7 November 2013

Secretary
Committee on the Northern Territory's Energy Future
GPO Box 3721
DARWIN NT 0801

via email: contef@nt.gov.au

Inquiry into Key Challenges and Opportunities

Tenax Energy welcomes the opportunity to provide comment into the Committee's inquiry into key challenges and opportunities associated with meeting the Northern Territory's future energy needs.

Tenax Energy is pleased to note that the Northern Territory Government continues to make a commitment to, and encourage the development of, a strong and viable energy industry, and is looking seriously into initiatives to promote the uptake of emergent energy technologies.

Please find attached Tenax Energy's submission to the Inquiry.

Should you have any questions or comments on this submission, please contact Alan Major, Director of Tenax Energy on (08) 8941 7688 or at alan.major@tenaxenergy.com.au.

Yours sincerely

Alan Major
Managing Director

TENAX ENERGY SUBMISSION TO THE COMMITTEE ON THE NORTHERN TERRITORY'S ENERGY FUTURE INQUIRY INTO KEY CHALLENGES AND OPPORTUNITIES

Introduction

Tenax Energy Pty Ltd (Tenax Energy) is a Darwin company established to be actively involved in initiating new renewable energy generation systems, to ensure there is a cheaper and more sustainable solution to meeting the long term energy needs of the community. The company is identifying, packaging and developing tidal energy generation projects across Australia and in the Asia-Pacific region.

Tenax Energy is well placed to provide comment to the inquiry by the Committee on the Northern Territory's Energy Future into key challenges and opportunities associated with meeting the Northern Territory's future energy needs. The first tidal energy generation project to commence is secured by a licence to occupy 16.8sqkm of the Clarence Strait, 45km north of Darwin in Australia's Northern Territory. The project is the first of its kind in Australia, and globally will be the first tidal energy facility in a tropical environment.

To support the pilot phase and accelerate the development of the resource in tropical environments, Tenax Energy has an MOU with the Research Institute for the Environment and Livelihoods based at Charles Darwin University in Darwin to facilitate the establishment of a world class, commercially oriented tidal energy research and testing facility, to be known as the Tropical Tidal Testing Centre ("T3C"), with an aim to stimulate collaboration across research institutions, device manufacturers, project developers, renewable energy markets and ancillary services.

The T3C has also entered into an MOU with the European Marine Energy Centre (EMEC). EMEC is the preeminent ocean energy research centre, based in the Orkneys, Scotland. The T3C offers a unique opportunity for device developers and researchers to develop a coherent and consistent research program focused on the testing of devices in arrays and operating in a tropical environment.

As awareness of global warming and climate change continues to increase, it is evident that new renewable forms of generating energy must be explored, in order to respond to the global need to reduce carbon expenditure. The Northern Territory Government has a responsibility to lead in creating an attractive environment for investing in a sustainable energy future. By global standards, the Northern Territory has a large pool of energy potential, both from renewable resources and embedded in fossil fuels, that is available to drive innovation and new export industries.

Primary themes for this submission are the unintended consequences of policy decisions and of the political debate of recent years that continues to starve the Australian renewable electricity generation sector of investment capital during the dual global imperatives of addressing climate change and providing a buffer to the financial paralysis.

Responses to the issues raised in the Call for Submissions

1. **Impact of cultural, economic, environmental, geographic, regulatory or other factors on:**
    - **the exploration, development and production of energy producing resources; and**
    - **availability of developed resources for the domestic energy market.**

Energy security

Australia does not have an energy security issue. The Northern Territory certainly does not have problems like those experienced in Europe with aging coal and nuclear electricity generation plant nearing the end of operating licenses, unreliable and very costly natural gas supplies, and limited options for local energy production.

Australia's identified gas reserves is enough to power the country's needs for almost two centuries. At the current rate of domestic usage, these gas reserves would last 184 years of gas production, former Resources Minister Martin Ferguson estimated in May 2012.

The Grattan Institute[1] estimates Australia's "proven and probable" gas reserves to be around 140,000 petajoules - more than two-thirds of which is from "conventional" gas reservoirs, with the remainder from "unconventional" coal seam gas reserves on the east coast. At current rates of production that total is enough to meet more than 70 years of gas demand.

With booming global demand for gas, Australia is ramping up its liquid natural gas (LNG) exports, with much of our gas destined to power growth in north and west Asia. Australia is the only country in the world that is confident enough with its energy security to have government policy settings that allow full international company access AND export without prioritising local supply[2] in most States and Territories.

The headlines in the Northern Territory press[3] on Monday, 4 November were that the Evans Shoal Gas field, controlled by ENI and Shell, has enough reserves to power the Northern Territory for 100 years. However, as ENI told the ABC, "it is likely all the gas will be exported and it cannot guarantee any onshore plants would be needed".

1. Does Australia have 200 years of gas reserves, or does having enough gas to satisfy 70 years of export demand at current production rates, and a spectacular surge in production and in exports, create potential for problems in Australian domestic energy supplies in the decades ahead?

Most of the Northern Territory's gas is located in Commonwealth waters where no domestic retention obligations apply without support from the Federal Government.

2. Will imposing domestic retention obligations see more off-shore processing via floating production, storage and offloading (FPSO) vessels, with resultant royalties not available to the Northern Territory, instead accruing to the Commonwealth?

[1] Grattan Institute Report No. 2013-6, June 2013
[2] Santos, Melbourne Mining Club presentation, February 2010
[3] http://www.abc.net.au/news/2013-11-04/evans-gas-field/5068490 Gas field could fuel Territory for 100 years

Environmental security

We built our civilisation by harnessing energy, which is at the core of economic growth and prosperity.

The fifth assessment report on the physical science of climate change by the Intergovernmental Panel on Climate Change (IPCC) warns that humanity is on course over the next few decades to raise global temperatures by more than 2C compared with pre-industrial levels.

In a paper titled Ethics, equity and the economics of climate change, released in August 2012, Lord Nicholas Stern, the Chair of the ESRC Centre for Climate Change Economics and Policy, writes:

> The science of climate change indicates that business-as-usual implies substantial risks of temperatures not seen on the planet for tens of millions of years, with consequences that could lead to the movement of hundreds of millions of people and thus possibly severe and prolonged conflict. Risks on this scale take us far outside the familiar policy questions and standard, largely marginal, techniques commonly used by economists; they raise deep questions about ethical perspectives beyond those traditionally captured in analyses of Pareto efficiency or social welfare functions. Climate change is absolutely central to economic policy-making around the world and we must therefore ask carefully how we can put economics and ethics to work to tackle the questions posed by the science and by our past, current and future patterns of economic growth and emissions.

The science tells us that this is a problem of risk management on an immense scale. The science tells us that this is a problem that will be politically very difficult. Understanding these implications is key to thinking about the economics, the ethics, the policy responses, and the political economy.

Sensible policy discussion requires some understanding of potential scale of risk. Again I reference Lord Stern from a presentation he made in September 2013 ahead of the release of the IPCC Fifth Assessment Report, as this encapsulates the issue in just a few short paragraphs:

> Current concentrations of carbon dioxide (CO2) are around 400 ppm, compared with pre-industrial concentrations of around 280 ppm. Current concentrations of the six “Kyoto” greenhouse gases (GHGs), which includes warming contributions from gases much shorter-lived than CO2, are now around 445 ppm carbon-dioxide equivalent (CO2e). We are adding CO2e at a per annum rate of around 3 ppm and that rate is rising (EEA, 2013). A century of "business-as-usual" might thus add 300 ppm or more and take us into the region of 750 ppm CO2e or perhaps much higher.
>
> The last time CO2 levels exceeded 750 ppm, came with surface temperatures well beyond 4°C above pre-industrial, and was around 35 million years ago during the Eocene Epoch when the planet was entirely ice-free, which today would drive a sea level rise of about 70 meters. Modern homo sapiens is probably no more than 250,000 years old (Stewart and Stringer, 2012) and has not experienced anything like this.
>
> Temperatures have been remarkably stable over the last 7 or 8 millennia fluctuating in a range of plus or minus 1 or 1½°C around an average, allowing cereals, sedentary agriculture, and the growth of villages and towns. Already on the upper edge of that range, and, above 2°C, will be well outside that range.
>
> We appear to be embarked on a massive experiment where the consequences are hard to predict and the effects may be irreversible. And the scientific evidence suggests the risks and the consequences are becoming still more worrying.

The implications of the science could suggest to some that delay whilst we learn more is a sensible response. This would be a profound mistake.

First, the "flow-stock" process implies a "ratchet effect". We are already at a difficult starting point in terms of concentrations of GHGs. Second, much of infrastructure and capital investment can result in technological "lock-in", which could last for many decades given the long lives of much of the relevant high-carbon infrastructure and network investment.

Delay increases the risk we would need to undertake radical, rapid and expensive decarbonisation in two or three decades time, which would result in the scrapping of vast amounts of 'locked-in' capital.

3. Policies for sustainable development require breaking the link between production and consumption activities on the one hand and emissions on the other.

I leave the final words to Lord Stern again: Deniers are increasingly intellectually marginal and irrational. To present a convincing case for inaction or delay you have to show you are very confident that the risks are small, or the risks of delay are small, or that a magic antidote will be discovered. Or care little about the future.

2. Demand and supply-side management strategies and incentive initiatives to improve productivity, cost effectiveness, energy efficiency, consumer and supplier participation in the energy market.

The balance of supply and demand for frequency control to maintain grid stability can be expected to change in the near future. Demand will increase as renewable penetration expands[4]. Renewable generation naturally produces a supply of electricity with fluctuating frequency, owing to the variable intensity of sun or wind over short periods of time. If renewable penetration is high enough, this variation can start to strongly influence the overall frequency across the entire grid, reducing power quality. In simple electrical loads such as lighting, this poor quality power can cause flickering or an occasional blown fuse. In more complex electronic loads it can result in permanent damage. There are also risks to frequency stability when distributed power generators connect in the lower capacity sections of the electricity network, and feed back into the grid.

PV Installations

Residences in the Northern Territory have a significant uptake of solar hot-water units. Solar PV installations have grown by 75% in the two years 2011 to 2013. However, the uptake rate is the lowest in Australia, at just 3% of households in comparison to Victoria's 8.3% or South Australia's 20.3%. The graph illustrates the low uptake of solar PV on the in the Northern Territory[5].

[4] Marchment Hill Consulting, Energy Storage in Australia Commercial Opportunities, Barriers and Policy Options, November 2012
[5] Drivers of Domestic PV Uptake, ACIL Allen Consulting, October 2013

Table 2 **PV installations by state/territory**

	2011 census	December 2011 data		August 2013 data		Since 2011	
State/ territ-ory	Dwellings	Installations	PV uptake rate	Installations	PV uptake rate	Change in installations	% growth in installations
NSW	2,871,058	168,326	5.9%	240,211	8.4%	71,885	42.7%
VIC	2,290,840	107,713	4.7%	190,353	8.3%	82,640	76.7%
QLD	1,824,396	166,847	9.1%	340,858	18.7%	174,011	104.3%
SA	728,542	94,682	13.0%	147,532	20.3%	52,850	55.8%
WA	963,352	87,438	9.1%	142,795	14.8%	55,357	63.3%
TAS	233,026	6,022	2.6%	15,992	6.3%	9,970	165.6%
NT	76,091	1,314	1.7%	2,301	3.0%	987	75.1%
ACT	145,136	10,281	7.1%	12,536	8.6%	2,255	21.9%
Total	**9,132,441**	**642,623**	**7.0%**	**1,092,578**	**12.0%**	**449,955**	**70.0%**

Note: This data does not include 1,359 installations which are listed in postcodes not used by the ABS
Source: CER, ABS.

Reasons for the low numbers can in part be attributed to: the Northern Territory government sponsored feed-in tariff (FiT) commencing later than other States and Territories; the FiT is equal to the retail price of electricity; a 4.5 kW cap on the size of domestic PV systems that can be grid connected before costly investigations are required; and, buyback rates based on gross production. The Commercial 'Time of Use' buyback rate can only be used by commercial customers in conjunction with the Commercial 'Time of Use Consumption' tariff.

The cost of deploying viable renewable energy projects in the Northern Territory is currently higher than the avoided cost of natural gas fired generation. The result is the liable RET entities such as Power and Water Corporation sourcing 85% of its Renewable Certificates from the national market, a disincentive to project development.

Smart infrastructure

Small-scale versions of centralized power systems, once just used against blackouts, are now gaining thousands of customers as homeowners in states with high power costs turn to them as a way to manage rooftop solar systems, cut electricity bills and, in some cases, say goodbye to their power companies.

By using existing telecommunication networks, advanced energy management technology allows solar electricity systems across a large area to work together as one. In cooperating, the generators are able to manage their power production in order to maximise the benefit to the system owner as well as the wider electricity grid. In achieving this, the aim is to improve the economics, effectiveness and uptake of small renewable generators like solar PV.

Not much of a factor a decade ago, microgrids are expected to explode into a $40 billion-a-year global business by 2020, according to Navigant Research, a clean-technology data and consulting company. In the

U.S., about 6 gigawatts of electricity -- enough to power as many as 4.8 million homes -- will flow through microgrids by 2020.

ARENA is looking at a model and a mechanism that could provide a "first of a kind" financing, prove the model, and allow financing costs to all. The financial model is focused not on leasing modules, but on leasing roof -space. This could be applied to rental properties and apartment blocks, where developers pay "rent" for the use of a roof top and sell the output to the residents or other local customers. Ivor Frischknecht[6] says it may be that ARENA will create a separate fund that could help finance such investment.

4. Given that there is a low uptake of roof-top solar PV in Darwin, there is an opportunity to stimulate this sector in a managed and collaborative approach with customers.

In New Zealand, electricity distributor Vector Energy is gaining global attention for promoting an innovative solar and battery leasing product. Their view is that customers installing their own generation is a threat to the traditional models and it requires utilities not to try and resist that change but to try and work out how they can actually change their business models. And also to change the ways they think about and design their network to recognise that change.

The Vector Energy solar leasing program recognises that customers have a choice to put solar on their roof and if this isn't done properly, from a New Zealand point of view, it isn't going to provide the benefits as if it was done in a more managed way. In combining solar with batteries there are network benefits for the distribution company, in terms of being able to time shift the solar output to coincide with peak demand, and it also provides buffering on the network which can facilitate high penetration of PV on houses, which is occurring regardless.

5. Efforts to spur the uptake of energy storage should be focused on the software interfaces, technical standards, and regulatory rules that enable straightforward, consistent, and manageable connections of storage to the grid.

3. Off-grid power generation alternatives for commercial and remote applications, including funding and investment options or the development of emergent and enabling technologies, infrastructure, and commercial scale demonstration projects.

ARENA is administering the Regional Australia's Renewables (RAR) Initiative which aims to support the deployment of commercially prospective renewable energy technologies, both generation and enabling, in off-grid and fringe-of-grid situations. The RAR Initiative aims to take advantage of growing energy demand in off-grid and fringe-of-grid areas and to increase the uptake and use of renewable energy in industries in these areas. The objectives of the RAR Initiative are to:

- Demonstrate a portfolio of renewable energy solutions, including hybrid systems, in Australian off-grid and fringe-of-grid areas.

[6] Ivor Frischknecht, presentation to All-Energy, October 2013.

- Ensure knowledge is produced and disseminated regarding the deployment of renewable energy systems in remote and regional areas catalysing further renewable energy uptake.

- Remove roadblocks, leading to greater deployment of renewable energy systems in off-grid and fringe-of-grid areas.

ARENA is delivering the RAR Initiative objectives through three separate RAR program streams: RAR – Industry Program; RAR - Community and Regional Renewable Energy, and RAR - Removing Roadblocks

Moving towards renewable energy offers myriad benefits: lessening reliance on imported fossil fuel, protecting Government and the community from volatile price swings, reducing CO2e emissions, fostering technological innovation and development, and promoting community development.

The first commercial wave and tidal current stream projects are now appearing online and forecast expenditure for the 2011-2015 period is $1.2 billion. The sectors have been characterised by a large number of concept devices. An increasing number of these technologies have attracted investment and progressed to full-scale prototype testing and beyond. Key countries such as the UK, France and Canada have put into place financial support and site development legislation to help the first commercial projects progress. This emerging industry offers potential to investors seeking to build or expand their renewable portfolio, as well as supply chain companies looking for new markets.[7]

Australia has a number of locations that represent high quality tidal energy resources, including the Clarence Strait in the Northern Territory (between Darwin and Bathurst Island) and for which a preliminary concession has been granted to Tenax Energy. The attraction in developing the Clarence Strait resource is in establishing the knowledge base and operational capacity to capture significant development and management opportunities across community and grid scale projects in Asia and the Pacific region.

Clear and credible policies can promote development of low-carbon technologies and private sector investment, the drivers of growth and change. With strong public policy and support, the private sector has a crucial role in driving the low-carbon transition forward. 80-90% of additional investment required to manage climate change likely to be private[8].

Expenditure involved in making the transition to a low-carbon economy must be viewed as an investment, rather than only a net cost, as there are many co-benefits outside climate change. Most of the investment is not a direct cost to the public purse, but will primarily be private investment[9].

This is about policies for the dynamics of innovation, learning and discovery and creation of benefits beyond that which is usually attributed to the narrow focus of GDP figures. It is not simply a static shift to higher input-output and lower growth.

The NT Government has the potential to be a world leader in the creation of a fully renewably powered industrial township at Glyde Point.

The location of vast renewable energy resources in the vicinity of Glyde Point is the foundation of this potential. The use of smart grid technology and emerging affordable storage strategies will fill out the vision.

[7] Douglas Westwood, UK, http://www.douglas-westwood.com/shop/shop-infopage.php?longref=566~0
[8] UNFCCC, 2007
[9] Romani, et al., 2011

Utilising innovation and expertise developed in the Northern Territory, the project could be initially commenced on grid with a programme to move off grid as capacity rises.

6. Policy that supports investment in renewable energy strategies in a measured growth plan for Northern Territory communities would help focus innovation into an area where investment is desired.

Further Comments

Governments create an attractive climate for investment by offering direct incentives to industry, providing of a range of stimulus packages and actively co-investing in projects, but primarily by having policy settings that remove the risk of regulatory uncertainty.

The intermittent failures of the Renewable Energy Target, initially enacted by the Howard Government as a program to transition Australia into a broad based emissions trading scheme, and the subsequent shelving of investments in utility scale renewable energy facilities is an indicator of the dangers Governments face when enacting unworkable or uncommercial policies.

What has yet to show significant decline is the community led desire to protect the environment for future generations, develop greener options for electricity generation, and contribute actionable sustainable solutions to the critical issues that need to be addressed to ameliorate the effects of Climate Change.

Proponents are looking to Government for unequivocal signals that include co-investment in the industry through a range of incentives, funding and facilitation roles, but definitely include the development of sustainable and workable policy frameworks.

The Northern Territory has been a breeding ground for global success in the energy sector leading to the export of skills, expertise, services and technology. Powercorp has taken products built to manage renewable energy integration in isolated indigenous communities of the Northern Territory to a global market that is encouraging high levels of wind and solar penetration.

Winner of the Northern Territory Export and Industry Awards, SRA Information Technology is recognised as developers of Australia's most comprehensive environmental data management system. EnviroSys solutions support industries in the areas of greenhouse gas emissions and pollutant reporting, energy consumption, water use and quality, waste management, sustainability reporting and general environmental monitoring such as weather.

It is the role of both Government and industry to work in tandem and identify, facilitate and encourage the development of a clean energy economy and leverage opportunities in the ancillary industries that are required to engineer, install, operate and maintain a range of utility scale energy facilities in Australia, and the Asia Pacific region. It is in these areas that significant skills development, employment initiatives and business investment are required to meet the future needs of the sector.