

# **SCENARIO PLANNING FOR SUSTAINABLE LANDUSE IN THE NAMOI CATCHMENT**

## **Report prepared for the Namoi Catchment Management Authority PART B: APPENDICES**

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# Contents

<b>A! Workshop 1 presentation.....</b>	
<b>B! Expert commentaries.....</b>	
<b>C! Drivers of change.....</b>	
<b>D! Scenario logics.....</b>	
<b>E! Leadership forum.....</b>	
<b>F! Endnotes.....</b>	

# **A Workshop 1 presentation**

The following slides were presented to the first Scenario Planning Workshop to summarise interviews with a range of stakeholders.

[See presentation send separately]

# B Expert commentaries

The following is a summary of the commentaries on the first draft of the Namoi scenarios that were commissioned from a set of experts. At this stage, the two critical uncertainties defining the scenarios were: (1) the Namoi shaping its future, versus having it shaped by others; and (2) Governments and decision-makers across Australia working in concert, versus working solo.

The areas of expertise included:

- ☐ Best practice in scenario planning
- ☐ Governance
- ☐ The economy
- ☐ Agriculture
- ☐ Biodiversity
- ☐ Mining
- ☐ Energy
- ☐ Water
- ☐ Climate change
- ☐ Local business and labour markets
- ☐ Education
- ☐ Knowledge economy
- ☐ Social issues generally

## **General comments**

In general, the experts have found the two critical uncertainties explored in the scenarios are challenging and relevant.

Some thought the scenarios should be shorter. Some wanted more issues dealt with, and some wanted fewer. Some liked footnotes and boxes, and some did not. This is pretty much expected - not everyone likes the same format for scenarios. We need to think about what our main audiences might like and give them different ways to view the scenarios and their conclusions.

A couple of commentators commented that the scenarios were not sufficiently imaginative with respect to the types of social and technological change that could occur in the future. They acknowledged that we have tried to avoid overly 'futuristic' scenarios so that decision-makers in the region and in State and Australian governments do not dismiss them as implausible. This is, however, a legitimate criticism that we need to think carefully about. We have found new research about 'disruptive technology' that might be woven into the scenarios.

## **City versus regions**

Several experts have questioned whether the dichotomy between city and regional views of the world is as large as the scenarios suggest. Several experts have suggested that there is a flavour of 'blaming the cities' in the shape/be shaped axis. Several have questioned whether it will ever be possible for regions to have control over their own affairs, and they have suggested that the scenarios should focus more on how regions cope when they have only minimal control.

## **The Namoi determining its own future**

Several experts talk about the reality that markets will drive virtually all change in the next two decades, and question whether the scenarios are economically naive when they suggest that people in the Namoi might take some control over what industries develop in the catchment and what incentives might be provided to attract desirable industries into the region. (We think that these experts have not understood that many of the arguments in the scenarios are based on sound thinking about markets and market failure, which indicates that these dimensions of the issues need to be explained more clearly in the next draft of the scenarios.)

## **Governance**

All experts who have commented on governance issues regarded regional government as being highly unlikely by 2030, although all acknowledge that some movement towards reforming local government and focusing governance at regional scales is highly likely.

## **Industries**

Several experts have commented on the potential competition between mining and agriculture for land and water in the Namoi between now and 2030. The consensus seems to be that both mining and agriculture have potentially bright futures, driven largely by increasing global demand for both energy and food. Some experts questioned whether the location of the Namoi gives it any competitive advantage over other catchments, but all acknowledge the major assets that coal reserves and black soils provide. Several experts acknowledge the importance of labour and skills in supporting the expansion of mining and agriculture, and the uncertainty about supply of these over the next two decades.

## **Urban water**

Several commentators questioned the focus on towns in the Namoi 'running out of water'. They asked how this could happen if town water use is a fraction of irrigation use. They assumed that if towns needed more water it could be diverted from agriculture. Clearly this issue needs to be explained more fully in the next version of the scenarios. (More generally, we need to identify a set of key assumptions and issues that we explain in some detail as a preamble to the scenarios.)

## **Population**

Several experts noted that issues about population and workforce composition and structures should be drawn out. Some suggested that the scenarios are all optimistic in terms of population growth in the Namoi and suggest that we should be considering population decline scenarios as well. Questions are asked about how strong the so-called 'tree change' phenomenon will be, and how long it will last for.

## **Assumptions**

Although we spent some time identifying assumptions held by participants in the scenario workshops, we did not communicate this information to the experts and several stressed the need to be open about what these assumptions are. In the absence of this information, several experts provided commentary on what appeared to be the assumptions implied in the scenarios and suggested that these were often overly optimistic, sometimes naive, and sometimes were either overly optimistic about the future of regional Australia or overly pessimistic about the attitudes of urban Australia.

On the other hand, the expert who was asked to comment specifically on governance recognised that the scenarios contained accurate insights into tensions between and among national, state, and local government and between urban and regional Australia. Our opinion is that the basis for

the scenarios is sound, but that a lot more effort needs to go into articulating the ideas behind them and realistic ways of addressing issues. (One commentator, for example, noted that meetings of representatives from regional Australia frequently complain about being neglected by city-based decision-makers and suggested that it is unproductive to continue with this rhetoric without new ideas about how to deal with it.)

### **National strategic approach**

This leads to the issue of a national strategic approach to resource use, which is the basis for the concert/solo dimension of the scenarios. Several commentators found it hard to identify what this issue was about. They asked for examples of what we thought a national strategic approach would look like. Some wondered whether this would ever be possible, given the nature of modern Australian politics. Some dismissed it as a complaint from regional Australia about being undervalued (which it partly is, except that we believe it is a legitimate complaint).

### **Biodiversity**

The responses with respect to biodiversity were as we expected, but nevertheless very interesting and useful. Both commentators suggested that limited improvement in biodiversity is possible between now and 2030, and that the best that can be hoped for is concerted efforts to arrest the decline in both the numbers of individuals and species and the ecosystem functions and services provided by living organisms in the catchment. Trade-offs between conservation and production, as expected, were a focus for some of the discussion, but both commentators argue that there is a need for fundamental change in thinking about the relationship between ecosystems and human welfare to support sustainable human communities and economies between now and 2030. Interestingly, while both commentators acknowledged that climate change will have a major impact on biodiversity between now and 2030, they both considered that the actions taken by decision-makers at all levels will have much bigger impacts.

### **Conclusions**

Overall, we believe that the scenarios have already stirred up discussion about some of these issues. We need now to make the scenarios more realistic, but at the same time more imaginative about future possibilities, and to make the arguments much more strongly and clearly.

It is worth considering whether there are alternative dilemmas (critical uncertainties) around which to structure the scenarios, but our feeling at the moment is that many of the other dilemmas (for example, movements in global markets, the tension between mining and agriculture, and the impacts of climate change) are best dealt with as potential shocks to the system, in which case we would focus on considering how these shocks would be dealt with differently under different scenarios.

The commentators have suggested a number of bifurcations (the scenario could go one way or the other) that we can think about.

# C Drivers of change

Participants in Workshop 1 were asked to identify issues they thought would be of concern for the Namoi's people in the future, and the factors that would drive change between 2007 and 2030. Their responses are given in the table below, unsorted and unedited.

ISSUES	DRIVERS
Loss of aesthetic values Changes to the community Environmental pollution Lack of government support Degraded infrastructure Intensified land control Skill shortages Climate change/amelioration of impacts of climate change Lack of water/damage to aquifers Market-based mechanisms to put a value/price on ESS – will the government do it? Will they do it efficiently? Cost of water – will it be affordable? Will unpriced, unconstrained water use be reigned in? Efficiently regulated under ? Who is going to fund the innovation? Where will the technology come from? Capacity of people and education, what to learn, teach Political – lack of leadership – 3 year focus rather than long term How do we use our water more wisely so we “get most bang for the buck” Support for development of new industries and transition to new markets considering scarce water resources Creation of disadvantaged communities due to water access and availability Will the environment be maintained or improved into the future by our decisions of the present?	Mining development; technology does not deliver efficient and affordable mining Change in population Conditions of approval, implementing amelioration measures Declining population base Local government lacks resources, state political ??? Public pressure Changing price relativities (e.g. so carbon emissions become more expensive) needs govt to set up the appropriate framework expectation government will do above Tension between environmental, economic and social concerns Adoption of technology by industry and competitive advantage (profit motive) e.g. through CSR reports Science and improved understanding of the ecosystem Increase in producer costs i.e. inflation Water use efficiency and technology and additional changes – appropriate costing regimes will force change Increase dam capacity – increased water security – new and existing; community and expert opinion driving political change and support Acknowledge the risk, plan for the change that is inevitable Community awareness of importance of healthy environment – determine what is a healthy environment that community will understand

# D Scenario logics

The table on the following page outlines the detailed logics for the scenarios.

## Characteristics of Scenarios 1-4 with respect to key issue areas

Please note: These scenarios assume effective governance arrangements. This means that they are all optimistic scenarios in which decision makers are able to find ways to address most of the challenges and take the opportunities associated with the energy and climate change trajectories.

Issue area	<b>1 HOT SCRAMBLE</b> Disorderly energy transition High warming Effective governance	<b>2 WARM SCRAMBLE</b> Disorderly energy transition Low warming Effective governance	<b>3 WARM COMPLACENCY</b> Orderly energy transition Low warming Effective governance	<b>4 HOT WEATHER, COOL HEADS</b> Orderly energy transition High warming Effective governance
<b>International pressures</b>	Oil supply declines and oil prices regularly rise, plateau and then rise again.	Oil supply declines and oil prices regularly rise, plateau and then rise again.	Oil supply stabilises, but the world realises it has to make the transition to alternative energy sources within the next few decades.	Oil supply stabilises, but the world realises it has to make the transition to alternative energy sources within the next few decades.
	There is a global scramble to secure coal and gas supplies, and negotiations on carbon emission reductions slow down.	There is a global scramble to secure coal and gas supplies, and negotiations on carbon emission reductions slow down.	There is an increased focus on coal and gas, but with a view to increasing reliance on renewables. Progress is made on carbon emission reduction goals, but this slows as the worst fears about climate change do not materialise.	There is an increased focus on coal and gas, but with a view to increasing reliance on renewables. Progress is made on carbon emission reduction goals.
	Political and social unrest are rife due to insecurities over energy and pressure from powerful interests to secure energy supplies.	Political and social unrest are rife due to insecurities over energy and pressure from powerful interests to secure energy supplies.	International tensions decline as the threats of energy shortages and climate change abate, and countries have time to repair diplomatic wounds and rebuild relationships.	While political and social unrest continue to be common due to the uncertain times, greater global cooperation emerges due to the recognition that climate change is real and a big global threat.
	The US economy is volatile due to its reliance on oil and the fact that many of its assets are	The US economy is volatile due to its reliance on oil and the fact that many of its assets are	The US economy stabilises, but its influence has been reduced due to the financial shocks of	The US economy stabilises, but its influence has been reduced due to the financial shocks of



	owned by Middle-Eastern and Asian countries and businesses. These countries cannot let the US fail, but they are increasingly withdrawing investments strategically.	owned by Middle-Eastern and Asian countries and businesses. These countries cannot let the US fail, but they are increasingly withdrawing investments strategically.	2007-10. Foreign investors in the US economy start to slowly exert more influence to protect their investments.	2007-10. Foreign investors in the US economy start to exert more influence to protect their investments in the uncertain world of high warming.
	As China's economy grows, it starts to build closer links with Eastern Europe to secure oil supplies. China struggles to maintain its rate of growth as oil supplies decline, but it rapidly increases its capacity in other energy sources. Demand for Australian coal is very high.	As China's economy grows, it starts to build closer links with Eastern Europe and Africa to secure oil supplies. China struggles to maintain its rate of growth as oil supplies decline, but it rapidly increases its capacity in other energy sources. Demand for Australian coal is very high.	As China's economy grows, it starts to build closer links with Eastern Europe to secure oil supplies, but retains its old alliances and links with the West for a few decades. Demand for Australian coal is high.	As China's economy grows, it starts to build closer links with Eastern Europe to secure oil supplies, but retains its old alliances and links with the West for a few decades. Demand for Australian coal is high.
	Climate change has major impacts on developing countries, notably causing failure of vital crops more frequently than in the past. Global food supplies come under pressure due to the impacts of climate change and high costs of energy and petroleum derivatives required for food production.	Climate change has only moderate impacts on developing countries, but food supplies still come under pressure due to high costs of energy and petroleum derivatives required for food production.	Climate change has only moderate impacts on developing countries. Food supplies still come under pressure due to population growth, but increased production in some areas (including Australia) is possible as energy costs have stabilised.	Climate change has major impacts on developing countries, notably causing failure of vital crops more frequently than in the past. Global food supplies come under pressure from climate change, but increased production in some areas (including Australia) is possible as energy costs have stabilised.
	Failure of developed and developing countries to reach agreements over free trade leads to growing resentment and forging of powerful trading blocs between China, several other Asian countries (including Indonesia), Russia, India, Brazil, Argentina, and several other South American countries that make trade more competitive and cut-throat, and more based on relationships and alliances.	Failure of developed and developing countries to reach agreements over free trade leads to growing resentment and forging of powerful trading blocs between China, several other Asian countries, Russia, India, Brazil, Argentina, and several other South American countries that make trade more competitive, and more based on relationships and alliances.	Developed and developing countries take another decade to reach agreements over free trade as there are no pressing global disasters and powerful countries act to protect their advantages. Resentment grows and trading tensions emerge between developing and developed countries, which eventually bring the developing countries back to the negotiating table.	Developed and developing countries reach agreement over free trade (the DOHA round resumes earlier than anticipated, and unexpected agreements are reached). There is wealth transfer from wealthy to less wealthy countries to compensate for reduced industrial activity in developing countries. Low emission technologies are fast-tracked and allow developing economies to continue growing.
<b>National policy and political trends</b>	Declining oil supplies and rising prices, combined with growing domestic concern about energy	Declining oil supplies and rising prices, combined with growing domestic concern about energy	Stabilisation of oil prices gives the Australian government the chance to focus on other issues.	Stabilisation of oil prices gives the Australian government the chance to focus on climate

	security and international demand for coal and oil, lead the Australian government to slow the introduction of emission control programs and to introduce concessions for energy intensive industries. Concern about climate change puts pressure on governments to not let emissions control fall off the agenda.	security and international demand for coal and oil, lead the Australian government to slow the introduction of emission control programs considerably and to introduce many concessions for energy intensive industries. Lack of concern about climate change allows emissions control to slip down the political agenda.	Climate change is of less concern than it was in the public's mind. Emission control programs are introduced slowly from 2012, but with a balance of concessions and penalties to keep the majority of voters happy. Some additional social and environmental objectives are introduced in policies aligned with emission control programs, but these are not especially hard-hitting. The public is becoming complacent about environmental issues as Australia is doing well, socially and economically. There is some support for developing renewable energy technologies and industries, but progress is slow.	change, which is a high concern. Emission control programs are introduced on time with few concessions. A wider range of social and environmental objectives are introduced in policies aligned with emission control programs. There is strong support for developing renewable energy technologies and industries, especially in regions.
	There is policy and social tension, however, as high warming generates public pressure for emission control. Government spending on climate change adaptation rises, but its focus is torn between climate change and growing concerns about energy.	There is little opposition to the slowing of emissions reductions as climate change is not looking as bad as expected. People are worried about energy supplies. Government spending on climate change adaptation plateaus as its focus is on energy.	There is little opposition to the minimal actions of the government on energy and climate change as the public is becoming relaxed and complacent about both issues. Government spending on climate change adaptation plateaus as its focus moves to other issues.	There is strong public support for emissions control as high warming is generating strong public pressure. Government spending on climate change adaptation rises and becomes the governments' prime focus.
	State and Australian governments are unable to focus on regional governance issues due to the major global issues confronting them, so governance reform stalls. Well-organised regional bodies and local governments are able to exert considerable influence if they can offer coordinated strategic planning and management capacity. Otherwise, regions are left to struggle with ad hoc	State and Australian governments are unable to focus on regional governance issues due to the major global energy issue confronting them, and because concerns about climate change have reduced, so governance reform stalls. Well-organised regional bodies and local governments are able to exert considerable influence if they can offer coordinated strategic planning and	State and Australian governments continue to consider reform of regional governance, but it is a low priority because the feared climate change disasters have not occurred and regional economies are performing reasonably well. However, well organised regional bodies and local governments are able to exert influence if they can offer coordinated strategic planning	State and Australian governments focus strongly on regional governance to leverage support for developing new energy industries and adapting to climate change. Well organised regional bodies and local governments are able to exert considerable influence if they can offer coordinated strategic planning and management capacity. There is continued talk about

	funding to ameliorate major problems as they arise. Catchments with energy resources are invested in, but in ad hoc ways related only to energy.	management capacity. Otherwise, regions are left to struggle with ad hoc funding to ameliorate major problems as they arise. Catchments with energy resources are invested in, but in ad hoc ways related only to energy.	and management capacity. Because governments are not investing much time in thinking about regional reforms, there is an opportunity for regions themselves to put forward reform ideas emphasising national benefits.	strengthening regional governance, including the creation of regional governments, but this has not reached a conclusion by 2030.
<b>Water</b>	The scramble for coal, together with regular dry spells, creates intense competition for water between agriculture and mining.	The scramble for coal creates competition for water between agriculture and mining, but this is less intense than in Scenario 1 because warming is lower.	Milder climate change and an orderly energy transition make competition for water between mining and agriculture less intense than in Scenarios 1 and 2.	Competition between agriculture and mining is strong, but is eased compared with Scenario 1 by the fact that the energy transition is being made gradually and miners are taking their development of new coal and gas fields more slowly.
	Effective leadership in the catchment, combined with policy support from governments, needs to minimise the tensions, but the conflict between panicked energy and water policies creates perverse outcomes that the catchment's decision makers have to wrestle with.	Effective leadership needs to deal with the potential for energy policy to dominate the minds of governments because the lower rate of warming means less urgency in climate and water policy. This makes it difficult for the catchment's decision makers to manage water tensions.	However, water sharing is still an issue and effective leadership needs to focus on capturing and sharing water to even out seasonal and annual variation. Effective leadership is likely to be easiest to achieve in this scenario as regional and government policy objectives align. However, this alignment could easily create a culture of complacency and counting on government to solve all the problems.	Effective leadership focuses on capturing and sharing water in good times and evening out the fluctuations between seasons and years. This scenario is conducive to good planning of water use for urban, industry and agricultural use.
	Increasing temperature and more variable climate have direct impacts on habitat and other conditions for biodiversity, but land management and policy have greater impacts.	Slightly raised temperature and ongoing bouts of drought have direct impacts on habitat and other conditions for biodiversity, but land management and policy have greater impacts.	Slightly raised temperature and ongoing bouts of drought have direct impacts on habitat and other conditions for biodiversity, but land management and policy have greater impacts.	Increasing temperature and more variable climate have direct impacts on habitat and other conditions for biodiversity, but land management and policy have greater impacts.
	High concern about energy sees a scramble for coal and gas, which means that emissions regulations are slowed down and environmental impacts are poorly considered.	High concern about energy sees a scramble for coal and gas, which means that emissions regulations are slowed down and environmental impacts are poorly considered.	Lower concern about energy and low concern about climate change sees an orderly but slow implementation of emission control programs.	Lower concern about energy and high concern about climate change sees an orderly implementation of emission control programs.

	Public concern about climate change is high due to high warming, which creates tensions between those benefiting from mining and those concerned about environmental, including biodiversity, impacts.	Public concern about climate change is lower than in a high warming scenario, which reinforces the neglect of environmental, including biodiversity, issues.	Public concern about climate change is lower than in a high warming scenario, which, together with low concern about energy, could breed complacency within the catchment.	Public concern about climate change is high due to high warming, which sees strong environmental, including biodiversity, policies applied to mining (and other industries).
<b>Environment/biodiversity</b>	Effective governance needs to address the tensions from a booming (mining) economy, high concerns about energy security and high concerns about climate change.	The challenge for effective governance is to keep the environment on the agenda with a booming (mining) economy, high concern for energy supply, and low concern about climate change.	The challenge for effective governance is to keep the environment on the agenda while people have little apparent need for short-term concern.	Effective governance needs to make the most of the orderly energy transition and high support for environmental policies to capture social, economic and environmental benefits for the catchment.
<b>Human well-being/lifestyle</b>	Effective leadership keeps some of the wealth from the scramble for coal and gas in the catchment, benefiting especially those residents directly or indirectly associated with mining.	Effective leadership keeps some of the wealth from the scramble for coal and gas in the catchment, benefiting especially those residents directly or indirectly associated with mining.	With effective leadership and a strong focus on getting energy and climate change policy right, social welfare issues are also drawn into the policy mix.	With effective leadership and a strong focus on getting energy and climate change policy right, social welfare issues are also drawn into the policy mix.
	Those in agriculture and associated industries don't fare so well, due to climate change and governments' focus on energy issues.	Agriculture continues to be profitable as climate change is mild and lessons have been learned from the early 2000s.	Although the economy is not booming, it is buoyant as both mining and agriculture are doing well and coexisting comfortably.	Although the economy is not booming, it is stable despite the pressures that agriculture is under from climate change.
	Value tensions emerge between those who benefit from mining and those concerned about the environmental impacts of mining and climate change.	Value tensions are not as strong as in Scenario 1, because climate change concerns are lower. It is hard to keep the environment on agendas.	Concerns about energy and climate change are both relatively low, so there are few value clashes. Complacency is a risk.	Environmental and other values are aligned. Miners support local communities as a part of their obligations under new government policies.
	Rapid but disorderly economic and social change, due to the uncoordinated mining boom, makes it a challenge to maintain health, education and welfare services.	Rapid but disorderly economic and social change, due to the uncoordinated mining boom, makes it a challenge to maintain health, education and welfare services.	Lack of panic, and a buoyant economy, should mean that health, education and welfare services are strong, but the tendency for complacency is a major risk.	Effective leadership, orderly economic and social change and strong sense of community lead to support for health, education and welfare services.
	Leaders struggle to make sure that the Namoi is not neglected by governments because it is seen as a prosperous catchment.	It is harder than in Scenario 1 to make sure that the Namoi is not neglected by governments, because climate change is milder.	As the worst fears about social problems have not been realised, governments focus elsewhere, downplaying pre-existing problems.	There is strong government focus on helping the Namoi deal with the social challenges of climate change and diversifying into energy.

<b>Population</b>	There is disorderly growth in population and unstable demographics due to the scramble for coal and gas and the associated rapid growth in the mining workforce.	There is disorderly growth in population and unstable demographics due to the scramble for coal and gas and the associated rapid growth in the mining workforce.	The population either remains similar to today or increases slightly. The mining workforce grows slowly, there is commitment to environmental and social objectives, and there is time for planning to integrate mining with agriculture.	The population either remains similar to today or increases slightly with churn in agriculture. The mining workforce grows slowly, there is commitment to environmental and social objectives, and there is time for planning to integrate mining with agriculture. Indigenous employment skyrockets as the Namoi becomes a focus for innovative schemes.
	The agricultural workforce struggles as mining and climate change threaten water supplies and cause great variation in workforce requirements from year to year.	The agricultural workforce does not struggle as much as in Scenario 1, but mining still threatens water supplies and competes for labour.	Demand for agricultural workers is more stable, but farm amalgamations and other efficiency measures see an overall decline in the agricultural workforce (not as much as in other scenarios).	Demand for agricultural workers fluctuates due to climate variability. Although smart water management evens out the variations considerably, farm amalgamations and other efficiency measures see an overall decline in the agricultural workforce.
	Concerns about energy and a warmer climate keep tree-change migration very small.	Concerns about energy keep tree-change migration small, except around Tamworth.	Concerns about energy and climate change are small, so there is a sizable tree-change migration.	Concerns about a warmer climate keep tree-change migration small.
	There are opportunities for employment of Indigenous people in mining but otherwise the chaotic nature of population and employment growth does not consider the particular needs of Indigenous communities.	There are opportunities for employment of Indigenous people in mining, but otherwise the chaotic nature of population and employment growth does not consider the particular needs of Indigenous communities.	There is an intent to consider the needs of all parts of Namoi communities, but the absence of major energy or climate challenges means that complacency creeps in. Indigenous employment schemes are implemented but require considerable effort by advocates to make them work with limited resources.	There is a strong focus on the needs of all parts of Namoi communities. Indigenous employment skyrockets as the Namoi becomes a focus for innovative schemes.
	The major challenge for leaders is to stabilise numbers of residents and spending within the catchment.	The major challenge for leaders is to stabilise numbers of residents and spending within the catchment.	The major challenge for leaders is to avoid complacency in water management that could leave the catchment vulnerable to dry spells.	The major challenge for leaders is to make agriculture attractive to workers and their families in a more variable world.
<b>Mining and energy</b>	Mining booms due to the	Mining booms due to the	Mining grows slowly as Australia	Mining grows slowly as Australia

	scramble for coal and gas, but there is constant tension between concerns about energy security and the need to reduce carbon emissions. National emission control programs are introduced by 2012, but with many concessions.	scramble for coal and gas, and there is little public opposition as they are concerned about energy security, and climate change is not as bad as feared. National emission control programs are implemented slowly from 2012, but with many concessions.	and the world move gradually to clean coal and gas, en route to a broader suite of energy sources. National emission control programs are introduced in 2010 with moderate concessions (public concern about energy and climate change is weak).	and the world move gradually to clean coal and gas, en route to a broader suite of energy sources. National emission control programs are introduced in 2010 with minimal concessions.
	Little attention is paid to renewable energy for five to 10 years while Australia secures its energy supply, and deals with international concerns about energy security and the high demand for coal and gas globally.	Little attention is paid to renewable energy for five to 10 years while Australia secures its energy supply, and deals with international concerns about energy security and the high demand for coal and gas globally.	Policy supports a diversification of energy production. Incentives are offered for clean and renewable energy industries. Few land owners supplement their income with energy generation as agriculture is still quite profitable.	Policy supports a diversification of energy production. Incentives are offered for clean and renewable energy industries. Many land owners supplement agricultural income with energy generation (especially wind and solar).
	Because profits are large, the Namoi's leadership is effective, and public concern about climate change is high, 'licence to operate' agreements are developed that include social and environmental objectives and financial investment in the catchment.	Because profits are large, and the Namoi's leadership is effective, 'licence to operate' agreements are developed that include social and environmental objectives and financial investment in the catchment. These are weaker than in Scenario 1 due to less public concern about climate change.	Energy industries agree to 'licence to operate' conditions that include mild environmental and social objectives (public concern about emissions and climate change is too weak to drive stronger conditions).	Because governments are taking a strategic approach to energy security, public concern about climate change is high, and the Namoi's leadership is effective, energy industries agree to 'licence to operate' conditions, including environmental and social objectives and financial investment in the Namoi.
<b>Agriculture</b>	Farmers spend a lot of time in negotiations and meetings about possible impacts of mining on water supplies and land quality.	Farmers spend a lot of time in negotiations and meetings about possible impacts of mining on water supplies and land quality.	Mining proceeds with strong consideration of environmental issues, including water use.	Mining proceeds with strong consideration of environmental issues, including water use.
	Production is lower than at present, due to lower average rainfall and competition for water with mining, but not as low as it might have been because the higher atmospheric carbon dioxide promotes growth. Improved water use efficiency, new breeds and fertilizers also help, but are expensive due to high oil prices.	Production is similar to the present as neither rainfall nor atmospheric carbon dioxide has changed greatly. Improved water use efficiency, new breeds and fertilizers also help, but are expensive due to high oil prices.	Production is similar to the present as neither rainfall nor atmospheric carbon dioxide has changed greatly. Improved water use efficiency, new breeds and fertilizers also help and are more affordable than in Scenarios 1 and 2.	Production is lower than at present due to lower average rainfall but not as low as it might have been because the higher atmospheric carbon dioxide promotes growth. Improved water use efficiency, new breeds and fertilizers also help and are more affordable than in Scenarios 1 and 2.
	Survival of agriculture requires	Survival of agriculture requires	Survival of agriculture requires	Survival of agriculture requires

	sufficient improvements in efficiency of water use, crop substitution and other strategies to cope with a substantially drier and more variable climate, and competition from mining, while still maintaining the ability to supply domestic and overseas markets (whose demand will potentially grow as developing countries' economies grow and/or climate change impacts on food production elsewhere in the world). This is complicated by the disorderly development of the energy sector.	sufficient improvements in efficiency of water use and other strategies to cope with a moderately drier and more variable climate, and competition from mining, while still maintaining the ability to supply domestic and overseas markets in competition with other nations that might be less affected by climate change. This is complicated by the disorderly development of the energy sector.	sufficient improvements in efficiency of water use and other strategies to cope with a moderately drier and more variable climate, while still maintaining the ability to supply domestic and overseas markets in competition with other nations that might be less affected by climate change. This is made easier by the orderly development of the energy sector.	sufficient improvements in efficiency of water use and other strategies to cope with a substantially drier and more variable climate, while still maintaining the ability to supply domestic and overseas markets (whose demand will potentially grow as developing countries' economies grow and/or climate change impacts on food production elsewhere in the world). This is made easier by the orderly development of the energy sector.
<b>Small business</b>	This is likely to be an unstable time for small businesses, with population churning and the challenge of getting miners to stay and spend in the catchment.	This is likely to be an unstable time for small businesses, with population churning and the challenge of getting miners to stay and spend in the catchment.	The environment for small business is likely to be more stable in this scenario than Scenarios 1 and 2, but economic growth is also likely to be slow.	With a reasonably stable mining sector and a fluctuating agricultural sector, there will be fluctuating demand for a wide range of services.
	There is a high level of innovation among small businesses to meet the needs of this dynamic social and economic local market, with a strong emphasis on mining-associated small businesses.	As in Scenario 1, there is a high level of innovation among small businesses, but in this scenario, the market is more a combination of mining- and agricultural-associated small businesses.	Small businesses show a lower level of innovation as times are stable and predictable. A major risk that is overcome is complacency, and failure to develop and implement succession plans.	Small businesses innovate to deal with the fluctuating fortunes of agriculture (including boom times and down times) and draw their stable income from mining and miners.
	Effective leadership can help. One particular challenge will be helping to dampen the fluctuations between good and bad years for agriculture, and/or helping small business cope with these fluctuations.	Effective leadership can help. Fluctuations between good and bad years are unlikely to be as bad as Scenario 1, but major market opportunities due to climate change impacts on food production in other countries might not be as frequent. Therefore, catchment leaders will still need to help small business cope with fluctuations in the regional economy.	Effective leadership will still need to find ways to encourage small businesses, as the trend towards corporatisation is likely to continue and this will disadvantage both small businesses and regions.	However, small businesses will need help to develop effective strategies for coping with boom and bust years.
	The scramble for energy could	The scramble for energy could	An orderly transition from oil to	An orderly transition from oil to

	see mining companies and governments spending on road and rail. Health and education will be a challenge, unless effective leadership can get people who work in the catchment to live there, as this will justify spending on hospitals and schools.	see mining companies and governments spending on road and rail. Health and education will be a challenge, unless effective leadership can get people who work in the catchment to live there, as this will justify spending on hospitals and schools.	other energy sources would see modestly increased government investment in rail and road infrastructure to the Namoi, as well as attention to education and health to ensure that this key energy generating region is socially stable and secure.	other energy sources would see increased government investment in rail and road infrastructure to the Namoi, as well as attention to education and health to ensure that this key energy generating region is socially stable and secure.
<b>Infrastructure (including transport, health and welfare, education and communications)</b>	Fluctuating populations and fortunes make traditional models of secondary and tertiary education unsustainable, so innovative models based on mobile populations and electronic communication are developed. Both mining families and agricultural families require flexibility to move in and out of, or within, the region at different times.	Fluctuating populations and fortunes make traditional models of secondary and tertiary education unsustainable, so innovative models based on mobile populations and electronic communication are developed. Movements of agricultural families are less pronounced in this scenario than Scenario 1.	The more stable population base leads to little pressure to change the traditional models for secondary and tertiary education. Cooperation between the Namoi and other regions enables economies of scale and the ability to make schools and tertiary institutions in the region more attractive and sustainable.	The population base is less stable than in 2008, as agricultural families are forced to diversify their income base to include work in major centres, or even out of the region, at times. Innovative models based on mobile populations and electronic communication are developed, although these are harder to fund than in Scenario 1 due to lower wealth from mining. On the other hand, the stronger social input of mining and other big industries reduces this difference.
	By offering better options than other regions, the Namoi creates a sense of emotional bonding between school and university aged youths, many of whom think favourably about living and working in the region in the future.	By offering better options than other regions, the Namoi creates a sense of emotional bonding between school and university aged youths, many of whom think favourably about living and working in the region in the future.		By offering better options than other regions, the Namoi creates a sense of emotional bonding between school and university aged youths, many of whom think favourably about living and working in the region in the future.
<b>Regional governance</b>	The key challenges for governance in this scenario are: channelling the scramble for coal and gas into spending in the catchment; helping keep agriculture afloat so it can take the opportunities opening up as overseas food markets stagger; and addressing the social	The key challenges for governance in this scenario are: channeling the scramble for coal and gas into spending in the catchment; keeping the momentum of environmental and water reform going when it appears that climate change might be less than the worst	The key challenges for governance in this scenario are: gaining a seat at the policy table to ensure that the Carbon Pollution Reduction Scheme is implemented to the benefits of all Australians; keeping the momentum of environmental and water reform going when it	The key challenges for governance in this scenario are: gaining a seat at the policy table to ensure that the Carbon Pollution Reduction Scheme is implemented to the benefit of all Australians; helping keep agriculture afloat so it can take the opportunities opening up as



	tensions that emerge due to population churn and winners and losers in the disorderly energy environment.	forecasts; and addressing the social tensions that emerge due to population churn and winners and losers in the disorderly energy environment.	appears that climate change might be less than the worst forecasts; and ensuring that the orderly policy transitions that are made consider social welfare issues for regional Australians.	overseas food markets stagger; and ensuring that the orderly policy transitions that are made consider social welfare issues for regional Australians.
<b>Technology</b>	It is likely that coal and gas mining will proceed initially without waiting for clean technologies.	It is likely that coal and gas mining will proceed initially without waiting for clean technologies.	It is likely that coal and gas mining will proceed slowly and with environmental regulations attached.	It is likely that coal and gas mining will proceed slowly and with environmental regulations attached.
	However, public opinion might demand increased spending on clean technologies due to concerns about climate.	Public opinion might not be so strongly in favour of clean technologies if the public is worried about energy security.	Public opinion might not be strongly behind either emissions or water reform because neither seems as urgent as in other scenarios.	Public opinion is likely to demand increased spending on clean technologies due to concerns about climate change.
	The focus on renewables could be reduced during the initial scramble.	The focus on renewables could be reduced during the initial scramble.	Renewable technologies are likely to be part of the energy mix, but public pressure is less (see above).	Development of renewable technologies is likely to increase and become part of the planned energy mix.
	Water-saving technologies and practices in agriculture and urban centres are likely to be fast- tracked.	Water-saving technologies and practices in agriculture and urban centres are likely to proceed less urgently than in Scenarios 1 or 3.	Water-saving technologies and practices in agriculture and urban centres are likely to proceed less urgently than in Scenarios 1 or 3.	Water-saving technologies and practices in agriculture and urban centres are likely to be fast- tracked.
	There is likely to be intense competition between energy and agriculture sectors for the attention of funders. A challenge for the Namoi's leaders will be to encourage funders to avoid the past tendency to focus on only one major issue at a time.	There is a risk that the energy sector will capture the research funding agenda, and a challenge for the Namoi's leaders will be to keep water research in the minds of funders.	There is likely to be competition between water and energy research with a relatively even distribution of funding between the two, and possibly less funding overall than the other three scenarios.	There is likely to be competition between water and energy research with a relatively even distribution of funding between the two.

# E Leadership forum

The following suggestions were made by participants in Workshop 3 about how a leadership forum might be established.

COMMENT
South East Queensland model is good, but luck was on its side (having high-level support in crisis). Might not find same here. Need dedicated individuals to help, but hard to find in these current circumstances. However, you can make your own luck. Important to have options on table, and people ready to act.
Regional Organisation of Councils?
Most decisions are made outside the catchment, and what role can we play in guiding them?
Lack of a cooperative local leadership approach that is trusted within the region and can guide/direct the future direction of the region, is there a need or desire for this to occur?
Even though we may benefit from climate change (winners), there will be losers - and we have to see it as a global issue, and must not lose vision and keep a broader perspective.
Mantra of economic development in councils is now considered as not always desirable, even though economic impacts must always be assessed.
If the risks of climate change are real and high, then we will be impacted on the most.
It does not really matter who. The main issue is to get things going.
There is a need to be in charge of your own destiny and not sit back and wait for someone to do the leadership.
Steering committee (but don't call it a committee) should be formed to drive this...
Perhaps we don't need to find the answer right now but need to ask the right question.
You cannot please everyone in the community - you need to be objective and look at all sides and do what is the best for the future sustainability of the local region, state and nation.
Leadership is not done by one single group but by a number of groups within the region. Need leaders with vision to focus and direct how data is used.
Let's avoid being parochial, and be positive about what we can do (avoid being negative), and find more than one leader who can get the community engaged and involved, and from within the community. Need to leave baggage at the door.
Why can't we legislate that our coal can't be sold without the same provisions that we demand with uranium?
The difficult thing is to get the community to agree on what are the main issues facing us in the future - there are those who think that coal is the main issue, those who think that protection of agricultural land is the major issue, those who think that a lack of service provision, etc. Perhaps the main issue is that the area is changing and that we need to get together and find leadership.
Economic development and economic growth, whilst being of benefit are not just about doing what we have been doing (e.g. agriculture and now coal and energy). We need to look at economic diversity to broaden the base of the economy and to take away the reliance on a resource based economy.
Local Government can be a part of the solution but it is hamstrung because it can't say no - there is government devolution of responsibility and the desire to help the bleeding hearts and solve all problems.
Councils should be looking to balance mining and agriculture, and to allow both co-existing, rather than acting as rivals.
Community has expectations that individuals have their own platforms and are voted in on their support of that platform.
Governments like communities that are prepared to share the commitment (and funding). Communities that don't work together die.
Local government being bled and fed by state government, policies written by academics and not for people on the ground.
Trying to get whole-of-government approach, but need to get more departments involved, and with backing of everyone (and thus inviting ownership).
Requires nimble ROC, independent and unfettered.
What can we do? (Not what we can't do!). We must take control of our own destiny, and take advantage of situation. But how do we legitimise those people?
There are organisations that should be involved, data should underpin decision-making (such as water-sharing plan), supported by NSW government. Need general support from all community organisations, and more than second-guesses on economic data.

Community leaders not game enough to come forward whilst backs against the wall: no avenue for them to step forward (even though leaders are there).
The collaborative will to go forward and to not focus on own area allows for boundaries to be removed.
How do you find common ground, don't benefits have to come back to the local area?
A lot of people in the region are for mining and coal, but there is a long way to go before approvals are granted, and timelines are greater than many imagine.
Can't model economic influences (too complex), but can map boundaries - with or without the government approval processes.
Socio-economic impacts allow some to win, and some to lose. Outcomes should be that no-one is worse off, but at best, some are much better off.
Regional areas have considerable opportunities: we all have to do more with less, but strategy is not simply budget cuts. We have to assess what our value proposition is, and to understand it and what our core responsibilities are. Some things will have to go (discretionary, mostly).
Notion that fear is only motivator is not the only driver. Excitement can be just as important.

# F Endnotes

<sup>1</sup> See 'Indigenous employment scheme "ambitious, unrealistic"', ABC News online, August 5, 2008. <http://www.abc.net.au/news/stories/2008/08/04/2323435.htm>. This plan, proposed by Australia's richest man, Andrew Forrest, and supported by the Prime Minister Kevin Rudd and the Cape York Institute's Noel Pearson, to create 50,000 jobs for Indigenous people in the private sector was initially thought to be overly ambitious but was nevertheless commended for its intent.

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