Renewable energy transition Australia 2040

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Abstract

This paper examines the transition to renewable energy within the context of a nation-state using Australia as case study. Both the Australian government and independent energy agencies have the potential to drive the transition as forerunner, with societal support. After determining currently ongoing initiatives, a framework is established for carrying out a hypothetical Integrated Sustainability Assessment. Both the theoretical framework and practical guide to implementation are presented in several stages: Stakeholder Analysis, Public Consultation, Modelling, Stakeholder Conference, Scenario analysis and lastly Monitoring and Evaluation. Finally, insights from the case study are translated into a synthesis of ideas for promoting country level renewable energy transitions.

The Australian government is among the most ambitious with regard to renewable energy targets. Currently, ten per cent of Australia's energy comes from renewable energy sources (RES). By 2020, this should reach twenty per cent according to the Renewable Energy Target, or RET (Australian Government Department of the Environment and Energy, n.d). Research teams, both governmental and independent, have concluded that a complete transition is technically achievable and economically feasible (Elliston et al., 2013; The Greens, n.d.; Hugh et al., 2006). A Roadmap report of the Australian Greens concludes that this transition is possible. Its costs would be similar to the cost of replacing ageing fossil fuel plants. Several governmental institutions have been established to guide the transition from conventional to renewable energy sources. Their main aim is to build the energy infrastructure that is going to determine the energy market in several decades' time. Two of these agencies, the Australian Energy Market Operator (AEMO) and Clean Energy Finance Corporation (CEFC), are the problem-owners of the case study outlined in this paper.

Strikingly, the Abbot government has recently halted the progress to meet the RET for 2020. There are considerations to scrap the target and accompanying financial assistance (Su, 2014). The proposal in this paper is set in a hypothetical situation: two of Australia's largest independent energy agencies have called for a complete Integrated Sustainability Assessment of plausible pathways to a fully renewable energy sector by 2040. The primary stakeholders of both agencies are investors and energy companies. Secondly, researchers and consumers can also be considered stakeholders. Even without further government initiative, the agencies are interested in a feasibility assessment which does not only assess economic benefits, but also social and environmental risks. In a country already affected by climate change, there is a strong intention to become more sustainable. Furthermore, Australia's climatic and geographic situation promise extremely high potential for a variety of profitable RES (Hearps & Wright, 2010). Existing wide scale solar plants have proven to be a success; Australia is ready to scale up RES as long as the benefits outweigh social or environmental disadvantages. This paper proposes steps of an ISA based on the Australian case study. Without carrying out the actual ISA a theoretical framework is provided.

First, the main question of the Integrated Sustainability Assessment proposal is discussed in context. Secondly, the proposed ISA stages are described. A knowledge basis for executing the different stages is included per stage. Finally, the proposal is concluded with a synthesis of ideas working towards a framework for country level RE transition.

I. Outline context

Climate change and the resulting consequences are among the biggest challenges of this era. Mitigation and adaptation are increasingly becoming priorities of governments worldwide. Environmental NGOs sound the alarm as the scenarios in IPCC reports become more alarming with each publication. The emission reduction targets (ERT) under the Kyoto protocol are not expected to result in the two degree global warming target as agreed upon during the COP in Copenhagen. Some countries take measures into their own hands, setting themselves higher targets and actively promoting the transition to more sustainable practices, especially in the energy sector.

It is expected that these trends will lead to increasing carbon pollution costs, while renewable energy is getting cheaper. According to the Australian Greens' Roadmap report, another desired side effect is the creation of jobs, because renewables employ more people on average. However, the report does not take into account citizens that will have to live with RE installations in their backyard.

Also, environmental compatibility is not assessed. The report does not give a complete overview of the three pillars to assess RE potential as defined in the World Energy Council Report, namely geographical potential, technical potential and economic potential (De Vries et al., 2007). The ISA outlined in this paper loosely works within these three definitions and relating mathematical formulas in order to create backcasting scenarios. The end point of the scenarios is identical, namely a 100% domestic renewable energy production. Different pathways to this end, from 2014 to 2040, are explored.

As the assessment of technical and economic potential of RES in Australia is already thoroughly documented, existing research can be used in the ISA. New knowledge is generated in the area of social and ecological implications of a large scale energy transition. Thus, the ISA is meant to identify possible constraints of scaling up RES, constraints which may not previously have been considered. A challenge frequently named is the vast amount of land required to produce alternative energy. Renewables must compete with humans, nature and agriculture. Other key variables are disturbances to ecosystems or settlements, the use of water, materials and possible negative impacts on the global climate system. These and other issues are included in five to ten scenarios using a combination of stakeholder dialogue, observational data and mathematical modelling. Consumption and transportation is not taken into account. The focus is on the process of production, extraction, storage, maintenance and replacement of machines.

Thus, this case study aims to assess plausible pathways towards a 100% renewable energy target by 2040 as well as the respective consequences for Australia's quality of life, environmental quality and economic vitality. Sub questions of the problem description are to be refined by the research team during the execution of the proposed ISA.

II. Stage I. Stakeholder analysis

Crucial stakeholders in the energy sector are the two problem owners, AEMO and CEFC. AEMO is the body advising on planning and operating the National Energy Market (NEM). As independent agency it ensures the long-term security and quality of the NEM in the interest of its members, the Australian consumers. By commission of the national government AEMO has conducted a study on energy transition (AEMO, 2013) including a Working Group for scenario development (See Appendix I). Similar in status, CEFC is an independent, commercially oriented agency initiated by the national government. Its main stakeholders are investors, businesses and scientists in the field of Research and Development (R&D) of clean technology. The CEFC prioritizes investment that generates social, environmental and economic benefits, accelerating a transformation in the energy sector.

In reaction to the government's diversion from its initial renewable energy target, the two clients wish to show commitment to the intentions of the 2011 Clean Energy Future Plan. Their main aim is to raise awareness and understanding in diverse fields of actors. Ultimately, the process of envisioning alternative futures should inspire thought, debate and action on all levels of society. Therefore, the widest variety of stakeholders must be mapped and involved in the ISA. Stakeholders are distinguished according to the five categories defined by Grosskurth and Rotmans (2005), namely businesses, interest groups, citizens, government and scientific experts. In Appendix II, critical actors on the list of relevant Australian entities are underlined. During the research process, until Stage IV, stakeholders are mapped in an interest-power matrix in order to identify players, subjects, context setters and 'the crowd'.

Due to the interesting possibilities of small-scale RES in a smart grid, any Australian citizen is a potential player. The group of citizens can be represented in two ways. Stage II focusses on individual citizens from different parts of society, whereas later stages only involve consumer interest groups. Taking an imperative approach, citizens are identified as actors who feel strongly enough about the issue to act on their feelings, whereas others may be guided by rational considerations such as economic interest (Enserink et al., 2010). The category 'businesses' includes energy producers (including transmission) and their associations as well as investors and their associations. Following the 'positioning approach', the government and related independent agencies such as AEMO are identified as actors with a formal position in policymaking (Enserink et al., 2010). The current Abbot government has a role of opinion leadership. 'Scientific experts' include R&D scientists as well as scientists in the fields of environment and social sciences. 'Interest groups' represent the interest groups which are not in one of the four other categories. A division can be made between environmental NGOs, regional NGOs and NGO's representing, to a certain extent, the interest of future generations, namely youth NGOs.

The list of actors is to be revised and completed during the research process. Critical actors are invited to the conference in Stage II. Special cooperation may be appropriate in the case of the Clean Energy Regulator, the agency which administers the National Renewable Energy Target. Furthermore, assistance during the ISA process may be required from the Southern Australian initiative called Renewables SA and an energy modelling company called Roam Consulting.

III. Stage II. Public consultation

At the start of the ISA, the researchers reach out to the general population to brainstorm about drivers, actors and critical uncertainties with reference to the framework established in this proposal. The initial focus is relatively local, with the aim of mapping fears and expectations of communities. This stage is important for the creation of ambassadors and possible buy-in. The research team accesses local and specialized knowledge. Even though formal power rests with the government, the citizens elect the executives and select energy providers. Commitments of civil society can bring about major changes, in which case citizens can be identified as actors rather than subjects. In this case, it is in the power of citizens to act by using rooftop solar power and solar hot water, for example.

Public consultation meetings are hosted by local organizations contacted by the researchers for collaboration and promotion purposes. An open, friendly and creative environment is necessary. This could be achieved for example by involving schools. The youngest children could be asked to draw their neighbourhood in 20 years; the results can be used for promotional material. Other educational projects could include small modelling or scenario building exercises, possibly under the umbrella of a regional competition. An inclusive approach gives the project a human face.

Thus, the interest of children and parents could be triggered. At the meetings, three steps are made. Firstly an actor analysis is done. This includes power-interest matrixes on the basis of resource inventories, subjective involve-ement and interdependencies. Secondly, drivers, critical uncertainties and indicators are identified in an interactive manner, which may result in simple causal models. In stage II, finally, the initial problem as defined by the researchers is altered using the meeting's findings. This step also functions as a partial baseline survey to explore the consequences of the introduction of the MET in 2001 until today. Experiences of the people living in the area affected by the RES are documented this way. This baseline survey functions as starting point for the research team to update an existing Reference Scenario from AEMO (AEMO, 2014). This reference scenario then forms the baseline of the different scenarios developed in later stages.

In this public consultation stage, participation is used for mapping out diversity and exploring tacit knowledge. The main aim is inspire, raise awareness and equip dedicated citizens with the tools, knowledge and network to initiate further action. Empowerment and involvement of energy users creates a common ground for possible changes, as well as understanding of the final results of the ISA. It is important to include also the next generations of citizens, sparking the curiosity of younger age groups or students. This aspect contributes to the long-term 'sustainability' of the project as a whole. In this context, possibly one or two local experts are invited for a presentation with Q&A session. The domains of UNEP 'GEO-3' scenarios are introduced to the public in order to provide ideas, respectively: Socio-political frameworks and institutions, demographics, markets and trade, value systems, and lastly scientific innovation. The approach of this stage is unique in the sense that the general public is given the opportunity to be part of the research, whereas oftentimes the balance of representatives is on the side of economic interests.

Outcomes can have all sorts of formats, varying according to the scope of each local meeting. The local organizations then summarize the conclusions by filling out a standardized online questionnaire. The results are visualized in tables and graphs after statistical analysis. In the extraordinary case of crucial information lacking in the survey, this is noted in the last question which provides room for comments. This format of simplification is necessary to process the data efficiently in the research. Nevertheless, the most important results of Stage II are ideas, visions, contacts and the possible (educational, community etc.) projects being set up. An executive summary of the ISA is handed out to all local organizations who hosted the public consultation. During the consultation progress, possibly groups could be formed who commit themselves to communicating the final results in a parsimonious manner to the participants. These groups elect representatives for a 'citizen focus group' in Stage IV.

IV. Stage III. Modelling

The results of the statistical analysis in Stage II are part of the subsequent study, both theoretical and practical, which prepares a basis of information for later focus groups. At this stage, the researchers may refer to the reading list (see Appendix IV) and explore both existing models and case studies of other countries. Earlier empirical work and data from current large-scale RE projects are searched for data in all three domains. In case of existing large-scale RES, effects on local nature and wildlife are assessed by a visiting team if such data is missing. Expectations of this stage are now discussed to establish a framework.

The potential of six categories of renewables is assessed, respectively biomass, hydroelectricity, solar-, marine-, wind-, and geothermal power. Existing empirical work is analysed to identify generalized numbers with regard to material inputs and socio- environmental implications per kilowatt hour of energy produced. In the domain of environmental impact, the focus is on air pollution, water pollution, water use, waste generation, greenhouse gas emission and land requirement. Environmental degradation and climate change are inputs. The economic variables are market prices, national energy stability and security, stranded assets and overall economic vitality. The institutional dimension covers both regional and local policies regarding energy, ETS, carbon pricing, environmental protection, RET etc. Social effects include health effects, possible undesired disturbances in surroundings of inhabited areas, employment and possible (cultural) benefits for local communities. Inputs are lifestyle and consumer behaviour.

The researchers collaborate closely with representatives from AEMO and CEFC. AEMO annually publishes National Electricity Forecasting reports including extensive analysis of input assumptions (AEMO, 2013) and a number of 2014 scenarios (See Appendix II). However, these scenarios focus only on the economic domain. The outcomes were mainly limited to the rise and fall of GreenPower sales, not including wider environmental or societal impacts. The ISA partly builds on findings of these reports. It includes assumptions regarding both large-scale renewable energy targets (LRET) and small-scale renewable energy targets (SRET). The LRET is defined by AEMO as main policy driver, while the carbon price has less impact on investment (AEMO, 2014). Next to annual reports, findings from AEMO's public consultation program can be used (AEMO, 2012).

In a first attempt to model interdependencies in the energy market, all four dimensions of uncertainty as identified by Rotmans and Van Asselt (2001) are integrated, respectively social, economic, environmental and institutional uncertainties (See figure 1). This model should be further extended and deepened by the research team. In addition, data from the International Futures Model can prove helpful (See Appendix III). This online scenario development software functions as example to translate the causal model into a simple, static, interactive computer model. This can be categorized as 'modelling for vision-building', to structure the problem and identify possible measures. When completed, the created program is peer-reviewed by a group of modelling experts. The computer model embodies a scenario framework which the consequent ISA stages are building on.

In order to assess the potential of RES, the focus of the model is determined three concepts, namely geographical potential, technical potential and economic potential. De Vries et al. (2007) define geographical potential as the energy flux that is theoretically extractable in areas considered available and suitable. The formula of technical potential takes into account also losses of the conversion, see figure 2 (De Vries et al., 2007). This formula serves as guideline for input variables in the model. Furthermore, it can be used to establish input numbers per RES which are run through the models in order to create scenarios.

The variables fi and Di include social and socio-geographical factors, respectively location, acceptability and social constraints, such as wind park density. Moreover, physical- geographical parameters, such as terrain, habitation and biomass yields complement these factors. Thus, the interactive computer model includes all possible RES that have enough potential for scaling up by 2040. As input, it is possible to select any combination of RES percentages, always adding up to 100% RE. The abstract consequences of different scenarios can be explored in a strictly quantitative manner. This is done in stage IV. The model can be considered a policy optimization model (Rotmans & Van Asselt, 2001), as it explores different pathways to a set goal. It has hybrid characteristics in the sense that it combines biophysical models with social models. The economic supply and demand system is not elaborated on. On the level of individual RES, new insights from modelling can be used for energy transition planning projects in different world regions. The complex model that integrates the feedbacks between the different RES and other variables is specific to Australia.

V. Stage IV. Stakeholder Conference

The 'envisioning stage' of the ISA starts in Stage IV, continuing in stage V. The modelling exercises in the previous stage can be used to identify and analyse possible pathways to achieve a 100% renewable energy target in Australia by 2040. This stage brings together tacit and explicit knowledge, powerful companies and smaller interest groups, in order to eliminate risks. The expectations of stakeholder participation in this stage should be clearly communicated to the various groups by the researchers. Simpson and Clifton (2014) conclude that extensive consultation of agents in Australia regarding the MET may lead to negative externalities such as a loss of investor confidence; this should be reduced, primarily through transparency. Since the government is currently reconsidering its plans regarding the NRET, there may not be direct results in policymaking. This stage is aims at creating a shared understanding among stakeholders.

Upon finalisation of the model, it is presented to several national focus groups consisting of maximum twenty individuals representing an interest group. The various focus groups arrive at a conference together, but are split part of the time. During this full day program, experts are asked to explain the key considerations of the region in a small presentation with Q&A possibility. Experiences from existing RE production methods are mentioned to get an overview of specific effects on the local population, flora and fauna. If research and development is currently in an early phase, then experts are asked to summarise findings and explore the probability of opportunities. Although these insights are considered by participants, the general model at the basis of the program is stochastic. The main outcomes from the public consultation are presented and evaluated. Definite critical uncertainties are defined per focus group, possibly including technology, energy prices and policies.

This stage develops narratives for different backcasting scenarios using the knowledge presented during the conference as well as the interactive computer model developed in the previous stage. The development of scenarios of Australia's RES by 2040 builds on a workshop prepared by the research team. In this 'experimenting stage', scenarios clarify the potential interactions between the three pillars. The model and summary of assumptions serve as communication tools in stakeholder dialogues. Participants can then try different combinations of scaled up renewables and discuss the consequences of these pathways more elaborately in order to choose one scenario.

Each focus group presents the scenario it has chosen and elaborations on the reasoning behind it. Clear instructions are given on the content and format of this presentation. It should include a comparison of the impact of the chosen scenario versus the others. Why did the group believe the total impact of a certain pathway was most convincingly positive and for whom? The primary concern is that of direct, regional impacts such as biodiversity loss. In the later stage, scenario narratives are finalised by fitting the initial 'complicated' model into a more 'complex' and dynamic one, dealing with feedbacks in a local as well as a global context.

After the different groups have presented their chosen pathway, a debate is organized to select with five to ten final scenario frameworks. The participants will then write a concise report per scenario in mixed groups. This forms the basis for the research team to build detailed versions and thoroughly analyse the scenarios. In this stage, participation is used to a certain extent to reach consensus regarding medium-term regional scenarios.

VI. Stage V. Scenario analysis

Modelling experts are consulted to integrate the scenario frameworks from Stage IV into more extensive quantitative backcasting scenarios. Scenarios are necessary because of high uncertainties, such as behavioural variability, techno-logical development and policymaking decisions. Formal, complex decision support scenarios are necessary for this multi- dimensional, multi-scale tangled web of problems (Van Notten et al., 2003). The main task is to combine newly generated knowledge with already existing models and the updated reference model. In all cases, validation through model performance tests is required. The NUSAP method is used for the management of uncertainty and quality of quantitative information. GAINS and PROMETHEUS are used to simulate influences from the earth system impacting the region Australia. At this point, scenarios should include both biophysical and socio-economic models, with a hybrid result. The outcome is less comprehensible for the wider public than the models and scenarios used and developed until this point in the ISA.

As with all ISA projects, difficulties arise with the transgression of time-scales, spatial scale- levels and domains. Scenarios are not predictions. Models are mostly deterministic. As for the scenarios, key expectations are discussed here. Renewables are expected to cover a larger surface area than the conventional energy sources they replace, emit less greenhouse gases and produce less waste. The least cost scenarios of Elliston et al. (2013) rely mostly on wind and solar power, as do AEMO scenarios (AEMO, 2014). Zahedi (2010) identifies a trend of fast growth of these RES in Australia. If technology furthers, Australia's climate is particularly suited for algae production and solar power, two highly efficient types of RES. Commercial-scale solar power plants are a reality in Australia today, roof top PV is increasingly popular among the population. In terms of consequences, algae are interesting due to high yields and the possible use of waste heat, waste fertilizers and wastewater, reducing use of water, nutrients and energy.

The task of the research team is to translate the quantitative scenarios into visually attractive narratives, while clearly addressing input assumptions. The scenario analysis should be presented as appropriate to guide decisions of investors, companies and eventually the government. This includes a report, an executive summary and an explainer video for all who participated in the conference. These resources are also received by the regional organizations hosting the public consultation. It is left to them to spread this knowledge, stimulating engagement in the process of change that was triggered during Stage II. It is in this way that the two ultimate aims of scenarios are achieved.

VII. Stage VI. Evaluation and Monitoring

In this final stage, a framework for monitoring is established, which can be used to administer national planning and reliability. The baseline for this framework is the Reference Scenario. Parsimonious policy evaluation scenarios until 2040 are defined. It is not the task of the research team to regularly update these scenarios, only to establish the quantitative computer model. In essence, this is a simplified version of the extensive model developed in Stage III, refined with the experiences that were shared during the stakeholder conference and expert scenario analysis. Its format is similar to the International Futures Model, notwithstanding less comprehensive. It resembles a regional input-output model. The data has to be updated by an agency with a grasp of nationwide trends, the most obvious being AEMO, CEFC or a governmental department. The outcomes are to be made public to ensure continued stakeholder engagement.

With regards to evaluation of the ISA, the details of the process will have been documented in every stage. This is used as a basis for a critical, reflective report which is then presented to the clients. It includes an overview of all stages, evaluates the outcomes in comparison to expectations and provides recommendations for future research.

VIII. Conclusion and recommendations

This case study has delved into the current status of Australia's policy environment, with a particular interest in initiatives aiming to expand the country's renewable energy production and use. The main goal of the ISA was to raise awareness, understanding between stakeholders and finally to catalyse action. Recommendations for conducting an ISA are now summarised. First, establish the main drivers, actors and critical uncertainties in the case. This stage can lay the foundation of expectation management in local communities. Classify all relevant stakeholders in five categories: Scientific experts, businesses, interest groups, citizens and government. Map the actors in a power-interest matrix.

In the public consultation stage, the research team can save time and effort by collaborating with existing local organisations - or national organisations with local branches - who take it upon themselves to host a meeting. The key to success of a spread out large-scale public consultation is preparation. Test the format of the meeting first, find out which tools facilitate the group process and how to most effectively raise interest. In the hyper-connected era it can be beneficial to take advice from experienced social media managers in order to position the ISA online as national campaign, clearly communicating the mission and bigger picture. Utilise the public consultations to establish a baseline; a reference scenario incorporating the people's experiences with renewable energy up until that point. Next to this, the public consultation aims to involve and empower stakeholders, thus creating a common ground for understanding the ISA results at a later stage. The outcomes of this stage can be fed to the central agency carrying out the ISA by means of standardised questionnaires.

The modelling stage has a theoretical focus, mostly consisting of research and complementing existing knowledge by possible field visits. This paper gave an overview of environmental, economic and social variables to take into account in this stage. In the process of 'modeling for vision-building', integrate social, economic, environmental and institutional uncertainties. The theoretical framework used in this paper works with the three concepts geographical potential, technical potential and economic potential. This policy optimisation model can be used to explore several backcasting scenarios.

The subsequent two stages are part of an 'envisioning' process. Firstly, the stakeholder conference gathers national focus groups. It is the aim of the conference to develop narratives for the different backcasting scenarios presented. In other words, participants ask themselves which changes would have to take place for a certain scenario to become reality? What are the likelihood and consequences of these changes? The presence of experts is vital to ensure that the conversation does not reach a deadlock due to a 'technical' question in a focus group. In contrast to the broad focus of the public consultation, this conference narrows down the focus of the ISA in a democratic process. The outcomes of the conference are used to create complex, dynamic, highly quantitative models which will have a status of authority for investors, companies and government institutions. Moreover, it is vital to communicate the resulting conclusions and actions to all participants.

The extensive process described in this paper can be scaled-down and used as a guide for ISA's in any region. Future research into other case studies is recommended.

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Appendix

	Environmental variables	Economic variables	Social variables
Outputs	Air pollution	Market prices	Health effects
	Water pollution	National energy stability and security	Disturbances
	Water use	Stranded assets	Employment
	Waste generation		Cultural
	Greenhouse gas emissions		
	Land requirements		
Inputs	Environmental degradation	Economic vitality	Lifestyle
	Climage change		Consumer behaviour

Table 1. Overview of environmental, economic and social variables in the modelling stage.

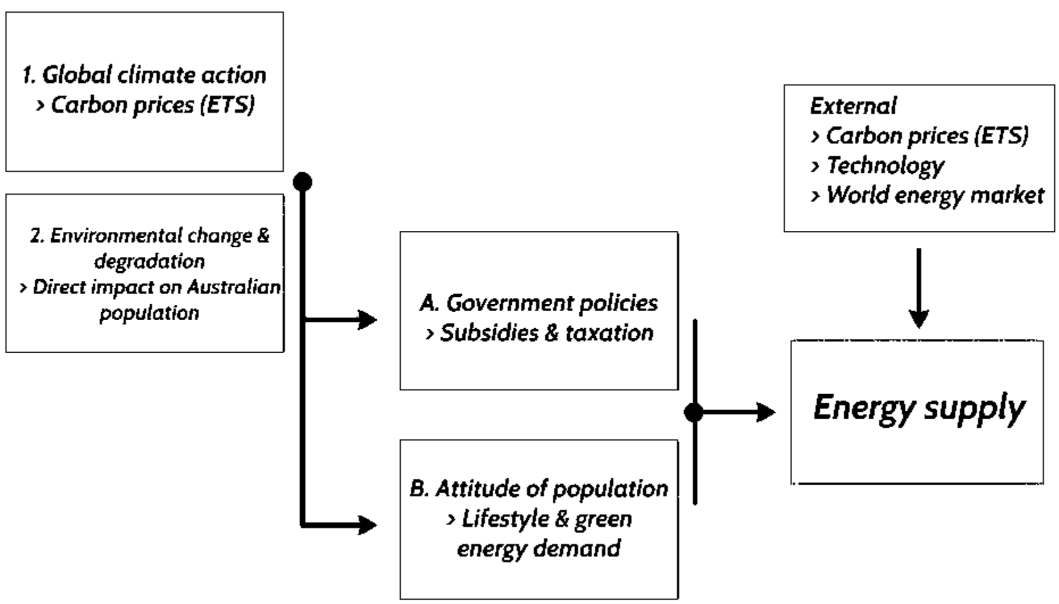


Figure 1. Model of key inputs and outputs in the energy market

$$ETi = fiAi\Phi[\eta i, Di, \lambda i]\,Ei\,(\mathrm{W})$$

E_i = Theoretically extractable energy output per unit surface area in W m^{-2}

A_i = Area surface in m^2

f_i = Suitability/availability factor

Φ = over-all conversion efficiency

η_i, = technology characteristics

D_i = *power density,*

λ_i = aggregate of other parameters such as operational details

Figure 2. Formula for technical potential by De Vries et al. (2007).

Appendix I. AEMO Scenarios

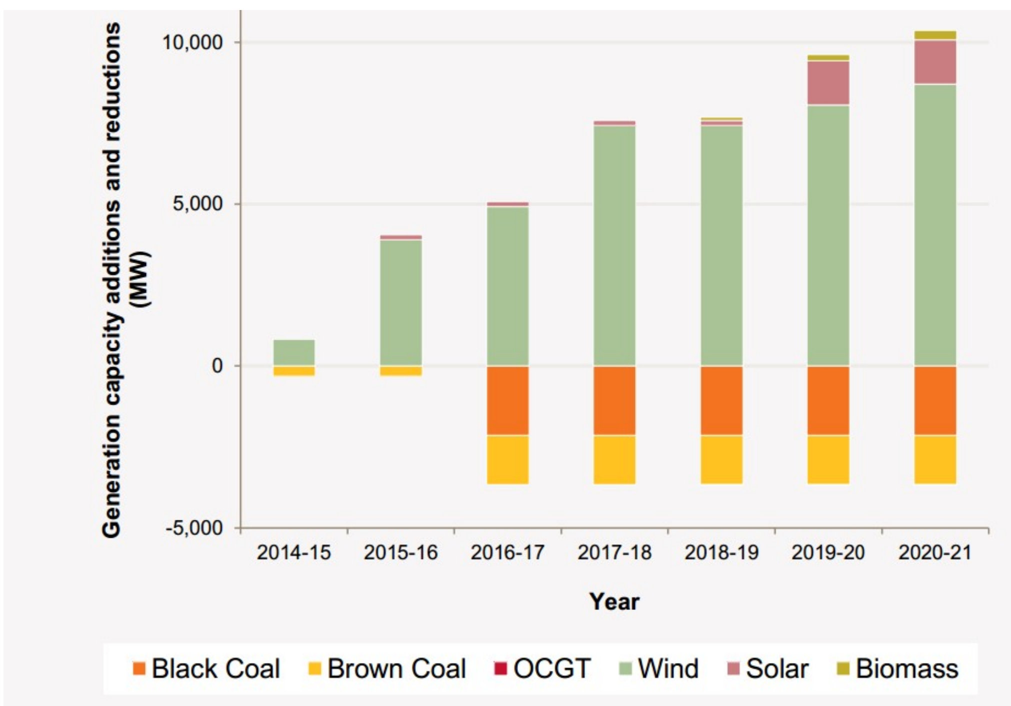
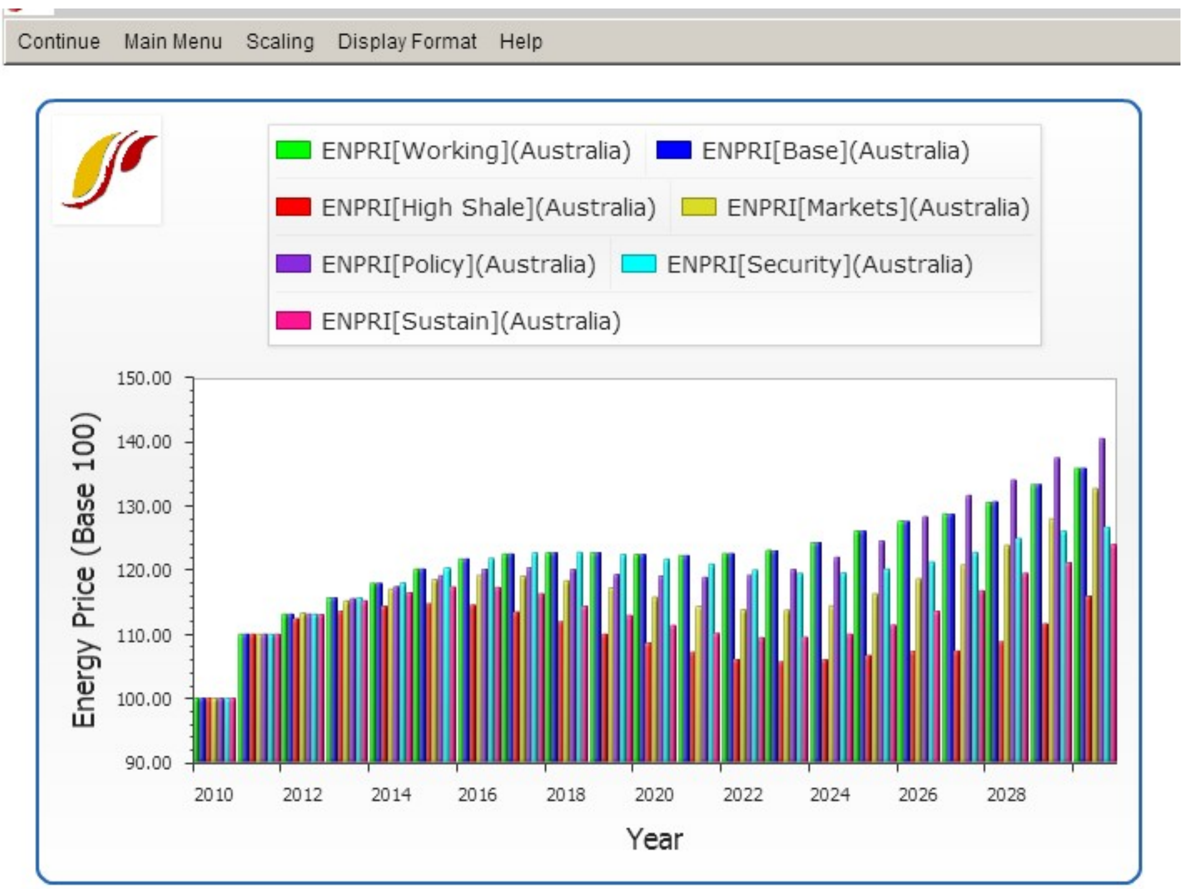


Table 1 - 2014 Scenarios

	High energy consumption from centralised sources	Medium energy consumption from centralised sources	Low energy consumption from centralised sources
Energy consumption	High	Medium	Low
Type of consumer[2]	Low engagement	Highly engaged	Highly engaged
Economic activity	High	Medium	Low

Appendix II. International Futures Model scenario Australia example



Appendix III. Stakeholder list

1. **Government**

Australian Energy Market Commission
Australian Council of Social Services Australian
Government Treasury
Clean Energy Council
Clean Energy Regulator
Department of Climate Change and Energy Efficiency
Department of Manufacturing, Innovation, Trade, Resources and Energy
Department of Sustainability, Environment, Water, Population and Communities
Economic Development Board

2. **Citizens**

Energy Users Association of Australia; Consumer Advocacy Panel#

3. **Interest groups**

Australian Student Environment Network Australian
Youth Climate Coalition
Banksia Environmental Foundation
Northern Alliance for Greenhouse Action Townsville
Enterprise
Total Environment Centre
World Wildlife Fund
South Australia Farmers Federation

4. **Business**

Production
Australian Geothermal Energy Association
Australian Sugar Milling Council
CSR Sugar
ElectraNet
Energy Networks Association
Energy Retailer's Association of Australia Energy
Supply Association of Australia EnergyAustralia
Grid Australia
Independent Market Operator WA Intergen
Major Energy Users
National Generators Forum
Origin Energy
PowerCor
Powerlink
Private Generators Group
Queensland Generators Group
Southern Generators Coalition
Sucrogen; Transpower NZ; Transend; and Western Power
Investor*AEMO*
CEFC
Renewables SA
Synergies Economic Consulting

5. Scientific experts

Australian Photovoltaic Institute
Australian Solar Institute
Academy of Technological Sciences and Engineering
*Commonwealth Scientific and Industrial Research Organisation (*CSIRO*)*
Roam consulting
The Bureau of Resources and Energy Economics

Appendix IV. Reading list

- AEMO public consultation results (AEMO, 2012)
- Potential of renewable energy alternatives in Australia (Yusaf, Goh, & Borserio, 2011)
- AEMO Stakeholder Survey Report, (AEMO, 2010)
- Least cost 100% renewable electricity scenarios in the Australian National Electricity Market (Elliston, Macgill, & Diesendorf 2013)
- Clean Energy Roadmap (The Greens)
- Executive Summary National Transition Network Development Plan For the National
- Electricity Market (AEMO, 2013)
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