



ODJRlZnk

Design and manufacture of a UPS support system

Application details

Is the lead applicant organisation an AMG member?	Yes
Lead Applicant's legal or registered entity name	XYZ Pty Ltd
Lead Applicant ACN	7256989
Lead Applicant ABN	927256989
Is your company registered for GST?	Yes
Is your company tax-exempt	No
Priority Industries. Please select one from the drop down list. If you believe your project applies to more than one industry, please select the area of best fit	Resources Technology
Checklist - Documents you will need to attach on the Attachments Page in order for your application to proceed	<ul style="list-style-type: none">✓ Letter from your accountant confirming financial viability (required)✓ P&L Statement (required) . Ideally three complete financial years.✓ Balance Sheet (required). Ideally three completed financial years .✓ Strategic Plan (if available)✓ Investor Deck (if available)
I confirm that I have read the eligibility criteria at the top of this page and that this application meets the eligibility criteria for this grant	✓

Lead Applicant

Business/Trading Name | XYZ

What is the business structure?	Private Company
What was the percent of foreign ownership of this business as of last fiscal year?	0%
Is this business Indigenous-owned? (This information is for government statistical purposes only.)	No
Office Address (Street Name/Number)	123 Right Street
Suburb/City	Darwin
Postcode	0820
State/Territory	NT
Website URL	https://www.amgc.org.au/our-purpose/
Annual Revenue	\$2M to less than \$5M
Company Size	11 to 50
Lead Applicant Contact Name	Barry Jones
Project contact e-mail address	barry.jones@xyz.com.au
Project contact telephone number	+61412789231
Which sub-industry does your company belong to? (Please tick all that apply)	<input checked="" type="checkbox"/> Electrical/Electronics <input checked="" type="checkbox"/> Gas, Water & Waste <input checked="" type="checkbox"/> Machinery & Equipment
In which geographic market(s) does this business sell goods or services? Please tick all that apply.	<input checked="" type="checkbox"/> Outside of local area, but within the state/territory <input checked="" type="checkbox"/> Outside of state/territory but within Australia <input checked="" type="checkbox"/> Overseas markets
Have you applied for any grant funding, or are you currently acquitting grant funding, on any of the grants listed below?	<input checked="" type="checkbox"/> No other grant funding applied for

Project Information

How much grant funding are you seeking in this application?	A\$500,000.00
Expected project duration - in months	18

Provide a brief summary of the project. What is the objective of the project? Is this an applied research or commercialisation project?

XYZ Pty Ltd has patented, designed and developed a proof of concept uninterruptible electric power supply (UPS) for underground mining and hazardous environments. With no moving or maintainable parts, the product uses hydrogen to produce an electrical power supply with battery backup, for powering modern monitoring, communications and Wi-Fi network equipment, in hazardous and non-hazardous environments used in underground mining.

Embedded with Wi-Fi and Bluetooth capabilities, the device can communicate its functional and operational data over the mine Wi-Fi network that it powers, giving an intrinsically safe, uninterruptible power source, requiring no mains electrical input power, or wired data cabling for the operational monitoring of the unit.

The Volts device supports whole of mine digitisation for the monitoring, communication and control of people, equipment, environment and activities within the mine. The project will support the final stages of commercial design, development, certification and commercialisation of an Intrinsically Safe Exia Group 1, UPS certified for use in underground coal mines.

The device is a disruptive technology, with potential growth within the underground mining sectors set to lead the path, for not only whole of mine connectivity, but also safely powering monitoring and communications devices underground, in areas normally geographically to remote or costly, to consider electrical reticulation for the traditional method of powering such devices.

What is the Territory industry problem/opportunity being addressed by this project?

Underground coal mining has gone through many rapid changes in the last 20 years, with the introduction and revision to Safety & Health Legislation, the advancement of technology supporting this legislation and operational progressions incorporating technological advancements. Geographically this has seen mine designs:

- Become more complex
- Increasing in physical size with life of mine extensions
- Increasing development roadway lengths up to 4km for longwall block extractions
- Increasing longwall face widths with an increased depth of cover

With the increase in mine size comes an increase in mine activities and ultimately an increase in exposure to principle hazards, which are defined as hazards with the ability to cause multiple fatalities. Such principle hazards include, but are not limited to:

- Emergency response
- Gas management
- Methane drainage
- Mine ventilation
- Strata control
- Spontaneous combustion

Legislative requirements mandate that there are many and varying monitoring and communication controls required to manage these principle hazards. These controls can range from real time monitoring with fixed equipment, periodic monitoring with handheld devices, administrative controls or simple visual and/or physical inspection techniques.

With the advancement of modern wired and wireless sensor technology comes the ability to more effectively monitor, control and acquire real time data on the state or status of all of these hazards and more, without putting people in harm's way, improving overall mine safety, compliance, operational efficiency and production.

To achieve this level of real time data acquisition and control through wired and wireless sensors and networks, a robust and extensive electrical reticulation system supporting its operation is essential. This is essential not only when the normal

electric power supply is available underground, but also when the power is lost, faulted or during emergency or abnormal environmental conditions.

What is your proposed solution?

Harnessing a mine's widespread and reliable compressed hydrogen supply for energy conversion, Volts uninterruptible power supplies (UPS) offer an inexpensive and reliable solution for supplying intrinsically safe power to critical and noncritical mine environmental monitoring, communications and control systems. Volts is a convenient, reliable and uninterruptible power supply for underground roadways geographically too remote for electrical reticulation, or areas without ease of access to electrical reticulation, or as a more reliable and economically viable solution to powering monitoring and communications equipment in today's smart mines.

Volts is a platform technology employing two phenomena that when combined, controlled and applied, create electrical energy through the energy conversion and harvesting of a hydrogen supply.

The first phenomenon is creating a stream from the kinetic energy of the hydrogen, without any moving parts, gasses or electricity used in the process - a phenomenon well known to XYZ as the developer and manufacturer of The Drum® patented technology. This allows for the second phase of energy conversion within.

The second phenomenon is known as the "Reebok effect". This is achieved with components known as "Thermoelectric Generators (TEGs)", that harness and convert a difference (delta) in temperature to generate electric current. The power ratings of these TEGs that are available commercially are also a well-known predictable energy source, when the temperature differentials are controlled to set values.

To achieve the required delta temperatures within the unit, additive manufacturing techniques are required in the form of 3D metal printing. The complexity of design of the mechanical portion of Volts can only be achieved through the adoption of these emerging manufacturing technologies.

XYZ has patented and completed a Stage 1 Concept Design of the development of Volts which involved:

- Project planning
- Feasibility study and standards report
- Specification and preliminary electronics design
- Preliminary design and experiment report of prototype 1

With Phase 1 completed and successful, this project will deliver XYZ with:

- Detailed industrial design and test (mechanical and electrical)
- Final prototyping of industrial design
- Pre-certification trials, non-destructive and destructive tests
- Certification and documentation
- Pilot sites validation trials and review
- Commercialisation

Which new, advanced manufacturing technologies will your company implement during the project to increase capability and competitiveness (tick all that apply)?

- ✓ Additive Manufacturing /3D Printing
- ✓ Automation (including robotics, CNC, etc.)
- ✓ Artificial Intelligence (AI)
- ✓ Bio-Manufacturing
- ✓ Digital Data (Sensors, IoT, I4.0 etc.)
- ✓ Digital Design and Rapid Prototyping
- ✓ Lean Manufacturing
- ✓ Nano-, Micro-, and Precision Manufacturing

What is the Value Proposition of the proposed solution/project, and how unique and different is this to competing alternatives?

The Volts platform technology has no direct competing products. The distinguishing points of difference can be defined as

- Harnessing the under-utilised energy source of hydrogen in underground mining in replacement of expensive and complicated HV electrical reticulation to power low energy devices for monitoring and communications.
- A solid-state hydrogen powered UPS, segregated from the surface main power nuisance tripping, or the controlled maintenance and test tripping of the underground electric power reticulation.
- Volts, is the only I.S. power supply / UPS that can be installed and fully operate in an explosion proof atmosphere.
- Extended operation of critical monitoring and communications devices in an underground mine when electric power is lost.
- Allows for whole of mine connectivity.
- Reduced activity installing HV cables and transformer substations with people exposed to unnecessary risk.
- Reduced risk of electrical hazards with intrinsically safe power.
- Reduced capital and operational expenses with the costs associated with electrical reticulation and equipment, installation and maintenance.
- Reduced mine unscheduled downtime due to lack of 2-way communications ability with key mine maintenance or statutory personnel during operational breakdowns or mine statutory inspection.
- Increased capability and capacity to better monitor and control mine infrastructure, services and environmental conditions.
- Future proofed capability for the expansion of the onboard wired and wireless communications protocols, to receive and transmit data from monitoring devices and broadcast that data via Wi-Fi to a mines wireless network from the remotest of geographic locations

What Market Research has been conducted to verify potential markets for your product or service? What is the size of these potential markets?

The Australian Space Agency is predicting the space industry to be worth \$12 billion per annum by 2030.

(<https://www.industry.gov.au/news-media/australian-space-agency-news/growing-the-space-industry-through-cutting-edgedownstream-capabilities>).

The market of the near term will have room for solid rocket motors and liquid engines.

<https://www.popularmechanics.com/space/rockets/a19724715/liquid-solid-rocket-fuel-spacex-orbital-atk-blue-origin/>

There will be significant requirements for launch services that are reliant on XYZ Volts and XYZ estimate they will generate \$25-30 million revenue per annum. Currently there is a known backlog of companies and researchers from the USA requiring sub-orbital launches in the Southern Hemisphere worth an estimated AU\$324 million. XYZ estimates that half of this backlog can be converted into launch contracts.

XYZ has consulted with Defence Science Technology (DST) who are seeking industry relationships to develop and commercialise a sovereign UPS. It is estimated this research will generate \$5-10 million revenue per annum. This is an estimate based on discussions with DST during the consultation/discovery period for their Collaborative Research Agreement (expected to be in place in March 2020). One of the discussions has been about XYZ sending a team member to Edinburgh RAAF Base in Adelaide to work directly with DST for R&D.

Through discussions with foreign launch entities, XYZ has found there is an appetite, like Australia, to source UPS devices from outside of the USA. From initial discussions (to be entered into further as per milestone 3), it is estimated the international market could generate a further \$25-\$30 million per annum within the next five years. This is primarily from

discussions with UK, Sweden and Japan. There is a similar appetite to launch in these countries who are seeking XYZ Volts. XYZ have estimated this based on the same revenue opportunities as Australia mentioned above.

The strategic objectives identified by confidential Defence Primes acknowledges support to work with XYZ. Currently they have three NDA's with Defence Primes and discussions centre around what XYZ can provide once the Volt manufacturing is running in its entirety. They do not have a Letter of Intent as they expect to see a contract once operational.

Other rocket launch providers have sought XYZ technology and services for testing and capabilities e.g. Volt boosters. Based on their predicted market opportunities, XYZ could see revenue generated in excess of \$10 million.

What business model will the company use as a pathway to commercialisation?

XYZ's commercialisation plan includes the following key phases:

- **Device lease:** XYZ devices can be placed in fields and conservation areas. A device lease arrangement allows customers to provide feedback on the device user experience and functionality. The lease phase will be used to validate the robustness of the device and establish customer support processes.
- **Complete Design-for-Manufacturing (DFM):** This process will identify required suppliers and confirm the cost of the production of XYZ units. Once the device is manufactured, XYZ will set up software load and testing processes to allow remote monitoring.
- **Market Launch and Distributor:** A batch of up to 50 units will be produced during the DFM process and they will be used for the market launch. XYZ has an in-principal agreement with Reebok (now acquired by Nike Corp) as part of Spring program participant. XYZ will be leveraging this relationship to reach out to various regions of Australia. XYZ will work with legal advisors to set up necessary agreements and contracts for device sales and operations.
- **Revenue Channels:** Devices will be available on the lease or for outright purchase. For the device lease, it will be an upfront cost of 3 months with a minimum 6-month lease period. The lease cost will cover the device cost, cost of IoT connectivity, and subscription to the customer portal. The devices purchased outright will include all the charges for the first year of operation. Going forward, there will be a subscription cost for the customer portal access. The ongoing monitoring will continue to measure the cost .v. business benefits provided by the use of the device.

With an established market presence for the current use case with the current product design, the next focus will be extending the product to other industries and countries. The problem of invasiveness is global. XYZ will be leveraging their advisory board and their experience in overseas markets to grow in export markets.

What is the expected business growth, in both revenue and jobs, as a direct result of this project, over the next five years?

		Additional Revenue	Additional Jobs
1	Year 1	A\$2,000,000.00	10
2	Year 2	A\$5,000,000.00	20
3	Year 3	A\$10,000,000.00	8

4	Year 4	A\$20,000,000.00	10
5	Year 5	A\$30,000,000.00	10

Please provide evidence to establish the validity of these sales projections

The company expects to retail it's Volts device at \$2500 and based on discussions with its existing customers and distributors it confidently predicts unit sales of:

- 2022 - 800 units
- 2023 - 2000 units
- 2024 - 4000 units
- 2025 - 8000 units
- 2026 - 12000 units

Please complete the Risk Assessment.

	Standard Identified Risk	Applicant Identified Risk	Risk Rating - (Low, Medium or High)	Strategy for Managing risk/issue (please add risk management comments)
1	Project scope may creep		Low	The scope is monitored every fortnight with the collaborators and participants
2	Project schedule may slip		Medium	Monitor and address any blockers ahead of time following stringent Iteration Management process.
3	The company may not achieve the desired technology results		Medium	The product has set targets to launch in the market, including investor support.
4	The company is unable to fund their contribution to the project		Low	A detailed cashflow plan is undertaken. Only confirmed cash streams are considered in the planning.
5		Supply chain	Low	Closely work with the

disruption

CM and stock ahead of time for upcoming device demand.

6

Covid lockdowns hampering the plans

Medium

Focus on working with local partners and optimising the plan to work around lockdowns

What is the Technical Readiness Level (TRL) at the start of the project? | 4

What is the Technical Readiness Level (TRL) at the end of the project? | 8

Please list position titles for jobs created during the project

- XYZ – 4 engineers, project and 1 hardware engineer
- La Trobe university – placements for industrial engagement for 3 students
- Farmer groups – 2 technicians as users of the device set up

Please list position titles for jobs created within one year of project completion

- ICT =10
- Hardware and Electronics = 5
- Customer support and Business Development: 5

Please describe how employees will be upskilled through this project.

- La Trobe university – placements for industrial engagement for 3 students
- Farmer groups – 2 technicians as users of the device set up

What private investment will this project leverage? Please describe sources and amounts.

Private investment will be leveraged as follows:

- XYZ will be committing a private investment of \$500,000 in cash to the project as well as \$80,000 in-kind.
- \$350,000 of the \$500,000 will be spent by XYZ on project management, design of components and implementation of a manufacturing line
- XYZ will contribute a further \$127,500 to Design Co for design and documentation of final products
- XYZ will contribute \$22,500 to Component Co for prototype components
- XYZ will contribute \$80,000 in kind towards project management and design work.

How will this project contribute to growing the manufacturing ecosystem in the Northern Territory?

This project will contribute to growing the manufacturing ecosystem in the Northern territory as follows:

- Employment of an additional 58 staff over the next 5 years
- Upskilling 5 staff during the project

- Demonstration of advanced manufacturing techniques such as 3D printing, robotics and industry 4.0 data sensor systems
- Collaboration with two NT companies in design and component supply
- Collaboration with a research institution on the use of AI technology
- Higher spending on R&D
- Higher information and communication technology (ICT) intensity
- Larger patent portfolio
- Higher relative salaries and wages
- More staff with science, technology, engineering and maths (STEM) skills
- More automation
- Smarter inventory management
- Better energy efficiency
- Better water efficiency
- Greater capital intensity
- Newer equipment
- Greater share of services in total revenue
- Higher product value density (by weight)
- Higher marketing expenditure
- Higher trade intensity
- More extensive backward links
- Larger geographical reach
- Superiority (offering a technically superior product or service)
- Diversity (possessing a competitive advantage across product or service segments)
- Flexibility (introducing an agile and responsive business model)
- The rise of data volumes, computational power and connectivity
- Emergence of business intelligence capabilities
- New forms of human-machine interactions
- Improvements in transferring digital instructions to the physical world

Lead Applicant Experience

Describe the history of the Lead Applicant, demonstrating a track record in managing similar projects with the required skills and describe their contribution to the project.

XYZ Pty Ltd was established in 2016 to develop, design, produce and sell unique equipment for underground mining operations to reduce stress for mine employees and ensure equipment is kept at optimal operational temperatures.

XYZ has gone on to develop these products:

- Mine® MKII - a lightweight portable system, that can rapidly and effectively reduce stress to substantially improve mining conditions, by maintaining compliant and acceptable stress levels for heat management and/or equipment overheating.
- Aag® - a non-reversible, single use, disposable first warning indicator system, to assist in the early visual detection of conveyors rotating mechanical components such as idlers, rollers and pulleys, in the early stages of bearing failure reducing unscheduled downtime, non-compliance to safety obligations and uninformed statutory inspections.

VOLTS (this project) - hydrogen powered, intrinsically safe, uninterruptable power supply (UPS), for underground mining and hazardous environments. It is a convenient reliable power supply for underground roadways geographically

too remote for electrical reticulation or areas without ease of access to electrical reticulation, or as a more reliable and economically viable solution to powering monitoring and communications equipment, in today

Detail the financial viability of the Lead Applicant, including details of access to capital to fund the project.

A review of the financial results of the company for the 3 years to June 2021 indicates that the company has the cash flow to execute the project milestones and implement project outcomes. In addition their external accountant has provided a letter of financial viability as attached, showing access to over \$800,000 in funding and lines of credit for the project.

Does your company hold patents for your existing products/services? Please list these patent numbers. In addition, please describe your continuing IP strategy going forward for products developed during this project.

The product Volts has had its name and logo trademarked by XYZ Pty Ltd and also engaged Halfords IP Attorneys to prepare a comprehensive provisional patent for the product which was submitted in October 2018. Additional to this, an "International Patent Search and Written Opinion" was led for examination and completed in December 2018.

Subsequent updated claims on novelty, inventive steps and industrial application were made to the provisional patent before being submitted for the international PCT in October 2019, protecting the product and claim globally until expiry in March 2021 by which time an application is to be made to the nominated countries for patent protection. Updates to the PTC are expected to take place during 2020, prior to the expiry to include protective claims over manufacturing techniques employed, product appearance, industrial application, novelty and further inventive step claims arising from the final development.

Product licencing and distribution arrangements with globally positioned companies currently operating within the industry and product space, is a strategy to:

- Have the protection of contractual and non-disclosure agreements in place.
- Have business partners with the financial ability, interest and benefit in the protection of the IP.

Further IP protection is assisted with the extensive development and certification processes required to have a product of this complexity market ready. Any competing similar product that navigates around XYZ's IP protection would still require two to three years for development and certification, allowing XYZ's first to market readiness with a market-trialed and adopted product.

Budget and Milestones

Project Budget

		AMGC Grant Amount	Participant Contribution	Cash Sub- Total	In-Kind Contributions	Milestone Totals
1	Milestone 1	A\$125,000.00	A\$125,000.00	A\$250,000.00	A\$25,000.00	A\$275,000.00
2	Milestone 2	A\$150,000.00	A\$150,000.00	A\$300,000.00	A\$50,000.00	A\$350,000.00
3	Milestone 3	A\$100,000.00	A\$100,000.00	A\$200,000.00	A\$25,000.00	A\$225,000.00
4	Milestone 4	A\$75,000.00	A\$75,000.00	A\$150,000.00	A\$25,000.00	A\$175,000.00

	(if needed)					
5	Milestone 5 (if needed)	A\$50,000.00	A\$50,000.00	A\$100,000.00	A\$25,000.00	A\$125,000.00
6	Milestone 6 (if needed)	A\$0.00	A\$0.00	A\$0.00	A\$0.00	A\$0.00
7	Milestone 7 (if needed)	A\$0.00	A\$0.00	A\$0.00	A\$0.00	A\$0.00
8	TOTALS	A\$500,000.00	A\$500,000.00	A\$1,000,000.00	A\$150,000.00	A\$1,150,000.00

Milestone 1 Start Date | 2021-01-01

Milestone 1 End Date | 2022-03-31

Milestone 1

	Supplier	Activity	Cash Cost	In-Kind Value
1	XYZ	Project management	A\$60,000.00	A\$15,000.00
2	XYZ	Site inductions, design development, pilot strategy	A\$100,000.00	A\$0.00
3	Design Co	Systems development,	A\$90,000.00	A\$0.00
4	Research Institution	Site facilities	A\$0.00	A\$10,000.00
5	TOTAL		A\$250,000.00	A\$25,000.00

Milestone 2 Start Date | 2022-04-01

Milestone 2 End Date | 2022-06-30

Milestone 2

	Supplier	Activity	Cash Cost	In-Kind Value
1	XYZ	Project management.	A\$60,000.00	A\$25,000.00
2	XYZ	Final design,	A\$125,000.00	A\$0.00

mechanical components supplied for certification and destructive testing.

3	Design Co	Embed development of final designs in prototype.	A\$115,000.00	A\$0.00
4	Research Institution	Site facilities	A\$0.00	A\$25,000.00
5	TOTAL		A\$300,000.00	A\$50,000.00

Milestone 3 Start Date | 2022-07-01

Milestone 3 End Date | 2022-09-30

Milestone 3

	Supplier	Activity	Cash Cost	In-Kind Value
1	XYZ	Project management	A\$30,000.00	A\$15,000.00
2	XYZ	Intrinsically safe designs	A\$100,000.00	A\$0.00
3	Design Co	Embed intrinsically safe designs in product	A\$25,000.00	A\$0.00
4	Component Co	Supply components for PCB's	A\$45,000.00	A\$0.00
5	Research Institution	Site facilities	A\$0.00	A\$10,000.00
6	TOTAL		A\$200,000.00	A\$25,000.00

Do you have another Milestone? | Yes

Milestone 4 Start Date | 2022-10-01

Milestone 4 End Date | 2022-12-31

Milestone 4 (if needed)

	Supplier	Activity	Cash Cost	In-Kind Value
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1	XYZ	Project management	A\$25,000.00	A\$10,000.00
2	XYZ	Set up manufacturing line	A\$125,000.00	A\$0.00
3	Research Institution	Site facilities	A\$0.00	A\$15,000.00
4			A\$150,000.00	A\$25,000.00

Do you have another Milestone? | Yes

Milestone 5 Start Date | 2022-01-01

Milestone 5 End Date | 2023-06-30

Milestone 5

	Supplier	Activity	Cash Cost	In-Kind Value
1	XYZ	Develop commercialisation strategy execution and prepare marketing plan and execution	A\$75,000.00	A\$15,000.00
2	Design Co	Document certification	A\$25,000.00	A\$0.00
3	Research Institution	Site facilities	A\$0.00	A\$10,000.00
4	TOTAL		A\$100,000.00	A\$25,000.00

Do you have another Milestone? | No

Project Collaborators

Design Co, Yes, 1257893, Design Co, Professional Services, 4 Dewey St, Darwin, NT, 0820, Design Co was founded in 2011 and is ISO9001 and ISO13485 certified. Design Co provides professional and comprehensive design, commercialisation and manufacturing services and specialises in the development of electronic products., Design will be paid \$255,000 for industrial design, development, testing, and specifications on the Volts product. The participant will support AMGC in the development of a case study and media opportunities and will participate as an AMGC project reference site, <https://www.amgc.org.au/projects/>, Not Indigenous-owned, No,, Percy Smyth, percy.smyth@designco.com.au, +61458789632

Component Co, Yes, 56897852, Component Co, Manufacturing Body, 56 Albatross St, Darwin, NT, 0820, Component Co provides an integrated metal 3D printing research, development, design, prototyping and manufacturing service to customers in the aerospace, defense and tooling sectors. Component Co has extensive capabilities and in-depth experience

in design for additive manufacturing of aerospace components using an unparalleled range of alloys. With three manufacturing facilities, access to two leading research Universities, a robust supply chain, and proven expertise in product design and optimization, Component Co's unique full-service offering includes R&D, design and prototyping and contract manufacture., Component Co will carry out tests to assess suitability of the powders for additive manufacturing through laser-3D printing and also ink jetting. Component Co will feed results back to XYZ as a part of an effort to help optimise process conditions for producing materials suitable for direct use in 3D printing., <https://www.amgc.org.au/resources/>, Not Indigenous-owned, No,, Millicent Powers, powers@componentco.com.au, +61415235815

Log in to ntamef.grantplatform.com to see complete application attachments.

