Group.

PRIORITY ONE

INFORMATION PACK

CONTENTS

ABOUT US

NGroup and Priority One

NGroup is a leading electrical, refrigeration and air-conditioning installation and servicing company that operates primarily in Melbourne's southern and southeastern suburbs as well as on the Mornington Peninsula.

Its servicing division is Priority One, which has built an enviable reputation for 24–7 service since the first version of the company was founded in 1998.

Commercial clients include supermarkets, vegetable and fruit shops, butchers, seafood outlets, and wineries whose livelihoods and reputations depend on efficient operation of their electrical, refrigeration and air-conditioning systems.

Domestic clients include some of Melbourne's leading citizens who rely on the company to keep their holiday retreats on the Mornington Peninsula operating efficiently.

Formerly the Nicholson Group, NGroup is also extensively involved in the renewable energy sector and installs rooftop solar panels, solar energy batteries, geothermal heating and cooling systems, hydronic heating, air-conditioning, and both diesel- and natural gas-powered generators in commercial and residential buildings.

This information pack contains details about the company and its founder, Mark Nicholson, and outlines some of NGroup's innovative projects as well as the work of Priority One.

Feedback

The company welcomes feedback. Please send to Mark Nicholson, company founder and head of Special Projects, by email – mark@nicholsongroup.com.au – or call or SMS 0425 729 337.

ABOUT US

Mark Nicholson – owner & founder

Mark Nicholson purchased a 14-metre (46-foot) catamaran based in the Caribbean in 2010 and brought it to Australia with his father Max over seven idyllic months in 2012.

It was the journey of a lifetime for the 46-year-old founder of the Nicholson Group, now called NGroup, and its associated businesses Priority One, and Melbourne Solar Services – and a "reward" for beating a rare form of cancer in 2009 and again in 2012. But two incidents occurred on the trip that profoundly influenced the direction of his business.

Father and son went snorkelling in the pristine waters of the San Blas Islands off Panama. Later that day they crossed to the windward side of an island, facing the Caribbean Sea, and were confronted with plastic and other rubbish a metre deep on what had once been pristine, golden sand beaches. "It was confronting," Mark said, "and an indication of how humans were blindly trashing the environment."

A few weeks later the pair visited the world-famous Galapagos Islands off Ecuador before sailing for 22 days across the Pacific Ocean to French Polynesia, a distance of about 6000 km.

Mark was in for another surprise. Trailing fishing lines 24-7, the pair caught just two lots of tuna, and saw one whale and one pod of dolphins where they thought sea life would be abundant.

"I had a lot of time on the journey to think about how we humans are impacting our planet," said Mark, who at the time did not describe himself as a "greenie".

He decided to explore ways to reduce his own "footprint" on the planet – and offer these solutions to both existing and future clients.

Back at work, he "went solar". First step was installing three types of photovoltaic (PV) solar panels on the roof of his Dromana factory. Despite extensive reading, he wanted to conduct his own research into PV, storage batteries, heat pumps, control equipment and other gear used to produce energy and cut power bills.

Knowledge gained led to the company accepting the task of retrofitting a large holiday home on the Mornington Peninsula with geothermal heating and cooling. The project involved design work by a professor of geotechnical engineering from the University of Melbourne and one of his PhD students.

Mark has continued to drive renewable energy projects at NGroup as head of Special Projects, installing systems at the company's headquarters as well as offering to both commercial and residential clients the benefits of experience gained in the rapidly growing and changing renewables sector.

The following pages showcase recent projects as well as news about what the company is doing.

OUR PROJECTS

Main Ridge geothermal

In 2010 and 2011, NGroup installed an innovative geothermal heating and cooling system at a Main Ridge house that was being renovated and doubled in size. Main Ridge is in the hilly hinterland of the Mornington Peninsula south of Melbourne.

The owner told Mark Nicholson he wanted the system to heat and cool his home as well as heat water for the pool and spa. “We currently use LPG for the pool but when I return from a trip, my adult children have been down and used all the gas,” the slightly exasperated owner said.

The project included installing two complex reverse-cycle air-conditioners servicing 13 separately controlled areas of the house, with back-up heating provided by an existing open fireplace.

Mark threw himself into research for the project and, on the way to collect his catamaran in the Caribbean, visited a leading heat pump manufacturer in Miami, Florida – FHP, which had been acquired by the United States subsidiary of Germany company Bosch in 2007.

Meanwhile, the homeowner contacted Professor Ian Johnson of the University of Melbourne. Professor Johnson along with one of his PhD students – Amir Kivi (now a doctor of engineering and founder of GeoFlow) – designed a system with 4.5 km of looped black plastic 25 mm pipes 2 metres below the surface, which is known as a horizontal loop. Systems can also be vertical or diagonal.

Designed for experimental research (Amir Kivi was using the project as part of his PhD), it had 160 temperature sensors in the ground – above, below and beside the pipes to enable close monitoring of the system. A Mitsubishi Electric low-noise heat pump was installed next to the house.

The homeowner allowed the university team to design a far more complex system than was required for a holiday house as he was just as committed to improving ground source heat pump design. “My staff and I gained a great deal of knowledge equipping the holiday home for a client who is a renewable energy pioneer and philanthropist.”

Experimental: *Setting up the horizontal loop geothermal system in Main Ridge, designed by Professor Ian Johnson and Dr Amir Kivi of the University of Melbourne and installed by NGroup with assistance from Brett Reaby of Melbourne-based manufacturer Phasefale, who supplied monitoring systems for the 160 temperature sensors.*

OUR PROJECTS

Bespoke house, Melbourne

The Main Ridge homeowner was so impressed with NGroup's work that he asked Mark and his team to equip his new home being built in Melbourne with innovative renewable energy systems – geothermal heating and cooling, solar power, batteries, and hydronic (hot water) heating. The four-storey home was constructed by Bespoke Builders, hence NGroup's name for the project.

Mark Nicholson and his client started brainstorming ideas in April 2012 with Mark being challenged to combine the most advanced technology and control systems available in Australia and overseas. The hydronic system was designed by Mark with significant input from his client.

Two of the control systems were made in Australia – the direct current (DC) voltage regulator (AERL in Queensland), which sends power direct to batteries, and the alternating current (AC) inverter charger (Selectronics in Melbourne), which controls the power sources – rooftop solar, batteries, natural gas-fuelled generator or mains power.

The house has 15 km of pipes for underfloor, in-slab hydronic heating on its four levels. There is ducted heating and cooling, a heated swimming pool and two spas, and a chilled-water wine cellar kept at 15 degrees Celsius. The in-ground pool has hydronic pipes embedded in the pool walls to speed up heating of the water, and the pool walls and floor are insulated to retain the heat.

There are 100 solar panels on the roof supplying 250 volts of direct current (DC), which goes through the AERL voltage regulator and is stepped down to 160 volts DC to charge the batteries of 160 kWh capacity. The panels were manufactured by Risen Energy, a tier one manufacturer in China.

The Caterpillar generator in a large, ground floor utility room utilises a Ford V10 that runs on natural gas. Heat is recovered from an exhaust heat exchanger that captures the 600-degree Celsius exhaust gases. There is a second heat exchanger in place of the standard Ford radiator. Each recovers about 80 kilowatts (kW) of rejected heat for a total of 160 kW of free energy.

Australian-first: *The main utility room contains heat and water systems as well as a Caterpillar generator (front right) that utilises a Ford V10 natural gas-fuelled engine for power. There are twin condensing boilers for back-up hot water.*

OUR PROJECTS

Bespoke house (continued)

A key part of the Bespoke system is the aqueous hybrid ion (AHI) batteries, made by Aquion Energy of Pittsburgh in the United States.

In a smaller utility room, NGroup has installed 66 of the company's 2.5-kWh batteries. Aquion guarantees its batteries will provide 3000 charge/discharge cycles while retaining 80% capacity after the 3000 cycles. If charged and discharged once a day, they will last for more than 8 years at 80% and longer still, as much as 15 years, if a lower capacity is acceptable. The batteries are behind a Perspex window so visitors can easily see the world's latest battery technology. The homeowner did the initial research before he and Mark agreed to install the AHI batteries.

Mark says the batteries are made of simple, abundant and non-toxic materials such as salt water, carbon and manganese oxide. "They are non-flammable, non-explosive and non-corrosive; have a long life cycle; and can discharge up to 100%," he said.

A key element of the air-conditioning system is a 330,000-litre rainwater tank, which functions in the same way as a condensing unit on a normal reverse-cycle air-conditioner placed on the roof or walls of a house. Ingeniously, the tank is under the tennis court and assists heating and cooling through 22 separate ducted systems run by 6 Mitsubishi Electric water-cooled condensers. The tank also supplies water for the garden and for the swimming pool.

The insulated pool walls and floor reduce heat loss by 30%. The pool (and two spas) can be heated using power from rooftop solar panels directly or from energy stored in the batteries. If energy is not available from these two sources, there is always the free recovered heat from the natural gas-powered Caterpillar generator or heat from the two high-efficiency gas boilers.

The two Baxi condensing boilers each produce 100 kW of heat that can be used for the hot water system, hydronic underfloor heating, swimming pool and spas. However, installation of the Caterpillar generator effectively took over the role of the boilers although they can be used if required.

The hierarchy of systems now looks like this:

Electricity sources

1 Rooftop solar panels and batteries.
2 Caterpillar generator.
3 Mains electricity from the grid.

Hot water sources

1 Rooftop solar panels and batteries driving the heat pump.
2 Recovered heat from Caterpillar generator.
3 Baxi condensing boilers, which are connected to mains gas.

The pool is heated to 28 degrees Celsius and has two settings – fast and normal heating. The spas are heated to 40 degrees Celsius.
All systems are fully automated using German company Gira's system, which uses the KNX operating system on an iPad-type touch device. (KNX is an international communications protocol for intelligent buildings.)
The Bespoke house energy systems have significantly reduced the owner's power bills. The systems installed by NGroup cost about 7% of the total building budget.

Power aplenty: *A smaller utility room in the Bespoke house contains 66 aqueous hybrid ion batteries that are expected to last 10–15 years, twice as long as lead-acid gel batteries.*

Innovate: *Mark Nicholson with some of the 100 solar panels on the Bespoke house in Melbourne, which feed energy to the world's second-largest array of Aquion batteries.*

Group.

OUR PROJECTS

Going solar at home

Mark Nicholson recently bought a home on almost 1 hectare (2 acres) in Bittern on the eastern side of the Mornington Peninsula – and he's itching to get going on a solar project using the knowledge gained in the past 5 years and having the freedom of being his own client, so to speak.

It's a 30-year-old, brick-veneer house with a tiled roof and floor-to-ceiling windows in several main rooms. It has 3 bedrooms and is 20 squares or 185 square metres. (A square is 100 square feet or 9.3 square metres.)

"I'm aiming to generate more than 100% of our power needs from solar panels on the shed roof and its north-facing wall," he said.

The "more than 100%" phrase reveals his ambition – "I'd like to export to the grid sufficient power so the electricity supplier is writing me cheques that will cover my council rates, gas and water bills – all outgoings, similar to what we have achived at our Dromana factory," he said.

The shed is an American-style barn so there's plenty of space for 40 panels that will generate 10 kW. Control equipment will be inside the shed. An additional 10 kW is also planned – a ground mounted system.

The panels will be black with black frames – "for aesthetic reasons", he said.

The solar feed-in tariff paid to homeowners by power companies in Victoria was 60 cents per kWh until 2012 when the state government dropped it to 25 cents and then to 8 cents in 2013. The 60 cents per kWh was to encourage householders to install solar systems but as the cost of panels dropped, people did not need the same incentive. By early 2016, there were more than 275,000 homes in Victoria with solar systems – more than 10% of all houses – and many happy faces when the power bill was received each quarter. Industry experts say half of all detached houses in Victoria will have rooftop solar by 2030.

The feed-in tariff – now more commonly known as a solar buy-back – will likely drop to 6 cents some time in 2016 but this will not stop people installing solar when they are faced with paying power suppliers 20 to 30 cents per kWh.

The Bittern project will include installing Enphase micro-inverters, Aquion batteries, and Selectronic inverter charger to store the solar power generated. It will also include installing two 20,000-litre rainwater tanks. Replacing the instant gas hot water system with a Thermann heat pump was first cab off the rank and was done in mid-February 2016.

He's looking at spending about $50,000 but is not motivated purely by wanting a return on investment: "It's partly an emotional decision," he said. "Showing the children what can be done; providing an example for family, friends and colleagues; and the satisfaction of opening a power bill with a minus figure."

OUR PROJECTS

Taking NGroup factory "off grid"

Testing: *Part of NGroup's extensive array of solar panels on the factory roof at Dromana. The company has been testing the efficiency of various types for several years.*

NGroup's headquarters is in the light industrial precinct of Dromana, a seaside town on the southern Mornington Peninsula about 80 km southeast of Melbourne.

When company founder and owner Mark Nicholson decided to invest in environmentally sustainable systems in 2009, the first action was installing water tanks. Water conservation was a major public focus after the so-called Millennium Drought of 2001–09 created severe shortages in southeast Australia and wreaked havoc on the natural and human-made environment. Rainwater is collected from the 500-square metre factory roof and stored in two 15,000-litre tanks for use in toilets, bathrooms and the kitchen. An ingenious "first flush" system diverts the initial dirty runoff into the stormwater system. The cleaner rainwater is triple filtered and is suitable for drinking.

After being "off the water grid" for several months, the water retailer assumed the meter was faulty and sent a worker to install a new one. As he walked up to the building, he said to Mark, "Oh, you've got tanks, haven't you?" Yes was the reply. "Oh well, I'm here to replace the water meter anyway."

Next installed were 3 types of solar panels on the factory roof – monocrystalline, polycrystalline, and quasi monocrystalline, 20 in each array (or group).

Mark has been testing the efficiency of the 3 types of solar panels over two and a half years. They perform similarly with the difference being less than 1%.

- Australian-made Tindo panels produce DC power and are connected to a string (or central) inverter.
- Another array of Tindo panels make AC power and have an Enphase micro-inverter behind each one.

Also installed were Thermann evacuated tubes, which produce hot water for hydronic heating in the offices.

The efficiency of panels connected to a string inverter is reduced if just one of the panels is even partly covered by shade or dirt (including bird droppings) or has abnormally high resistance due to a manufacturing defect.

Panels with micro-inverters operate independently so every panel performs at its maximum potential.

Mark is evaluating the performance of the 5 kW string inverter array versus the 5 kW micro-inverter array, with the latter well in the lead at present.

Six solar panels have been installed above the large factory roller door and the north-facing windows of the office.

The provide shade, reducing heat in the office and therefore air-conditioning requirements. When in full sun, the panels provide enough electricity to drive the main office air-conditioning system. They generate 1.5 kW and are connected to a string inverter.

NGROUP'S ELECTRIC VEHICLES (EVs)

Holden (GM) Volt

After going "off grid" by installing water tanks and solar power, Mark Nicholson wanted to go "off bowser" so bought a Holden Volt electric car in July 2015 from a General Motors (Holden) dealer. It was a demonstration car with about 3000 km on the clock and cost $42,000.

The Volt is powered by a 16.5 kW lithium-ion battery and has a range of 87 km (54 miles). When the battery runs low, a 1.4-litre petrol engine kicks in to extend the range to about 600 km (373 miles). The engine does not drive the wheels – it powers a generator that provides more electricity.

The Volt can be recharged in under 6 hours using a normal household 10 amp power point for as little as $2.50 for a full charge. The fast charger at NGroup headquarters charges 50% of the Volt in 1 hour and takes a further 2 hours for the remainder.

Although GM announced in April 2015 that it would not sell its next generation Volt in Australia, as it would not produce right-hand drive Volts, Mark is unfazed. "The Volt is fantastic," he said. "It's everything an electric car should be."

GM will continue to support Volts sold in Australia, about 250 since it was released in late 2012.

It's widely agreed the Volt's limited appeal was the price – $60,000 for a car about the same size as a $20,000 Holden Cruze.

But the price of electric and hybrid cars is dropping and their range is increasing. Cars like the $47,490 Mitsubishi Outlander PHEV (plug-in hybrid electric vehicle) and $69,900 BMW i3 REX (Range Extender) show that electric and hybrid cars are becoming more affordable. Both the Outlander and BMW have electric and petrol motors.

Mark said "range anxiety" and relatively cheap fuel were two reasons Australians were not buying electric or hybrid cars in great numbers. "It will change given that 90% of drivers commute less than 100 km a day. There are now a number of makers offering range extender models where a petrol engine is used as a generator to charge the battery, and this makes them 100% useable.

Bright sparks: *NGroup's Mark Nicholson with the two electric cars – the Holden Volt (left) and the newly acquired BMW i3 REX, which has been described as the start of future motoring.*

"Most cars are used for 1 hour or less each day, travelling to and from work – so spend most of the time parked at either end of the journey. About 90% of all charging required could be done at work or home if both had charge points."

Mark said the Ford tray utility he drove before getting the Volt travelled 17,200 km and used about $3600 of fuel in the last 6 months before changeover. In the first 6 months of driving the Volt, it's travelled 17,000 km and used 150 litres of fuel, which cost about $220.

"Countries such as the United States and Japan support renewable fuel and low emission vehicles by providing tax relief, public recharging stations, and a range of incentives for potential owners," he said. "Sales of electric and hybrid cars will not take off in Australia until federal and state government get behind them."

One advantage not being widely discussed is that an electric motor requires less maintenance than a petrol or diesel engine.

"An engine in a hybrid also runs more efficiently than one in a normal car because it operates at constant revs to charge the batteries as opposed to revving up and down to meet the driver's demand. They last longer and require less maintenance," Mark said.

One commentator says Australians aren't buying electric cars because the nation's base-load power continues to be dependent on coal- and gas-fired power stations. Many potential buyers of "green" cars see little advantage when the power from wall sockets is sourced from substances that emit similar CO2 to burning liquefied fossil fuel in a petrol or diesel engine.

This is where the NGroup's electric vehicles have an advantage – they are plugged in to chargers and above them are dozens of solar panels providing the "juice".

As of February 2016, the Volt had travelled 17,500 kilometres and used just 146 litres of fuel. A "normal" car of comparable size would have used more than 1000 litres.

BMW i3 REX

Mark Nicholson took delivery of a BMW i3 REX in January 2016, a vehicle that motoring commentators say is the start of future motoring.

Soon after, he drove it to NGroup's headquarters in Dromana, parked it beside the company Holden Volt, had a photo taken, and posted it on the internet.

The i3 is packed with technology including a system that allows a smartphone app to check the remaining charge or the car's location. It can activate the air-con remotely and unlock doors. The body is made of carbon fibre and aluminium, and weighs 1320 kg, 400 kg less than the Volt.

Like the Volt, it is powered by electricity only. A 360-volt electric motor puts out 125 kW and 250 Nm of torque, more than enough for a runabout hatchback. It goes from zero to 100 km/h in 7.9 seconds, as good as a small sports hatch.

The range extender engine is a 650 cc BMW twin-cylinder petrol motorcycle engine that maintains the battery charge at its current level, increasing the overall range of the vehicle from 120 km to 230 km. The 120 figure increases to 150 km in economy mode, for a total of 260 km.

Energy is put into the batteries when the car is slowing down or descending a hill. Accomplished drivers have reported doing trips of 20 to 30 km without using the brakes.

Motoring writer Ewan Kennedy reckons the performance is terrific. "Handling is excellent thanks to the low centre of gravity created by the underfloor batteries."

BMW i3 REX (continued)

There is good legroom for four adults. It has a rear luggage area and a 35-litre storage area under the bonnet.

The i3 has a very small turning circle, which makes it easy to park and manouevre in places like shopping centre car parks.

Like all electric cars, the BMW is not cheap at $69,900 but if you recharge from solar panels and rarely use the petrol motor, it becomes a standout alternative.

THE KNOWLEDGE

A short history of the electric car

The first vehicles not pulled by animals were powered by electricity. An inventor in Hungary demonstrated the first electric car in 1828 and the rechargeable lead-acid battery was invented in 1859 by a Frenchman. Its capacity was improved by another Frenchman and industrial scale manufacturing of batteries started in 1881, a key moment in the development of the electric car. Thomas Parker showed off his first production electric vehicle in London in 1884 – it looked like a four-wheel carriage without horses. (Parker electrified the London Underground so knew what he was doing.)

Until the rise of internal combustion engines, electric vehicles held many speed and distance records including the first to break the 100 km/h (62 mph) barrier – in April 1899. Ferdinand Porsche's all-wheel drive electric car, powered by a motor in each hub, also set several records.

By 1900 in the United States, 40% of cars were powered by steam, 38% by electricity, and 22% by petrol.

The popularity of electric cars waned after the First World War in 1914–18. Electric cars had been limited to urban use only by their slow speed (top speed about 32 km/h or 20 mph) and low range (65 km or 40 miles).

Longer roads were being built, discoveries of large petroleum reserves led to affordable fuel with petrol-engine cars becoming cheaper to operate over long distances, and Henry Ford invented the production line, which made cars cheaper than ever before.

By 1912, an electric car cost almost double a petrol car.

Electric vehicles became a niche item where distance and speed was not an issue – forklifts (invented in 1923), milk delivery vehicles, and golf carts (1954), for example.

Between 1940 and 1996, car makers experimented with a number of electric cars – the Henney Kilowatt (late 1950s), the Rambler American station wagon (1969), Amitron (1967) and Electron (1977).

Other battery-electric concept cars included the Scottish Aviation Scamp (1965), the Enfield 8000 (1966) and two electric versions of General Motors petrol cars, the Electrovair (1966) and Electrovette (1976). None entered production.

Electric car development received a major boost in 1990 when the Californian government introduced laws requiring car makers to offer zero emissions vehicles. General Motors, Toyota, Honda, Ford, Nissan and Chrysler produced and sold almost 5000 vehicles including the GM EV1, Toyota EV RAV4, Ford Electric Ranger, and Nissan Altra.

The car that attracted most attention was GM's EV1, which could only be leased in what GM said was a "real-world engineering evaluation" project. Production ceased three years later with GM claiming the car was not profitable due to insufficient interest, another Californian law that required car makers to provide parts and servicing for 15 years for any model made – electric or "traditional" – and that expected improvements in battery technology had not occurred.

But the genie was out of the bottle.

Toyota's Prius hybrid was released in 1997 and was followed by hybrids such as the Honda Civic and Ford Escape.

Today, electric and hybrid models available include BMW i3, Audi A3 e-tron, Nissan Leaf, Honda Accord Hybrid, Toyota Prius, Toyota Camry Hybrid, Tesla, and Holden Volt.

Ferdinand Porsche built first hybrid

It's not well known the first vehicle designed and personally built by automotive legend Ferdinand Porsche was an electric car, the Egger–Lohner C.2 Phaeton. It was in 1898 and he was aged just 22.

Dubbed the P1, it had a range of almost 80 km (49 miles) and a top speed of 34 km/h (21 mph).

The engine weighed only 130 kg (287 pounds) but the batteries were 500 kg (1100 pounds) and total vehicle weight was 1360 kg (2997 pounds). A few years ago, the P1 was discovered in a garage in Austria where it had sat since 1902. It was restored and unveiled at the Porsche museum at Stuttgart in 2014.

In 1900, Porsche – who had moved to Vienna in 1893 to undertake an apprenticeship as an electrician – built the world's first all-wheel drive vehicle, which had an electric motor on each wheel.

By this time he and coachbuilder Jacob Lehner had formed a partnership and in 1901, Porsche produced the world's first hybrid vehicle, the Lehner–Porsche Semper Vivus (Latin for "always alive"). An improved version, the Mixte, was released in 1903.

It was to be 96 years before Toyota launched the Prius hybrid EV in Japan in 1997. The company had sold 5.2 million versions of the Prius by 2015.

The world's first hybrid vehicle, the Lehner–Porsche Semper Vivus, was designed by Ferdinand Porsche and built in 1901, 96 years before Toyota launched the Prius. Three years earlier, Porsche had designed and built his first vehicle – the P1 – when he was aged 22. Porsche improved on the Semper Vivus and two years later released the Lehner–Porsche Mixte, with its wheels part of the electric motors. The man himself is at the wheel in this photo.

NEWS

Industry leaders visit Bespoke project

Two of the heavyweights of plumbing and electrical supplies in Australia have visited the Bespoke project in Melbourne with Mark Nicholson – Alan Wilson of Reece, and Nicholas Middendorp of Middy's.

Reece and Middy's supplied all plumbing and electrical materials used in the project.

The two men were shown through the property separately in late 2015 and were very impressed, Alan Wilson taking photos to show the Reece "energy team", which is considering retrofitting its stores with energy-saving systems.

Alan has been executive chairman of the Reece board since 2001, was CEO between 1974 and 2008 – when he handed the day-to-day reins to his son Peter – and a director since 1969.

Alan and his brothers John and Bruce, and Alan's son Peter hold four of six positions on the board that guides a public company worth more than $3 billion with the Wilson family holding about 70% of stock.

Reece has come a long way since 1919, when founder Harold Reece started selling hardware products from the back of a truck. The company is now Australia's biggest supplier of bathroom and plumbing products, with more than 450 outlets in Australia and New Zealand, and more than 3500 staff.

NGroup and its forerunner Nicholson Group have been buying from Reece for more than 18 years, forging a strong commercial link that has seen Reece become NGroup's main supplier of plumbing products.

NGroup has also done some work on Alan's weekender on the Mornington Peninsula.

* * *

Nicholas Middendorp can also lay claim to being part of a company that had its beginnings in Melbourne in the early years of the 20th century.

In 1928, his grandfather Petrus Middendorp started selling light globes, vacuum cleaners and other electrical products imported from Holland and England. In the 1940s Middendorp and Sons – Petrus and his sons Peter, Nick and Hugh – started manufacturing products made from moulded rubber and bakelite (an early form of plastic) from a factory in Preston under the brand name Middy.

Middendorp Electric Company Pty Ltd was registered in 1948. The firm moved away from manufacturing in the late 1950s to concentrate on wholesaling electrical goods. Now called Middy's Data & Electrical, the company is Australia's largest privately owned independent electrical wholesaler, and has more than 100 branches nationally.

Mark Nicholson has been a client of Middy's since he started his business in 1998. "They are our main supplier of electrical gear," he said.

Middy's is set to build a new headquarters, and Nicholas told Mark he'd like to use some of the ideas and systems used in the Bespoke project, including batteries to store solar power, the control systems, and generator heat recovery.

PRIORITY ONE

The genesis of 24-7 service

When Mark Nicholson started his electrical, refrigeration and air-conditioning contracting business in 1998, operating from home in Rosebud, he was on call 24-7 from day one because he was young, keen and wanting to win clients in a highly competitive environment.

His motto was “call any hour, any day”.

An important tool was the mobile phone, a rare consumer item 20 years ago, although tradespeople on site and on the move were early adopters.

Mark bought one of the early Motorola version – now known affectionately as “the brick” due to the size and weight of the battery – when he was with Rosebud-based Andca in the early 1990s, the company where he served his apprenticeship. It cost him about $3500 and was a big investment for a young bloke earning about $35,000 a year – 10% of his annual income. Calls cost $1 a minute.

He had learnt the power of rapid response when working in Andca’s service department, which looked after electrical, refrigeration and air-conditioning installations on the Mornington Peninsula and southeastern suburbs of Melbourne. Mark was one of two employees in the service department. He was soon put in charge and guided it through a period of rapid growth from 2 to 9 employees.

Team game: *Some of NGroup’s staff at company headquarters in Dromana on the Mornington Peninsula south of Melbourne. Mark Nicholson is at far left and co-owner Peter Wrench far right.*

The genesis of 24-7 service (continued)

Being on call 24–7 worked a treat and business boomed for the one-man band known as Mark A Nicholson Pty Ltd, and he was soon receiving referrals from satisfied clients.

Clients included supermarkets, vegetable and fruit shops, butchers, and seafood outlets. Nothing worries a shopowner like an alarm going off on a coolroom temperature gauge with thousands of dollars of stock at risk of spoiling. Or a baker turning up for work at 2am to find the mixing machines or ovens on the blink.

In summer, the iconic carnivals on Rye and Rosebud foreshores operated by the famous Wittingslow family were sometimes in need of an urgent repair job.

The "call any hour, any day" philosophy is a key plank of Priority One's operations.

Over the summer of 2015–16, Priority One staff attended up to 80 jobs on their busiest day – providing an essential service to tourism and shopping destinations that depend on holiday trade to make the whole year a success.

Case study: Priority One saves the bacon

In January 2016, the owner of a large butcher's shop on the southern peninsula called Priority One's hotline at about 9 o'clock one night. The coolroom alarm had warned him the temperature was rising. Matt Ellis, one of Priority One's refrigeration specialists, met the owner at the shop 30 minutes later. The compressor had broken down, putting at risk thousands of dollars of meat and smallgoods including bacon and ham smoked on the premises.

Matt called the manager of Actrol in Carrum Downs, Australia's largest wholesaler of refrigeration and air-conditioning equipment, established that he had a suitable compressor, and arranged after-hours access.

He then called his Priority One colleague Jordan Walworth, who was relaxing at home in Somerville, not far from Carrum Downs. "We've got an urgent job, Jordan. Can you drive up to Actrol and pick up a compressor?"

Jordan collected the compressor while Matt was removing the old one. They had the new one installed and operating by 3am. In the six hours the compressor was offline, products in the coolroom room had barely increased in temperature.

An early adopter of new technology

In 2000, Mark's business became a two-man band when he took on his first apprentice, Jeremy Sword. The younger man was also a fan of new technology and took Mark to a Telstra shop to show him some of the new personal digital assistants (PDAs), the forerunner in many ways of today's smartphones.

Doing invoices by hand soon went the way of dinosaurs – Mark and Jeremy could input data into a PalmPilot when out on a job, return to the office, plug it into a desktop computer running accounting software (MYOB), and generate invoices on an inkjet printer. This was heady stuff as the World Wide Web did not become widely used until after 2002.

When it comes to new technology that helps run a superior business, Mark has always been an "early adopter".

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THE KNOWLEDGE

How a geothermal heat pump works

A geothermal heat pump (or more correctly, ground source heat pump) is a central heating and/or cooling system that transfers heat to and from the ground.

It uses the ground as a heat source (in winter) or a heat sink (in summer). It takes advantage of the moderate temperatures in the ground to boost efficiency and reduce operating costs.

A standard air-conditioner is a heat pump – as is a refrigerator.

One way to explain the process is this – if you pour a little rubbing alcohol on your skin, it will feel cold, but it isn't refrigerated. Alcohol evaporates at room temperature and while doing this, it absorbs heat from your skin, making it cooler.

Coolant (or refrigerant) works in a refrigerator the way alcohol works on your skin. In a fridge, coolant is trapped inside a series of coils – condenser coils (on the outside of the fridge) and evaporator coils (on the inside). As it circulates, it changes back and forth from a liquid to a gas.

The compressor constricts the refrigerant vapour, raising its pressure, and pushes it into the coils on the outside. When the hot compressed gas in the coils meets the cooler, external air temperature of the kitchen, it becomes a liquid.

Now in liquid form at high pressure, the refrigerant flow is restricted, creates a drop in pressure, and cools down as it flows into the coils inside the freezer and the fridge. The refrigerant absorbs the heat inside the fridge, cooling the air. The refrigerant evaporates to a gas and flows back to the compressor, where the cycle starts all over.

In a similar way, a ground source heat pump extracts ground heat in the winter (for heating) and transfers heat back into the ground in the summer (for cooling).

Temperatures below about three metres underground around the world are fairly constant (12–18 degrees Celsius), regardless of outdoor temperature. By using geothermal heat to equalise a building's temperature with that of the ground, less energy is required to bring the temperature up or down to comfortable levels, resulting in significant energy savings.

In Victoria, heating, cooling, and making hot water consumes about 80% of the average household's power bill.

How evacuated tubes work

Evacuated tubes consist of two glass tubes fused at the top and bottom. The space between the tubes is evacuated to form a vacuum, which provides excellent insulation against heat loss and helps to retain up to 97% of thermal energy.

A copper pipe (called a heat pipe) containing a small amount of purified water runs through the centre of the inner tube. The one-way coating on this tube absorbs the sun's thermal energy and heats the water in the heat pipe. The water evaporates and rises to the manifold at the top of the pipe, which is connected to a slow-flow circulation pump that then sends the heated water to a storage tank. Water is heated during daylight hours but can be used at night or the next day because the tank is insulated.

Evacuated tubes can extract heat from the air on an overcast day and don't need direct sunlight. This provides an advantage over solar panels, which do not perform as well in the early morning or late afternoon. Evacuated tubes are designed to operate in warm or cold weather.

NGroup rooftop solar PV panel layout