

Electricity industry participants and other interested parties

Date: 29 August 2008

Dear Colleague

Request for Information – Long-term electricity industry scenarios

Transpower New Zealand Ltd. is hereby inviting industry participants and other interested parties to provide their views on the issues they believe will shape the future electricity system in the longer term and thus determine the scope for transmission services in the future.

The feedback obtained will be used to develop a set of scenarios that will be a main input into Transpower's Grid Development Strategy project.

Background and purpose

In August 2008, Transpower began a process, which aims to produce a long term Grid Development Strategy by early 2010.

The objective of the Grid Development Strategy project is:

To form a long term national grid development strategy taking into account New Zealand's future social and economic requirements and long-term technology trends.

A key input into the Strategy is a set of scenarios, which describe possible future development paths of the New Zealand power system. The scenarios are storylines of how the demand/generation landscape may develop based on which future trends become most dominant.

The storylines will then be quantified to get an expected development of generation and demand, which can be used for assessing the *demand for transmission services* in each of the scenarios. Based on this assessment, a strategy for long-term development of the grid in an economic, reliable and sustainable manner will be developed. This is the Grid Development Strategy.

Overall approach and timeline

An indicative timeline of the project is shown below.

	2008					2009												2010		
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Electricity industry scenarios	█																			
Planning criteria / assumptions	█																			
Future transmission technology development	█																			
Transmission needs assessment						█														
Forming options													█							
Testing options against technical and economic criteria														█						
Formulate Grid Development Strategy																	█			
Compile documentation																			█	
Publish Grid Development Strategy																				█ 25-Mar

As it can be seen, it is made up of several interrelated work packages, one of which deals with the development of electricity industry scenarios. This paper represents the initiation of that work package.

The scenarios will be finalised in late 2008 and will become an input to the following transmission needs assessment. The Grid Development Strategy itself will not be completed until early 2010 once a detailed transmission option analysis based on the need assessment is undertaken in the second half of 2009.

More information about the approach, the different work packages and the timeline can be found at: <http://www.gridnewzealand.co.nz/grid-development-strategy>

Overview of Work Package 1 – Electricity industry scenarios

The purpose of this work package is to develop scenarios that define the need for electricity transmission services out to 2050. Given the horizon, a broad based scenario approach (rather than a specific forecasting approach) has been selected to make the strategy robust to likely future challenges.

The year 2050 has been selected as:

- Transmission assets have a long life time. Those under consideration now will typically be part of the grid in 2050 as well.
- By 2050, all non-hydro power plants are likely to be replaced or fully decommissioned. The grid must at that stage match the new generation mix, which may include new technologies, such as marine energy.
- Many international targets will be set by mid-century, such as discussions of emission reductions in the IPCC forum. From that perspective, 2050 is a natural choice.
- Statistics NZ's base population forecast has population growth slowing to a minimum around that time and some projections have a decreasing population from the 2040s. If combined with increased energy efficiency, the impact on transmission services could be significant.
- Transport sector transformation is likely. However, even scenarios with a high penetration of electric vehicles will have a modest impact pre 2040 due to the slow turnover of New Zealand's vehicle fleet. The growth between 2040 and 2050 is expected to be significant and including the extra 10 years will help to adjust the strategy to deal with any impacts of this.

The planned approach for developing the scenarios is:

Aug 08 – Sep 08: Request for information (RFI): The purpose of this step, which is initiated by this document, is to get an overview of the relevant issues to be considered. This is further explained below.

- Sep 08: Industry ‘Roundtable’ workshop*: The purpose of this is to identify the most important drivers that will shape the industry in the future. The outputs will be published in time for people responding to the RFI to comment on the findings.
- Sep 08 – Nov 08: Scenario drafting: Based on the previous steps, a number of scenarios will be created. An industry advisory group will be formed to assist in the development. One-to-one meetings will be held with various parties to obtain further information and clarify issues that arise. Furthermore, the high-level scenario descriptions are quantified to give numerical inputs (generation and demand) to the later stages of the project.
- Nov 08: Industry workshop: The draft scenarios and the quantification of those will be presented. Feedback on these is sought: Are they likely? Are they relevant? Are there important issues that have not been considered?
- Nov 08 – Dec 08: Scenario finalisation: Based on the workshop feedback, the scenarios will be adjusted. By the end of the year, the scenarios are expected to be ready for the more detailed power system analysis studies that will ultimately lead to the Grid Development Strategy.
- Jan 09 – Apr 09: Scenario documentation: In this step, the finalized scenarios will be documented in a report. Quantitative data will be collected and issued with the report on a CD-ROM.

* Due to the format required for this workshop, numbers have been restricted to 20 people representing 20 organisations. A mix of people representative of the industry, users, researchers and consumers has been invited.

The programme of engagement above anticipates a significant level of involvement by industry and other interested parties throughout the project. This should ensure that everyone has an opportunity to have their ideas heard and assessed.

Scenario approach

The scenarios will be derived based on the driving forces that are most likely to shape the future. Some useful terminology is shown in the table below.

Driver: a driver or driving force is a variable that will shape the future of the issue in focus. A driving force behind electricity transmission built is electricity demand, which itself has some drivers (population, GDP, etc.)

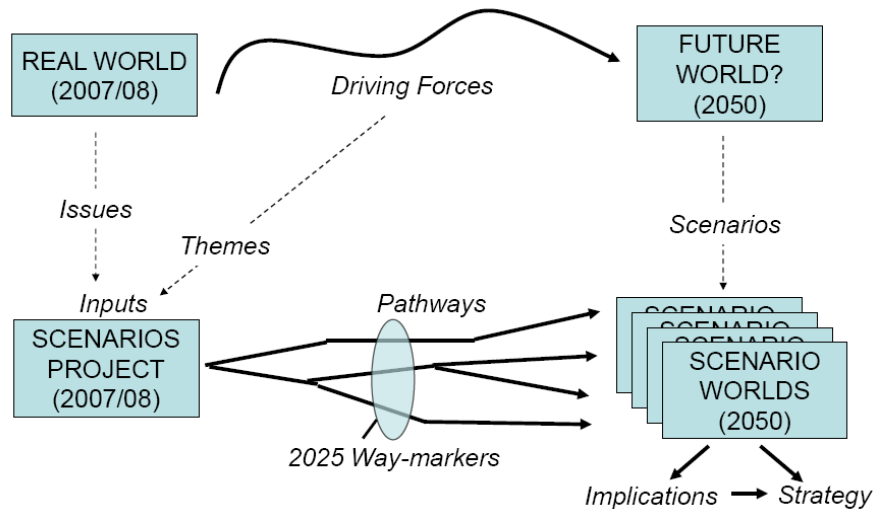
Trend: a pattern of change over time for a variable of interest (the driver). One of the most obvious, and largest trends, is the increase in world population. The term “megatrend” is often used to indicate a widespread (i.e., more than one country), long-lasting trend of major impact, typically composed of subtrends which in themselves are capable of major impacts.

Emerging issue/Trend break: This term describes sources of change, which could be a break away from an otherwise perceived trend.

Wild cards: low probability but high impact changes – like a global plague – usually in the form of (sudden) events rather than gradually unfolding changes.

Different realisations of the chosen drivers (typically those with the greatest impact and most uncertainty) will span the set of future scenarios with the near term direction set by the issues of importance now, such as environmental concerns, economic growth, etc.

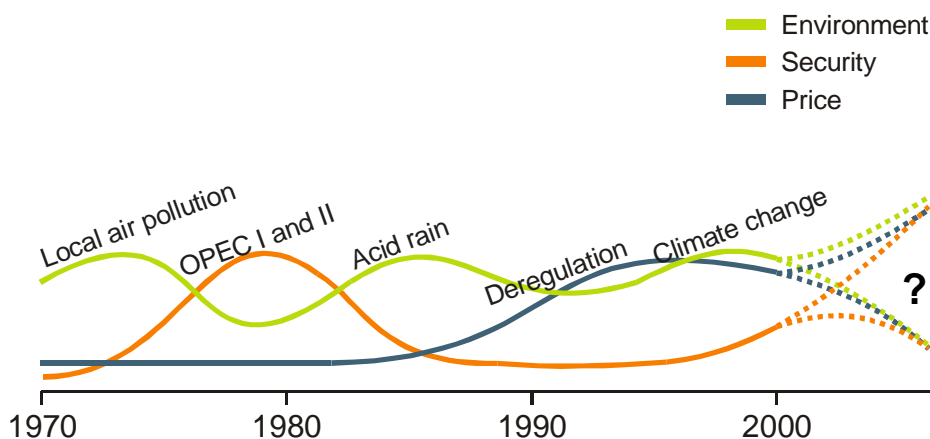
The concepts are explained well in the figure below, which is sourced from Ofgem, the UK electricity industry regulator. They are in the final stages of their LENS (Long-term Electricity Network Scenarios) project¹.



Scenario terminology in Ofgem's LENS project

At this stage, Transpower is looking to identify the drivers ('Themes' in the figure above) that should be considered and their ranking in terms of uncertainty and importance. Also, we will be looking at which 'Issues' set the direction here and now. This information can be derived from documents such as the New Zealand Energy Strategy and strategy and vision documents of the main industry players.

The Issues most often arise from the three opposing forces² that govern the electricity industry worldwide in a rather cyclic behaviour. This is illustrated in the figure below for the European power sector.



From "Testing times: The Future of the Scandinavian Electricity Industry" by ECON

¹ See: <http://www.ofgem.gov.uk/Networks/Trans/ElecTransPolicy/lens/Pages/lens.aspx>

² Opposing, as focus on one of the issues typically leads to less optimal outcomes for the other issues

As an alternative to using drivers to form the scenarios, the three forces shown above could be used, so that the different scenarios would have a general focus on one of those subjects. This is very similar to the approach Shell used for their “Global Scenarios to 2025”³. Transpower is open to both ideas.

Feedback sought

We would welcome your views on the subjects raised above. In particular, we are seeking feedback on:

- what are the most important drivers for the New Zealand power system, which of them are most uncertain, and which of them are within New Zealand control;
- the approach sketched in this document;
- any emerging issues and potential trend breaks that should be considered; and
- references, such as strategy documents, and similar studies conducted in New Zealand or overseas, that would provide useful inputs to the study.

The drivers/issues could be international, or specific to New Zealand or even to individual regions within New Zealand. Examples are changes in demand patterns, fuel prices and new generation technology developments.

Submissions should be sent to gdsproject@transpower.co.nz with the subject “GDS – WP1 submission” before 19 September 2008.

Thank you for your assistance.

Kind regards,



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³ Shell (2005): “Shell Global Scenarios to 2025”, Shell International Limited.