

HERE COMES THE SUN

DEVELOPER : Sundrop Farms
MAIN CONSTRUCTION COMPANY : John Holland
PROJECT VALUE : \$175 million



The Sundrop Farms Project is a world first cutting-edge, sustainable farming solution, that is leading the way to meet future food demands. A 20ha greenhouse uses solar-thermal technology to sustainably generate fresh produce all year round.

Port Augusta in South Australia enjoys 300 days of sunshine every year and this energy is now being harnessed and concentrated to produce 16,000 tonnes of tomatoes annually for Coles. The \$175 million world-first 20ha solar greenhouse operated by Sundrop Farms was built by John Holland, who designed and constructed the facilities and utilities.

The Sundrop Farms Solar Greenhouse is a showcase of John Holland's integrated engineering expertise. The project saw the construction of a world-first state-of-the-art facility that uses concentrated solar-thermal technology to sustainably generate fresh produce all year round in a semi-arid environment. It does this by harnessing and concentrating the sun's energy to desalinate seawater to produce fresh water for irrigation, heat in the form of stored hot water for crop temperature control and to produce electricity to power the facility.

This cutting-edge, sustainable farming solution is geared to meet future food demands and would be transferable to many other world locations where conventional farming is not possible because of low rainfall and poor electricity infrastructure.

There were plenty of challenges involved in the project according to John Holland's Project Director, Mark Burnett. "Given the ground-breaking nature of the solar greenhouse construction, which involved companies from the northern hemisphere as well as local contractors, it was a great exercise in coordination and cooperation. The remote location, climatic conditions and the limited physical area in which everyone was operating at once added to the complexity."

"We have a reputation for delivering technically complex and challenging projects with skill and innovation," Mark said. "One of the key points of differentiation from our peers is the extent, depth and breadth of our service offering. Coupled with the strength of our internal collaboration model, our service offering allows us to effectively and efficiently deliver infrastructure and engineering solutions."

"We advocate for principals to adopt the 'early contractor involvement' model," Mark

explained. "Our early involvement in projects can reduce risk exposure and maximise the rate of return for projects. Embracing the ECI model means that our services extend across the project life-cycle spectrum. We work collaboratively with our customers to define and develop concepts, validate and fund projects and deliver the full range of engineering construction and operations services required to realise projects."

John Holland has a number of other environmental projects to its credit, including a number of desalination plants around Australia. One of the largest international projects they have been involved in was the iconic Hong Kong Sludge Treatment Facility for the Hong Kong Environmental Protection Department which it constructed in a joint venture.

Located in the western part of the New Territories, the facility is critical to the region's wastewater treatment capacity and at 2,000 metric wet tonnes capacity per day, the plant is the largest waste facility of its type in the world. The plant is equipped with flue gas treatment lines as well as steam-producing incinerator boiler furnaces that drive the turbines to convert the steam into electricity.

Surplus energy generated from the plant is supplied to the national grid. This complex project combines proven technologies with leading innovations in receiving and treating dewatered sewage sludge from sewage treatment works.

The Sundrop Farms Project utilised many of John Holland's skillsets, which include delivering comprehensive and integrated infrastructure solutions, robust planning, integrated design, cost effective procurement, fast-track construction and seamless transition to operation.

"John Holland is very proud to have played a pivotal role in the construction of Sundrop Farms which is set to provide a benchmark for innovative food production methods around the globe," Mark said.

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Below CNF & Associates delivered innovative engineering solutions on the Sundrop Farms Project.



“The importance of the Sundrop Farms Solar Greenhouse is that it is the most significant renewable energy project in the world.” This is the view of CNF & Associates Project Director, John Giannasca who, with his CNF colleagues, was involved from the earliest stage of Sundrop Farm’s Project.

CNF is a multi-disciplinary engineering firm that designs and constructs process plants as well as providing specialist services in electrical, instrumentation, mechanical, hydraulic and compliance services. Key to CNF’s DNA is its excellence in developing designs and delivering innovative engineering solutions.

CNF has enjoyed a long relationship with John Holland, Sundrop Farm’s builder, spanning over 15 years.

“We have delivered many projects with John Holland, especially in regional areas,” John said. “With Sundrop Farms, CNF delivered the key role as electrical, instrument and control designers as well as acting as the process consultants for John Holland for the integration of this ‘first of a kind’ renewable energy project.”

John explained that renewable energy has, up until now, been linked directly in people’s minds to the generation of electricity. This project ties renewable energy to the production of food. This development by Sundrop Farms gives greater relevance to concentrated solar thermal power (CSP) which is at the core of the energy delivery for the project.

“CSP has taken a back seat to wind power and photovoltaic systems in the renewable energy agenda in recent years. This is mainly due to wind and PV being almost commoditised as electricity generators and CSP is little understood, particularly the value of heat as an energy source.”

The delivery of the Sundrop Farms development presented plenty of challenges being a ground-breaking concept linking concentrated solar power to food production for the first time anywhere in the world.

Integrating the various key components was a major challenge. CNF was tasked with the design of the balance of plant electrical, instruments and controls as well as integrating the various control systems to enable the plant to function as an integrated unit.

In this role CNF was party to most of the technical challenges faced. European technology was used in the 20ha glasshouse construction and operation, with a Danish company providing the 127m solar tower and more than 23,000 mirrors used to harvest and reflect the sun’s rays.

John said that CNF was very excited to be a part of the Sundrop Farms development.

“The interest amongst CNF’s engineers was intense because it represented a technology that could revolutionise food production around the world, particularly in arid countries with unreliable electricity production,” said John. “Food can be produced within the country where it is

consumed without the need to carry food for thousands of miles. The project has lived up to all the expectations we had. It was new, interesting, challenging and will change the way food production and renewable energy are viewed.”

The company had an average of five staff engaged throughout the project with a peak of 10 at different stages depending on the level of activity and technical skills required.

CNF has a well-deserved reputation for innovative and collaborative project design and engineering. It undertakes project planning as either a stand-alone activity or as one of the initial phases in project delivery.

Project planning defines the project activities, assesses the likely risks, estimates the costs and agrees the desired outcomes and then determines how these outcomes will be best achieved.

“We work with our clients to develop the concept design and to prepare a project delivery plan. The major activities and tasks are identified along with estimates of time, cost and resources required to implement the project and deliver the required outcomes,” John said.



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Sundrop Farms Project, South Australia



Sundrop Farms Greenhouse Project

Port Augusta, South Australia

Boral has been at the foundation of Sundrop Farms' future, providing concrete and quarry materials for a multi-million-dollar expansion project of its custom-engineered hydroponic facility at Port Augusta.

Despite operating in a harsh climate devoid of plentiful fresh water, Sundrop Farms' pioneering agribusiness methods and successful focus on using renewable energies to operate South Australia's largest greenhouse has resulted in the 20-hectare expansion 300 kilometres north-west of Adelaide.

Sundrop's renewable focus on using desalinated water from the Southern Ocean and solar power allows its produce including tomatoes, peppers, chillies, cucumbers and fruit to flourish.

Boral supplied 29,500 tonnes of road base to York Civil for general civil works for the project site, including the entrance the facility.

Boral provided 5075 cubic metres of concrete for the project – a split between 3505 for John Holland 1570 for York Civil, which included 560 and 140 placed in single mass pours for the solar tower base and pedestal.

Boral concrete was also used other applications such as slabs, paths and kerbing.

Concrete supply was able to be guaranteed with primary capacity sourced from Boral's nearby Port Augusta plant. Concrete security was further guaranteed with a fixed concrete plant in Whyalla with staff on standby to provide back-up to the Sundrop project in case of break-down.

Raw material provision was also guaranteed with supply originating from Boral's Stirling North quarry, located only 16 kilometres from the project.

Safety was a priority of this project and Boral inducted drivers prior to commencing to ensure they met site requirements at all times.

The greenhouse is expected to produce more than 15,000 tonnes of vegetables worth \$50 million annually to be sold in Australian supermarkets.

Overall construction with began in December, 2014 and was completed in 2016.

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Below Water & Carbon Group provided effluent and wastewater solutions on the Sundrop Farms Project.

Below Nilsen provided on site technical assistance including the commissioning of all electrical systems.



Handling effluent and wastewater in any location requires a skilful technical and engineering approach, but when the site is in a remote area with a sensitive environment, the challenges are even greater. The Water & Carbon Group succeeded beyond measure at the Sundrop Farms Solar Greenhouse project on the shores of Port Augusta, meeting Sundrop's sustainability objectives and delivering on time and on budget.

The reed bed sewage treatment plant designed and constructed by The Water & Carbon Group is a great example of wastewater management for remote sites. The treatment plant handles sewerage effluent, grey water and the wastewater from the glasshouse tomato production and chillers.

CEO of The Water & Carbon Group, Jim Hunter, said that the project took 10 months from design to commissioning. "We had an internal team of 10 working on the assignment and had at least 20 local contractors supplying material and labour for the systems that we built. Our original design was modified to meet specific legislative requirements for licence approvals but apart from that, the system went in without any major obstacles."

"We utilised our experiences from a range of other projects and processes to integrate them into this system for Sundrop," Jim said.

"The combination of processes was unique and innovative and importantly, minimised energy dependency. We are not aware of any systems matching it in Australia."

The Water & Carbon Group integrates ecology with traditional engineering processes to deliver more sustainable, low energy and simple-to-operate wastewater treatment systems. They design and deliver both small and large-scale wastewater treatment solutions. Most recently, Water & Carbon delivered a sewage treatment system for a town of 5,000 people in Western Australia for the state's Water Corporation. This system uses about 50% less energy than equivalent treatment systems with a lower capital and operational cost. The company has also designed and delivered an innovative leachate treatment system for Sydney Olympic Park.

Based in Queensland, The Water & Carbon Group has the capability to provide sustainable low-energy solutions for wastewater treatment across Australia.

For more information contact The Water & Carbon Group Pty Ltd, Level 4, 127 Creek Street, Brisbane QLD 4001, phone 07 3211 9997, email enquiry@waterandcarbon.com.au, website www.waterandcarbon.com.au

What better way to celebrate a company's centenary than to be a key contributor to one of the world's most innovative solar powered projects? Founded in 1916 as Oliver J. Nilsen, the company has a national footprint specialising in a wide range of electrical engineering and contracting roles.

Nilsen's role at Sundrop Farms Solar Greenhouse was pivotal in the provision of on site technical assistance including the commissioning of all electrical systems.

This included the earth testing system and the related components installed for lightning protection, substation step and touch voltages testing and high voltage switchboard system testing. Division Manager for Nilsen, Damien Fischer, said that the company also performed transformer testing inclusive of frequency response of stray losses (FRSL), high voltage switchboard voltage and current transformer testing, high voltage protection relay injection and trip testing, and commissioning of the concentrated solar powered parallel generation system for compliance with the local supply authority witnessing approval.

"Nilsen had four staff on this project, specifically an operations manager, a site engineer, a high energy technician and a salesperson,"

Damien said. "Standing behind the team was the experience and technical knowledge of the company's 1,300 national staff."

Nilsen's design, construction, contracting and service offices are located in all Australian states and the Northern Territory as well as in major mining and industrial hubs. The company specialises in the commissioning, maintenance, installation and repairs of high and low voltage distribution systems and communication systems. Offerings can be tailored to suit any installation requirements.

In the last 20 years, Nilsen has been awarded some 130 National Electrical and Communications Association (NECA) awards. "The projects cover a very wide range and illustrate the scope of Nilsen's services and expertise," Damien said. "We are very proud of our 100-year old heritage and continue to maintain the traditions on which we were built, namely service, reliability and quality."

For more information contact Nilsen (SA) Pty Ltd, 100 Regency Road, Ferryden Park SA 5010, phone 08 8440 5300, email NilsenSA@nilsen.com.au, website www.nilsen.com.au

Below Aggreko Australia provided on site power generators during the two years of construction.



Below Pearce Earthmovers completed extensive civil works and ground preparation on the project.



Aggreko is a world leader in the temporary power generation marketplace, offering innovative rental solutions supported by highly qualified technical staff. It played a key role in the Sundrop Farms Solar Greenhouses project through the provision of on site generators to contractor John Holland for two years during construction.

Aggreko specialise in providing turnkey power generation solutions and has the skills to handle the power generation demands of all industries, including those in remote locations like the mining industry and renewable energy projects.

A developing role for the company is supporting the renewable energy industry during construction, pre-commissioning and final commissioning. The wind power industry, as an example, requires input from other power sources for various tasks. Wind turbines have a power requirement to run the ancillary equipment within the turbines.

There are heaters and dehumidifiers to keep both the windings of the main alternator and the electronic components dry. If moisture builds up in these areas, damage can occur which can be very expensive to repair and it can delay the commissioning and power generation.

Turbines also have hydraulic pumps built-in so the power module can be kept facing into the wind and also to pitch the blades to start and stop the turbine. The hydraulic system also lubricates the main bearings and operates the turning gear to slowly move the shaft around intermittently to prevent bearing damage.

Aggreko has developed systems to support the various stages of commissioning wind farms using its power generators, including methods to reduce labour, capital and fuel costs. The advantage for the wind farm operator is that once grid power is connected, revenue can be generated from day one rather than going into an extended testing and commissioning period.

For more information contact Aggreko – Australia Pacific, 101 Woodlands Drive, Melbourne VIC 3195, phone 1300 728 324, email info@aggreko.com.au, website www.aggreko.com.au

Respected local Port Augusta firm Pearce Earthmovers conducted the heavy lifting in the civil works programme at the Sundrop Farms Solar Greenhouse construction site.

Initially contracted to prepare the ground for pond structures, Pearce Earthmovers was ultimately engaged to undertake other civil works at the location. Starting work in mid June 2015, major works took until October to complete, but minor projects required Pearce Earthmovers to have equipment and employees involved on-site until March 2016.

Utilising its own equipment including a 15 tonne excavator, smaller excavators, bobcats, tip-trucks and concrete pumps, between 10 and 15 employees completed a number of concrete anchor beams around the ponds, the largest being the freshwater pond which had a 400 lineal metre circumference. This required trenches to be dug, formed up and concrete poured. A total of four ponds were completed in this manner facilitating the anchoring of pool liners. Pearce Earthmovers also constructed overflow pits, formed up and poured concrete thrust blocks and was involved in the site clean-up.

Leon Cimarosti, Civil Supervisor at Pearce Earthmovers, said that the biggest challenges related to the impact of the weather. Rain made

movement around the site more difficult and in the dry season, dust from all the mobile plant was an issue. “Coordination of the different groups carrying out their particular roles was also a challenge, with plant, materials and personnel constantly moving around the construction area,” Leon said.

Pearce Earthmovers has been in operation for over 30 years and has built a reputation for carrying out civil works to the highest standard and in a safe and sustainable manner.

Situated in Port Augusta, Pearce Earthmovers is 100% Indigenous owned and undertakes general earthmoving and civil construction including site works, subdivisions, carparks, concrete construction and fencing. The company’s specialty is communication and electrical reticulation, delivering pits, service pillars, padmounts and pole footings.

They are a preferred supplier to SA Power Networks, SA Water and Alinta Energy.

For more information contact Pearce Earthmovers, 15 Yon Street, Port Augusta SA 5700, phone 08 8642 2266, email info@pearceearthmovers.com.au, website www.pearceearthmovers.com.au

Great People.

Many options. Only one choice.



Below Aqualutions supplies and services the plant's water treatment requirements.



Our long history of partnering with clients to mitigate their people risk and successfully deliver projects means you can trust us to provide you with the most effective workforce solutions available in today's market.

Ask the team at John Holland what we were able to deliver for them on the Sundrop Farms Solar Greenhouse project!

Take advantage of our award-winning:

- Safety management systems and solutions;
- Quality control and compliance measures;
- Industrial relations framework; and
- Access to a highly skilled solar experienced labour force.

If you have a project and need great people, speak to us.

WorkPac has recently supplied skilled construction workers to a world leading, concentrated solar power (CSP) tower plant in Port Augusta, South Australia.

The plant will be operational in late 2016, supplying electricity, heat and desalinated seawater to grow tomatoes in the desert.

Operations Manager for WorkPac's Southern Region, Mr. James Smart says he's excited about WorkPac's involvement in renewable energy projects.

"We are pleased to be working as a preferred supplier to John Holland, to deliver innovative construction projects such as this one."

"As a specialist supply partner, with proven capability and experience we look forward to our continued partnership with John Holland and other renewables partners across Australia."



Aqualutions Pty Ltd is at the leading-edge of the supply of innovative chemical products for industries utilising sustainable energy in Australia. For this reason the South Australian company was selected to not only supply chemicals to the Sundrop Farms Solar Greenhouses at the start of the project, but also has an on-going contract to supply and service the plant's water treatment requirements. Aqualutions' associate company Chemology Pty Ltd manufactures the chemicals at its Lonsdale site.

Managing Director of Aqualutions and Chemology, Jason Ottenhoff, said that his companies have many years experience specialising in water treatment requirements for industrial boiler and cooling systems including cooling towers.

"Sundrop Farms are using our biocides and scale/corrosion inhibitors which are especially crucial because of the use of desalinated water for in the steam boiler and the pipes which provide heating in the greenhouses. None of these structures can work at peak efficiency without our chemicals keeping everything in tip-top condition."

The continued growth of Aqualutions' business has been achieved through its commitment to service and technical back up, as well as the

cost-effective solutions it provides to clients. "We offer a full service package from supply, installation, service of pre-treatment such as reverse osmosis to ion exchange, water softeners, cooling tower dosing systems and tailored water treatment chemical requirements for boilers and cooling tower plants," Jason said.

Aqualutions is the only company in South Australia that manufactures all of its water treatment chemicals on site at its Lonsdale manufacturing plant. Like Sundrop Farms, many of Aqualutions customers are involved in agriculture and food production, including Australian Tartaric Products, Arnott's Biscuits, Angove Wines and Smiths Crisps.

"Sundrop Farms is one of Australia's most innovative sustainable enterprises and my firm belief is that we will see many more industries focus on ways to lessen their environmental impact through the use of 'green' energy production. Aqualutions is continually striving to develop products to make water treatment more efficient and to support these enterprises," Jason said.

For more information contact Aqualutions Pty Ltd, 4 Walla Street, Lonsdale SA 5160, phone 08 8326 6170, email jason@aqalutions.com.au, website www.aqalutions.com.au

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