ACTEW
CORPORATION

Legislative Assembly for the ACT
Standing Committee on Climate Change, Environment and Water
Dr Hanna Jaireth
Committee Secretary

30 April 2009

Dear Secretary,

Inquiry into ACT Greenhouse Gas Reduction Targets
Submission by ACTEW Corporation

I am writing in response to the ACT Legislative Assembly Standing Committee on Climate Change, Environment and Water Inquiry into ACT Greenhouse Gas Reduction Targets, Invitation for Public Submissions. I note the Terms of Reference at:
http://www.parliament.act.gov.au/committees/index1.asp?committee=112&inquiry=753&category=13.

ACTEW Corporation Limited (ACTEW) is an ACT Government owned company with assets and investments in water, wastewater, electricity, gas and telecommunications. ACTEW owns the water and wastewater assets and business in the ACT, is a 50% owner of ActewAGL, a multi utility providing energy, water and telecommunications services. ACTEW has two voting shareholders, the Chief Minister and Deputy Chief Minister of the ACT.

ACTEW Corporation aims to prudently manage public assets to provide sustainable water and wastewater services in the ACT region, to maximise the return on its investments, and to ensure a safe and reliable water supply to the ACT and region.

For this inquiry ACTEW is focusing on providing input related to our water business, noting that a separate submission is to be lodged by ActewAGL, covering large scale energy supply and demand issues for the ACT.

Greenhouse Gas Emissions in the ACT Water Business

ACTEW through ActewAGL has been reporting greenhouse gas emissions associated with its operations, including it water businesses, as part of the Greenhouse Challenge since 2002-03. ACTEW's water business has increased its energy usage since 2006 due to the need to bring higher energy intensive water sources into supply as a response to ongoing drought and climate change.

Relative to 2000-01 emissions (about 20,000 TCO2-e/year), emissions for the water business have almost doubled from 2007-08 onwards with additional pumping from Cotter Dam and the Murrumbidgee River. Our water business emissions are expected to remain at or about this level for the next new water security infrastructure (to about 40,000 TCO2-e/year).

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ACTEW has committed to offsetting the greenhouse gas emissions associated with the construction and operations of its new water security major projects infrastructure, namely:

- The Enlarged Cotter Dam and associated pumping infrastructure; and
- The Murrumbidgee to Googong Transfer system.

To address this commitment ACTEW initiated a strategy in February 2008 to identify emissions footprints, undertake cost effective reduction measures and select appropriate offsets. ACTEW has to March 2009:

- applied an approach to minimise emissions where cost effective (criteria of less than $40 per T $CO2_{-e}$). This has resulted in reductions in emissions estimates of about 10,000 $CO2_{-e}$/yr;
- committed to a diversified portfolio approach to offset purchases;
- committed to pursue GHG offsets that are real, measurable, permanent, additional and independently verifiable; and
- aimed to develop offsets within the ACT region.

This approach has resulted in the identification of three key abatement measures, namely:

1. Use of biodiesel during construction
2. Installation of an energy recovery hydro generator as part of the Murrumbidgee to Googong Transfer project
3. Investing in carbon sink forestry offsets to offset about 30,000 TCO2-e/year (Operations 20,000 TCO2-e/year /construction 5,000 TCO2-e/year, safety margin 3,000 TCO2-e/year).

Essentially this offset commitment will abate ACTEW's water business back to 2000 level emissions. To extend abatement outcomes further investment would be required and using similar costs would be in the order of:

- $25,000 - $40,000 per year to achieve a 5% offset of 2000 levels by 2020; and
- $75,000 - $120,000 per year to achieve a 15% offset of 2000 levels by 2020.

ACTEW is currently assessing proposals for Carbon Sink Forestry Offsets with the view to enter into contract negotiations in June 2009. In addition ACTEW is reviewing its existing and potential future hydro generation opportunities with the objective of optimising operations and identifying new opportunities within local and Federal legislation.

Federal Legislation

ACTEW has noted key risks in the current draft Carbon Pollution Reduction Scheme (CPRS) and associated papers. The current implied design of CPRS means that any voluntary undertakings in abating emissions will be appropriated by Federal Government and provide more permits to the national emissions account, removing any positive reduction in national emissions profiles.

Whilst the Government's current policy intentions appear to be inequitable and therefore untenable and this is recognised by the Minister, it is necessary to continue a risk-mitigation strategy, in the event that the CPRS passes into legislation in its current form.

It is critical to note that effective steps in reducing and avoiding emissions provide the best outcome in the context of regulatory uncertainty and the draft Federal Carbon Pollution Reduction Scheme (CPRS). This should be reflected in ACT Government policy through appropriate incentive arrangements.

Appropriate monitoring, reporting and review process for the targets

ACTEW and ActewAGL will be registering for the National Greenhouse and Energy Reporting Scheme which will require reporting on an annual basis by 31 October each year. A consistent approach to annual reporting would build on these existing processes.

In terms of reviewing the targets, a 5 yearly review process to coincide with regulatory planning and budgeting processes would enable appropriate response by service providers such as ACTEW and ActewAGL. Water regulatory periods are 2008-2013, 2013-2018 and so on. Clear commitments would need to be communicated to ACTEW in 2010-11 to enable responses to be included in regulatory submissions.

Climate change

Climate change is the variable with the largest impact on ACT water supply security and as such ACTEW has placed significant effort using results from climate models to predict the effect of climate change on our local climate since 2004-05. ACTEW has in place an assumption that 2030 climate change predictions are in place already in terms of planning for water security.

Whilst global warming progresses proportionally to the build up of greenhouse gases in the atmosphere, it can result in rapid ("step") climate changes in a particular region. The reduction in rainfall and runoff experienced in the Perth region in the past 30 years is often cited as an example of at least one step change in climate, commonly attributed to climate change. A similar step change in climate could have occurred in the ACT region since the mid 1990's but will not be confirmed for many years due to climate variability.

A summary of the predicted 2030 climate change conditions and observed conditions since 2000 are included in the tables below:

	Change in Rainfall			**Change in Evaporation**		
Season	Predicted Worst Case	Predicted Best Case	Observed Since 2000	Predicted Worst Case	Predicted Best Case	Observed Since 2000
Summer	-9%	12%	-4.2%	11.0%	0.5%	1.2%
Autumn	-5%	5%	-39.6%	10.8%	0.8%	5.2%
Winter	-11%	2%	-4.7%	12.8%	2.2%	3.7%
Spring	-11%	0%	-9.4%	12.0%	2.1%	6.5%
Annual	-9%	2%	-13.6%	9.1%	1.4%	4.6%

	Reduction compared to long term averages		
Dam	**Observed 1997-2007**	**Observed 2002-2007**	**2030 Climate Change Worst Case Predictions**
Corin	31%	40%	32%
Bendora	45%	49%	40%
Cotter	46%	48%	53%
Googong	72%	82%	55%
Corin, Bendora & Googong	53%	62%	45%
4 Dams	52%	60%	46%

The past 5 to 10 years are clearly the most severe long-term dry period in the 1871 to present with respect to rainfall and inflows to water storages. It is noted that the reductions in rainfall and inflows observed in recent years are even worse than predicted 2030 climate change. On average, a five year period worse than the 2002-2007 period would occur once every 19 years under 2030 climate change conditions. Therefore, the last few years would be a drought even with predicted 2030 climate change.

It is also noted that the seasonal variation in climate change predictions has not been reflected since 2000. In particular predictions about wetter autumns under climate change conditions have not eventuated. In fact the opposite has occurred with Canberra experiencing some of the driest periods of the year during the autumn months. ACTEW is working with the South Eastern Australian Climate Initiative (SEACI) research program to constantly improve climate change predictions for the ACT region.

It would be prudent in a risk management framework for Government to identify policies and implement programs based on the assumption that 2030 climate change may have already occurred in the Canberra region.

Climate Change and Bushfires

As recognised in the ACT Government's Climate Change Strategy, climate change has a direct impact on the occurrence of bushfire events. Following the 2003 bushfires which significantly impacted on the water supply catchment of the Cotter River, ACTEW has placed significant effort into predicting the occurrence of bushfires under climate change conditions through development of a bushfire trigger model.

The bushfire trigger model tests a catchment's antecedent condition for severe bushfire event potential. The antecedent condition tests have been determined from observed catchment conditions prior to major historic bushfires, and reflect a catchment's potential fuel load, season and relative dryness. If the bushfire indicator conditions are satisfied, the model engages a probability function to ignite a bushfire. The probability function reflects the average recurrence interval of historically severe bushfire events, derived from Cotter catchment sedimentary core records.

The table below outlines the frequency with which each catchment experiences bushfire potential conditions and the recurrence interval of actual triggered bushfires for current climate and 2030 climate stochastic sequences.

Predicted Severe Bushfire Frequencies

		Corin	Bendora	Cotter	Simultaneous ignition
Current climate (Year 1990)	No. of bushfire potential seasons	998	1072	981	-
	% bushfire potential seasons	10%	11%	10%	-
	No. of triggered bushfires	132	137	111	6
	Average Recurrence Interval of bushfire events	76	73	90	1667
Climate change (Year 2030)	No. of bushfire potential seasons	1425	1674	1399	-
	% bushfire potential seasons	14%	17%	14%	-
	No. of triggered bushfires	159	190	178	10
	Average Recurrence Interval of bushfire events	63	53	56	1000

Bushfire events occur more frequently within the 2030 climate stochastic sequence, reflecting the drier nature of the catchments and increased susceptibility to bushfire. "Simultaneous catchment ignition events" refer to bushfire events that ignite in all three catchments simultaneously, and represent the worst bushfire yield reduction case.

ACT Government would be prudent to review resource allocation into fire response and managing fuel loads within the ACT and surrounding catchments as part of its climate change strategy and in response to the expected increase in risk of significant bushfire events under climate change conditions.

Issues and opportunities for achieving the targets

Through ACTEW's development of greenhouse gas emissions abatement options for the purpose of abating emissions associated with our Water Security Major Project, ACTEW has taken on board an objective to identify opportunities within the ACT. Several pre-feasibility studies were undertaken to inform our process including a geothermal study and a woodwaste power renewable generation study which may be of interest to the ACT Government.

Geothermal

The geothermal study was undertaken by Papp Geophysical Services and Earth Energy Pty Ltd in 2009 to determine the feasibility of geothermal applications within the ACT. During the preliminary phase of this study it became evident that the only geothermal technology with an immediate and practically viable future in the ACT/Queanbeyan region is geoexchange systems for buildings.

Geoexchange systems couple a building to the surrounding environment by beneficial heat storage. The movement of heat from the ground to the building for heating or from the building to the ground for cooling is the basis for the high efficiency offered by the systems. District heating/air conditioning requires medium grade heated water

in the winter and medium grade cooled water in the summer. The efficiency of heat pump systems is greatest when the annual heating and cooling loads are similar. The method has significant technical benefits over conventional air conditioning, especially when large public buildings (office buildings, schools) require independent climate control for different zones simultaneously, have fluctuating usage schedules, or have high occupancy rates.

Numerous configurations of the ground heat exchanger are possible to meet the needs of many different project characteristics. Systems can use ground water directly to minimize land use, or incorporate a network of sealed piping to transfer heat with the ground. Lakes, ponds and rivers can also provide a means for geoexchange.

The distributed nature of the geoexchange system provides simplicity in operation and maintenance as well as contributing to the lower energy use of the system. Moving heat around the building with a water loop adds to the efficiency of the system compared with moving heat around the building with an air distribution system.

It is noted that geoexchange technology is not classified as a true renewable (geothermal) energy source, rather as a sustainable heat storage solution with proven environmental and economic advantages.

The main advantages of geoexchange are:

- Low operating costs,
- Simplicity
- Low maintenance
- No supplement heat required
- Low cost integrated water heating
- No required exposed outdoor equipment
- Low environmental impact
- Level seasonal electricity demand

The main disadvantage is the higher initial capital cost to install but installations can have positive net present value over a period of 25 years when considering annual savings of 50% to 75 % in energy use.

There are many examples around the world where geoexchange is used on significant scale in temperature control of city buildings including New York. The Geoscience Australia building is undoubtedly the largest and best documented geoexchange system in the ACT. However, a few smaller installations do exist, for example:

- Australian Defence Force Academy - has a small installation
- ex-CSIRO site in Fyshwick - has a geothermal hot water system
- Finnish Embassy
- Yarramundi Reach Aboriginal Cultural Centre – uses Lake Burley Griffin for heat exchange
- there are small geothermal heat exchange systems in several private residential buildings in and near the ACT.

Land development could be used to facilitate the use of geoexchange in the ACT. Feasibility studies for a central geothermal system, including thermal conductivity testing are carried out prior to building design and sold as part of the development package. Once the land is sold, buildings are designed and thermal load requirements are established for the new buildings, the geothermal heat exchange system final design and construction is also completed.

ACTEW considers this to be a viable solution to the ACT's growing energy demands but would require Government support to pursue on a significant scale. ACTEW can provide the ACT Government with its pre-feasibility studies on this option should it wish to progress it further.

Woodwaste Power Generation

The concept of a woodwaste power plant was initially proposed to ACTEW as part of our consultation with ACT Territory and Municipal Services in 2008. ActewAGL on behalf of ACTEW undertook a pre-feasibility study in conjunction with ACT Recycling to further develop the concept.

A wood waste resource was identified at ACT Recycling of about 10,000 tonnes per year of which currently about half goes to landfill. It is recognised that this resource could be increased to about 25,000 tonnes per year through consolidation of all woodwaste to a central site such as ACT Recycling within the ACT.

Gasification was identified as the most technically and economically feasible technology that could be utilised to convert the wood waste into a renewable power source and could power a 2 MW facility or produce 20,000 Renewable Energy Certificates (RECS). The net present value of this type of plant was estimated at negative $2.6 M. Given the environmental nature and the lack of working examples of this type of technology in Australia, a strong argument could be made to seek Government funding to support the project.

Although ACTEW is not considering pursuing this option further at this stage, we would be interested in purchasing the RECS produced by such a scheme should the ACT Government consider progressing it with the associated parties. The concept has some merit in pursuing given broader Government policies in relation to energy and waste and that it could be used as a working pilot to prove its operations and test opportunities for further applications with relation to other biomass.

ACTEW can provide its studies to date to Government for further consideration. It is noted that ACT Recycling is a key party in this concept.

Biodiesel

Through our studies it has been identified that biodiesel is a low to no-cost alternative to normal diesel use in generators and machinery. ACTEW is seeking to maximise use of biodiesel through the construction phase of the Water Security Major Projects. The reduction in greenhouse gas emissions (Scope 1, 2 and 3) for a 20% biodiesel in diesel blend, based on canola oil, is 562 kg CO2-e/kL.

Biodiesel is derived from materials containing fatty acids, such as vegetable oils and animal fats. In Australia tallow, canola oil, used cooking oil and palm oil are the major feedstocks for biodiesel. 100% biodiesel is rarely used as a fuel for vehicles and is typically blended with petroleum diesel with blends up to 20% biodiesel (referred to as B20) being the most common. Some of the more standard consistent blends are or can be certified as a diesel equivalent usually for use in diesel engines for static and mobile plant, road and transport, marine engines, etc

Biodiesel can be used in diesel engines without modification, although replacement of some fuel lines, gaskets, seals may be necessary for older vehicles (pre 1996). Biodiesel reacts with natural rubber and therefore synthetic rubber is required when using biodiesel and biodiesel blends.

It is noted that there is currently no supply of biodiesel from within the Canberra region. ACTEW is of the view that there may be further opportunities in the ACT for uptake and/or production of biodiesel from local sources. Given the low cost of implementing biodiesel, it would be prudent to explore this option further.

ACT Government's Climate Change Strategies

Establishment of a fund for assisting private and public sector in applying for funding for development of local renewable energy projects and offset opportunities may help to progress ACT Government policy.

ACTEW will continue to monitor, investigate, inform and respond to ACT and national policy developments in this area. ACTEW believes that it is setting new standards in delivering water assets where emissions are actively reduced and abated in the planning, design and construction phase to deliver optimal outcomes in ongoing operations.

ACTEW will continue to look at ways to maintain our water services and other business ventures in a sustainable manner and assist in achieving Government policies.

I look forward to discussing these critical issues with the Committee on 8 May 2009.

Yours Sincerely

Mark Sullivan
Managing Director