

North West Queensland Energy Demand Working Group

Final Report

July 2008

Introduction

In November 2007 the Queensland Government, through the Department of Mines and Energy, established a Working Group to assess the likely demand for energy in North-West Queensland (NWQ) in the medium to long term. The background to this action was one of strong growth in economic activity and energy demand in the region, due in large part to continuing high level of demand for and prices of base metals, and consequent strong growth in mining activity.

The North West Queensland Minerals Province is a major area of focus for future mining and minerals processing activities, with a particular focus on base metals. The region also has a well-established pastoral industry and is becoming an increasing focus for tourism. Mount Isa, the major city in the region, serves as a transport hub and as a base for much of the economic and social activity in the region. The other significant township is Cloncurry.

The region forms the north-western apex of the Northern Economic Triangle (NET), a region identified by the Government which integrates the activities of the economic centres of Mount Isa, Townsville and Bowen, by developing strategies to form stronger regional linkages and the competitive advantages of individual economic centres. The NET Infrastructure Plan 2007-2012, published in August 2007, has as one of its strategic objectives to sustainably exploit the rich mineral resources of the North West Minerals Province by expanding mining and mineral processing.

Continued growth in energy demand in NWQ was seen to be likely to approach or exceed the capacity of existing supply facilities in NWQ within a few years, particularly if new mines were to commence operations in the current buoyant commodities market. Some proposed projects have already found it difficult or impossible to secure long term, firm energy supply contracts at current price levels. Accordingly, there is increasing interest in the development of additional capacity in the region to provide competitively-priced and reliable energy to the community and to industry.

Differences in the nature of investment in the mining and energy industries, however, make it difficult to deliver the necessary new investment. This is principally because of the difference in investment horizons and commitment periods in the two industries, but also because the energy market in the isolated NWQ system is essentially characterised by bilateral contracting rather than a supply “pool” serving a diversified and continuing load, as exists in the National Electricity Market.

This means that potential supply-side investors will seek to “lock in” contracts with a number of customers who they believe will offer them a return on investment over a relatively long period (15 – 25 years) whereas many of the customers are planning on mining operations with initially committed lives of 10 years or less (although frequently extended). Another issue is that the level of energy demand is not independent of the price – lower energy prices improve mine profitability and allow production from lower grade ores and over extended mine lives.

Against this background, the Government established the Working Group to attempt to collate the likely demands for energy in NWQ over the medium – long term, in consultation with existing and potential energy customers and drawing on all available information from other stakeholders including industry associations and the existing energy suppliers. The intention is that the resulting estimate of potential demand should be freely provided to parties wishing to consider investment in NWQ energy supply facilities, in order to provide improved confidence in development of commercial projects for the augmentation of supply.

Working group task

The purpose of the Working Group is to develop and validate a forecast of the future electricity and gas peak demands and energy requirements for NWQ. Terms of Reference for the Working Group are at **Attachment 1** and a map of the study area is at **Attachment 2**. A description of the existing energy supply arrangements is at **Attachment 3**.

Existing energy supply in NWQ depends largely on the supply of gas from Ballera over the Carpentaria Gas Pipeline, both for electricity generation and for direct use in minerals processing operations. Most of the region's electricity is generated at the Mica Creek Power Station (MCPS), operated by CS Energy Limited. Electricity delivery is via the transmission and distribution system (the NWQ grid) owned and operated by Ergon Energy Corporation Limited (Ergon Energy).

In addition to Mount Isa city, Cloncurry and surrounding areas, several mines are supplied from MCPS. Xstrata (Mount Isa Mines Limited), while supplied from MCPS, also operates its own 30MW gas-fired power station on the mine site at Mount Isa. BHP Billiton (Cannington Mine) and Incitec Pivot (Phosphate Hill) operate their own isolated gas-fired generation (sourcing gas from the Carpentaria Gas Pipeline). Barrick (Osborne Mine) and a number of other mines operate their own isolated diesel-fired generation (it is noted that Osborne Mine is in the process of converting its generation from diesel to gas).

In addition to the existing mines, there are several potential developments already identified and also considerable potential for viable minerals discoveries. The Working Group has sought to assess new, increased, or reduced electrical loads in terms of their likelihood of occurrence, peak power requirement, load profile (particularly the power requirement coincident with system peak), new project commencement date and mature project closure date.

The examination of NWQ electricity requirements has included:

- Obtaining forecasts of future electricity requirements from existing offtakers from the NWQ grid, including mining operations and Ergon Energy as the local retailer;
- The collation of projected electricity requirements of proposed new projects in the region that could be expected to be connected to the NWQ grid, as currently known by the working group members or available from other sources;
- An assessment of existing electrical loads in the region which are not currently served by the NWQ grid but might be considered for connection (having regard to network as well as generation requirements);
- An assessment of electrical demands that may either cease or be reduced within the study timeframe;
- Consideration of the extent to which some operations might be candidates for non-firm supply contracts at a discounted tariff; and
- Seeking similar information on the gas requirements of the region, taking into account requirements for both electricity generation and direct use.

Forecasts have been made on the basis that energy prices will be cost reflective for the study period, reflecting the expectation that any further supply enhancement to NWQ would be provided on a commercial basis.

Membership and meetings

In order to obtain the widest possible input into the development of forecasts of future energy requirements in NWQ, the Working Group was established with a broad membership. In addition to formal membership, all known potential developers of new mining projects in NWQ were consulted directly to ensure the Working Group's forecasts would be as comprehensive as possible.

The initial membership included representatives from Government, the mining and minerals processing industry (both individual firms and the Queensland Resources Council) and the existing suppliers CS Energy and Ergon Energy.

The North West Queensland Energy Demand Working Group met in Brisbane twice, on 20 November 2007 and 29 January 2008, and in Mount Isa on 19 February 2008.

A list of the Working Group members is at **Attachment 4**. In addition to the members shown, representatives of eight other existing or potential mining operations were consulted during the development of the Working Group's estimates of energy requirements.

Data collection

Once the Working Group had familiarised itself with the Terms of Reference, it developed a template questionnaire for completion initially by the members. The purpose was to extract all information on NWQ energy requirements that was readily available from the members and to seek direction on further work to be done or other parties to be followed up.

The Department of Mines and Energy (DME), as Working Group secretariat, followed up the information provided to ensure consistency and completeness. DME also contacted non-group members to seek details on current and future mining operations. The high level of response received from both members and non-members of the Working Group is acknowledged.

A list of the parties consulted in developing the estimates of future regional energy requirements is at **Attachment 5**.

Once all available data had been collected, the information was collated to develop a preliminary assessment of the aggregate energy demands in NWQ. The initial focus was on demand for electricity drawn from the NWQ grid. However, the potential total regional demand was also assessed, on the basis that under some commercial (pricing) scenarios, some of the mines currently generating their own electricity using gas or diesel might convert to taking supply from the grid.

The Working Group was aware of views expressed by some mining stakeholders that expansions of mining operations (for example through expansion of mine scale or mine life to include lower grade ores) may be possible if lower cost energy was available in NWQ. Therefore, one of the early objectives of the Working Group was to ensure that the data acquisition process sought respondents' views on the sensitivity of energy demand to energy price. However, the data received did not provide any firm indication of the link between demand and price which could be used in making reliable scenario forecasts of future energy requirements. Similarly, it proved not to be possible to deduce a linkage between energy demand and commodity prices from the information provided.

Moreover, most of the data provided was based on existing mine plans or, at best, advanced feasibility studies, so that the longer term (beyond about 2020) energy requirements were not well estimated.

Qualitatively, the point was made by several respondents that there is a linkage between energy price and mine projects proceeding and/or the length of their life. There was strong interest in the possible extension of transmitted supply from the coastal system in the expectation that such a development would result in significant reductions in energy costs in NWQ. However, the impact that this would have on demand was never quantified by respondents and it remains unclear how much additional activity would occur as a consequence of reduced energy costs.

The Working Group acknowledges that the development of a relationship between energy demand and price would have added significantly to the value of the study. In its absence, the Working Group has opted to present a range of energy demands which, implicitly, allows for a potential range of energy prices (and variations in other project parameters).

Some respondents were able to provide estimates of their committed demand (a minimum, but firm demand) as well as an estimate of their highest likely demand if their projects under feasibility study were to proceed (a higher, but less certain demand). However, as noted above, most of the projections received did not include potential long term (beyond about 10 years) requirements.

Initial results

Initial results of the aggregation of forecast electricity demands in NWQ for existing and potential mines, and for Ergon Energy's supply to non-mining customers, are shown graphically in **Attachments 6 and 7**.

Attachment 6 shows a forecast including only those supplied or likely (due to proximity) to be supplied from extensions to the existing electricity network. Attachment 7 shows an estimate of the potential total regional electricity demand. This forecast differs from the first in that it includes all of the existing and potential mining operations in the study area, including those now supplied or considering supply from their own on-site generation using diesel or gas fuel. Both attachments show a Low (committed) and a High (possible maximum) demand as described above.

Respondents were asked to provide forecasts of annual energy requirements as well as maximum demands. Aggregated forecasts of annual electricity consumption (GWh) in NWQ, on the same basis as described above, are shown in **Attachments 8 and 9**.

The helpful co-operation of each of the mining proponents and other parties consulted is acknowledged. However, it needs to be understood that it has not been possible for them to provide detailed, highly reliable estimates of possible future energy requirements, particularly for projects not yet committed. In recognition of the resulting uncertainties, it has been considered justified to make a number of assumptions or simplifications in the development of aggregate regional forecasts.

The aggregate demands shown in Attachments 6 and 7 represent the undiversified sums of the individual forecasts received and are therefore likely to overestimate regional maximum demand. It is noted, however, that mining loads tend to be high load factor (i.e. close to continuous) loads because of the continuous nature of the mining operations, so that their contributions to a regional peak demand are likely to be a high proportion of their individual maximum demands.

The electricity demand and energy forecasts do not include allowances for losses in the electricity transmission and distribution network that would supply the loads, and which would increase the total demand seen by the supply system. There is also no provision for increased electricity requirements from increased regional infrastructure growth that could occur due to expanded regional mining activities.

These two assumptions, or simplifications, will tend to offset each other. On balance, it is believed that the uncertainty in the aggregated regional forecasts is likely to be considerably less than the uncertainties in the advised future requirements of the various projects.

Assessment of initial forecasts

The decline in the forecast aggregated electricity demand after 2015 shown in Attachments 6 and 7 is thought to be more a reflection of ten year mine planning horizons than a likely outcome or a projection of likely resource exhaustion. Indicated mine lives generally relate only to proved and probable reserves, not to the identified mineral resources.

Mining companies continuously explore the land near existing mines with a view to extending mine life, but normally on a 5-10 (maybe 15) year basis. This timeframe is based on balancing the costs of exploration with the maintenance of adequate reserves to plan mine operations. It is understood there is limited incentive to expend exploration dollars proving up resources beyond a 10 year mine life. However in discussion, most companies indicate that they have considerable additional resources.

The Working Group and other respondents were therefore consulted again to see whether additional information on future plans and requirements could be provided that might give potential investors confidence that actual outcomes beyond about 2015 would exceed those shown in Attachments 6 – 9. In addition, an attempt was made to draw upon available published material to gain an understanding of the prospects for longer-term demand.

For example, Xstrata is examining an extension of the life of the Ernest Henry mine well beyond its current planned closure date in late 2010, by pursuing the feasibility of an underground operation. A \$15 million pre-feasibility study resulted in over 40,000 metres of drilling and core samples that were used to increase Xstrata's confidence in the ore body beneath the open pit mine and to consider a variety of underground mining options. Work has commenced on a decline to further evaluate the underground life extension option. Xstrata is also actively considering the development of a major magnetite operation at Ernest Henry.

Xstrata is also believed to have significant options for extending the life of its operations at Mount Isa, with Measured, Indicated and Inferred copper ore resources of about 150 million tonnes at its existing X41 and Enterprise mines, 75 million tonnes in the "500 ore body" and 208 million tonnes of potential open cut resource. On this basis, copper operations could continue at current rates for over 20 years. There are also known to be oxide ore resources which might be developed under the right combination of metal prices and mining and processing costs.

The Mount Isa zinc-lead-silver operations are reported to have Measured, Indicated and Inferred resources of around 446 million tonnes, sufficient to support operations at current production rates for over 30 years, under the right economic conditions.

BHP Billiton has recently advised that a study team is undertaking a pre-feasibility study on a significant life extension of the Cannington mine.

The Zinifex Dugald River project, which has been included in the projected demands in this study, represents one of the world's most significant undeveloped lead and zinc deposits. However, the forecast energy requirements of the project have been provided and incorporated into the regional forecasts on the basis of the initial mine plan only, despite the fact that the area adjacent to the proposed mine is highly prospective for further development. Zinifex has also identified the potential for further upside at Dugald River through copper production.

In general, the potential for some of the operations in NWQ to have very long mine lives is not reflected in the energy demand figures provided to the Working Group, because they remain

as potential, and subject to the uncertainties of the markets. The figures reported tend to be shorter term ones based on committed mine plans or well advanced feasibility studies.

The above discussion also highlights the fact that ore reserves are only the amount of material that a mining company estimates it will be able to extract with a positive margin between the cost of production and the selling price of the final product. This margin covers the cost of capital and provides an adequate return to the investor. Increases in the cost of the major inputs to the mining process such as electricity or decreases in the market price for metals can quickly relegate reserves to resources status and significantly reduce the official life of a mine. All mines continuously review and adjust their reserves levels as production costs, international commodity prices and currency exchange rates fluctuate.

Further analysis of regional potential

Recognising that the energy demands collated in the initial approach were likely to understate the long term demands in NWQ because of the nature of mining investment decisions, the Working Group sought to obtain a view of the potential of the region based on resource endowments, rather than ore reserves or nominated mining projects.

The Working Group recognised that it was not in a position to provide guarantees about information on likely future requirements generated in this way and understood the commercial realities faced by both mining operators and proponents and energy suppliers. However, it considered there was value in seeking to identify further information that might provide confidence in long-term energy requirements in NWQ and support appropriate decisions by the parties involved.

In addition to the mineral resource information referred to above, the Working Group identified further information and activities of Government, explorers, and miners, as discussed below. It also noted recent predictions by a variety of commentators on the likelihood that the current high level of demand and price for commodities is likely to last for many years, underpinned by demand from the growing economies of China and India.^{1, 2, 3}

While such an outcome cannot be incorporated with certainty into the Working Group's energy demand forecasts, it is supported by continuing strong interest in exploration in NWQ and elsewhere in Queensland.

The Department of Mines and Energy had already commissioned a series of reports by consultants ACIL Tasman Pty Ltd on the '**Economic contribution of mining and mineral processing in Queensland**'. In the report on the significance of the mining and minerals industry to the North West Region published in January 2007, ACIL Tasman advised:

"Queensland's North West Mineral Province is recognised as being highly prospective for base metals (zinc, lead and copper) as well as silver and gold. With world demand for mineral commodities at high levels, the outlook for further growth in exploration, mining and, minerals processing in the North West Region

¹ For example, Vivek Tulpule, Chief Economist of Rio Tinto, in April 2008 stated that "strong demand arising from economic and demographic development will generate ongoing commodity demand growth" and "China is the new force in commodity demand". Rapid commodity-intensive growth, decoupling of growth from world (US) economy and increasing costs of domestically-sourced commodities were expected to result in strong global growth in commodity demand and prices. Having regard to the relationship between consumption of metals and GDP/capita, and economic and population growth forecasts, a strong rise in consumption, particularly of copper, was projected for 2007-2022 and beyond.

² Dr Peter Lilly of CSIRO, in May 2008, similarly noted the relationship between base metal consumption and GDP per capita, the projected population growth in China and the current growth in consumption of consumer goods in China. He also noted the proportions of the world's consumer goods now made in China and concluded that there would be sustained demand for mineral commodities.

³ The Mining Council of Australia, in its 2008-09 Pre-Budget Submission, cites forecasts of economic growth to 2016-17 of 6.1 – 9.3% p.a. for North-east Asia (excluding Japan) and 2.7 – 8.5% for South-east Asia.

of Queensland is bright. This in turn augurs well for the economic prospects of the region and for Queensland more generally.”

As already noted, the major mines in NWQ are largely at a mature stage of the mining cycle, with several operations in the region either mined out or facing closure by 2015-2020 (subject to revision based on additional resources and/or high commodity prices, as discussed above). Ongoing optimism in the region over the past year stems largely from continuing strong commodity prices, encouraging results on some projects under feasibility study, new mines under development and some new discoveries. Although at this stage not individually comparable with the discoveries of Ernest Henry, Cannington and Century in 1990-1991, these new deposits could be highly significant in sustaining the future of the mining industry in NWQ. Some of these potential new mines have been incorporated in the estimates in Attachments 6 - 9, on an estimated basis, but their longer term potential could not be fully reflected in those estimates.

DME's Industry Development Division advises that NWQ continues to be a highly prospective and relatively immature location for mineral exploration particularly at depth, because many previous explorers generally did not conduct deep drilling. Also the continual evolution of new exploration technologies and more sophisticated modelling is allowing explorers to look much deeper under cover to find promising ore bodies. This high level of prospectivity is reflected by the many projects in the region that are now at various advanced stages of investigation. These potential projects include:

- Cloncurry project (copper) - Exco Resources NL
- Cloncurry project (copper, gold) - Ivanhoe Cloncurry Mines Pty Ltd
- Dugald River (zinc, lead, silver) - Zinifex Ltd
- Lady Loretta (zinc, lead, silver) - Xstrata plc
- Roseby (copper) - Universal Resources Ltd
- White Range (cathode copper) - Matrix Metals Ltd
- Rocklands (copper cobalt) - Cudoco Ltd
- Kalman (molybdenum copper gold) - Kings Minerals NL.

Having regard to these potential projects and existing operations and potential extensions or expansions, the Working Group was able to identify almost 1,700 million tonnes of known resources of base metals, silver and gold ores, compared to reserves of operating mines of around 330 million tonnes.

While most of these specific projects were included on a “best estimate” basis in the “High” estimates shown in Attachments 6 – 9, it is predicted that with NWQ's high prospectivity and with Government programs such as Smart Exploration and Smart Mining - Future Prosperity, there will be further important new greenfield discoveries in NWQ in the near future.

Support for this conclusion is provided by the **AusLink Mount Isa-Townsville Corridor Strategy** published in 2006, a collaborative initiative of the Australian Government Department of Transport and Regional Services and the Queensland Department of Main Roads, Queensland Transport, Queensland Rail, Queensland Coordinator-General, and Queensland Department of Natural Resources and Water. The report's findings included:

“There is expected to be strong demand for transport on the corridor to 2030 due to increasing economic activity in the mining and mineral processing industries and resulting population growth in Mount Isa and Townsville. Lower demand is expected from economic activity from the service industry associated with mineral production....” and

“The mining industry is expected to grow at both ends of the corridor. Based on the mines’ and project proponents’ planning horizon of 10 years, supply prospects and world demand projections indicate continual growth of the sector, especially in North West Queensland.”; and

“Based on existing operations and proven, economically viable known reserves, production is expected to peak at 6.3 million tonnes per annum in 2010/11 at a value of \$5.2 billion a year. However it is likely that new resources, proven in the intervening period, will increase that production.”; and

“Most companies indicate that they have considerable resources in addition to those quoted in annual reports and which, when evaluated, would extend their mine lives beyond 10 years.”

Basis for long-term projections

In attempting to forecast longer term energy requirements in NWQ, it is necessary to turn to assessments of the geology of the region, rather than to assessments of specific projects. In doing so, it is necessary to consider both what is known in general about the region, the level of current exploration activity and its outcomes and implications for other related areas, and the steps being taken to ensure that the exploration activity is maintained and expanded.

NWQ, already one of Australia’s premier base metal provinces, is characteristically a multi-commodity province containing a variety of mineralisation styles including sediment hosted silver-lead-zinc, brecciated sediment hosted copper, iron oxide-copper-gold deposits, and Broken Hill style silver-lead-zinc. The area contains the Century mine, the world’s largest zinc mine, and Cannington, the world’s largest silver mine, as well as the world class Mount Isa and Ernest Henry mines. The region also has major phosphate resources, one of which is in production at Phosphate Hill.

The area also contains a known iron ore deposit at Constance Range and unexploited resources of copper, molybdenum and significant nickel-cobalt resources. New styles of mineralisation are being discovered with greater company activity in the region (eg the Kalman prospect, and the Las Minerale copper mineralisation). Current exploration projects have identified new copper-cobalt associations and copper-molybdenum-gold associations. Much of the copper mineralisation in the region was initially exploited as near surface oxide ore, but recent deeper drilling has identified deeper exploitable sulphide resources in many of the historic mining areas (eg Mount Gordon).

Known mineralisation is documented in the DME Queensland Minerals annual review of company exploration and resources. This review identifies the resources identified from company exploration in the region. The outcropping Mount Isa region continues to the north, south and east under cover of later rocks. Continuity of the rocks has been demonstrated through airborne magnetic and gravity surveys undertaken by government and company exploration. To date most successful exploration has occurred at shallow depths mainly to the east of the outcropping Mount Isa Block (eg the Cannington mine). Future deeper drilling on prospective magnetic and gravity targets under cover has the potential to greatly increase known mineralisation in the region.

Smart Exploration and Smart Mining – Future Prosperity

The Queensland Government has committed to major investments in pre-competitive geoscience and other assistance to explorers, with a view to doubling exploration in Queensland between 2004-05 and 2009-10. The Smart Exploration and Smart Mining – Future Prosperity programs represent \$49.08 million in funding aimed at stimulating exploration investment in the State.

The \$20 million Smart Exploration program commenced in 2005 and targets four areas across Queensland that are considered to have the highest potential for the discovery of additional mineral and energy resources - the Mount Isa Region, the Bowen-Surat Basins, the Drummond Basin and the Mount Rawdon Corridor.

The \$29.08 million Smart Mining–Future Prosperity program commenced in September 2006 and targets additional prospective regions of the state.

Some \$39 million of the total funding is being directed towards the acquisition of a diverse range of pre-competitive, strategic, regional geoscientific data and information including airborne magnetic and radiometric, ground gravity, airborne hyperspectral and deep crustal seismic reflection data, exploration geochemistry data, and updated geological mapping. Collaborative research projects are also being carried out to leverage further geoscientific knowledge from the acquired data.

The Queensland Government has recently announced that contractors are carrying out two new geophysical surveys in the northern part of the NWQ Mineral Province from April 2008 until the end of the year, to get a better understanding of the minerals and energy geology of the area. Both surveys are intended to provide important data on the distribution of rock types beneath the earth's surface and assist explorers to target areas with high potential for mineral and energy discoveries. The Government expects to release geophysical data from both surveys to industry by the end of the year.

The remaining \$10.08 million in funding is being directed towards providing financial assistance to explorers (via industry grants) in frontier and under-explored areas of Queensland, improving access to land and promoting mining and non-traditional careers for women.

The information gained through these processes is being made available to industry to promote increased exploration activity across the State. Recently, results of deep seismic surveys were reported, indicating that an area south-east of Cannington had the potential for further significant discoveries. NWQ is a major focus and the combination of continuing high commodity prices, the natural prospectivity of the region and the availability of additional information has seen significant increases in exploration activity.

In the area served by the Mount Isa office of DME, for example, there was a 50% increase in the total exploration permit area granted or applied for between September 2006 and April 2008, as shown in **Attachment 10**. As shown in **Attachment 11**, there has been a very significant increase in the area under application or granted in the NWQ Mineral Province.

The Queensland Government has further indicated its confidence in the NWQ Region through the allocation in its 2008-09 Budget of \$2.4 million for the construction of a new facility at Mount Isa for the safe and secure storage of drill core samples. This facility will accommodate the increasing volume of core samples from surrounding areas and help promote exploration in the NWQ Mineral Province.

Restricted area Program

To manage the release of the data and to ensure that the region is actively explored, DME has created restricted areas over certain locations of mineral potential in the Mount Isa region.

Restricted areas are temporary restrictions on exploration created over possible mineralisation signatures identified using airborne geophysical data acquired under the Smart Exploration program. The purpose of the program is to generate high quality exploration proposals through a competitive process. The exploration opportunities provided by the intended repeal of the restricted areas on a specified date are actively promoted to Australian and overseas companies. Seventeen areas have so far been created in NWQ.

Importantly for the purposes of the Working Group, the promotion of these opportunities resulted in considerable interest being generated, Nine companies, including some who are new entrants to the region, lodged a total of 26 applications in relation to the four Restricted Areas released in June 2007. As a result of the process, priority has been given in the assessment of applications for exploration permits for minerals to a Korean consortium consisting of Hanwha Australia, Sun Metals Corporation and KORES Australia, for three of the four areas. The participation and success of the Korean consortium is seen as indicative of the strength of demand and as providing diversity to the exploration industry in Queensland.

Historical growth in NWQ energy requirements

A further indicator of the possible future patterns of growth which might be expected in NWQ is afforded by consideration of the historical energy requirements of the region. While gathered from a variety of sources and containing some gaps and discontinuities arising from factors such as the changed role of the Mines Power Station (MPS) at Mount Isa, the commissioning of generation at the WMC acid plant and more recently Xstrata's 30MW gas-fired power station, the data does provide a clear indication of the sustained growth the region has experienced in the past.

Attachment 12 shows the growth in electricity output from the combined MCPS plus MPS from 1962-63 to 1994-95 and for Mica Creek from 1997-98 to the present.

It is also evident from consideration of three historic sets of demand forecasts made by Mount Isa Mines Limited (MIM) when it owned MCPS, that the continued growth has occurred despite views taken from time to time that activity in the region had peaked. **Attachment 13** shows the energy requirements of MIM as projected in 1995, 2000 and 2002 and, for comparison, the requirements today. The key messages are that, despite declines projected in 1995 and 1999, the Mount Isa mines have continued operations, and their energy requirements have actually increased significantly. The actual data also shows strong growth year on year in the current market environment.

Conclusions

The preliminary conclusion of the Working Group is that there is significant potential future energy demand in NWQ. The assessments made show that, if all proposed new mining projects in the region were to eventuate and be connected to the network, the aggregated regional electricity demand could be in the order of 500 MW by 2013. If only existing mines and projected mines that are close to the existing electricity network were connected to electricity supply, the demand could be in the order of 400MW by 2013 if all projects proceeded.

However, there are two clear issues:

- There is a difference of around 150 to 200MW between the optimistic figures described above and the demands of known committed developments
- More seriously, the projected demands are front-ended and relatively short-term, showing considerable reductions in both 2016 and 2021.

Both of these issues will have a direct impact on the commercial development of potential supply options, both in the justification of capacity to be provided (and the level of fixed charges per unit of supply for high capital investments, if demand does not eventuate) and in the risk posed by uncertain demand beyond about 10 years.

These issues in turn can impact on the prices that energy suppliers need to justify supply projects, and energy prices can impact demand through their effects in the commerciality of mining projects.

While these are recognised as issues which need to be considered by project proponents, the other more qualitative considerations discussed in the report suggest a conclusion that strong exploration and mining activity, and associated industrial, commercial and residential expansion may be expected to continue for many years to come. These considerations include:

- the continuing buoyant markets for base metals
- the Measured, Indicated and Inferred resources in the vicinity of existing mines
- the number of new mining projects approaching commitment
- the likely extent of mineralisation and Government support for further data collection and release
- the current strong level of exploration and development activity
- the prospects of further economic discoveries in NWQ
- observations about past energy demand growth in NWQ despite contrary projections.

Finally, the bulk of the work of the Working Group has focussed on electricity demand. There is a significant level of existing gas demand in the region and concern about future supply of that commodity, as to both price and supply capacity. This is important as gas-fired generation is the principal form of electricity supply in the region at present and its continuation and expansion will rely on the availability of gas at prices which support development in the region. A similar process could therefore be undertaken in relation to aggregate gas demands to inform potential gas suppliers and pipeline owners/operators of the opportunities in that market. However, any such study will be subject to the same uncertainties about longer term demands as has been found during the assessment of electricity demand.

North West Queensland Minerals Province Energy Demand Working Group

Terms of Reference

Background

The North West Queensland Minerals Province is a major area of focus for future mining and minerals processing activities, with a particular focus on base metals. The region also has a well-established pastoral industry and is becoming an increasing focus for tourism.

Mount Isa, the major city in the region, serves as a transport hub and as a base for much of the economic and social activity in the region. The other significant township is Cloncurry.

Energy supply in the region largely depends on the supply of gas from Ballera over the Carpentaria Gas Pipeline, either for electricity generation or for direct use in minerals processing operations. Most electricity is supplied from the Mica Creek Power Station (MCPS), operated by CS Energy Limited. MCPS is a 325MW (nominal) power station comprising 10 generation units of 30-35MW capacity.

In addition to Mount Isa city, Cloncurry and surrounding areas, several mines are supplied from Mica Creek. Xstrata (Mount Isa Mines Limited), while supplied from MCPS, also operates its own 30MW power station on the mine site at Mount Isa. BHP Billiton (Cannington Mine) and Incitec Pivot (Phosphate Hill) operate their own isolated gas-fired generation and a number of mines operate their own isolated diesel-fired generation.

For those areas and mines supplied from MCPS, electricity transmission and distribution is by Ergon Energy Corporation Limited. Ergon Energy operates unregulated transmission assets from MCPS to both Century Mine to the north and Ernest Henry Mine to the east. Ergon Energy also operates a regulated distribution network in Mount Isa, Cloncurry and surrounding areas. In addition it operates an isolated diesel power station and associated distribution at Burketown and Camooweal.

A renewed interest in base metals, with high demand from developing countries and historically high prices has led to strong growth in the region and in its energy demands. There is considerable interest in extension of the lives of existing mines, expansions and the development of new mines. In addition, the development of the region's tourism potential, the growth of Mount Isa as a regional hub and the increased penetration of refrigerative air conditioning in homes and businesses has resulted in strong growth in both peak demand and energy requirements.

The peak demand on the regional electricity network is now approaching the capacity of connected generation. Some of the generating units at MCPS may need replacement in the medium term if the capacity contracted for is maintained or grows. Additional supply capacity will also be required if new mines are to take electricity supply from the regional network rather than generate their own electricity.

Purpose

The purpose of the Working Group is to develop and validate a forecast of the future electricity and gas peak demands and energy requirements for the North West Queensland network, to provide a sound basis for development of commercial projects for the augmentation of supply.

Deliverables

Determine the likely future demand for electrical power from the North West Queensland electrical network (NWQEN) over a study period of 15 years. Assess new, increased or reduced electrical loads in terms of their likelihood of occurrence, peak power requirement, load profile (particularly the power requirement coincident with system peak), new load/project commencement date and mature project closure date.

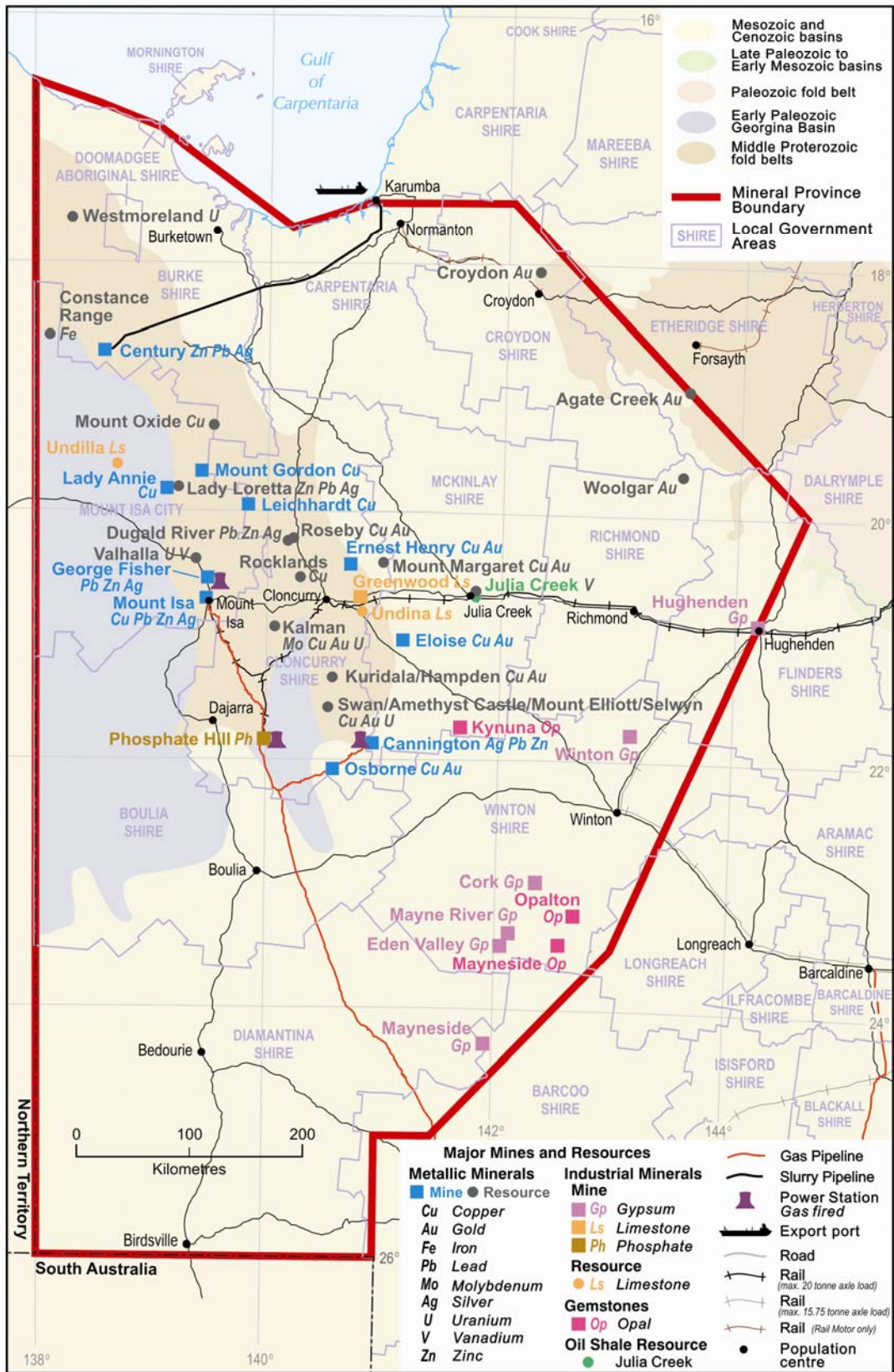
For the study period, considerations are expected to include:

- A forecast of future electrical load requirements of existing customers served by the NWQEN
- A validation of projected electrical load requirements of proposed new projects in the region that could feasibly be connected to the NWQEN, as currently known by members of the working group members or available from other sources
- An assessment of existing electrical loads in the region which are not currently served by the NWQEN but might feasibly/economically be connected to the NWQEN (having regard to network requirements as well as generation)
- An assessment of NWQEN electrical loads that will cease to be required or be reduced
- The extent to which particular operations may be candidates for non-firm supply contracts at a discounted tariff
- Similar outputs for the gas requirements of the region, taking into account requirements for both electricity generation and direct use.

Forecasts should be made on the basis that energy prices are cost reflective for the study period.

The Working Group's report on this study is expected to include tabular and graphical representations of load forecasts and a regional map identifying the locations of major loads considered and their proximity to the existing network.

North West Queensland Mineral Province



Energy Supply in North-West Queensland

Energy supply in NWQ largely depends on the supply of gas from Ballera, in South-West Queensland, over the Carpentaria Gas Pipeline, either for electricity generation or for direct use in minerals processing operations. Most electricity is supplied from the Mica Creek Power Station (MCPS), operated by CS Energy Limited. MCPS is a 325MW (nominal) power station comprising 10 generation units of 30-35MW capacity.

In addition to Mount Isa city, Cloncurry and surrounding areas, several mines are supplied from MCPS. Xstrata (Mount Isa Mines Limited), while supplied from MCPS, also operates its own 30MW power station on the mine site at Mount Isa. BHP Billiton (Cannington Mine) and Incitec Pivot (Phosphate Hill) operate their own isolated gas-fired generation and a number of mines operate their own isolated diesel-fired generation.

Currently Xstrata (Mount Isa Mines, Ernest Henry), Zinifex (Century Mine), CopperCo (Lady Annie) and Aditya Birla (Mount Gordon) are supplied through the network.

BHP Billiton (Cannington) and Incitec Pivot (Phosphate Hill) have on-site gas-fired generation facilities.

Barmenco (Eloise Copper) and Barrick Gold (Osborne) have on-site diesel-fired generation facility (the Osborne mine is currently converting to gas-fired generation).

For those areas and mines supplied from MCPS, electricity transmission and distribution is by Ergon Energy Corporation Limited (Ergon Energy). Ergon Energy operates unregulated transmission assets from MCPS to both Century Mine to the north and Ernest Henry Mine to the east. Ergon Energy also operates a regulated distribution network in Mount Isa, Cloncurry and surrounding areas. In addition it operates an isolated diesel power station and associated distribution at Burketown and Camooweal.

The peak demand on the regional electricity network is now approaching the capacity of connected generation. Some of the generating units at MCPS may need replacement in the medium term if the capacity contracted for is maintained or grows. Additional supply capacity will also be required if new mines are to take electricity supply from the regional network rather than generate their own electricity.

Initial Membership of North West Queensland Energy Demand Working Group

Group Members	Organisation
Alan Millis Kevin Freier Mitul Patel	Department of Mines and Energy
Geoff Dickie Thomas Nott	Department of Planning and Infrastructure
Tim Spencer	Queensland Treasury
Ross Thompson	Xstrata
Andrew Mackintosh	Zinifex
John Rich	BHP Billiton
Don Briggs	Incitec Pivot
Michael Roche Andrew Barger	Queensland Resources Council
Tony Pfeiffer Peter Goldsmith Tony Loveday	Ergon Energy
Jerry McBrien	CS Energy

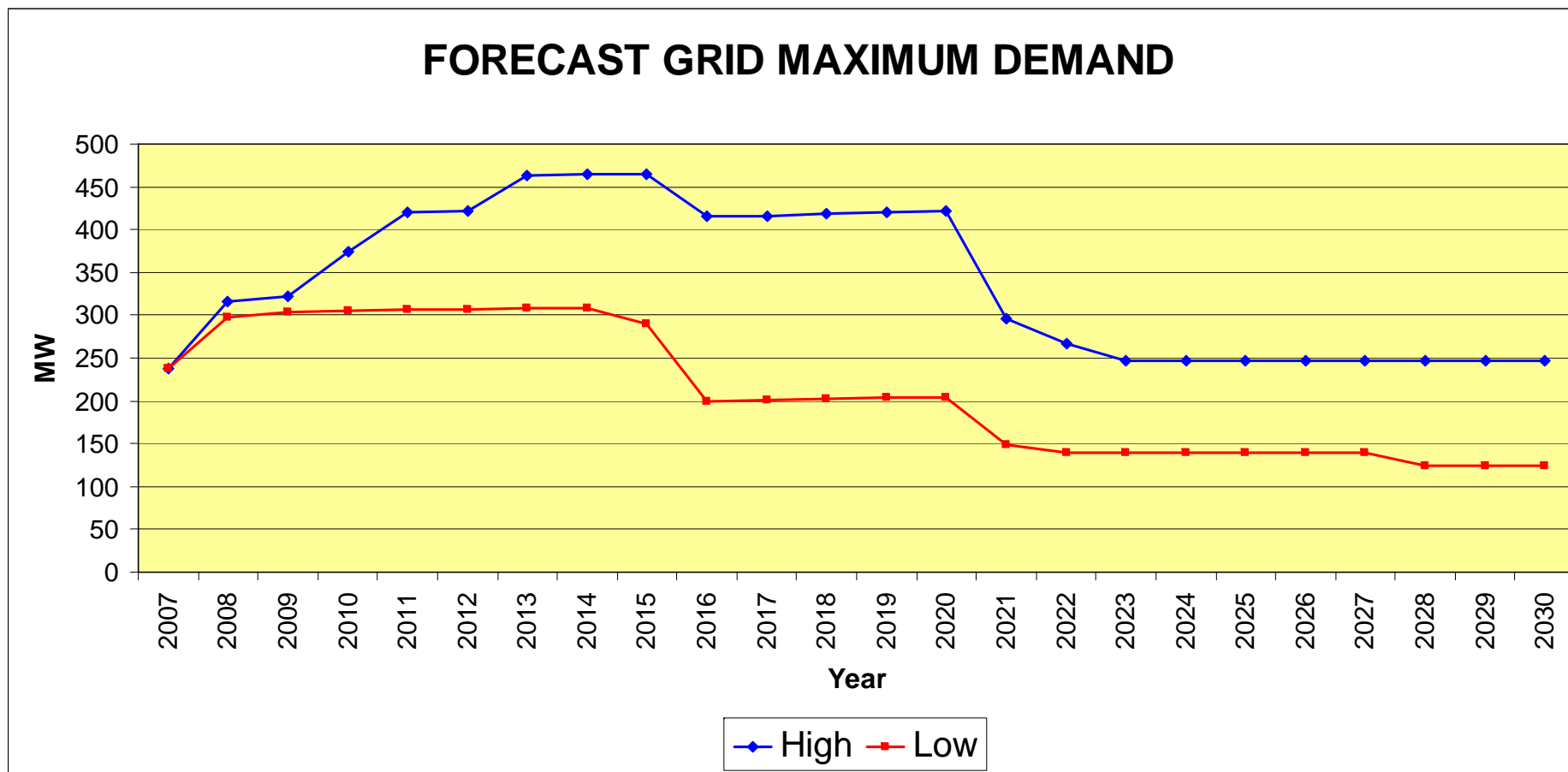
Mining Entities Consulted Regarding Energy Requirements

Existing Mines

Project	Operator	Electricity Supply
Ernest Henry	Xstrata	Grid Power
Mount Isa – Copper	Xstrata	Grid Power
Mount Isa – Copper Smelter	Xstrata	Grid Power
Enterprise	Xstrata	Grid Power
George Fisher	Xstrata	Grid Power
Black Star	Xstrata	Grid Power
Century Mine	Zinifex	Grid Power
Century Mine mill expansion	Zinifex	Grid Power
Lady Annie	CopperCo	Grid Power
Mt Gordon Mine	Aditya Birla Minerals	Grid Power
Osborne Mine	Barrick (Osborne) Pty Ltd	Diesel generation on-site
Trekelano Mine	Barrick (Osborne) Pty Ltd	Diesel generation on-site
Leichhardt Operation	Matrix Metals	Diesel generation on-site
Eloise Copper	Barmenco Pty Ltd	Diesel generation on-site
Phosphate Hill	Incitec Pivot	Gas generation on-site
Cannington Mine	BHP Billiton	Gas generation on-site

Planned/possible Future Projects

Project	Operator	Electricity Supply
Ernest Henry (U/G)	Xstrata	Grid Power
Ernest Henry Magnetite	Xstrata	Grid Power
Mount Isa Copper Extension	Xstrata	Grid Power
Dugald River	Zinifex	Grid Power
Lady Annie Copper Expansion Project	CopperCo	Grid Power
Lady Annie Sulphide Ore Treatment Plant	CopperCo	Grid Power
Cloncurry Copper Project	Exco Resources	-
Cannington Mine Expansion	BHP Billiton	Gas generation on-site
Leichhardt Expansion	Matrix Metals	-
Osborne Pit	Barrick (Osborne) Pty Ltd	-
Kulthor Mine	Barrick (Osborne) Pty Ltd	-
Lucky Luke	Barrick (Osborne) Pty Ltd	-
Duchess	Barrick (Osborne) Pty Ltd	-
Kuridala Project	Matrix Metals	-
White Range Project	Matrix Metals	-
Rocklands Copper Project	CuDeco	-
Cloncurry copper project	Ivanhoe Australia	-
Roseby Copper Project	Universal Resources	-
Lady Loretta	Xstrata	Grid Power
Kalman Project	Kings Minerals	-

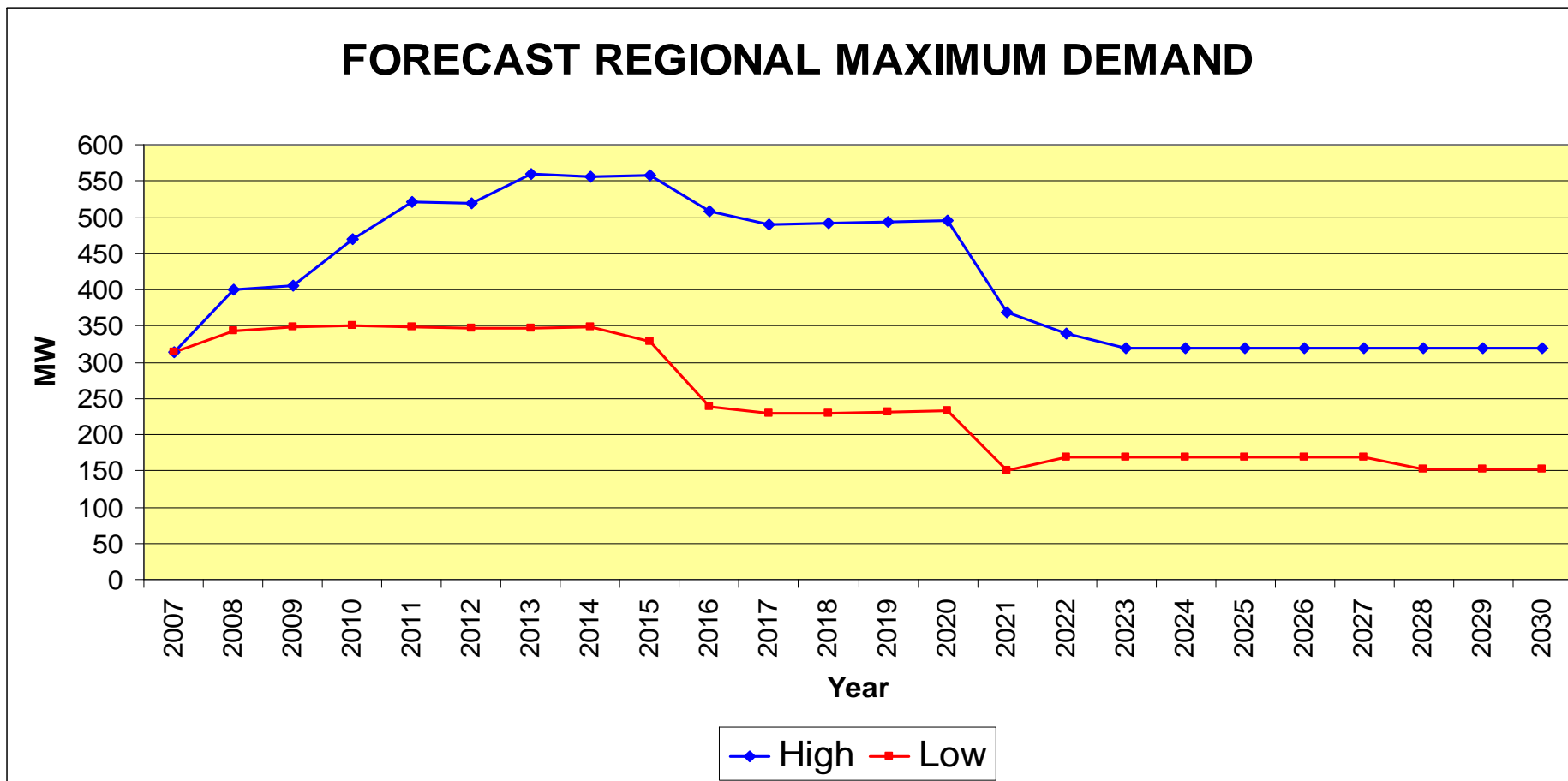


Undiversified sum of project maximum demands, excluding transmission and distribution losses.

High represents current mining projects plus possible expansions and future projects.

Low represents current mining projects.

No allowance made for uranium mining due to Queensland Government policy not to issue mining leases for uranium.

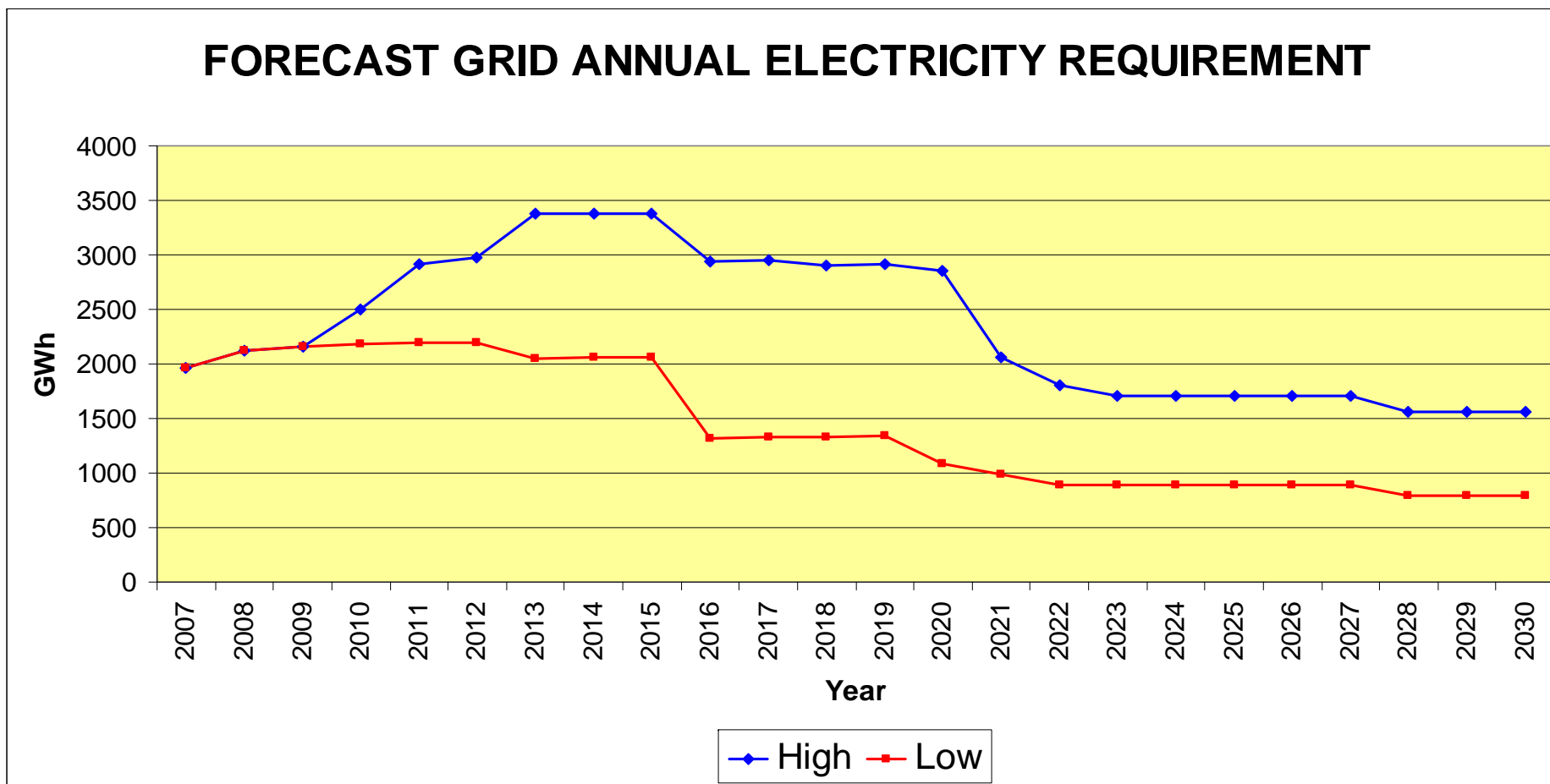


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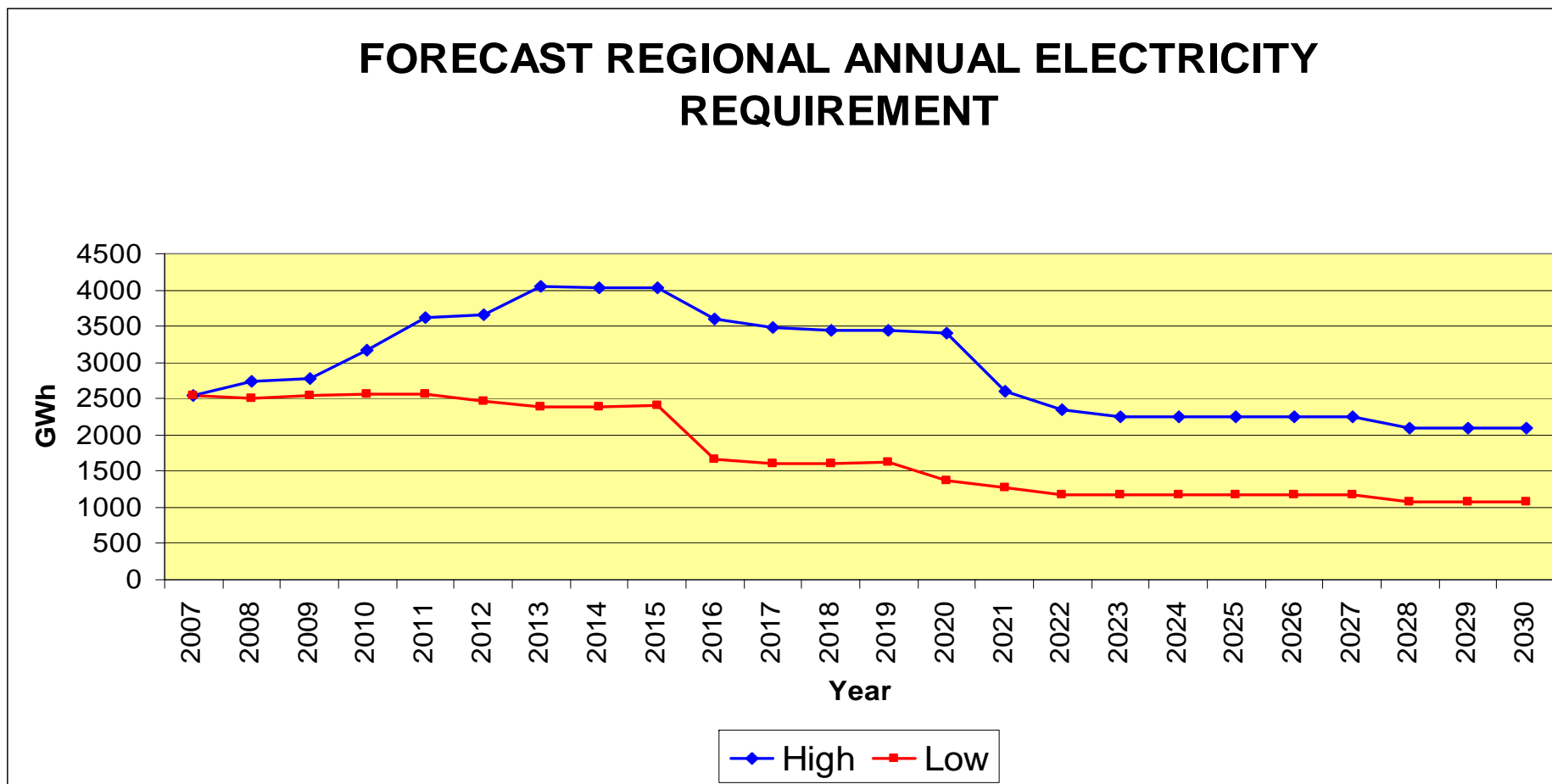


Sum of project energy requirements, excluding transmission and distribution losses.

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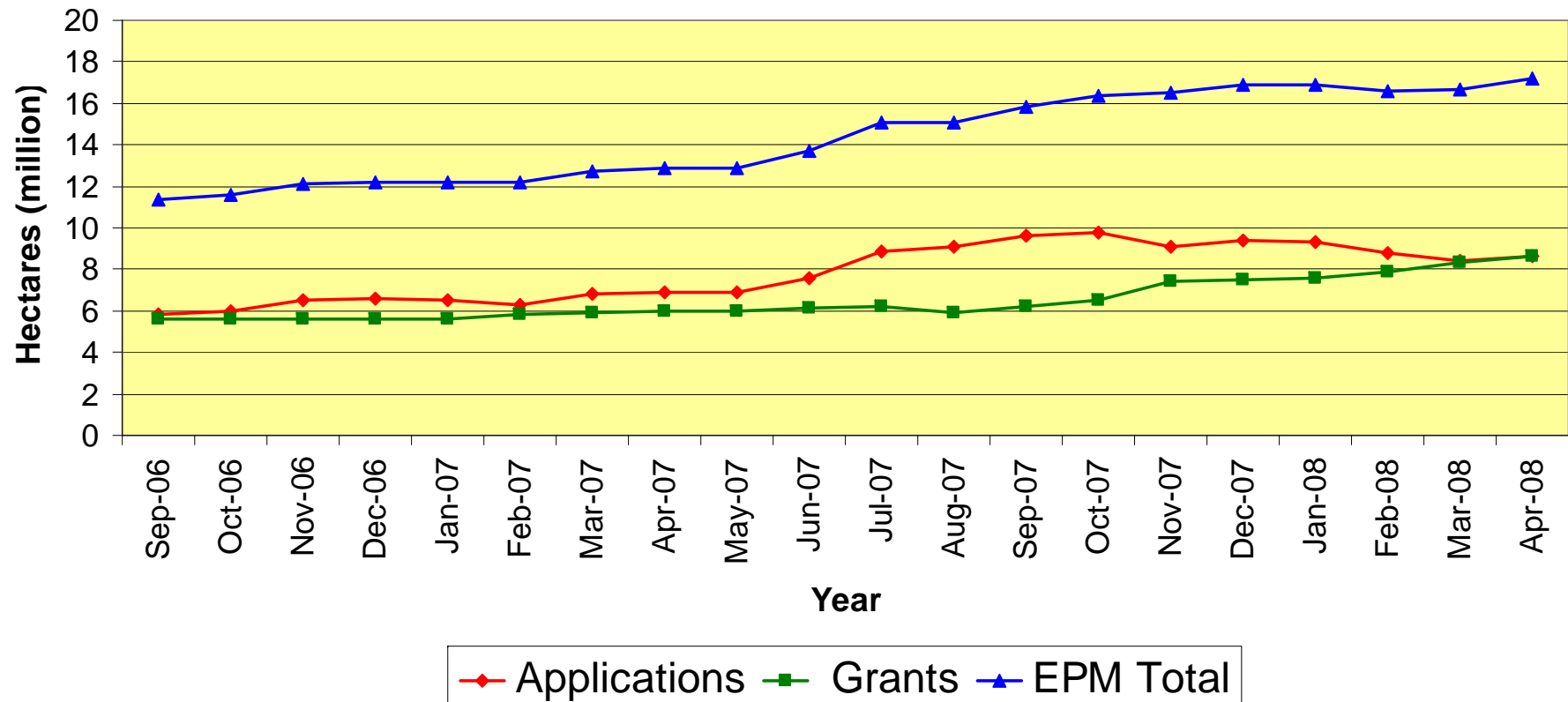
Sum of project energy requirements, excluding transmission and distribution losses.

High represents current mining projects plus possible expansions and future projects.

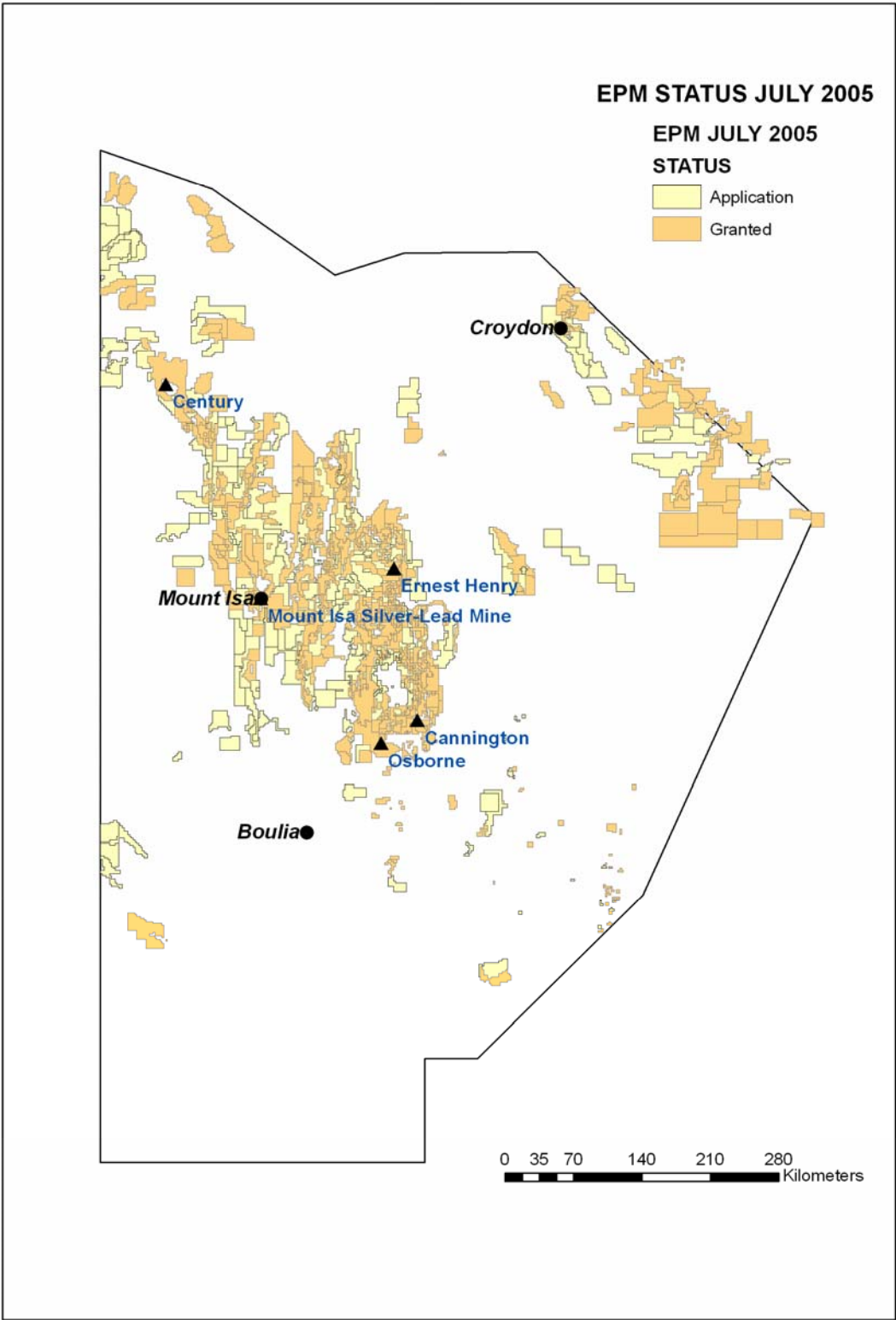
Low represents current mining projects.

No allowance made for uranium mining due to Queensland Government policy not to issue mining leases for uranium.

Exploration Permit Minerals (EPM) MOUNT ISA



COVERAGE OF EXPLORATION PERMITS (JULY 2005)



COVERAGE OF EXPLORATION PERMITS (APRIL 2008)

