EIP5 - 2009 Environmental Action Plan

APPROVAL BY EPA AND ENDORSEMENTS

This Environmental Action Plan sits within Environment Improvement Plan 5 and is a public commitment to continued improvement of environmental performance by Qenos Australia and has been prepared in accordance with Section 26B of the Environment Protection Act 1970.

For Qenos Australia — Ross McCann — Chief Executive Officer

This Environmental Action Plan is approved by the Environment Protection Authority

For Environment Protection Authority — Sylvia Armand — EPA - Manager Pollution Response

The following signatories endorse this Environmental Action Plan

For City of Hobsons Bay — Craig Bruckner — Manager Health and Regulatory Services

For City West Water — Geoff Gardiner — General Manager Service Sustainability

For Qenos Environment Monitoring Team

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2009 ENVIRONMENTAL ACTION PLAN

This section details the environmental improvement action items that Qenos has committed to complete in 2009. This Environmental Action Plan (EAP) has been developed in conjunction with the Qenos Environment Monitoring Team (EMT), and has been approved by the Victorian Environmental Protection Authority (EPA), and endorsed by the City of Hobsons Bay, City West Water (CWW), and the local community representatives of the EMT.

Action Items

The action items are listed by Environmental Impact, as described in Section 4 of the EIP 5 framework, which follows the same format and structure as previous EIPs. Several of the categories of Environmental Impact used here are actually tools used to identify and reduce Qenos's impact, such as environmental risk assessments, auditing and training.

Not all Environmental Impact categories have an action item for this year, so the numbering may appear inconsistent for this reason.

3. Greenhouse Gases

Ref No.	Environmental Impact	Site	Objective	Plan
3.7	Greenhouse Gases	Plastics	Reduce Greenhouse Gas emissions per unit of production where cost effective	Downrate gearbox on Reactor 2 cycle gas compressor

In 2006, the gearbox on one of the two reactor cycle gas compressors, which charge the ethylene gas to the reactors at Plastics, was re-geared so that the compressor would run at a lower speed and therefore use less energy. This project was successful, and the gearbox on the second compressor will now also be re-geared. The new gearsets were purchased in 2008 and are ready to install at the first opportunity in 2009.

Each compressor now runs about 10% slower, with a power saving of 145 kW hours. For each compressor, this equates to a power saving of about 1.23 GW per year, with reduced greenhouse emissions of 1230 tonnes.

Ref No.	Environmental Impact	Site	Objective	Plan
3.15 (a)	Greenhouse Gases	Resins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Complete the Energy Efficiency Opportunities assessment at the Resins site

The Federal Government's Energy Efficiency Opportunities (EEO) program requires large energy users to identify, evaluate and report publicly on cost effective energy saving opportunities. Qenos registered for the program, and submitted an assessment and reporting schedule at the end of 2007.

The next stage of the program is to conduct the detailed energy assessments, and Qenos began this in 2008 with the Resins site, where the energy analysis was completed.

The remaining steps in the Resins EEO assessment can now be completed in 2009.

Ref No.	Environmental Impact	Site	Objective	Plan
3.15 (b)	Greenhouse Gases	Plastics	Reduce Greenhouse Gas emissions per unit of production where cost effective	Progress the Energy Efficiency Opportunities assessment at the Plastics site

See 3.15 (a) above for details on the EEO program.

The energy analysis for the Plastics site will be conducted in 2009. The EEO assessment for Plastics can then be completed in 2010.

Ref No.	Environmental Impact	Site	Objective	Plan
3.15 (c)	Greenhouse Gases	Olefins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Progress the Energy Efficiency Opportunities assessment at the Olefins site

See 3.15 (a) above for details on the EEO program.

The energy analysis for the Olefins site will be conducted in 2009. The EEO assessment for Olefins can then be completed in 2010.

Ref No.	Environmental Impact	Site	Objective	Plan
3.16	Greenhouse Gases	Admin	Reduce Greenhouse Gas emissions	Review company vehicle policy

This item carries over from the 2008 EAP. The review commenced in 2008 but was not finalised by year end, and will continue into 2009.

The existing company vehicle policy will be reviewed, with consideration for energy efficient vehicles with lower GHG emissions.

Ref No.	Environmental Impact	Site	Objective	Plan
3.17	Greenhouse Gases	Olefins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Reduce energy losses from ethylene run-down line

Vapour ethylene product is charged directly to Plastics and Resins for conversion to polyethylene, but excess ethylene production from the SCAL-2 unit can be condensed and stored as a liquid in TK-816. The liquid ethylene must be kept colder than -90^{o}C to prevent it boiling off. As such, good thermal insulation of the run-down line and the storage tank is essential.

The existing insulation on the run-down line is in need of replacement. There is too much heat leakage leading to excessive re-vaporisation of the liquid ethylene on its way to the tank. The vaporised ethylene is charged into the customer line, backing out ethylene gas straight off the plant, requiring additional ethylene to be liquefied for storage. This is essentially creating an energy-inefficient process whereby more ethylene is being condensed than is really needed.

A new insulated line is to be installed to replace the existing run-down line.

Ref No.	Environmental Impact	Site	Objective	Plan
3.18	Greenhouse Gases	Olefins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Optimise boiler operation

The combustion chambers in the boilers use fresh air as the oxygen source for the combustion process. Air is approximately 21% oxygen and 79% nitrogen. All of the air drawn into the firebox must be heated up to the firebox temperature, so the greater the quantity of air drawn into the firebox, the more energy required to heat this air, and the more greenhouse gas emissions. The optimum amount of air is that which results in an "excess oxygen" level of about 2% in the combustion products. This provides a safe margin to ensure that there is sufficient oxygen available for complete combustion of the fuel gas, but without having too much "excess air" to heat up.

Optimisation of the boiler operation requires good control of this excess oxygen level.

Ref No.	Environmental Impact	Site	Objective	Plan
3.19	Greenhouse Gases	Olefins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Optimise SCAL-1 furnace operation

See 3.18 above for an explanation of excess oxygen management in a firebox.

Optimise the excess oxygen level in the SCAL-1 furnace firebox operation, for energy efficient operation of the furnaces.

Ref No.	Environmental Impact	Site	Objective	Plan
3.20	Greenhouse Gases	Olefins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Optimise SCAL-2 furnace operation

See 3.18 above for an explanation of excess oxygen management in a firebox.

Optimise the excess oxygen level in the SCAL-2 furnace firebox operation, for energy efficient operation of the furnaces.

Ref No.	Environmental Impact	Site	Objective	Plan
3.21	Greenhouse Gases	Olefins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Direct tail gas to fuel rather than flare

The "tail gas" received from BOC is normally directed to the Olefins boilers where it is combusted as a fuel, backing out the equivalent amount of fuel gas. However, there are occasions when the composition of the tail gas is such that it cannot be safely combusted with the existing boiler control instruments, and so it is re-directed to the flare. On such occasions, the heat energy of the tail gas is not being recovered to reduce fuel gas demand, and the net effect is an increase in total combustion and therefore greenhouse gas emissions.

The instrumentation will be modified to allow the tail gas to be directed to the boilers at all times, thereby reducing overall combustion and greenhouse gas emissions.

Ref No.	Environmental Impact	Site	Objective	Plan
3.22	Greenhouse Gases	Olefins, Resins	Reduce Greenhouse Gas emissions per unit of production where cost effective	Reduce energy required to transfer ethylene to the Resins plant

Ethylene vapour produced at Olefins is supplied to the Plastics and Resins sites via pipeline. The ethylene cannot be stored as a vapour, so Olefins production must closely match the demand of the two Polymers plants, with any excess ethylene production required to be condensed and stored as a liquid, and any shortfall made-up by vaporising stored liquid ethylene. Both of these steps are energy intensive, and while it is advantageous to hold an inventory of liquefied ethylene to balance out longer term supply-demand needs, it is desirable to avoid any unnecessary condensing and revaporising to meet the day-to-day supply requirements.

The Plastics plant utilises a continuous reaction process, and as such the ethylene vapour demand is fairly steady. However, the Resins plant utilises a batch process, so the ethylene demand can step change throughout each batch cycle. These step changes in offtake to Resins require changes to the amount of ethylene condensed to storage at Olefins, with more condensing required between batches, and then additional vaporisation from storage to assist with the supply for each batch charging step.

An investigation will be undertaken to identify opportunities for smoothing out the supply to Resins with the aim of minimising the amount of condensing and re-vaporisation required.

Ref No.	Environmental Impact	Site	Objective	Plan
3.23	Greenhouse Gases	Admin	Reduce Greenhouse Gas emissions per unit of production where cost effective	Develop energy efficiency standards and specifications

The Qenos Engineering Standards are used to manage the design of plant changes and modifications, but they do not currently include standards or specifications defining energy efficiency requirements.

Including energy efficiency standards and specifications will enable the systematic installation of more energy efficient modifications to facilities and the purchasing of more energy efficient spares and replacements.

Ref No.	Environmental Impact	Site	Objective	Plan
3.24	Greenhouse Gases	Admin	Reduce Greenhouse Gas emissions per unit of production where cost effective	Include energy efficiency standards in purchasing procedures

Qenos purchasing procedures do not currently require consideration of the energy efficiency when procuring equipment or spares.

Once the energy efficiency standards and specifications are developed, the purchasing procedures will be updated to ensure that purchased equipment and spares meet the energy efficiency standards and specifications.

7. Odour

Ref No.	Environmental Impact	Site	Objective	Plan
7.5	Odour	All	Determine source of plant odours	Conduct annual odour audit of each site

This is an annually occurring action item, and retains the same number as for previous years.

An odour audit is conducted on each site with local community members and the EPA to identify the main sources of odour that may have an off-site impact on the local community. Findings of the odour audits may lead to the development of odour reduction projects. The audit is now scheduled to be conducted in March.

8. Transported Wastes

Ref No.	Environmental Impact	Site	Objective	Plan
8.16	Transported Wastes	Olefins Resins	Reduce waste sent to landfill	Trial disposal of various solid wastes via solvent slurry process

This item carries over from the 2008 EAP. The trials of the Qenos waste streams have been delayed while Geocycle completes the construction of their new SuperBlender, which was expected to be late in 2008, but it will now be commissioned early in 2009. Once it is ready, Qenos samples can be sent to Geocycle for processing and evaluation.

Geocycle is one of Qenos's existing waste receivers, namely for solvent based liquid waste streams. Geocycle is currently developing a program whereby solid waste materials that have a significant calorific value (ie. they burn readily and produce heat energy as a fuel) can be ground up as a slurry suspension in a solvent or oil liquid, and burnt as an alternative fuel source at a newly modified cement kiln in Railton, Tasmania. This process can effectively redirect such solid waste material from landfill disposal routes to a higher value energy recovery route.

Qenos has a number of solid waste streams that may be suited to this slurry process, and a series of trials will be conducted to determine if this is a suitable alternative disposal route.

Ref No.	Environmental Impact	Site	Objective	Plan
8.20	Transported Wastes	Olefins	Eliminate a prescribed waste stream	Final de-sludge and clean out of Blue Pond

The BEAL unit at the Olefins site includes the Blue Pond, which is a large sump for collecting copper containing wastewater from the BEAL unit operation, so that the copper can be treated and removed prior to discharging the wastewater to the process sewer system. Over time, a significant amount of the copper in the wastewater in the Blue Pond will precipitate out of solution, forming a copper based sludge which settles at the bottom of the pond and which requires periodic removal.

The BEAL unit was shutdown in 2005, and has now been demolished so there is no longer any source of copper contamination in the wastewater and no need to maintain the Blue pond in this service. Most of the copper sludge from the Blue Pond has already been removed, and the final cleanout of this pond can now proceed. It is intended to follow the same process used already - the sludge will be dewatered on-site using Geobags, then transported to a copper smelter where the copper content can be recovered for recycling.

9. Water and Wastewater Management

Ref No.	Environmental Impact	Site	Objective	Plan
9.41 (a)	Water and Wastewater	Olefins	Reduce fresh water consumption and trade waste volume	Develop design options for sour water re-use – install facilities

Several other enabler projects are also required, including the direct re-use of the Resins effluent stream on-site at Resins to free up capacity in the WWTP. These will all be covered under this one EAP action item.

At Olefins, the cracking steam condensate and other contaminated process water streams are collected, decanted and passed through the sour water stripper (SWS), where hydrocarbons and other contaminants are stripped out using live steam injection, to produce a stripped water stream that is currently discharged into the sewer as waste water. This stream flowrate is typically 40-50 tonnes per hour, which equates to about 400 ML per year. If this stream can be treated on-site to a suitable standard, then it can be re-used as cooling tower make-up water, backing out the equivalent amount of potable water.

The sour water re-use project began in the 2006 EAP with initial project evaluation for removing the remaining contaminants, and was progressed throughout 2007, with several design options evaluated. It was determined that a biological treatment step would be required, and the existing Plastics Waste Water Treatment Plant (WWTP) would be used for this treatment. A two-stage project was developed, with the first stage designed to prove the technology and the second to upgrade the existing facilities to allow recovery of all the available sour water. This project will receive Victorian Government co-funding of up to $2.5M, with the funding deed, managed by the Department of Sustainability and Environment's Water Office, signed in 2008.

Stage 1 of this project progressed through 2008 with the detailed engineering design completed and the commencement of the installation of the new facilities to send the Olefins sour water to the Plastics WWTP, with the treated water to be used in the Plastics and Resins cooling towers. The project has a number of discreet elements that must be implemented across all three sites, Olefins, Plastics and Resins, and this work now continues into 2009.

Stage 1 of this project is to be completed in the first half of 2009 so that evaluation trials can then commence.

Ref No.	Environmental Impact	Site	Objective	Plan
9.41 (b)	Water and Wastewater	Olefins	Reduce fresh water consumption and trade waste volume	Develop design options for sour water re-use – conduct evaluation trials

Following completion of the installation of facilities for Stage 1 of the sour water re-use project, as described above, the evaluation process can commence. This is likely to take at least the remainder of the year to prove and optimise the treatment process, and to evaluate the use of the treated water in the cooling water circuits at Plastics and Resins.

Ref No.	Environmental Impact	Site	Objective	Plan
9.49	Water and Wastewater	Olefins	Improve effluent waste water quality	Trial collection of coke in furnace decoke sumps

This item carries over from the 2007 EAP. A trial Geobag was obtained late in 2007, and this was to be set-up in the decoke sump for trialling during the next Scal-1 furnace decoke early in 2008. However due to various conflicting priorities, including major disruptions to operations late in the year, this has again been rolled over into early 2009.

During the steam cracking process in the Olefins furnaces, a layer of coke deposits on the inside of the furnace tubes. This is burned off periodically using steam and air, with the vented steam condensate directed into the dirty water sewer. Solid coke particles in this stream can enter the sewer, where they will make their way down to the effluent treatment plant (ETP) where they will settle out in the ETP sludge.

In order to reduce the volume of sludge accumulating at the ETP, it is best to catch it at the decoke sump. It is planned to trial the use of Geotube filter bags in the decoke area to determine if they can be used to improve coke collection and reduce the amount entering the sewer.

Ref No.	Environmental Impact	Site	Objective	Plan
9.53	Water and Wastewater	Olefins	Reduce fresh water consumption	Utilise recycled water supply from CWW

In 2007, Qenos signed a Memorandum of Understanding with CWW for the supply of 2 gigalitres/year of desalinated treated wastewater from CWW's nearby Altona Treatment Plant (ATP). This recycled water will directly back out the equivalent amount of potable water for use throughout the Olefins plant, including cooling tower make-up water, boiler feed water, firewater, and other general process water uses.

CWW will develop and build the new facilities at their plant, and provide a supply line to the Olefins fenceline in Maidstone Street. This supply line will utilise an existing Qenos-owned pipeway which runs through the Altona Chemical Complex, and Qenos will provide support to CWW as required to install the pipeline through Qenos facilities.

Qenos will design and build the on-site pipework to deliver the recycled water from the CWW water meters to the Olefins process so that it is in place and ready to receive the recycled water supply when it begins operation late in 2010 or early 2011.

Ref No.	Environmental Impact	Site	Objective	Plan
9.55	Water and Wastewater	Plastics	Improve stormwater discharge quality	Reduce the amount of PE powder in on-site stormwater

This item carries over from the 2008 EAP. The main focus for 2009 will now be on housekeeping around the reactor structures to prevent PE powder spillages from washing into the stormwater drains. One of the shift operation teams will take on the responsibility for implementing these improvements.

Reducing the amount of polyethylene powder actually reaching the on-site stormwater channels will reduce the likelihood of powder leaving the site in the stormwater. This item involves investigating methods for reducing the amount of powder entering the stormwater drains on-site.

Ref No.	Environmental Impact	Site	Objective	Plan
9.56	Water and Wastewater	Plastics	Improve stormwater discharge quality and reduce fresh water consumption	Reduce stormwater discharge events

This item carries over from the 2008 EAP. It was determined in 2008 that a larger water recovery pump should be installed in the stormwater sump to handle the flow requirements of a 1-in-10 year storm event, such that it would normally not be necessary to release any stormwater to the Galvin Drain. The new pump was purchased late in 2008 and will be installed early in 2009. The recovered stormwater will be used as cooling tower make-up water, backing out the equivalent amount of potable water.

Some of the water collecting in the stormwater channels at Plastics is already recovered for on-site re-use via a small pump. By increasing the recovery of stormwater, the number of stormwater discharge events to the Galvin Drain will be reduced, thereby reducing the likelihood of powder being discharged to the drain.

10. Soil and Groundwater

Ref No.	Environmental Impact	Site	Objective	Plan
10.27	Soil and Groundwater	All	Maintain EPA compliance on groundwater	Conduct annual groundwater monitoring

This is an annually occurring action item, and retains the same number as for previous years.

Qenos' Groundwater Management Plan requires the annual sampling and testing of bore water across the sites, and reporting of results to the EPA. This activity is usually undertaken in the 4th quarter of each year.

11. Flares

The elevated flares at Olefins are used to safely dispose of surplus hydrocarbon gases, particularly during plant upsets and when preparing equipment for maintenance activities. The operation of the flares can present a potential impact on the community in a number of ways, namely smoke due to incomplete combustion, noise from heavy flaring or smoke suppression steam, and light from flaring at night.

Over recent years, a number of improvements have been made to the flare operation, and a detailed Flare Management Review has been conducted and independently reviewed by experts from the Qenos Botany plant. Findings from this review have formed a number of action items which are included in this year's EAP.

Ref No.	Environmental Impact	Site	Objective	Plan
11.13	Flares	Olefins	Reduce flare impact on community	Establish baseline flare noise level

The manufacturer of the flare tips used at Olefins specifies a particular design noise level for a certain flowrate, however this rate is very high and would involve very large flares. Qenos will not carry out a noise level check at these conditions, as the large flares would have a significant impact on the community and Qenos wishes to avoid such conditions.

Instead, the manufacturer will be consulted to help establish if the noise level of the Olefins flares at typical operation flowrates is as expected.

If the flares are not operating within the expected noise levels, Qenos will collaborate with the manufacturer to identify the reasons for the discrepancy and determine options to return flare operation to the expected noise levels.

Ref No.	Environmental Impact	Site	Objective	Plan
11.14	Flares	Olefins	Reduce flare impact on community	Assess flare noise level performance

The flares will be checked annually to ensure that they are still operating at the baseline noise levels identified by the flare system review. Detection of increased noise levels can indicate that something has changed in the flare operation, and an investigation can then be undertaken to determine what has changed and how the flare operation might be returned to the baseline noise level.

Ref No.	Environmental Impact	Site	Objective	Plan
11.15	Flares	Olefins	Reduce flare impact on community	Evaluate options to share flaring load

Olefins has two elevated flares, the normal capacity flare and the overcapacity flare, and these are designed to operate at differing backpressures. The backpressures are set by a water seal which serves two purposes – firstly the water seal prevents oxygen from the air getting back into the flare header where it could result in a combustible mixture, and secondly, the height of the water seal sets the backpressure. The higher the water seal level, the greater the pressure required to displace it to allow hydrocarbons into the flare stack.

For small releases of hydrocarbon to the flare header, the normal capacity flare would begin to operate first as the low pressure water seal is displaced, producing a relatively small flame at the flare tip. As the backpressure in the flare header rises with increased flow, a larger water seal will be displaced allowing the normal flare to take its full rated load, with the flame size increasing accordingly. Further increase in backpressure will then break the water seal to the overcapacity flare, so that both flares will be in operation and some load is taken off the normal flare.

There is the potential to modify the water seal arrangements to change the way the load is shared between the two flares, so that the first flare need not be so large before the second flare kicks in. The various options will be evaluated to determine if a suitable project can be developed.

Ref No.	Environmental Impact	Site	Objective	Plan
11.16	Flares	Olefins	Reduce flare impact on community	Consider single flowpath to flares

There are two interconnected flare headers at Olefins, and it is possible with the current piping configuration to have differing gas compositions flowing to each of the two flares. This phenomenon led to the flare odour incident in 2005 when a combustible fuel gas mixture

introduced into one flare header did not end up at both flare tips, and a non-combustible discharge occurred from the second flare.

Installation of a blind in the SCAL-2 flare gas header near the flares will force all flare header flows through a single flowpath before splitting again to the two flares, thereby ensuring a common gas composition for both flares. The installation of this blind needs to be evaluated to ensure that the pressure drop of a single flow path to the flare is acceptable for continuous ongoing operations.

Ref No.	Environmental Impact	Site	Objective	Plan
11.17	Flares	Olefins	Reduce flare impact on community	Reduce events involving heavy flaring

A review is to be conducted on significant flaring events since the SCAL-1 plant reconfiguration in 2006, to identify common flaring events with the aim of reducing the frequency of occurrence of such events.

14. Training

Ref No.	Environmental Impact	Site	Objective	Plan
14.8	Training	All	Train personnel in environmental compliance	Complete Environmental Awareness sessions for all employees

This is an annually occurring action item, and retains the same number as for previous years.

All operations personnel, including plant operators, maintenance teams, and process support staff, are required to attend a face to face environmental awareness session as part of the annual training program. This session is used to inform employees of the particular environmental impacts that Qenos can present to the local environment and what can be done to reduce these impacts, as well as the various environmental issues Qenos may be facing through new regulations and social expectations.

These awareness sessions also embrace sustainability principles that are applicable in the workplace and at home.

Ref No.	Environmental Impact	Site	Objective	Plan
14.9	Training	All	Promote Sustainability	Complete a Sustainability Awareness session

In June 2008, Qenos signed on to the PACIA Sustainability Framework program, and has since deployed its own Sustainability Framework encompassing all aspects of the business. A new section on the company intranet ahs been established for sustainability, and includes the framework.

A series of awareness sessions will be conducted through 2009 to bring attention to this new Sustainability Framework and where to find support information.

These awareness sessions will also be used to address the new Energy Efficiency Standards that are to be developed and published in the Engineering Standards Manual in accordance with EAP item 3.23 above.