Electricity produced from gas produces 50–70 per cent less greenhouse gas emissions than current coal-fired power generation facilities. (1) Strong economic growth in the next 30 years is predicted to increase global energy demand by over 50 per cent, (2) with world natural gas consumption expected to increase by 1.7 per cent per year. Increasingly, natural gas supplies will come from unconventional sources, such as shale formations and coal seams. Natural gas is used for electricity generation, industrial applications (as a heat source and for raw materials), for transportation and domestically for heating and cooking.

CSG provides 90 per cent of Queensland’s gas needs and 15 per cent of the state’s electricity. Origin has worked in regional Queensland for more than 30 years, and for 16 of those years we have been developing and producing CSG. Electricity produced from gas produces 50–70 per cent less greenhouse gas emissions than current coal-fired power generation facilities. (3) According to the Intergovernmental Panel on Climate Change (IPCC), “natural gas is the fossil fuel that produces the lowest amount of greenhouse gas (GHG) per unit of energy consumed and is therefore favoured in mitigation strategies.” (3)

While the majority of GHG emissions that result from natural gas will occur during the combustion of the gas (78 per cent), there are also some minor sources of GHG emissions that occur as the gas is extracted and processed in both the upstream (11 per cent) and downstream (11 per cent) parts of the process (see diagram below). In this process, only a small proportion of emissions will occur in Australia during the extraction and processing stages.

Fugitive emissions

Research from the United States shale gas industry has been reported in a way that has created some uncertainty around the amount of GHG gas emissions resulting from CSG extraction and processing. As a result, Origin, as the Upstream operator for Australia Pacific LNG, supported a joint Australian CSG fugitive emissions study undertaken by CSIRO to conduct research specific to Australian CSG development. As part of this study, the CSIRO surveyed 43 wells — six in New South Wales and 37 in Queensland — operated by a range of CSG companies including Origin. The work focused on CSG wells to better understand how asset integrity or activities through the CSG process influence emission volumes. This is the first study of its kind on emission rates from Australian CSG production. The results of this study were released on 31 July 2014 by the Department of the Environment. (5)

The study confirmed that the emissions range is consistent with the current emission estimates for general equipment leaks, and confirms that equipment leaks comprise only a very small proportion of GHG emissions from CSG production. The evidence suggests GHG emissions from CSG production and processing are broadly in line with previous estimates. This confirms that our current approach to estimating minor emissions sources around wells is appropriate and that the uncertainty of the overall emissions from CSG production and processing is relatively low.

Global energy demand will increase by 50% in the next 30 years due to strong economic growth.

(2) eia.gov/forecasts/ieo/world.cfm (International Energy Outlook 2013)
(5) This report can be viewed at csiro.au/Outcomes/Energy/Fugitive-emissions-from-coal-seam-gas.aspx

Lifecycle emissions produced during the CSG-to-LNG process

Upstream: 11%

1. Extraction of the gas from the well
2. Gas and water gathering, and treating water
3. Gas processing plant
4. Main transmission pipeline from gas fields to domestic customers or LNG facility

Downstream: 11%

5. Successive stages of refrigeration cool the gas turning it into LNG

Globalenergiebedarf wird um 50% in den nächsten 30 Jahren aufgrund eines starken Wachstums erwartet.
Methane seeps in the Surat Basin

Methane seepage from oil and gas basins is a natural phenomenon that has been historically used by oil and gas explorers to identify potential production areas. There is historical evidence of methane seepage in Australia Pacific LNG development areas in Queensland. We are collaborating with the Gas Industry Social & Environmental Research Alliance (GISERA) on an innovative research program to better understand the emissions rate from methane sources in the Surat Basin. This two-year project began in 2013 and focuses on methane detection and measurement methodology, and the development of a pilot site for detection and measurement.

We are also investigating seeps occurring along the Condamine River at four locations along a five-kilometre stretch of the river. These seeps were identified by local landholders after heavy flooding on the Condamine River subsided. Discussions with landholders suggest that at least one of these seeps may have existed for decades. In early 2013, the Queensland Government released its Technical Report into the Condamine River Gas Seep Investigation. This report found no evidence of safety risk or detrimental environmental harm.

On behalf of Australia Pacific LNG and in conjunction with QGC, Origin is managing a multi-stage investigation to learn more about possible causes of the seeps. The investigation is supported by the Queensland Government’s CSG Compliance Unit and our own team of sub-surface specialists.

A detailed research and investigation report describing possible causes of the seeps conducted by international consultancy Norwest was released in April 2014. The report is available on the Australia Pacific LNG website. The report was subject to an independent scientific review coordinated by the government’s Chief Scientist Dr Geoff Garrett, and assessed by the CSG Compliance Unit. The investigation gathered accurate data from a variety of sources, and then developed a series of scientific hypotheses or scenarios. Each of these scenarios is based on the data collected to date, recent and historical observations, and relevant international situations, and provides an understanding of gas sources, pathways, release mechanisms and possible causes of the bubbling.

The Norwest Report scenarios which could contribute to the seeps include:

— Depressurisation – either from natural causes such as drought, or human activity such as water bores tapping the coal seams, CSG wells, or numerous open coal exploration bores;
— Repressurisation – impact of floods and aquifer recharge;
— Fractures, faults and springs – natural pathways for water and gas; and
— Capping and trapping – geological structures which “cap and trap” natural gas movement.

In line with the Norwest report’s key recommendations we are implementing an ongoing monitoring program. As a part of this program, Origin has installed monitoring bores near the Condamine River seeps. A total of eight monitoring bores are being installed in groups of two at four locations. At each location, one bore accesses the shallower Springbok Sandstone formation, while the second bore goes down to the deeper Walloon Coal Measures. The Walloons are the target formation for CSG development. The monitoring bores are located on private properties managed by local landholders.

The monitoring bores are located on private properties managed by local landholders who support efforts to learn more about the seeps. We will continue to monitor these various mechanisms and pathways through multiple lines of enquiry, supported by the collection of measurements and observations over an extended time period. This includes monitoring bores and river height gauges, and implementation of scientific investigation and monitoring programmes in the Condamine River, surrounding surface lands and subsurface. Origin with support from QGC, have also commenced a detailed seismic survey, specifically designed to image the shallow geology in the seep study area.