Discussion document on

Feed-in tariffs

for aiding the uptake of small scale renewable electricity generation schemes

Stephan Heubeck, September 2009

Background:

Numerous studies[1][2][3] have time and again shown, that New Zealand has a technological renewable resource potential sufficiently large enough to allow for all current and future energy needs of the nation to be satisfied from renewable resources, and additionally sustain extensive exports of renewable fuels, or refined energy intensive commodities such as aluminium, nitrogen fertilizer or milk powder. Deriving the large majority of New Zealand's transportation fuels, heat requirements and electricity needs from domestic, renewable resources would provide major benefits to the nation, such as:

- Improved balance of payments
- Improved national energy security
- More domestic employment and an economic stimulus, in particular in disadvantaged rural regions
- Creation of "future industries" with export potential
- Reduced GHG emissions and a reduction in associated costs
- A diverse range of secondary environmental benefits, ranging form reduced local air pollution due to bio-fuels use in vehicles, to erosion control provided by energy forests, to waste minimisation, nutrient recycling and odour control provided by bio-waste to energy projects.

However, almost equally as well documented as New Zealand's vast and underutilised renewable energy potential, is the fact that a successful and timely transition to a renewable energy future can not be successfully facilitated by market forces alone. This is mainly due to the enormous lead times involved in almost every aspect of the transition to a renewable energy future, from building-up a skilled work force, to growing the resource base (e.g. energy forests) to planning, consenting & constructing the renewable energy infrastructure. Additionally most renewable energy projects are hampered by high up-front investments (balanced by low operating costs), requiring a long-term investment strategy and the fact that many of the positive externalities of renewable energy projects (see table above) can currently not be monetised.

To rectify these imbalances, and to be able to benefit from the positive externalities of renewable energy schemes sooner, many countries around the globe have initiated a divers range of support mechanisms for renewable transportation fuels, heat and electricity[4]. While it is acknowledged that New Zealand currently has a number of rather specific initiatives (e.g. bio-fuels subsidy, EECA EIB grants) to foster the development of renewable energies

[1] Scion 2008: Bioenergy options for New Zealand
[2] NIWA 2008: Energyscape asset reviews: Earth resources, Renewables & Biomass
[3] Wabnitz 2007: NZ Biogas naturally
[4] BMU 2008: Renewable Energy Resources in Figures – National and International Development

in our country, in this document we want to focus on the apparent lack of a comprehensive strategy and policy tool to further electricity generation from renewable resources, in particular at the small/medium scale and by companies, individuals and organisation in possession of vast resource potentials, but currently not engaged in electricity generation.

New Zealand electricity generation

New Zealand prides itself for having one of the highest renewable shares in the national electricity mix among OECD countries[5]. Partially due to this fact the environmental impact of electricity generation, as well as other externalities associated with electricity generation, have long been considered as a non issue in NZ.

The high share of renewables in the national electricity mix has however been declining for over 2 decades. At the same time NZ has become increasingly dependent on energy imports for electricity generation (coal for Huntly, diesel for Whirinaki, LNG imports considered for the future)[5]. The electricity generation sector has also recorded the fastest and largest increase in GHG emissions of any sector of the economy since 1990.

New Zealand, once world renowned for its engineering expertise in hydro and geothermal generation, has not only lost its champion position in these areas over the last decades, but also failed to actively embrace, and become a leading force in the area of the "new renewables" (wind, biomass, marine etc); a situation which, given our resource potential, is totally unwarranted.

Many of these negative developments can be explained with the very low cost of fossil fuels in this country and the incumbent generators investment strategies that are generally short term, favour higher operating cost over high initial investments and focus on large scale centralised rather than smaller scale distributed generation schemes. However these developments have also been exacerbated by an apparent lack of any long term regulatory framework that would favour the development of smaller scale distributed renewable generation schemes over larger scale centralised generation schemes, and simplify and aid the participation of future renewable generators, for whom electricity generation is not core business, by providing clear long term rules and investment security.

Demands on a future long term regulatory framework

The BANZ is of the opinion that development of a long term regulatory frame work aimed at increasing the share of electricity from renewables in the national electricity mix, in particular from smaller scale set-ups, and providing clear long term rules and investment security for future renewable generators should be a priority for New Zealand's leaders. Such a future frame work should be based on and provide for:

- enabling the development of the greatest possible range of renewable resources for electricity generation to their fullest extent
- preventing destructive/negative competition between different technologies/energy sources

[5] MED 2009: Energy Data File 2009

- providing long term planability and security for investors in (small scale) renewable generation schemes
- providing priority connection of renewable schemes to the grid and priority transmission of electricity generated in theses schemes
- defining clear rules regarding the responsibilities of renewable generators, electricity transmitters, electricity retailers and end users
- being able to (at least partially) reward positive externalities of (distributed) renewable electricity generation
- not burdening government coffers or require tax payer dollars of any kind

We have concluded that a Feed-in Tariff (FIT) system for (small/mid scale) renewable electricity generation would be a most appropriate tool, fulfilling these demands in a NZ situation

A comprehensive Feed-in Tariff system for New Zealand

Over 60 states and territories around the world have legislated a wide range of FIT systems for electricity from renewable resources. Developments in this area are rapid, as recent developments in Ontario and the UK have impressively showcased. FIT's can be tailored to suit each countries individual needs and requirements, and are often implemented not only as an energy policy, but as a tool for enhanced economic development as well.
For the basic outline of a comprehensive New Zealand FIT system the BANZ suggests the following key criteria:

Criteria	Feature	Rational
FIT type	Gross feed-in tariff	○ Even playing field for all participants ○ Ease of administration ○ No cheating
Size	From 1 kW to 20 MW electrical out-put	A bracket currently considered too small by incumbent generators, but ideally suited to the resource base applicable to most renewable generation technologies
Sources	Proven: Biomass Wind Solar Geothermal Micro-hydro Future: Marine Thermal gradient Salt gradient	○ Creating a renewables portfolio as broad as possible ○ Preventing negative/destructive competition between sectors ○ Allowing each sector to flourish within resource limitations ○ Driving and giving security to innovation in new renewables area by including future sources
Grid connection	○ Priority grid connection at the closest possible location ○ Guaranteed for live of scheme ○ Priority transmission of FIT electricity	○ Provides investment security ○ Clear demarcation of responsibility
Duration of	20 years	○ Investment security

tariff period		○ Proven overseas
Grading of tariff level by source	Experimental > Solar > Biomass & Geothermal > Wind & Micro-hydro	○ Recognizes maturity of technology and technology risk ○ Rewards early adopters ○ Prevents windfall profits
Grading of tariff level by size	At least 5 size dependent tariff brackets required (dependent on source), e.g: < 20kW 20 – 150 kW 150 – 500 kW 0.5 – 4 MW 4 – 20 MW Tariff declining with increasing size	○ Reflects ease of grid integration ○ Reflects diminishing environmental impact (e.g visual) with decreasing size ○ Compensates for little economies of scale with smaller set-ups, which are often most valuable in terms of positive externalities
Grading of tariff level by time of entry	The 20 year fixed tariff level depreciates according to the time of entry/grid connection High depreciation rates for less mature technologies benefitting form technological advances. Little / no depreciation for mature technologies, expecting few technological advances, and where cost are mainly driven by underlying raw material costs	○ Bonus for early adopters ○ Drives innovation – the need to improve ○ Recognises technological limits of mature technologies
Grading of tariff level by co-benefits	The tariff levels may be increased with bonuses, recognising secondary benefits, such as the beneficial use of waste heat, waste minimisation, destruction of fugitive GHG emissions, the use of innovative technology etc.	○ Rewards secondary benefits ○ Tailors FIT to individual national needs ○ Drives innovation
Cost of grid side upgrades required to enable FIT supported generation	○ Initially funded by electricity transmitter ○ Reimbursed via national equalisation and cost forwarding scheme	○ Clear demarcation of responsibilities ○ Cost neutral to electricity transmitters ○ Prevents undue delays for the roll-out of FIT generation schemes
Cost recovery	National equalisation and cost forwarding scheme: ○ Annual (monthly) equalisation of the annual average FIT electricity volume and FIT electricity cost (including grid side costs) between all national retailers/whole sellers ○ Budgeting of annual average FIT electricity cost against reference price (annual average spot market price) for determining FIT excess	○ Cost neutral to government / tax payer, electricity transmitters and retailers ○ Just ○ One scheme for distributing burdens and benefits ○ Additional cost of FIT scheme almost insignificant when spread over all electricity usage (dependent on FIT source mix). *Information from Germany indicates that FIT electricity (17% of national electricity) will be responsible for a maximum of 5% of the electricity retail price, before benefits outweigh*

	cost/benefit. ○ Addition/subtraction of FIT excess cost/benefit to/from all units of electricity sold in NZ and pass on of costs/benefit to all end users	*disadvantages and FIT electricity will lead to real (and potentially nominal) declines in electricity prices.*
Administration	Minimal	MED to facilitate a registry of FIT generators, a complaints panel (also assessing the rightfulness of grid upgrades required due to FIT integration), and police national cost equalisation and forwarding scheme

The impact of a FIT system

FIT's are rapidly adopted around the world and some countries and territories have up to a decade or more working experience with feed-in tariff systems. Comprehensive data is available form Germany, where 8 years after the introduction of FIT's the regulation, has directly created 134,000 jobs in a 13+ billion € p.a. industry, saves 50 million t CO_{2equi} in energy GHG emissions as well as 900 million € in fuel imports annually[4] and is going to stabilise electricity prices in the long term.

We are convinced that the introduction of a suitably designed FIT system in NZ, where vastly superior renewable resources are at hand, could at least provide proportional benefits, potentially even quicker and at a lower cost.

BANZ therefore urges the government to seriously consider the swift introduction of a FIT system in NZ.