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ANDREW GARNETT: So I'll start here with some very simple perspectives. So how the hell did we get to this point and I'm going to go through three questions, which are more rhetorical than anything: what the hell did we think was gonna happen; who are the players involved, which these guys are going to dig into; and where have all the good times gone, which is the end reflection on what have been doing with many years of cheap energy?

So what the hell did we think would happen? We've had a wonderfully closed little market with one basin following one city. Clearly it's a finite nature resource. With any finite natural resource in a closed system it degrades and depletes. So what did we expect the production costs and prices to do? So to say this is a price shock is a little bit different. What did we really expect would happen? It's been on the horizon, I'll show you in a minute, for several years. Globally as well, the graph on the left is a typical one, if you read from right to left on the X axis that's just the amount of technically recoverable reserves and up the graph that's the cost of production. The little green thing is more or less what we've produced, but the big message is it's a natural resource, we're depleting it globally; we're going up the cost curve. Unconventional gas is a marginal gas compared with conventional gas. This is the trend that's been in place for ten years. Looking at the global LNG prices that some of our competitors have been paying for gas, we're down at the $4/$3 range, or at least we have been; global prices have been trending up; we've been in an isolated market until quite recently.

So it's anyway getting more difficult. We're depleting the resource, demand has grown significantly but then so has price. So in other words, from a global perspective our energy demand is simply outstripping the way we're going along the top curve. The competition we're actually talking about in a global sense is a competition for capital, so the capital to invest in new gas supplies is what we're competing for globally, and then you've got to ask yourself, in that context do you invest in a small closed environment with a low price or do you choose to invest in a big price? So you can answer that one yourself. This is from Tony's report, which I won't go into much other than to say most of the gas use is industrial use and many of the major consumers are also the major producers.

Interestingly enough, when we talk about what to do about this remember that, in this country anyway, the producers are private firms, private consortiums. That's not true for most of the world, but here they're private companies and therefore they're owned by funds and institutions and so on, and actually many of them, if you trace back far enough, are owned by pensions and supers. And therefore anything that distorts that market to invest in this is not quite as victimless as it sounds from a personal point of view if your super or pension is in any way invested in the oil and gas sector. So it's nice to talk about these things in the abstract, but remember there's a real person somewhere at

the end of it. I suspect my super's also invested in that, although I couldn't tell you today whether it really is or not.

So interestingly enough, it's very well recognised that a lot of our economic growth and robustness has been predicated on low cost energy and the question underneath there is how long did we really think that was going to go on, what did we do to prepare ourselves for that? So the Bligh government in 2008/9 opened that up, basically took a closed system into an open system and exposed us to the international gas price market, and that's why there is an industry. So it's not so much, like you sometimes seen in papers, the gas price has gone up because there is an LNG industry; this gas is there at the surface because there's an LNG industry. It was predicated by that opening up of the system. In fact, it was the only reason they took FID.

So if you look carefully at the signals though it was very clear for four years, actually more if you were keeping an eye on the energy market, there was a good four or five years of this is coming, this was going to happen. You could look at all sorts of indicators that the prices were going up prior to 2008. So really, again, where I am here is we had this wonderful low-cost energy environment for a long time, what did we do with it? We never surely believed prices were going to stay the same or go south? Or maybe we did, but if any of us had a long term business surely we didn't really? So it's a bit of a rhetorical question to leave you with. Nothing lasts forever; this is only the current energy dilemma, so doubtless there'll be another one when we come up with another source; and you've got to think about the way we long term plan both in business and government in this country to start looking at if we'll ever get out of these shocks which are so shocking you could have predicted them eight years ago.

That's the end, thank you.

MARK GRENNING: Thanks very much for the opportunity of speaking at this seminar. As John said, I'm speaking in my capacity as a Director of the Energy Users Association. Those of you who are in the energy markets will know that the objectives of both the gas and electricity law are basically for the long term interests of consumers. What never ceases to amaze me, as I go around in a whole range of different energy forums, is how many people who aren't users seem to know what's in our best interests, and gas policy on the east coast is no different from that. The title of the Grattan Institute paper we've heard referred to tonight, *Gas at the Crossroads: Australia's Hard Choice*, neatly summarises that challenge.

I want to argue three propositions tonight. The first proposition, energy policy has driven industry policy when it should be the other way round. Second proposition, the current east coast Australian gas market does not operate as a properly functioning transparent competitive gas market. This is caused by a combination of what us economists call market failure and non-market failure; it's not simply, again sorry, technical term, transitional disequilibrium that can be ignored by government. The third proposition is that the domestic gas supply business model has fundamentally changed and all stakeholders need to recognise it.

So the first proposition, gas policy has driven industry policy when it should be the other way round. Federal Government's green paper rightly heralds the benefits of Australia's energy resources and, as someone who works for a mining company I will recognise the benefits of getting international prices for our gas resources. However, the EUAA believes that the government in their understandable

support of Queensland LNG failed to understand what they needed to do in their industry policy to ensure that these energy developments did not have adverse impacts on domestic energy-intensive industries. The employment and value add from these industries seems to have been ignored. But let me first be very clear about what I mean by industry policy. It is light years away from the old style of picking winners or its recent incarnations of domestic reservation and price control or a national interest-type test on LNG developments. It's not that.

What I do mean by industry policy is a set of policy instruments available at all levels of government to set the legislative and regulatory framework. It's about approvals. It's about development and barriers to entry. It's about property rights. It's about competition and tax policy. It's about the ability of gas developers to bring resources to market and the ability of buyers to have a transparent market where they both enter a contractual arrangement they're happy with. The EUAA believes that this is not the case for large users in the east coast gas market. EUAA members are saying to us that their long term gas suppliers are not engaging in meaningful discussions to extend existing contracts that are due to end in the next couple of years. Firms that built a manufacturing asset base assuming the continued availability of gas are now questioning the ability of them to continue their operations.

Now, two defences are normally cited in this situation. The first one was something like, "Well, back in 2007/2008 we believed there was plenty of gas for both LNG and domestic markets, but the uncertainty of delivery of the individual CSM wells meant that the producers had to be conservative in their reserves management and we could not have reasonably forecast the situation where there's no gas available for domestic users". Perhaps one response from a user could be that the reserves simply couldn't support three projects being developed at once, particularly when they have two trains associated with them. The second defence of the current situation about the lack of gas for domestic customers is not market failure. They claim, again to use my economist term, the market is simply working, there's a disequilibrium between demand and supply and that's just normal course of events in efficiently functioning markets. The fact that the transition pathway is sudden rather than gradual is no reason for governments to intervene. New supply will eventually appear, a bit like Kevin Costner's Field of Dreams, brought on by the lure of high prices.

This leads me to my second proposition and that's the east coast Australia gas market does not operate as a properly functioning transparent domestic gas market, a combination of market and non-market failures. Market failure is one of the most used and abused terms in regulatory economics and policy, not just in terms of whether it exists but, importantly, if it does exist what should governments do and is it serious enough to require governments to actually do something, what form of an intervention should that take? Then we have an extensive literature on how government stepping in has created its own failure called non-market failure which calls into question the original policy intervention. I want to argue this proposition in three parts.

This is the first part about the legal framework around mergers and the ACCC approval process. Historically, large gas users in Queensland were dominated by a few producers under joint marketing arrangements. They negotiated long term bilateral contracts, strict confidentiality, restrictions on use and resale and, to the lawyers' delight, extensive litigation on the price review clauses. This put the producers in a very strong bargaining position with information asymmetry and prevented what I believe was the development of a competitive gas market. The development by CSM of small companies and the willingness of Energex to act as an aggregator for a contract that I put in place for

Comalco in 2003 changed all that. We had a 10 year five PJ contract where Energex was the aggregator, Comalco was the buyer, and it was the first CSM contract.

These new companies were considered a threat to traditional sellers. CSM reserves were increasing and these small players were for the first time in Queensland actually offering real competition to us buyers. Consumers had their brief period in the sun and it's the sort of market I would define closely as a competitive market and the sort of benchmark I'll use later in my remarks. The incumbents were worried about the value of their reserves, the value of their power and information asymmetry in the market, and they started dreaming about LNG. They also started buying up the small companies. The EUAA mounted an unsuccessful campaign for a number of years in the ACCC arguing against those acquisitions. We argued that they would substantially lessen competition in the domestic gas market and result in much higher prices and concerns around the availability of gas. Sometimes the ACCC supported us, as was the case with Santos and QGC, sometimes not.

An example of when they did not support us was when the ACCC approved the Santos Tipperary acquisition by accepting what we thought was a particularly novel argument that the proposed PNG gas pipeline – hands up all those who remember PNG gas and the dream of PNG gas? ACCC accepted an argument from Santos that PNG gas offered a competitive supplier for their acquisition of Tipperary. This is before there are any contracts in place for the purchase of PNG gas, aside from the fact there weren't even any pipelines or delivery facilities. The proponents of the merger sought to assure the ACCC and large consumers that their large consumer concerns were unfounded. Government and their advisers believed them. The EUAA said at the time they were wrong and they've been proved right. An effective oligopoly was allowed to develop. So what we have in Queensland now is LNG producers, either through ownership or contract, effectively control all P2 reserves.

The second part of my argument is that this concentration of ownership has contributed to the current market failure because of a lack of a competitive functioning market. Again, let me be clear about the standard I'm applying here. It's not the US Henry Hub system, which you're probably familiar with, of extensive pipeline system, extensive number of producers in there. What I'm talking about is a standard of a competitive market as where we are in Australia in our stage of development: limited sellers; limited pipeline system; negligible spot market. Where there is a transparent price discovery process it allows buyers and sellers to interact to reach a mutual acceptable contract. Our EUAA members tell us it is extremely difficult, if not impossible, to get bids to supply gas for a reasonable length contract. Rio Tinto in its submission to the green paper shows that it went through two market engagement processes over a three year period in 2014 for a relatively small amount of gas for its alumina refinery in Yarwun. On both occasions it received sub-economic short term offers.

EUAA members in other eastern states tell a similar story, yet we hear all sorts of public statements from the gas producers that they are engaging with users in substandard discussions, but honestly our members wonder who they've been talking to. Users recognise that in many cases historical prices are just that, history. They recognise that exploration and development costs have increased. They recognise that recent CSM discoveries do not have the benefits that past discoveries have had, yet users just don't consider pricing above LNG netback and the inability to get firm supply as indicative of an efficiently functioning market. So we look forward to the Productivity Commission highlighting that although, based on the workshop yesterday of the modelling that the Productivity Commission is, I don't think we should hold our breath.

The third part of the market failure argument is I don't believe it's simply a transition period. A transition period requires a functioning market, that is prices rise and are volatile, gas is still generally available and users are able to purchase substitutes. This is not what we face as users in east coast Australia. Statements like "higher prices will ensure new supply becoming available to domestic users" roll easily off the tongue. If there is only a temporary transition period markets should internalise the transactional risk and the disequilibrium in demand and supply. In practice market and non-market failures show that this will simply not happen. It's not a Field of Dreams and with many barriers to entry, particularly for juniors around availability of capital, difficulty to find buyers, the regulatory structure and approvals process they have to do etc. etc. The LNG producers are focusing on their contractual commitments with their new LNG projects. They have made a large investment and they want it to work. They are also having trouble finding the gas reserves they need to meet their contractual commitments, or in particular to support their train two projects. Their action with domestic buyers is perfectly understandable in this context.

This leads to my third proposition. The domestic gas supply business model has fundamentally changed and all stakeholders need to recognise that. This new business model has a cameo role perhaps for LNG producers who are struggling to get the reserves they need. It has a greater role for gas buyers, gas aggregators and junior gas companies. In fact, it's probably returned to what we had 10 or 15 years ago for CSM juniors. For gas users it means being willing to consider putting up funding to assist juniors in exploration development, particularly now that they can't get funding at a $45 or a $50 oil price, in return for a long term contract, and it means aggregators willing to work with juniors and buyers to get a commercial structure that's acceptable to large users. A number of EUAA members are doing just that, but given the lack of real offers from the larger producers.

That leads me to finish with six policy matters which the EUAA believes should be considered by government.

First, lessen controls on exploration development – easier said than done. Second, in particularly the Queensland context, consider releasing exploration licences to upstream producers on the condition that they are being used to supply domestic customers. My understanding is that this is currently possibly under Queensland law but it's not used. Third, consider reviewing the "use it or lose it" rules for undeveloped gas reserves and contingent resources that are not offered to the market in time of severe market illiquidity. Four, develop more trading hubs such as Wallumbilla, in conjunction with a review of the role of government supporting expansion and delivery infrastructure and a review of the restrictive practices that are undertaken by the owners of those hubs. Five, remove joint marketing protection from producers. Six, start looking at the rules for priority allocation if there is a shortfall.

I know governments are working on some of these but progress is pretty slow. Some of the changes can happen quickly, some will take years to show any impact. The white paper made all the right noises, but many governments seem to prefer setting up new inquiries rather than making politically difficult decisions. The difficulties of energy regulation in the Federal systems are also well-recognised. However, no matter what governments do, the EUAA believes that many large users are in for a very tough few years. Many existing gas contracts expire before these measures can take effect. The lure of an Eastern Australian Gas Strategy in 2020 doesn't have much attraction to a business that's not going to be around in 2020 to enjoy the benefits of it. Even if we do get the juniors going, they will need to make a judgement of how many domestic customers are actually going to be around in the seven or so years it takes for them to develop a new resource.

It will be interesting to see how the politics plays out. What if there is a shortage on a cold day? What if large regional employers close because they don't have any gas? What happens when a lot of small and medium gas users have sticker price shock and start writing to their local parliamentarian? What happens when large users have to leave the market and the remaining users have to pick up the tab for the regulator return on the network, the gas equivalent of the electricity network death spiral? As the Grattan report suggests, the LNG producers may have a cameo role to make gas available to mitigate the risk of direct government intervention. How much do they wish to avoid a West Australian-type reservation policy?

Anyway, I hope the picture that I've sketched gives you some perspective on what the EUAA, as an association with large users, believes. I think there's a lot of common ground between ourselves and the producers. We're willing to roll up our sleeves and get involved in finding the solutions. Thanks.

TIM O'GRADY: Thanks very much to Grattan and UQ for the opportunity to speak to you tonight. I'm going to talk a little bit about gas in general and then about gas supply and gas prices, and hopefully address some of the market failure issues that Mark alluded to.

I've worked in the energy industry for many years more on the electricity side and I used to look down my nose at gas a little bit, but then in some ways it's a more boring fuel than electricity, you can't do a real lot with it. But I've come to really learn to understand and love gas and see its benefits. It is quite a remarkable fuel. We have an abundance of gas resources in Australia. It's a very flexible fuel. It plays a very important role in electricity generation in terms of its flexibility and supporting reliability. And, of course, more recently we've been able to liquefy it and transport it from the east coast of Australia and we're now realising the benefits of exporting gas, and those benefits are quite extraordinary. As mentioned at the start, seven of the 10 or 11 active projects in the world are in Australia; three of them are on Curtis Island at Gladstone.

The Australian Pacific LNG venture, that Origin is part of, alone employs directly 13,000 people and it's a $24.7billion project adding enormous jobs and wealth and improvements in the standard of living for the people of Queensland and the remarkable thing is that there's two almost identical projects side-by-side. But I also want to highlight the environmental benefits of gas. Gas, when used in power generation here in Australia, generates less than half of the carbon emissions compared to coal. You've got some of the most modern, best, supercritical coal-fired power stations here in Queensland and they emit about 0.9 tons of CO_2 per megawatt hour of electricity and our gas base load power stations here in Queensland emit about 0.4 tons of carbon per megawatt hour. Some of the brown coal generators in Victoria are up about 1.5 tons.

Now it's the same overseas. When we export gas to Japan and China and other places through LNG it's also a very important part of the global solution to achieve climate change goals. Worley Parsons did a study a few years ago in 2011 focusing in particular on coal seam gas to liquefied natural gas being exported from Queensland and the life cycle carbon emissions. And what they found is that when used in place of black coal from Australia in conventional coal-fired generation in China the emissions in China decreased also by around half. Also what they found was that for every ton of carbon that's emitted in Australia by producing coal seam gas to LNG, 4.3 tons are reduced globally. So in fact a very important way that Australia can play our part in climate change goals is by producing and exporting more liquefied natural gas.

In terms of the supply and the price, some of these things might be explored a bit more in the questions and have been mentioned already, but we have an abundance of gas resources. I'd say we're never going to run out of gas in Australia and we've got plenty of gas to supply the domestic users, plenty of gas to supply the current export industry, and plenty of gas over time to greatly grow our export industry. Historically we paid very low prices for gas compared to our global competitors, as Mark alluded to, and, as Mark said, that was mainly because some of the initial basins where we found the gas in offshore Victoria and the Cooper Basin, they were low-cost or they had abundant liquids associated with the gas reserves.

Now, the gas price is going up regardless of the LNG industry on the east coast of Australia. The new reserves we need for domestic supply are much higher cost than the historical prices and, sure, broadly doubling. You can reassess where you're going to finish with current oil prices, but people speak about gas prices broadly doubling from $4 to $8, that kind of transition. Grattan had $4 to $9 in their report; Tony would probably change it if he did the report now a little bit. And that's a big change but I think of gas as having the haves and the have nots. So there are countries that have abundant gas, like Australia and now America, and there are countries that don't, like Japan and China.

In the case of gas, unlike a lot of other fuels and resources, the transport costs are significant because with gas the transport costs include that liquefaction of cooling that gas down to -173 degrees Celsius, which takes a lot of effort, and then to transport it and to de-gas it at the other end. And so the difference is anything up to about 50% or a bit less. So gas might be landed in China or Japan for their customers and they might pay $14 a gigajoule for the gas and in Australia we might pay $8 a gigajoule. So that difference between those who have the gas and can export it and those who have to import it is quite significant. And that is an ongoing comparative advantage for Australia, as well as the comparative advantage to continue to produce and export our gas and get the economic benefits from that.

Now, gas users in the room, the gas fuel costs or the commodity costs in your bill is typically 10% and the other 90% is network fixed costs and so on. So if gas prices were to double then the impact on your bill might be an increase in 10% and, perhaps typically, $30 a year. So that's the transition on the residential side. On the industry side, of course the transition is far bigger. A lot of industry are facing a lot of pressures, high labour costs and the dollar and a whole range of other competitive market issues, and it is a transition to move from the lower cost that we're used to historically to the higher market-based costs. But being connected to that international market means it encourages investment in Australia and it means we can then develop more gas for use locally and for use overseas. So in the long term I think that is better for overall reliability and affordability for domestic users and for international users.

And I think, to finish off, in terms of the title of the Grattan paper, *Gas: Too good to burn?* I think it more should be *Gas: Too good to leave in the ground?* We should do everything we can to encourage the responsible development of our gas resources. Thank you.

TONY WOOD: Thanks Tim and, again, thank you to our partnership with the UQ Energy Initiative. The first thing I need to do is humbly apologise, because last time we had an event in Brisbane one of the people in the audience asked us about the gender balance of the panel and you'll notice that the gender balance of the panel tonight is not exactly significantly improved. All I can say is, maybe we can hope to do better and maybe the gas industry is an awfully blokey industry.

The second thing I should do is also just explain very briefly who Grattan is. Grattan basically is almost a self-identified independent public policy think-tank. What we try and do is have a close look at some of the key issues that are affecting public policy across a whole range of things, in my case we look at the issues associated with energy. We're funded primarily through an endowment which was created by the Federal Government, the Government of Victoria and BHP Billiton, and this is going back six years ago, and we have a number of organisations who are affiliates of Grattan and they range from companies like EY, Google and those sorts of organisations. They have no editorial control over the sort of things we work at and they certainly have no influence on our opinions.

What I'm going to do just in the next few minutes is just try and focus specifically on some of the practical consequences of some of the stuff you've already heard about and open up a little with some of the comments that Mark made around policy and some of the comments that Tim made around pricing.

So, you've seen this chart already as it turns out, this one just makes the point that in Australia a substantial amount of the gas that we use is used in either manufacturing or to produce electricity. The amount that's used in homes is relatively small and, of course, for those of you who live in Queensland – I'll come to this point later – it's even smaller again than it is on average across Australia. So why is everybody talking about gas, because gas used to be one of the most boring things that you could think about in terms of what was going on? Basically, there was a fair bit of it, we used it in a few places and no-one worried about it too much and, as Tim said, electricity historically has been a far more exciting energy field. There used to be a company in Australia who actually marketed on the basis of "we think this whole thing's pretty more exciting than you do".

Well, what's been happening is quite a significant amount of change and inevitably change, particularly when it happens quickly, results in all sorts of tensions arising, but in particular what we've seen is global gas prices diverging and becoming more volatile. This is an update about a couple of weeks ago on what's been happening in the global gas markets. You'll see historically, this chart goes back to about 2000, that global gas markets more or less worked pretty closely in sync but what happened about five or six years ago is they diverged remarkably and they diverged remarkably driven partly by economic growth in Asia and then subsequently caused by the reaction in Japan to the tsunami. And, just to prove that everything's connected to everything else, who would have thought that a tsunami in Japan would have impacted on gas prices on the east coast of Australia, but that's the way the world is connected these days.

What's particularly interesting is to see what happens next. I have not got a chart that shows you what we think's going to happen next, but it's interesting to think what might cause certain things to happen, particularly whether you're a producer or a buyer or a consumer of gas you might want to have a view about what you think's going to happen next and how you might either protect yourself against certain consequences of that or how you might take a view on decisions you make about using gas or electricity or any other fuel. But I would suggest you can't have that level of divergence and commodity prices and it won't be sustained, so what will happen is people move into that market and prices eventually converge, recognising that there are, as Tim said, costs associated with liquefying and transporting gas. But that sort of divergence simply is unsustainable and you'll already see in the last little while a convergence of those prices and I draw your attention to the top chart which shows the price in Asia coming down quite quickly, and only yesterday morning the spot price in Japan was about $7 a gigajoule. Now you can't get gas out of the ground and stick in a ship and

get it to Japan for $7. So things are very dynamic, they're changing rapidly and this has consequences for a whole range of things.

The other thing that happened is that gas prices have already increased substantially. Electricity prices have had the headlines. Electricity prices in real terms have increased by about 160% over the last five years and that's been a quite visible issue and has been debated extensively, fundamentally driven by increases in network prices. On the other hand, gas has been a little bit below the radar because it only increased by 36% in real terms over the last five years and I would suggest that if it hadn't been for the electricity price increase then maybe the gas price increase would have got a lot higher publicity in the minds of consumers and also in the minds of governments and regulators. But that's what's happened and big companies, the sort of companies that are represented by the EUAA, are already seeing the impact of those higher prices as they renegotiate the contracts that they're looking to use to underpin their existing operations and possible future growth.

Now some Australian homes use a lot of gas. I moved from Brisbane to Melbourne about 10 years ago and I now know that more than a third of all the gas that's used in homes in Australia is actually used in Victoria. This chart shows you typically how much gas people use and you'll notice dramatically how different it is, and yet when you look at electricity consumption you tend to see almost the reverse. Because Victorians use so much more gas for heating and much less electricity for air conditioning their overall use of electricity is much lower than Queenslanders, but the gas consumption is very high. What that means is that when you see a price increase, and the number we used, as Tim said, was well, what would happen if the gas price increased by about $5 a gigajoule at the wholesale level? And many people have said it's already increasing more than that. Where that goes next? No idea, but if it was to increase by about that much what does it mean?

As you can see here it means relatively small amount in Brisbane because we use so little gas in Brisbane the network price dominates, and so you can see even a substantial increase in the wholesale price of gas represents a relatively small increase in the retail price. On the other hand, in Victoria the average consumer is looking at a potential gas price increase if a $5 wholesale price was to be passed through to households of something in excess of $300 or $400 a year. I know in my case I've got, as many Melburnians do, gas for heating my home, for cooking and for hot water. I use about 90 gigajoules a year compared to my brother who still lives in Brisbane and uses about eight. In my case I'm looking at an increase of about $400 or $500 a year in my gas.

This is politically a really big deal. Governments will struggle to sustain the position they're taking today in the wake of that sort of potential increase. Now I'm not saying it's about to happen overnight, but what I'm saying is if this starts to happen don't be surprised if there's a political reaction of some sort and, of course, people get nervous about what that might be. In the case of businesses, some businesses use a lot of gas and a lot of businesses don't use much at all. So it's actually a very heterogeneous use of gas across our economy. When we did our research on this project we went and visited quite a few people who use a lot of gas and typically they're looking at a very nasty outlook if the sort of price increases that are being talked about flow through. And for them the transition that both Tim and Mark have talked about looks like being very ugly, and that's why you're hearing lots of manufacturing more and more and still loudly arguing for governments to do something about it.

There's a whole range of things that they might do and what they're being asked to do, but it's not surprising, if you've been paying $3 or $4 a gigajoule for an input to your business that represents 5-20% of your total costs and you're looking at a price increase in that commodity for these sort of customers of 60-80% over two or three years, this is, again, a big deal. And so lots of middle-size manufacturing people, who do not have the choice of even moving away easily from gas to something else for their fuel let alone for their feed stock, are facing a really nasty problem and, not surprisingly, they're pretty upset about it and they're either blaming their retailer for not helping them through this or they're blaming governments for not doing something about it.

The other sector where gas potentially can be important, Tim made the point that as consumed in our power station gas is lower emissions than coal is absolutely strictly true and, of course, there's a small amount of emissions that also are generated when gas is produced depending on how it's produced. The trick is that climate change policy in this country is a dog's breakfast and this chart is attempting to show on the horizontal axis what happens to the relative cost of electricity produced from different sources, brown coal, black coal and gas, at different carbon prices. And you'll see here on the left-hand side that with zero carbon price brown coal wins all the time, black coal is less competitive and gas, even at historically low prices, was struggling. Now, that was not always the case because in certain circumstances, because of the availability of gas and coal, gas could compete, but what's changing is if you then think about what happens with a higher price for gas.

Now the solid lines, as you can see, cross over somewhere I the order of about $25 to $30 a ton and, guess what, that's a little bit more than what the so-called carbon tax was up until the middle of last year. We don't have a carbon price anymore. And look what happens when you have a gas price that increases to somewhere between $6 and $9 a gigajoule, then you can see what happens, you need a very, very high carbon price indeed to be able to see the carbon benefits of gas reflected in the electricity price, and that's partly why I don't think anytime soon we're going to see gas playing a significant role in helping to reduce greenhouse gas emissions. In fact, since the carbon price was lifted our gas consumption hasn't improved very much at all for power. What's been happening is we're producing more electricity from coal and Australia's greenhouse gas emissions have been going up. That's not exactly the proposition we should be looking for I would suggest.

So the sort of things we're thinking governments should look at in relation to policy.

Firstly, we think government need to fundamentally and quickly address what is an incredibly divergent view across Australia about what we do about developing one particular source of gas, namely unconventional coal seam gas. There are serious environmental issues that need to be addressed but, equally, there are serious economic issues that need to be addressed and we don't have a consistent way of addressing that and that seems to me to be a serious failure of policy. Secondly, we need to try and ensure that people understand what's going on a bit more clearly because for many people in Australia gas is no longer the economic fuel of choice.

Now, there are people for other reasons who might like to use gas for cooking or heating or whatever, but on an economic basis for many consumers gas is not the most economically efficient way to cook or heat water or heat your home and many people don't know that because they don't see the sort of detail that we're talking about this evening, let along the detail that people in the market understand. We need to remove barriers to competition, and Mark very clearly expounded some of those barriers, and we need to make sure that if we are going to see increases in gas prices that vulnerable

customers, particularly those who use gas significantly for home heating, are protected against significant gas price increases.

What we shouldn't be doing is reserving gas for domestic purposes because it does not work and we don't have a problem of enough gas, as you've already heard. Introducing a national interest test is a furphy and would be a distraction and if you can even get someone to define what a national interest test might be I would suggest it's basically a distraction. We should not – and this is a Victorian-centric view – repeat the subsidy for regional gas extension. I won't go into any more detail because that was a really dumb policy that two Victorian governments put in place and wasted a lot of money. And finally, we should not subsidise domestic prices, what we should be making sure is that we can work through both between producers and consumers how we respond to what is a clearly very dynamic and, to some extent, uncertain future.

I also believe quite strongly that there is a need to fundamentally have a look at the way the wholesale gas market is working or not and having people like the Productivity Commission or the ACCC have a close look at that market to satisfy both buyers and sellers that we can have a competitive gas market would be important. They raise is a question as to whether we Australians are getting the best use of the resource. I think we already across Australia wasted most of the resource boom in the first decade of this century, it would be nice to think we don't waste the resources boom in the second decade of this century because I would suggest by the time we get to the fourth and fifth decade of this century fossil fuels will be on the backburner – if I can use that term which somehow seems an inappropriate use of burning. And finally, I certainly think that what we should start to do in certain specific cases is promoting energy efficiency and I don't mean subsidising; I mean thinking about things like low-interest loans which would help people move across from one fuel to the other.

There are some big issues, they need to be thought about, policymakers need to address them and hopefully we can address some of them in the next half-an-hour or so with our conversation. Thank you.

JOHN STEEN: Thank you Tony. So for the remainder of our time this evening we have a scheduled discussion, interaction with the speakers and then, to follow on from that, a moderated Q&A including you the audience.

You've all come up with similar issues and similar themes: the gas market is not a perfect market; it's a resource that is finite; there are swings and roundabouts in terms of carbon emissions, we will increase our carbon emissions if switch to coal but, on the other hand, as Tim pointed out, we're lowering carbon emissions elsewhere. So obviously it's a very complicated issue. I think one thing that's become very prominent in the media is what are we doing with manufacturing? So manufacturing in Australia is a sector that's on its knees and it probably can't take too many more knocks. It's already very unproductive, Grattan's also done work on productivity in manufacturing, and this could certainly be a nail in the coffin for quite a few businesses.

So, perhaps as a starting point for discussion, what can we do to help those really exposed businesses that will face higher prices and suffer for that? So perhaps if I could open that up to the panel as a discussion point to start with?

MARK GRENNING: I'd just make a few points that expand on what I said in my remarks to answer your question John. What we're talking about here, the answer is not old-style regulation, not reservation, not price control, not price subsidy, not national interest test or anything like that. All the EUAA members who are in that manufacturing industry, and there are a lot there, what is frustrating them is that they can't even get somebody to offer them gas.

So we hear lots of points about yes, there is plenty of gas out there and, I agree with Tim that yes, there's lots of gas out there; the issue is the barriers against getting that gas to market so you can actually have offers out there capable of evaluation and acceptance. And that's what the manufacturing industry is looking for now and they're not getting it and the problem they have, and there are a number of large gas users in this category, they have contracts that are maturing in the next few years and they do not know where their gas is coming from after the end of that existing contract. They're not getting offers that are really capable of acceptance and so they're wondering where they're going to survive. And many of these industries are in regional areas, large employers in regional areas, and I'm not sure whether the politics realises that as yet and it's going to be interesting, as Tony said, to see how the politics react to that.

TIM O'GRADY: Could I just respond with a couple of examples? Origin does offer gas to large customers and we do offer various terms and durations of those contracts and we are signing them up, including some of the very large gas users who are prominent in the users group. There are quite a few deals on the record. One that we have on the record, which you would know, is MMG which is a new gas load at Mount Isa, so brand new additional load, and we signed them up for nine years out of 2014. Now we do sign up new customers. I think really the biggest issue for the customers is the price rather than the offer, but I do acknowledge that although Origin I think is pricing all customers that come to the door for the duration and the volumes of gas they need, others probably are not in as comfortable a situation as we are.

I know it's difficult to play things forward, but I think if you go forward and if you had a customer like Rio who just wanted five more petajoules per annum at Gladstone or whatever, which traditionally would be a very large amount of gas and people would wonder in years gone by where it will come from. Now there's going to be so many options to get that gas, so many more producers of gas, retailers of gas and pipelines for gas that I think in the future when the LNG projects are commissioned, we are going through a bit of a transition, I think the options for large users to get large amounts of gas will be a lot easier simply because our domestic consumption is pretty stable. A lot of you I know would know this, it's around 600 petajoules per annum on the whole east coast and these export projects that are starting up now, together they're about 1,200. So it is tripling the amount of gas and it just means that then when Rio or a large customer needs more gas there will be the gas available.

TONY WOOD: I think when we talked to both producers and customers what we found is a complete disconnect as to what's actually going. I mean, you've heard a little bit of it today from both Tim and Mark and they both can't be right and they're probably not both wrong either. And so I would suggest that the members of the larger businesses that consume gas are probably big enough and ugly enough to sort out how they're going to resolve this themselves and some of them have already taken action and taken positions in the upstream gas as equity partners with gas producers to try and get some better security of supply. I certainly wouldn't be signing a long term contract for gas prices because who knows where gas prices are going to be, but I reckon that's a very difficult place.

To me a far more difficult situation is middle-size manufacturers. We went and spoke to regional producers of things like tomatoes, a woman who's growing flowers in hothouses and needs a lot of gas, and they don't have the resources that the big companies have to be able to monitor gas prices and they are seriously pissed off about the way they think they've been treated by the gas suppliers. And if we start to see a hollowing out of that sort of manufacturing or they convert to something else they won't come back to gas any time soon.

So what I don't necessarily see Tim is, I know there's a lot of these guys but there doesn't seem to be the dynamic engagement that you would think you'd get with the suppliers to try and find a way of taking some combined risk to help buyers through what is clearly a very difficult position with a lot of uncertainty. I don't think it's a role for government. I think certainly looking at the way the market operates is a good idea, but at this point it seems to me there's not as much interaction as I would have expected from the sellers to their customers to help find a way of maybe sharing the risk or whatever it might be through what is obviously going to be a difficult period. Because I think seriously a lot of that manufacturing is going to go or it's going to switch to something else and, if it does, it's not going to come back to gas any time soon.

JOHN STEEN: Tim, maybe you'd like to respond to that issue around engagement?

TIM O'GRADY: I think a couple of points. A lot of customers in economic terms, they can pass it through. So if you're selling flowers from regional Australia into city markets then you can pass that cost increase through. The same with a lot of other large gas users at that mid end, people like dry cleaners and hot bread makers and so on, and their competitors face the same issue. Electricity prices, as you've said, have doubled in nominal terms in many places and people have had to deal with that. There's not really much that a retailer can do or much that a government can do.

I've certainly got sympathy for manufacturers who are trade-exposed if they're competing in international markets then they're the ones that through some of these transitions, like the carbon price, the government has given compensation to. Unfortunately, throughout Australia, a lot of those manufacturers are disappearing because we're not cost competitive and I agree, it's sad when manufacturers disappear. The car industry would be probably the biggest example but, brutal as it is, in some cases, like the car industry, it's in everyone's long term best interest and it's part of the development and restructuring of the economy.

MARK GRENNING: Our members are not looking for special treatment, they are not looking for government subsidies; all they're looking for is how can you free up a situation that was not forecast that has happened so that they at least have the possibility of buying gas a competitive price in a competitive market? If that means they have to go out of business then I have no qualms with that, as Tim does, because it simply means that the cost structure that we have here is no sustainable for that industry. The crucial difference now is that they cannot get the availability of the gas to even find what the price is to know whether or not they have a future beyond the end of their existing gas contract.

So we keep on emphasising it's not a price issue until we have availability. And what appears to be the case, and maybe Origin is different, is that the LNG developers generally are saying, "We need every skerrick of gas that we are finding to meet our contractual commitments" and, as someone who works for a company that has large investments and has contractual commitments, I can well understand that they want to ensure they have the reserves for that.

So we've reached a crunch point where those reserves are all committed to export so that legitimately they can meet their investment returns and that leaves local industry in a very difficult positon. And yes, as Tim says, there's plenty of gas out there. I've got no doubt about there is plenty of gas there. The real question is how long is it going to take for that additional gas to get to market? And our experience is it's going to take a long time because of the barriers I mentioned and the problem is that the buyers of manufacturing industry now will not be around when that gas eventually comes on stream. They would have gone out of business.

JOHN STEEN: Thanks Mark. That might be a good segue to an industry view on some of those barriers to entry. Certainly the Cooper Basin seems alive and well, it's expanding westwards as we go and gas seems to be coming out at a greater rate. So Andrew, if I could ask you, is the response to the high price really that difficult for producers, especially those mid-tier producers like Beach and Senex and companies like that?

ANDREW GARNETT: Yes, that's a great point. I'm not sure the Cooper is actually moving westwards at great speed, in fact I'm pretty sure it's not. The reality is we're in an extremely high-cost economy. What's just happened, and it seems like special pleading, but what's happened is that everybody's confidence in the oil price has just got knocked to six, so there's not going to be an awful lot of people chucking risk money, which is what we're talking about, into building unconventionals in the Cooper.

Now, if you think you could get a firm price of $15 a gig you might, so it is about price and availability as you were saying, and you could do it quicker particularly in the Cooper because it's plumbed in. But this is a high-cost economy with an even higher cost premium on our remote reserves and frankly on the unconventionals, the shale gas in the Cooper, the technical tricks that we haven't actually got to the bottom of yet. And now we're in where everybody's now risk-averse, we don't want to be chucking risk money. Now everybody of course if you've got money you're welcome to go and chuck it in the Cooper Basin, but you won't get a lot of people doing that at the moment. So yes, we're now in a crisis of confidence in addition to the other matters you were talking about.

JOHN STEEN: Perhaps if I could pick up on a point from Tony about industry policy that assists to the transition of a new reality of a higher cost gas environment. You can probably all correct be for being wrong, but I recall the situation of energy efficiency improving during the Thatcher era because of coal strikes and the higher energy prices during that time and for a period of time the UK manufacturing sector became very energy-efficient. So maybe there is a future there for a more energy-efficient sector with the right policies to support. I don't know if that's a possibility, given that lowering prices doesn't seem to be a possibility.

TONY WOOD: To me, people will adopt energy efficiency when they see an outlook of prices that are looking higher, and that applies to electricity and gas. You've seen the charts and I think we're starting to see that. Consumption of electricity certainly has been falling across Australia. With the very hot weather in Queensland this last summer actually electricity demand in Queensland went up in the last couple of months, but otherwise across Australia electricity demand is falling. That's in response to a whole range of things, but particularly in response to price. And I think what you will see is people either making decisions to go to a different fuel – oil, electricity, whatever it might be – and you'll see people looking to be more efficient in the way they use it. And that's obviously a bad thing because that not only has a payoff economically, but eventually has a payoff environmentally as well.

JOHN STEEN: I think I'll open the question to the whole panel. In order of priority to reduce those barriers to entry what should governments be doing right now and, indeed, do policy makers simply not understand the energy industry and what those barriers really are? Do you think that's a real problem in advancing energy policy and addressing these market failure problems?

TIM O'GRADY: Just a couple of points I'd like to make there is New South Wales is the best example where they just haven't progressed their gas industry at all. The current government, when they came in in 2011 the first thing they did was put a six month moratorium on new coal seam gas licences and just going into the election they've extended it further by another 12 months, so almost five years or moratorium on coal seam gas development and that's a state that historically has only ever produced about 5% of its gas. In a sense it's almost worse in Victoria. They've had moratoriums for years on fracking and the development of onshore gas and they keep on extending them and having reviews. We don't even know if they've got any yet. No-one wants to develop their gas.

Now, the reality is I say to the New South Wales people, "That's fine. Just leave your gas in the ground. It'll be supplied from elsewhere". I mean, the country doesn't need their gas, but it would make things a hell of a lot better for New South Wales if they did develop it. So I think there are a lot of things governments can do about encouraging the development of gas and that's responsible. People have valid concerns about the impact of gas on land use, on water and fracking, but we've been doing all of that for 20 years here and we've never had a material issue. Really, coal seam gas is not a particularly intrusive industrial activity, although it really gets people very worked up.

JOHN STEEN: Tony?

TONY WOOD: Personally my view would be, and I was involved with some of the activities in Queensland with coal seam gas, I think broadly speaking the industry has done a pretty bad job engaging with communities, to be honest, across the board, and that's not any particular company. As Tim said, there are valid environmental concerns, they may be able to be addressed, but it would seem to be a terrible outcome if we end up stuffing around and not saying whether we're going to do this or not. If we seriously want to leave the gas in the ground let's do that. Let's come to that conclusion in a clear and transparent process, because then you can move on and start to develop the alternatives of the sort that Tim's talking about. But whilst ever there's uncertainty obviously no-one's going to go and develop the alternative when they think the governments might still allow them to develop coal seam gas. So getting that sorted out is a clear priority, one way or the other. I mean, I've probably got a view one way or the other, but the important thing is to get it fixed, not to let it drift off.

The second issue, I think we desperately need some clarity about climate policy in this country, and I don't see that happening any time soon, because that has a major impact on the role that gas will play into the future, only probably maybe for a few decades because by the time we get out into the middle of the century gas will have to be on the decline as well significantly. And finally, I think there is a need for governments to have a pretty close look at this wholesale gas market because it is a narrow market, a small number of buyers, a small number of sellers, and it's not working as well as it might and I think it could be improved, not to the same sense as the United States has because they've got thousands of sellers and buyers, but we can certainly do better than we are now.

JOHN STEEN: Andrew?

ANDREW GARNETT: I'm just thinking that the barriers to entry on the supply side is on the licencing side. The obvious things that governments can do, particularly state governments, can start opening licencing rounds and so on. If you look at what's actually currently licenced in South Australia and Queensland there's not an awful lot that's not already out for offer, actually there's not free land sitting out there waiting for people to grab. So you can do that and you can be a bit more proactive on licencing and you can certainly hold people to terms insofar as people have a firm work program, you can certainly make sure that the work program's done and they relinquish on drill and so on and so on. That's all just good licence management. And maybe there's some room to improve there, but there's not an awful lot of untaken acreage at the moment.

So then you're into what can you do with juniors? If we're talking shale gas in this country, juniors aren't going to be the answer. It's just too big, unless you can find a way to give them cheap capital - if you can give us a shout, because I'll get some of that too. But it's just not a junior's game. Deep shale gas in this place is not a junior's game. It only was in the US because they could sit on the back of this enormous economy with a huge boom with 1,700 land rigs. So it's not that game here, it's going to require the big guys who can afford to lose several hundred million dollars in order to prove the shale place. So juniors I see are less of a point and licencing maybe a little bit.

JOHN STEEN: Thank you. We've moved to open some questions for the audience. I have a number of questions that came in before this evening. I guess for a lot of people the relationship between oil prices and LNG prices is very obscure and arcane. Would you mind giving a layman's explanation of how those prices are linked, because obviously the oil price has fallen quite a long way?

TONY WOOD: Historically in the region where gas prices are written on long term contracts it made sense because if you're going to develop major industry or resources of the sort Tim was describing you need those long term contracts to provide certainty for investment. The way the prices were set, because there wasn't a vigorous trading hub in this part of the world they were basically set on an oil-indexed price. You might wonder why would you do that, what's the connection between the oil industry and the gas industry? There are obviously some but it's not as deep as you might think. And a year or so ago when oil prices were above $100 a barrel the buyers in Asia were very seriously upset about all this, they wanted to move to something different and the producers, not surprisingly, were on the other side of it.

Now it's all changed. So whether or not we'll see a move away from long contract prices towards more spot prices remains to be seen, but the end result is right today – and this is not about what the individual commercial arrangements are – those contracts that have been written to underpin the LNG facilities in Queensland and the northern part of Western Australia, the gas price is linked to the oil price; when the oil price falls, so does the gas price and so do Santos and Origin's share price.

JOHN STEEN: Yes.

TIM O'GRADY: And maybe to add a bit of context to that. When people like us made decisions to invest in these mega $20/25billion projects it wasn't done on the basis of a transient spot price above US$100 a barrel, it was done on more sustainable forward prices. They were never $100 and they're not $50. The other point to note is the macro-economy does work to an extent. So although those forward prices have dropped in US$ the AU$ has dropped as well, so the revenue in AU$ has not dropped as much. But yes, LNG pricing, we've sold all of our gas for 20 years out of Australia Pacific

LNG mainly to Sinopec in China and also to a customer in Japan and those prices are not transparent or public, they're private contracts and they're complicated contracts. They're not 100% linked to oil prices but they're certainly broadly, as per the commentary and the press and what Tony said, they are linked to oil prices, yes.

ANDREW GARNETT: The cost base of oil and gas are linked. Most gas are associated gas or much is, so producing oil and producing gas is the same cost base, the same contractor base, the same supplier base. So there's a hard link there on the cost side too.

JOHN STEEN: Thanks for that explanation. I might ask the audience, do you have any questions for the panel?

AUDIENCE: Do we have the technology to deliver the gas to the local market at a reasonable price?

TIM O'GRADY: What's a reasonable price? Do you mean at a reasonable price or a regional margin? Can someone put risk money into a gas company, into a gas field and make a reasonable return on risk? Well, we have a high cost economy so we're going to end up, one way or another, with high prices until we do something structurally about the cost and productivity factors in Australia, I'm afraid. Technologically, if you just want straightforward technical answers, we can get the stuff out, but it's always going to be more expensive here than it is in Louisiana until we do something structural.

TONY WOOD: It's more of a market issue than it is a technology question. The Australian domestic gas market is very, very small relative to the size of the resources we're talking about, whereas the US, which is done quite differently as a result of the changes in unconventional gas, is almost the opposite. They've got a really large domestic market with lots of buyers and sellers, lots of infrastructure; they've certainly seen the benefits of being able to do that, plus a lot of the gas has, as Andrew said, come off the back of oil that was being developed at the same time, so the gas was relatively cheap. It's a very different market.

So it's not a technology questions to be able to deliver gas at whatever price point you think it might be, it's more of a market question as to can we actually do it at a level that can be sustainable for the domestic market? Arguably, without the LNG we're talking about, the coal seam gas in Queensland would not have been developed to the extent it has been without the export market.

AUDIENCE: My question is to Andrew, why is it that a country that has amongst the lowest gas resources in the world turning out to be one of the largest exporters and how is that sustainable and does that start to answer your argument as to why the prices are so volatile in Australia? Because if you look at the BP World Energy Book, Australia has far less than 1% of the total world gas supplies, from my memory, so it just seems inconsistent to me that we have a very large export industry for LNG when we are actually underpinned by very scant resources.

ANDREW GARNETT: I think, first of all, "1% of the world reserves are resources" is actually a very large number. So just because it's 1% of the world, I suspect you mean resources but I'm not sure, to be honest. It's actually a lot, so in terms of per capita or per domestic consumption we actually have a massive reserve for production or reserve for the domestic consumption ratio. So it's just because we're a bit country but only 20million-odd people in it. So I'm not really sure on your numbers, but we're actually extremely well-endowed in resources and increasingly, especially over the last six

years, we've added another 40 TCS of two-piece reserves. And it's quite a detailed conversation to go into whether they're reserves or resources and who's counting them and so on, I'm happy to talk about it afterwards, but we're actually well-endowed with resources.

AUDIENCE: My question follows on from that. I understood the first speaker to say that gas is a finite resource which is inevitably being depleted, and then I thought I heard the third speaker say that we have resources that are so abundant that we're unlikely to ever run out. Can they both be true or is it just a matter of different timescales that you're talking about?

ANDREW GARNETT: Yes, it's the different timescales.

TONY WOOD: I think the evidence is the world is not about to run out of fossil fuels any time soon, which is good for some economies and bad for some environments or bad for all of our environment.

ANDREW GARNETT: But you can go down to the peak gas or the peak oil type of arguments which are always lots of fun and we always get horribly wrong. A lot of the expression that came out of OPEC, who said that the Stone Age didn't end because of a lack of stones. So we're not looking for a lack of gas or oil to end this problem.

TIM O'GRADY: Can I just add onto that point a couple of facts. We're currently the fourth biggest exporter of LNG. It's pretty remarkable, but in three years' time we will be the largest exporter of LNG in the world. But we could double that quite easily, if we can get the international customers, as a country we definitely have the gas reserves to double that. We have got heaps of gas.

AUDIENCE: As I understand it, all speakers have said that it's not a rational policy to have a domestic reservation requirement. Can you explain what the situation in Western Australia is and what led to the outcome there?

TONY WOOD: I'll have a go. A lot of this started back in the '90s when the North West Shelf Projects were being developed and the Western Australian government at the time, to help get those projects moving, effectively guaranteed a market for that gas into Western Australia. So as a result of that a lot of gas suddenly flooded the market, both domestically and to supply that export market, and the end result was very low price gas and a very gas-intensive economy. If you look at Western Australia the amount of gas used per dollar of state product in WA is much, much higher than it is in the east coast for that reason.

What then happened was that these things move dynamically, so when you have this very low price there was very little incentive for people to find more gas and so after a while things started to change and the new Western Australian government got very nervous and imposed this concept of we need to reserve some gas for ourselves. And unfortunately, if you're literally running out of physical gas then you could understand why you want to say let's keep some for ourselves, but if you're really more concerned about where the price is going to go then a reservation policy doesn't work. Basically the evidence is that in WA it does exactly the opposite in the long term of what the Western Australian government was hoping to achieve. It takes away incentives for people to go and find more gas and because of the way in which it's structured says that the producer has to supply a percentage of their gas to the domestic market provided the price is commercially competitive, the price ends up being the price anyway.

So it actually does not work. And on the east coast, again, we have the same issue. All the issues we're discussing are not about a shortage of gas. It's a very interesting and difficult challenge the way that we and the market are responding to the tension you've heard, but it's not about a shortage of gas and therefore a reservation policy would fundamentally produce a completely diverse outcome.

AUDIENCE: I think some of the speakers tonight have been a little bit lazy. There's a clear distinction between reserves and resources. The Society of Petroleum Engineers basically says if you can get it out of the ground, sell it and make a profit it's a reserve of various levels; if it's gas and it's sitting in rock and you can't get it out and make a profit it's a resource. The two are completely different. If the price of gas goes up more resources could be converted to reserves and vice versa.

I'd like to ask someone from the panel, bearing in mind the announcement from Shell two days ago that they're going to not proceed with their Curtis Island project and assuming they've developed about the same amount of gas as QGC and Origin and Santos, does Shell's announcement mean that all of a sudden Queensland has lost 25% of its reserves or its resources?

ANDREW GARNETT: I used to work for the company, but I can't speak intelligently of them any more so I can only make some guesses like you. So of course Queensland's lost nothing, the molecules are still there. The reserves versus resources is purely a classification, as you suggested, in terms of the economics and the economics you said it's whether you can make a profit out of them. It's not quite; it's whether you forecast you can make a profit out of them. So it's really a very uncertain number. So one person's reserves might choose a certain price forecast going forward and another company might make a completely different set of price forecasts and for the same asset, for the same endowment, they have very different reserves numbers.

So what you're seeing when you see companies doing different movements in a market is that they've got effectively different requirements for screening values, firstly, and, secondly, they've got different opportunities in other countries to spend their money on. So that's what you're seeing in the dynamic of whether people choose to develop or not is there's an inherent different set of conservatism or different optimism on forward prices. There's other things, different costs of capital and all the rest, but there's also, don't forget, other places to spend this money at the moment where it doesn't cost $7 a gig to get it to the wellhead, or whatever the number is. So I think that's a dynamic we're seeing with Shell, but I've no special knowledge of that.

TIM O'GRADY: But the question about the reserves, the fact that Shell are not proceeding with that project doesn't change the reserves, so they're now available for other users.

MARK GRENNING: So I think the interesting thing will be, and that's one of the points I raised that the EUAA is inviting governments to consider, how do they treat reserves which are available there which are now not committed to an LNG project? And I'm sure Shell and Arrow are engaged in discussions with the existing parties developing projects who may be short of gas for their train two, equally we remain to see whether or not that gas will be offered to domestic users.

AUDIENCE: A quick question from a non-blokey point of view, it's directed towards the gentleman representing Origin. First, I challenge you on your statement that gas' footprint is conclusively less than coal. If you go online and look at Crikey there's an article written by yours truly which challenges that based upon the fact that the footprint is calculated using data from the American oil and

petroleum industry which was collected in the 1990s from two very small studies. The CSG industry has committed very little to no resources in actually collecting data to be able to conclusively quantify the greenhouse gas footprint of the industry, and anyway the International Energy Agency wrote a report probably around 2011 itself saying that gas is not a panacea for climate change.

Also I was just wanting you to respond to the question, given that the development of the LNG industry threatens to rip the heart out of manufacturing and is already threatening the agricultural industry, where does that fit under your corporate social responsibility framework to threaten major industries within Queensland when you've promised wealth for the people of Queensland through extracting the gas resources and that, for example, the royalties that Queensland earned in the 2013/14 financial year has dropped from $191million down to something like $74million?

TIM O'GRADY: There's a few points there, I'll try and address them quickly. We do do measurement of our gas emissions, our gas completions, and the CSIRO have done recent measurements of that and have found that our emissions are in line or below some of the API data you refer to. But I acknowledge that emissions from coal production, emissions from gas production and transport, there's a range. I would say that all the studies I've really seen would indicate that the emissions from gas-fired power generation are around half of the emissions from coal, but I acknowledge you can use data that can indicate otherwise in some cases.

In terms of the coal seam gas industry wrecking manufacturing, I don't think so. I just think that really if there was no LNG industry or if there was no coal seam gas industry the customers would probably be in a worse situation, would be my view. And your third point about sustainability and coexistence with landholders. I think in Queensland, unlike the other states where the industry is not very advanced, we have been here for many years, over 20 years. We have hundreds of landholder agreements that have all been voluntary. Those landholders are remunerated for what we do on their properties and I think we have demonstrated, in fact, that coal seam gas extraction can coexist with agricultural use.

JOHN STEEN: Tony, you commented also in your talk on relativities of emissions from coal and gas. In your research you would have looked at some of those papers I guess?

TONY WOOD: I completely agree that the whole issue is the full lifecycle emissions and there's a debate about how much emissions are produced in building a wind farm or producing solar panels. Fundamentally no-one can disagree with the idea that you should consider the full lifecycle emissions. There's also a lot of sometimes conflicting data out of the United States about what they're measuring and what levels and so on. There needs to be more of the sort of thing Tim's talking about, more measurement and clarity around this. Most of the data that I've seen suggests that on the emissions side, even when you take into account anything like the sort of emissions you do get from the production of the gas, that when you add that you still get significantly lower total emissions from producing electricity from gas than you do from coal. Now, we've still got a situation in several decades where we're going to stop doing this because we can't keep burning gas or coal at all, but put that side for a second.

The other side of it which is a far more complex issue which is about the global warming potential of methane versus CO_2 and there's a big debate often about that question. If you use the generally accepted principal that number then the numbers, again, don't change very much. But there are

people who would argue, depending on the way you use the multiple of how long does the gas stay in the atmosphere and what sort of greenhouse impact it has, there is another argument that says under different sorts of assumptions about that very, very complex scientific question gas is worse again than the numbers would otherwise suggest. Now that's something that I wouldn't even get into because I think it's a very complex scientific issue and if you or anybody else is interested in that there are plenty of references you can get to to try and satisfy yourself a bit more about the relativity of gas and coal. But I think from what I've seen, broadly speaking, at least for a while, electricity from gas is better than electricity from coal.

That doesn't mean that that's where we need to be for the long term. I think quite understandably a lot of people with environmental priorities and people who are keen on renewable energy who thought gas was a fuel of transition have seen, as people have said already, we're not about to run out of anything anytime soon and gas is possibly also threatening renewable energy rather than coal. And that probably is a much driving some people as others, but I think at least for a while if I was worried about climate change I'd rather see carbon prices of the sort I was talking about which would actually drive us towards gas for a while yet.

ANDREW GARNETT: The IAA study you're talking about actually said there's no universal panacea, not surprisingly. It actually said increased use of gas will prolong the time we have to get us into that 450 PPM solution, so it basically buys some time if it increases. If you go with the global GDP growth that they assume, which fluctuates now and again, that's basically what they said. The reality on coal versus gas, even when you put fugitives because you put in the CO_2 equivalent and you can put in 24 global warming or whatever you choose, the reality is of course there's a range. If you have a combined cycle base load power station it's about 40% of a black coal reasonable one, it's a lot better against a brown coal one. If you run gas open cycle just for peak saving it's about 60-65% of normal coal. If you add on an LNG processing plant it's again not so good, you add another 5-10% CO_2 emissions.

So it's really lovely for us to put out a 40% or a 50% and unfortunately there's actually a whole range of things that determine that. Almost every time you come up with gas, one way or another, being a lower emission fuel from a CO_2 equivalent point of view than coal. And so whether it's 40 or 65 is the argument. You have to do some real special pleading to get it equal to coal and it's almost impossible, unless you reinvent physics, to get it equal to brown coal. You can reinvent physics by the way, it's allowed because the numbers we did in the 1960s apparently don't apply in the 1990s.

AUDIENCE: We hear all the time from New South Wales that there's going to be a massive gas shortage, the people are going to not be able to heat their homes, there's been a big scare campaign in New South Wales, but they've been getting gas from Queensland for decades. So while there seems to be this dissidence with we've got lots of gas but we haven't got enough gas, we don't want a reservation policy. So that was my first part.

The other issue that's just come up in regards to Origin and that landholders are happy. I go out there quite a lot, I've got friends who live in the Surat Basin and there are a lot of farmers that I talk to that are not happy, a lot of landholders that are having huge issues with their water and with coexisting, which some landholders say is more like co-occupancy. Some of these are people who have signed up with gas on their places, continual breaches, continual having to deal with problems, and I get farmers ring me in tears, and some of these are Origin, QGC, Arrow, Santos. So it's a huge

industrialisation of a rural area and there are a lot of problems which a lot of people don't realise. There are people who are sick and having huge issues.

JOHN STEEN: Sorry, if I could just interrupt, could you frame that as a question please?

AUDIENCE: So what is being done to address these issues? There are people that have been bought out from there. There are other people who want to go but they can't afford to go and some of them are under Origin or have Origin as a next door neighbour or have Origin on their land.

JOHN STEEN: Okay, thank you. Tim, if you'd like to respond.

TIM O'GRADY: I should comment briefly on that and I can't comment on the specific people that you're speaking to, but all I can really do is note that we have over 600 agreements, they're all voluntary. When I speak to those landholders, those farmers are really getting a stream of revenue they otherwise wouldn't get. They're often getting water as well that we treat and supply back to them. They're often getting other improvements.

You did mention health issues. There have been some allegations of health impacts from coal seam gas activity, but I think the only couple where there has been some issue, like with the black rain where there was a substance on people's cars that was tested, they have been found to have nothing to do with coal seam gas. The black rain, which is one you may know, was in fact an insect residue.

AUDIENCE: No it wasn't. I've read the results of that test, they did not say that that was – they found no sugars in the residue that were on the cars. And they weren't under trees.

TIM O'GRADY: Look, all I can say, that's not my understanding. That particular one, which was quite high profile, was tested and that was my understanding.

JOHN STEEN: Okay, maybe you could get into that debate separately, but thank you for the question.

AUDIENCE: Thank you. The first question was about the gas shortage in New South Wales.

TIM O'GRADY: I had a quick answer for that, just because of the way you framed it. Some people are saying that in the winter of 2016 or 2017 on a few very cold days there may be insufficient gas. There will be sufficient gas. It's not an issue of anyone's stove not working or the lights going out in Sydney or up here. There certainly will be sufficient gas. It's just an economic shortfall in very extreme days which the market, if it happens, will solve by curtailing electricity generation or curtailing large customers. The shortage of gas issue I don't think has a lot of substance in it.

JOHN STEEN: We've run over time unfortunately but, like me, I hope you've enjoyed this conversation this evening. I think Grattan's role in trying to elevate the debate and actually get facts into the debate is critical in how we resolve these issues and certainly your input tonight has been part of that discussion. It remains for me to thank our panellists, Professor Andrew Garnett, Mark Grenning, Tim O'Grady and Tony Wood, and as a member of UQ I'd also like to that Grattan for this collaboration. Thank you very much.

END OF RECORDING