VISION FOR A SUSTAINABLE ENERGY FUTURE FOR THE NORTHERN RIVERS (Short version)

100% reliance on renewable energy cannot be achieved without reducing the energy intensity of our economy and daily lives first – energy efficiency becomes the first step on that path.

This is my suggested pathway:

1. **Energy Efficiency**. Implement all-encompassing energy efficiency in all areas of residential, commercial and industrial life. On average, 40-50% of all energy used today can be saved over the next 10 years.

2. **Energy pricing**. To encourage the uptake of energy efficiency measures, energy prices MUST NOT be reduced but gradually increased. A tiered rate approach, where the basic amount of energy no household or business can do without is cheap and subsequent tiers become more and more expensive, will help to keep cost affordable during the transition process.

Example for households:

   a. Base rate 25 cents per kWh for the first 10kWh per day
   b. Next 10kWh per day: 30 cents per kWh
   c. 20kWh plus: 45 cents per kWh

The present pricing structure does exactly the opposite (discounted rates for higher power consumption).

3. **PV Solar.** Large scale adoption of PV Solar in community and commercial solar farms around the country. Floating solar farms on farm dams, lakes, reservoirs and other suitable water bodies should be used as well – the extra cost of water based infrastructure will be made up by higher system efficiencies and economies of scale if built in a modular, industrial scale way. Most of the regions DAYTIME energy can be created that way.

4. **Wind.** The potential for wind energy is limited within the Northern Rivers; however ranges towards the west offer potential, and off-shore installations can be built. Both options are more costly than PV Solar due to potentially long distances from the site of generation to the end user and the cost of building off-shore. However, the longevity of these installations and the reliable performance over 30-50 years provide excellent long term returns.

5. **Baseload power.** Both wind and solar are exposed to periods of energy non-production. Wind and PV Solar together can cover approximately 80-90% of total energy need, but backup power supply from non-weather dependent sources is required. The following options may be used:

   a. **Pumped Hydro.** Dams and reservoirs at higher altitudes can be used together with newly built lower reservoirs. For example, Rocky Creek Dam may release water into a floodplain reservoir (to be built near Lismore). While releasing water, electricity will be produced (typically at night), while daytime solar power will be used to pump the water back into Rocky Creek dam. The lower reservoir will need to be dammed to avoid contamination in flood periods.

   b. **Concentrating (Thermal) Solar.** Together with molten salt storage, solar energy can be stored for the following night or longer.

   c. **Battery Storage**. Increasingly, battery storage in form of Lithium Ion or Flow battery technology becomes commercially attractive as utility scale short and

medium term storage. While still expensive today, the costs need to be seen in the context of avoided cost for fossil fuels and avoided environmental damage. Costs will come down dramatically over the next 5 years.

6. **Biogas.** Anaerobic digestion of organic matter (Bio fermentation) is a viable option for parts of the Northern Rivers and can also be used for baseload power generation. Care must be taken to rely on waste crop products as much as possible. Purpose-grown energy crops may be used if they can be grown without detrimental environmental effects (Biodiversity, competition with food crops, land degradation etc.). Another important consideration is keeping the transport of materials low. Examples of potential bio-energy resources include but are by no means limited to:

a. Sugar cane waste products
b. Animal manure
c. Water based weeds
d. Some types of grasses grown of marginal lands

7. **Virtual net Metering.** The transfer of energy from one generator (e.g. PV Solar) with excess energy to another nearby user of power over the existing grid should be promoted (and not obstructed by network providers!) within the capacity constraints of the existing infrastructure. Compensation for use of the network should be fair and reflect the actual cost for the network provider.

8. **Transitional issues.** For the next 10 years or so, fossil fuel based energy may have to be available until independence has been achieved. Rather than building new gas fired power plants or using diesel generators, I suggest to keep using green (if available) or black power from the existing grid.

9. **Incentives.** Monetary incentives can help to establish innovative technologies until they have achieved economies of scale. I believe incentives should only be made available if the payback periods are longer than 7-10 years, and they need to be reviewed annually. Incentives that that run longer than required to kick-start an innovative technology only serve to attract fly-by-night businesses hoping to get rich quick and actually prevent prices from dropping, in line with technological advances. Solar feed-in tariffs need to reflect the avoided cost for the network providers and energy retailers. Battery storage is one example where incentives now would be beneficial.

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