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Submission to House of Representatives Standing Committee on Industry and Resources.

Inquiry into developing Australia's non-fossil fuel energy industry

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A Cautious Approach to Supporting Renewable Energy Sources

It is not the intention of this writer to add to the information stream on renewable energy possibilities but rather discuss possible approaches to deal with the driving intent behind renewables, the reduction in the human generation of greenhouse gases.

It is the view of this writer that there are currently no predictions available on potential climate changes.

"Projections" are made from assumed "scenarios" adopted by the Intergovernmental Panel on Climate Change.

There are no probabilistic calculations that would indicate the most likely climate development. Consequently there is no more than an implied threat that humans have influenced and will influence the course of climate development.

Any recommendations made by the committee should take into account the great uncertainty of human influence on climate change. Thus policy should be framed to cause minimum disturbance to economic development while allowing a full exploration of the range of technologies available if they need to be deployed. The approach could mirror the approach to national defence: war may be unlikely but we should make preliminary preparations.

1 Picking winners.

The difficulty of predicting the future technologies will be discussed below. However it is clear from the actions of both State and Federal Governments that some technologies have been favoured over others. The Federal Government is thought by some to have favoured nuclear power and bio-fuels. Clean coal has been promoted as the real answer to our and other countries problem of major reliance on coal for electricity generation.

Much of this activity has been supporting research and development. However, the Federal Government and some of the State Governments have moved to subsidize manufacture and use of renewable energy technologies. Often there is little economic justification for the increased costs that are ultimately born by the consumers of energy. The best example is the subsidies given to wind power and the best example of its likely impact is to be found in the McLennan Magasanik Report to Sustainability Victoria (July 2006). Here an increase of 1,000 Mw of installed wind power would save the state some 70 Mw of power generated from brown coal.

The problem of moving to operating subsidies is that schemes have long lifetimes so that economic returns can be achieved. This is a distortion of the market and leads to political pressures on governments to continue support, possibly to the detriment of other opportunities.

The reasons for the absence of useful predictions are discussed below.

2 i Economic Uncertainty

Climate change projections are made to cover a span of 110 years from the year 1990 to 2100. The projections rest on future world economic activity, described by scenarios that give rise to varying energy use that will put carbon dioxide into the atmosphere. World carbon emissions were 7 billion tonnes in 2004. Projections for 2100 are in the range 15 to 30 billion tonnes that give rise to a global temperature increase from 2^0C to 6^0C.

The economic scenarios used to calculate the production of carbon dioxide depend on a number of key assumptions, including the present world economy, the forecast growth, the convergence of rich and poor countries and hence the carbon dioxide produced as a function of population and technology.

Economic growth and convergence, that is faster growth of less developed economies, depends on a multitude of conditions that cannot be predicted. Growth often requires changes in economic management and political structures and is not subject to arithmetic extrapolation. Examples of differences in next-door neighbours, such as East and West Germany, Mexico and the United States, shows the importance of these structures but there are no guides or timetables for the development of economic systems.

It may be possible to usefully project forward some ten or maybe twenty years but one hundred years of economic growth is an heroic timescale

2 ii Technology Development.

The development of technology is a significant uncertainty. The committee is considering the potential role of technology for energy supply. However there is also the uncertainty from possible changes in energy demand as communities develop and the balance of industry changes.

The most extraordinary contemporary example is the invention of the transistor in 1948 and the integrated circuit in 1959. The revolutionary effects are still being felt. For instance in the 1950's computer circuits used valves. Each valve had a filament to produce electrons and used about 5 watts of electrical power. The first production-line machine, the UNIVAC, had 5,000 valves and overall would consume 125 kilowatts. The present Pentium processor has some tens of millions of transistors, each roughly the equivalent of a valve and consumes 20 watts. This enabling technology has been applied throughout economies while initiating new and transforming old industries. There is no way this could have been predicted at the start of the twentieth century or at mid-century and it is not possible even now to forecast the further economic influence of this technical revolution.

The Club of Rome *Limits to Growth* resource exhaustion and Paul Ehrlich's *The Population Bomb* with world famine were models of a future that has not come to pass. Both were defeated at least partly by a contemporary lack of knowledge and an inability to predict the impact of technology

2 iii Climate Prediction

Members of the IPCC Assessment groups have stressed the limited state of their present modelling of futures climates. They hope to develop and refine the models so that they will take present climate starting values and thus make regional and global forecasts in very much the way that weather is forecast. The underlying problem for both weather and climate forecasts is the complexity of the system and the stochastic (deterministic chaos) nature of its progress. Unfortunately at the present time we have measures of the success of weather forecasting but little to show for climate forecasting.

3 Proceeding with Caution

The scenarios are intelligent guesses at the future world economy and climate but because they deal with the unknowable, must contain large inherent uncertainties. It is very likely that the uncertainty in economic and technology development completely overwhelm the deliberately chosen differences amongst the future scenarios.

So attention should be directed at how far useful policy can be developed given the possible failure of climate modelling and the unknowable future of economic and technical development.

We simply do not have useful certainty with one hundred year projections of our impact on climate.

4 Conclusion

Governments could usefully explore technologies through R&D programs and support for pilot scale and demonstration plants. These should be partnerships with industry to try to achieve practical outcomes.

The States should not extend specific operating subsidy programs nor should the Federal Government.

If it is judged necessary to prepare for some perceived change in climate then some universal approach to atmospheric carbon dioxide, such as Cap and Trade or a carbon tax, would be preferable to the present piecemeal approach. Of course, mitigation might be a better, less costly path to follow.

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