39 metre transmission corridor, subdivision requires restricted discretionary resource consent. In other words, consent can be granted to new development within the transmission corridor where in particular circumstances: (i) the benefits of restricting sensitive new development within the corridor are not significant, and/or (ii) there are significant costs in restricting new sensitive development within the corridor.

76 In addition, a number of operative district and city plans already require consent for new development within transmission line corridors. For these districts and cities the provisions resulting from Transpower's proposed approach may not be significantly more onerous (and in some instances may be less onerous) than existing requirements.

77 Also irrespective of any provisions contained in existing or future district or city plans, compliance with NZECP34:2001 is mandatory under the Electricity Act. This requires all buildings and structures to meet minimum electrical safety clearance distances from transmission lines and other transmission facilities. It is only the incremental economic costs from restrictions, over and above those imposed by NZECP34:2001 (and any contained in operative district or city plans), that are a consequence of Transpower's proposed approach.

CONCLUSIONS

78 Having regard to:

(i) The economic significance of electricity supply and transmission services at the national, regional and district or city levels;

(ii) The economic benefits of Transpower's proposed approach to implementing the NPSET in the form of reduced inspection, operation, maintenance, replacement and upgrade costs; reduced outages, improved safety; and reduced process costs for Transpower;

(iii) The various factors identified in this report which limited the extent of additional economic costs resulting from Transpower's proposed approach; and

(iv) Transpower's proposed approach not facilitating new transmission line corridors or new sites for other transmission facilities;

Transpower's proposed approach is likely to be consistent with enabling "*communities to provide for their … economic ... well being*", and having regard to "*the efficient use and development of natural and physical resources"*. This is not to deny that in some circumstances it will impose costs on some individual landowners.