

Water Security Major Projects Greenhouse Gas Abatement Strategy

June 2009 Update Report
By Exigency Management

Introduction

The ACT Government committed to voluntarily offset greenhouse gas emissions (GHG) from the operations of ACTEW Corporation's Water Security Major Projects (WSMP) in October 2007. To address this commitment, ACTEW initiated a strategy in February 2008 to identify GHG footprints, undertake cost effective reduction measures and select appropriate GHG offsets. Since this time, ACTEW has :

- applied an approach to minimise GHG emissions where cost effective (criteria of less than \$40 per T CO₂.e);
- committed to a diversified portfolio approach to GHG offset purchases;
- committed to pursue GHG offsets that are real, measurable, permanent, additional and independently verifiable;
- aimed to develop GHG offsets within the ACT region;
- supported offsetting construction and operating GHG of WSMP, subject to annualised costs being in the order of \$800,000 per year over 30 years.

Exigency Management has been engaged since February 2008 to provide ongoing strategic advice in relation to estimating and offsetting GHGs associated with the following WSMP:

- Enlarged Cotter Dam (ECD) including Cotter Recreational Precinct;
- Cotter Pump Station (CPS) upgrade;
- Murrumbidgee to Googong (M2G) Water Transfer Project;
- Murrumbidgee to Cotter (M2C) Water Transfer Pipeline; and
- Demonstration Water Purification Scheme (WPS) and Salt Reduction Scheme at Lower Molonglo Water Quality Control Centre (LMWQCC).

In December 2008, Exigency Management provided advice to ACTEW in relation to the Water Security Major Projects¹ Greenhouse Gas Abatement Strategy. A number of recommendations were endorsed by the ACTEW Corporation Board, resulting in the following activities:

- Further engineering design to achieve economic emissions reductions;
- A tender exercise to secure suitably accredited carbon sinks;
- Feasibility studies on specified renewable power schemes; and
- Further research into geothermal energy and soil carbon sequestration.

This report provides an update on each of these initiatives and the outcomes to June 2009.

¹ Cotter Dam, Murrumbidgee to Googong Water Transfer, Murrumbidgee to Cotter Water Transfer and Demonstration Water Purification Plant

Further Engineering Design

As part of the Greenhouse Gas Abatement Strategy, a carbon price was factored into the engineering design, providing the impetus to consider a number of innovations in the construction and operating phases. This included:

- use of energy recovery equipment to reduce emissions during construction of the Enlarged Cotter Dam
- use of locally produced biodiesel to fuel construction-phase plant and equipment
- provision of mobile power generation during construction as an alternative to power transmission lines
- installation of an energy-recovery hydro generator in the Murrumbidgee to Googong Pipeline
- use of “green” cement. (This was ruled out of the current design process due to standards and supply chain considerations, but will be actively considered for other future projects).

All of the above measures were subjected to detailed design as well as technical and commercial due diligence by the Water Security Major Projects alliance team. In March 2009 it was identified that the two key reduction measures to be pursued were the use of biodiesel and the energy recovery hydro generator in the Murrumbidgee to Googong Transfer Pipeline.

These measures, together with further refinements to the design, hydrological modelling and emissions factor analysis have resulted in an overall reduction in the emissions footprint, comprising a small increase in construction-related emissions and a reduction in operating emissions.

WSMP GHG Footprint with Reduction Measures, March 2009

WSMP GHG Footprint	Amortized Construction (30 years) T CO _{2-e} .	Operating Emissions T CO _{2-e} .	Safety Margin T CO _{2-e} .	Annual GHG Offset T CO _{2-e} .
October 2008	5,000	28,000	3,000	36,000
March 2009 no reductions	5,500	24,000	3,000	32,500
March 2009 with reductions	5,000	19,500	3,000	27,500

It is noted, however, that significant reductions are through the decision in December 2008 not to pursue the Water Purification Scheme.

Initial feasibility assessments indicate that the use of Australian produce biodiesel in a 20% blend (B20) can be reliably supplied and deployed in suitable construction plant and equipment, including generators, at similar cost to mineral diesel. A track record of biodiesel use in Council vehicles exists in Australia (four councils run their entire fleet, between 140-300 vehicles, on biodiesel blends and have reported no operational problems).

Biodiesel should be sourced from a manufacturer(s) that use sustainable feedstocks (e.g. used cooking oil, tallow, canola oil) and meet Australian Diesel Standards. It is recommended that palm oil is not used as a biodiesel feedstock for the projects. The WSMP alliance teams are progressing this initiative to maximise the use of biodiesel across the projects.

Initial feasibility assessments indicate that the incorporation of a hydro generator (energy recovery) in the Murrumbidgee to Googong Transfer pipeline has the potential to reduce operating GHG by about 4,500 T CO_{2-e} per year. Based on conservative budgeting assumptions in the feasibility stage, the project is economic at \$65 per T CO_{2-e} using an underground power line. The hydro has the added attraction that it is perfectly correlated with the operating footprint of the project and its economics will be enhanced with the addition of Tantangara flows through the pipeline. It is currently being progressed with the WSMP alliance teams to design.

Tender for Suitably Accredited Carbon Sinks

Exigency was tasked with managing a tender process to acquire accredited carbon sink forest offsets from suitably qualified providers within Australia. With an emphasis on sourcing credits that meet internationally recognised best practice, Exigency sought binding proposals on behalf of ACTEW.

The tender identified ACTEW's requirements in a series of discrete carbon "lots", together with specified risk factors. The tender was not prescriptive, to enable innovative structures to be put forward. The evaluation process incorporated discounted cash flow analysis, together with a monetary evaluation of the risk factors within each proposal.

The successful proposals were those that best met ACTEW's requirements, in terms of price and mitigation of the risk factors specified in the Request for Proposal.

Consistent with the risk management approach within the Greenhouse Gas Abatement Strategy, ACTEW has accepted offers from a small number of accredited providers, to provide a diversified portfolio of carbon sinks. Contract negotiations are due to be finalised by the end of June 2009.

Feasibility Study on Specified Renewable Power Projects

Currently, a large amount of construction wood waste from within the ACT goes to landfill. This represents a waste of a potentially valuable renewable resource and in the longer term is inconsistent with the “No Waste” philosophy.

ACTEW commissioned an initial study into a small scale wood waste power generation project, comparing conventional steam turbine technology and pyrolysis (gasification). The plant was sized with regard to the sustainability of the wood waste supply and the cost of connection to the local power distribution network.

The study identified that pyrolysis provides the best commercial and technical solution, but at small scale would probably require a renewable electricity price higher than prevailing market rates in order to be economic. The project is still under review.

A second initiative, for a potential renewable hydro scheme at Corin Dam is currently under consideration. Previous studies have found such a scheme to be uneconomic, but the assumptions on the original design will be revisited to incorporate the latest views on carbon pricing, system costs and any synergies with other ongoing activities.

ACTEW is also in ongoing discussions with developers of regional wind farm projects.

Further Research into Geothermal Exchange and Soil Carbon Sequestration

ACTEW commissioned a desk-based study by Papp Consulting and Earth Energy, ACT-based Geothermal specialists, to review the local Geothermal potential and to identify technologies with commercial potential.

The report identified that whilst there is no “hot rock” potential (suitable for power generation) the geothermal gradient at shallow depth (near surface to around 250 meters) provides a suitable heat source for space heating and cooling in residential, commercial and light industrial applications, known as geexchange. Whilst strictly not defined as a “renewable” energy source, the use of geothermal heat for space heating and cooling has the potential to reduce carbon emissions by displacing fossil-fuelled alternatives.

Initial estimates indicate that suitable applications for geexchange could deliver CO_{2-e} reductions for less than \$50 per tonne, compared to conventional technologies. On this basis, geexchange is worthy of further consideration as part of a broader abatement strategy.

Soil Carbon Geosequestration (SCG), or the long term storage of carbon in depleted soils has been identified as potentially one of the largest, low-cost responses to Climate Change worldwide. Additional reported benefits include the improvement in soil fertility and productivity, moisture retention (for the improvement of run-off into water storages) and reduction in conventional fertilisers, which are Greenhouse Gas-intensive. Whilst the technique (and the science) is ancient, the lifecycle analysis necessary for suitable accreditation is much more recent and not yet mature. Consequently, whereas Soil Carbon Geosequestration credits are traded within localised schemes, there is as yet no internationally recognised scheme in which SCG can be accredited.

Recognising both the immaturity and the potential, ACTEW has sought to establish SCG baselines within its Accredited Carbon Sink arrangements. By performing these measurements at the outset, the option will be created to capture soil carbon benefits, should the category achieve international recognition in the future.

Regulatory Risks

The Greenhouse Gas Abatement Strategy is being implemented in the context of an evolving Emissions Trading Scheme (the Carbon Pollution Reduction Scheme, CPRS). Whilst the underlying objective is to surrender credits in fulfilment of a Voluntary Undertaking to the Chief Minister and not to trade them, the strategy and the abatement portfolio had to take account of changes to “Business as Usual” resulting from the CPRS and associated legislation in order to secure the integrity of the abatement activities with respect to additionality.

At the time of writing, the Carbon Pollution Reduction Scheme, treatment of voluntary renewable energy schemes, National Greenhouse and Energy Reporting System (NGERs) and the draft National Carbon Offset Standard have all been problematic in the execution of this strategy.

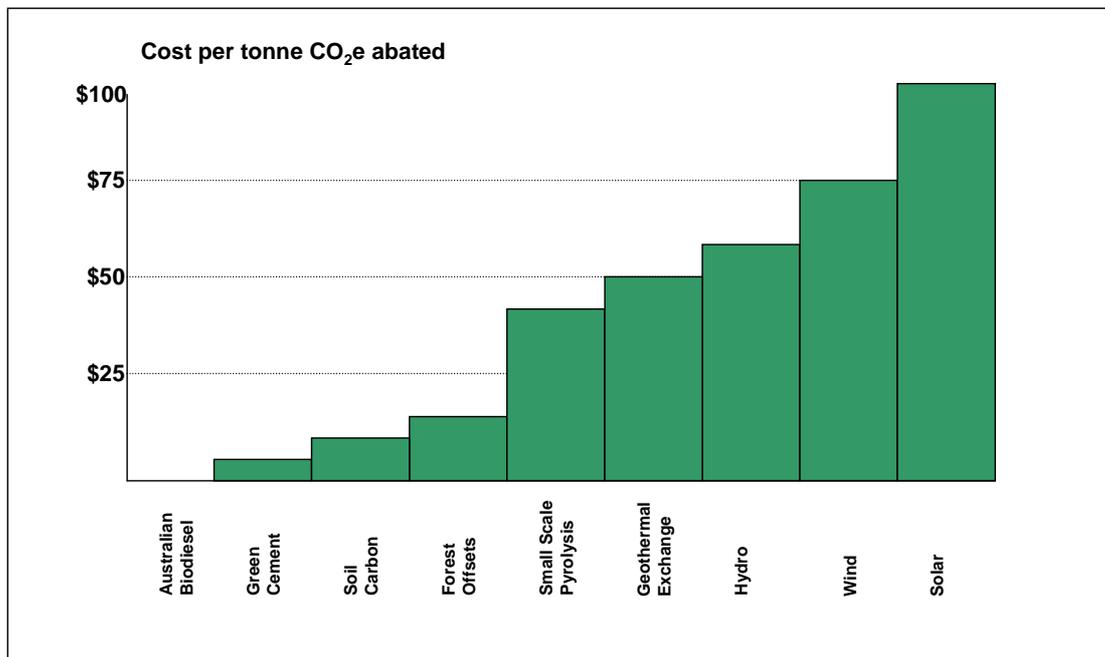
Fundamentally, this has occurred because the legislative framework has tended to incorporate voluntary activities within national targets, thereby compromising their additionality. Whilst challenges remain with voluntary renewables (both in terms of national carbon accounting and NGERs reporting), it is understood that the ACT and Federal Government are aware of this current anomaly and the potential to create perverse incentives.

With respect to Carbon Sinks, it is considered that the optimal way to secure additionality in the long term is to gain accreditation within the CPRS as an issuer of pollution permits and then to withhold them from the market.

Otherwise, the most secure method of abatement from a regulatory view point is to achieve emissions reductions within the projects themselves.

Conclusions - Carbon Abatement Cost Curve

The Greenhouse Gas Abatement Strategy adopted by ACTEW is designed to achieve real reductions in carbon emissions at the least cost, through a diversified portfolio of activities. The following cost curve combines engineering measures (emissions reductions) as well as carbon sinks and renewables (offsets). It incorporates abatement options canvassed. The figures represent a mix of summarised data and current best cost estimates.



Exigency continues to assist in the investigation of which options can provide the best value to ACTEW, taking into account technical, commercial and regulatory risks.

Based on the rigorous process that has been applied since February 2008, the key elements of the abatement strategy have been determined as:

- Biodiesel use during construction, providing estimated emissions savings in the order of 15,000 T CO₂e total;
- Implementation of a hydro generator for energy recovery (about 20 to 30%) in the Murrumbidgee to Googong Transfer Pipeline saving about 5,000 T CO₂e per year; and
- Procurement of Carbon Sink Forest Offsets in the amount of approximately 30,000 T CO₂e per year).

Expected average costs provided by these initiatives is less than \$25 per T CO₂e.

Further work

Updates from the WSMP alliance teams on the use of biodiesel and the planned hydro generator will be available later in 2009.

Inventories of construction emissions are being put in place for the WSMP and estimates will continue to be revised and confirmed as the projects are completed.

ACTEW will provide updates and ensure that it is able to demonstrate with complete transparency that commitments have been achieved with respect to offsetting the construction GHGs associated with the projects.

ACTEW is investigating applying a similar approach to ACTEW's broader Water Business' in 2009-10.