

Visit Report

Visit to South Australia State by Officers of Climate Change Department, Government of Gujarat: Understanding Climate Change actions in South Australia

Introduction

Mr. Mukesh Shah, Joint Secretary and Mr. Shwetal Shah, Technical Advisor of Climate Change Department visited Adelaide, South Australia during October 30 – November 01, 2017. The purpose of the visit was to understand to progress made by the South Australia in areas of climate change adaptation and mitigation. The Future Fund of the Climate Group, States and Regions Alliance provided support in accomplishing this visit and learning platform for emerging State partners. The visit was comprehensively planned and supported by the officers and associates of Government of South Australia. The major discussions and deliberation of the visit are given in this report.

Day 1 – Interaction with the DEWNR team and Visit of Adelaide City

The meeting with the DEWNR team was organized in the first half of the day 1, in this meeting primary introduction on the activities of South Australia was given by Ms. Julia Grant. The broad understanding of the South Australia's DEWNR's activities was given and how the planning is in place for the net zero emission by 2050 was also discussed. Mr. Shwetal Shah made presentation on Gujarat's activities in Climate Change field along with an audio visual presentation of the major activities of the State of Gujarat in the field of Renewable Energy and the Climate Change adaptation. Dr Brita Pekarsky also made an interesting presentation with a comparison of the two states, which is highly varied in its population, land area and overall GHG emission, she also explained on details like how GHG emission is being reduced in South Australia since 1990 to the present day and how net zero GHG will be achieved by 2050.

Following are the key points of the South Australia's Climate Change Vision:

- South Australia has a strong record in leading climate change action. SA was the first jurisdiction in Australia to introduce climate change-specific legislation – the Climate Change and Greenhouse Emissions Reduction Act 2007 – which sets greenhouse gas emissions reduction and renewable energy targets. The Act promotes climate change mitigation and adaptation action within South Australia that provides consistency with national and international schemes.

- Importantly, it sets a bold new greenhouse gas emissions target to achieve net zero emissions by 2050. This target will provide a new focus for action by all sectors and send a strong signal that further and more ambitious actions are required to reduce emissions.
- Increase renewable energy generation to at least 33% of electricity generation in SA by 2020.
- Reduce GHG emission in SA by at least 60% by 2050
- Engaging community as partners in tackling climate change – partnerships are an important component of climate change intervention initiatives, they enable collaboration of ideas and knowledge including essential regional input from people who know local problems and solutions.
- Land-use planning has emerged as a consistent theme in SA, and it is clear the planning system needs to deliver sound, long-term decision that will help in adapting to climate change and become low carbon.
- A sustainable society has to be imagined first before it can be created – therefore the importance of planning and developing policies, strategies and inclusive implementation is necessary.

The discussion also took place on Adaptation Framework and State Adaptation Plan of South Australia by Ms Olessya Vitkovskaya and Ms Lauren Burton. They explained about how planning and programs are being framed to safeguard people from extreme weather conditions like Heat wave, cyclones and other climate change impacts. Also Gujarat's adaptation sector perspectives and challenges were discussed with a view of changing weather pattern and other developmental pressure on natural resources.

- Projections for South Australia indicate warmer and drier conditions and sea level rise across much of the state with an increased risk of severe weather events including storms, flooding, heatwaves, drought and bushfires. These changes will affect our individual health and wellbeing, along with the key industries and resources that underpin the state's economy.
- South Australia's adaptation framework *Prospering in Changing Climate: A Climate Change Adaptation Framework for South Australia* was released in 2012. It is a foundation for guiding business, the community, non-government organisations, the research sector, local governments and state government agencies to develop well-informed and timely adaptation responses. The framework was developed by the Department of Environment, Water and Natural Resources (DEWNR), in

partnership with the Premier's Climate Change Council, the Natural Resources Management Council and other government agencies.

- As part of this initiative, a Government Action Plan outlines the roles that the government will play in implementing the adaptation framework. The framework supports a region-based approach, through the development of locally relevant adaptation responses across the South Australian government regions recognising that the economic, social and environmental impacts of climate change will vary across the state.



After the discussion in the office of DEWNR, the delegation visited the Central Business District and Market place of the Adelaide. Ms Jaimi Smith and Mr David Bailey accompanied this city visit and explained the major features of the Carbon Neutral

Adelaide, its Action Plan, Business engagement and strategies to achieve the Carbon Neutral Adelaide project.

Followings are important points of Carbon Neutral Adelaide:

- The South Australian State Government and Adelaide City Council have shared aspiration for Adelaide to be the world's first carbon neutral city.
- Adelaide will be a showcase for the uptake of renewable and clean technologies and for embracing the economic opportunities of responding to climate change.
- Carbon neutrality for the City of Adelaide means that the net greenhouse gas emissions associated with operational activities that occur within the Adelaide City Council local government area are equal to zero. The local government area includes the Adelaide Park Lands, the CBD and North Adelaide.
- Carbon neutrality is achieved through a combination of measuring and reducing greenhouse gas emissions and then purchasing carbon offsets.
- Adelaide is the capital city of South Australia. Greater metropolitan Adelaide is home to 75% of the State's population of 1.7 million people. The City of Adelaide is surrounded by 760 hectares of parklands. The city accounts for 20% of the state's economy.
- In 2014/15, the total operational greenhouse gas emissions of the City were 951,923 tonnes CO₂-e. Electricity, gas and transport fuel use were the primary sources of carbon emissions, with electricity and gas contributing 60%, transport fuel use 35% and waste disposed to landfill generated 5% of emissions.
- Pathways to carbon neutrality
 1. Energy efficient built form Drive investment in energy efficiency of city buildings and other infrastructure, and green the streetscapes and open spaces.
 2. Zero emissions transport: Decarbonise transport and change the way we travel to and in the city.
 3. Towards 100% renewable energy Continue to drive investment in large-scale renewable energy generation and storage in the state, and encourage the uptake of small scale renewable energy supply and storage in the city.
 4. Reduce emissions from waste and water Build on South Australia's leadership in resource recovery and diversion of waste from landfill.
 5. Offset carbon emissions Reduce emissions rapidly in every way we can, and offset the remaining emissions when appropriate timing has been confirmed with our partners.

- **Building Upgrade Finance:** BUF is a mechanism that helps building owners access commercial loans to help fund their works to improve the energy, water and environmental efficiency of their existing commercial buildings. The BUF mechanism is voluntary for building owners, financiers and local councils. The mechanism will support Carbon Neutral Adelaide and generate multiple environmental and economic benefits by stimulating jobs and investment in the property sector, providing opportunities for local manufacturers and suppliers of clean technologies, improving the quality and amenity of buildings, and reducing the impact of rising energy and water costs on businesses.
- **Sustainability Incentives Scheme:** The Adelaide City Council and the Department of Environment, Water and Natural Resources are co-funding the Sustainability Incentives Scheme, which provides rebates for investment in the installation of water and energy savings systems such as solar PV panels, solar hot water systems, energy storage systems, apartment building energy efficiency upgrades, electric vehicle charging points and rainwater tanks. It is estimated that these actions will result in approximately 1,000 tonnes CO₂ -e of avoided emissions annually.
- **Siemens City Performance Tool:** The Siemens City Performance Tool (CyPT) report has been undertaken in 13 cities worldwide, including San Francisco, London, Vienna and Shenzhen, and Adelaide is the first Australian city to undertake the review. The findings are a valuable contribution to the Carbon Neutral Adelaide discussion.

The overall coordination of the first day was done by the Ms. Alision Brooks.

Action points: Carbon neutral city planning may be carried out in a few selected cities of Gujarat. Gujarat may propose to enact a legislation on GHG emission reduction Act. Gujarat may develop 2050 carbon neutrality pathway.



Day 2 – Renewable Energy and Low Carbon Strategies

On the second day of the visit, the meetings and discussion were taken place in the State Administration Centre, 200 Victoria Square Adelaide in the first half. Mr Sam Crafter of the Low Carbon Economy Unit explained about South Australia’s Energy Plan. Ms Mary Lewitzka explained about the Bioenergy and Mr. Alan Richards talked about Zero Emission Vehicle strategy of the South Australia. Gujarat’s team also made a presentation about renewable energy actions in Gujarat and policies of the State Government in field of Solar, Wind and other sources of renewable energy. A discussion on the 100 MW, world’s first large scale battery storage project and its features were discussed in detail.

Some of the key points discussed regarding South Australia’s Climate Change Strategy 2015 – 2050 - Towards A Low Carbon Economy are as under:

- South Australia is a leader in climate change action. In 2007, they introduced Australia’s first climate change legislation i.e. the Climate Change and Greenhouse Emissions Reduction Act 2007, embedding an emissions reduction target in law. This legislation also enshrined a renewable energy generation target.

- The supportive policy and regulatory frameworks have provided transparency and certainty to investors, resulting in 41 per cent of the state’s electricity generated from renewable energy sources in 2014/15.
- They have demonstrated great capacity for innovation, achieving significant growth in the renewable energy and clean-tech sectors by acting early and introducing significant measures to address climate change, South Australia has already commenced the transition towards a low carbon economy.
- South Australia has a suite of ambitious targets to guide action over coming decades:
 - i. South Australia will achieve net zero emissions by 2050.
 - ii. Adelaide will be the world’s first carbon neutral city.
 - iii. South Australia will achieve \$10 billion in low carbon investment by 2025.
 - iv. South Australia will generate 50 per cent of its electricity from renewable sources by 2025.
 - v. South Australia will improve the energy efficiency of government buildings by 30 per cent of 2001 levels by 2020.
- SA’s aspirations for the future and provides a framework for renewed effort and action. The Strategy outlines new initiatives that will put us on the path towards achieving South Australia’s ambitious new emissions reduction target and building resilience to the climatic changes.

The Strategy is organised into six themes:

 1. South Australia taking the lead on climate change action
 2. Towards net zero emissions
 3. Showcasing Carbon Neutral Adelaide
 4. Innovating to drive a resilient and competitive low carbon economy
 5. Creating a prosperous and resilient state
 6. Building community capacity to take action on climate change.
- Transport contributes almost a quarter of the world’s emissions. The uptake of electric vehicles will be a key strategy to cut emissions from the transport sector. There are a range of strategies are being explored to support the uptake of electric vehicles. For example, the SA government is supporting a hybridelectric car share project. The project aims to give people the experience of driving an electric car and to showcase local industry capability for Low Carbon Investment Plan.

Action Points: Gujarat may develop low carbon roadmap for various sectors like energy, transportation, manufacturing etc. Develop strategies to leverage investment in low

carbon initiatives. Mass battery storage infrastructure and priority to renewable energy through leadership initiatives.



Site Visit - University of Adelaide and Lunch at Art Gallery of South Australia

The objective of visiting the UA was to discuss Renewable Energy Research Projects and other opportunities in areas of education and climate change.

During the visit to Adelaide University, Associate Professor Nesimi Ertugrul of Electrical and Electronic Engineering, University of Adelaide, Dr Chris Matthews Manager, Institute for Mineral and Energy Resources, University of Adelaide, Mr. Richard Webster Principal Advisor, Low Carbon Economy Unit, Department of the Premier and Cabinet, Government of South Australia, Ms. Yvette Booth (YB) - Executive Officer, Climate Change & Carbon Neutral Adelaide Cabinet Taskforce, Department of the Premier and Cabinet, Mr. Mukesh Shah and Mr. Shwetal Shah were present.

During the meeting it was discussed that there is interest in climate change policy and capacity building, and the University has experience in this area. Gujarat would welcome visits and promotion from the University because the population of Gujarat is very young and there is a strong desire there to be progressive and have excellence in education and there would be many international students wishing to come to Adelaide.

Gujarat would welcome university's assistance in setting up climate change courses and syllabuses that could be delivered in Gujarat as part of their University degrees. There is interest in wave and tidal power energy and there is a strong wave and tidal group in the university, which could be engaged. Other areas of great interest to Gujarat were food and agriculture, and associated with this were energy efficiency and water pipeline networks. The UA has a desire to expand work in waste to energy conversion, and the SA has a long track record in this area. Sectors like energy storage, microgrids and energy efficiency are great opportunities to save energy using some simple engineering changes in India. There was also a discussion of the Energy Storage Knowledge Bank Project and to have an MoU with UA and Gujarat to take collaborations in the ways described above.

Action Points: MoU between universities of two states. Students, faculty exchange programme, joint courses development, sharing climate change content for text books of primary, secondary and graduate level schools.





Site Visit - Lochiel Park Green Village

Dr David Whaley of the University of South Australia explained and showed the renewable technology and smart grid applications in the Lochiel Park Green research village. The key points of interest during this visit are as under:

- Lochiel park provides a new way of living for South Australians and is an example of South Australia's strategic plan in action. now complete, Lochiel park is a model green village and home to over 150 residents enjoying sustainable living using the best sustainable technologies available.
- It is approximately 8 km north-east of the Adelaide CBD. It was master planned based on sustainability principles which included addressing climate change impacts and establishing credentials for claiming carbon neutrality.
- All houses are serviced by Solar PV cells, recycled water systems, gas boosted solar hot water systems, a minimum 7.5 star thermal performance rating, with a target of reducing potable water supply by 78%, greenhouses gases by 74% and energy use by 66%, compared to the 2004 SA average.
- The project demonstrates sustainable practices, principles and approaches with a goal of transforming the development industry's ability to cope with the impacts of climate change and reduce greenhouse emissions.

- Mandated photovoltaic cells on every dwelling (1kW per 100sqm habitable floor area). - Recycled (third pipe) water supply system provided for toilet flushing, cold tap washing machines, garden use and parkland irrigation.
- This system uses captured storm water from a 190 hectare adjacent urban catchment which is cleaned through a wetland system and aquifer storage recovery scheme prior to reuse in houses.
- Recycled and low embodied energy materials used in reserve and public realm infrastructure, including recycled aggregate and fibre reinforced concrete, pavers and bricks manufactured on site from recycled waste material and clay excavated from the wetlands and use of recycled pavement products in the road base.
- Water sensitive urban design initiatives used to clean stormwater collected from an adjacent urban catchment of 70 hectares (separate to the recycled stormwater catchment) before discharge into the River Torrens.
- Community buildings are also fitted with photovoltaic cells and public lighting uses solar and high energy efficient systems. A 10 hectare urban forest biodiversity corridor has been created adjacent to the development that is also designed to offset greenhouse gases from the development. A community garden is developed to provide residents access to a local food bowl to reduce vehicle use.
- The development of Lochiel Park provides a unique opportunity to test modelled theories on residential water and energy efficiency and waste reduction against real life data, and thereby demonstrate the costs and benefits of various approaches to reducing energy and water use for residential development with the climate change adaptation and mitigation aspects.

Action Points: Sharing case studies between peer groups like architects, engineers, researchers, real-estate developers etc. Bringing innovation and sustainability passive and active features in housing sector in Gujarat.



Site Visit – Fluid Solar House

- Fluid Solar House is a custom-designed \$8 million four-storey commercial office building, constructed with Fluid Solar technologies. These include a large thermal battery under the car park, renewable energy-powered heating, cooling and ventilation systems and innovative solar thermal collectors. Its unique blend of energy collection, storage and utilization make it the first of its kind in the world.
- Fluid Solar House has disconnected from SA's embattled electricity grid due to its ability to generate 250 kilowatt peak (kWp) of thermal and PV electric power from the building's use of patented concentrating Fluid Solar Thermal collectors and conventional photovoltaic (PV) solar panels on its rooftop.
- The 3000-square-metre building contains 2200 kilowatt hours (kWh) of energy storage capacity, comprising around 90 per cent thermal storage and the remaining 10 per cent as conventional battery storage. Fluid Solar House is also part of Tesla's car-charging network, with provision for 11 electric vehicles parking spots fully supplied by solar power harvested from a 98kWp array of 378 PV solar panels on the building's roof.
- This company is not only involved in demonstration but also is progressive in research of Solar Thermal, heat storage, natural ventilation, zero energy building, solar thermal based low temperature & low pressure steam turbine tec. Their

unique and innovative ideas and leadership in net zero building makes them outstanding worldwide.

Action Points: Develop B2B framework for Green Technology, Promotion of innovation for Climate Change mitigation and adaptation projects. Demonstrate public utility building like college, hospital, shopping markets etc with zero energy concept. Development of solar thermal based steam turbine energy generation.



Day 3 - South Australia's Water Management Frameworks

The South Australian Water Story and International Engagement presentation was given by The Hon. Karlene Maywald of SA Water and Ex. Minister, Govt. of SA. She explained and give a very good insight of issues and various interesting solutions followed in SA in the water resources solutions. Mr. Daryl Day (ICEWaRM) talked on Capacity Building on Water Challenges and also give the brief about their engagement with India state of Rajasthan, which is very appropriate sister state initiative in the water sector. Gujarat can also take benefits of this engagement as having mostly similar challenges and it is getting increasing because of climate change.

Some of the key point discussed were:

- SA is Australia's driest state, it faces a tough challenge in climate change, particularly in securing a reliable water supply. SA's economic productivity is undermined by many weather events that will become more frequent as climate changes. SA Water manages water services in South Australia. It is owned by the South Australian Government. It works to provide world class water services to nearly 1.7m South Australian customers. Provides safe, clean drinking water, and once this water has been used, removes the waste and treat it to ensure the best outcomes for health, and to reduce environmental impact.
- SA Water is committed to providing safe, clean water supplies to their customers. The water security plans - which are developed for each region in South Australia - are one way of helping us to offer this reliable service. The plans also provide strategic direction for our capital, maintenance and operational projects and are adaptable to meet the needs of current and future generations. These projects form part of our Regulatory Business Proposal (RBP). We submit the RBP to our regulator, the Essential Services Commission of South Australia (ESCOSA) every four years.
- The plans use the best analytical and scientific methods for South Australian weather and climatic conditions. These are matched against long-term forecasts of resources availability and customer demand. Our research complements work by the Department of Environment, Water and Natural Resources (DEWNR) and the Goyder Institute.

- Water security planning analyses water availability and historic customer demand. This helps to quantify and project future water supply requirements. SA Water considers a wide variety of potential influences to water demand patterns. SA Water uses these to build models to forecast demand in each water supply system. The models consider residential and non-residential (commercial and industrial) water use. This is to reflect potential differences in demand patterns.
- The models match the demand to the potential influence of:
 - a. climate, including the latest climate change data (rainfall, temperature and evaporation)
 - b. population projections
 - c. state Gross Domestic Product (GDP)
 - d. water prices, water restrictions and network losses.
- If existing resources are deemed insufficient to meet future needs (on either a volume or quality basis), options for augmentation are considered. These options look at both demand and supply measures, including:
 - ✓ potential customer water efficiencies
 - ✓ substitution with stormwater or recycled water for non-drinking purposes
 - ✓ alternate water supply
 - ✓ increasing extractions from existing supply
- Consideration is also given to: cost, sustainability of the resources, the social, environmental and economic impact of each option.
- International Centre of Excellence in Water Resource Management, ICEWaRM's work brings together a large and diverse range of water sector professionals across government, education and industry. They include researchers, educators, water managers, scientists, policy staff and consultants from various domains.
- ICE WaRM has developed a global network of partnerships and links with numbers of key organisations, governments and specific water resources management departments. Rajasthan is the major partner State with the ICEWaRM and Gujarat shall also take advantage of this partnership.

Mr. Steve Morton of DEWNR coordinated third day's meetings and site visits.

Action Points: sharing best practices for water and climate change adaptation, water efficiency improvement technologies and practices. Implementation of water metering and monitoring of household level water consumption. Water quality and desalination technologies.





Site Visit – Adelaide Airport Stormwater Harvesting Project

SA Water is actively seeking recycling opportunities from its various wastewater treatment plants to provide water for irrigated agriculture and other fit for purpose uses. This visit provided an opportunity to hear about the utility's approach to developing alternative water resources as a key mix of resources for various uses using the Adelaide Airport Storm Water Harvesting Scheme as an example.

- The Adelaide Airport Stormwater Scheme is a \$9.8 million project to capture, store and distribute treated stormwater for industrial, commercial and irrigation use on and around the Adelaide Airport.
- The scheme is jointly funded by the Australian Government, through the Water for the Future initiative, the Government of South Australia and SA Water.
- The stormwater scheme has the capacity to deliver up to 270 million litres of treated stormwater each year, reducing the use of potable water and thereby improving the security of water supplies for metropolitan Adelaide.
- The scheme creates positive outcomes for the environment and the people of metropolitan Adelaide by reducing reliance on water from the River Murray and Mount Lofty Ranges, and increasing urban stormwater harvesting and recycling.
- As part of the scheme, infrastructure to harvest, treat and store stormwater is constructed on Adelaide Airport land at James Melrose Road, Novar Gardens. A new underground main to distribute treated stormwater is laid along the eastern boundary of the Airport.

- The storm water is harvested from Brownhill Creek, filtered via media filtration and biofiltration, injected into the T2 aquifer for storage before being extracted for use. The system is capable of capturing, treating and supplying up to 270 megalitres (ML) of water per annum.

Action Points: technology transfer in water and climate change adaptation sector as per guidelines of Paris Agreement. Few water conservation demonstrations in Gujarat.





Site Visit – Oaklands Wetlands Storm water Harvesting Project

Oaklands Wetland is a new and deeply valued wetland which plays a variety of important roles. Most importantly its key purpose is to clean and supply precious water to many local parks and sporting facilities. It is a ‘water farm’ and provides the community with green open spaces. This visit provided an opportunity to see the wetland and associated infrastructure and to hear about the role that it plays in providing water supplies for irrigating public open space and as a community space for recreational and other activities. Mr Sam Phillips explained about the site and provided insight of the project that how an abandoned site of drivers training converted to an ecological park and a center of water management and climate change adaptation for community as well as biodiversity.

- Key objectives of the stormwater harvesting, treatment, storage and distribution system in Oaklands Park, in the City of Marion include:
 - Develop Up to 172ML of water suitable for irrigation to council reserves in the

area;

-A high value public open space for community usage;

-A bio-diversity vegetation corridor; and

- Community education.

- Wetland was constructed to treat stormwater, extracted from the Sturt River to a standard that is suitable for aquifer injection. The 2.3 hectare wetland is designed to treat between 400-500 ML of water each year.
- Treated water flows from the wetland are injected into the Tertiary aquifer under the site through four wells. The target aquifer is between 100-120m below ground surface and each well is expected to be capable of accepting up to 10 L/s of water during injection and produce up to 14 L/s during extraction. Generally, the system injects during winter and extract during summer.
- During the irrigation season water is pumped from the wells into an on-site 'buffer' tank. This tank is connected to a pump station that delivers treated stormwater, via a network of approximately 11.5 kms of distribution pipes to 35 sites around the City of Marion.
- The peak irrigation rate for the system is designed to be 70 L/s with the current nominated demands i.e. irrigation of council reserves. The system is however designed to enable efficient upsizing of the capacity to enable up to 90 L/s peak flow rate to include demands from third parties such as local schools, Universities and other developments in the vicinity.

Action Points: Understanding positive land-use change. Demonstration of industrial land or semi industrial land into rejuvenated biodiversity park. Community participation and positive externalities in Government intervention. Water conservation practices and sustainable use of ground water resources.

