

100% RENEWABLE ENERGY FOR AUSTRALIA

Decarbonising Australia's Energy Sector Within One Generation

Prepared for: GetUp! and Solar Citizens





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The Institute for Sustainable Futures (ISF) was established by the University of Technology Sydney in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment, human well-being and social equity. We seek to adopt an inter-disciplinary approach to our work and engage our partner organisations in a collaborative process that emphasises strategic decision-making.

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1 INTRODUCTION

The Institute of Sustainable Futures (ISF) at the University of Technology Sydney has produced an economic and technical scenario model for a transition towards a renewable energy system. The model describes Australia's future energy system, including an assessment of technology pathways and cost implications of three future energy scenarios. The model used by ISF was created by the German Aerospace Agency in cooperation with Greenpeace International and has previously been used to inform the German government's 'Energiewende' and climate mitigation scenarios for the Intergovernmental Panel on Climate Change (IPCC). This research was commissioned by GetUp! and Solar Citizens to provide the technical basis for the Homegrown Power Plan. The key results of the modelling are presented in Section 2, followed by methodology and assumptions in Section 3 and detailed results and cost analysis in Section 4.

1.1 GLOBAL CONTEXT

Global energy markets are rapidly changing. Renewable energy technologies now constitute more than half of the new power plants built worldwide each year¹. In 2014, growth rates for coal use stalled globally for the first time, including in China. This trend continued through 2015². Currently, oil and coal prices are at record lows, which has halted the development of most new coal and oil mining projects.

While electric vehicles still have a negligible share of global car transport this is likely to change as most international car manufacturers prepare for a massive shift toward electric vehicles. It is possible that the market for electric vehicles could follow the same exponential development pathways as the solar photovoltaic (PV) market. Between 2010 and 2015 solar technology suddenly took off, with increasing market shares and a significant drop in investment costs. Solar photovoltaic at the household level is now cheaper than retail electricity prices (tariffs) in most industrialised countries. As such, it is now cost-effective for many households to produce their own power.

Wind power is now the cheapest technology worldwide for new power plants. This led to a huge global market for wind with 63,000MW of capacity added during 2015 – equivalent to installing a new turbine every 10 minutes³.

These global developments are already having an impact on Australia's energy market, and this impact can only increase in the coming years.

1.2 THE AUSTRALIAN CONTEXT

The fundamental shifts in the energy system globally, represent a huge opportunity for innovative energy interventions both in technologies and business models. This is happening at a time when the Australian Government has put science and innovation on the national agenda, investing in technologies and concepts to start an "ideas boom".



¹ REN21 (2015) *Renewables 2015 Global Status Report*, Paris, REN21 Secretariat. Available at: www.ren21.net/status-of-renewables/global-status-report/

² Li Junfeng, Director General at the National Climate Change Strategy Research and International Cooperation Centre: *The Guardian Interview*, 20th January 2016. Available at: www.theguardian.com/environment/2016/jan/19/chinas-coal-burning-in-significant-decline-figures-show

³ Global Wind Energy Council (GWEC), February 2016: www.gwec.net/global-figures/wind-energy-global-status/



While most renewable power generation technologies are mature and ready for large-scale market deployment, there is still a need for system-supporting technologies that ensure Australia has a resilient power supply system into the future. Australia is very well positioned to tap into the new large-scale global renewable market with a well-known tendency to be an "early adopter" of technologies — especially information technologies.

The need to transform Australia's energy system is further strengthened by the ageing coal power plant fleet. Indeed, the age of the fleet necessitates an almost complete replacement within the next two decades. This opens up a historic window of opportunity to restructure Australia's power sector, moving from our current reliance on fossil fuels to a resilient and carbon-free renewable power system. Innovation is needed to develop new business models for future renewable power supply. At the same time, we can redefine the role of energy as a service rather than a commodity and to evolve the role of network companies and retailers as energy service organisations. International examples of power markets with a high share of renewable energy such as Germany, Denmark, Spain and USA states such as Texas have paved the way to 100% renewable energy is technically feasible, and our research indicates that Australia is in a good position to do likewise.

1.3 THE ROLE OF SCENARIOS IN ENERGY POLICIES

Scenarios are necessary to describe possible future development paths, giving decision-makers a broad overview outlining the implications of various options. A scenario is by no means a prognosis of what will happen, but an "if-then" analysis. The scenarios provide decision-makers with an indication of how they can shape the future energy system.

Three scenarios have been developed to show possible pathways for Australia's future energy supply system:

- Reference scenario based on Australian government forecasts and reflecting a continuation of the status quo.⁴
- **Renewable scenario** focused on renewable energy in the stationary power sector by 2030 while the transport and industry sectors remain dependent on fossil fuels.
- Advanced Renewable scenario for a fully decarbonised power sector by 2030 and a fully renewable energy supply system – including transport, and industry – by 2050.

Changes to energy markets require long term decision-making, because of the potential for changes in infrastructure to be required. They are not dependent on short-term market developments. Without long term planning for infrastructure, the power market cannot function optimally. Grid modifications and the roll-out of smart metering infrastructure, for example, require several years to implement. These technologies build the basis for the energy market and enable for energy trading.

It should be noted that long term energy scenarios have a different role to 'grid and dispatch' scenarios and simulate the energy system in annual or 5-year rather than 15-minute steps. Energy scenarios develop the 'big picture' for a country, while a grid or dispatch model develops the details on how to implement such a concept. This project uses one of the main models that underpinned Germany's "Energiewende", in which the German Government has a target of 80% renewable electricity by 2050.

This report specifically looks at energy generation. An important parallel stream of research is the analysis of organisations like CSIRO and others, for example through the Future Grid Research Program to better understand the role of and needs of Australian electricity grids in a future powered by increasing levels of renewable energy. The Institute for Sustainable Futures has developed its own grid investment model and has significant knowhow in grid modelling, with a number of other specialised power grid simulation models, however this analysis was not within the scope of this project.

⁴ We note that some of the assumptions embodied in these forecasts, such as the replacement of existing coal power plants with additional coal power plants, are increasingly unlikely to be realised given the very factors covered in this report.



2 KEY RESULTS

2.1 KEY RESULTS FOR THE ADVANCED RENEWABLES SCENARIO

The transition to a 100% renewable energy system by 2050 is both technically possible and economically viable in the long term. This report presents two scenarios for transitioning towards a decarbonised energy system and a reference case based on current policies. The **Advanced Renewables** scenario is the focus of this report as it is the most ambitious scenario, resulting in a renewable electricity system by 2030 (for stationary energy) and a fully renewable energy system by 2050. The key results of the **Advanced Renewables** scenario are presented below, and discussed in detail in report alongside the **Renewables** and **Reference** scenarios.

Power Sector

- The supply of electricity is 100% renewable by 2030 for stationary power.
- By 2035 97% of total electricity demand (including electrified transport) is supplied by renewables.
- Energy productivity doubles by 2030.
- All coal power plants shut down by 2030.
- Firm capacity remains at today's level of approximately 75% throughout the entire scenario period.

Transport Sector

- The supply of energy is 41% renewable by 2035, 64% by 2040 and 100% by 2050.
- Australia is independent from oil imports within one generation.

Industry Sector

- The supply of energy is 50% renewable by 2035 and 100% by 2050.
- Electricity use doubles by 2050 to replace direct fuel consumption.

Primary Energy

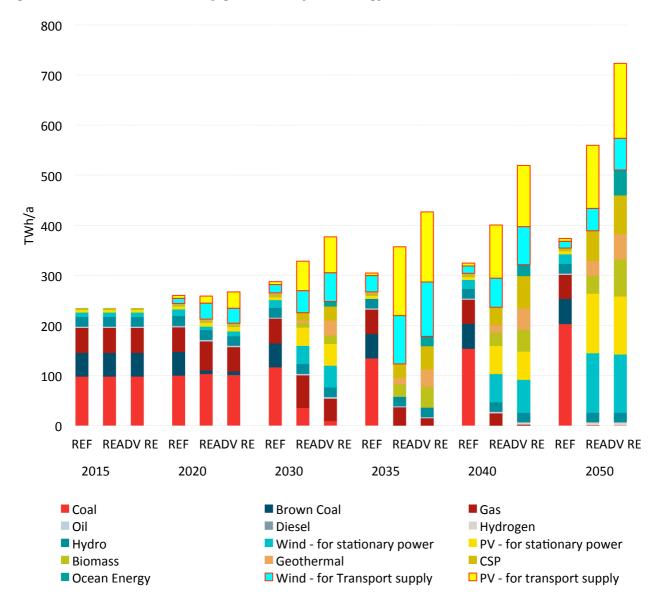
41% of energy use across all sectors is renewable by 2030, 59% by 2035, 75% by 2040 and 96% by 2050.

Cost Analysis

- New capital investment in the power sector would almost entirely (99%) be directed to renewables and cogeneration until 2050.
- This results in higher investment costs of \$800 billion out to 2050, compared to \$150 billion in the Reference scenario. A large part of the additional investment in renewable power generation capacity goes towards meeting increased demand from the transport and heating sectors (as those sectors switch over to electricity), and towards generating synthetic fuels for use in those sectors.
- Because renewable technologies have no ongoing fuel costs, power sector fuel savings of \$340 billion and transport fuel savings of \$400 billion more than compensate for the higher investment costs, a net saving of \$90 billion.
- The combined power and transport fuel cost savings would cover around 110% of the capital investment cost. New renewable power generation needed for a 100% renewable energy system can therefore be financed by fuel cost savings before 2050.



Figure 1: Breakdown of electricity generation by technology





3 METHODOLOGY AND ASSUMPTIONS

3.1 MODELLING OVERVIEW

The modelling approach used in this research is the development of target-orientated scenarios. In this approach a target is set and technical scenarios are developed to meet this target and then compared to a reference case. The scenarios are based on detailed input data sets, which take into account defined targets, renewable and fossil fuel energy potential and specific parameters for power, heat and fuel generation in the energy systems. The data sets are then fed into a model developed by DLR that uses MESAP/PlaNet software, an accounting framework for the calculation of the complete energy system balance to 2050.

The simulation model PlaNet that includes MESAP, an energy and environmental planning package (MESAP, 2008), was created to assist long-term strategic planning at a national, regional, or local level. PlaNet consists of two independent modules:

- 1. A flow calculation module, balancing energy supply and demand annually; and
- 2. A cost calculation module for the calculation of the corresponding generation and fuel costs.

The PlaNet flow calculation uses a set of linear equations, which can be solved sequentially. Note that this is not a dispatch model (such as UNSW CEEM's NEM simulation model), a cost optimisation model, DigSilent technical grid simulation model or a geo-spatial grid model (Such as the [R]E 24/7 model developed by Dr Teske). Rather, it is a bottom-up integrated energy balance model. Different modelling approaches each have their benefits and drawbacks. This model is particularly good at helping policy makers and analysts understand the relationships between different energy demand types in an economy.

Historically, heating, electricity and mobility have been quite separate in terms of their energy sources, requiring different infrastructure and therefore planning – electricity for stationary power, petrol and diesel for mobility and onsite heat for buildings and industrial processes. However, things are changing, with electricity projected to be used increasingly for heating and mobility (via electric vehicles). Thus, it is important to take an integrated approach across heat, mobility and electricity/stationary power when developing future energy system scenarios, as this model does.

In a simulation model, the user specifies the drivers of energy consumption, including forecast population growth, GDP and energy intensities.

Specific energy intensities are assumed for:

- Electricity consumption per person,
- The industrial heat demand to GDP ratio,
- Demand for energy services, such as useful heat, and
- Different transport modes.

For heat as well as electricity production, the model distinguishes between different technologies, characterised by their primary energy source, their efficiency and their costs. Examples include biomass or gas burners, heat pumps, solar thermal and geothermal technologies and several power generation technologies (PV, wind, biomass, gas, coal, nuclear, combined heat and power).

For each technology, the market share with respect to total heat or electricity production is specified according to a range of assumptions including targets, potentials, costs and societal, structural and economic barriers.

The main outputs of the model are:

• Final and primary energy demand, broken down by fuel, technology and sectors of the economy as defined by the International Energy Agency (IEA) – industry, power generation, transport and other (buildings, forestry and fisheries)⁵,

.

⁵ Note these industry sectors correspond to IEA energy statistics that are input to the model.



- Results broken down by the three main types of energy demand electricity, heating and mobility (transport) - specifically, the energy required, technology deployment and investment costs for each of these types of energy demand.
- Total energy budget the total cost of energy for the whole energy system, and
- Energy-related greenhouse gas emissions over the projection period.

3.2 OVERVIEW OF THE SCENARIOS

The average age of a power plant in Australia is 36 years⁶ meaning most are reaching their optimal lifespan. For this reason, Australia needs to renew its power plant fleet over the coming decades. Building new power plants – no matter what technology – will increase production costs for generated electricity and increase wholesale market prices, because most coal power plants are fully paid off, so they are operating on marginal costs with no capital costs. The need to build new plants means that an increase in the cost of generation is therefore unavoidable.

With the decrease in the price of solar photovoltaic and onshore wind in recent years renewables have become an economic alternative to building new coal and gas power plants. As a result, renewables achieved a global market share of over 50% of all new build power plants in 2014 and 2015. Australia is blessed with some of the best solar and wind resources world-wide and renewables generation costs are generally lower than in other parts of the world. However constantly shifting policy frameworks have lead to high investment risks and therefore higher project development and installation costs for solar and wind projects relative to countries with more stable policy.

The scenario-building process for all scenarios includes assumptions on policy stability, the role of future energy utilities, nuclear power generation and carbon capture and storage (CCS), population and GDP, firm capacity and future costs.

- Policy stability: This research assumes that Australia will establish a secure and stable framework for the deployment of renewable power generation. In essence, financing a coal power plant or a wind farm is quite similar. In both cases a power purchase agreement, which ensures a relatively stable price for a specific quantity of electricity, is required to finance the project. Daily spot market prices for electricity and/or renewable energy or carbon are not sufficient for long-term investment decisions for power plants with technical lifetimes of 20 years or longer.
- Strengthened energy efficiency policies: Existing policy settings, namely those outlined in the National Energy Productivity Plan, will need to be strengthened in order to deliver on Australia's well-demonstrated potential to double energy productivity by 2030.⁷
- Role of future energy utilities: With 'grid parity' of rooftop solar PV under most current retail tariffs, this modelling assumes that the energy utilities of the future take up the challenge of increased local generation and develop new business models which focus on energy services rather than only selling kilowatt-hours.
- Nuclear power generation and carbon capture and storage (CCS): As they are not classified as renewable energy resources, the scenarios do not include these options in the modelled future energy mix as they fall outside the 100% renewable energy scenario definition. In the case of nuclear, high costs, uncertainties over social license to operate, and very long construction times (an average of 12 years based on all currently operating nuclear power plants worldwide⁸) would likely exclude this option from featuring in a rapid energy system transition. Uncertainties surrounding the technical and economic case for carbon capture and storage may also preclude that technology from featuring within a rapid energy system transition scenario.9

Climate Council (2014) Australia's Electricity Sector: Ageing, Inefficient and Unprepared, available at: http://www.climatecouncil.org.au/uploads/f9ba30356f697f238d0ae54e913b3faf.pdf

ClimateWorks (2015) 'Australia's Energy Productivity Potential', ClimateWorks Australia, Melbourne, Victoria

⁸ Mycle Schneider, Antony Froggatt et al. World Nuclear Industry Status Report 2015

⁹ See, for example, Steffen, W (2015), 'Unburnable Carbon: why we need to leave fossil fuels in the ground', and Stock, A (2014), 'Australia's Electricity Sector: Ageing, Inefficient and Unprepared' Climate Council of Australia



- **Population and GDP:** The three scenarios are based on the same population and GDP assumptions. Projections of population growth are taken from the Australian Bureau of Statistics (ABS) while the GDP projection assumes long-term average growth of around 2.0% per year over the scenario period, as documented in Section 3.3.1.
- **Firm Capacity:** The scale of each technology deployed and the combinations of technologies in each of the three scenarios target a firm capacity in line with the current Australian energy system's firm capacity (75%). Firm capacity is the "proportion of the maximum possible power that can reliably contribute towards meeting peak power demand when needed." Firm capacity is important to ensure a reliable and secure energy system. Note that fluctuating or variable renewables still have a firm capacity rating and the combination of technology options increases the firm capacity of the portfolio of options (see also 'security of energy supply' point in the RE scenarios).
- Cost assumptions: The same cost assumptions are used across the three scenarios. As technology costs decline with deployment scale rather than time, the renewable energy cost reduction potentials in both renewable cases may even be larger than in the reference case because market sizes are bigger. The reverse is true for the fuel cost assumptions as all three scenarios are based on low fossil fuel price projections, while both renewable scenarios have a significant drop in demand; the reference case assumes increased demand that might lead to higher fuel costs. As such, the costs should be considered to be conservative. The cost assumptions are documented in section 3.3.3.

3.2.1 The Reference Scenario

The **Reference scenario** (**REF**) reflects a continuation of current policies and is based on Australian Government forecasts. Energy statistics are taken from the International Energy Agency's "Energy Balances of OECD Countries 2016"¹¹ as well as "Australian Energy Update 2015" published by the Commonwealth Department of Industry, Innovation and Science¹². The Australian energy demand projections use a combination of recent regulatory reporting forecasts where available, and the Australian Bureau of Resources and Energy Economics (BREE) Australian Energy Projections published November 2014¹³. Official market forecast sources include the Australian Energy Market Operator (AEMO) national electricity and gas forecasts¹⁴ and the IMO 2015 Gas forecast for Western Australia¹⁵. This results in a forecast incorporating the most recent outlook from official sources where available.

¹⁰ http://igrid.net.au/resources/downloads/project4/D-CODE_User_Manual.pdf

¹¹ International Energy Agency, 2015, *Energy Balances of OECD Countries*. Available at: https://www.iea.org/statistics/relateddatabases/energybalancesofoecdcountries/

Department of Industry and Science. 2015. 2015 Australian energy update Available at: http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/aes/2015-australian-energy-statistics.pdf

¹³ Commonwealth of Australia Bureau of Resources and Energy Economics. 2014. *Australian Energy Projections to 2049-50*. Available at: http://www.industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/aep/aep-2014-v2.pdf

¹⁴ Australian Energy Market Operator (AEMO). 2015. *National Electricity and Gas Forecasting*. [ONLINE]. Available at: http://forecasting.aemo.com.au/Electricity/AnnualConsumption/Operational

¹⁵ Independent Market Operator (IMO). 2015. Gas Statement of Opportunities. Available at: http://wa.aemo.com.au/docs/default-source/Reserve-Capacity/november-2015-gas-statement-of-opportunities v28968963f29c46dc8b2c9ff0000bd36b5.pdf?sfvrsn=0



3.2.2 Assumptions for both renewable scenarios

Both the **Renewables (RE)** and **Advanced Renewables (ADV RE)** scenarios are built on a framework of targets and assumptions that strongly influences the development of individual technological and structural pathways for each sector. The main assumptions considered for this scenario-building process are detailed below:

- Emissions reductions: Strong improvements in energy efficiency and the dynamic expansion of renewable energy across all sectors are the main measures to meet CO₂ emission reductions targets.
- Renewables industry growth: A dynamic growth in new capacities for renewable heat and power generation is assumed based on current knowledge about potentials (see energy potentials discussed in Section 3.3.5), costs and recent trends in renewable energy deployment.
- **Fossil fuel phase out:** The operational lifetime for coal power plants is conservatively estimated to be 40 years. In both scenarios brown coal power plants are phased out early on, followed by hard coal power plants and finally gas power plants.
- **Future power supply:** The capacity of large hydropower remains flat in Australia over the entire scenario period, ¹⁶ while the quantities of bioenergy grow within the potential for sustainable biomass for Australia (see dot point on sustainable biomass levels below). Wind power and solar power, both photovoltaic and concentrating solar power (CSP), are expected to be the main pillars of future power supply, complemented by smaller contributions from bioenergy, geothermal (hydrothermal and Enhanced Geothermal Systems [EGS]), and the future expansion of small and medium sized ocean energy. Note that solar PV figures combine both rooftop and greenfield development.
- Annual renewable energy installation market: In the process of defining the input assumptions
 for this modelling, ISF contacted the Clean Energy Council (CEC) to identify Australia's current
 and future potential renewable industry capacity in regards to installations (MW) per year for solar
 PV, concentrated solar power, wind, bioenergy and different forms of geothermal energy
 technologies. The annual installation numbers modelled between 2015 and 2020 for the
 Advanced Renewables scenario are in line with the capacities identified by the CEC.
- Security of energy supply: The scenarios limit the share of fluctuating or variable power generation and maintain a sufficient share of controllable, secured capacity. Power generation from biomass and CSP, as well as a share of gas-fired back-up capacities and storage, are considered important for the security of supply in a future energy system, related to the output of firm capacity discussed above.
- Sustainable biomass levels: The sustainable level of biomass use for Australia is assumed to be limited to 1500 PJ, based on background studies on sustainable biomass potentials¹⁷. Low-tech biomass use, for example inefficient household wood-burners, are largely replaced in the renewable scenarios by state-of-the-art technologies, primarily highly efficient cogeneration plants.
- **CSP technology:** CSP implementation after 2030 was assumed to have a solar multiple of three¹⁸, which then enables thermal energy storage to provide energy for 12 hours per day of full-load operation of the turbine.

¹⁶ Increased droughts due to climate change pose risks to large-scale hydro's potential to continue generating at the same level as it has in the past, a risk which may be partly addressed through efficiency upgrades to existing installations and the addition of run-of-river, mini and micro hydro schemes. Geoscience Australia and ABARE (2010), 'Hydro Energy', chapter 8, Australian Energy Resource Assessment, Canberra

¹⁷ Global Biomass Potentials: Investigation and assessment of data Country-specific energy crop potentials, Remote sensing in biomass potential research, Global Biomass Potentials -Investigation and assessment of data, Country-specific energy crop potentials, Remote sensing in biomass potential research; Thilo Seidenberger et. al. (2008) German Biomass Research Centre

¹⁸ Oversizing the heliostat field by three times, to ensure both peak output and overnight thermal storage.



- **Electrification of transport:** Efficiency savings in the transport sector are a result of fleet penetration with new highly efficient vehicles, such as electric vehicles, but also assumed changes in mobility patterns and the implementation of efficiency measures for combustion engines. The scenarios assume a limited use of biofuels for transportation as the supply of sustainable biofuels is limited.
- Hydrogen and synfuels: Hydrogen and synfuels generated by electrolysis using renewable electricity is introduced as a third renewable fuel in the transportation sector, complementary to biofuels, the direct use of renewable electricity and battery storage. Hydrogen generation can have high energy losses; however the limited potentials of biofuels and mostly likely also battery storage for electric mobility mean it is necessary to have a third renewable option in the transport sector. Alternatively, this renewable hydrogen could be converted into synthetic methane and liquid fuels depending on economic benefits (storage costs vs. additional losses) as well as technology and market development in the transport sector (combustion engines vs. fuel cells).

3.2.3 The Renewables scenario

The **Renewables scenario** (**RE**) is designed to meet targets of halving Australia's energy related carbon dioxide emissions by 2035 and reducing them by 70% by 2050 compared to 1990 levels. These targets are in line with those that underpin ClimateWorks' Deep Decarbonisation Pathways modelling and are focused mainly on stationary power generation. Further to these targets are the objectives of phasing out all coal power plants by 2035, doubling energy productivity by 2030 and tripling it by 2050.

The energy efficiency projections for each sector are taken from research by ClimateWorks, ANU and CSIRO in "Pathways to deep decarbonisation in 2050" 19. The renewable energy trajectories for the first decades are taken from the ClimateWorks projections with solar photovoltaic figures updated with market figures from the Australian PV Institute for 2015. Renewable energy markets are projected to grow at a rate equal to the renewable energy markets of OECD countries with consistent reliable energy policies over the past decade and into the next decade. In addition, pathways for the deployment of renewable energy and efficiency measures reflect the technology trends of the last few years and market estimations of the solar photovoltaic, wind industry and other innovative technologies.

This scenario includes significant efforts to fully exploit the large potential for energy efficiency, available through current best-practice technology. At the same time, various proven renewable energy sources are integrated, to a large extent for electricity generation and also to a lesser extent for the production of synthetic fuels and hydrogen for heating (domestic, commercial and industrial) and transport.

3.2.4 The Advanced Renewables scenario

The **Advanced Renewables scenario (ADV RE)** takes a more ambitious approach to transforming Australia's entire energy system towards 100% renewable energy supply. The consumption pathways remain almost the same as in the **Renewables scenario**, however under this scenario a much faster introduction of new technologies leads to a complete decarbonisation of energy for stationary energy (electricity), heating (including process heat for industry) and transportation. The latter requires a strong role for storage technologies such as batteries, synthetic fuels and hydrogen.

The resulting final energy demand for transportation is lower compared to the **Renewables scenario** based on the assumptions that:

- Future vehicles and particularly electric vehicles will be more efficient and
- There will be greater changes in the transport mode-shift i.e. a greater use of public transport

¹⁹ ClimateWorks Australia, ANU, CSIRO and CoPS, 2014, *Pathways to Deep Decarbonisation in 2050: How Australia can prosper in a low carbon world: Technical report.* Available at: http://www.climateworksaustralia.org/sites/default/files/documents/publications/climateworks-pdd2050 technical report 20140923.pdf



The Advanced Renewables scenario increases the share of electric and fuel cell vehicles. This scenario also relies on a greater production of synthetic fuels from renewable electricity for use in the transport and industry sectors. Renewable hydrogen is converted into synthetic hydrocarbons, which replace the remaining fossil fuels, especially for heavy duty vehicles and air transportation, albeit with low overall efficiency of the synfuel system. Note that since renewable synfuels would use the current gas infrastructure, they could, with investment, become an export industry for Australia, in addition to what is modelled in these scenarios. To compensate for the high energy losses associated with the production of synthetic fuels, this scenario requires more fundamental changes in mobility patterns, behaviour and infrastructure.

In the heating sector (mainly heat for industry) electricity and hydrogen play a larger role in substituting for remaining fossil fuels. In the power sector, natural gas is also replaced by hydrogen. Therefore, electricity generation increases significantly in this scenario, assuming power from renewable energy sources to be the main "primary energy" of the future.

The **Advanced Renewables** scenario also models a shift in the heat sector towards an increase in the direct use of electricity, because of the enormous and diverse potential for renewable power and the limited availability of renewable fuels for high-temperature process heat in industry. A rapid expansion in the use of district heating and geothermal heat pumps is assumed, leading to an increase in electricity demand, which partly offsets the efficiency savings in these sectors. A rapid expansion of solar and geothermal heating systems is also assumed.

The increasing shares of variable renewable power generation, principally by wind farms and photovoltaics, will require the implementation of smart grids and a fast expansion of transmission grids, storage, and other load balancing capacities. Other infrastructure needs will also result, for example from the increasing role of on-site renewable process heat generation for industries and mining and the generation and distribution of synthetic fuels. The **Advanced Renewables** scenario therefore assumes that such infrastructure projects will be implemented in all parts of Australia without serious societal, financial or political barriers.

Scenarios by no means claim to predict the future; they provide a useful tool to describe and compare potential development pathways out of the broad range of possible 'futures'. The **Advanced Renewables** scenario was designed to indicate the efforts and actions required to achieve the ambitious objective of a 100% renewable energy system and to illustrate the options available to change our energy supply system into one that is truly sustainable. They may serve as a reliable basis for further analyses of possible concepts and actions needed to implement pathways for an energy transition.

3.3 SCENARIO ASSUMPTIONS

3.3.1 Population and economic development

Future population and economic growth are important factors in energy scenario building because they affect the size and composition of energy demand, directly and through its impact on economic growth and development. For population the Australian Bureau of Statistics projections²⁰ are used (see Table 1) while GDP growth is assumed to converge with the long-term OECD average at 2.0% per annum over the next 35 years.²¹

Table 1: Australia's population projection

Year	2015	2020	2030	2040	2050
Population	22,000,000	24,000,000	28,000,000	32,000,000	40,000,000

²⁰ Australian Bureau of Statistics 3222.0 - Population Projections, Australia, 2012 (base) to 2101 - Series A http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/3222.0main+features52012%20(base)%20to%202101

²¹ OECD Shifting Gear: Policy Challenges for the next 50 Years, Economics Department Policy Notes, 24 July 2014.



3.3.2 Fuel price projections

Global oil prices have fluctuated dramatically over recent years and this has been considered in the price projections for this modelling. In the IEA's World Energy Outlook 2014 oil price projections by 2040 range from \$100 per barrel in the '450-ppm scenario' up to \$155 per barrel in the 'Current Policies scenario' (in 2013 USD). At the time of this analysis (January 2016), the oil price was at a historic low of only \$30 per barrel with gas prices also showing significant fluctuation. The international coal price fell significantly and reached a low of \$50 dollar per ton in early 2016.

To account for these fluctuations the IEA projections from 2014 have been adjusted to the fuel prices of January 2016, which were less than half the price originally projected for this year. While there are coal price projections for export coal²², there are no long term price projections for domestic thermal coal. Furthermore Australian coal power plants do not pay the full international export price, a factor which can in many cases be classified as an effective subsidy.

The oil price assumption for all futures is taken from IEA World Energy Outlook 2014 '450-ppm scenario'.

Given the very high uncertainties of fossil fuel price projections, this research has taken into account the following cost projections for the power generation sector (coal and gas):

- The IEA WEO High Coal and Gas Price Scenario (WEO 2014)
- A continuing low coal price (as of January 2016) with the price staying at this current low price through to 2050.
- A low coal price (as of January 2016) with the price recovering (escalating) in line with the IEA's trajectory
- A low gas price (as of January 2016) with the price recovering (escalating) in line with the IEA's trajectory
- The average coal price of the past 5 years and prices increasing according to the IEA's trajectory.

Table 2: Development projections for fossil fuel and biomass prices in AUS\$/GJ (Source IEA WEO 2014, DLR/GPI - Energy [R]evolution 2015)

in AUS\$/GJ		2015	2020	2025	2030	2035	2040	2045	2050
Hard coal	IEA WEO High Price	5.9	6.5	7.5	8.0	8.4	8.9	9.3	9.6
	Historic low price	2.0	2.2	2.5	2.7	2.8	3.0	3.1	3.2
	Average price	2.9	3.2	3.8	4.0	4.2	4.5	4.6	4.8
	Current and continuing low price	2.9	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Natural	IEA WEO High Price	20.5	24.2	26.1	28.0	29.9	31.8	34.7	37.6
gas	Historic low price	6.8	8.1	8.7	9.3	10.0	10.6	11.6	12.5
	High price	9.8	11.5	12.4	13.3	14.2	15.1	16.5	17.9
	Current and continuing low price	9.8	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Crude oil	IEA WEO	23.2	27.2	29.3	31.4	31.4	31.4	31.4	31.4
Biomass	DLR	4.5	4.9	5.2	5.5	5.8	6.0	6.4	6.7
and waste	Biomass and waste	2.1	2.3	2.5	2.6	2.7	2.9	3.0	3.2

²² Bullen, J., Kouparitsas, M. and Krolikowski, M; *Long-Run Forecasts of Australia's Terms of Trade*; Treasury Working Paper 2, 2014–01 <a href="http://www.treasury.gov.au/~/media/Treasury/Publications%20and%20Media/Publications/2014/Long%20run%20forecasts%20of%20Australias%20terms%20of%20trade/Documents/PDF/long_run_tot.ashx



These coal and gas fuel cost projections are combined into the following three possible fuel cost futures and in two cases a relatively low carbon price which the three scenarios are tested against:

- 1. A current and continuing low coal price, with a low gas price and no carbon price
- 2. A low coal price, a low gas price and a carbon price of \$20/tonne in 2020 rising to \$30/tonne in 2030 and staying stable at this price until 2050
- 3. The average coal price, high gas price (from IEA WEO) and a carbon price as in 2.

It should be noted that the impact of the carbon price is <u>only</u> relevant to the resulting costs of electricity generation as outlined in Section 4.2.2. In this model a carbon price is <u>not</u> applied to the investment cost or the fuel costs, and is therefore not assumed in the calculation of the fuel cost savings delivered by either renewable scenario.

3.3.3 Cost projections for investment, operation and maintenance costs

The assumptions for the specific investment and operation costs of coal, gas, brown coal and oil power plants have been made according to the World Energy Outlook (WEO) 2014 Special Report on Investments²³. Because these technologies are at an advanced stage of technology and market development, the potential for cost reductions is limited.

The different renewable energy technologies available today all have different costs, levels of technical maturity and development potential. While hydropower has been widely used for decades, other technologies, such as the gasification of biomass or ocean energy, have yet to find their way to market maturity. Other types of renewable technologies being employed today are at a relatively early stage of market development, while others already developed mature markets. It is expected, however that large cost reductions can come from technical advances, manufacturing improvements and large-scale production, unlike conventional technologies. The dynamic trend of cost developments over time plays a crucial role in identifying economically sensible expansion strategies for scenarios spanning several decades.

Some renewable sources by their very nature, including wind and solar power, provide a variable supply, requiring a revised coordination with the grid network. But although in many cases renewable energy technologies are 'distributed' - their output being generated and delivered locally to the consumer – they also have large-scale applications like offshore wind parks, photovoltaic power plants or concentrating solar power stations.

To identify long-term cost developments, learning curves have been applied to the model calculations to reflect how the cost of a particular technology changes in relation to the cumulative production volumes. For many technologies, the learning factor (or progress ratio) sits between 0.75 for less mature systems to and 0.95 and higher for well-established technologies. A learning factor of 0.9 means that costs are expected to fall by 10% every time the cumulative output from the technology doubles. Empirical data shows, for example, that the learning factor for PV solar modules has been fairly constant at 0.8 over 30 years whilst that for wind energy varies from 0.75 in the UK to 0.94 in the German market.

The ISF research partners, the German Aerospace Centre (DLR) Institute for Technical Thermodynamics, Technology and System-Analysis, developed cost projections for renewable energy technologies. Assumptions on future costs for renewable electricity technologies were derived from a review of learning curve studies of Lena Neij²⁴, the analysis of technology foresight and road mapping studies, including the European Commission funded NEEDS project (New Energy Externalities Developments for Sustainability)²⁵, the IEA Energy Technology Perspectives 2008, projections by the

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²³ IEA 2014: Power Generation in the New Policies and 450 Scenarios - Assumed investment costs, operation and maintenance costs and efficiencies in the IEA World Energy Investment Outlook 2014, data file download: http://www.worldenergyoutlook.org/investment/

²⁴ Neij, L, 'Cost development of future technologies for power generation - a study based on experience curves and complementary bottom-up assessments', *Energy Policy* 36 (2008), 2200-2211

²⁵ www.needs-project.org



European Renewable Energy Council published in April 2010 ("Re-Thinking 2050") and discussions with experts from different sectors of the renewable energy industry.

In 2014 and 2015 DLR updated and revised those cost projection for the Greenpeace International Energy [R]evolution research²⁶. Due to significant cost decreases between 2014 and 2016, recent market developments have been taken into account, leading to further reduction of cost assumptions - especially for photovoltaics and solar thermal power plants (including heat storage). However, to increase consistency in the modelling, cost assumptions from WEO 2014 are adopted for biomass power plants, hydro, wind power and ocean energy.

These cost assumptions – especially for the base years – have been adapted to current Australian costs on the basis of the Australian Power Generation Technology Report²⁷. Future cost projections have been compared with several other projections, including the International Renewable Energy Agency (IRENA), Renewable Power Generation Costs in 2014.²⁸

It should be noted that all the publications referred to above are within the same cost estimation range. These cost assumptions (investment, operation and maintenance costs) are detailed in Appendix A. It should be noted that the solar PV costs listed in Appendix A assume an average between rooftop and utility scale solar PV, as it is assumed that Australia will see both.

3.3.4 Assumptions for hydrogen and synfuel production from renewable electricity

In the Advanced Renewables scenarios hydrogen and sustainable synthetic fuels (synfuels) are introduced as a substitute for natural gas, and make up a significant share of transport fuels after 2030. Hydrogen is assumed to be produced via electrolysis, resulting in an additional electricity demand supplied by extra renewable power production capacity mainly from wind, PV and CSP.29 Renewable hydrogen and synthetic fuels are essential for a variety of sectors:

- For the industry sector, hydrogen serves as an additional renewable fuel option for hightemperature applications, supplementing biomass in industrial processes, whenever direct use of renewable electricity is not applicable.
- The transport sector also increasingly relies on hydrogen as a renewable fuel, where battery supported electric vehicles reach their limitations and where limited biomass potentials restrict the extension of biofuel use. However, future application of hydrogen might not suffice to replace all fossil fuel demand, especially in aviation, heavy-duty vehicles and navigation. The Advanced Renewables study introduces synthetic hydrocarbons from renewable hydrogen, electricity and biogenic/atmospheric CO₂. These synfuels are introduced after 2030 and provide for the remaining fossil fuel demand that cannot be supplied by biofuels due to limited potentials.

3.3.5 Renewable Energy Potential

The renewable energy potential is taken from AEMO's 100% Renewables Study – Modelling Outcomes Report³⁰. The energy potential figures are used to make sure each energy technology in the scenarios is within the maximum installable generation capacity (GW) and maximum recoverable electricity (TWh/year). AEMO's figures (see Table 3) estimate the energy resource available for each technology based on historical weather and spatial data, giving consideration to competing land uses, topography and population density. The Australian Energy Resource Assessments³¹ (ABARE 2010) and 2014) were also reviewed but AEMO data was used as it is more conservative and comparable across technologies.

²⁶ This research has been undertaken for more than 10 years and resulted in more than 100 country analyses

²⁷ CO2CRC Limited, 2015, *Australian Power Generation Technology Report*:, Australia, <u>www.co2crc.com.au</u>

²⁸ IRENA, Renewable Power Generation Costs in 2014, January 2014, Abu Dhabi, www.IRENA.org

²⁹ Note this is also good for balancing the energy system – on very windy and sunny days, where generation exceeds supply, the excess generation can be used to create syn-fuels.

30 AEMO (2013) 100 per cent Renewables Study – Modelling Outcomes Report. Retrieved from

https://www.environment.gov.au/climate-change/publications/aemo-modelling-outcomes

ABARE (2010, 2014) Australian Energy Resource Assessments. Retrieved from http://www.ga.gov.au/scientific- topics/energy/resources/australian-energy-resource-assessment



Table 3: Renewable Energy Potential (AEMO 2013)

Resource	Maximum installable generation capacity (GW)	Maximum recoverable electricity (TWh/year)
Wind – onshore (greater than 35% capacity factor)	880	3100
Wind – offshore (greater than 50% capacity factor)	660	3100
Solar – CST/PV	18,500 / 24,100	41,600 / 71,700
Geothermal (EGS)	5,140	36,040
Geothermal (HSA)	360	2,530
Biomass	16	108
Wave	133	275
Hydro	8	12
Total	25,700 / 31,300	86,800 / 116,900

Table 4 shows the required areas for three types of renewable energy technologies.

Table 4: Required area for Solar PV and Wind

Technology		Unit	2015	2020	2030	2040	2050
PV	Total installed capacity	GW	3	28	72	111	166
	Specific nominal capacity (per m2)	kW/m ²	0.14	0.15	0.16	0.17	0.17
	Area	km ²	22.3	174.2	449.2	654.4	976.5
Wind onshore	Total installed capacity	GW	4	13	29	37	47
Originale	Average capacity	MW	2.0	3.0	3.5	4.0	4.3
	Number of plants	#	2,087	4,354	7,143	9,138	10,960
Wind offshore	Total installed capacity	GW	0	0	6	7	9
Oligilore	Average capacity	MW	5.4	6.2	7.5	8.5	9.0
	Number of plants	#	0	0	797	1,011	1,022



4 RESULTS

In this section, we outline the key results across a range of areas, both in terms of the impacts and the costs of the different scenarios. First, we consider stationary energy, focusing on electricity generation, capacity and breakdown by technology. We then examine energy supply for heating, focusing on industrial heat supply. This is followed by a section considering the impacts and costs of the different scenarios on transport and on the development of CO2 emissions. The section ends with an examination of the final costs, outlining the required energy budget.

4.1 ELECTRICITY CONSUMPTION/DEMAND

To understand the results, it is first necessary to clarify the metrics used. Two of the main metrics used in the energy industry to analyse energy are primary energy consumption and final energy demand.

Final energy demand "is a measure of the energy that is delivered to energy end users in the economy to undertake activities as diverse as manufacturing, movement of people and goods, essential services and other day-to-day energy requirements of living." 32

Primary energy consumption is defined as the "direct energy use at the source, or supply to users without transformation, of crude energy; that is, energy that has not been subjected to any conversion or transformation process." Primary energy statistics often make the renewables share appear lower than other forms of energy. For example, IEA 2010 statistics listed the global primary energy share for nuclear energy as 6% and hydropower at 2%, however both technologies produced the same amount of power generation in Terawatt hours. This is due to the fact that nuclear power is a thermal process with an average efficiency of around 30% - thus the input of uranium (the primary energy resource) is therefore three times higher, than the final energy (3:1), while hydropower which does not involve a thermal process is calculated as final energy equals primary energy (1:1).

4.1.1 Final Energy Demand

Total final energy demand

Combining the population development GDP growth and energy intensity projections results in future development pathways for Australia's final energy demand under all three scenarios (Figure 2).

Under the Reference scenario, the total final energy demand increases by 54% from 3900 PJ/a in 2015 to 6000 PJ/a in 2050. In the basic **Renewables** scenario, final energy demand decreases by 8% compared to current consumption, equating to 3600 PJ/a of energy in 2050. The **Advanced Renewables** scenario results in further reductions due to a higher share of electric cars.

³² http://www.seai.ie/Energy-Data-Portal/Frequently-Asked-Questions/Energy_Use_FAQ/

https://stats.oecd.org/glossary/detail.asp?ID=2112



7.000 6.000 5.000 4,000 3,000 2,000 1,000 0 REF RE ADV RE ■ Transport ■ Industry ■ Other Sectors □Efficiency

Figure 2: Projection of total final energy demand by sector (excluding non-energy use and heat from CHP auto producers)

Final energy demand for electricity

Figure 3 shows the breakdown by sector of final energy demand drawn from electricity, excluding gas and oil used directly for transport, heating and industry. Under both renewable scenarios, overall electricity demand is expected to increase despite efficiency gains.

This reduction can be achieved in particular by introducing highly efficient electronic devices using the best available technology in all demand sectors. The transformation to a carbon free energy system in the **Advanced Renewables** scenario will further increase the electricity demand in 2050 up to 500 TWh/a. Electricity will become the major renewable 'primary' energy, not only for direct use for various purposes but also for the generation of synthetic fuels to substitute for fossil fuels. Around 230 TWh are used in 2050 for electric vehicles and rail transport in 2050 in the 100% scenario, around 50 TWh for hydrogen and 40 TWh for synthetic liquid fuel generation for the transport sector (excluding bunkers).



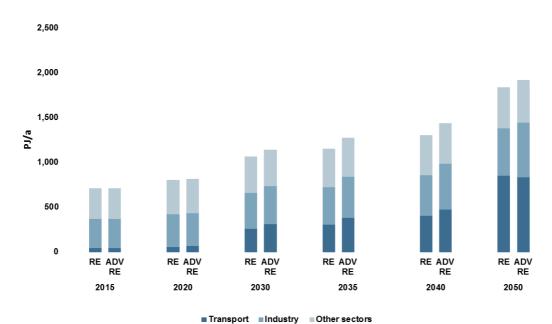


Figure 3: Development of electricity demand by sector in both renewable scenarios

Total electricity demand rises from 700PJ/a to approximately 1830PJ/a by 2050 in the basic **Renewables** scenario. This is due to economic growth, increasing living standards and electrification of the transport sector. However, compared to the Reference scenario, efficiency measures in the industry, residential and service sectors avoid the generation of approximately 80TWh/a (or 288 PJ/a). This reduction can be achieved in particular by introducing highly efficient electronic appliances using the best available technology in all demand sectors.

The transformation to a carbon free energy system in the **Advanced Renewables** scenario results in a greater increase in electricity demand by 2050 of 1900PJ/a. Under this scenario, electricity becomes the major renewable 'primary' energy, not only for direct use for various purposes (stationary electricity, electric vehicles, etc.) but also for the generation of synthetic fuels for fossil fuel substitution. In 2050 under the **Advanced Renewables** scenario, approximately:

- 830PJ of electricity is used for electric vehicles and rail transport
- 180PJ of electricity is used for hydrogen production, and
- 145PJ of electricity is used for synthetic liquid fuel generation for the transport sector (excluding bunkers³⁴).

Final energy demand for heat

Under both renewable scenarios, heat related final energy consumption equivalent to about 900 PJ/a by 2050 is avoided through efficiency gains compared to the Reference scenario (see Figure 4). These gains can be driven by energy-related innovation in industry and renovation of the existing stock of residential buildings, for example the introduction of low energy standards and 'passive climatisation' for new buildings, as well as highly efficient air conditioning systems. In this way the same level of comfort and other energy services is delivered by lower future energy demand. The efficiency gains in process heating - mainly in industry - are even larger than in the electricity sector.

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³⁴ Bunker fuels: Fuels for international aviation and shipping



2,500 2,000 1,500 1,000 500 0 RE ADV RE ADV RE ADV RE ADV RE ADV RE ADV RE RE RE RE RE RE 2015 2020 2030 2035 2040 2050

Figure 4: Development of heat demand by sector in the renewable scenarios

Final energy demand for transport

Figure 5 shows increased efficiency in transport energy demand, despite population and GDP growth in both renewables scenarios. In particular, there is a reduction of final energy demand for road transport due to electrification of vehicles (electrified vehicles are more efficient than combustion engines). There is a slight increase in final energy demand for rail due to mode shifting (i.e. increased public transport use) but this is relatively minor. In both renewables scenarios domestic aviation remains stable despite population growth, but goes up significantly in the Reference scenario.

☐ Efficiency ■ Other sectors ■ Industry



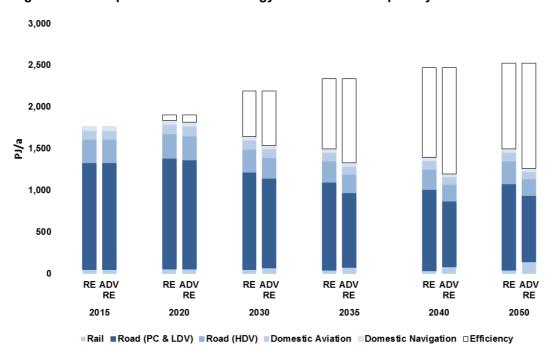


Figure 5: Development of the final energy demand for transport by sector in the renewable scenarios

4.1.2 Primary energy consumption

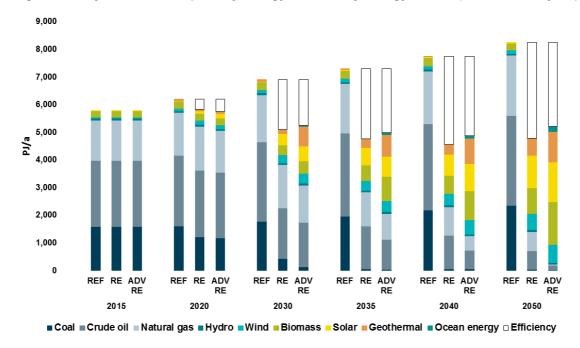
The primary energy consumption under the three scenarios is shown in Figure 6, based on the modelling assumptions discussed in Sections 3.2 and 3.3. Under the basic **Renewables** scenario, primary energy demand decreases by 18% from today's 5800PJ/a to 4750 PJ/a in 2050. In the **Advanced Renewables** scenario the reduction is slightly less – 11% from today's level to 5200 PJ in 2050. Demand is lower under both renewables scenarios in comparison to the Reference scenario where primary energy demand is around 8000PJ in 2050. Overall primary energy demand is 42% lower in 2050 under the **Renewables** scenario and 36% lower in the **Advanced Renewables** scenario.

The **Advanced Renewable** scenario aims to phase out fossil fuels as fast as possible by expanding renewable energy and a rapid introduction of very efficient vehicles in the transport sector to replace oil based combustion engines. This leads to an overall renewable primary energy share of 59% in 2035 and more than 96% in 2050 – this includes non-energy consumption³⁵. In the basic **Renewables** scenario the overall renewable primary energy share is slightly lower at 40% in 2030 and 70% in 2050 – this represents a 100% renewable *electricity* system, but with fossil fuels still providing energy for industry and transport needs. In contrast to the Reference scenario, no new coal power plants will be built in Australia in both renewable scenarios.

³⁵ "Non-energy use covers those fuels that are used as raw materials in the different sectors and are not consumed as a fuel or transformed into another fuel." IEA - https://www.iea.org/statistics/resources/balancedefinitions/#nonenergyuse



Figure 6: Projection of total primary energy demand by energy carrier (incl. electricity import balance)





4.2 ELECTRICITY GENERATION

4.2.1 Electricity generation, capacity and breakdown by technology

The development of the electricity supply sector is characterised by a dynamic and growing renewable energy market and an increasing share of renewable electricity. This trend will more than compensate for the phasing out of brown and hard coal power production and continuously reducing the number of fossil fuel-fired power plants.

In the Renewables scenario:

- By 2050 97% of the electricity produced in Australia will come from renewable energy sources, with the remaining 3% from gas. 'New' renewables mainly wind, PV and geothermal energy will contribute 82% to the total electricity generation.
- The share of electricity production from renewable sources will be 33% by 2020, 68% by 2030 and 90% by 2035.
- The installed generation capacity of renewables will reach about 151 GW in 2035 and 260 GW in 2050

In the Advanced Renewables scenario:

- By 2050 100% electricity supply will come from renewable energy sources, with 96.5% by 2035. If transport electrification is excluded, 100% of electricity supply for stationary power will come from renewable energy sources by 2030.
- The installed generation capacity of renewables will reach around 174 GW in 2035, and 310 GW in 2050
- Secure (firm) capacity remains at around 75% for the entire period, shifting from 74% in 2015 to 80% in 2035.

Figure 7: Breakdown of electricity generation by technology

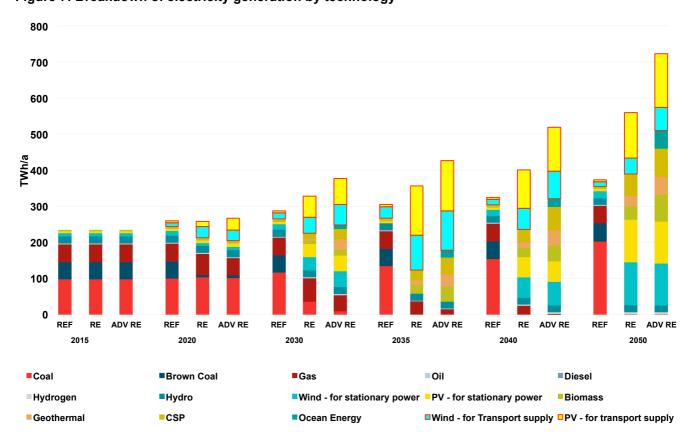




Figure 7 shows the structure of power generation by technology type. The supply for stationary power will reach 100% in 2030 under the **Advanced Renewables scenario**, with electricity generation for transport excluded. By 2020 there will already be solar PV and wind capacity dedicated to supply electricity for the transport sector, either for electrified public transport or individual transport vehicles. ³⁶ Battery technologies as well as the production of synfuels for heavy duty vehicles, mining and shipping, will also be required for the transport sector where it is not connected to the grid. Geothermal and Concentrated Solar Power (CSP) plants will also be vital for providing additional dispatchable capacity while storage technologies will be expanded significantly after 2020 particularly in providing electricity for transport (see Section 4.4).

Table 5: Projection of renewable electricity generation capacity

In GW		2015	2020	2030	2040	2050
	REF	8	8	7	7	7
Hydro	RE	8	8	8	8	8
	ADV	8	8	8	8	8
	REF	0	1	1	1	1
Biomass	RE	0	1	2	5	9
	ADV	0	1	3	8	20
	REF	4	11	15	15	15
Wind	RE	4	18	37	52	72
	ADV	4	18	45	63	80
	REF	0	0	1	0	0
Geothermal	RE	0	0	1	3	7
	ADV	0	0	7	9	10
	REF	3	3	4	4	4
PV	RE	3	14	59	102	153
	ADV	3	26	72	111	166
	REF	0	0	0	0	0
CSP	RE	0	0	6	7	12
	ADV	0	0	10	13	16
	REF	0	0	0	0	0
Ocean	RE	0	0	0	0	0
	ADV	0	0	3	6	13
	REF	15	23	28	27	27
Total	RE	15	41	113	176	260
	ADV	15	54	146	217	311

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³⁶ Note this is already starting to happen with the NSW Government putting out a request for tender for renewable electricity to supply a new train line in Sydney. http://reneweconomy.com.au/2016/nsw-seeks-renewable-energy-to-power-north-west-rail-line-63247



Table 5 shows the comparative evolution of the different renewable technologies in Australia over time. By 2020 wind and solar PV overtake hydropower, which is currently the main renewable power source. After 2020, wind and solar PV will continue to grow, complemented by electricity from solar thermal, geothermal and ocean energy. Both renewable scenarios will lead to a high share of variable power generation sources (PV and onshore-wind) of 54% and 60% by 2030 and 79% and 83% by 2050, which underscores the importance of robust generation forecasts. Smart grids, demand side management (DSM), energy storage capacities and other options need to be expanded in order to increase the flexibility of the power system for grid integration, load balancing and a secure supply of electricity.

Figure 8 shows the average annual capacity changes in the Advanced Renewable scenario by electricity generating technology.

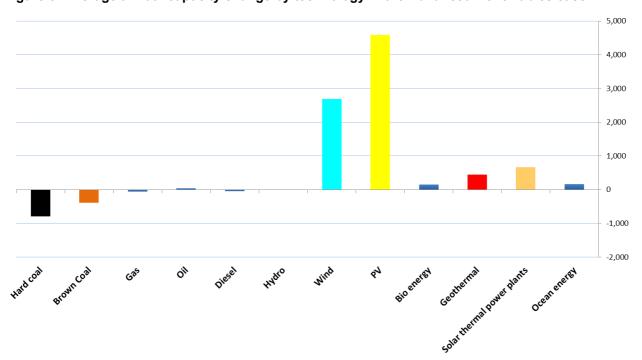


Figure 8: Average annual capacity change by technology in the Advanced Renewables case

The average annual installations for solar PV between 2015 and 2030 are at around 4,500 MW, only four times more than the PV market size of 2011, 2012 and 2015. The wind turbine installations will need to remain at 2,600 MW a year for the coming 15 years. This is equal to the development in the German wind power market between 1999 and 2014, a country smaller in area than New South Wales. There are neither space nor wind resource constraints to building the wind and solar capacities projected in the Advanced Renewables case until 2050 or exceeding this market size.

The renewable energy capacity will be built up in moderate annual steps, based on the experiences of other OECD countries of the past 15 years. Existing coal power plants will be retired step-by-step at a rate of approximately 750 MW per year, equal to one or two average coal power plant blocks.



4.3 ENERGY SUPPLY FOR HEATING

4.3.1 Industrial heat supply and breakdown by energy carrier

Renewables already supply around 10% of Australia's energy demand for heating, mainly in the commercial buildings and industrial sectors. This is mainly supplied from the use of biomass. Dedicated support instruments are required to ensure the development needed for renewable heating technologies for buildings and process heat production.

In the basic **Renewables** scenario, renewables provide 21% of Australia's total heat demand in 2030 and 49% in 2050. In the **Advanced Renewables** scenario renewables also supply approximately 25% of heat demand by 2030 and reach 100% by 2050.

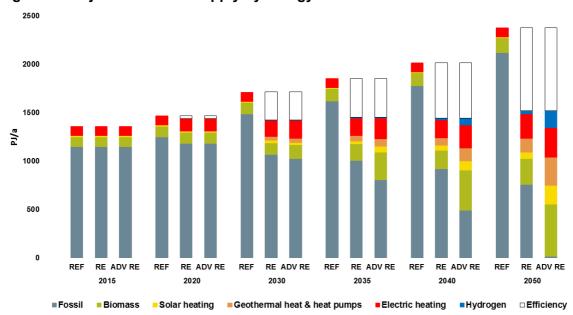


Figure 9: Projection of heat supply by energy carrier

Figure 9 shows the projection of heat supply by energy carrier in Australia over time. In spite of improving living standards and economic growth, energy efficiency measures help to reduce the growing energy demand for heating by 36% between now and 2050 in both renewable scenarios (relative to the reference scenario). Biomass remains the main renewable energy source for heating, with increasing investments in highly efficient modern biomass technology. After 2030, a massive growth of solar collectors and a growing share of geothermal (including geothermal heat pumps) as well as heat from renewable hydrogen can further reduce the demand for fossil fuel based heating systems. A shift from coal and oil to natural gas in the remaining conventional applications leads to a further reduction of CO₂ emissions. The **Advanced Renewable** scenario results in a complete substitution of the remaining gas consumption by hydrogen generated from renewable electricity.

Table 6 shows the development of different renewable technologies for heating in Australia over time in terms of energy and Table 7 shows the installed capacity for each technology.



Table 6: Projection of renewable heat supply

in PJ/a		2015	2020	2030	2040	2050
	REF	105	110	118	132	149
Biomass	RE	105	111	120	190	264
	ADV RE	105	111	144	414	536
	REF	11	11	11	11	11
Solar heating	RE	11	10	26	52	68
	ADV RE	11	10	26	98	197
	REF	0	0	0	0	0
Geothermal heat & heat pumps	RE	0	7	39	76	145
	ADV RE	0	7	41	133	292
	REF	0	0	0	0	0
Hydrogen	RE	0	0	2	17	37
	ADV RE	0	0	2	72	177
	REF	116	121	129	143	160
Total	RE	116	128	187	334	514
	ADV RE	116	128	212	716	1,202

Table 7: Installed capacities for renewable heat generation

in GW		2020	2030	2040	2050
	REF	17	17	18	18
Biomass	RE	15	14	12	11
	ADV RE	15	15	30	43
	REF	0	0	0	0
Geothermal	RE	0	2	4	6
	ADV RE	0	2	5	9
	REF	3	3	3	3
Solar heating	RE	3	8	16	21
	ADV RE	3	8	31	61
	REF	0	0	0	0
Heat pumps	RE	1	5	8	15
	ADV RE	1	5	11	28
	REF	20	21	21	22
Total	RE	20	29	40	52
	ADV RE	20	30	77	140



4.4 TRANSPORT

To decarbonise the transport sector in Australia a key requirement is the introduction of incentives for people to drive more efficient vehicles. It is also vital to develop infrastructure to shift transport use to more efficient modes like rail, light rail and buses, especially in the expanding large metropolitan areas. These requirements, along with rising prices for fossil fuels, reduce the projected growth in car sales in both renewables scenarios in comparison to the projections in the Reference scenario.

Due to population increase, GDP growth and higher living standards, energy demand from the transport sector is expected to increase in the Reference scenario by around 40% to 2540 PJ/a in 2050. However in the **Renewables** scenario, efficiency measures and modal shifts will save 41% (1040 PJ/a) in 2050 in comparison to the Reference scenario. Greater modal shifts and technology switching will lead to even higher energy savings in the **Advanced Renewable** scenario of 50% (1270 PJ/a) in 2050 compared to the Reference scenario.

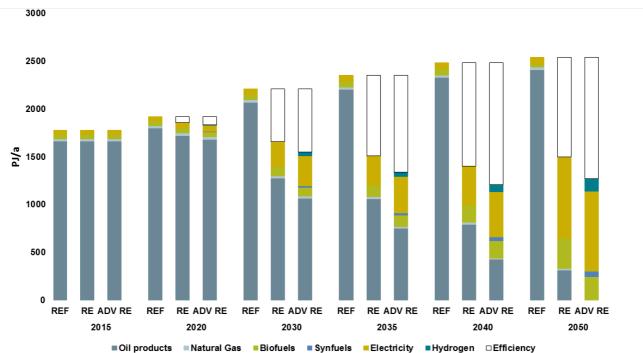


Figure 10: Final energy consumption transport under the scenarios

Highly efficient propulsion technology with hybrid, plug-in hybrid and battery-electric power cars and trains will bring about large efficiency gains. Table 8 shows the projection of transport energy demand by different modes in the **Renewables** scenario. Figure 10 shows the projection of transport energy supply by energy carrier in Australia over time. Specifically, it shows that electricity will provide 16% of the transport sector's total energy demand by 2030, while in 2050 the share will be 57%. In the **Advanced Renewables** scenario electricity would provide 66% of total energy demand by 2050. The remaining transport energy supply (up to 130 PJ/a or around 5%) will be delivered by biofuels, hydrogen and other synthetic fuels generated using renewable electricity.



Table 8: Projection of transport energy demand by mode

in PJ/a		2015	2020	2030	2040	2050
Rail	REF	52	56	64	72	80
	RE	52	56	50	42	45
	ADV RE	52	60	73	85	143
Road	REF	1,558	1,681	1,930	2,176	2,232
	RE	1,558	1,621	1,445	1,209	1,307
	ADV RE	1,558	1,596	1,320	987	998
Domestic aviation	REF	101	113	134	148	132
aviation	RE	101	110	105	104	103
	ADV RE	101	109	99	88	80
Domestic navigation	REF	53	57	65	73	81
ilavigation	RE	53	56	50	42	45
	ADV RE	53	56	50	42	45
Total	REF	1,764	1,907	2,194	2,470	2,526
	RE	1,764	1,843	1,649	1,397	1,500
	ADV RE	1,764	1,821	1,542	1,202	1,266

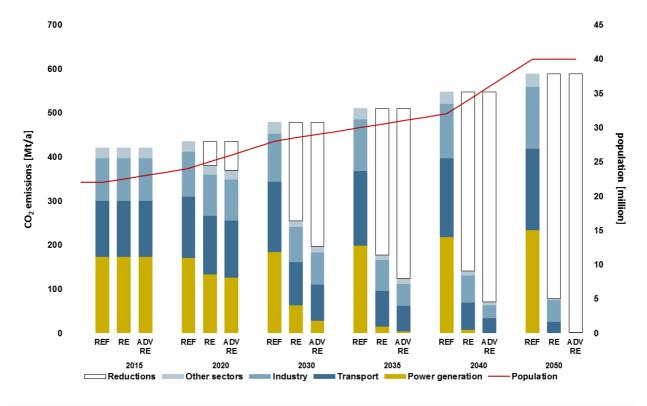


4.5 CO₂ EMISSIONS TRAJECTORIES

Figure 11 sets out Australia's energy greenhouse gas emissions resulting from modelling the three scenarios. In the **Advanced Renewables** scenario Australia's energy sector is completely decarbonised by 2050. By 2030 total energy sector emissions decrease to 206 million tonnes a year, with per capita emissions down to 7.0 tonnes from 19.1 tonnes. By 2035 emissions decrease to 120 million tonnes and annual per capita energy emissions from 19.1 to 4.0 tonnes. Comparatively, in the Reference scenario Australia's greenhouse gas emissions from energy increase by 40% between 2015 and 2050.

Under the **Renewables** scenario energy emissions decrease from 450 million tonnes in 2015 to 178 million tonnes in 2035. By 2050 emissions will decrease to 80 million tonnes and annual energy per capita emissions will drop from 19.1 tonnes at present to 2.0 tonnes by 2050. In spite of increasing power demand, energy greenhouse emissions will decrease in the electricity sector. In the long run efficiency gains and the increased use of renewable electricity in vehicles strongly reduce emissions in the transport sector as well. In the basic **Renewables** scenario, the Industry sector will be the largest source of emissions from energy, accounting for 62% in 2035 and 48% in 2050, with the remainder coming from the transport sector. In the Reference scenario power generation remains the largest source of emissions from energy.

Figure 11: Development of energy-related CO2 emissions by sector ('Reductions' = emissions reduction compared to the Reference scenario)





4.6 COST ANALYSIS

The previous sections have outlined the technical results of the modelling, and the following section outlines the results of the cost analysis. Specifically, the report sets out the following for the three scenarios:

- Capital investment costs to meet Australia's power (electricity) and heating needs,
- Fuel costs (and savings) to meet Australia's power, heating and transport needs,
- Impact of these capital and fuel costs on the electricity generation prices, and
- Combined energy budget for Australia including capital investment, operations and fuel costs.

As set out in the assumptions, it should be noted that there are costs and savings that are outside the scope of this research:

- Grid infrastructure costs, including the costs of smart meters and greater integration with communications technologies,
- Transport capital investment such as the cost of new cars or charging infrastructure, and
- Demand management and energy storage costs.

It should also be noted that these costs are Australia wide and are not an analysis of how consumer electricity bills will be impacted, as this involves a highly complex set of factors including the extent to which consumers own some of the generation infrastructure, price, volume and tariff structures, grid charges, as well as local network credits for decentralized generation.

4.5.1 Capital investment

Electricity

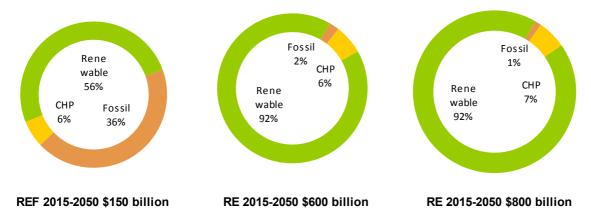
Under the **Renewables** and **Advanced Renewables** scenarios Australia would shift almost 98% and 99% respectively of new power sector capital investment towards renewables and cogeneration between now and 2050 (see Figure 12). This will result in higher investment costs than the reference scenario, in significant part due to the fact that electricity becomes the 'primary' fuel to meet an increased proportion of Australia's heating and transport energy needs. We assume, as in almost every other country worldwide, that this will be private sector investment. As such, the power sector investment costs should not be considered in isolation from transport and heating costs – particularly operational/fuel cost savings (see Section 4.5.4 for the combined energy budget for Australia).

Around \$600 billion will be required in investment in the power sector over the period to 2050 for the basic **Renewables** scenario, approximately \$13.8 billion per year between 2015 and 2030 and on average \$17 billion per year over the entire period until 2050. Investments for the **Advanced Renewable** scenario are around \$800 billion until 2050, on average \$22 billion per year between 2015 and 2030 and on average \$23 billion per year over the whole time span. This includes investments for replacement after the economic lifetime of the current power plants. The costs increase slightly over time as the level of more expensive dispatchable renewables required grows. However, this also means there is time to bring these technologies down the cost curve to a greater extent than projected, and as such these investment projections should be considered to be conservative (i.e. on the high side of the likely costs).

In the **Reference** scenario the total investment would be around \$150 billion. This includes the assumption that 4000 MW of new coal power plant capacity will be installed, replacing power stations to be closed by 2050 (we note however that this is unlikely to eventuate given current cost projections). Under the **Reference** scenario, conventional power plants account for approximately 43% of total power sector investment, while the remaining 57% would be invested in renewable energy and cogeneration technology.



Figure 12: Share of investment between renewable, fossil and CHP technologies by scenario



Heating

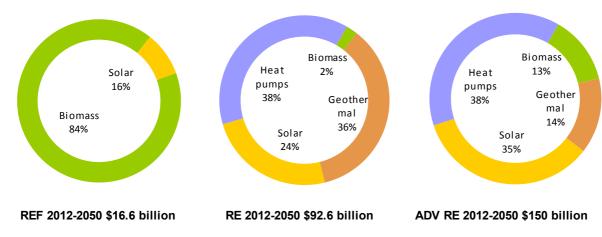
In the heating sector both renewable scenarios would require a major revision of current investment strategies in heating technologies. In particular, solar thermal, geothermal and heat pump technologies need an enormous increase in installations if their potential is to be tapped for the heating sector.

It should be noted that in Australia and around the world the costs associated with heating in the residential, commercial and industrial sectors are not well documented, particularly compared to the costs for electricity generation. Further, renewable heating technologies are extremely variable, from low-tech biomass generators or unglazed flat panel solar collectors to very sophisticated enhanced geothermal and solar systems. As such these results should only be considered an indicative estimate.

The modelling results estimate that the **Renewables** scenario in total requires around \$90 billion to be invested in renewable heating technologies through to 2050 (including investments for the replacement of heating infrastructure after it reaches the end of its economic life). This equates to approximately \$2 billion per year (see Figure 13).

The **Advanced Renewables** scenario assumes a more ambitious expansion of renewable technologies resulting in an average investment of around \$4 billion per year. It should be noted that this analysis does not include the capital cost of increased electricity generation for direct heating needs and to generate synthetic fuels to substitute for the remaining fossil fuel heating. Instead these costs are factored into the electricity capex analysis above.

Figure 13: Share of investment for renewable heat generation technologies





4.5.2 Fuel Costs and Savings

Figure 14 shows the annual fuel costs for each three scenarios. This in turn illustrates that under both renewables scenarios fuel costs decline significantly from 2030. Further, the biggest costs in the **Reference** scenario and thus the biggest savings are from avoiding the use of oil (which is primarily used for transport), although savings from the avoided use of natural gas are also significant.

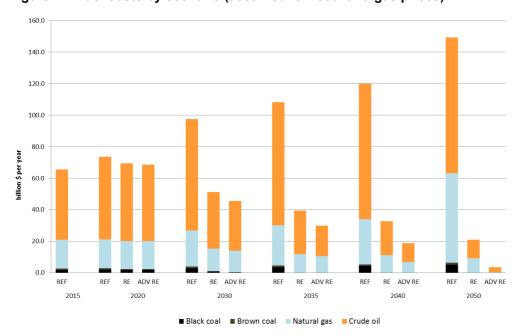


Figure 14: Fuel costs by scenario (assumed low coal and gas prices)

The primary reason for this is that most renewable energy technologies have no ongoing fuel costs after construction. As such, in the **Renewables** scenario the power sector fuel cost savings reach a cumulative total of between \$230 and \$270 billion by 2050 (depending on fuel price projections). This is approximately \$7 to \$8 billion per year. The total fuel cost savings over the period 2015-2020 for the power sector would therefore cover between 50% and 60% of the additional capital investments in renewables compared to the **Reference** scenario.

Power sector fuel cost savings in the **Advanced Renewables** scenario are even greater, around \$300 to \$340 billion cumulative to 2050, or \$8 to \$9 billion per year. This would compensate for 46% to 52% of the additional capital investment in renewable energy in this scenario.

If fuel cost savings from the transport sector are included (primarily from avoiding oil use) this leads to further fuel cost savings, even accounting for the electrification of the road transport increasing the overall electricity demand significantly. The cumulative fuel cost savings from transport to 2050 in the **Renewables** scenario would be around \$300 billion and \$400 billion in the **Advanced Renewables** scenario. This would compensate for 70% and 60% of the electricity sector capital investment costs respectively on top of the 50-60% savings from avoided fuel use in the power sector.

It should be noted that fuel input costs (Figure 14) are independent of any carbon pricing assumptions. Carbon pricing only affects electricity generation prices (see Section 4.5.3 below)

4.5.3 Future Electricity Generation Prices

Due to the ageing electricity generation fleet in Australia, replacement of generation capacity cannot be avoided under all three scenarios. It then becomes only a matter of timing. When the generation fleet will be replaced, and the replacement technology to be used, becomes a matter of sustainable and prudent investment. As such, all scenarios (including the **Reference** case) show an increase of the average generation cost of 1-2c/kWh until 2030 or between 12-30% (see Figure 15). The one exception to this is the **Reference** case under a fuel price projection of current very low coal prices continuing to 2050, low gas prices and no carbon price (see Figure 16).



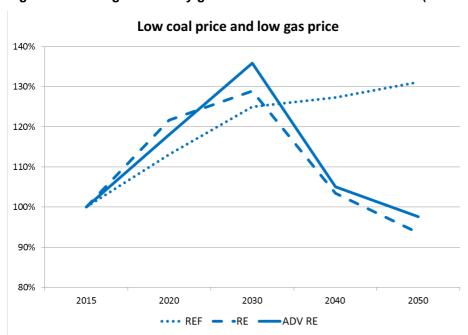


Figure 15: Average electricity generation costs for each scenario (low coal and low gas price)

Figure 15 and Figure 16 show that under both renewable energy scenarios and all coal and gas price projections generation costs will be lower than the reference scenario in the long-term. By 2050, the generation costs of the **Advanced Renewable** scenario will be between 1.1c/kWh and 3.7c/kWh below those in the **Reference** case under a high fuel cost future and low fuel cost future respectively. This is because renewable power generation with the exception of biomass do not include fuel costs, while conventional power plants have ongoing fuel costs. This also means that for renewables generation costs are stable and predictable over the entire technical lifetime, unlike conventional power generation that is subject to fuel cost fluctuations.

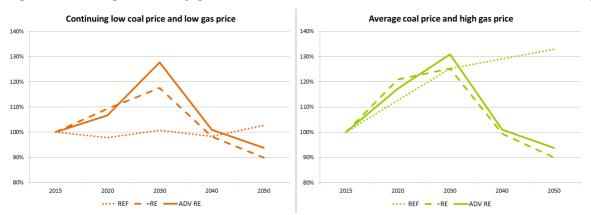


Figure 16: Average electricity generation costs for each scenario under two fuel cost assumptions

While both renewables scenarios ultimately end up cheaper under all fuel price assumptions, they become cheaper at different dates depending on the scenario and the fuel price projections as shown in Figures 15 and 16. For example at one extreme, which assumes the current low coal prices will remain low over the next 35 years to 2050, low gas prices and no carbon price, renewable scenarios become cheaper in 2040. At the other extreme under an average coal, high gas and a small future carbon price, renewable energy scenarios become cheaper as soon as 2025.

In 2030, the difference in full cost of generation compared to the **Reference** case under the low fuel price projection will between 0.8-1.9c/kWh in the **Renewable** scenario and 0.6 – 1.6c/kWh in the **Advanced Renewables** scenario.



4.5.4 Combined Energy Budget

Figure 17 shows the total energy costs including operational and capital power supply costs and fuel costs for heating and transport for all three scenarios in \$billion per year. Both renewable scenarios replace fossil fuels with renewable electricity, either directly or indirect via synfuels and/or hydrogen. However the **Advanced Renewables** scenario is more ambitious and as Figure 17 shows, leads to the lowest annual combined costs for Australia's total energy budget between 2035 and 2050.

This graph also shows that currently over a half of Australia's combined energy budget is spent on oil and as such the biggest cost savings to be had from avoided oil and natural gas (for heating and transport) fuel costs. It should also be noted that:

- Electricity for synfuel production becomes significant in the Advanced Renewables scenario by 2050
- Electricity for transport starts to make a cost impact by 2030 in both renewables scenarios
- The annual cost of electricity for stationary power is similar across all three scenarios in 2020 and 2030 and starts to be measurably cheaper by 2035.

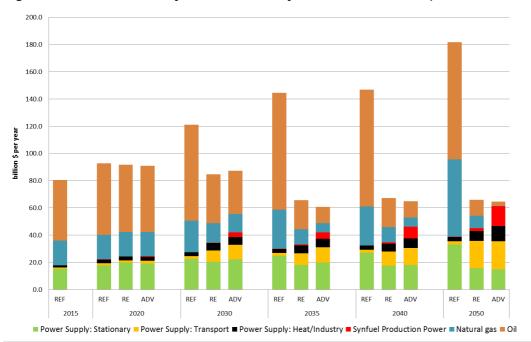


Figure 17: Annual electricity and fuel costs by sector and scenario (assumed low coal and gas prices)

By 2030, the economic advantage of the Renewables Scenarios compared to the Reference case starts to be significant, with overall annual savings of almost \$40 billion. By 2050, Australia's total energy costs are approximately one third of what they would otherwise be under the Reference Case: ~\$65 billion/year as opposed to \$180 billion/year.

Depending on fuel cost projections, the combined transport and power sector fuel cost savings cover 120% to 130% of the renewable energy infrastructure investment required to deliver the **Renewable** scenario. For the **Advanced Renewables** case, fuel savings cover around 110% (106% to 112%) of all capital investments in renewables.

To conclude, the total investment in new power generation under both Renewable cases can be financed by fuel cost savings before 2050, while simultaneously delivering a reliable carbon and fossil fuel free electricity system for Australia post-2050. This suggests that a 100% renewable energy system is beneficial for Australia's economy, and planning for this transition now is an investment in Australia's future.



5 CONCLUSIONS & IMPLICATIONS

The transition towards 100% renewable energy supply is technically and economically viable for Australia. The abundant local renewable energy potentials of solar, wind, geothermal and sustainable bioenergy production exceed the current and future energy demand by an order of magnitude.

Renewable energy technologies are mature, available, and significant recent price reductions – especially for solar PV and wind power – offer an economic alternative to the current coal based electricity sector for future power generation in Australia.

Under every fossil fuel price projection, the renewables scenarios are the least cost alternative for future generations. Depending on fuel cost developments and whether or not a carbon price is implemented, the timing of when overall generation cost in the renewable scenarios fall below the Reference scenario ranges from 8 to 20 years from now.

When power generation moves closer to the consumer, an increase of actual power generation costs do not necessarily lead to higher power bills, as the cost structure changes for end-use customers. While current rooftop solar generation costs are more than twice as high as the current wholesale electricity price, it is already significantly cheaper than the average end-consumer price for power.

Required technologies for a 100% renewable energy supply for Australia are available and mature. However, the integration of large shares of variable power generation requires a "systems-thinking" approach, to adapt to new infrastructure needs and operational strategy, and change business models for energy retailers as well as power and gas grid operators.

Baseload power generation is not a technical concept, but a business concept supported by the traditional power sector over the past decades in order to maximise the quantum and value of electricity supplied by an individual conventional power plant.³⁷ With high shares of variable renewable power generation operating in a wholesale market with no fuel cost, this approach to maintaining 'baseload' generation is no longer feasible. The focus for the energy sector will have to shift towards the management of wind and solar photovoltaic which will represent the 'basegeneration', and reactive dispatch power plants such as hydro, concentrated solar power with storage, geothermal, bio energy plants and a cascade of storage technologies combined with demand side management. The future value chain for the power sector will replace fuel production with power system management – a field that requires more research and is not within the scope of this analysis.

A transition towards a 100% renewable energy supply for Australia can spark a series of innovations that represent huge potential for societal value, while the transition away from fossil fuels must be organised with sound social policies so no worker will be left behind. This will lead to a greater acceptance of renewable energy, which is required as power generation moves closer to the consumer and will be increasingly visible in daily life.

Long-term stable energy policies are required as the transition will take one generation. International experiences such as in Denmark, Germany, China, as well as parts of the USA and Latin America, show that an energy transition is possible and is well under way in many countries.

This 100% renewable energy system analysis has been developed by applying global technology development trends into Australia's energy sector. While there is still significant research needed towards a full renewable energy supply by 2050, there are no technical barriers to starting the transition process immediately.

³⁷ Hansen, L. and Lovins, A. (2010) 'Keeping the Lights on While Transforming Electric Utilities', Rocky Mountain Institute



APPENDIX A: TECHNOLOGY COST ASSUMPTIONS

The following tables set out the costs for power generation for the range of technologies used in the modelling. These are based on up to date data and current market developments, as described in section 3.3.3. The specific investment costs in \$/kW are given in Table 9 and ongoing operation and maintenance costs in \$/kW/year given in Table 10.

Table 9: Specific investment costs for power generation

in \$/kW		2015	2020	2030	2040	2050
Power plants	Biomass and waste power plant	3,145	2,969	2,867	2,750	2,691
	Coal power plant	1,411	1,390	1,356	1,321	1,287
	Diesel generator	907	907	907	907	907
	Gas power plant	769	751	715	679	644
	Geothermal power plant	12,579	9,507	6,509	5,409	4,652
	Hydro large	3,466	3,573	3,734	3,869	3,987
	Hydro small	3,466	3,573	3,734	3,869	3,987
	Lignite power plant	1,645	1,609	1,575	1,540	1,507
	Nuclear power plant	6,615	6,615	6,615	6,615	6,615
	Ocean energy power plant	4,710	3,364	2,340	1,943	1,730
	Oil power plant	967	948	910	872	834
	PV power plant	1,817	1,682	1,305	1,059	1,079
	Solar thermal power plant	5,787	4,705	3,799	3,595	3,479
	Wind turbine offshore	5,631	3,876	3,072	2,775	2,386
	Wind turbine onshore	1,519	1,316	1,305	1,312	1,371
Hydrogen production	Electrolysis	893	844	746	746	746
CHP for Power	CHP Biomass and waste	5,150	4,505	3,934	3,626	3,445
Generation and Industry	CHP Coal	1,950	1,919	1,872	1,824	1,777
•	CHP Fuel cell	1,726	1,346	1,214	1,155	1,141
	CHP Gas	1,038	995	974	954	933
	CHP Geothermal	13,456	11,409	9,068	7,606	6,582
	CHP Lignite	1,950	1,919	1,872	1,824	1,777
	CHP Oil	1,340	1,312	1,259	1,205	1,153
Buildings /	CHP Biomass and waste	2,545	2,486	2,443	2,418	2,391
Other Small Scale	CHP Coal	1,949	1,919	1,872	1,824	1,777
	CHP Fuel cell	1,726	1,346	1,214	1,155	1,141
	CHP Gas	965	911	804	790	775
	CHP Geothermal	13,456	11,409	9,068	7,606	6,582
	CHP Lignite	1,950	1,919	1,872	1,824	1,777
	CHP Oil	1,339	1,312	1,259	1,205	1,153



Table 10: Operation and maintenance cost for power generation technologies

in \$/kW/a		2015	2020	2030	2040	2050
Power plants	Biomass and waste power plant	189.1	178.3	172.0	165.5	162.2
Power plants	Coal power plant	30.8	29.7	29.7	29.7	29.7
		112.6	112.6	112.6	112.6	112.6
	Diesel generator					
	Gas power plant	23.7	22.1	20.6	18.6	17.8
	Geothermal power plant	548.6	426.6	324.4	302.9	286.7
	Hydro large	139.0	143.3	149.2	155.0	159.4
	Hydro small	139.0	143.3	149.2	155.0	159.4
	Lignite power plant	27.1	26.5	25.9	25.4	24.9
	Nuclear power plant	162.0	162.0	162.0	162.0	162.0
	Ocean energy power plant	188.7	134.7	93.0	78.2	69.0
	Oil power plant	22.4	21.7	20.3	18.8	17.4
	PV power plant	38.7	21.9	15.4	14.7	15.4
	Solar thermal power plant	350.9	270.0	233.8	215.0	196.4
	Wind turbine offshore	209.5	164.5	133.6	126.6	108.9
	Wind turbine onshore	56.5	55.9	56.8	59.8	62.6
Hydrogen production	Electrolysis	17.9	16.8	14.6	14.6	14.6
CHP for Power Generation	CHP Biomass and waste	361.3	315.9	275.0	254.5	241.3
Generation	CHP Coal	68.7	67.3	65.8	64.4	62.9
	CHP Gas	42.4	39.5	39.5	38.0	38.0
	CHP Geothermal	487.1	409.5	342.3	298.4	272.1
	CHP Lignite	81.9	80.4	77.5	76.1	73.1
	CHP Oil	48.3	46.8	43.9	42.4	41.0
CHP for	CHP Biomass and waste	93.6	83.4	74.6	68.7	62.9
Industry	CHP Coal	68.7	67.3	65.8	64.4	62.9
	CHP Fuel cell	86.3	67.3	61.4	58.5	57.0
	CHP Gas	42.4	39.5	39.5	38.0	38.0
	CHP Geothermal	239.9	231.1	222.3	220.9	219.4
	CHP Lignite	81.9	80.4	77.5	76.1	73.1
	CHP Oil	48.3	46.8	43.9	42.4	41.0
CHP for	CHP Biomass and waste	101.7	99.5	98.0	96.5	95.1
Buildings / Other Small	CHP Coal	68.0	67.3	65.8	64.4	62.9
Scale	CHP Fuel cell	86.3	67.3	61.4	58.5	57.0
	CHP Gas	38.8	36.6	32.2	32.2	30.7
	CHP Geothermal	239.9	231.1	222.3	220.9	219.4
	CHP Lignite	81.9	80.4	77.5	76.1	73.1



APPENDIX B: INVESTMENT COSTS

In the following tables the difference between the investment costs in the power sector for the renewable scenarios compared to the reference is shown. This is split by investment costs for electricity generation and fuel cost savings, with investment costs for heat generation shown separately. The results of the **Renewable** Scenario compared to the Reference are shown in Table 11 and 12 and the **Advanced Renewable** Scenario in Tables 13 and 14. Positive values reflect a net saving from the reference scenario and negative values reflect a cost.

Table 11: Accumulated investment costs for electricity generation and fuel cost savings under the Renewable scenario compared to the Reference scenario

in billion \$	2015- 2020	2021- 2030	2031- 2040	2041- 2050	2015- 2050	Average 2015-50	Average 2015-30	Average 2030-50
ACCUMULATED INVES	TMENT CO	STS (differe	nce REF mi	nus RE)				
Conventional (fossil)	0.5	13.8	20.8	17.7	52.8	1.5		
Renewables (incl. CHP)	-30.6	-121.1	-127.2	-224.0	-503.0	-14.4		
Total	-30.2	-107.3	-106.4	-206.4	-450.2	-12.5	-9.2	-16.5
ACCUMULATED FUEL	COST SAVI	NGS (savin	gs cumulati	ve RE versı	ıs REF)			
Fuel oil (power)	-0.4	-1.3	1.8	2.7	2.8	0.1		
Fuel oil (road transport - electrification credit)	0.0	15.2	78.4	206.4	300.0	8.6		
Gas	-4.3	-12.2	36.6	92.0	112.1	3.2		
Hard coal	-0.2	9.7	32.0	42.1	83.7	2.4		
Brown coal	2.0	8.0	8.8	10.0	28.7	0.8		
Total power sector	-2.9	4.1	79.2	146.9	227.3	6.5	0.1	11.9
Total power + transport sector	-2.9	19.3	157.6	353.3	527.3	15.1	1.1	26.9

Table 12: Accumulated investment costs for heat generation under the Renewable scenario compared to the Reference scenario

in billion \$	2015- 2020	2021- 2030	2031- 2040	2041- 2050	2015- 2050	Average 2015-50	Average 2015-30	Average 2030-50
ACCUMULATED INVES	TMENT CO	STS (differe	nce REF mi	inus RE)				
Renewables	16.1	11.4	14.8	33.8	76.0	2.2	1.8	2.6



Table 13: Accumulated investment costs for electricity generation and fuel cost savings under the Advanced Renewable scenario compared to the Reference scenario

in billion \$	2015- 2020	2021- 2030	2031- 2040	2041- 2050	2015- 2050	Average 2015-50	Average 2015-30	Average 2030-50
ACCUMULATED INVES	TMENT CO	STS (differe	nce REF m	inus RE)				
Conventional (fossil)	3.3	13.7	19.8	18.8	55.6	1.6		
Renewables (incl. CHP)	-57.0	-220.5	-160.4	-266.7	-704.6	-20.1		
Total	-53.7	-206.8	-140.5	-247.9	-649.0	-18.5	-17.4	-20.4
ACCUMULATED FUEL	COST SAVI	NGS (savin	gs cumulati	ve RE versı	ıs REF)			
Fuel oil (power)	-0.4	-1.9	1.5	2.7	1.9	0.1		
Fuel oil (road transport - electrification credit)	0.1	19.4	112.5	264.1	396.0	11.3		
Gas	0.6	7.3	65.3	105.3	178.6	5.1		
Hard coal	-0.1	11.0	33.3	42.2	86.4	2.5		
Brown coal	2.0	8.0	8.8	10.0	28.7	0.8		
Total power sector	2.2	24.4	108.8	160.2	295.6	8.4	1.8	14.2
Total power + transport sector	2.2	43.8	221.3	424.3	691.6	19.8	3.1	34.0

Table 14: Accumulated investment costs for heat generation under the Advanced Renewable scenario compared to the Reference scenario

in billion \$	2015- 2020	2021- 2030	2031- 2040	2041- 2050	2015- 2050	Average 2015-50	Average 2015-30	Average 2030-50
ACCUMULATED INVES	TMENT CO	STS (differe	nce REF mi	inus RE)				
Renewables	-0.6	12.4	43.8	77.9	133.4	3.8	0.8	6.4

Part	Electricity generation in TWh/a Scenario:	Australia I	Reference	(2015)							Installed capacity in GW Scenario:	Australia	Reference	(2015)						
Septiment of the control of the cont	Scenario.				2025	2030	2035	2040	2045	2050	Scenario.				2025	2030	2035	2040	2045	2050
	Power plants										Total generation									
Separate 19 19 19 19 19 19 19 19 19 19 19 19 19		138	98	100	102	117	134	153	178	202	- Fossil	33		29	29	31	34	36	36	39
Control Cont	- Gas	42	38	37	36	35	33	33	32	31	- Brown Coal	4	6	6	6	6	6	6	6	6
Separate properties 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	- Oil	1			0	0	0	0	0	0	- Oil	1	1	1	1	1	1	1	1	1
Mary Content	- Biomass (& renewable waste)	1	0	1	2		2	2	2	2	- Hydrogen (fuel cells, gas power plants, g	0 10					0 27			0
Separate property 1	- Wind	6		24	32	32	32	33	33	33	- Hydro		8	8	8	7	7	7	7	7
Seminopular propries of 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- PV	1	5	6			6	6		6	of which wind offshore	0	0	0			1	1	1	1
Part	- Solar thermal power plants	0	0	0	0	0	0	0		0	- Biomass (& renewable waste)		0	1	1	1	1	1	1	1
											- Solar thermal power plants	0	0	0				0	0	0
Septiminary 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	 Hard coal (& non-renewable waste) 			0	0	0	0	0	0	0										
Septimonical properties of the											Fluctuating RES (PV, Wind, Ocean) Share of fluctuating RES									
Secure of the control	- Oil	0	0				0	0	0	0		23%	35%	44%	49%	47%	45%	43%	43%	41%
Profession											,									
Self-proposed proposed propose										0	Final energy demand in PJ/a 1)	Australia	Toforono	(2015)						
			0								ocenano.				2025	2030	2035	2040	2045	2050
Separate property of the prope			12						17		Total (incl. non-energy use)									
- Freedom Control Cont											Transport	1,304	1,780	1,924	2,067	2,211	2,354	2,487	2,515	2,542
- Sementic 1	- Fossil	225	198	200	201	216	234	255	280	305	- Natural gas	19	20	21	22	23	24	26	27	28
	Hard coal (& non-renewable waste) Brown Coal												0						0	
											- Electricity									71 12
	- Diesel	2	1	1	2	1	2	2	2	2	- Hydrogen	0	0	0	0	0	0	0	0	0
	- of which renewable H2	0	0	0	0	O	0	0	0	0	•									
- Progression demonstrational 1	- Hydro	14	19	19	19	19	19	18	18	18	- Electricity	288	327	370	385	405	427	458	498	534
	- PV	1	9 5		6	6	6	6	6	6	 Public district heat 	11	12	12	12	12	12	13		13
Section of the content of the cont	- Geothermal		3		5	5	5 2	6	6	6	RES district heat - Hard coal & Brown Coal	0 111	1 80	1	1 92	1 98	1 103	1	1 108	1 105
Second column	 Solar thermal power plants 	Ö	0	0	0	0	0	0	0	0	- Oil products	168	196	210	224	238	252	261	271	281
Import RES											- Solar	0	0	0	0	0	0	0	0	0
Selection Control Cont	- Import RES	Ö	ō	0	0	O	0	0	0	0	- Geothermal	0	0	0	0	0	0	0	0	0
Seeches from progression and continues of the continues o	Distribution losses	13	12	13	14	15	16	17	18	20	- Hydrogen RES share Industry	14%			10%		9%			7%
Package Pack	Own consumption electricity Electricity for hydrogen production	27 0.0			25 0.5	24 0.5	23 0.6			21 0.7	Other Sectors	825	753	778	809	853	903	958	1,016	1,079
Public Propriet Control (1974) 1974 1975 1974 1974 1974 1974 1974 1974 1974 1974	Electricity for synfuel production										- Electricity RES electricity									569
Stage of function (1962) Stage of function											- Public district heat	0	0	0	0	0	0	0	0	0
Control Cont	Share of fluctuating RES	3%	6%	12%	14%	13%	13%	12%	11%	11%	- Hard coal & Brown Coal	1	0	0	ō	0	0	0	0	0
Second Multiplication Processes (1987) - 1987 - Continented pirels - 1		10%	15%	21%	25%	23%	22%	20%	18%	1/%	- Gas	180	211	210	210	217	226	240	255	271
Continue	Heat supply and air conditioning in PJ/a Scenario:	Australia F	Reference	(2015)								58	58	60	60		60	60	60	60
Contemporary Cont					2025	2030	2035	2040	2045	2050		0		0	0	0	0	0	0	0
- Floor March 1											RES share Other Sectors								17%	
- Solver conductions	District heating plants	1	1	1	1	1	1	1	1	1	TALO SITURO OUTER OCCIOIO									
Secretary 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- Fossil fuels	1	1	i	i	1	i	1	i	1	Total RES		279	347	390		406			
From tends	- Fossil fuels - Biomass - Solar collectors	1 0 0	ō	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	Total RES RES share		279	347	390		406			
- Geophermal 0 0 0 0 0 0 0 0 0	- Fossil fuels - Biomass - Solar collectors - Geothermal	1 0 0	0	1 0 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	1 0 0	Total RES RES share	8% Australia	279 7% Reference	347 8%	390 9%	8%	406 8%	8%	7%	6%
- Hydrogen 0 0 1 1 1 1 1 1 1 1	- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels	1 0 0 0 0	0 0 62 42	1 0 0 0 0	1 0 0 0 0 68 45	1 0 0 0 71 47	1 0 0 0 0 83 55	1 0 0 0 0 86 57	1 0 0 0 0	1 0 0 0 94 61	Total RES RES share CO2 emissions in Mill t/a Scenario:	Australia 2012	279 7% Reference 2015	347 8% (2015) 2020	390 9% 2025	2030	406 8% 2035	2040	7% 2045	2050
- Fossit Marie - Foss	- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels - Biomass	1 0 0 0 0 43 30 13	0 0 62 42 20	1 0 0 0 0 65 43 21	1 0 0 0 0 68 45 22	1 0 0 0 71 47 23	1 0 0 0 0 83 55 27	1 0 0 0 0 86 57 28	1 0 0 0 0 88 58 29	1 0 0 0 94 61 32	Total RES RES share CO2 emissions in Mill t/a Scenario: Condensation power plants	Australia 2012 195	279 7% Reference 2015	347 8% 9 (2015) 2020 168	390 9% 2025 168	2030	406 8% 2035	2040	7% 2045 212	2050
- Biomass 124 84 89 82 85 86 86 104 111 117 11 11 11 11 11	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Blomass - Geothermal	1 0 0 0 0 43 30 13 0	0 0 62 42 20 0	1 0 0 0 0 65 43 21	1 0 0 0 0 68 45 22	1 0 0 0 71 47 23	1 0 0 0 0 83 55 27	1 0 0 0 0 86 57 28	1 0 0 0 0 88 58 29	1 0 0 0 94 61 32 0	Total RES RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal	8% Australia 2012 195 132 37	279 7% Reference 2015 169 93 55	347 8% (2015) 2020 168 95 52	390 9% 2025 168 96 51	2030 181 111 50	406 8% 2035 197 127 50	2040 216 146 51	7% 2045 212 141 52	2050 231 161 53
- Good-hermal	- Fossil fuels - Blomass - Solar Collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating	1 0 0 0 43 30 13 0 0	0 0 62 42 20 0 0	65 43 21 0	68 45 22 0 1	1 0 0 0 71 47 23 0 1	83 55 27 0	1 0 0 0 0 86 57 28 0 1	88 58 29 0	94 61 32 0 1	Total RES RES share CO2 emissions in Mill Va Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas	Australia 2012 195 132 37 23 1	279 7% Reference 2015 169 93 55 21 0	347 8% 9 (2015) 2020 168 95 52 20 0	390 9% 2025 168 96 51 19	2030 181 111 50 19 0	406 8% 2035 197 127 50 18 0	2040 216 146 51 18	7% 2045 212 141 52 17 0	2050 231 161 53 17 0
Electric direct heathers 57 68 68 69 69 69 69 69 69	- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Fossil fuels	1 0 0 0 43 30 13 0 0 931 738 124	0 0 0 62 42 20 0 0 1,295 1,103 84	65 43 21 0 1 1,401 1,205	68 45 22 0 1 1,517 1,318 92	1 0 0 0 71 47 23 0 1 1,641 1,439 95	1 0 0 0 83 55 27 0 1 1,771 1,566 98	1 0 0 0 86 57 28 0 1 1,929 1,718	88 58 29 0 1 2,100 1,883	94 61 32 0 1 2,283 2,059	Total RES RES share CO2 emissions in Mill Ua Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gal - Gal - Diesel	8% Australia 2012 195 132 37 23 1 2	279 7% Reference 2015 169 93 55 21 0	347 8% e (2015) 2020 168 95 52 20 0	390 9% 2025 168 96 51 19 0	2030 181 111 50 19 0	406 8% 2035 197 127 50 18 0	2040 216 146 51 18 0	7% 2045 212 141 52 17 0	2050 231 161 53 17 0
Tach heat supply) 975 3,877 1,467 1,568 1,719 1,865 2,016 2,176 1,967 1,976 1,97	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Biomass - Fossil fuels - Geothermal - Geothermal - Geothermal	1 0 0 0 43 30 13 0 0 931 738 124 11	0 0 62 42 20 0 0 1,295 1,103 84 11 0	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11	1 0 0 0 68 45 22 0 1 1,517 1,318 92 11	71 47 23 0 1 1,641 1,439 95 11	1 0 0 0 83 55 27 0 1 1,771 1,566 98	1 0 0 0 0 86 57 28 0 1 1,929 1,718 104 11	1 0 0 0 0 88 58 29 0 1 2,100 1,883 111 11	94 61 32 0 1 2,283 2,059 117 11 0	Total RES RES share CO2 emissions in Mill Ua Sconario: Condensation power plants - Hard coal (8 non-renewable waste) - Brown Coal - Diesel Combined heat and power plants - Hard coal (8 non-renewable waste)	8% Australia 2012 195 132 37 23 1 2 8 0	279 7% Reference 2015 169 93 55 21 0 1	347 8% 2 (2015) 2020 168 95 52 20 0 1	390 9% 2025 168 96 51 19 0 1	2030 181 111 50 19 0 1	406 8% 2035 197 127 50 18 0 1	2040 216 146 51 18 0 1	7% 2045 212 141 52 17 0 1	2050 231 161 53 17 0 1
Footstate Service 1,146 1,240 1,340 1,487 1,521 1,175 1,941 2,121 1,121 1,101	- Fossil fuels - Blomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Geothermal - Heat pumps 2) - Electric direct heating - Leictric direct heating - Leictric direct heating - Leictric direct heating	1 0 0 0 43 30 13 0 0 931 738 124 11 0 0 57	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11 0 0 96	1 0 0 0 68 45 22 0 1 1,517 1,318 92 11 0 96	71 0 0 0 71 47 23 0 1 1,641 1,439 95 11 0 0 96	1 0 0 0 83 55 27 0 1 1,771 1,566 98 11 0	1 0 0 0 86 57 28 0 1 1,929 1,718 104 11 0 96	88 58 29 0 1 2,100 1,883 111 11 0 96	94 61 32 0 1 2.283 2.059 117 11 0 96	Total RES RES share CO2 emissions in Mill Ua Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Gas - Obesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Gas - Gas - Gas - Gas	Australia 2012 195 132 37 23 1 2 8 0 3	279 7% Reference 2015 169 93 55 21 0 1	347 8% 2 (2015) 2020 168 95 52 20 0 1	390 9% 2025 168 96 51 19 0 1	2030 181 111 50 0 1 1 8 0 0 7	406 8% 2035 197 127 50 18 0 1	2040 216 146 51 18 0 1	7% 2045 212 141 52 17 0 1	2050 231 161 53 17 0 1
Solid collections	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen - Solar collectors - Geothermal - Eloinass - Caechtermal - Hydrogen - Hydrogen	1 0 0 0 43 30 13 0 0 931 738 124 11 0 0 57	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11 0 0 96	68 45 22 0 1 1,517 1,318 92 11 0 96	71 47 23 0 1 1,641 1,439 95 11 0 96	83 55 27 0 1 1,771 1,566 98 11 0 96	1 0 0 0 0 86 57 28 0 1 1.929 1.718 104 11 0 96	88 58 29 0 1 2,100 1,883 111 11 0 96	94 61 32 0 1 2,283 2,059 117 11 0 96	Total RES RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil	8% Australia 2012 195 132 37 23 1 2 8 0 3 5 1 1 1 1 1 1 1 1 1	279 7% Reference 2015 169 93 555 21 0 1 8 0 7 1	347 8% 20(2015) 2020 168 95 52 20 0 1 8 0 0 7	390 9% 2025 168 96 51 19 0 1 8 0 0 7	2030 181 111 50 19 0 1 8 0 0 7	406 8% 2035 197 127 50 18 0 1 0 8 1	2040 216 146 51 18 0 1 9 1 0 8	7% 2045 212 141 52 17 0 1 9 0 8 1	2050 231 161 53 17 0 1 9 0 0 8
- Geothermal - 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Unrect heating - Fossil fuels - Fossil fuels - Blomass - Solar collectors - Geothermal - Heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Het pumps 2) - Blechtic direct heating - Hydrogen - Total heat supply3)	1 0 0 0 43 30 13 0 0 931 738 124 11 0 0 57 0	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 0 96 0	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11 0 0 96 0	1 0 0 0 68 45 22 0 1 1,517 1,318 92 11 0 0 96 0	1 0 0 0 71 47 23 0 1 1,641 1,439 95 11 0 0 96 0	83 555 27 0 1 1,771 1,566 98 11 0 96 0	1 0 0 0 86 57 28 0 1 1,718 104 11 0 96 0 2,016 1,775	88 58 29 0 1 2,100 1,883 111 111 0 96 0	1 0 0 0 94 61 32 0 1 2,283 2,059 117 11 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oi - Discel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Gos - Oil - Gos - Oil -	Australia i 2012 195 132 37 23 1 2 8 0 3 5 1	279 7% Reference 2015 169 93 55 21 0 1 8 0 0 7 7 1 178 93	347 8% 2020 168 95 52 20 0 1 8 8 0 0 7 1	390 9% 2025 168 96 51 19 0 1 8 0 0 7 1	2030 181 111 50 19 0 1 8 0 0 7 1	406 8% 2035 197 127 50 18 0 1 1 9 1 0 8 1	2040 216 146 51 18 0 1 1 9 1 0 8 1	7% 2045 212 141 52 17 0 1 9 0 0 8 1 221 142	2050 231 161 53 17 0 1 9 0 0 8 1
- Electric direct healting	- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Het pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Solar Sola	1 0 0 0 43 30 13 0 0 931 738 124 11 0 0 57 70	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11 0 0 96 0	1 0 0 0 68 45 22 0 1 1,517 1,318 92 11 0 0 96 0	1 0 0 0 71 47 23 0 1 1,641 1,439 95 11 0 0 96 0	1 0 0 0 83 55 27 0 1 1,771 1,566 98 11 0 0 96 0	1 0 0 0 86 57 28 0 1 1,929 1,718 104 11 0 96 0 2,016 1,775 132	1 0 0 0 0 88 58 29 0 1 2,100 1,883 111 0 0 96 0	94 611 322 0 1 2,283 2,059 117 11 0 96 0	Total RES RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Coal - Gas - Oal - Oal - CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal	8% Australia i 2012 195 132 37 23 1 2 8 0 3 5 1 2 203 132 39	279 7% Reference 2015 169 93 55 21 0 1 8 0 7 1 178 93 555	347 8% 2 (2015) 2020 168 95 52 20 0 1 1 8 0 7 1 176 95 52	390 9% 2025 168 96 51 19 0 1 8 0 7 1 176 97 51	2030 181 111 50 0 1 1 8 0 0 7 1 1 199 0 111 150	406 8% 2035 197 127 50 18 0 1 1 9 1 0 8 1 1 206 128 50 26	2040 216 146 51 18 0 1 1 9 1 0 8 1 1 225 146 51	7% 2045 212 141 52 17 0 1 9 0 8 1 221 142 52 25	2050 231 161 53 17 0 1 9 0 0 8 1
ES share (including RES electricity) ES share (including RES electricity) Final energy consumption hand promps (Whiba) 16% 10% 10% 10% 0% 0% 0% 0%	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass	1 0 0 0 43 30 13 0 0 0 931 738 124 111 0 0 0 57 770 137 111 0 0	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105 11 0	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11 0 96 0 1,467 1,249 110	1 0 0 0 68 45 22 0 1 1,517 1,318 92 11 0 96 0 1,585 1,364 114 11	1 0 0 0 71 47 23 0 1 1.641 1.439 95 11 0 96 0 1.713 1.487 118 11	1 0 0 0 83 555 27 0 1 1,771 1,566 98 11 0 0 96 0 1,855 1,621 125	1 0 0 0 86 57 28 0 1 1,929 1,718 104 11 0 96 0 2,016 1,775 132 11 0	1 0 0 0 0 88 58 29 0 1 2,100 1,883 111 11 0 96 0 2,189 1,941 140 11 0	94 61 32 0 1 2,283 2,059 117 11 0 96 0 2,378 2,121 149 11 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coas - Coas - Oil - Coas -	Australia 2012 195 132 37 23 1 2 8 0 3 5 1 203 132 39 28	279 7% Reference 2015 169 93 55 21 0 1 8 0 7 1 178 93 555 28	347 8% 2020 168 95 52 20 0 1 1 8 0 0 7 1 176 95 52 22 20 20 20 20 20 20 20 20 20 20 20 20	390 9% 2025 168 96 51 19 0 1 1 8 0 0 7 7 1	2030 181 1111 50 0 1 8 0 7 1 1 199 1115 50 26	406 8% 2035 197 127 50 18 0 1 1 9 1 0 8 1 1 206 128 50 26	2040 216 146 51 18 0 1 9 1 0 8 1 225 146 51 26	7% 2045 212 141 52 17 0 1 9 0 8 1 221 142 52 25	2050 231 161 53 17 0 1 9 0 0 8 1 1 241 161 53 25
Product Prod	- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHF 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Biom	1 0 0 0 43 30 0 0 13 0 0 0 931 738 124 11 0 0 0 57 770 137 11 0 0 0 57	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96	1 0 0 0 65 43 21 0 1 1.401 1.205 89 10 0 96 0 1 1.467 1.249 110 111 0 0 96	68 45 22 0 1 1,517 1,318 92 11 0 96 0 1,585 1,364 114 111 0 0 96	1 0 0 0 71 47 23 0 1 1,641 1,439 95 11 0 0 96 0	10000000000000000000000000000000000000	1 0 0 0 866 577 288 0 1 1 1,929 1,718 104 111 0 0 96 1,775 132 11 0 0 96	88 58 29 0 1 2,100 0,883 111 11 0 0 2,189 1,941 140 11 0 0 96	1 0 0 0 944 611 322 0 1 1 2.283 2.059 117 111 0 0 96 0 0 2.378 2.121 149 111 0 0 96	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil	8% Australia i 2012 195 132 37 23 1 2 8 0 3 5 1 203 132 39 28 3 0.00	279 7% Reference 2015 169 93 55 21 0 1 8 0 0 7 1 178 93 55 28 2 0.00	347 8% 2 (2015) 2020 168 95 52 20 0 1 1 8 0 0 7 1 176 95 52 27 2 2 2 2 3 4 4 4 5 5 2 2 2 2 3 4 4 4 5 5 2 2 2 2 2 3 4 4 5 5 2 2 2 2 2 3 4 5 2 2 2 2 2 2 2 2 2 2 2 2 3 2 3 2 3 2 3	390 9% 2025 168 96 51 19 0 1 8 0 0 7 1 176 97 51 27 2	8% 2030 181 111 50 19 0 1 8 0 0 7 7 1 190 111 50 26 2	406 8% 2035 197 127 50 18 0 1 1 206 128 50 26 2	2040 216 146 51 18 0 1 9 1 0 8 1 225 146 51 146 51 26 2	7% 2045 212 141 52 17 0 1 9 0 0 8 1 221 142 52 25 2 0.000	2050 231 161 53 17 0 1 9 0 0 8 1 1 241 161 53 25 2
Final energy consumption transport in P-Jia Scenario: Australia Reference (2015)	- Fossil fuels - Biomass - Solar Collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Geothermal - Hydrogen - Biomass - Solar collectors - Solar collectors - Geothermal - Biomass - Biomass - Caeothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Geothermal - Hydrogen - Geothermal - Heat supply3) - Fossil fuels - Biomass - Geothermal - Heat fuels - Geothermal - Heat fuels - Geothermal - Heat fuels - Geothermal - Hydrogen - Geothermal	10000000000000000000000000000000000000	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96 0	1 0 0 0 65 43 21 0 1 1,401 1,205 89 11 0 0 96 0 1 1,467 1,249 11 0 0 0 96 1	68 45 22 0 1 1.517 1.318 92 11 0 96 0 1.585 1.364 114 111 0 0 96 1	1 0 0 0 71 47 23 0 1 1,641 1,439 95 11 0 0 96 0 1,713 1,487 118 111 0 0 0 1 96 1	1 0 0 0 83 555 27 0 1 1.771 1.566 98 11 0 0 96 0 1 125 11 0 0 96 1	1 0 0 0 86 57 28 0 1 1.929 1.718 104 111 0 0 96 0 0 2.016 1.775 132 11 0 0 96 1	1 0 0 0 88 58 59 0 1 2,100 1,883 111 11 0 0 96 0 1,941 140 111 0 0 0 0	1 0 0 0 944 611 322 0 1 1 2.283 2.059 117 11 0 0 96 0 0 2.378 2.121 149 111 0 0 96 1	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Oil - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coz intensity (gkWh) without credit for CHP heat - Coz intensity (gsWh) without credit for CHP heat	8% Australia 2012 195 132 37 23 1 2 2 8 0 3 5 1 203 132 39 28 3 0.00 0.00 902	279 7% Reference 2015 169 93 55 21 0 1 8 0 7 1 178 93 55 28 2 0.00 0.000 897	347 8% 2 (2015) 2020 168 95 52 20 0 1 1 176 95 52 27 2 2 0 0.00 0.00 0.80 883	390 9% 2025 168 96 51 19 0 1 8 0 0 7 1 176 97 51 27 2 0.00 0.000 877	2030 181 1111 50 19 0 1 1 8 0 0 7 7 1 190 1111 50 26 2	406 8% 2035 197 127 50 18 0 1 1 0 8 8 1 1 206 128 50 26 2 0.00 0.00 878	2040 216 146 51 18 0 1 0 8 1 1 225 146 51 146 51 2 0 0.00 0.00 0.83	7% 2045 212 141 52 17 0 1 9 0 8 1 221 142 52 2 0.00 0.00 790	2050 231 161 53 17 0 1 9 0 0 8 1 241 161 53 25 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Final energy consumption transport in PJ/a Scenario: Australia Reference (2015) 2020 2025 2030 2035 2040 2045 2056 2057 2	- Fossil fuels - Biomass - Solar Collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Geothermal - Hydrogen - Biomass - Solar collectors - Caeothermal - Biomass - Caeothermal - Biomass - Caeothermal - Biomass - Caeothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Caeothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Geothermal - Geothermal - Geothermal - Hydrogen - Geothermal - Hydrogen - RES share (including RES electricity) - RES share (including RES electricity) - RES share (including RES electricity)	1 0 0 0 43 30 13 0 0 0 931 738 124 11 0 0 57 70 137 11 0 0 157 0	0 0 0 62 42 20 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105 11 0 96 0	1 0 0 0 65 43 21 0 1 1.401 1.205 89 11 0 0 96 0 1.447 1.249 110 0 96 1 100% 0%	10000000000000000000000000000000000000	1 0 0 0 711 447 23 0 1 1.641 1.439 95 11 0 0 96 0 1.713 1.487 118 111 0 0 96 1 96 1 9% 0%	1 0 0 0 83 555 27 0 1 1.771 1.566 98 11 0 0 96 0 1.855 1.621 125 11 0 0 96 1 8% 0 %	1 0 0 0 86 57 28 0 1 1.929 1.718 104 11 0 0 96 1.775 132 11 11 0 0 96 1 8% 0%	1 0 0 0 88 58 529 0 1 2.1000 1.883 111 0 0 96 0 0 2.189 11 0 0 96 1 1 8% 0%	1 0 0 0 0 94 61 32 0 1 2.283 2.059 117 111 0 0 96 0 0 2.378 2.121 149 11 0 0 96 1 7%	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dissell Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coas - Oil - Coas - Oil - Coa - Coa - Coas - Oil - Coa - Co	8% Australia 2012 195 132 37 12 8 0 3 5 1 203 132 39 28 3 0.000 902 815	279 7% Reference 2015 169 93 55 1 0 1 178 93 55 28 2 0.00 897 759	347 8% 2 (2015) 2020 168 95 52 20 0 1 1 176 95 52 27 2 2 0 0 0 1 176 95 52 2 0 0 0 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2	390 9% 2025 168 96 51 19 0 1 1 8 0 0 7 1 1 176 97 51 27 2 2 0.00 0.00 877 661	2030 181 1111 50 19 0 1 1 8 8 0 0 7 7 1 190 1111 50 26 2 0.00 0.00 876 674	2035 197 127 50 18 0 1 1 9 1 0 8 1 1 206 128 50 26 2 0.00 0.00 878 688	2040 216 146 51 18 0 1 1 0 8 1 225 146 51 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 0 8 1 8 1	7% 2045 212 141 52 17 0 1 9 0 8 1 221 142 52 2 0.00 790 644	2050 231 161 53 17 0 1 9 0 0 8 1 241 161 53 2 2 0 0 0 0 791 655
Condition Cond	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Bonnass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen - Bromass - Solar collectors - Solar collectors - Geothermal - Blomass - Geothermal - Blomass - Geothermal - Blomass - Geothermal - Geothermal - Geothermal - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - RES share (including RES electricity) - electricity consumption heat pumps (TWh/a) - 1) public CHP and CHP autoproduction	1 0 0 0 43 30 13 0 0 0 931 738 124 11 0 0 57 70 137 11 0 0 157 0	0 0 0 62 42 20 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105 11 0 96 0	1 0 0 0 65 43 21 0 1 1.401 1.205 89 11 0 0 96 0 1.447 1.249 110 0 96 1 100% 0%	10000000000000000000000000000000000000	1 0 0 0 711 447 23 0 1 1.641 1.439 95 11 0 0 96 0 1.713 1.487 118 111 0 0 96 1 96 1 9% 0%	1 0 0 0 83 555 27 0 1 1.771 1.566 98 11 0 0 96 0 1.855 1.621 125 11 0 0 96 1 8% 0 %	1 0 0 0 86 57 28 0 1 1.929 1.718 104 11 0 0 96 1.775 132 11 11 0 0 96 1 8% 0%	1 0 0 0 88 58 529 0 1 2.1000 1.883 111 0 0 96 0 0 2.189 11 0 0 96 1 1 8% 0%	1 0 0 0 0 94 61 32 0 1 2.283 2.059 117 111 0 0 96 0 0 2.378 2.121 149 11 0 0 96 1 7%	Total RES RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coal - Gas - Oil - Gas - Gas - Oil - Gas - Oil - Gas - Oil - Gas - Oil - Gas -	8% Australia 2012 195 132 37 23 1 2 2 2 8 0 3 5 1 2 2 3 3 2 2 3 3 3 2 3 3	279 7% Reference 2015 169 93 55 21 0 1 1 8 0 0 0 7 1 178 93 55 28 2 0.00 0.00 897 759	347 8% (2015) 2020 168 95 52 20 0 1 1 8 0 0 0 7 1 1 176 95 52 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	390 9% 2025 168 96 51 19 0 0 7 1 1 176 97 2 2 0.00 0.00 877 2 450 450 450 450 450 450 450 450	2030 181 111 50 0 1 8 0 0 7 1 1 90 111 50 26 2 0.00 0.00 876 674 478	406 8% 2035 197 127 50 18 0 1 0 8 1 1 206 128 26 2 0.00 0.00 878 608	2040 216 146 51 18 0 1 1 9 1 0 8 1 1 225 146 51 126 0 0 8 8 1 20 0 0 8 1 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7% 2045 212 141 52 17 0 1 9 0 8 1 1 221 142 52 25 2 0.00 0.00 790 644	2050 231 161 53 17 0 1 9 0 0 8 1 1 241 161 53 25 2 2 0.00 0.00 791 655
road	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Birch Selection - Geothermal - Hydrogen - Birch Selection - Geothermal - Hydrogen - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Birch Selection - Geothermal - Hydrogen - Total heat supply3 - Fossil fuels - Birch Selection - Geothermal - Hydrogen - Electric direct heating - Hydrogen - Hydro	1 0 0 0 0 43 300 13 0 0 0 931 738 124 11 0 0 57 770 0 0 16% 0% 2) heat from	0 0 0 62 42 20 0 0 1.295 1.103 84 11 0 0 96 0 1.357 1.146 105 11 0 0 96 0 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 0 6 0 6 0 0 6 0 6 0 0 6 0 6 0 0 6	1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 68 45 22 0 1 1.515 7 1.318 92 11 0 0 0 96 1 1.44 11 1 1 1 0 0 96 1 1 9% 0% Ucicly use	1 0 0 0 0 71 47 23 0 1 1.641 1 1.439 95 11 10 0 0 96 1 1713 9% 0 0 96 1 0 0 96 1 0 0 0 96 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	83 55 27 0 1 1,756 98 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 86 57 28 0 1 1 1,929 10 17,718 104 11 0 0 0 96 1 1,775 132 11 0 0 96 1 1 0 0 96 1 1 0 0 96 1 1 0 0 96 1 1 0 0 96 1 1 0 0 0 96 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	88 58 29 0 1 1 2.100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 944 611 32 2 0 1 1 1 0 0 96 1 1 1 1 1 0 0 96 1 1 7 % 0 %	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dilesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Oil & diseal - Oil & diseal - CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity total electr. generation - CO2 intensity total electr. generation CO2 emissions by sector - % of 1990 emissions (276 Mill t) - Industry 1)	8% Australia 2012 195 132 37 23 1 2 8 0 3 5 1 1 203 3132 39 28 3 0.00 0.00 902 815 374 136% 45	279 7% Reference: 2015 169 93 55 21 0 0 7 1 178 93 55 28 2 0 0 0 0 7 1 178 93 55 28 29 40 60 60 60 60 60 60 60 60 60 6	347 8% 2 (2015) 2 (2015) 52 2020 168 95 52 20 0 1 1 8 0 0 7 1 176 95 52 7 2 0.000 883 694 435 158%	390 9% 2025 168 96 51 19 0 0 7 1 1 8 0 0 0 7 1 1 2 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0	8% 2030 181 111 50 19 0 1 8 0 0 7 1 1190 211 50 22 0.000 876 674 478 173% 87	406 8% 2035 197 127 50 18 0 1 9 1 0 8 1 206 128 50 206 0.00 878 688 515 510 94	8% 2040 216 146 51 18 0 1 0 8 1 1 225 146 51 51 51 51 51 51 51 51 51 51	7% 2045 212 141 52 17 0 1 9 0 0 8 1 1221 142 52 2 0.000 790 644 557 202%	6% 2050 231 161 53 17 0 1 9 0 0 8 1 1 161 53 2 2 0.000 0,00 791 655 589 2213%
- biofuels	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Birch Selection - Geothermal - Hydrogen - Birch Selection - Geothermal - Hydrogen - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Birch Selection - Geothermal - Hydrogen - Total heat supply3 - Fossil fuels - Birch Selection - Geothermal - Hydrogen - Electric direct heating - Hydrogen - Hydro	1 0 0 0 43 30 13 0 0 0 931 738 124 111 0 0 57 770 137 711 1 0 0 57 70 157 0 16% 0% 2) heat from	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 1,711 47 23 0 1 1,641 1 1 0 0 0 96 0 0 1,713 118 111 0 0 0 96 1 1,987 0 96 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 86 57 28 0 1 1 1,929 1 104 11 0 0 0 0 0 0 0 1 1,775 132 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 88 88 29 9 0 1 1 883 111 0 0 96 0 0 2.189 1.941 11 10 0 96 1 1 8% 0% cing	1 0 0 0 0 94 61 32 2 0 0 1 1 2 2 2 8 3 2 2 0 5 9 1 1 7 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oileel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oileel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil & diesel - CO2 intensity (gkWh) without credit for CHP heat - CO2 intensity fossil electr; generation - CO2 criensisions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Industry 1) - Other sectors 1)	8% Australia 2012 195 132 37 23 1 2 8 0 0 3 5 1 2 203 3 5 1 2 203 3 0 0 0 0 0 0 0 0 0 0 4 5 7 7 8 4 5 20 9 6 9 6 9 9 6	279 7% Reference 2015 169 93 55 21 0 0 1 1 178 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	347 8% 2 (2015) 2 (2020) 168 95 52 2 0 0 0 1 1 8 0 0 0 7 7 1 1 176 95 52 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	390 9% 2025 168 96 51 19 0 0 7 1 1 8 0 0 0 7 1 1 27 2 0 0 0 0 0 0 0 0 0 0 0 0 0	8% 2030 181 111 50 19 0 7 1 190 111 50 26 2 0.000 876 674 478 173%	406 8% 2035 197 127 50 18 0 1 0 8 1 1 206 2 2 0.00 0.00 0.00 88 688 510 185% 688	8% 2040 216 146 51 18 0 1 0 8 1 225 146 51 26 2 0.00 883 705 547 198%	7% 2045 212 141 52 17 0 1 9 0 0 8 1 221 142 52 2 0.00 0,00 790 644 557 202%	6% 2050 231 161 53 17 0 1 9 0 0 8 1 161 53 25 2 0 00 0 00 0 00 0 119 29 119 29
- natural gas 2 4 5 6 7 8 10 0 1 1 12 2 3 incl. CHP public 2 3 incl. CHP public 3 incl. CHP public 3 incl. CHP public 3 incl. CHP public 4 5 1 6 7 8 8 10 11 1 12 2 3 incl. CHP public 4 5 1 6 7 8 8 10 1 1 1 12 2 3 incl. CHP public 4 5 1 7 7 8 8 8 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10	- Fossi fluels - Biomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossi fluels - Biomass - Geothermal - Hydrogen - Direct heating - Fossi fluels - Biomass - Geothermal - Hydrogen - Biomass - Solar collectors - Solar collectors - Solar collectors - Biomass - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossi fluels - Biomass - Solar collectors - Solar collectors - Biomass	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 0 0 0 0 65 43 21 1 1 1 2 205 89 1 1 1 1 1 2 205 89 1 1 1 1 0 0 0 96 0 1 1 1 1 1 2 2 4 9 1 1 1 1 0 0 0 96 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	68 445 222 11.517 1.318 92 11.517 1.318 92 11.517 1.318 92 11.517 1.318 96 0 0 1.585 1.364 111 0 0 96 1 1.517 1.318 11 1 0 0 0 96 1 1.517 1.318 11 1 0 0 0 0 1 1.517 1.5	1 0 0 0 0 71 47 23 1 1 1.641 1 1.439 95 1 1 1 0 0 96 0 1 .713 1 1 1 0 0 96 0 1 .930 1	1 0 0 0 0 8 83 555 277 11.566 98 11 1 0 0 0 0 0 1 855 127 11 0 0 0 0 1 855 125 11 1 0 0 0 96 1 1 855 11 1 1 0 0 0 96 1 1 855 125 11 1 0 0 0 96 1 1 855 125 125 125 125 125 125 125 125 125 1	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	88 88 88 29 0 1 1 2.1100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 94 61 32 2 283 32 2,059 1177 11 0 0 96 0 1 1 7 7 % 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dissel - Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil & diesel - Oil & diesel - Oil indensity (gNWh) without credit for CHP heat - CO2 indensity fosal electr, generation - CO2 criminatify fosal electr, generation - CO2 criminatify fosal electr, generation - CO2 emissions by sector - % of 1900 emissions (276 Mill t) - Industry (1) - Other sectors (1) - Transport - Power generation 2	8% Australia 2012 195 132 23 1 2 8 8 0 3 5 5 1 2 203 132 233 902 28 3 0.00 0.00 902 815 374 136% 45 20 96	279 7% Reference 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 0.00 152% 67 23 128 128	347 8% 2 (2015) 2 (2015) 2 (2016) 168 95 52 20 0 1 176 95 52 27 2 0.00 0.00 883 694 435 158% 74 23 138	300 9% 2025 168 96 96 17 19 0 0 0 7 1 176 97 51 27 2 2 0.00 0.00 987 450 1683 80 450 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 80 80 80 80 80 80 80 80 80	8% 2030 181 111 50 19 0 1 1 8 0 0 7 1 1 190 111 50 26 2 0.00 0.00 876 674 478 173% 87 424 159 185	406 8% 2035 197 127 127 150 18 0 0 1 0 8 1 0 0 1 206 22 2 0 0.00 0.00 778 688 510 185%	8% 2040 216 146 51 18 0 1 1 225 146 51 26 0.00 0.00 0.00 102 26 179 219	7% 2045 212 1441 552 17 0 0 8 1 1 221 1442 25 2 0.000 0.000 644 557 202% 110 28 184 28 184 215	6% 2050 231 161 53 17 0 1 1 9 0 0 8 1 1 241 161 53 25 2 0.00 0.00 0.00 1655 589 213%
-electricity 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1	- Fossi fluels - Biomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossi fluels - Biomass - Geothermal - Hydrogen - Direct heating - Hossi fluels - Biomass - Geothermal - Hydrogen - Biomass - Solar collectors - Solar collectors - Solar collectors - Biomass - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossi fluels - Biomass - Biomas	1 0 0 0 0 43 30 0 13 0 0 0 13 12 4 11 12 4 11 12 12 12 12 12 12 11 10 10 12 11 10 10 10 10 10 10 10 10 10 10 10 10	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 65 43 21 1 1 1 1 1 2 0 5 6 5 6 9 9 1 1 1 1 1 2 0 5 6 6 1 1 1 1 2 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1	68 445 222 11.5817 1.318 921 11.5817 10 0 0 0 0 0 1.585 11	1 0 0 0 0 71 47 23 23 1 1 1.641 1 1.439 91 1 1 0 0 0 96 0 1 .713 1 1.487 11 0 0 96 1 1 9 % 0 %	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 888 589 299 1 1 22,100 1,883 1111 11 0 0 96 0 1 1,884 11 10 0 0 96 1 1,894 1 140 0 0 96 1 1 140 0 0 96 1 1 2,212 2,2	1 0 0 0 94 61 32 2.050 1177 117 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dilesel - Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coas - Oil - Transport - Transport - Transport - Oil	8% Australia 2012 195 132 23 1 2 8 8 0 3 5 5 1 2 203 132 233 902 28 3 0.00 0.00 902 815 374 136% 45 20 96	279 7% Reference 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 0.00 152% 67 23 128 128	347 8% 2 (2015) 2 (2015) 2 (2016) 168 95 52 20 0 1 176 95 52 27 2 0.00 0.00 883 694 435 158% 74 23 138	300 9% 2025 168 96 96 17 19 0 0 0 7 1 176 97 51 27 2 2 0.00 0.00 987 450 1683 80 450 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 80 80 80 80 80 80 80 80 80	8% 2030 181 111 50 19 0 1 1 8 0 0 7 1 1 190 111 50 26 2 0.00 0.00 876 674 478 173% 87 424 159 185	406 8% 2035 197 127 127 150 18 0 0 1 0 8 1 0 0 1 206 22 2 0 0.00 0.00 778 688 510 185%	8% 2040 216 146 51 18 0 1 1 225 146 51 26 0.00 0.00 0.00 102 26 179 219	7% 2045 212 1441 552 17 0 0 8 1 1 221 1442 25 2 0.000 0.000 644 557 202% 110 28 184 28 184 215	6% 2050 231 161 53 17 0 1 1 9 0 0 8 1 1 241 161 53 25 2 0.00 0.00 0.00 1655 589 213%
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- fossifidelis	- Fossil fuels - Blomass - Solar collectors - Geothermal Heaf from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen - Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) - Typidic C-Per a Gel subspondation - Fossil fuels	1 0 0 0 0 43 30 30 13 0 0 0 931 1 1 0 0 0 9 1 1 1 0 0 0 1 1 1 0 0 0 1 1 1 0 0 0 1 1 1 0 0 1 1 1 0 0 1 1 1 1 0 0 1	0 0 62 42 20 0 0 1,295 1,103 84 1 10 0 0 96 0 1 1,357 11 0 0 0 96 0 1 1,357 15 15 15 15 15 15 15 15 15 15 15 15 15	1 0 0 0 0 65 43 21 0 1 1.401 1.205 89 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 45 22 0 1 1.517 1.318 96 0 0 0 0 1.585 1.364 111 10 0 96 1 7.746 17.746 54 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 71 47 23 0 1 1 1,641 1,439 96 0 0 0 1 1,713 1 1,487 11 0 0 0 6 0 0 1 1,855 58 0 7 7 0 0 0 0	1 0 0 0 0 83 555 27 0 1 1.771 1.566 98 11 0 0 96 1 1.855 12 11 0 0 96 1 1.821 12 12 12 12 12 12 12 12 12 12 12 12 1	1 0 0 0 0 866 577 28 8 0 1 1 1,929 1,718 100 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	88 88 58 29 0 1 2,100 1,883 11 11 11 10 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 94 61 32 0 1 1 2.283 2.050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dilesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - 1 da diseal - Oil & diseal - Oil & diseal - CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity total electr. generation - CO2 memsions by sector - % of 1990 emissions (278 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) 1) Incl. CHP galloproducers 2) Incl. CHP public	8% Australia 2012 195 132 37 132 23 1 2 2 8 0 0 3 3 5 1 2 203 132 37 132 30 000 000 000 000 000 000 000 000 00	279 7% Reference 2015 169 93 55 21 0 1 178 93 55 28 2 0.00 887 7 1 178 93 55 28 2 128 128 128 128 129	347 8% (2015) 2020 168 95 52 20 0 1 176 95 52 27 2 0 0.00 883 158% 435 158% 443 158%	300 9% 2025 168 96 96 17 19 0 0 0 7 1 176 97 51 27 2 2 0.00 0.00 987 450 1683 80 450 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 80 80 80 80 80 80 80 80 80	8% 2030 181 111 50 19 0 1 1 8 0 0 7 1 1 190 111 50 26 2 0.00 0.00 876 674 478 173% 87 424 159 185	406 8% 2035 197 127 127 18 0 0 1 0 8 1 0 0 1 0 206 22 2 0 0.00 0.00 878 688 510 185%	8% 2040 216 146 51 18 0 1 1 225 146 51 26 0.00 0.00 0.00 102 26 179 219	7% 2045 212 1441 552 17 0 1 221 1442 25 2 0.00 0.00 0.00 644 557 202%	6% 2050 231 161 161 53 17 0 1 9 0 0 8 8 1 161 53 2 2 0.00 0.00 0.00 791 655 589 213% 119 29 185 29 185
- biofuels	- Fossil fuels - Blomass - Solar collectors - Geothermal Heaf from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen - Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) - Typidic C-Per a Gel subspondation - Fossil fuels	1 0 0 0 0 43 30 30 13 0 0 0 931 1 1 0 0 0 9 1 1 1 0 0 0 1 1 1 0 0 0 1 1 1 0 0 0 1 1 1 0 0 1 1 1 0 0 1 1 1 1 0 0 1	0 0 62 42 20 0 0 1,295 1,103 84 1 10 0 0 96 0 1 1,357 11 0 0 0 96 0 1 1,357 15 15 15 15 15 15 15 15 15 15 15 15 15	1 0 0 0 0 65 43 21 0 1 1.401 1.205 89 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 45 22 0 1 1.517 1.318 96 0 0 0 0 1.585 1.364 111 10 0 96 1 7.746 17.746 54 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 71 47 23 0 1 1 1,641 1,439 96 0 0 0 1 1,713 1 1,487 11 0 0 0 6 0 0 1 1,855 58 0 7 7 0 0 0 0	1 0 0 0 0 83 555 27 0 1 1.771 1.566 98 11 0 0 96 1 1.855 12 11 0 0 96 1 1.821 12 12 12 12 12 12 12 12 12 12 12 12 1	1 0 0 0 0 866 577 28 8 0 1 1 1,929 1,718 1004 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	88 88 58 29 0 1 2,100 1,883 11 11 11 10 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 94 61 32 0 1 1 2.283 2.050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dilesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - 1 da diseal - Oil & diseal - Oil & diseal - CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity total electr. generation - CO2 memsions by sector - % of 1990 emissions (278 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) 1) Incl. CHP galloproducers 2) Incl. CHP public	8% Australia 2012 195 132 37 132 23 1 2 2 8 0 0 3 3 5 1 2 203 132 37 132 30 000 000 000 000 000 000 000 000 00	279 7% Reference 2015 169 93 55 21 0 1 178 93 55 28 2 0.00 887 7 1 178 93 55 28 2 128 128 128 128 129	347 8% (2015) 2020 168 95 52 20 0 1 176 95 52 27 2 0 0.00 883 158% 435 158% 443 158%	300 9% 2025 168 96 96 17 19 0 0 0 7 1 176 97 51 27 2 2 0.00 0.00 987 450 1683 80 450 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 80 80 80 80 80 80 80 80 80	8% 2030 181 111 50 19 0 1 1 8 0 0 7 1 1 190 111 50 26 2 0.00 0.00 876 674 478 173% 87 424 159 185	406 8% 2035 197 127 127 18 0 0 1 0 8 1 0 0 1 0 206 22 2 0 0.00 0.00 878 688 510 185%	8% 2040 216 146 51 18 0 1 1 225 146 51 26 0.00 0.00 0.00 102 26 179 219	7% 2045 212 1441 552 17 0 1 221 1442 25 2 0.00 0.00 0.00 644 557 202%	6% 2050 231 161 53 17 0 1 1 9 0 0 8 1 1 241 161 53 25 2 0.00 0.00 0.00 1655 589 213%
-electricity 15 45 49 52 56 60 63 66 70 73 77 81 101 101 101 101 113 123 134 132 148 132 134 134	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Solar collectors - Hydrogen - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Lessil fuels - Lossil f	1 0 0 0 0 43 30 30 31 33 0 0 931 124 4 14 10 0 975 770 137 17 1 17 1 10 0 0 16% 2012 2) heat from 2012 1,076 1,076 1,076 1,076 0 0 0 0 0 0 5 5 7	0 0 62 42 20 0 0 1.295 1.103 41 11 0 0 0 0 0 0 1.357 47 47 4 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 65 43 21 0 1 1 1.4.01 1 2.05 96 0 0 0 0 0 0 1.881 1 1 0 0 0 0 0 1 1.81 1 1 1 1.02 1 1.826 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 45 22 0 1 1 1.517 1,318 92 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 71 47 23 0 1 1 1.641 11 1.439 95 11 1 1 4.487 11 1 0 0 0 0 96 0 0 1.713 1.487 11 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 83 55 27 0 1 1 7771 1,566 0 0 0 0 0 0 0 1,855 1,621 1 0 0 0 0 0 0 1,855 1,621 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 86 57 28 0 1 1 1,929 1,718 104 111 0 0 0 96 0 2,1016 1,775 132 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 88 858 58 29 0 1 1 2,100 1,883 1,941 1 11 0 0 0 96 0 2 2,189 1,941 1 1 0 0 0 96 1 2,172 2,172 2 0 0 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 94 61 1 2 2.833 2 0 0 1 17 1 17 11 17 1 17 1 17 1 17 1	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dilesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - 1 da diseal - Oil & diseal - Oil & diseal - CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity total electr. generation - CO2 memsions by sector - % of 1990 emissions (278 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) 1) Incl. CHP galloproducers 2) Incl. CHP public	8% Australia 2012 195 132 37 132 23 1 2 2 8 0 0 3 3 5 1 2 203 132 37 132 30 000 000 000 000 000 000 000 000 00	279 7% Reference 2015 169 93 55 21 0 1 178 93 55 28 2 0.00 887 7 1 178 93 55 28 2 128 128 128 128 129	347 8% (2015) 2020 168 95 52 20 0 1 176 95 52 27 2 0 0.00 883 158% 435 158% 443 158%	300 9% 2025 168 96 96 17 19 0 0 0 7 1 176 97 51 27 2 2 0.00 0.00 987 450 1683 80 450 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 1683 80 80 80 80 80 80 80 80 80 80	8% 2030 181 111 50 19 0 1 1 8 0 0 7 1 1 190 111 50 26 2 0.00 0.00 876 674 478 173% 87 424 159 185	406 8% 2035 197 127 127 18 0 0 1 0 8 1 0 0 1 0 206 22 2 0 0.00 0.00 878 688 510 185%	8% 2040 216 146 51 18 0 1 1 225 146 51 26 0.00 0.00 0.00 102 26 179 219	7% 2045 212 1441 552 17 0 1 221 1442 25 2 0.00 0.00 0.00 644 557 202%	6% 2050 231 161 53 17 0 1 1 9 0 0 8 1 1 241 161 53 25 2 0.00 0.00 0.00 1655 589 213%
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- fossifiedes 29 53 57 61 65 70 73 77 81 bit of bid	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Electric direct heating - Hydrogen - Electric direct heating - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Heat pumps 2) - Heating Hydrogen - Heat pumps 2) - Fossil fuels - Hydrogen - Hydrogen - Hydrogen - Final energy consumption transport in P.J/a - Scenario: - Final energy consumption transport in P.J/a - Fossil fuels - biofuels - synfuels - natural gas - hydrogen - electricity - Electricitizy - Fossil fuels - Lossil fuels	1 0 0 0 0 43 3 30 0 0 931 13 0 0 0 931 13 10 0 0 0 975 57 0 0 0 0 75 77 137 11 1 0 0 0 0 0 1 0 1 0 0 1 0 0 0 0 0 1 0	0 0 62 42 20 0 0 1.286 11 10 10 10 10 10 10 10 10 10 10 10 10	1 0 0 0 0 65 42 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 68 45 22 2 0 0 1 1.517 92 1 1 1.517 92 1 1 1 1.518 92 1 1 1 1.518 92 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 83 55 7 0 0 1 1.771 1 1.566 98 1 1 1.75 1 1 1.566 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 86 57 28 0 1 1 1.929 17.718 10 0 0 96 1 1.929 17.72 19.9	1 0 0 0 0 88 85 85 90 0 1 1 2.1100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 94 4 61 1 32 2 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Gas - Oil - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Brown Coal - Brown Coal - Coz intensity (gkWh) without credit for CHP heat - COz intensity fosal electr, generation - COz intensity fosal electr, generation - COz emissions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) - Ind. CHP public 3) district heating, refineries, coal transforr	8% Australia 2012 195- 195- 195- 192- 195- 195- 195- 195- 195- 195- 195- 195	279 7% Reference 2015 189 855 21 0 0 1 178 893 555 28 2 0.00 0.00 8877 759 420 152% 1728 173 29	347 8% 2 (2015) 2020 1688 55 55 2020 0 1 1 8 8 0 0 0 7 7 1 176 95 52 27 2 0 0.00 0.883 694 435 158% 74 23 138 138 122 29	390 99% 2025 168 96 51 19 0 0 7 1 176 8 0 0 0 7 7 1 177 27 2 0.00 0.00 87 67 163 450 163 450 163 450 163 163 163 163 163 163 163 163 163 163	8% 2030 181 181 190 0 7 1 1 8 0 0 0 7 1 1 100 26 27 0.00 0.00 876 677 478 478 159 87 24 159 23	406 8% 2035 197 127 50 18 0 1 1 0 8 1 1 208 26 2 2 0.00 0.00 878 668 668 668 698 200 22	8% 2040 2166 2168 118 0 1 1 9 1 0 8 1 1 0 88 1 2255 1468 22 0.00 0.00 0.00 100 198% 198% 102 26 179 219 21	7% 2045 212 212 1141 52 7 0 0 8 8 1 142 225 2 0.00 0.00 644 557 790 644 110 28 184 215 21 215 21	6% 2050 2311 53 77 0 0 1 9 0 0 0 0 8 8 1 1 615 53 25 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-syntleds 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaft from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Geothermal - Hydrogen - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Hydrogen - Hodel Palmograductor - Final energy consumption transport in PJ/a - Scenario: - Fossil fuels - biofuels - synfuels - inducial - electricity - Electrification share: - rail - Iossil fuels - iofuels - iostifuels	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 62 42 20 0 0 1.295 11 0 0 96 11 1.395 11 0 0 96 11 1.395 11 0 0 0 0 0 0 10 10 10 1.357 47 0 0 0 0 0 0 0 4 5 5 7 7 7 0 0 0 0 4 5 5 3	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 8 0 0 0 52 5 61 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 711 477 23 0 1 1,439 58 96 1 1,713 1,467 118 119 96 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 83 55 5 20 1 1 1,7771 1,5660 98 1 1 1,7771 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 86 57 72 88 97 72 88 97 72 88 97 72 89 97 97 97 97 97 97 97 97 97 97 97 97 97	1 0 0 0 0 88 8 58 8 29 0 0 1 1 11 11 11 11 11 11 11 11 11 11 1	1 0 0 0 0 94 4 61 1 22 283 2 0 0 1 1 2 2 283 2 117 17 10 96 0 0 0 96 1 117 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dilessel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Oil & diesel - CO2 intensity (gi/kWh) without credit for CHP heat - CO2 intensity total electr. generation - CO2 intensity total electr. generation - CO2 intensity total electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Oither sectors 1) - Transport - Power generation 2) - Other conversion 3) - I) incl. CHP gutoproducers 2) incl. CHP public - Oither conversion 3) - Primary energy demand in P.J/a Scenario:	8% Australia 2012 195 2012 195 21 21 22 8 8 0.00 3 3 5 1 203 132 3 0.00 0.00 902 28 815 374 136% 45 20 96 200 13 Australia 2012	279 7% Reference 2015 8 0 0 0 7 1 178 993 955 22 0.00 0.00 897 128 128 173 29 transport	347 8% 2 (2015) 2020 198 95 52 20 0 0 1 176 95 27 7 1 176 95 152 20 0 0 0 7 1 1 176 95 27 27 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	390 99% 2025 168 96 51 19 0 0 7 1 176 97 1 27 2 2 0.00 0.877 450 163% 24 149 171 26	8% 2030 181 181 191 50 19 0 1 1 190 111 190 0 111 190 0 0 0 0	406 8% 2035 197 127 50 18 0 1 1 0 8 1 1 206 128 20 20 20 20 20 20 20 20 20 20 20 20 20	8% 2040 2040 216 146 51 18 0 1 1 225 146 1 1 225 146 1 20 20 20 20 21 21 21 21 21 21 21 21 21 21	7% 2045 212 141 52 141 52 17 0 0 0 8 1 221 142 22 0.00 0.00 790 044 215 21 110 28 1142 215 21 20 21 20 21 21 22 21 22 20 23 24 24 24 25 25 25 25 26 27 20 28 28 28 29 20 20 20 20 20 20 20 20 20 20 20 20 20	6% 2050 2050 2050 2050 2050 2050 2050 205
awataton 111 101 113 123 134 132 148 132 132 134 132 148 132 132 134 132 148 132 132 134 132 148 132 132 134 132 148 132 132 134 132 148 132 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 132 148 132 134 134 134 134 134 134 134 134 134 134	- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaft from C-HP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Heat pumps 2) - Hydrogen - Hydrogen - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Hy	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 45 22 2 0 0 1 1.585 11 0 0 0 0 1.585 11.364 114 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 71 1 477 23 0 1 1 1,641 1 1 1 0 0 0 0 0 0 1 1,439 95 1 1 1,487 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 83 55 70 0 1 1,771 1 1,566 98 1 1,771 1 11 10 0 0 0 1 1,821 1 11 10 0 0 0 0 1 1,821 1 125 1 125 1 125 1 1 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 86 57 57 57 57 57 57 57 57 57 57 57 57 57	1 0 0 0 0 88 858 929 90 0 1 11 11 11 11 11 11 11 11 11 11 11 1	1 0 0 0 0 944 611 32 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Coal - C	8% Australia 2012 195 195 132 207 27 27 37 3 3 3 5 5 1 203 132 203 132 3 3 5 5 1 203 132 205 31 40 200 202 201 205 374 136 5 45 200 13 46 200 13 Australia 2012 5 5,147 5 5,147 5 5,147 5 5,147 5 5 5,147 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 6 6 6 7 6 7	279 7% Reference 2015 169 88 00 11 178 893 555 28 2 0 00 07 11 178 93 128 128 128 128 128 128 128 128 128 128	347 8% 2 (2015) 2020 19 (2015) 2020	390 99% 2025 1688 96 51 19 0 0 7 7 1 1 7 2 2 2 2 3 6 6 1631 19 19 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8% 2030 1811 150 1811 50 0 1 1 1 8 0 0 0 7 1 1 1 50 2 6 2 0 0 0 876 4 7 8 7 8 7 1 8 1 8 1 8 1 8 1 8 1 8 1 8 1	406 8% 2035 197 127 127 50 18 0 1 1 206 8 1 1 1 206 8 8 50 8 50 8 1 1 28 50 20 20 20 20 20 20 20 20 20 20 20 20 20	8% 2040 2040 2146 146 51 18 0 1 0 1 0 1 0 1 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0	7% 2045 2142 1441 52 147 70 0 0 8 8 1 122 52 2 0.0000 700 644 100 28 184 215 21 21 21 2045 7,855	6% 2050 2050 231 161 53 70 0 0 0 0 0 0 0 241 165 53 25 2 2 2 2 2 2 11 181 19 10 10 10 10 10 10 10 10 10 10 10 10 10
- biofuels	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Geothermal - Hydrogen - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Fossil fuels - Liofutels - synfuels - natural gas - hydrogen - electricity - electr	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 62 42 20 0 0 1,295 1,103 84 11 11 11 10 0 0 1,357 1,146 10 1 1,158 7 2015 1,158 7 47 0 0 0 4 4 0 0 0 0 4 5 5 5 5 5 5 3 5 3 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 8 20 22 0 0 1 1,517 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 71 1 477 23 0 1 1 1,641 1 1 1 0 0 0 0 0 0 1 1,439 95 1 1 1,487 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 83 55 70 0 1 1,771 1 1,566 98 1 1,771 1 11 10 0 0 0 1 1,821 1 11 10 0 0 0 0 1 1,821 1 125 1 125 1 125 1 1 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 86 57 57 57 57 57 57 57 57 57 57 57 57 57	1 0 0 0 0 88 8 8 29 0 0 1 1 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 944 611 32 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dissel - Dissel - Hard coal (& non-renewable waste) - Brown Coal - Cas - Oil - Coas - Oil - O	8% Australia 2012 195 195 201 21 22 31 2 2 8 8 0 00 3 5 1 2 203 29 902 815 374 138% Australia 2012 2012	279 77% Reference 2015 169 93 55 21 0 1 178 8 0 0 0 7 1 1178 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	347 8% 9 (2015) 2020 1 188 95 52 20 0 0 7 1 176 95 52 27 2 0 0 0 0 7 1 1 176 95 52 27 2 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1	390 99% 2025 1688 96 51 19 0 0 7 1 1 7 2 2 2 0.00 97 67 1 1 27 2 2 0.00 163% 80 450 163% 80 450 163% 80 450 163% 80 450 80 80 80 80 80 80 80 80 80 80 80 80 80	8% 2030 181 111 50 19 0 7 1 180 8 0 0 7 1 100 876 674 478 478 477 4478 223 2030 6,915 6,354 6,915 6,354	406 8% 2035 197 127 50 18 0 0 1 1 0 8 1 1 206 26 2 0 0 0 0 0 0 0 0 6 8 8 688 688 688 688 6	8% 2040 2040 216 51 146 51 18 0 0 1 0 8 1 1 225 2 0 000 883 1 225 246 246 257 267 276 277 277 278 279 279 279 279 279 279 279 279	7% 2045 212 141 52 17 0 1 9 0 0 8 1 1 142 22 22 20.00 0,00 790 644 215 27 22 110 28 110 28 110 211 211 211 211 20 20 20 20 20 20 20 21 21 21 21 21 20 20 20 20 20 20 20 20 20 20 20 20 20	6% 2050 2050 231 161 53 17 0 0 0 8 8 1 1 161 63 23 2 2 0.00 0.00 791 865 53 2 2 2 1191 191 191 191 191 191 191 191
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-electricity 15 45 49 53 56 60 64 67 71 -of which non-energy use 202 235 242 242 242 242 242 242 242 242 242 24	- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaft from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Olivect heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Dictudies - Indicated Part suppenductor - Fossil fuels - Dictudies - Hydrogen - Lectricity - Lectricity - Lectricity - Lectricity - Lectricity - Indicated Part fuels - Lectricity - Le	1 0 0 0 0 43 3 30 0 0 0 1 7338 1 128 4 1 1 1 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1	0 0 62 42 20 0 0 1,295 1,103 84 1 11 10 10 96 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 45 22 0 1 1 1,517 1,318 2 11 11 1 0 0 0 0 0 1 1,586 1 1,364 1 11 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 711 477 23 0 1 1 1,433 95 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 83 55 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1 0 0 0 0 86 57 728 8 70 1 1 1.929 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 88 85 85 99 0 1 1 21,883 1111 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 944 1 1 2 2 2 8 3 2 0 0 0 0 1 1 1 7 1 1 1 1 1 1 1 1 1 1 1 1	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Coas - Oal - Coare - Hard coal - & non-renewable waste) - Brown Coal - Brown Coal - Brown Coal - Coa - Coas - Oal - Coas - Oal - Coa - Coa - Coas - Oal - Coa	8% Australia 2012 195- 195- 195- 195- 195- 195- 195- 195-	279 77% Reference 2015 169 93 55 21 0 1 178 8 0 0 0 7 1 1178 2 0 0 0 897 759 1528 2 1133 29 420 152% 67 23 31 1133 29 420 1,072 521 521 522 522 522 522 522 522 522 52	347 8% 9 2015) 2020 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	390 97% 2025 168 96 51 19 0 0 7 1 176 8 0 0 0 7 1 177 2 2 0,000 97 151 163% 80 24 91 171 163% 80 24 91 171 172 173 174 175 175 175 175 175 175 175 175	8% 2030 191 191 191 191 191 191 191 191 191 19	406 8% 2035 197 127 50 18 0 1 1 0 8 1 1 205 26 2 0 0.00 6759 688 688 67 7 310 6 7.59 67 7 310 6 7.59 67 7 310 6 7.59 67 7 310 6 7.59 67 7 310 6 7.59 67 7 310 6 7.59 67 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7.59 6 7 7 310 6 7 5 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7	8% 2040 216 146 51 18 0 1 0 8 1 1 225 147 26 19 10 245 147 26 188 10 27 27 27 27 27 27 27 27 27 27	7% 2045 212 141 52 17 0 1 9 0 0 8 1 1 142 25 25 20 0.00 790 644 412 215 217 221 211 221 221 244 497 7,855 7,855 7,855 21 2045 21 21 2045 497 21 2045 497 21 2045 497 21 2045 497 21 2045 497 320 2044 497 476 668 678 3211 32 2244	6% 2050 2050 31 161 161 161 161 161 161 161 161 161
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MES snare 11% 3% 3% 3% 3% 3% 3% 3% 2% 2% 1 RES share 0.06047 0.06184 0.07992 0.08843 0.08108 0.07531 0.06957 0.06046 0.05644	- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Olivect heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Solar collectors - Geothermal - Heat pumps 2) - Fossil fuels - Hydrogen - Total heat supply3) - Fossil fuels - Hydrogen - Fossil fuels - F	1 0 0 0 0 43 3 30 0 0 0 1 3 1 3 1 0 0 0 0 1 1 3 1 1 1 1	0 0 0 62 42 20 0 0 0 1.2895 1.103 1 1.146 10 0 0 0 0 1.558 1.507 4 5 2 7 7 0 0 0 0 0 1.688 1.507 10 1 10 1 10 1 10 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 68 45 22 2 0 0 1 1,515 92 1 1 1 1,517 92 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 86 57 8 1 1,929 1 1,718 104 11 1 1,718 104 104 10 0 0 1 1 1,718 104 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 888 588 588 589 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 94 4 61 1 2.283 2 0 0 1 177 6 96 1 1 2 2.378 8 0 0 1 170 6 1 1 1 2 2.31 2 2 1 1 2 0 0 1 1 1 2 2 2 2 2 2 2 2 2	Total RES RES share CO2 emissions in Mill Va Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coambined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Co2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil & diesel - CO2 intensity (pkWh) without credit for CHP heat - CO2 intensity fosal electr, generation - CO2 emissions by sector - CO2 intensity fosal electr, generation - CO2 emissions by sector - % of 1990 emissions (276 Mill 1) - Industry 1) - Indus	8% Australia 2012 195 195 195 195 195 195 195 195 195 195	279 7% Reference 2015 169 93 55 21 0 0 7 1 178 8 0 0 0 7 1 1178 2 2 0 0 0 15 28 8 93 759 420 173 128 128 128 128 128 128 128 128 128 128	347 8% 2 (2015) 2020 11 168 95 52 200 0 000 0 000 11 1 176 52 27 2 2 0 0.00 0.000 15883 694 435 52 27 2 2 2 0.00 0.000 6.207 5.7111 467 5.711 487 5.711 487 5.711 487 5.75 5.866 88 86 31 31 32 5.866 66 88 66 68 86 66 6.207	390 97% 2025 1688 96 51 19 0 0 7 7 11 16 8 0 0 7 7 11 12 2 2 2 2 4 450 1 1 1 2 6 1 1 1 2 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4	8% 2030 181 111 50 19 0 1 188 0 0 0 7 1 190 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	406 8% 2035 197 127 50 18 0 1 0 1 1 206 2 205 2 207 117 27 285 67 117 32 285 67 117 32 286 67 117 32 286 67 7,310 67 7,310	8% 2040 216 146 51 18 0 0 1 0 8 1 1 225 146 146 2 2 129 1219 21 1 21 21 21 21 21 21 21 21 21 21 21 2	7% 2045 212 141 52 17 0 1 9 0 0 8 1 1 221 142 25 2 20 0 0 0 0 0 0 1 10 221 142 221 21 21 21 21 21 21 21 21 21 21 20 20 20 20 20 20 20 20 20 20 20 20 20	9% 2050 231 161 53 17 0 1 1 153 25 2 2 2 13% 165 55 589 213% 22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaft from C-HP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Geothermal - Hydrogen - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Hod Hydrogen - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen	1 0 0 0 0 433 300 0 0 0 0 0 0 0 0 0 0 0 0	0 0 62 42 20 0 0 1.295 1.103 84 1 1 1 0 0 0 1 1.357 1.146 10 51 1.558 1.558 1.559 52 7 7 0 0 4 5 5 2 5 3 5 3 0 0 1 1.780 0 0 0 0 4 5 5 2 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 65 3 21 1 1 1 1 1 1 1 1 2 2 1 1 1 1 1 1 1	1 0 0 0 0 68 44 20 20 0 0 1,515 67 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 71 1 1.641 1 1.439 96 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 0 0 83 55 7 0 0 1 1.771 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 86 57 57 57 57 57 57 57 57 57 57 57 57 57	1 0 0 0 0 88 8 58 99 0 1 1 2,100 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1	1 0 0 0 0 94 4 1 4 1 4 1 4 1 4 1 4 1 2 2 8 3 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Total RES RES share CO2 emissions in Mill t/a Scenario. Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil & diesel - Coz intensity (gkWh) without credit for CHP heat - COz intensity fossil electr; generation - COz emissions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) - Other conversion 3) - Other conversion 3 - Jind. CHP public - Jind. CHP public - Jind. CHP public - Jind. CHP public - Gas and Charles - Fossil - Hard coal (& non-renewable waste) - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas - Crude oil - Renewables - Wind - Solar - Biomass (& renewable waste) - Geothermal - Ocean energy Total Inic. net elec. & synfuel import - of which non-energy use Total RES lind. electr. & synfuel import	8% Australia 2012 1952 1952 1953 19 20 1953 10 20 1953 10 20 1953 11 22 28 3 3 0 000 000 1953 1954 1954 1955 1955 1955 1955 1955 1955	279 7% Reference 2015 169 93 55 21 0 1 178 8 0 0 0 0 0 0 0 0 0 152 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	347 8% (2015) 2020 (188 95 52 20 0 0 0 0 0 0 7 7 1 1 1 176 20 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	390 9% 2025 168 96 97 17 17 17 17 17 17 17 17 17 17 17 17 17	8% 2030 181 111 50 19 0 1 188 0 0 7 1 190 2 8 674 478 87 478 87 24 159 2030 8915 1.698 233 2030 6915 1.698 1.698 1.698 1.698 1.698 1.698 676 674 674 674 674 674 674 67	406 8% 2035 197 127 50 18 0 1 1 206 8 1 1 208 8 50 0 8 1 1 208 50 1 8 50 0 0 0 0 0 0 20 21 21 21 21 21 21 21 21 21 21 21 21 21	8% 2040 2040 216 146 51 18 0 1 9 1 0 8 1 1 225 2 0 000 000 000 198 883 705 547 198% 219 211 2249 21 2040 7,757 218 1,902 21 1,902 21 1,7757 242 20 32 0 7,757 242 32 0 7,757 242	7% 2045 212 141 52 17 0 1 9 0 0 8 1 1 221 142 52 2 2 2 0 0 0 0 0 0 8 644 1557 202 8 184 215 21 21 21 21 21 21 21 27 20 28 28 28 29 20 30 20 28 28 29 30 30 30 30 30 30 30 30 30 30 30 30 30	6% 2050 2050 231 161 53 17 0 1 1 9 0 0 0 8 1 1 161 53 25 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Electricity generation in TWh/a Scenario:	Australia I	RENEWA	RIF							Installed capacity in GW Scenario:	Australia I	RENEWA	RIF						
Scenario.	2012	2015	2020	2025	2030	2035	2040	2045	2050	Scenario.	2012	2015	2020	2025	2030	2035	2040	2045	2050
Power plants	236	217	238	272	302	325	363	449	519	Total generation	43	44	67	104	130	157	181	225	262
- Hard coal (& non-renewable waste) - Brown Coal	138	98 47	103	62	36 0	0	0	0	0	- Fossil - Hard coal (& non-renewable waste)	33 18	29 13	26 14	21	17 5	6	4	2	0
- Gas of which from H2	42	38	44	49 0	47 0	21 0	8	2	0	- Brown Coal - Gas (w/o H2)	4	6	1	0 11	0 11	6	0	0	0
- Oil - Diesel	1 2	0	0	0	0	0	0	0	0	- Oil - Diesel	1	1	1	1	1	0	0	0	0
- Biomass (& renewable waste) - Hydro	1	0 19	0 19	2 19	3 19	11 19	9 19	10 19	6 19	Hydrogen (fuel cells, gas power plants, g Renewables	, 0 10	0 15	0 41	0 83	0 113	1 151	1 176	1 221	2 260
- Hydro - Wind of which wind offshore	6	9	39 0	57 2	81 6	97 10	115 20	134 31	163 40	- Hydro - Wind	6	8	8 18	8 26	8 37	8 44	8 52	8 59	8 72
- PV	1	5	22	72	95	137	163	215	245	of which wind offshore	0	0	0	1	2	4 86	7	11	14
Geothermal Solar thermal power plants	0	0	1	5	5 15	13 27	14 35	22 48	26 60	- PV - Biomass (& renewable waste)	0	0	14	45 1	59 2	4	102 5	134 6	153 9
- Ocean energy	0	0	0	0	0	0	0	0	0	Geothermal Solar thermal power plants	0	0	0	2	6	3 6	3 7	5 10	7 12
Combined heat and power plants - Hard coal (& non-renewable waste)	13 0	17 0	20 0	23 0	26 0	32 0	38 0	35 0	40 0	- Ocean energy	0	0	0	0	0	0	0	0	0
- Brown Coal - Gas	2 8	0 12	0 14	0 16	0 18	0 15	0 16	0 11	0	Fluctuating RES (PV, Wind, Ocean) Share of fluctuating RES	4 9%	7 17%	32 48%	72 69%	97 74%	130 83%	153 85%	193 86%	225 86%
of which from H2 - Oil	0	0	0	0	0	0	0	0	0	RES share (domestic generation)	23%	35%	61%	80%	87%	96%	97%	99%	99%
Biomass (& renewable waste) Geothermal	2	3	4	5	6	13	17	18 2	30 4										
- Hydrogen	Ö	ō	ō	ō	Ö	2	3	4	6	Final energy demand in PJ/a 1) Scenario:	Australia I	DENEWA	DIE						
CHP by producer	0	0	0	0	0	0	0	0	0	Scenario.	2012	2015	2020	2025	2030	2035	2040	2045	2050
Main activity producers Autoproducers	5 8	12	5 15	5 18	5 21	5 27	5 33	30	5 35	Total (incl. non-energy use)	3,333	4,133	4,283 4.079	4,221	3,983 3,779	3,815 3.611	3,665 3.461	3,773 3,569	3,761 3.557
										Total energy use 1) Transport	3,132 1,304	3,897 1,780	1,857	4,018 1,810	1,660	1,509	1,405	1,421	1,503
Total generation - Fossil	249 225	234 198	258 171	295 131	328 104	357 37	401 25	485 13	560 1	Oil products Natural gas	1,258 19	1,668 20	1,723 27	1,548 25	1,280 23	1,063 21	795 19	536 19	315 19
Hard coal (& non-renewable waste) Brown Coal	138 33	98 47	103 7	63 0	36 0	0	1	0	1 0	- Biofuels - Synfuels	14 0	47 0	52 0	68 0	95 0	120 0	184 0	226 0	316 0
- Gas - Oil	50 2	50 2	58 2	65 3	65 3	36 0	24 0	13 0	0	- Electricity RES electricity	15 1	45 7	55 18	168 94	262 179	304 273	407 381	640 623	854 853
- Diesel - Hydrogen	2	1 0	1 0	1	0	0 2	0	0	0	- Hydrogen RES share Transport	0 1%	0 3%	0	0	0	0 26%	0	0	0 78%
- of which renewable H2	0	0	0	0	O	2	3	4	6	·		1.365	1.462	1.469	1.405			1.421	1.349
Renewables (w/o renewable hydrogen) Hydro	24 14	36 19	87 19	164 19	224 19	318 19	373 19	467 19	553 19	Industry - Electricity	1,002 288	327	366	381	401	1,379 423	1,329 454	493	529
- Wind - PV	6	9 5	39 22	57 72	81 95	97 137	115 163	134 215	163 245	RES electricity - Public district heat	28 11	50 12	123 12	213 13	274 15	379 16	425 16	480 18	528 18
Biomass (& renewable waste) Geothermal	2	3 0	4 2	7 4	9 5	25 13	26 16	28 25	36 30	RES district heat - Hard coal & Brown Coal	0 111	1 80	1 63	1 60	1 56	1 52	1 46	1 51	13 28
Solar thermal power plants Ocean energy	0	0	1	5	15 0	27	35 0	48 0	60 0	- Oil products - Gas	168 316	196 695	213 748	213 742	198 680	189 646	175 591	184 624	161 569
Import	0	0	0	0	0	0	0	0	0	- Solar - Biomass	0	0 55	0	0	0 56	0	0	0	0
- Import RES	0	0	0	0	O	0	0	0	0	- Geothermal	0	0	0	0	0	0	0	0	0
Export Distribution losses	13	12	12	0 12	13	0 13	13	13	0 13	- Hydrogen RES share Industry	0 14%	0 8%	0 13%	0 19%	0 24%	0 31%	0 36%	0 37%	0 43%
Own consumption electricity Electricity for hydrogen production	27 0.0	27 0.0	24 0.2	22 0.1	19 1.7	17 8.0	16 11.6	14 16.8	13 24.8	Other Sectors	825	753	760	739	714	723	727	727	705
Electricity for synfuel production Final energy consumption (electricity)	0.0 209.4	0.0 195.6	0.0 222.3	0.0 261.0	0.0 294.7	0.0 318.5	0.0 360.4	0.0 440.8	0.0 509.1	- Electricity RES electricity	451 43	332 51	379 128	390 217	398 272	419 376	437 410	453 440	449 449
Fluctuating RES (PV, Wind, Ocean)	8	14	61	129	176	234	278	348	408	Public district heat RES district heat	0	0	0	0	0	0	0	0	0
Share of fluctuating RES	3% 10%	6% 15%	24%	44% 56%	54% 68%	66%	69% 94%	72%	73%	- Hard coal & Brown Coal - Oil products	1	0	0 107	0 85	0 37	0	0	0	0
RES share (domestic generation)	10%	15%	34%	36%	68%	90%	94%	97%	100%	- Gas	124 180	141 211	205	188	175	151	131	92	60
Heat supply and air conditioning in PJ/a Scenario:	Australia I	RENEWA	BLE							- Solar - Biomass	11 58	11 58	10 53	14 51	26 47	33 45	52 41	59 38	68 35
	2012	2015	2020	2025	2030	2035	2040	2045	2050	- Geothermal - Hydrogen	0	0	5	11 0	31 0	41 0	51 0	77 0	92 0
										RES share Other Sectors	14%	16%	26%	40%	53%	68%	76%	84%	91%
District heating plants					2	2													
District heating plants - Fossil fuels	1	1	2	2	2	2	2	2	2	Total RES	263	279	450	729	981	1,320	1,592	1,994	2,398
- Fossil fuels - Biomass - Solar collectors	1 0 0	1 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	2 0 0	RES share	263 8%	279 7%	450 11%	729 18%	981 26%	1,320 37%	1,592 46%	1,994 56%	2,398 67%
- Fossil fuels - Biomass - Solar collectors - Geothermal	1 0 0	0	0 0 0	2 0 0 0	2 0 0 0	2 0 0 0	2 0 0 0	2 0 0	2 0 0		8% Australia I	7% RENEWA	11% BLE	18%	26%	37%	46%	56%	67%
- Fossil fuels - Biomass - Solar collectors	1 0 0 0 43 30	0 0 62 42	2 0 0 0 75 49	2 0 0 0 92 58	2 0 0 0 110 65	2 0 0 0 165 52	2 0 0 0 206 55	2 0 0 0 210 38	2 0 0 0 270 2	RES share CO2 emissions in Mill t/a Scenario:	8%	7% RENEWA 2015	11% BLE 2020	18%	26%	2035			2050
- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1)	1 0 0 0 0 43 30 13	0 0 62	2 0 0 0 75 49 26	2 0 0 0 0 92 58 33	2 0 0 0 110 65 42	2 0 0 0 165 52 96	2 0 0 0 206 55 121	2 0 0 0 210 38 127	2 0 0 0 270 2 198	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants	8% Australia I 2012 195	7% RENEWA 2015 169	11% BLE 2020	18% 2025 86	26%	37%	46%	56%	67%
- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels - Biomass	1 0 0 0 43 30	0 0 62 42 20	2 0 0 0 75 49	2 0 0 0 92 58	2 0 0 0 110 65	2 0 0 0 165 52	2 0 0 0 206 55	2 0 0 0 210 38	2 0 0 0 270 2	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal	8% Australia I 2012 195 132 37	7% RENEWA 2015 169 93 55	11% BLE 2020 130 98 8	2025 86 59 0	2030 60 34 0	2035 12 0 0	2040	2045	2050 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating	1 0 0 0 43 30 13 0 0	0 0 62 42 20 0 0	2 0 0 0 75 49 26 0 0	2 0 0 0 92 58 33 0 0	2 0 0 0 110 65 42 0 2	2 0 0 0 165 52 96 6 11	2 0 0 0 206 55 121 13 17	2 0 0 0 210 38 127 20 24	2 0 0 0 270 2 198 33 37	RES share CO2 emissions in Mill Va Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal	8% Australia I 2012 195 132 37 23 1	7% RENEWA 2015 169 93 55 21 0	11% BLE 2020 130 98 8 24 0	2025 86 59 0 26 0	2030 60 34 0 26 0	2035 12 0 0 11 0	2040 5 0 4 0	2045 1 0 0 1	2050 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Biomass	1 0 0 0 43 30 13 0 0 931 738 124	0 0 0 62 42 20 0 0 1,295 1,103 84	2 0 0 0 75 49 26 0 0 1,359 1,131 85	92 58 33 0 0	2 0 0 0 110 65 42 0 2 1,312 1,000 77	2 0 0 0 165 52 96 6 11 1,286 950 73	2 0 0 0 206 55 121 13 17 1,235 863 69	2 0 0 0 210 38 127 20 24 1,340 873 72	2 0 0 270 2 198 33 37 1,249 755 66	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (a non-renewable waste) - Srown Coal - Drown Coal - Diesel	8% Australia I 2012 195 132 37 23 1 2	7% 2015 169 93 55 21 0	11% BLE 2020 130 98 8 24 0	2025 86 59 0 26 0	2030 60 34 0 26 0	2035 12 0 0 11 0 0	2040 5 0 4 0	2045 1 0 0 1 0 0	2050 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Strect heating - Fossil fuels - Biomass - Solar collectors - Solar collectors - Geothermal	1 0 0 0 43 30 13 0 0 931 738 124 11	0 0 62 42 20 0 0 1,295 1,103 84 11 0	2 0 0 0 75 49 26 0 0	2 0 0 0 92 58 33 0 0 1,371 1,106 83 14	2 0 0 0 110 65 42 0 2 1,312 1,000 77 26	2 0 0 0 165 52 96 6 11 1,286 950 73 33 15	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21	2 0 0 0 210 38 127 20 24 1,340 873 72 59 26	2 0 0 2 270 2 198 33 37 1,249 755 66 68	RES share CO2 emissions in Mill Va Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Diesel Combined heat and power plants - Hard coal (& non-renewable waste)	8% Australia I 2012 195 132 37 23 1 2 8 0	7% RENEWA 2015 169 93 55 21 0 1 8 0	11% BLE 2020 130 98 8 24 0 0	2025 86 59 0 26 0 0	2030 60 34 0 26 0 0	2035 12 0 0 11 0 0	2040 5 0 0 4 0 0	2045 1 0 0 1 0 0 0 6 0 0	2050 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors	1 0 0 0 43 30 13 0 0 931 738 124	0 0 0 62 42 20 0 0 1,295 1,103 84 11	2 0 0 0 75 49 26 0 0 1,359 1,131 85	2 0 0 0 92 58 33 0 0 1,371 1,106 83	2 0 0 110 65 42 0 2 1,312 1,000 77 26	2 0 0 0 165 52 96 6 11 1,286 950 73 33	2 0 0 0 206 55 121 13 17 1,235 863 69 52	2 0 0 0 210 38 127 20 24 1,340 873 72 59	2 0 0 270 2 198 33 37 1,249 755 66	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Diesel Combined heat and power plants	8% Australia I 2012 195 132 37 23 1 2 8	7% RENEWA 2015 169 93 55 21 0 1	11% BLE 2020 130 98 8 24 0 0	2025 86 59 0 26 0 0	26% 2030 60 34 0 26 0 0	2035 12 0 0 11 0 0	2040 5 0 0 4 0 0	2045 1 0 0 1 0 0 0 6	2050 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2)	1 0 0 0 0 43 30 13 0 0 0 931 738 124 11 0	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0	2 0 0 0 75 49 26 0 0 1,359 1,131 85 10 0 7	2 0 0 0 92 58 33 0 0 1,371 1,106 83 14 0	2 0 0 0 110 65 42 0 2 1,312 1,000 77 26 11 29	2 0 0 0 165 52 96 6 11 1,286 950 73 33 15 35	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21	2 0 0 0 210 38 127 20 24 1,340 873 72 59 26 69	2 0 0 0 270 2 198 33 37 1,249 755 66 68 33 79	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal	Australia I 2012 195 132 37 23 1 2 8 0 3	7% RENEWA 2015 169 93 55 21 0 1 8 0 0	11% BLE 2020 130 98 8 24 0 0	2025 86 59 0 26 0 0	2030 60 34 0 26 0 0	2035 12 0 0 11 0 0	2040 5 0 0 4 0 0 0	2045 1 0 0 1 0 0 0	2050 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Biectic direct heating - Hydrogen - Total heat supply3)	1 0 0 0 43 30 13 0 0 0 931 738 124 11 0 0 0 975	0 0 62 42 20 0 1,295 1,103 84 11 0 96 0	2 0 0 0 75 49 26 0 0 1,359 1,131 85 10 0 7	92 58 33 0 0 1.371 1,106 83 14 0 15 152 0	2 0 0 0 110 65 42 0 2 1.312 1,000 77 26 11 29 169 0	2 0 0 0 165 52 96 6 11 1.286 950 73 33 15 35 179 0	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 42 189 0	2 0 0 0 210 38 127 20 24 1,340 873 72 59 26 69 242 0	2 0 0 0 270 2 198 33 37 1,249 755 66 68 33 79 248 0	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Gas - Oil - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Ga - Oil - Oil - CO2 emissions power and CHP plants	Australia I 2012 195 132 37 23 1 2 8 0 3 5 1	7% RENEWA 2015 169 93 55 21 0 1 8 0 7 1 178	11% BLE 2020 130 98 8 24 0 0 0 9 0 0 8 1	2025 86 59 0 26 0 0 10 0 9 1	2030 60 34 0 26 0 0 11 0 9 1	2035 12 0 0 111 0 0 8 0 0 8 0	2040 5 0 0 4 0 0 8 0 8	2045 1 0 0 1 0 0 0 6 0 0 6 0 7	2050 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Strect heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels	1 0 0 0 43 30 13 0 0 0 931 738 124 11 0 0 57 0	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105	2 0 0 0 75 49 26 0 0 1,359 1,131 85 10 0 7 126 0	2 0 0 0 92 58 33 0 0 1,371 1,106 83 14 0 1,5 15 15 0	2 0 0 0 1110 655 42 0 2 1,312 1,000 77 26 11 29 169 0	2 0 0 165 52 96 6 11 1,286 950 73 33 15 35 179 0	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 42 189 0	2 0 0 0 210 38 127 20 24 1,340 873 72 59 26 69 242 0	2 0 0 2 2 198 33 37 1,249 755 66 88 33 79 248 0	RES share CO2 emissions in Mill Va Scenario: Charles (a fine America Condensation power plants - Hard coal (a non-renewable waste) - Drain Coal - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Coa - Coal - Coa - Coal - Coal	8% Australia I 2012 195 132 37 23 1 2 8 0 3 5 1 203 132 39	7% RENEWA 2015 169 93 55 21 0 1 8 0 0 7 1 178 93 55	11% 11% BLE 2020 130 98 8 24 0 0 9 0 0 8 1 139 98 8 24 1 1 1 1 1 1 1 1 1 1 1 1 1	2025 86 59 0 26 0 0 10 0 9 1	2030 60 34 0 26 0 0 11 0 9 1 71 34 0	2035 12 0 0 111 0 0 8 0 0 8 0 0	2040 5 0 0 4 0 0 8 0 0 8 0 0 13 1	2045 1 0 0 1 0 0 0 6 0 0 6 0 0 0 0 0 0 0 0 0	2050 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHF 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass	1 0 0 0 43 30 13 0 0 0 931 738 124 11 0 0 57 70 0 975 7770 137 11 0 0	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105 11 0	2 0 0 0 75 49 26 0 0 1,359 1,131 85 10 0 7 126 0	2 0 0 0 92 58 33 0 0 1.371 1.106 83 14 0 15 152 0 1.465 1.167 117	2 0 0 1110 65 42 0 2 1,312 1,000 77 26 11 29 169 0 1,424 1,068 120 26 11	2 0 0 165 52 96 6 11 1,286 950 73 33 15 179 0 1,454 1,005 170 33 21	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 189 0 1,443 920 190 52 34	2 0 0 0 210 38 127 20 24 1,340 873 72 59 269 242 0 1,552 914 198 59	2 0 0 270 2 198 33 37 1,249 755 66 68 33 79 0 1,521 759 248 0	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste)	Australia I 2012 195 132 37 23 1 2 8 0 3 5 1	7% RENEWA 2015 169 93 55 21 0 1 8 0 7 1 178 93	11% BLE 2020 130 98 8 24 0 0 9 0 131 131 9 9 11 139 98	2025 86 59 0 26 0 0 10 0 9 1	2030 60 34 0 26 0 0 11 0 9 1	2035 12 0 0 11 0 0 8 0 0 8 0 0	2040 5 0 0 4 0 0 8 0 0 8 0 0 13 1	2045 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2050 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHF 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Solar collectors - Solar collectors - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Biomass - Solar collectors - Geothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Biomass - Biomass - Biomass - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen	1 0 0 0 43 30 0 13 0 0 931 738 124 11 0 0 57 0 975 770 137 11 0 0 0 57	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96	2 0 0 0 75 49 26 0 0 1,135 10 0 7 126 0 1,1437 1,182 1111 0 0 7	92 58 33 0 0 1,371 1,106 83 14 0 15 152 0 1,465 1,167 117 14 0 15 152	2 0 0 110 65 42 0 2 1,312 1,000 77 26 11 29 0 1,424 1,068 11 20 26 11 1,006	2 0 0 165 52 96 6 11 1.286 950 73 33 15 179 0 1.454 1.005 170 33 21 35 179	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 42 189 0 1,443 920 190 52 34 42 189	2 0 0 0 210 38 127 20 24 1,340 873 72 59 26 69 242 0 1,552 914 198 59 47 69	2 0 0 270 279 198 33 37 1,249 755 66 68 33 79 248 0	RES share CO2 emissions in Mill Va Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Olesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil Cas - Oil Cas - Oil Gas - Oil Aliand Coal (& non-renewable waste) - Brown Coal - Gas - Oil Aliand Coal (& non-renewable waste) - Brown Coal	8% Australia I 2012 195 132 137 23 1 2 8 0 3 5 1 2 203 132 39 28 3 0.00	7% RENEWA 2015 169 93 55 21 0 1 8 0 0 7 1 178 93 55 28 2 0.000	11% BLE 2020 130 98 8 24 0 0 9 0 131 139 98 8 1 139 98 8 22 0.000	2025 86 59 0 26 0 0 10 0 9 1 1 96 59 0 35 2	2030 60 34 0 266 0 0 11 0 9 1 71 34 0 35 2 0.00	37% 2035 12 0 0 111 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 4 0 0 8 0 0 8 0 13 1 0 13 0 0 0	2045 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Geothermal - Hydrogen - Biomass - Solar collectors - Geothermal - Biomass - Geothermal - Hydrogen - Geothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Geothermal - Heat pumps 2) - Geothermal	10000000000000000000000000000000000000	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96 0	2 0 0 0 75 49 26 0 0 1,359 1,131 85 10 0 7 126 0 1,437 1,182 111 10 0 7	92 58 33 0 0 1,371 1,106 83 14 0 15 152 0 1,465 1,167 117 147 14 0 15 1,52	2 0 0 1110 65 42 0 2 1.312 1.000 77 26 11 29 169 0 1.424 1.068 120 26 11 29 169 2	2 0 0 165 52 96 6 11 1.286 950 73 33 15 35 179 0 1,454 1,005 179 11	2 0 0 0 206 55 121 13 17 1.235 863 69 52 21 42 42 189 0 1,443 920 190 52 34 42 42 189 17	2 0 0 0 210 38 127 20 24 1.340 873 72 59 246 69 242 0 1.552 914 198 59 47 69 242 24	2 0 0 0 270 2 198 33 37 1,249 755 66 68 33 79 248 0 1,521 759 264 66 79 248 37	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Gose - Oil - Gose - Oil -	8% Australia I 2012 195 132 37 23 1 2 8 0 3 5 1 203 132 39 28 3 0.00 0.00 902	7% RENEWA 2015 169 93 55 21 0 1 8 0 0 7 1 178 93 555 28 2 0.00 0.000 897	11% BLE 2020 130 98 8 24 0 0 9 11 139 98 8 1 139 98 8 22 0.00 0.00 813	2025 86 59 0 26 0 0 10 0 9 1 1 96 59 0 35 2	2030 60 34 0 26 0 0 11 0 9 1 71 34 0 35 2 0.00 0.000 682	37% 2035 12 0 0 11 0 0 8 0 0 8 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 8 0 0 8 0 0 13 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2045 1 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0050 000 000 000 000 000 000 000 000 00
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHF 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Solar collectors - Solar collectors - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Biomass - Solar collectors - Geothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Biomass - Biomass - Biomass - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen	1 0 0 0 43 30 0 13 0 0 931 738 124 11 0 0 57 0 975 770 137 11 0 0 0 57	0 0 0 62 42 20 0 0 1,295 1,103 84 11 0 96	2 0 0 0 75 49 26 0 0 1,135 10 0 7 126 0 1,1437 1,182 111 10 0 7	92 58 33 0 0 1,371 1,106 83 14 0 15 152 0 1,465 1,167 117 14 0 15 152	2 0 0 110 65 42 0 2 1,312 1,000 77 26 11 29 0 1,424 1,068 11 20 26 11 1,006	2 0 0 165 52 96 6 11 1.286 950 73 33 15 179 0 1.454 1.005 170 33 21 35 179	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 42 189 0 1,443 920 190 52 34 42 189	2 0 0 0 210 38 127 20 24 1,340 873 72 59 26 69 242 0 1,552 914 198 59 47 69	2 0 0 270 279 198 33 37 1,249 755 66 68 33 79 248 0	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil & diesel - Gas - Oil & diesel - CO2 intensity (gMVh) - Wiltout Credit for CHP heat - CO2 intensity (graph coal) - CO2 intensity (graph coal) - CO2 intensity (graph coal) - CO2 intensity total electr. generation	8% Australia I 2012 195 132 37 12 2 8 0 3 5 1 1 203 132 39 28 3 0.00 0.00 902 815	7% RENEWA 2015 169 93 55 21 0 1 8 0 0 7 1 178 93 555 28 2 0.00 0,000 897 759	11% BLE 2020 130 98 8 24 0 0 0 0 8 1 1 139 98 8 8 22 2 0.00 0.00 813 540	2025 86 59 0 26 0 0 0 10 0 9 1 9 6 59 0 35 2 0 0.00 0.35 2	2030 60 34 0 26 0 0 11 0 0 9 1 71 34 0 35 2 0.000 682 215	37% 2035 12 0 0 11 0 0 8 0 0 0 0 19 0 0.00 539 56	2040 5 0 0 4 0 0 0 8 0 0 8 0 0 13 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 0 0 6 0 7 0 0 7 0 0 0 0 504 14	0000 0000 0000 0000 0000 0000 0000 0000 0000
- Fossil fuels - Biomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Sirect heating - Fossil tuels - Biomass - Solar collectors - Geothermal - Hadrogen - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Hadrogen - Hydrogen - Electric direct heating - Hydrogen - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Hydrogen - RES share (including RES electricity)	1 0 0 0 43 30 13 0 0 0 13 124 11 0 0 0 57 70 137 11 0 0 57 0 16% 6 %	0 0 0 62 42 20 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105 11 0 96 0	2 0 0 0 75 49 26 0 0 1,359 1,131 85 10 0 7 128 111 10 0 7 1,437 1,182 111 10 0 7	2 0 0 0 92 58 33 0 0 1.371 1.106 83 14 0 15 152 0 1.465 1.167 117 14 0 15 152 0 15 152 0 154 154 154 155 155 155 155 155 155 155	2 0 0 0 110 65 42 0 2 1,312 1,000 77 26 11 29 169 0 1,424 1,068 120 26 11 29 169 2 2 2	2 0 0 0 1655 52 966 6 111 1,286 950 73 33 15 15 35 179 0 1,454 1,005 170 133 21 135 170 170 170 170 170 170 170 170 170 170	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 142 189 0 0 1,443 920 190 52 34 42 189 17 35% 35%	2 0 0 0 210 38 127 20 24 1,340 873 72 26 69 242 914 198 59 47 69 242 24 41% 492%	2 0 0 0 270 2 198 33 77 1,249 755 66 68 33 79 248 40 0 1,521 759 264 68 66 79 248 37	RES share CO2 emissions in Mill Va Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Diseal Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Brown Coal - Gas - Coal - Gas - Coal - Gas - Coal - C	8% Australia I 2012 195 132 37 23 1 2 8 0 3 5 1 203 132 39 28 3 0.00 902 815 374	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 897 759	11% IBLE 2020 130 98 8 24 0 0 0 0 8 8 1 139 98 8 32 2 0.00 0.00 813 540	2025 86 59 0 0 0 0 10 0 0 9 1 1 96 59 0 0.35 2 0.00 739 327 315	2030 60 34 0 26 0 0 11 0 0 9 1 71 34 0 0 35 2 0.00 0.00 682 215	37% 2035 12 0 0 11 0 0 8 0 0 8 0 0 19 0 0.00 0.00 539 56	2040 5 0 0 4 0 0 8 0 0 8 0 0 13 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2045 1 0 0 1 0 0 6 0 0 7 0 0 0 0 0 0 0 0 0 0 0 0 0	0000 000 000 000 000 000 000 000 000 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supplyol - Fossil fuels - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supplyol - Fossil fuels - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Electric direct heating - Hydrogen - Heat pumps 2) - Hydrogen - Electric direct heating 2) - Hydrogen - Heat pumps 2 - Hydrogen - Heat pumps 2 - Hydrogen - Hydr	1 0 0 0 43 30 13 0 0 0 0 13 738 124 111 0 0 57 0 137 111 0 0 57 0 16% 0%	0 0 0 62 42 20 0 1,295 1,103 84 11 0 0 96 0 1,357 1,146 105 11 0 0 96 0 0 1,295 1,103	2 0 0 0 75 49 26 0 0 0 1,359 1,131 85 0 0 7 126 0 0 1,437 1,182 111 10 0 1 2 55% ambient ener	2 0 0 0 92 58 33 0 0 1.371 1.106 83 14 0 15 152 0 1.465 1.167 117 14 0 15 152 0 15 152 0 154 154 154 155 155 155 155 155 155 155	2 0 0 0 110 65 42 0 2 1,312 1,000 77 26 11 29 169 0 1,424 1,068 120 26 11 29 169 2 2 2	2 0 0 0 165 52 96 6 11 1.286 950 73 33 15 135 179 0 1.454 1.005 170 33 21 35 179 11 30% 269%	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 142 189 0 0 1,443 920 190 52 34 42 189 17 35% 35%	2 0 0 0 210 38 127 20 24 1,340 873 72 26 69 242 914 198 59 47 69 242 24 41% 492%	2 0 0 0 270 2 198 33 77 1,249 755 66 68 33 79 248 40 0 1,521 759 264 68 66 79 248 37	RES share CO2 emissions in Mill Va Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Draw Coal - Diseal Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Grown Coal - Gas - Oil & diesel CO2 cristensity (gkWh) - CO2 intensity (gkWh) - CO2 cristensity fosail electr. generation - CO2 cristensity fosail electr. generation - CO2 emissions by sector - % of 1990 emissions (276 Mill t)	8% Australia I 2012 195 132 37 23 1 1 2 8 0 3 5 1 203 132 28 3 0.00 0.00 902 815 374 136%	7% RENEWAR 2015 169 93 55 21 0 1 178 8 0 0 7 1 177 1 278 28 2 0.00 0.00 0.90 897 759	11% BLE 2020 130 98 8 24 0 0 9 0 0 8 1 139 98 8 1 139 98 8 1 39 22 0.00 0.00 3813 540 381 138%	2025 86 59 0 26 0 0 10 0 9 1 96 59 0 0 35 2 0 0 35 2 1 1 1 1 1 1 1 1 1 1 1 1 1	2030 60 34 0 26 0 0 11 0 0 9 1 71 34 0 0 0 0 0 0 0 0 0 0 0 0 0	37% 2035 12 0 0 111 0 0 8 8 0 0 0 0 0 0 0 0 0 0 0 178 64%	2040 5 0 0 4 0 0 8 8 0 0 0 8 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2045 1 0 0 1 1 0 0 6 6 0 0 7 0 0 0 0 0 0 0 0 0 1 4 1 1 1 3 4 1 1 3 4 1 1 %	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Solar collectors - Geothermal - Hydrogen - Geothermal - Hydrogen - Geothermal - Biomass - Solar collectors - Geothermal - Biomass - Geothermal - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - RES share (including RES electricity) - Hydrogen - RES share (including RES electricity) - Geotherical Consumption heat pumps (TWh/a) - 1) public CHP and CHP autoproduction	1 0 0 0 43 30 13 0 0 0 0 13 738 124 111 0 0 57 0 137 111 0 0 57 0 16% 0%	0 0 0 62 42 20 0 1,295 1,103 84 11 0 96 0 1,357 1,146 105 11 0 96 0	2 0 0 0 75 49 26 0 0 0 1,359 1,131 85 0 0 7 126 0 0 1,437 1,182 111 10 0 1 2 55% ambient ener	2 0 0 0 92 58 33 0 0 1.371 1.106 83 14 0 15 152 0 1.465 1.167 117 14 0 15 152 0 15 152 0 154 154 154 155 155 155 155 155 155 155	2 0 0 0 110 65 42 0 2 1,312 1,000 77 26 11 29 169 0 1,424 1,068 120 26 11 29 169 2 2 2	2 0 0 0 165 52 96 6 11 1.286 950 73 33 15 135 179 0 1.454 1.005 170 33 21 35 179 11 30% 269%	2 0 0 0 206 55 121 13 17 1,235 863 69 52 21 142 189 0 0 1,443 920 190 52 34 42 189 17 35% 35%	2 0 0 0 210 38 127 20 24 1,340 873 72 26 69 242 914 198 59 47 69 242 24 41% 492%	2 0 0 0 270 2 198 33 77 1,249 755 66 68 33 79 248 40 0 1,521 759 264 68 66 79 248 37	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Gas - Oil - Coas - Oil - O	8% Australia I 2012 195 132 37 23 8 0 3 5 1 2 203 132 39 28 3 0.00 902 815 374 136% 45 20	7% RENEWAR 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 0.90 152% 67 23	11% BLE 2020 130 98 8 24 0 0 0 9 0 0 8 1 139 98 8 32 2 0.00 0.000 813 381 138%	18% 2025 86 59 0 26 60 0 10 0 9 1 1 96 59 0 0 00 00 739 327 315 114%	2030 60 34 0 26 0 0 0 11 71 34 0 0 9 1 7 1 7 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0	2035 12 0 0 11 10 0 0 11 10 0 0 8 8 0 0 20 0 0 0 19 0 0 0 17 18 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 0 0 8 0 0 13 1 0 0 0 0 0 8 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1	56% 2045 1 0 0 1 0 0 6 0 0 7 0 0 0 0 0 0 0 0 0 0 0 1 113 41%	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Solar collectors - Solar collectors - Solar collectors - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Solar collectors - Heat pumps 2) - Electric direct heating - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - RES share (including RES electricity) - Electricit (consumption heat pumps (TWh/la) - I public CHP and GHP autoproduction - Final energy consumption transport in PJ/a - Scenario.	1 0 0 0 0 43 30 0 13 30 0 0 13 13 0 0 0 15 124 11 11 0 0 0 77 77 0 137 77 0 0 0 57 70 0 16% 0%	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	75 49 60 0 0 13,359 11,131 85 10 0 7 71,182 1111 110 0 7 7 126 0 12% 55% ambient energy 1,821 110 12% 55% ambient energy 1,821 110 110 12% 12% 12% 12% 12% 12% 12% 12% 12% 12%	2 0 0 0 0 92 58 33 30 0 0 1.3711 1.106 83 14 0 0 15 152 0 1.167 11 14 0 0 15 152 152 0 16% 124% 2025 1.580	2 0 0 0 0 110 65 5 42 1 1.312 1 1.000 77 72 66 111 29 0 1 1.424 1 1.068 120 2 6 11 29 169 2 2 21% 227% 2030 1.4445	2 0 0 0 0 165 52 96 6 11 1 1.286 6 95 0 1 1.454 1.70 3 3 21 1 30 5 269% 269% 269% 2035 1.305	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 0 0 0 0 210 38 8127 224 2 242 242 41% 492% 2045 1,226	2 0 0 0 0 270 2 188 183 33 79 1249 248 248 248 66 68 68 66 68 68	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coal - Gas - Oil - Coal - Gas - Oil - Coa - Coal -	8% Australia II 2012 195 1322 23 1 2 2 8 0 0.00 0.00 902 815 374 138% 45 20 96	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 0.00 0.00 152% 67 23 128 128 173	11% BLE 2020 130 98 8 24 0 0 0 0 8 8 1 139 98 8 32 2 0.00 0.000 381 138% 71 20 133 134	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	2035 12 0 0 11 0 0 11 0 0 0 8 8 0 0 0 0 0 0 0 0	2040 5 0 0 0 4 0 0 0 8 8 0 0 0 8 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 0 0 6 0 0 0 0 6 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen Total heat supprys - Hossil fuels - Biomass - Solar collectors - Geothermal - Had pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Hydro	1 0 0 0 0 43 3 30 13 30 0 0 931 1224 11 10 0 0 975 770 0 0 975 770 0 16% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 0 1,359 1,131 85 0 0 0 1 1,359 1,182 0 0 0 1 1,359 1,181 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 92 58 33 0 0 0 1,371 1,106 83 1 1,107 117 117 117 117 117 117 117 117 117	2 0 0 0 0 1100 65 42 1,312 1,000 77 26 11 29 169 0 0 1,424 1,068 11 29 2 2 1% 227% initially use	2 0 0 0 0 1655 52 96 6 11 1,286 950 950 1570 170 33 15 179 11 1 2569% 2035	2 0 0 0 0 206 55 121 13 17 1235 69 52 214 42 189 0 190 190 152 34 42 189 30 190 552 34 42 2040 2040	20 0 0 0 210 38 127 20 24 1,340 59 914 1,552 914 198 59 47 69 242 24 11% 41% 41% 22% 242 24 24 24 24 24 24 24 24 24 24 24 24	2 0 0 0 0 270 270 279 198 33 3 37 7 755 66 88 33 37 79 248 66 66 66 66 66 66 66 66 66 66 66 66 66	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Disesl Combined heat and power plants - Hard coal (& non-renewable waste) - Gas - Oal - Oa	8% Australia 1 195 132 2012 195 132 2 8 0 0 3 5 1 1 2 203 3 5 1 1 374 39 902 815 374 45 20 96	7% RENEWAR 2015 169 93 55 21 0 1 8 0 0 7 1 178 93 55 28 2 0.000 897 759 420 152% 67 23 128	11% BLE 2020 130 98 8 24 0 0 9 0 0 8 1 139 98 8 32 2 0.000 813 540 0.138 71 20 133	18% 2025 86 59 0 26 0 0 0 10 0 9 1 1 96 59 0 0 35 22 0.00 0 739 327 315 71 18 119	2030 60 34 0 0 26 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Solar collectors - Geothermal - Hydrogen Direct heating - Fossil fuels - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply0) - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) - Ty patic CHP and CH	1 0 0 0 0 43 30 0 0 13 13 0 0 0 931 1738 0 0 0 975 770 770 137 11 1 0 0 0 57 0 16% 0 0 0 16% 0 0 1 1.076 1.0	0 0 0 62 42 20 0 0 1,286 11 10 0 96 0 1 1,357 11 0 0 96 0 1 1,357 2) heat from TRENEWAI 2015 1,559 7	2 0 0 0 75 49 26 0 0 0 1.359 11.131 82 111 10 0 7 7126 0 12% ambient ener	2 0 0 0 0 92 58 33 0 0 0 1.371 1.106 83 14 0 0 15 152 0 0 15 152 0 0 16 16% 6 17 17 17 124% 6 17 17 124% 6 17 17 124% 6 17 17 124% 6 17 17 17 18 17 18 18 18 18 18 18 18 18 18 18 18 18 18	2 0 0 0 0 1110 655 42 0 2 1,312 1,000 0 177 266 111 299 1699 0 2 13,424 111 29 169 120 6 227% 6 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 1655 52 52 52 52 52 52 52 52 52 52 52 52 5	2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20 0 0 0 210 38 127 20 24 1,340 873 72 259 26 69 242 24 29 1,552 241 198 2442 24 41% 498 499 2442 24 41% 41% 41% 41% 41% 41% 41% 41% 41% 41	2 0 0 0 0 270 2 198 33 37 1249 7555 66 68 33 37 99 248 8 0 0 1,521 759 50% 546% 546%	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coal - Gas - Oil - Coal - Gas - Oil - Coa - Coal -	8% Australia II 2012 195 1322 23 1 2 2 8 0 0.00 0.00 902 815 374 138% 45 20 96	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 0.00 0.00 152% 67 23 128 128 173	11% BLE 2020 130 98 8 24 0 0 0 0 8 8 1 139 98 8 32 2 0.00 0.000 381 138% 71 20 133 134	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil rules - Biomass - Geothermal - Hydrogen - Direct heating - Fossil rules - Solar collectors - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supplyS) - Fossil rules - Solar collectors - Geothermal - Heat pumps 2) - Fossil rules - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen - Electric direct heating 2) - Hydrogen - Hydrogen - Heat pumps 2) - Hydrogen - Heat pumps 2) - Hydrogen - Fossil rules	1 0 0 0 0 43 30 13 0 0 13 13 13 13 13 15 124 11 11 11 124 15 77 0 0 0 15 77 0 0 16% 0% Australia 1 1,092 1 1,076 1 1,0	0 0 62 42 20 0 0 1.295 1.103 103 103 103 103 103 103 103 103 105 105 105 105 105 105 105 105 105 105	75 49 26 0 0 1.359 11.131 82 11.182 1	2 0 0 0 0 92 58 33 0 0 0 13.371 1.106 83 14 0 0 15 152 0 0 15 152 0 0 16 16% 0 17 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	2 0 0 0 0 1110 655 42 0 0 2 1,312 1,000 0 12 2 19 169 0 0 2 12 10 10 10 10 10 10 10 10 10 10 10 10 10	2 0 0 0 165 52 96 6 11 1 1.286 6 6 11 1 1.286 97 33 15 35 179 0 1 1.454 1.005 179 33 30 16.269% 2005 13.005 2005 30 1 3.005 20	2 0 0 0 0 2066 55 5 121 13 17 1.235 863 17 17 1.235 863 17 189 0 190 2 14 42 189 20 190 2 15 189 17 2 35% 5 18 18 18 17 17 12 18 18 18 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18	20 0 0 0 210 38 127 20 24 13,340 873 26 69 242 24 24 198 244 25 9 14 479 24 24 41% 492% 413 443 0 0 15 0 0 15 0	2 0 0 0 0 270 2 198 33 37 1249 566 68 33 79 79 248 66 68 83 66 68 86 68 87 9 248 0 1 1,521 759 248 0 1	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Gas - Oal - Gas - Oal - Coas - Oal - Coas - Oal - Coas - Oal - Coas - Oal - Coa - Coas - Oal - Coaresions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Brown Coal - Coa missions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Coa missions power and CHP plants - Coal reneatly (gAWh) without credit for CHP heat - CO2 intensity (soal electr, generation - CO2 intensity (soal electr, generation - CO2 emissions by sector - CO2 intensity (soal electr, generation - CO2 emissions (276 Mill t) - Industry (1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3)	8% Australia II 2012 195 1322 23 1 2 2 8 0 0.00 0.00 902 815 374 138% 45 20 96	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 55 28 2 0.00 0.00 0.00 0.00 152% 67 23 128 128 173	11% BLE 2020 130 98 8 24 0 0 0 0 8 8 1 139 98 8 32 2 0.00 0.000 381 138% 71 20 133 134	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Blectin: Girect heating - Hydrogen Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Solar collectors - Hydrogen - Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWNa) - Typatic CiPar a CIP supproducing RES share (including RES electricity) electricity consumption heat pumps (TWNa) - Typatic CiPar a CIP supproducing - Final energy consumption transport in P-J/a - Sociandirectors - Lossil fuels - Lossil fu	1 0 0 0 0 43 30 0 13 13 0 0 0 931 1738 11 10 0 0 975 770 0 137 71 11 0 0 0 16% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 62 42 20 0 0 1,295 1,103 84 1 10 0 96 0 11,357 11 0 0 96 0 0 10 1,357 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 75 49 26 0 0 0 1.359 1.1331 110 0 0 7 7 1.26 0 0 0 1.437 1.182 111 10 0 0 7 7 126 0 1 1.55% arablent execution of the control of th	2 0 0 0 0 92 58 33 0 0 1,371 1,106 883 14 4 1 1,107 152 0 15 152 0 124% 124% 124% 2005 1,580 1,390 2025 1,580 1,390 13 13	2 0 0 0 1110 65 42 0 2 1,312 1,000 70 65 2 1 1,424 1,068 11 29 169 2 2 1,312 1,000 11,424 1,068 2 11 1,145 69 1 1,145 69 0 1 1,445 1,445	2 0 0 0 0 165 52 6 6 6 11 1.286 950 11 1.286 950 11 1.286 950 11 1.286 950 11 1.286 950 11 1.454 1.005 11 1.454 1.005 11 1.454 1.005 11 1.454 1.005 11 1.005	2 0 0 0 0 0 206 55 5 121 13 17 1 235 863 137 14 2 14 42 189 0 1 1.443 1920 190 152 34 42 189 17 1 25% 309% 20 10 10 12 20 40 11.209 696 132 0 13 13	20 0 0 0 210 38 127 20 24 1,340 873 24 25 99 47 69 242 24 1914 49296 242 24 1,226 467 47 143 0 15	2 0 0 0 0 270 2 198 33 37 1,249 755 68 88 89 248 66 679 244 546% 546% 546% 17 287 287 189 199 17	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oil - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oil CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Oil & dissel - CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity total electr. generation - CO2 intensity total electr. generation - CO2 missions by sector - % of 1990 emissions by sector - % of 1990 emissions (276 Mill t) - Industry 1 - Other sectors 1) - Transport - Power generation 2) - Other conversion 3)	8% Australia 4 2012 195 132 37 23 1 2 8 0 0 3 5 5 1 12 203 31 55 1 203 31 55 1 32 39 815 374 45 206 207 138 45 208 138 45 208 138	7% RENEWA 2015 1699 93 93 555 20 0 1 8 0 0 7 1 178 93 55 28 2 0.000 897 759 420 152% 67 23 128 128 129	11% BBLE 2020 1300 98 8 24 0 0 0 0 0 88 1 139 98 8 32 2 2 0 0.00 0813 540 381 138% 71 20 133 134 23	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Biomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Biomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Biomass - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen - Hydrogen - Total heat supply3) - Fossil fuels - Biomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Solar Celle Jeden Geothermal - Heat pumps 2) - Electric direct heating 2 - Hydrogen - Heat pumps 2) - Electric direct heating 2 - Hydrogen - Geothermal - Heat pumps (TWNa) - Ipulate CHP and CHP and proposition - Final energy consumption transport in PJ/a Scenario: toad - fossil fuels - blofuels - synfluels - satural gas - hydrogen - electricity - electr	1 0 0 0 0 43 30 30 31 33 0 0 931 124 4 11 1 0 0 975 770 137 1 1 1 1 0 0 0 1 6% 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 62 42 20 0 1,295 1,103 84 1 10 0 0 96 0 1 1,357 11 0 0 0 96 0 1 1,357 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 75 49 26 0 0 0 1.359 1.131 181 185 180 0 0 7 7 128 0 0 0 1 2.2% 255% ambient center to the control of	2 0 0 0 0 92 58 33 0 0 1 3.371 1,106 83 1 14 1 15 152 0 1 1,465 1,167 11 15 152 0 1 1,24% 20 124% 20 20 1,390 1,390 1,390 1,390 121 8% 54	2 0 0 0 0 1110 642 1 312 2 1 312 2 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 165 52 8 6 6 6 6 6 9 6 6 111 1 1.286 6 950 73 33 31 15 5 179 179 179 179 179 179 179 179 179 179	2 0 0 0 0 206 55 1 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 1 1 1 1 2 1	2 0 0 0 210 38 27 20 127 20 24 1,340 873 27 29 24 2 0 1,552 914 192% 242 24 492% 244 492% 244 492% 244 492% 467 1,226 467 143 0 501 1,552 244 492% 467 497 447 498% 498% 498% 498% 498% 498% 498% 498%	2 0 0 0 0 270 2 1989 0 7 7 7 0 0 14 45 22%	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Coal -	8% Australia 4 2012 195 132 37 23 1 2 8 8 0 3 5 1 1 2 203 3 5 5 1 1 309 208 815 374 45 206 207 138	7% RENEWA 2015 1699 93 93 555 20 0 1 8 0 0 7 1 178 93 55 28 2 0.000 897 759 420 152% 67 23 128 128 129	11% BBLE 2020 1300 98 8 24 0 0 0 0 0 88 1 139 98 8 32 2 2 0 0.00 0813 540 381 138% 71 20 133 134 23	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Goothermal - Hydrogen - Unrect heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 30 - Hydrogen - Hydrogen - Hydrogen - Lectricity - Lectrici	1 0 0 0 0 43 30 30 13 30 0 0 931 124 11 1 1 1 0 0 975 770 137 70 0 16% 0% 2 2012 1,076 14 14 14 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.350 0 0 0 75 49 28 0 0 0 0 1.359 1.359 10 0 0 0 1.359 1.131 10 0 0 7 128 111 11 10 0 0 1.437 1.182 111 11 128 128 20 20 12 20 0 0 12 0 0 0 12 0 0 0 12 0 0 0 12 0 0 0 12 0 0 0 12 0 0 0 12 0 0 0 12 0 0 0 0	2 0 0 0 0 92 58 33 3 0 0 1.3711 1.106 83 14 0 15 15 152 152 1.580 1.390 1.390 1.465 1.55 15.5 15.5 15.5 15.5 15.5 15.5 15	2 0 0 0 0 1110 645 2 1 3.12 2 1 1 1.000 777 26 1 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 1 1 2 2 1	2 0 0 0 0 165 52 6 6 6 11 1 1.286 6 6 6 73 33 15 5 179 179 179 179 179 179 179 179 179 179	2 0 0 0 0 206 5151 13 13 13 17 1,235 69 52 21 14 2 189 9 52 2 190	2 0 0 0 0 2110 338 127 72 20 1340 1340 15 15 0 0 15 15 15 20 20 24 22 24 24 24 24 24 24 24 24 24 24 24	2 0 0 0 0 270 0 0 0 2 198 33 3 37 1249 33 3 37 795 6 68 33 3 79 248 0 0 1 1,521 1759 248 68 68 68 68 68 68 68 68 68 68 68 68 68	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Coal	8% Australia 4 2012 195 132 37 23 1 2 8 8 0 3 5 1 1 2 203 3 5 5 1 1 309 208 815 374 45 206 207 138	7% RENEWA 2015 1699 93 93 555 20 0 1 8 0 0 7 1 178 93 55 28 2 0.000 897 759 420 152% 67 23 128 128 129	11% BBLE 2020 1300 98 8 24 0 0 0 0 0 88 1 139 98 8 32 2 2 0 0.00 0813 540 381 138% 71 20 133 134 23	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen - Electric direct heating 2) - Hydrogen - Hydrogen - Heat pumps 2) - Hydrogen - Heat pumps 2) - Heating fuels - Heat pumps 2) - House of Heat pumps (TWh/a) - Hydrogen - Heat pumps 2 - Heating fuels - Hydrogen - Hydrogen - Heating fuels - Hydrogen - Heating fuels - Hydrogen - Hydrogen - Heating fuels - Hydrogen - Hydrogen - Heating fuels - Hydrogen	1 0 0 0 0 433 300 0 0 931 133 0 0 0 931 1738 114 11 11 11 11 11 11 11 11 11 11 11 11	0 0 62 42 20 0 0 1.286 11 10 96 11 1.357 11 10 96 0 0 10% 2) heat from 0 0 4 4 0 0 0 0 4 0 0 0 1.558 1.558 1.57 7 7 0 0 0 0 0 0 10% 1.558 1.558 1.57 7 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 75 49 9 26 0 0 0 1,359 11,351 85 0 0 0 7 126 0 0 7 126 0 0 1 1,852 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 925 83 33 0 0 1.3711 1.106 83 4 1.106 155 2 0 15 15 15 15 15 15 15 15 15 15 15 15 15	2 0 0 0 0 1110 65 42 0 0 0 0 1 100 65 42 0 0 0 1 100 100 100 100 100 100 100 10	2 0 0 0 0 1652 0 0 0 0 1655 0 0 0 1655 0 0 0 0 1655 0 0 0 0 1655 0 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 206 55 121 13 17 17 1235 69 152 142 142 149 150 150 150 150 150 150 150 150 150 150	2 0 0 0 210 0 0 2 10 0 0 0 2 10 1 2 10 1 2 1 2	2 0 0 0 0 270 0 0 0 270 0 0 0 2 7 1508 2 33 3 37 755 688 0 0 1.551 2.48 0 0 1.551 2.48 0 0 1.551 2.48 2.48 2.48 2.48 2.48 2.48 2.48 2.48	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Coal -	8% Australia 4 2012 195 132 37 23 1 2 8 8 0 3 5 1 1 2 203 3 5 5 1 1 309 208 815 374 45 206 207 138	7% RENEWA 2015 169 93 55 21 0 1 178 93 55 28 2 0 0 0 0 0 0 0 0 0 55 67 23 128 173 29	11% BLE 2020 130 98 8 24 0 0 0 8 1 139 98 8 1 139 98 8 7 120 130 381 138% 71 20 133 134 23	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen - Brech heating - Fossil fuels - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Solar collectors - Solar collectors - Geothermal - Heat pumps 2) - Letectric direct heating 2) - Hydrogen - RES share (including RES electricity) electricity consumption heat pumps (TWh/a) - I public CHP and production - Final energy consumption transport in P.J/a - Soenario: road - Iossil fuels - biofuels - natural gas - natural gas - natural gas - hydrogen - electricity - Lossil fuels - biofuels - cossil fuels - biofuels - cossil fuels - biofuels - synfuels - biofuels - synfuels - electricity	1 0 0 0 0 43 3 30 13 3 0 0 931 13 3 0 0 931 1738 2141 1 1 1 0 0 0 0 57 70 770 770 1371 1 0 0 0 0 0 1 10 10 10 10 10 10 10 10	0 0 62 42 20 0 0 1 2.295 0 1 1.295 0 1 1.295 0 1 1.295 0 1 1.295 0 1 1.357 1 1 1 1 0 0 0 1 1 1.357 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 75 9 1 1,359 1 1,351 1 1 1 2 6 0 0 1 1,359 1 1 1 1 1 2 6 0 0 1 1,359 1 1 1 1 1 2 6 0 0 1 1 2 5 6 6 7 7 0 0 0 4 8	2 0 0 0 0 92 58 33 30 0 1.371 1.106 83 4 1.106 155 2 0 1.582	2 0 0 0 0 1110 0 65 5 6 6 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 165 2 0 0 0 0 0 165 2 0 0 0 0 165 2 0 0 0 0 0 165 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 2006 552 1 121 1 137 1 1.235 689 2 12 1 2 12 1 12 1 189 0 1 190 2 1 1 189 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 210 0 0 0 2 10 1 2 1 2 2 4 1 3.34 0 1 1 .52 0 2 4 2 4 2 4 1 1 .54 0 0 1 1 .55 2 2 4 1 2 2 4 1 1 2 2 6 1 2 2 4 1 1 2 2 6 1 2 2 4 1 1 2 2 6 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 2 3 1 2 2 2 4 1 3 1 2 2 2 3 1 2 2 2 4 3 7 3 7 3 7 3 7 3 7 3 7 3 7 3 7 3 7 3	2 0 0 0 0 270 0 0 0 270 1098 33 3 37 9 248 0 1,521 759 248 37 9 248 37 9 248 37 9 248 37 79 248 37 79 248 37 79 248 37 79 248 37 79 248 37 79 248 37 79 248 37 79 248 37 70 0 0 0 11,521 70 70 0 814 52 4 4 5 4 2 0 0 3 9 3	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Bown Coal - Diase Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Coll - Coz emissions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Grown Coal - Gas - Oil - Brown Coal - Gas - Oil - Brown Coal - Gas - Oil - Brown Coal - Gas - Oil - Governies of the Coal - Gas - Oil - Brown Coal - Gas - Gas - Oil - Brown Coal - Gas - Gas - Oil - Brown Coal - Gas - Gas - Oil - Brown Coal - Gas - Gas - Oil - Brown Coal - Gas	8% Australia 1 2012 195 27 27 27 27 28 3 1 2 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7% RENEWA 2015 169 93 55 21 0 1 178 93 55 28 2 0 0 0 0 0 0 0 0 0 55 67 23 128 173 29	11% BLE 2020 130 98 8 24 0 0 0 8 1 139 98 8 1 139 98 8 7 120 130 381 138% 71 20 133 134 23	18% 2025 86 59 26 0 0 10 0 9 1 96 59 0 0 0 739 327 315 114% 71 18 119 90	2030 60 34 0 0 26 0 0 0 11 71 34 0 0 35 2 2 15 2 2 2 15 2 3 4 1 1 1 1 1 1 1 1 1 1 1 1 1	37% 2035 12 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 0 8 0 0 13 13 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 0 6 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaft from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Olivect heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Heat pumps 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 2) - Electric direct heating 20 - Hydrogen - Heat pumps 20 - Electric direct heating 20 - Hydrogen - Heat pumps 20 - Electric direct heating 20 - Hydrogen - Heat pumps 20 - Electric direct heating 20 - Hydrogen - Heat pumps 20 - Electric direct heating 20 - Hydrogen - Heat pumps 20 - Hydrogen	1 0 0 0 0 43 3 3 0 1 3 1 3 1 3 1 3 1 3 1 3 1 3 1 3	0 0 62 42 20 0 0 1.295 6 1.505 6 1.105 6 1.105 6 0 0 1.357 1.146 105 6 0 0 0 1.357 1.146 105 1.558 1.507 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 75 49 8 1.359 11.351 10 0 0 1.359 11.351 10 0 0 1.437 12.8 0 0 12.8 55% arabient center to each of the control of the	2 0 0 0 0 92 53 33 3 0 0 1.3711 1.106 83 14 0 155 152 0 1.465 1.167 117 14 14 152 0 15 152 0 15 152 0 15 158 0 1.390 121 188% 6 1 0 0 7 47 54 54 52	2 0 0 0 0 1100 65 5 1,100 0 77 6 1 1,000 77 6 1 1,000 77 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 165 52 2 6 6 6 6 6 6 6 6 6 6 73 3 75 9 77 9 11 1 256 26 9 1 1 3 0 5 2 2 2 3 5 2 2 2 3 5 2 2 2 3 5 2 2 2 3 5 2 2 2 3 5 2 2 2 3 5 2 2 2 3 5 2 2 2 3 5 2 2 3 5 2 2 3 5 2 2 3 5 2 2 3 5 2 2 3 5 2 2 3 5 2 3 5 2 3 5 2 3 5 2 3 5 2 3 5 2 3 5 2 3 5 2 3 5 5 5 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 2006 521 1 1 3 1 1 3 1 1 1 1 3 1 1 1 1 1 1 1 1	2 0 0 0 0 210 312 1 3140 1 314	2 0 0 0 0 270 0 0 0 0 270 1989 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Disesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Oa	8% Australia 1 2012 1955 1957 23 1 1 2 8 0 3 5 1 12 2032 112 23 3 0.000 902 25 374 45 200 13 Australia 1 2012 2012	7% RENEWA 2015 169 55 56 0 0 178 93 55 28 0 000 997 759 67 23 128 127 173 29 transport	11% BLE 2020 130 98 84 10 00 99 00 00 88 11 139 98 83 22 000 00 139 139 131 138%	18% 2025 86 59 0 0 10 0 9 1 1 96 59 2 0 0 0 0 11 11 11 11 11 11 11 11 11 11 1	2030 60 34 4 0 0 0 0 11 1 1 34 0 0 0 0 9 1 1 71 1 34 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2035 12 00 0 11 10 0 0 0 11 0 0 0 0 0 0 0 0	2040 5 0 0 0 8 0 0 0 8 0 0 0 13 1 0 0 0 0 0 13 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1	56% 2045 1 0 0 0 0 0 0 0 0 0 0 0 0 0	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossi fuels - Blomass - Solar collectors - Geothermal - Heaf from C-HP 1) - Fossi fuels - Blomass - Geothermal - Hydrogen - Geothermal - Hydrogen - Geothermal - Hydrogen - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Fossi fuels - Solar collectors - Geothermal - Heat pumps 2) - Fossi fuels - Liofucles - syntuels - natural gas - natural gas - electricity - Electrification share: - rail - Fossi fuels - Lossi fuels	1 0 0 0 0 43 3 30 13 13 0 0 0 931 137 12 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 62 42 20 0 0 1.295 11 0 0 96 11 1.295 11 0 0 96 11 1.397 11 10 0 96 11 1.397 11 10 0 0 0 0 0 10% 2) heal from PRENEWAL 2015 1.559 47 0 0 0 0 0 0 45 52 7 7 0 0 0 45 53	2 0 0 0 75 6 1 1,359 1 1,359 1 1,131 1 10 0 7 7 1,182 1 1,182 1 1,552 1 5 % 6 0 0 0 1 1,552 1 5 % 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 92 58 93 33 0 0 1,371 1,100 98 1,140 9 1 1,100	2 0 0 0 0 1100 65 6 1 0 0 2 118 15 % 6 6 1 0 0 4 3 50 6	2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 2006. 0 1211 13 17 1235 863 863 863 863 1921 42 42 42 189 10 1209 120 120 120 120 120 120 120 120 120 120	2 0 0 0 0 210 0 0 0 2 10 1 20 1 20 1 20	2 0 0 0 0 270 0 0 0 2 198 2 33 3 37 9 1,249 248 0 0 1,591 2,248 66 67 9 2248 67 9 248 68 66 67 9 20 50 1,307 287 189 0 0 17 7 287 189 0 0 17 287 189 189 189 189 189 189 189 189 189 189	RES share CO2 emissions in Mill I/a Scenario: Cendensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Oal - Coal - Gas - Oal - Oa	8% Australia 1 2012 105 105 107 108 108 108 108 108 108 108 108 108 108	7% RENEWA 2015 1693 55 55 528 0 0.00 0.00 178 93 55 28 2 0.00 152% 67 73 128 128 127 31 127 329	11% BLE 2020 130 98 8 24 0 0 0 8 8 1 1399 98 8 1 1393 122 2020 13381 1344 23	18% 2025 86 59 0 0 26 0 0 0 11 96 59 1 315 22 0.00 0,00 739 327 114 8 119 90 11 18 18 2025 5,525 4,550 677	2030 2030 60 34 4 0 26 0 0 11 11 34 4 0 0 0 9 1 17 71 34 4 92% 67 71 13 92 83 12 2030 5 5 103 3 825 2 2030 5 5 103 3 825 2 2030	2035 12 0 0 0 11 0 0 0 11 0 0 0 8 0 0 0 0 11 0 0 0 0	2040 5 0 0 0 4 0 0 0 8 0 0 8 0 0 0 8 0 0 0 13 0 0 0 0 0 0 15 15 15 16 16 16 16 16 16 16 16 16 16	58% 2045 1 0 0 1 1 0 0 6 6 0 7 0 0 0 0 504 113 41% 6 6 42 4 4 3 3	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal Heaf from C-HP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Solar collectors - Geothermal - Geothermal - Fossil fuels - Solar collectors - Fossi	1 0 0 0 0 43 3 30 30 30 30 30 30 30 30 30 30 30 30	0 0 62 42 20 0 0 1,295 1,103 84 11 11 11 10 0 0 1,357 1,146 10 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 75 6 6 6 5 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 92 58 33 3 0 0 1,371 1,100 88 9 1,100 15 152 0 0 15 124% 20 15 124% 20 15 1,580 13 10 124% 20 15 1,580 13 10 12 1,580 15 1,580 1	2 0 0 0 0 1100 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 2006. 0 121 1 13 17 1235 863 863 863 121 42 142 142 189 17 17 1235 189 17 17 1235 189 17 17 1235 189 17 17 1235 189 17 17 1235 189 17 17 1235 189 17 17 1235 189 17 17 1235 189 17 1235 189 17 125 189 189 189 189 189 189 189 189 189 189	2 0 0 0 210 0 0 210 0 0 2 10 1 20 2 1 2 2 4 1 3.340 2 2 4 2 2 4 1 3 2 3 1 2 3 1 2 1 2 2	2 0 0 0 0 270 0 0 0 2 198 33 3 37 9 1,249 248 0 0 1,521 755 66 66 79 2248 66 67 9 264 66 54 66 54 66 54 66 54 66 54 66 54 66 67 9 13.07 189 0 0 17 0 17 0 12 189 0 0 17 0 17 0 17 189 0 0 17 0 17 189 0 0 17 0 17 189 0 0 17 0 17 189 0 0 17 189 0 0 17 189 0 0 17 189 184 184 184 184 184 184 184 184 184 184	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Disesel Combined heat and power plants - Hard coal (& non-renewable waste) - Cas - C	8% Australia 1 2012 105 105 107 108 108 108 108 108 108 108 108 108 108	7% RENEWA 2015 169 93 95 51 0 0 1 178 99 155 8 8 90 0 0 0 7 1 178 93 128 128 173 29 152% 420 152% 67 23 128 173 29 420 152%	111% BLE 2020 1300 1300 9 9 8 8 24 0 0 0 0 8 1 1 1399 98 8 92 2 0.000 813 381 1334 23 BLE 2020	18% 2025 86 59 0 26 0 0 10 0 9 1 1 96 59 0 0 25 1 18 119 90 11 18 18 18 2025 5.525 4.550 77 118 18 18 18 18 18	2030 2030 34 34 0 26 0 0 11 71 34 34 0 0 0 5 12 71 34 35 215 67 13 99 63 12 2030 5 5 103 3,823 39 1,567	2035 12 0 0 0 11 0 0 0 11 0 0 8 8 0 0 20 0 0 0 11 0 0 0 0 11 0 0 0 0 0 0	2040 5 5 0 0 4 0 0 0 8 8 0 0 13 1 1 0 0 0 8 0 0 13 13 13 13 13 13 13 13 13 13	56% 2045 1 0 0 1 0 0 6 6 0 7 0 0 0 0 504 113 41% 6 42 4 3 3	2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossi fuels - Blomass - Solar collectors - Geothermal - Heaf from C-HP 1) - Fossi Huels - Blomass - Geothermal - Hydrogen - Geothermal - Hydrogen - Geothermal - Hydrogen - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Hydrogen - RES share (including RES electricity) - electricity consumption heat pumps (TWh/la) - Jupital C-IP and Pautoproduction - Final energy consumption transport in PJ/la - Scenario: Final energy consumption transport in PJ/la - Scenario: - Fossi fuels - biofuels - synfuels - including - inc	1 0 0 0 0 433 300 0 0 931 3738 4111 11 11 11 11 11 11 11 11 11 11 11 1	0 0 62 42 20 0 0 1.295 6 1.00 1 1.295 6 1.00 1 1.295 6 1.00 1 1.357 1 1.146 1 10 0 0 0 1 1.357 1 1.146 1 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 75 49 9 1,359 1 1,351 85 0 0 0 1 1,359 1 1,131 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 928 538 33 0 0 1.3711 1.106 83 4 1.106 1552 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 152 0 0 15 15 15 15 15 15 15 15 15 15 15 15 15	2 0 0 0 0 1110 65 42 0 0 0 1 105 65 42 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 1652 562 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 73 3 5 15 6 52 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	2 0 0 0 0 2066 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 210 0 0 2 10 1 329 318 318 318 318 318 318 318 318 318 318	2 0 0 0 0 270 0 0 0 270 1089 2248 545 4 4 5 2 0 0 39 45 144 332 0 103	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Dieseal Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Coas - Oil - Oile - Coas - Oile -	8% Australia 1 2012 1952 1953 1954 203 11 2 8 0 0 3 3 5 1 1 2 23 3 1 12 203 3 5 1 1 2 203 3 3 5 1 1 2 203 3 3 5 1 1 2 203 3 3 3 4 5 1 3 3 4 4 5 203 3 3 4 4 5 203 3 3 4 4 5 203 3 3 4 4 5 201 2 8 4 5 200 1 3 4 4 8 8 8 8 0 8 8 0 8 8 8 8 0 8 8 8 8 8	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 0 7 7 1 178 2 2 128 0 0 000 0 000 0 000 0 000 0 000 0 000 0	11% BLE 2020 130 98 8 24 0 0 0 0 8 1 139 98 8 24 139 139 139 139 139 139 139 139 139 139	18% 2025 86 59 0 0 0 0 10 0 9 1 1 1 96 59 0 35 2 2 315 2 71 114 119 90 18 18 19 2025 5,525 4,550 79 18 18 19 20 18 21 2025	2030 2030 60 34 40 0 26 0 0 11 71 71 34 0 0 0 0 682 215 254 92% 67 13 99 63 12 2030 5,103 3,8252 1,567 1,567 1,567	2035 12 0 0 11 0 0 11 0 0 8 8 0 0 0 0 11 0 0 0 11 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 2040 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 1 0 0 6 0 0 7 7 0 0 0 0 0 0 1 14 113 41% 58 6 42 4 3 3	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 1 1 1 28% 48 3 3 25 1 1 2 2050 4,777 1,411 697 1,411 697 677 677
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaft from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Divect heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Fossil fuels - Blomass - Solar collectors - Geothermal - Fossil fuels - Solar collectors - Geothermal - Fossil fuels - Hydrogen - Fossil fuels - Fossil	1 0 0 0 0 43 3 30 30 30 30 30 30 30 30 30 30 30 30	0 0 62 42 20 0 0 1.295 1 1.095 1 1.00	2 0 0 0 75 6 6 6 5 4 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 92 58 33 0 0 1,371 1,108 83 14 0 0 15 152 0 155 1,167 14 14 152 1 1,168 1,162 1 1,162 1 1,163 1 1,163 1 1,163 1 1,165 1 1,16	2 0 0 0 1100 65 42 2 13.142 4 1.0688 2 120 2 6 1 1 2 2 1 1 1 2 2 2 1 1 1 1 1 2 2 2 2	2 0 0 0 0 1455. 2 1 1 1 1 2 2 1 1 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 1 1 2 1 1 2 1	2 0 0 0 0 2006 2006 2006 2006 2006 2006	2 0 0 0 210 0 0 210 0 0 0 210 1 0 1 217 2 2 2 4 1 3.440 1 2 3 7 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	2 0 0 0 0 270 0 0 0 2 198 33 3 37 1249 33 3 37 79 248 8 0 0 17.755 66 8 546 15 20 15	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Disesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - O	8% Australia 1 2012 195 195 197 23 1 1 2 8 0 3 5 1 1 2 203 195 11 2 203 11 2 203 11 2 203 11 2 203 11 2 203 11 2 203 11 2 203 11 2 203 11 2 203 203 203 203 203 203 203 203 203 2	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 0 7 1 1778 2 2 0 0 0 0 0 897 420 420 152% 67 23 23 23 29 420 152% 67 152%	111% BLE 2020 130 130 139 98 8 24 0 0 0 0 8 1 1 1399 98 8 2 2 0 000 1331 1394 23 2 1 1384 23 134 124 135 15 15 15 15 15 15 15 15 15 15 15 15 15	18% 2025 86 59 0 0 0 10 0 9 1 1 10 96 59 2 0 0 0 0 11 11 11 11 11 11 11 11 11 11 1	2030 60 34 60 0 0 0 0 11 1 71 34 0 0 0 0 9 1 1 71 34 92% 67 1 3 3 5 2 2 5 4 7 1 3 3 1 2 2 2 3 3 1 2 2 2 3 3 4 4 1 2 1 2 2 3 3 5 3 6 3 1 2 2 2 3 3 6 3 1 2 2 2 3 3 6 3 1 2 2 2 3 3 6 6 8 6 8 6 8 6 8 6 8	2035 12 0 0 0 111 0 0 0 111 0 0 0 8 0 0 0 0 0 0	2040 5 0 0 0 4 0 0 0 0 0 0 0 8 0 0 13 0 0 0 0 0 530 33 0 140 0 51% 51% 557 9 62 28 8 5 5	56% 2045 1 0 0 1 1 0 0 7 0 0 0 0 7 0 0 0 0 0 0 0	2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Solar collectors - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 3) - Hydrogen - Heat pumps 2) - Electric direct heating 3) - Hydrogen - Heat pumps 2) - Electric direct heating 3) - Hydrogen - Leider Hydro	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 62 42 20 0 0 1.295 6 1.005 6 1.005 6 1.005 6 1.005	2 0 0 0 75 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 92 2 92 93 3 3 0 0 13.71 13.06 8 8 8 9 9 13.810 9 14.61 9 15.810	2 0 0 0 1100 65 61 1312 1312 1312 1312 1312 1312 1312 1	2 0 0 0 0 1655 2 170 0 0 0 1655 2 170 0 0 0 1655 2 170 0 0 1655 2 170 0 0 1655 2 170 0 0 1655 2 170 0 0 1655 2 170 0 170	2 0 0 0 0 2056 2011 13 17 1235 883 883 883 883 883 883 883 883 883 8	2 0 0 0 210 0 0 210 1 38 9 127 27 29 26 69 242 0 24 1914 492% 492% 492% 492% 492% 492% 492% 492	2 0 0 0 0 270 0 0 0 0 2 198	RES share CO2 emissions in Mill t/a Scenario: Cendensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Diseal Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Oile CO2 emissions power and CHP plants - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Oal	8% Australia 1 2012 195 2012 195 195 195 197 23 1 1 2 203 132 29 902 902 902 913 374 4536 200 13 2013 2013 374 4,836 200 13 2013 387 4,836 387 4,838 387 1,874 4,836 387 1,874 1,538	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 7 1 178 93 93 93 155 67 729 420 0.00 997 759 421 178 22 23 173 399 422 173 399 420 173 420 174 29 29	11% BLE 2020 130 98 8 24 0 0 0 8 8 1 1399 98 8 1 1393 131 134 23 22 2000 203 331 24 201 2020 25 26 26 26 26 26 26 26 26 26 26 26 26 26	18% 2025 86 59 0 0 10 0 0 9 1 1 96 59 0 0 35 2 0.00 0 739 35 2 1144% 71 118 119 119 119 119 118 2025 5.5.25 4,550 677 39 18 205 1,644 2,190 293	2030 2030 34 34 00 0 11 71 34 34 0.00 0 82 215 2215 2215 2215 2215 2215 2215 22	2035 12 0 0 0 11 10 0 0 11 10 0 0 8 0 0 0 0 0 0	2040 5 0 0 0 4 0 0 0 8 0 0 8 0 0 8 0 0 13 0 0 0 0 0 0 0 0 13 0 0 13 0 15 15 15 15 15 15 15 15 15 15	56% 2045 1 0 0 1 1 0 0 0 6 6 0 7 0 0 0 0 0 0 0 0 1 113 41% 58 6 42 4 4 4 4 4 3 3	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossi fuels - Blomass - Solar collectors - Geothermal Heaf from CHP 1) - Fossi fuels - Blomass - Geothermal - Hydrogen Direct heating - Fossi fuels - Blomass - Solar collectors - Geothermal - Hydrogen Direct heating - Fossi fuels - Fossi fuels - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossi fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Fossi fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossi fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossi fuels - Hydrogen - Fossi fuels - Hydrogen - Fossi fuels - Indicated promound of the Pula - Scenario. Final energy consumption transport in PJ/a - Scenario. Final energy consumption transport in PJ/a - Fossi fuels - biofuels - biofuels - biofuels - synfuels - electricity - navigation - fossi fuels - biofuels - synfuels - synfuels - synfuels - synfuels - synfuels - total (incl. pipelines) - fossi fuels - biofuels - synfuels - biofuels - synfuels - biofuels - biofuels - synfuels - biofuels	1 0 0 0 0 43 3 30 30 30 30 30 30 30 30 30 30 30 30	0 0 62 42 20 0 0 1,295 1,103 84 11 11 10 10 10 96 0 0 0 0 10 1,558 84 1,557 47 0 0 0 0 45 52 7 7 0 0 0 0 45 53 53 0 0 0 0 1,186 84 84 84 84 84 84 84 84 84 84 84 84 84	2 0 0 0 75 6 6 6 54 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 92 58 33 0 0 1,1716 1106 8 8 1 1 107 100 8 8 1 1,588 68 8 1 1 1,584 68 8 1 1 1,584 68 1 1 1 1,584 68 1 1 1 1,584 68 1 1 1 1,584 68 1 1 1 1,584 68 1 1 1 1,584 68 1 1 1 1,584 68 1 1 1 1 1,584 68 1 1 1 1 1,584 68 1 1 1 1 1,584 68 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 1100 65 42 2 13.13 2 12 12 2 13 12 2 12 13 12 2 13 12 2 13 14 24 15 15 % 69 0 0 1.846 5 69 0 1.846 6 10 0 1.866 0 1.866 0 1.866 0 1.866 18 0 1.8	2 0 0 0 0 1465. 2 0 0 0 0 0 1465. 2 0 0 0 0 0 1465. 2 0 0 0 0 0 1465. 2 0 0 0 0 1465. 2 0 0 0 0 1465. 2 0 0 0 0 1465. 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 2006 2006 2006 2006 2006 2006	2 0 0 0 210 0 0 210 0 0 0 210 0 0 0 210 0 0 0	2 0 0 0 0 270 0 0 0 2 198 33 3 37 9 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 8 0 0 1 528 248 24 2 2 0 0 1 528 248 24 2 2 0 0 1 528 248 24 2 2 0 0 1 528 248 24 2 2 0 0 1 528 248 248 2 0 0 1 528 248 248 2 0 0 1 528 248 248 2 0 0 1 528 248 248 2 0 0 1 528 248 248 2 0 0 1 528 248 2 0 0 1 528 248 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 1 528 2 0 0 0 1 528 2 0 0 0 1 528 2 0 0 0 1 528 2 0 0 0 1 528 2 0 0 0 0 1 528 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Coal - Gas - Oal - Coal -	8% Australia 1 2012 105 2012 105 32 33 1 2 8 8 90 132 20 33 5 1 203 30 0.00 0.00 902 815 32 341 3364 45 20 20 20 20 13 Australia 1 45 20 13 45 20 13 45 20 13 45 20 13 45 20 20 20 20 20 20 20 20 20 20 20 20 20	7% RENEWA 2015 169 93 95 21 0 1 178 99 15 28 0 0 0 7 1 178 95 55 28 28 177 37 29 420 152% 67 23 1728 1729 420 152% 67 23 173 29 420 162% 67 23 173 29 420 174 29 420 174 29 420 174 29 420 175 29 420 420 420 420 420 420 420 420 420 420	11% BLE 2020 130 130 98 8 24 0 0 0 0 8 1 1339 98 8 24 2 0 0 0 0 8 1 1339 134 134 22 BLE 2020 133 134 134 23 134 134 136 66 68 68 68 68 68 68 68 68 68 68 68 68	18% 2025 86 59 0 0 10 10 9 1 1 96 0 0 0 35 227 3315 114% 18 119 90 18 2025 4.550 68 89 18 2025 4.550 68 80 300 108	2030 2030 34 34 00 0 11 71 34 34 00 0 9 1 17 34 42 2030 67 13 3,825 67 13 3,825 67 13 12 2030 3,825 12 2030 34 1,567 1,826 68 68 89 34 1,278	2035 12 0 0 0 11 0 0 0 11 0 0 0 8 8 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 8 8 0 0 13 1 0 0 0 0 8 0 0 13 13 13 13 13 13 13 13 13 13	58% 2045 1 0 0 1 1 0 0 0 6 6 0 7 7 0 0 0 0 0 504 113 41% 6 6 42 4 3 3 2045 47711 1,903 28 27 907 941 22,808 88 88 88 87 907 941 1,005 7 953	2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossi fuels - Blomass - Solar collectors - Geothermal Heaf from C-HP 1) - Fossi fuels - Blomass - Goothermal - Hydrogen Brock Geothermal - Hydrogen Brock Geothermal - Hydrogen Brock Geothermal - Hydrogen Brock Geothermal - Fossi fuels - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen Total heat supply3) - Fossi fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Fossi fuels - Blomass - Solar collectors - Geothermal - Hydrogen -	1 0 0 0 0 43 3 30 30 30 30 30 30 30 30 30 30 30 30	0 0 62 42 20 0 0 1,295 11,103 84 11 11 11 11 11 11 11 11 11 11 11 11 11	2 0 0 0 7.5 6 6 7 7 7 0 0 0 1.857 1.723 6 2 0 0 0 1.855 6 7 7 7 0 0 0 1.857 1.723 6 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 925 88 93 93 0 0 1,371 1,160 91 1,160	2 0 0 0 0 1100 65 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 1655 2 0 0 0 0 0 1655 2 0 0 0 0 0 1655 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 2006 2006 2006 2006 2006 2006	2 0 0 0 0 210 0 0 0 1270 0 0 0 0 1277 20 1277 224 1,340 29 242 2 0 0 2 242 2 0 0 2 242 2 0 0 2 242 2 0 0 2 242 2 242 2 242 2 2 2	2 0 0 0 0 2 198 2 3 3 3 3 7 9 8 2 48 8 6 6 6 7 9 9 2 2 48 8 6 6 6 7 9 9 2 2 48 8 6 6 6 7 9 9 2 6 4 5 4 4 2 2 0 1 0 3 9 3 0 1 5 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - Diesel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oil - O	8% Australia 1 2012 195 2012 195 20 21 22 8 8 10 3 5 1 203 35 1 203 392 28 30 0.00 902 28 374 1369 399 201 374 1369 45 20 1374 1369 45 20 1374 1369 15374 1374 1369 15374 1374 1374 1374 1374 1374 1374 1374 1	7% RENEWA 2015 169 93 95 51 0 1 178 93 93 52 2 0 0.00 897 7 1 178 93 128 173 29 420 152% 67 23 128 173 29 420 152% 67 23 173 29 420 152% 67 23 28 173 29 420 161 420 161 420 162 420 162 67 23 173 29 420 162 67 23 29 20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	HLE 2020 1300 8 8 8 24 0 0 0 0 0 8 1 1 139 98 8 32 2 0 0 0 0 0 0 8 1 1 139 139 134 134 23 134	18% 2025 86 87 90 0 10 0 91 1 96 59 0 0 0 739 227 315 114% 18 119 90 18 2025 5,525 68 67 67 68 2030 1084 0 1084 0 1084 0 1084 0 1086 0 1086 0 1086 0 1086 0 1086 0 1086 0	2030 2030 30 30 30 30 30 30 30	2035 12 0 0 11 10 0 0 11 10 0 0 8 8 0 0 20 0 0 10 10 10 10 10 10 10 10 10 1	2040 5 5 0 0 4 0 0 0 8 8 0 0 13 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	56% 2045 1 0 0 1 0 0 0 6 6 0 7 0 0 0 0 504 113 41% 6 6 42 4 711 1,903 227 24 4 3 3	2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaf from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Fossil fuels - Blomass - Geothermal - Hydrogen - Brown of the state o	1 0 0 0 0 433 300 0 0 931 3738 411 11 10 0 0 0 975 57 0 0 0 15 57 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 62 42 20 0 0 1.295 6 1.00 1 1.00	2 0 0 0 0 75 48 9 26 0 0 0 1,359 11,313 1 86 1 0 0 0 7 126 0 0 0 7 126 0 0 0 1 1,857 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 925 83 30 0 0 1.3711 1.106 83 4 1.106 1552 0 0 15 154 0 0 15 154 0 0 15 154 0 0 15 154 0 0 0 15 15 15 15 15 15 15 15 15 15 15 15 15	2 0 0 0 0 1100 65 42 0 0 0 1 100 65 42 0 0 0 1 100 100 100 100 100 100 100 10	2 0 0 0 0 1655 20 0 0 0 1655 20 0 0 0 1655 20 0 0 0 1655 20 0 0 0 173 35 179 0 0 179 179 179 179 179 179 179 179 179 179	2 0 0 0 0 2006. 0 1 1.235 55 55 55 55 55 55 55 55 55 55 55 55 5	2 0 0 0 2 10 0 0 2 10 1 3 1 2 2 1 1 3 2 1 0 1 2 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 1 2 1	2 0 0 0 0 270 0 0 0 2 70 0 0 0 0 2 70 108 2 108 2 33 3 37 745 68 8 8 66 67 9 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4 5 4	RES share CO2 emissions in Mill t/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Dissel Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Gas - Oal - Coal - Gas - Oal - Coal -	8% Australia 1 2012 105 2012 105 32 33 1 2 8 8 90 132 20 33 5 1 203 30 0.00 0.00 902 815 32 341 3364 45 20 20 20 20 13 Australia 1 45 20 13 45 20 13 45 20 13 45 20 13 45 20 20 20 20 20 20 20 20 20 20 20 20 20	7% RENEWA 2015 169 93 95 21 0 1 178 99 15 28 0 0 0 7 1 178 95 55 28 28 177 37 29 420 152% 67 23 1728 1729 420 152% 67 23 173 29 420 162% 67 23 173 29 420 174 29 420 174 29 420 174 29 420 175 29 420 420 420 420 420 420 420 420 420 420	11% BLE 2020 130 130 98 8 24 0 0 0 0 8 1 1339 98 8 24 2 0 0 0 0 8 1 1339 134 134 22 BLE 2020 133 134 134 23 134 134 136 66 68 68 68 68 68 68 68 68 68 68 68 68	18% 2025 86 59 0 0 10 10 9 1 1 96 0 0 0 35 227 3315 114% 18 119 90 18 2025 4.550 68 89 18 2025 4.550 68 80 300 108	2030 2030 34 34 00 0 11 71 34 34 00 0 9 1 17 34 42 2030 67 13 3,825 67 13 3,825 67 13 12 2030 3,825 12 2030 34 1,567 1,826 68 68 89 34 1,278	2035 12 0 0 0 11 0 0 0 11 0 0 0 8 8 0 0 0 0 0 0	2040 5 0 0 4 0 0 0 8 8 0 0 8 8 0 0 13 1 0 0 0 0 8 0 0 13 13 13 13 13 13 13 13 13 13	58% 2045 1 0 0 1 1 0 0 0 6 6 0 7 7 0 0 0 0 0 504 113 41% 6 6 42 4 3 3 2045 47711 1,903 28 27 907 941 22,808 88 88 88 87 907 941 1,005 7 953	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heaft from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Collectors - Geothermal - Hydrogen - Urier heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Electric direct heating - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Fossil fuels - Solar collectors - Geothermal - Jydrogen - Fossil fuels - Solar collectors - Geothermal - Fossil fuels - Solar collectors - Geothermal - Fossil fuels - Solar collectors - Geothermal - Fossil fuels - Solar collectors - Individual gas - Hydrogen - electricity - Raigen - Geothermal - Fossil fuels - Solor fuels - Solar fuels - Solor fuels - S	1 0 0 0 0 43 3 30 0 0 0 1 3 3 0 0 0 0 0 0 0 0 0 0 0	0 0 62 42 20 0 0 1.295 6 1.505	2 0 0 0 7 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	2 0 0 0 0 92 2 53 3 0 0 1 371 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 1100 65 42 2 13.142 1.068 11 1.29 2 121% 2271% 2030 1.445 1.145 66 0 1.280 1.285 20 0 1.586 6 1.280 1.285 20 0 1.586 6 1.280 1.285 20 0 1.586 6 1.280 1.285 20 0 1.285 2	2 0 0 0 0 165.5 2 1 0 0 0 1 165.5 2 1 0 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 0 1 1 0 1	2 0 0 0 0 2006 2006 2016 2016 2016 2016	20 0 0 0 210 0 0 0 210 1 0 1 0 1 0 1 0 1	2 0 0 0 0 270 0 0 0 0 0 0 0 0 0 0 0 0 0	RES share CO2 emissions in Mill I/a Scenario: Candensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Diseal Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Oile - Core missions power and CHP plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Coal - Coal - Gas - Oal - Coal	8% Australia 1 2012 195 195 197 23 1 1 2 8 0 0 3 5 1 1 2 203 3 1 122 233 0.000 9815 314 45 200 13 Australia 1 2012 2013 374 4,836 200 13 Australia 1 1,538 387 4,838 1,674 4,836 0 0 0 0 0 0 0 1,5147 1,538 387 1,538 1,5	7% RENEWA 2015 169 93 55 21 0 1 178 8 0 0 7 1 1778 93 55 52 2 0 0 00 999 420 152% 67 22 23 29 420 1148 2113 29 420 1148 32 20 20 20 20 20 20 20 20 20 20 20 20 20	11% BLE 2020 130 98 8 24 0 0 0 8 1 1399 98 8 1 1399 98 8 1 1399 98 8 1 1399 98 8 1 1399 98 8 1 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 1 10 1399 98 8 10 10 10 10 10 10 10 10 10 10 10 10 10	18% 2025 86 59 0 0 26 0 0 10 0 9 1 1 96 97 33 32 22 0.00 732 315 114 114 119 90 1 18 2025 5.525 4,550 677 39 1,644 2,190 677 3,90 677 4,90 677 4,90 677 4,90 677 677 677 677 677 677 677 677 677 67	2030 2030 34 34 00 00 9 11 71 34 00 00 926 627 67 31 34 92% 67 13 12 2030 631 12 2030 5,103 3,825 67 18,703 399 34 11,857	2035 12 0 0 11 0 0 11 0 0 8 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 2040 4.559 2.300 29 26 68 413 765 666 84 357 0	56% 2045 1 0 0 1 1 0 0 0 6 6 0 7 0 0 0 0 0 0 0 0 1 14 14 13 4 4 4 4 4 4 4 4 4 4 4 4 4 4	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Fossil fuels - Blomass - Solar collectors - Geothermal - Heat from CHP 1) - Fossil fuels - Blomass - Geothermal - Hydrogen - Direct heating - Hydrogen - Direct heating - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Hydrogen - Fossil fuels - Blomass - Solar collectors - Geothermal - Heat pumps 2) - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Total heat supply3) - Fossil fuels - Blomass - Solar collectors - Geothermal - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Heat pumps 2) - Electric direct heating 2) - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Hydrogen - Insail fuels - biofuels - synfuels - biofuels - synfuels - biofuels - hydrogen	1 0 0 0 0 43 3 30 10 10 10 10 10 10 10 10 10 10 10 10 10	0 0 0 62 42 20 0 0 1 1.285 11.03 19.04 19.05 19.	2 0 0 0 0 75 49 9 1,359 11,331 85 0 0 0 1,359 11,131 126 0 0 1,359 11 10 0 0 7 12% 55% anticent exert 155% 1552 55% 1,621 1 1,552 1 1,	2 0 0 0 0 92 558 33 3 0 0 1.3711 1.106 83 4 1.465 1.167 1.10	2 0 0 0 0 1100 65 42 0 0 0 1 1.000 77 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 1655 562 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 73 3 6 75 75 75 75 75 75 75 75 75 75 75 75 75	2 0 0 0 0 2006 552 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	2 0 0 0 0 2410 1340 1340 1354 1414 1536 0 0 1 1421 5326 0 0 1 1,421 5326 0 0 1 1,421 5326 0 0 1 1,421 5326 0 0 1 1,421 5326 0 0 1 1,421 5326 0 0 0 1 1,421 5326 0 0 0 1 1,421 5326 0 0 0 1 1,421 5326 0 0 0 1 1,421 5326 0 0 0 0 1 1,421 5326 0 0 0 0 1 1,421 5326 0 0 0 0 0 1 1,421 5326 0 0 0 0 0 1 1,421 5326 0 0 0 0 0 0 1 1,421 5326 0 0 0 0 0 0 0 0 1 1,421 5326 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 0 0 0 270 0 0 0 0 270 1089 33 37 79 248 45 42 2 0 0 0 814 52 4 3 2 0 0 10 93 3 103 3 103 3 103 3 10 0 10 93 0 0 0 1 1,503 3 3 10 0 10 93 0 0 0 1 1,503 3 3 10 0 10 93 0 0 0 1 1,503 3 3 10 0 10 93 0 0 0 1 1,503 3 3 10 0 10 93 0 0 0 1 1,503 3 3 10 0 10 10 0 10 0 10 0 10 0 10 0	RES share CO2 emissions in Mill I/a Scenario: Condensation power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Diseal Combined heat and power plants - Hard coal (& non-renewable waste) - Brown Coal - Gas - Oal - Oal - Coal - Gas - Oal - Oa	8% Australia 1 2012 1955 187 23 1 1 2 20 3 1 1 2 2 180 180 181 203 3 5 1 1 203 3 5 1 1 39902 815 374 45 200 13 Australia 1 1389 45 200 13 45 201 201 201 201 201 201 201 201 201 201	7% RENEWA 2015 199 199 195 100 1 1 178 8 0 0 0 7 7 1 1 178 2 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	11% BLE 2020 130 98 8 24 0 0 0 0 8 1 139 99 8 8 24 1 139 99 139 139 540 131 540 131 540 131 540 131 540 131 540 131 540 131 541 641 141 1595 641 1595 65837 751 7204 661 661 661	18% 2025 86 59 0 0 0 10 0 9 1 1 1 96 59 0 0 0 0 739 739 739 71 114 18 18 2025 5,525 4,550 777 77 18 18 18 205 5,525 5,525 5,525 6,526 6,520 6,000 6,0	2030 60 34 4 0 0 0 0 0 0 1 1 1 71 34 0 0 0 0 0 0 0 682 215 254 92% 67 13 99 63 12 1 2 2 2 3 2 2 1 1 1 1 1 1 1 1 1 2 2 2 2	2035 12 0 0 11 0 0 11 0 0 0 11 0 0 0 11 0 0 0 0 0 0 0 0 0 0 0 0 0	2040 2040 8 8 0 0 0 8 8 0 0 0 13 1 1 0 0 0 0 0 0 0 13 3 1 1 0 0 0 0	56% 2045 1 0 0 1 1 0 0 6 0 0 7 7 0 0 0 0 0 0 0 0 0 1 113 113 58 6 42 4 711 1,903 28 7 907 941 2,808 4 1,111 1,903 531 0 4 7,11 2,808 4 4 7,111 2,808 4 4 7,111 2,808	67% 2050 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Scenario: A	Australia A	dvanced l	PE .							Installed capacity in GW Scenario:	Australia A	dvanced	RE						
	2012	2015	2020	2025	2030	2035	2040	2045	2050	Scenario.	2012	2015	2020	2025	2030	2035	2040	2045	2050
Power plants	236	217	247	292	350	395	481	624	683	Total generation	43	44	78	113	156	178	219	280	313
Hard coal (& non-renewable waste) Brown Coal	138 31	98 47	101 7	68 0	9	0	0	0	0	- Fossil - Hard coal (& non-renewable waste)	33 18	29 13	24 14	20 9	10 1	4 0	1	0	0
- Gas of which from H2	42 0	38 0	34 0	39 0	29 0	4 0	0	0	0	- Brown Coal - Gas (w/o H2)	4 8	6 8	1 8	9	0 8	3	0 1	0	0
- Oil - Diesel	1 2	0	0	0	2	0	0	0	0	- Oil - Diesel	1	1	1 0	1 0	1 0	0	0	0	0
- Biomass (& renewable waste) - Hydro	1 14	0 19	0 19	2 19	7 19	22 19	13 19	27 19	43 19	 Hydrogen (fuel cells, gas power plants, g Renewables 	0 10	0 15	0 54	0 93	0 146	1 174	1 217	1 279	2 311
- Wind of which wind offshore	6	9	39 0	57 2	101 26	109 22	142 32	164 39	180 40	- Hydro - Wind	6 3	8	8 18	8 26	8 45	8 49	8 63	8 73	8 80
- PV - Geothermal	1 0	5	42 2	82 14	115 30	140 34	178 40	241 47	266 47	of which wind offshore - PV	0	0	0 26	1 51	9 72	8 88	12 111	14 150	14 166
Solar thermal power plants Ocean energy	0	0	1	5 5	28 10	47 19	65 23	79 48	78 50	Biomass (& renewable waste) Geothermal	0	0	1 0	1	3 7	7 8	8	11 9	20 10
Combined heat and power plants	13	17	20	23	26	32	38	35	40	 Solar thermal power plants Ocean energy 	0	0	0	2	10 3	10 5	13 6	16 12	16 13
Hard coal (& non-renewable waste) Brown Coal	0	0	0	0	0	0	0	0	0	Fluctuating RES (PV, Wind, Ocean)	4	7	44	79	119	141	180	235	258
- Gas of which from H2	8	12 0	14 0	16 0	16 0	11 0	0	0	0	Share of fluctuating RES	9%	17%	57%	70%	76%	79%	82%	84%	83%
- Oil - Biomass (& renewable waste)	1 2	2	2	2	1 9	0 18	0 30	0 28	0 30	RES share (domestic generation)	23%	35%	69%	82%	93%	98%	99%	100%	99%
- Geothermal - Hydrogen	0	0	0	0	0	1 2	3	3 4	4 6	Final energy demand in PJ/a 1)									
CHP by producer	0	0	0	0	0	0	0	0	0	Scenario:	Australia A 2012	dvanced 2015	RE 2020	2025	2030	2035	2040	2045	2050
Main activity producers Autoproducers	5	5 12	5 15	5 18	5 21	5 27	5 33	5 30	5 35	Total (incl. non-energy use)	3 333	4.133	4.261	4.181	3 871	3 645	3 437	3 538	3 542
										Total energy use 1) Transport	3,132 1,304	3,897 1,780	4,057 1.836	3,977 1,769	3,668 1,553	3,441 1,341	3,234 1,211	3,335 1,201	3,338 1,270
Total generation - Fossil	249 225	234 198	267 160	315 126	377 57	427 15	519 2	659 0	723 0	Oil products Natural gas/biogas	1,258	1,668	1,682	1,461	1,069	755 14	431	149	0 2
Hard coal (& non-renewable waste) Brown Coal	138	98	101	68	9	0	0	0	0	- Biofuels - Synfuels	14	47 0	52	68 12	95 17	120	184 39	226 51	246 56
- Gas - Oil	50 2	50	48 2	55 3	45 3	14	2	Ö	0	- Electricity RES electricity	15 1	45 7	5 67 27	190 114	314 266	25 379 365	473 471	666 666	836 836
- Oil - Diesel - Hydrogen	2	1	1	1 0	0	0 2	0	0	0	- Hydrogen RES share Transport	0	0 3%	3 4%	114 14 11%	40 26%	47 41%	73 63%	103 87%	130 100%
- of which renewable H2	0	0	0 0 107	0 0 189	0 0 319	2 2 410	5 5 512	4 4 655	6 717	·	1%	1.365	1.462	1.469	1.398	1.374	1.288	1.397	1.350
Renewables (w/o renewable hydrogen) Hydro Wind	24 14 6	36 19 9	107 19 39	189 19 57	319 19 101	410 19 109	19 142	19 164	717 19 180	Industry - Electricity RES electricity	1,002 288 28	1,365 327 50	1,462 366 147	1,469 381 229	1,398 421 357	1,374 463 447	1,288 512 510	1,397 589 589	1,350 610 610
- Wind - PV - Biomass (& renewable waste)	1	5	42	82	115	140	178	241	266	 Public district heat 	28 11 0	12	12	14	15	17	16	17	18
- Geothermal	0	0	4 2	7 14	16 30	41 35	44 43	55 50	74 51	RES district heat - Hard coal & Brown Coal	111	1 80	63	2 59	6 43	11 33	14 60	15 29	17 18
Solar thermal power plants Ocean energy	0	0	1 0	5 5	28 10	47 19	65 23	79 48	78 50	- Oil products - Gas	168 316	196 695	213 748	213 742	197 652	66 575	29 328	23 136	0
Import	0	0	0	0	0	0	0	0	0	- Solar - Biomass	0 108	0 55	0 60	0 60	0 69	25 181	47 223	80 310	116 343
- Import RES Export	0	0	0	0	0	0	0	0	0	- Geothermal - Hydrogen	0	0	0	0	0	15 0	37 36	78 136	100 146
Distribution losses Own consumption electricity	13 27	12 27	12 24	12 22	13 19	13 17	13 16	13 14	13 13	RES share Industry	14%	8%	14%	20%	31%	49%	67%	86%	99%
Electricity for hydrogen production Electricity for synfuel production	0.0	0.0	1.3 3.9	5.6 8.9	17.3 11.7	26.9 17.4	65.5 26.9	119.3 34.5	127.9 37.2	Other Sectors - Electricity	825 451	753 332	760 379	739 390	717 403	726 427	735 448	737 466	718 471
Final energy consumption (electricity)	209.4	195.6	225.6	267.1	315.8	352.4	398.1	478.3	532.5	RES electricity - Public district heat	43 0	51 0	152 0	234 0	341 0	411 0	446 0	466 0	471 0
Fluctuating RES (PV, Wind, Ocean) Share of fluctuating RES	8 3%	14 6%	81 30%	144 46%	226 60%	268 63%	343 66%	452 69%	495 68%	RES district heat - Hard coal & Brown Coal	0	0	0	0	0	0	0	0	0
RES share (domestic generation)	10%	15%	40%	60%	85%	96%	100%	100%	100%	- Oil products - Gas	124 180	141 211	107 205	85 188	36 174	33 149	14 107	7 30	0
Heat supply and air conditioning in PJ/a Scenario: A	Australia A	dvanced l	RF							- Solar - Biomass	11 58	11 58	10 53	14 51	26 47	33 44	51 52	74 55	81 58
Section 6.	2012	2015	2020	2025	2030	2035	2040	2045	2050	- Geothermal - Hydrogen	0	0	5	11	31 0	41	51 12	77 29	108
District heating plants	1	1	2	2	2	1	2	2	2	RES share Other Sectors	14%	16%	29%	42%	62%	73%	83%	95%	100%
- Fossil fuels - Biomass	1	1	2	2	2	1	2	1	0	Total RES RES share	263 8%	279 7%	509 13%	799 20%	1,287 35%	1,763 51%	2,247 69%	2,954 89%	3,317 99%
- Solar collectors - Geothermal	0	0	0	0	0	0	0	0	1	recondition	0,0		1070	2070	0070			0070	0070
Heat from CHP 1)	43	62	76	92	117	174	248	233	270	Australia Advanced RE	2012	2015	2020	2025	2030	2035	2040	2045	2050
- Fossil fuels - Biomass	30 13	42 20	50 27	57 34	57 56	36 120	0 197	1 184	1 198	Condensation power plants	195	169	123	86	26	3	1	0	0
- Geothermal	0	0	0	0	1 2	7	24 27	24 25	33 38	- Hard coal (& non-renewable waste) - Brown Coal	132	93 55	96 8	65 0	9	0	0	0	0
- Hydrogen Direct heating	931	1.295	1.359	1.371	1.305	1.278	1 193	1.317	1.249	- Gas - Oil	37 23 1	21 0	19 0	21 0	16 2	2	1	0	0
- Fossil fuels - Biomass	738 124	1,103	1,131	1,106	964 87	767 169	488 216	204	15 337	- Diesel	2	1	0	0	0	0	0	0	0
- Solar collectors	11 0	11	10	14 0	26	58	98	154 44	197 58	Combined heat and power plants	8	8	9	10 0	9	5	0	0	0
- Geothermal - Heat pumps 2)	0	ō	0 7	15	11 29	15 55	30 79	148	200	Hard coal (& non-renewable waste) Brown Coal	3	0	ō	ō	ō	ō	ō	ō	0
Electric direct heating Hydrogen	57 0	96 0	126 0	152 0	189 0	214 0	237 45	316 155	304 139	- Gas - Oil	5 1	1	8 1	9	8 1	5 0	0	0	0
Total heat supply3)	975	1,357	1,437	1,465	1,424	1,454	1,443	1,552	1,521	CO2 emissions power and CHP plants	203	178	133	96	35	8	1	0	0
- Fossil fuels - Biomass	770 137	1,146 105	1,182 111	1,166 118	1,023 144	804 289	490 414	205 480	16 536	Hard coal (& non-renewable waste) Brown Coal	132 39	93 55	96 8	65 0	9	0	0	0	0
- Solar collectors - Geothermal	11 0	11 0	10 0	14 0	26 12	58 22	98 54	154	197	- Gas	28	28	26					0	0
Heat pumps 2) Electric direct heating	0							69	92	- Oil & diesel	3	2	2	30 2	24 2	7	1	U	
	57	0 96	7 126	15 152	29 189	55 214	79 237	148 316	200 304	- Oil & diesel CO2 intensity (g/kWh)	3	0.00	0.00	0.00	0.00	7 0 0.00	0.00	0.00	0.00
- Hydrogen	0	96 0	0	152 0	29 189 2	214 12	79 237 72	148 316 180	200 304 177	Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat CO2 intensity fossil electr. generation	0.00 0.00 902	0.00 0.00 897	0.00 0.00 829	0.00 0.00 763	0.00 0.00 611	7 0 0.00 0.00 538	0.00 0.00 567	0.00 0.00 1,068	0.00 0.00 0
Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a)		96		152	29 189	214	79 237	148 316	200 304	Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat CO2 intensity fossil electr. generation CO2 intensity total electr. generation	3 0.00 0.00 902 815	0.00 0.00 897 759	0.00 0.00 829 497	2 0.00 0.00 763 305	0.00 0.00 611 93	7 0 0.00 0.00 538 19	0 0.00 0.00 567 2	0.00 0.00 1,068 0	0
Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a)	0 16% 0%	96 0 10% 0%	0	152 0 16% 124%	29 189 2 26% 226%	214 12 44%	79 237 72 66% 583%	148 316 180 87% 1059%	200 304 177 99%	Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat CO2 intensity fossil electr. generation	0.00 0.00 902	0.00 0.00 897	0.00 0.00 829	0.00 0.00 763	0.00 0.00 611	7 0 0.00 0.00 538	0.00 0.00 567	0.00 0.00 1,068	0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CPI# and CPI# autoproduction 2 Final energy consumption transport in PJ/a	0 16% 0%) heat from a	96 0 10% 0% ambient ener	0 13% 55% gy and electri	152 0 16% 124% city use	29 189 2 26% 226%	214 12 44% 422% 3) incl. proces	79 237 72 66% 583% ess heat, cook	148 316 180 87% 1059%	200 304 177 99% 1390%	Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat CO2 intensity fossil electr. generation CO2 intensity total electr. generation CO2 emissions by sector % of 1990 emissions (276 Mill t) Industry 1)	3 0.00 0.00 902 815 374 136% 45	2 0.00 0.00 897 759 420 152%	2 0.00 0.00 829 497 369 134%	2 0.00 0.00 763 305 308 111%	2 0.00 0.00 611 93 196 71%	7 0 0.00 0.00 538 19 123 45%	0 0.00 0.00 567 2 71	0.00 0.00 1,068 0 27 10%	0 0 2 1%
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CPIP and CPIP autoproduction 2 Final energy consumption transport in PJ/a	0 16% 0%) heat from a	96 0 10% 0% ambient ener	0 13% 55% gy and electri	152 0 16% 124%	29 189 2 26% 226%	214 12 44% 422%	79 237 72 66% 583%	148 316 180 87% 1059%	200 304 177 99%	- Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity fossil electr. generation - CO2 intensity total electr. generation CO2 emissions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1)	3 0.00 0.00 902 815 374 136% 45 20	2 0.00 0.00 897 759 420 152% 67 23	2 0.00 0.00 829 497 369 134% 71 20	2 0.00 0.00 763 305 308 111%	2 0.00 0.00 611 93 196 71%	7 0 0.00 0.00 538 19 123 45% 46 11	0 0.00 0.00 567 2 71 26% 27 7	0.00 0.00 1,068 0 27 10%	0 0 2 1%
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CPIP and CPIP autoproduction 2 Final energy consumption transport in PJ/a	0 16% 0%) heat from a Australia A 2012	96 0 10% 0% ambient ener dvanced I 2015	0 13% 55% gy and electri RE 2020 1,591	152 0 16% 124% city use 2025 1,522	29 189 2 26% 226% 2030 1,307	214 12 44% 422% 3) incl. proces 2035 1,094	79 237 72 66% 583% ess heat, cook	148 316 180 87% 1059% king 2045 916	200 304 177 99% 1390%	Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat CO2 intensity fossil electr. generation CO2 intensity total electr. generation CO2 emissions by sector % of 1990 emissions (276 Mill t) Industry 1)	3 0.00 0.00 902 815 374 136% 45	2 0.00 0.00 897 759 420 152%	2 0.00 0.00 829 497 369 134%	2 0.00 0.00 763 305 308 111% 71	2 0.00 0.00 611 93 196 71% 63 13	7 0 0.00 0.00 538 19 123 45%	0.00 0.00 567 2 71 26%	0.00 0.00 1,068 0 27 10%	0 0 2 1% 2 0
Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public (IPP and IPP alexproduction Final energy consumption transport in PJ/a Scenario: A road	0 16% 0%) heat from a Australia A 2012	96 0 10% 0% ambient ener	0 13% 55% gy and electri	152 0 16% 124% city use	29 189 2 26% 226% 2030	214 12 44% 422% 3) incl. proces	79 237 72 66% 583% 583 heat, cook 2040 956 344 146 31	148 316 180 87% 1059% king	200 304 177 99% 1390% 2050 966	- Oil & dissel CO2 intensity (g/kWh) without credit for CHP heat - CO2 mensity total electr, generation - CO2 mensity total electr, generation CO2 emissions by sector - % of 1900 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Power generation 2) - Other conversion 3)	3 0.00 0.00 902 815 374 136% 45 20 96 200	2 0.00 0.00 897 759 420 152% 67 23 128 173	2 0.00 0.00 829 497 369 134% 71 20 129 127	2 0.00 0.00 763 305 308 111% 71 18 112 89	2 0.00 0.00 611 93 196 71% 63 13 82 28	7 0 0.00 0.00 538 19 123 45% 46 11 58	0 0.00 0.00 567 2 71 26% 27 7	0.00 0.00 1,068 0 27 10% 13 2	0 0 2 1% 2 0 0
- Hydrogen RES ahare (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CIP and CIP autoproduction 2 Final energy consumption transport in PJ/a scenario: troad - fossif fuels - biofuels - symfuels - natural gas	0 16% 0%) heat from a 2012 1,092 1,076 14 0 2	96 0 10% 0% ambient ener dvanced I 2015 1,558 1,507 47 0 4	0 13% 55% gy and electri RE 2020 1,591 1,513 50 5	152 0 16% 124% city use 2025 1,522 1,306 58 10 11	29 189 2 26% 226% 2030 1,307 943 71 13 8	214 12 44% 422% 3) incl. proces 2035 1,094 645 94 19 5	79 237 72 66% 583% ess heat, cook 2040 956 344 146 31 3	148 316 180 87% 1059% king 2045 916 103 156 35 0	200 304 1777 99% 1390% 2050 966 0 141 32 0	- Oil & dissell CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity fost all electr. generation - CO2 intensity fost all electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3)	3 0.00 0.00 902 815 374 136% 45 20 96 200	2 0.00 0.00 897 759 420 152% 67 23 128 173	2 0.00 0.00 829 497 369 134% 71 20 129 127	2 0.00 0.00 763 305 308 111% 71 18 112 89	2 0.00 0.00 611 93 196 71% 63 13 82 28	7 0 0.00 0.00 538 19 123 45% 46 11 58	0 0.00 0.00 567 2 71 26% 27 7	0.00 0.00 1,068 0 27 10% 13 2	0 0 2 1% 2 0 0
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- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) patic CPF and CPF autoproduction 2 Final energy consumption transport in PJ/a Scenario: road - fossal fuels - botholes - natural gas - hydrogen - electricity Electrification share: tal - fossal fuels - fossal fuels - including transport - electricity Electrification share: tal - fossal fuels - biofuels - biofuels - biofuels - bydrigen - syntiels	0 16% 0%) heat from s Australia A 2012 1,092 1,076 14 0 2 0 0% 57 42 0	96 0 10% 0% ambient ener 2015 1,558 1,507 47 0 4 0 0 0% 52 7	0 13% 55% gy and electri RE 2020 1,591 1,513 50 5 12 3 14 1% 60 6 0	152 0 16% 124% city use 2025 1,522 1,306 58 10 11 14 133 9% 63 5 1 0	29 189 2 26% 226% 226% 2030 1,307 943 71 13 8 40 246 19% 73 4	214 12 44% 422% 3) incl. proces 2035 1,094 645 94 19 5 47 303 28% 79 3 1	79 237 72 66% 583% 2040 2040 2044 146 31 3 390 41% 85 3 1 0	148 316 180 87% 1059% king 2045 916 103 156 35 0 103 553 60% 114 1 2	200 304 177 99% 1390% 2050 966 0 141 32 0 0 130 695 72% 143 0 2	- Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity fossil electr. generation - CO2 intensity total electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Oildustry (1) - Oildustry (1) - Oildustry (1) - Transport - Power generation 2) - Oildustry (1) - Oildustry	3 0.00 0.00 902 815 374 136% 45 20 96 200 13	2 0.00 0.00 897 759 420 152% 67 23 128 173 29	2 0.00 0.00 829 497 369 134% 71 20 129 127 22	2 0.00 0.00 763 305 308 111% 71 18 112 89	2 0.00 0.00 611 93 196 71% 63 13 82 28	7 0 0.00 0.00 538 19 123 45% 46 11 58	0 0.00 0.00 567 2 71 26% 27 7	0.00 0.00 1,068 0 27 10% 13 2	0 0 2 1% 2 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWhla) 1) patic CPF and CPF autoproduction Final energy consumption transport in PJ/a Scenario. road - fossil fuels - syntucis - hydrogen - electricity Electrification share: rail - fossil fuels - lossil fuels - electricity	0 16% 0% 0 heat from a Australia A 2012 1,092 1,076 14 0 2 0 0 0% 57 42 0 0	96 0 10% 0% ambient ener dvanced 1 2015 1,558 1,507 47 0 0 0% 52 7 0 0 45	0 13% 55% gy and electri 2020 1,591 1,513 50 5 12 3 14 1% 60 6 0 0 0 53	152 0 16% 124% 124% 2025 1,522 1,306 58 10 11 14 133 9% 63 5 1 0 57	29 189 2 26% 226% 226% 2030 1,307 943 71 13 8 40 246 19% 73 4 1 0 68	214 12 44% 422% 3) incl. proces 2035 1,094 645 94 19 5 47 303 28% 79 3 1 0 75	79 237 72 66% 583% sts heat, cook 2040 956 344 146 31 3 73 3990 41% 85 3 1 0 82	148 316 180 87% 1059% king 2045 916 103 156 35 0 103 553 60% 114 1 2 0 1111	200 304 177 99% 1390% 2050 966 0 141 32 0 130 695 72% 143 0 2 1 140	- Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity fossil electr. generation - CO2 intensity total electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Oildustry (1) - Oildustry (1) - Oildustry (1) - Transport - Power generation 2) - Oildustry (1) - Oildustry	3 0.00 0.00 902 815 374 136% 45 20 96 200 13	2 0.00 0.00 897 759 420 152% 67 23 128 173 29	2 0.00 0.00 829 497 369 134% 71 20 129 127 22	2 0.00 0.00 763 305 308 111% 71 18 112 89	2 0.00 0.00 611 93 196 71% 63 13 82 28	7 0 0.00 0.00 538 19 123 45% 46 11 58	0 0.00 0.00 567 2 71 26% 27 7	0.00 0.00 1,068 0 27 10% 13 2	0 0 2 1% 2 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public OFF and OFF autoproduction road - fossil fuels - bibfuels - synthesis - electricity Electrification share: rail - fossil fuels - synthesis - electricity - road - fossil fuels - fossil fuels - fossil fuels - synthesis - electricity - rail - fossil fuels - synthesis - electricity - rail - raydaption - raydaption - rossil fuels - fossil fuels	0 16% 0%) heat from a 2012 1,092 1,076 14 0 2 0 0 0% 57 42 0 0 0 15	96 0 10% 0% smblent ener 2015 1,558 1,507 47 0 4 0 0 0% 52 7 0 0 45 53 53	0 13% 55% gy and electri RE 2020 1,591 1,513 50 5 12 3 14 1% 60 6 0 0 0 5 5	152 0 16% 124% city use 2025 1,522 1,306 58 10 11 14 133 9% 63 5 1 0 57 54 52	29 189 2 26% 226% 2030 1,307 943 71 13 8 40 246 19% 73 4 1 0 68	214 12 44% 422% 3) ind. proces 2035 1,094 645 94 19 5 47 303 28% 79 3 1 0 75 45 35	79 237 72 66% 583% ses heat, cook 2040 956 344 146 31 3 73 390 41% 85 3 1 0 82 42 27	148 316 180 87% 1059% king 2045 916 103 156 35 0 103 553 60% 114 1 2 0 1111	200 304 177 99% 1390% 2050 966 0 141 32 0 605 72% 143 0 2 1 1 140 45 0	- Oil & diesel CO2 intensity (gfWh) without credit for CHP heat - CO2 mensity losal electr, generation - CO2 mensity basil electr, generation - CO2 mensity basil electr. generation CO2 emissions by sector - % of 1900 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Other sectors 1) - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP authoroducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in PJ/a Scenario.	3 0.00 0.00 902 815 374 136% 45 20 96 200 13	2 0.00 0.00 897 759 420 152% 67 23 128 173 29 transport	2 0.00 0.00 829 497 369 134% 71 22 127 22 RE 2020 5,746	2 0.00 763 305 308 111% 71 18 112 89 17	2 0.00 0.00 611 93 196 71% 63 13 82 28 10	7 0 0.00 0.00 538 19 123 45% 46 11 58 4 5	0 0.00 0.00 567 2 71 26% 27 7 33 1 2	0.00 0.00 1,068 0 27 10% 13 2 11 10 1	0 0 2 1% 2 0 0 0 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CIP and CIP and CIP a	0 16% 0% 0) heat from s 2012 1,092 1,076 14 0 2 0 0 0% 57 42 0 0 15	96 0 0% smblent ener dvanced l 2015 1,558 1,558 1,557 47 0 4 4 0 0 0% 52 7 0 45 53	0 13% 55% gy and electri 2020 1,591 1,513 50 5 12 3 14 1% 60 6 6 0 0 0 53	152 0 16% 124% 2025 1,522 1,306 58 10 11 14 133 9% 63 5 1 0 57	29 189 2 26% 226% 226% 2030 1,307 943 71 13 8 40 246 19% 73 4 1 0 68	214 12 44% 422% 3) incl. proces 2035 1,094 645 94 19 5 47 303 28% 79 3 1 0 75	79 237 72 66% 583% ess heat, cook 2040 956 344 146 31 3 73 390 41% 85 3 1 0 0 82 42	148 316 180 87% 1059% king 2045 916 103 156 35 0 103 156 35 0 114 1 2 0 1111	200 304 177 99% 1390% 2050 966 0 141 32 0 130 695 72% 143 0 2 1 140 45	- Oil & diesel CO2 intensity (gfkWh) without credit for CHP heat - CO2 intensity losal electr, generation - CO2 intensity base leader, generation - CO2 intensity base leader, generation CO2 emissions by sector - % of 1900 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Transport ention 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district healing, refineries, coal transform Primary energy demand in P.J/a Scenario: Total - Fossil - Hard coal (& non-renewable waste)	3 0.00 0.00 902 815 374 136% 45 20 96 200 13 anation, gas	2 0.00 0.00 7,59 420 152% 67 23 128 173 29 40 40 40 40 40 40 40 40 40 40 40 40 40	2 0.00 0.00 829 497 369 134% 71 20 129 127 22 8 8 8 2020 5,746 5,059	2 0.00 763 305 308 111% 71 18 112 89 17 2025 5,681 4,409 722	2 0.00 0.00 611 93 196 71% 63 13 82 28 10	7 0 0.00 0.00 0.00 538 19 123 45% 46 11 58 4 5 5	0 0.00 0.00 567 2 71 26% 27 7 33 1 2	0.00 0.00 1.068 0 27 10% 13 2 11 0 1 1 2 0 1 1 1 2 1 1 2 5 1 1 1 1 1 1 1 1 1 1 1 1	0 0 2 1% 2 0 0 0 0 0 0 5,209 226 7
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) patic CIP and CIP autoproduction Final energy consumption transport in PJ/a 2 Final energy consumption transport in PJ/a 4 - fossil fuels - sosil fuels - synfuels - natural gas - hydrogen - electricity - clectricity - rail - fossil fuels - synfuels - synfuels - including the synfuels - synfuels - synfuels - synfuels - lectricity - navigation - fossil fuels - synfuels	0 16% 0% 0) heat from s Australia A 2012 1,092 1,076 14 0 2 0 0% 57 42 0 0 15 29 0 0 111	96 0 10% 0% ambient ener didvanced i 2015 1,558 1,507 4 0 0 0 0 0 4 52 7 0 0 4 53 0 0 1 53 0 1 53 0 1 53 0 1 53 0 1 53 0 1 53 0 1 53 0 1 53 0 53 0	0 13% 55% 55% 57 87 2020 1.591 1.513 50 5 12 3 14 11% 60 6 0 0 0 5 5 5 12 3	152 0 16% 124% city use 2025 1,522 1,306 10 11 14 133 9% 63 5 1 0 0 57	29 189 2 26% 226% 226% 2030 1,307 943 71 13 8 40 246 19% 73 4 1 0 68 50 43 6 1	214 144% 422% 3) incl. proces 2035 1,094 645 94 19 5 7 303 28% 7 9 3 1 0 75 45 35 8 8 2	79 237 72 66% 583% 583% 2040 956 344 146 31 3 390 41% 85 3 1 0 82 27 12 3 88	148 316 180 87% 1059% king 2045 916 103 156 35 0 103 553 60% 114 1 2 2 0 1114 1 2 3 5 8 8 8 8	200 304 1777 99% 1390% 2050 966 0 141 32 0 130 695 72% 143 0 2 1 144 45 0 37 88 88	- Oil & dissell CO2 intensity (gfWh) without credit for CHP heat - CO2 intensity fostil electr. generation - CO2 intensity fost electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other commissions (276 Mill t) - Transport - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in PJ/a Scenario: Total - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas	3 0.00 902 815 374 136% 45 20 96 200 13 Australia A 2012 5,147 4,836 1,538 387 1,036	2 0.00 0.00 759 420 152% 67 23 128 173 29 40 40 40 40 40 40 40 40 40 40 40 40 40	2 0.00 0.00 829 497 369 124 120 127 22 22 RE 2020 5.746 5.059 110,777 110 1,503	2 0.00 763 305 308 111% 71 18 112 89 17 2025 5,681 4,409 7722 39 1,552	2 0.00 0.00 611 93 196 63 13 82 28 10 2030 5,249 3,088 10 34 110 34 1,341	7 0 0.00 0.00 538 19 123 45% 46 11 58 4 4 5	0 0.00 0.00 567 2 71 26% 27, 7, 33 1 2 2040 4.879 1,248 37, 25, 512	0.00 0.00 1.068 0 27 10% 13 2 11 0 0 1	0 0 2 1% 2 0 0 0 0 0 0 5,209 226 7 12 32
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CIP and CIP and production Z Final energy consumption transport in PJ/a scenario: road - fossil fuels - biofuels - synfuels - natural gas - hydrogen - electricity Electrification share: tail - fossil fuels - biofuels - synfuels - including the share: tail - fossil fuels - biofuels - synfuels - synfuels - synfuels - fossil fuels - biofuels - synfuels	0 16% 0% heat from a 2012 Loss ratio a 2012 1.0962 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	96 0 10% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0	0 13% 55% gy and electri 2020 1.591 1.513 50 5 12 3 14 1% 60 6 0 0 53 56 54 2 0 109 109 0	152 0 16% 124% city use 2025 1,522 1,306 58 10 11 14 133 9% 63 5 1 0 57	29 189 2 28%, 226% 2030 1,307 943 71 13 8 40 246 40 246 19% 6 8 1 0 6 1 1 9 1 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1	214 124 44% 422% 3) incl. proces 2035 1,094 645 94 19 5 47 303 28% 79 3 1 0 75 45 45 47 303 28% 28 49 49 49 49 49 49 49 49 49 49 49 49 49	79 237 72 66% 583% 583% 10 2040 956 344 146 31 3 3 73 390 41% 85 3 1 0 82 27 12 3 88 57 72 5 25	148 316 180 87% 87% 87% 1059% king 2045 916 103 156 35 60% 114 1 2 0 1111 43 15 23 5 86 30 46	2004 1777 99% 1390% 2050 966 0 141 32 0 1390 695 72% 143 0 2 1 140 45 0 0 37 8 80 0 0 65	- Oil & dissell CO2 intensity (gf.Wh) without credit for CHP heat - CO2 intensity lost electr. generation - CO2 intensity lost electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) - Other conversion 3) - Other conversion 3) - Strick Public - 3) district heating, refineries, coal transform Primary energy demand in PJ/a Scenario: - Fossil - Hard coal (& non-renewable waste) - Natural gas - Crude oil - Renewables	3 0.00 0.00 902 815 374 136% 45 20 96 200 13 Australia A 2012 5,147 4,836 1,538 387 1,036 1,874 371	2 0.00 0.00 897 759 420 152% 67 23 128 173 29 29 420 167 23 128 173 29 420 173 29 420 173 29 420 420 420 420 420 420 420 420 420 420	2 0.000 0.00 829 497 369 134% 71 20 127 22 22 REE 2020 1,077 110 1,503 2,368 688	2 0.00 0.00 763 305 111% 71 18 112 89 17 2025 5.681 4.409 39 22,297 722 39 22,297 1,552 2,097	2 0.00 0.00 611 93 196 71% 63 13 82 28 10 2030 5,249 3,088 110 34 1,341 1,603	7 0 0.00 0.00 0.00 538 19 123 45% 46 11 58 4 5 5 2035 4,993 2,058 9 30 30 31 1,086	0 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	0.00 0.00 1.086 0 27 10% 13 2 11 1 0 0 0 1 1 1 1 1 2 0 1 1 1 1 1 1	2 1% 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CIP and CIP and production ZiFinal energy consumption transport in PJ/a Scenario: road - fossil fuels - biofuels - synfuels - natural gas - hydrogen - electricity Electrification share: tail - fossil fuels - biofuels - synfuels - including the share: tail - fossil fuels - biofuels - synfuels	0 16% 0% heast from a 2012 110% 110% 110% 110% 110% 110% 110%	96 0 10% 0% 0% arribent ener 4 1,558 0 0 0 101 101 0 0 0 0 0 0 0 0 0 0 0 0	0 13% 55% gy and electric F55% 12 2020 11,591 1,513 50 12 3 14 15% 60 6 0 0 0 53 56 54 2 0 0 109 109 0 0 0	152 0 16% 124% 2025 1.522 1.306 58 11 14 133 9% 57 1 0 0 7 54 52 2 0 106 98 6 1 1	29 189 2 26% 226% 2030 1,307 943 71 13 8 40 246 19% 10 68 50 68 1 1 99 79 79 73 3	214 44% 422% 422% 2035 1.094 645 94 19 5 47 203 28% 28% 2 92 72 72 17 3	79 237 72 66% 66% 66% 66% 66% 66% 66% 66% 66% 66	148 376 1890 87% 1059% 1	200 304 1777 99% 2050 966 0 1411 32 0 130 985 72% 143 0 0 2 1 140 45 0 0 37 8 8 80 0 0 65 15	- Oil & diesell CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity folial electr. generation - CO2 intensity botal electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in PJ/a Scenario. Total - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas - Renewables - Hydro - Wind	3 0.00 0.00 902 815 374 136% 45 20 96 13 13 2012 2 2012 2 115.538 387 1.538 387 1.538 387 1.538 387 1.538 387 1.538 387 1.538 387 2.538 2.538	2 0.00 0.00 897 759 420 152% 67 23 173 29 29 2015 5.800 2015 5.800 2015 5.800 1.468 2.380 68 33 38 38 38 38 38 38 38 38 3	2 0.00 0.00 829 497 369 134% 71 20 127 22 2 2 5.746 5.059 688 68 68 68 141	2 0.00 0.00 763 305 111% 71 18 112 89 17 2025 5.681 4.409 2.205 6.82 2.097 6.82 2.007 6.007	2 0.00 0.00 611 93 196 71% 63 13 82 28 10 2030 5.249 3.088 110 34 1.603 34 1.603 36 68 68 68 68 68 68 68 68 68 68 68 68 68	7 0 0.00 0.00 0.00 538 19 123 45% 46 11 58 4 5 5 2035 4,993 2,058 9 30 1,086 68 392 2,935 68 392	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00 0.00 0.00 1.068 0 27 10% 13 2 11 0 0 1 1 2 10 5 5 6 6 0 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 2 1% 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) pulic CIP and CIP autoproduction 2 Final energy consumption transport in PJ/a Scenario: road - fossil fuels - biofuels - natural gas - hydrogen - electricity Electrification share: tall - iossil fuels - biofuels - iossil fuels - biofuels - syntuels - iossil fuels - biofuels - iossil fuels - biofuels - syntuels - electricity - fossil fuels - iofuels - syntuels - iossil fuels - biofuels - syntuels - syntuels - syntuels - syntuels - biofuels - syntuels - biofuels - syntuels - biofuels - biofue	0 16% 0% heast from a 2012 2012 2012 1.0992 1.076 20 0 0 0 1111 101 0 0 0 0 1.304 1.258	96 0 10% 0% 0% arbitest ener 2015 1,558 47 0 0 0 4 4 0 0 0 4 5 2 7 7 0 0 0 4 101 101 101 101 101 101 101 101	0 13% 55% 97 and electric 55% 150 150 150 150 150 150 150 150 150 150	152 0 16% 124% 20 20 25 1.522 2 2 0 106 98 6 1 1.769 1	29 29 2 26% 226% 2030 1.307 943 71 13 8 40 40 19% 50 68 50 1.553 1.553 1.553 1.553 1.553	214 44% 422% 422% 2035 1,094 645 94 19 5 47 303 28% 79 3 1 0 0 75 8 8 2 92 72 73 3 1,341 755	79	148 376 180 77% 1059% 2045 916 103 156 0 35 53 36 60% 1114 12 2 0 1111 1111 23 5 8 86 30 46 10 11,201 1,449	200 304 177 99% 1390% 2050 966 0 141 32 0 0 143 130 855 130 0 0 37 72% 45 0 0 37 72% 45 0 0 37 140 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 0 37 150 150 150 150 150 150 150 150 150 150	- Oil & diesel CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity fosal electr. generation - CO2 intensity fosal electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in PJ/a Scenario. Total - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas - Crude cil - Renewables - Wind - Solar - Wind - Solar - Biomass (& renewable waste)	3 0.00 0.00 902 815 374 136% 45 0.00 13 45 0.00 13 45 0.00 13 45 0.00 13 45 0.00 13 15 0.00 15	2 0.00 0.00 897 759 420 152% 67 23 23 23 29 29 40 40 40 40 40 40 40 40 40 40 40 40 40	2 0.00 0.00 829 497 389 134% 71 20 127 22 2 2 5.746 5.059 68 68 141 165 253	2 0.00 0.00 763 305 305 308 111% 18 112 2025 5.681 4,409 722 39 1.552 2.097 68 205 329 300 300	2 0.00 0.00 611 93 196 71% 63 13 82 28 10 2030 5,249 3,088 110 20 68 8 364 541 448	7 0 0.00 0.00 0.00 538 19 123 45% 46 11 58 4 5 5 2035 4,983 2.058 9 30 1.086 68 392 730 680 880 880 880	0 0.00 0.00 567 2 71 26% 27 7 33 3 1 2 2 2040 4.870 1.248 675 512 675 512 675 511 972 1.061 1.061 1.061	0.00 0.00 0.00 1.088 27 10% 13 2 11 0 1 1 2045 5 5,112 600 5 26 205 364 4,512 68 89 1,308 89 11 89 10 10 10 10 10 10 10 10 10 10 10 10 10	2 1% 2 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
I-Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) public CIP and CIP autoproduction Final energy consumption transport in PJ/a Final energy consumption transport in PJ/a Final energy consumption transport in PJ/a road - fossil fuels - biofuels - synfuels - natural gas - hydrogen - electricity - road - fossil fuels - biofuels - synfuels - electricity - road - fossil fuels - biofuels - synfuels - synfuels - biofuels - biofue	0 16% heat from 2 2 1,096 1111 111 0 0 0 1111 111 0 0 0 111 111	96 0 10% 0% without energy of the control of the co	0 13% 55% gy and electric RE 2020 1.591 1.513 56 6 54 2 0 0 0 1.836 19 0 0 0 1.836 19 0 0 1.836 19 0 0 1.836 19 0 0 1.836 19 0 0 1.836 19 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1.836 19 0 0 0 1 1.836 19 0 0 0 1 1.836 19 0 0 0 1 1.836 19 0 0 0 1 1.836 19 0 0 0 1 1.836 19 0 0 0 1 1.836 19 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 1 1.836 19 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	152 0 16% 124% 124% 2005 1.522 1.306 58 0.10 1.41 1.305 57 57 54 52 2 0 106 98 6 1 1.769 1.769	29 189 2 26% 226% 2030 1,307 943 8 40 19% 73 4 1 1 0 68 50 43 6 6 1	214 44% 422% 2035 1,094 945 19 5 7 7 3 3 1 0 7 5 4 5 3 1 2 8 2 8 2 8 2 8 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	79 237 72 66% 583% 688 583% 2040 2040 9966 4146 31 3 73 390 4119 85 3 1 0 82 42 27 12 3 88 87 72 5 5	148 2045 97% 1059% 2045 976 103 156 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 0 103 155 105 105 105 105 105 105 105 105 105	200 304 177 99% 1390% 2050 966 0 141 32 0 0 132 130 695 72% 45 0 2 1 140 45 0 65 15 15 140 15 15 16 16 16 17 18 18 18 18 18 18 18 18 18 18 18 18 18	- Oil & diesell CO2 intensity (gfkWh) without credit for CHP heat - CO2 intensity losal electr, generation - CO2 intensity basel electr, generation - CO2 commissions by sector - No 1900 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Transport ention 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district healing, refineries, coal transform Primary energy demand in P.J/a Scenario: Total - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas - Crude oil - Renewables - Wind - Solar	3 0.00 0.00 902 815 574 136% 45 20 96 13 13 13 14 2012 15 1.43 83 87 1.53 83 87 1.63 83 83 87 1.63 83 83 83 83 83 83 83 83 83 83 83 83 83	2 0.00 0.00 897 759 420 152% 67 23 173 29 173 29 420 152% 67 23 173 29 420 152% 173 29 173 29 173 174 175 175 175 175 175 175 175 175	2 0.000 0.00 829 497 497 129 127 22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2 0.00 0.00 763 305 308 111% 71 18 17 17 2025 5.681 4.409 722 32 1.552 2.097 1.273 68 68 205 532 932 943 944 954 954 954 954 955 956 956 957 957 957 957 957 957 957 957	2 0.00 0.00 611 93 196 71% 63 13 82 28 10 10 2030 5,249 3,088 110 2,162 68 8 364 541	7 0 0 0.00 0.00 0.00 10 123 45% 46 11 58 4 4 5 5 2035 9 30 933 68 8 392 730 68	0 0.00 0.00 567 2 71 26% 27 73 33 1 2 2 2040 4.870 1.248 37 25 512 675 3,621 68 6511 972	0.00 0.00 1.068 0 27 10% 13 2 11 0 1 1 1 2 11 0 1 1 2 1 1 1 0 0	0 0 2 1% 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) pulic CIP and CIP autoproduction 2 Final energy consumption transport in PJ/a Scenario: road - fossil fuels - biofuels - natural gas - hydrogen - electricity Electrification share: tall - iossil fuels - biofuels - iossil fuels - biofuels - syntuels - iossil fuels - biofuels - iossil fuels - biofuels - syntuels - electricity - fossil fuels - iofuels - syntuels - iossil fuels - biofuels - syntuels - syntuels - syntuels - syntuels - biofuels - syntuels - biofuels - syntuels - biofuels - biofue	0 16% 0% heat from a 2012 2012 2012 1.0962 1.0962 0 0 0 15 57 42 0 0 0 15 20 29 29 0 0 0 1.258 0 0 0 1.3044 1.258	96 0 10% 0% orbital energy of the property of	0 13% 55% 12 2020 1.591 1.513 1.513 50 5 12 2 3 14 19 10 0 0 1.816 54 2 2 0 1.816 1.618 1.	152 0 16% 124% 2025 1.522 1.306 58 0 10 11 11 41 41 41 41 41 41 41 41 41 41 41	29 189 2 26% 226% 2286 2030 1,307 943 71 13 8 40 246 199 41 10 68 50 43 41 11 68 50 43 41 11 68 41 11 68 41 11 11 11 11 11 11 11 11 11 11 11 11	214 44% 422% 42% 3) incl. process 47 33 incl. process 47 30 3 28% 79 3 3 5 8 8 2 92 2 72 17 3 1,341 7555	79 237 72 66% 583% 68% 583% 146 146 33 390 41% 85 3 1 0 82 27 12 3 88 87 72 5 5 1.211 431 184	148 2045 87% 1059% 2045 978 1059% 2045 159 2045 159 2045 2045 2045 2045 2045 2045 2045 2045	200 304 177 99% 1390% 2050 966 0 141 32 0 0 132 130 695 72% 45 0 0 65 15 11,270 0 0 65 15	- Oil & dissell CO2 intensity (gfWh) without credit for CHP heat - CO2 intensity losal electr. generation - CO2 intensity basil electr. generation - CO2 missions by sector - No 1990 emissions (276 Mill t) - Industry 1) - Other commissions (276 Mill t) - Transport - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in P.J/a Scenario: Total - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas - Crude oil - Renewables - Hydro - Solair - Biomass (& renewable waste) - Solair - Biomass (& renewable waste) - Geothermal	3 0.00 0.00 902 815 374 136% 45 20 96 13 313 42012 13 1.538 387 1.038 387 1.038 387 1.038 22 17 222 0 17 222 0 0 18 15 16 16 16 16 16 16 16 16 16 16 16 16 16	2 0.00 0.00 897 759 420 152% 67 23 173 29 128 173 29 2015 5,800 5,442 1,468 2,130 359 359 369 329 29 2016	2 0.00 0.00 829 497 97 97 97 97 97 97 97 97 97 97 97 97 9	2 0.00 0.00 763 305 305 111% 18 112 2025 5.681 4.409 1.552 20 300 68 205 302 900 352 352 352	2 0.00 0.00 611 93 196 71% 63 13 82 28 10 2030 5.249 110 24 1,341 1,341 1,341 1,341 448 8364 448 705	7 0 0 0.00 0.00 0.00 538 19 123 45% 46 11 58 4 4 5 5 2035 2,058 9 30 933 80 2,935 68 89 292 730 880 880 7996	0 0.00 0.00 567 2 71 26% 27 7 33 1 2 2 2040 4.870 25 512 512 512 512 512 512 512 512 512	0.00 0.00 1.068 27 10% 13 2 11 0 1 1 2045 5,112 600 5 26 205 364 4,512 68 89 1,306 1	0 0 2 1% 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Hydrogen RES share (including RES electricity) electricity consumption heat pumps (TWh/a) 1) patic CIP and CIP autoproduction Final energy consumption transport in PJ/a 2 Final energy consumption transport in PJ/a 4 rosal fuels - lossifuels - synfuels - natural gas - hydrogen - electricity - electricity - road - fossifuels - individuals - individu	0 16% 0% heat from a 2012 1.092 1.096 1.006 0 0 0 1.006 0 0 0 1.006 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 0 1.006 0 1.006 0 0 1.006 0 0 1.006 0 1.00	96 0 10% 0% ambient ener 2015 1.559 1.559 2.7 7 0 0 0 0 0 1.780 1.668 2.7 0 0 1.780 1.668 47 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 13% 55% 12 2020 1.591 1 1.513 5 6 6 6 0 0 0 0 5 3 14 19 109 0 0 1.836 1.682 5 5 26	152 0 16% 124% 209 use 2025 1,502 1,306 58 10 11 14 133 9% 63 5 5 1 0 0 57 54 52 2 0 106 68 12 1,769 1,461 68 12 24	29 189 2 226% 226% 228% 2030 1,307 71 13 8 40 246 199 43 4 1 0 68 50 43 6 6 1 1 9 9 1 7 1 3 1 5 1 6 1 8 1 8 1 8 1 8 1 8 1 8 1 8 1 8 1 8	214 44% 422% 422% 2035 1.094 645 94 19 5 47 303 228% 79 3 1 1,341 755 8 2 92 27 17 3 1,341 755 120 25 14	79	148 376 180 2045 1059% 2045 1059% 2045 103 156 30 0 103 156 30 60% 111 4 3 5 5 5 3 6 6 10 10 12 2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	200 304 177 99% 1390% 2050 966 96 141 132 2 0 130 150 2 1 140 2 140 37 8 8 8 0 6 5 5 5 1 1 2 7 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	- Oil & dissell CO2 intensity (gfkWh) without credit for CHP heat - CO2 intensity losal electr, generation - CO2 certensity total electr, generation - CO2 certensity total electr, generation CO2 emissions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other commissions (276 Mill t) - Transport - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in PJ/a Scenario: Total - Hard coal (& non-renewable waste) - Hard coal (& non-renewable waste) - Hard coal (& non-renewable - Hard coal (& no	3 0.00 0.00 902 815 374 138% 200 13 45 20 13 45 200 13 45 200 13 45 200 13 45 200 13 45 200 13 45 200 13 45 200 15	2 0.00 0.00 897 759 420 152% 67 23 128 173 29 420 4dvanced 2015 5.800 2015 1.488 32 29 229 0 0	2 0.00 0.00 829 497 97 97 97 97 97 97 97 97 97 97 97 97 9	2 0.00 0.00 763 305 111% 12 20.25 5.681 4.409 1.552 2.9 300 2.5 2.9 300 352 18	2 0.00 0.00 611 93 196 71% 63 13 82 28 10 2030 5.249 11.341 1.341 1.341 1.341 1.341 1.441	7 0 0.00 0.00 0.00 538 19 123 45% 46 115 58 4 5 5 58 4.993 2.058 9.30 9.30 9.33 1.986 58 58 58 58 58 58 58 58 58 58 58 58 58	0 0.00 0.00 567 2 71 26% 27 77 33 1 2 2 2040 4.870 25 12 512 512 512 512 512 512 512 512 5	0.00 0.00 1.068 27 10% 13 2 211 0 1 1 1 2045 5.112 2045 5.112 600 5 26 205 364 4,512 68 68 591 1.306 81 81 81 81 81 81 81 81 81 81 81 81 81	2 1% 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Hydrogen RES share (including RES electricity) electricity on consumption heat pumps (TWh/a) electricity consumption heat pumps (TWh/a) electricity consumption heat pumps (TWh/a) 1) putic CPI and CPIP and pumps (TWh/a) 2 Scenario. road - fossil fuels - biolidusis - syntusis - hydrogen - electricity Electrification share: rail - fossil fuels - pumpsis - electricity - electricity - electricity - electricity - road - rossil fuels - biolidusis - syntusis - syntusis - rossil fuels - biolidusis - syntusis - syntusis - syntusis - tossil fuels - biolidusis - syntusis - tossil fuels - tossi	0 16% on% heat from a 2012 1.09% 1.00% 1.0	96 0 10% 0% 0% 1.780 0 1.780 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 13% 55% September 2020 1.591 1.513 50 60 6 6 0 0 0 1.836 53 56 54 2 0 0 1.836 56 52 6 3 3 1.882 52 52 6 3 3	152 0 16% 124% 2025 1.502 1.502 1.306 58 10 11 14 133 9% 63 5 1 0 57 7 1.769 98 6 1 1 1.769 98 6 1 1 1.769 98 6 1 1 1.769 98 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	29 29 2 26% 226% 226% 2030 1,307 943 71 13 8 40 246 8 19% 73 4 1 0 0 68 68 1,553 6 1 1,553 95 17 19 40 40 40 40 40 40 40 40 40 40 40 40 40	214 44% 422% 2035 1.094 2035 1.094 2035 28% 2 72 73 3 1.341 755 124 47 47 47	79 237 72 237 72 2653% 2040 9966 344 145 145 27 25 5 5 5 7 25 5 5 1211 431 431 439 10 73	148 316 180 37% 1059% 2045 9916 103 35 0 0 103 155 35 35 60% 1114 1 1 1 2 3 5 5 86 46 10 11 1201 1201 1201 1201 1201 1201 12	200 304 177 99% 1390% 2050 9966 0 141 32 0 0 130 995 72% 143 0 0 130 141 140 0 0 130 141 140 0 0 0 150 150 160 160 160 160 160 160 160 160 160 16	- Oil & diesell CO2 intensity (g/kWh) without credit for CHP heat - CO2 intensity fostal electr. generation - CO2 intensity fostal electr. generation - CO2 missions by sector - % of 1990 emissions (276 Mill t) - Industry 1) - Other sectors 1) - Transport - Power generation 2) - Other conversion 3) Efficiency' savings (compared to Ref.) 1) incl. CHP autoproducers 2) incl. CHP public 3) district heating, refineries, coal transform Primary energy demand in P.J/a Scenario. Total - Fossil - Hard coal (& non-renewable waste) - Brown Coal - Natural gas - Crude elected - Wind - Solar - Biomass (& renewable waste) - Geothermal - Ocean energy Total incl. net elec. & synfuel import - of which non-energy use Total tall ES incl. electr. & synfuel import	3 0.00 0.00 902 902 913 915 916 916 916 916 916 916 916 916 916 916	2 0.00 0.00 897 759 420 152% 67 23 128 173 29 29 29 1 1,488 32 29 229 0 0 0 5,800 0 5,800 235 5,800 235 5,800 2 359	2 0.00 0.00 829 134% 497 369 134% 71 20 129 22 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2 0.000 0.00 763 308 1111% 112 112 112 112 112 112 112 112 1	2 0.00 0.00 611 93 196 71% 63 182 28 10 2030 5.249 3.088 110 4.341 1.341 1.341 5.41 5.41 5.41 5.41 5.41 5.41 5.41 5.	7 0 0.00 0.00 0.00 0.00 123 19 123 45% 46 11 58 4 5 5 120 120 120 120 120 120 120 120 120 120	0 0.00 0.00 567 2 71 26% 27 7 33 1 2 2 2040 4.870 4.870 1.248 37 5.12 5.12 5.12 5.12 5.12 5.12 5.12 5.12	0.00 0.00 0.00 27 10% 13 2 11 10 1 1 1 2045 5,112 68 690 690 690 691 1,306 691 1,306 691 1,294 1,512 204 5,5112	2 1% 2 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0





