

## SOR Outstanding Moisture Battery Development Success

**Perth, Australia – 29 December 2022.** Strategic Elements Ltd (ASX: SOR) is pleased to report multiple successful developments in the Energy Ink™, a revolutionary new power source that generates electrical energy from moisture in the air.

- A successful demonstration compared the power output of an Energy Ink battery, powered solely by moisture, to the baseline power consumed by a leading glucose-monitoring skin patch. The extremely thin, flexible, environmentally friendly Energy Ink battery generated over 200% more power than required.
- Successful design and fabrication of programmable load simulators proved to increase the data available to the engineering team, speed up testing, and drive optimisation of the technology. Millions of data points have now been collected for use in engineering, and to form a future databank for discussions with OEM manufacturers.
- Utilising data from programmable load simulators and other sources, a simple power management system was combined with Energy Ink technology for the first time. Initial testing revealed an over 500% increase in power density or power per square centimetre. A smaller device (with power management) with one-quarter of the area was able to generate over 5 times the power output of the larger device (without power management) for the exact same load. Power management systems were proven to have the potential to dramatically increase the performance of an Energy Ink power solution.

*Strategic Elements Managing Director Charles Murphy said “The technology is evolving at a rapid rate. It was a fantastic result to clearly produce more than enough power compared to a leading existing glucose monitoring patch being used by millions of people worldwide and to have the excess potential for a manufacturer to include more advanced sensing or other features. The thinness, flexibility, printability, safety, and environmentally friendly aspects of the technology are all very attractive, however, it needs to produce enough power to be truly commercially useful. Hence, we are extremely pleased with the trajectory of the Energy Ink development”*

*“The sudden escalation in power per square centimetre from a rudimentary, very simple power management system has provided the team with great optimism for Q1, 2023 and what could potentially be achieved through this approach”.*

### **Skin Patch Energy Ink**

A demonstration was designed to measure the power output of the Energy Ink battery as compared with the baseline power consumed by a leading glucose-monitoring skin patch. The test was designed to validate both the ability of the Energy Ink technology to power a similar glucose-monitoring device and examine how much more the Energy Ink device may be able to power. For example, there is a strong desire to incorporate more sensors and wireless technologies into skin patches, however, this has been limited by the size and capacity of the battery that can be incorporated into such small devices.

Two different cell configurations were tested together with simple power management on programmable load simulators designed to simulate the load of a leading skin patch device. One test consisted of two 6x6cm cells and one test with two 4x4cm cells. Both tests were run continuously for one week and demonstrated a power output of 300% and 200% of the total power used by a leading skin patch device respectively.

Millions of people worldwide use these types of devices to reduce the frequency of daily finger prick blood glucose checks and better manage glucose levels. They are generally used for 7-14 days before being disposed and over 38 countries globally already provide reimbursement. The ACC is concerned with child safety of the button/coin cell batteries used in these types of devices and in 2022 ordered manufacturers/retailers to comply with strict new Australian mandatory safety and information standards.

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With the use of these devices expected to surge globally, the clear goal for manufacturers is to make devices as inconspicuous as possible, provide more advanced sensing, keep costs low, and be friendlier to the environment. **The advantages of the Energy Ink technology align with these goals and include flexibility, thinness, and the ability to print various sizes whilst using environmentally friendly materials.**

### Device Power Optimisation

An additional laboratory has been established in Perth, with several electronic engineers from Stealth Technologies laying a foundation for testing battery devices towards commercial and consumer device integration. Programmable load simulators were successfully developed and after calibration against leading scientific test equipment were used with battery cells manufactured and shipped from the team at UNSW. A total of four load simulators were built and used during the quarter. Due to the value being unlocked through using the load simulators, the team is planning to build and utilise additional simulators in the next quarter.

A key aim of using the load simulator was to collect data to help consider how to optimise device performance. The potential value that can be realised from this approach to device optimisation was validated through a test that revealed an over 500% increase in device power density or power per square centimetre. This was achieved using two 4x4cm cells as a baseline and then adding engineered power management to two 2x2cm cells. The smaller device with one-quarter of the area was able to generate over 5 times the power output of the larger device for the exact same load. There is a significant upside in optimising devices through further cell technology development and additional power management.

### Larger Scale Energy Ink Systems

The **Energy Ink™** technology is still in early development, and the fundamental upper limit of aspects such as maximum power output, duration and energy density remains unknown. Printed graphene-oxide-based cells that generate energy from airborne water molecules have the potential to directly power a device, complement a battery by extending device life or provide energy for battery storage. The global imperative for more innovative, renewable energy creation and power sources is expected to grow significantly.

Electronic Skin Patches are currently a large USD 10 billion market<sup>1</sup> and remain the Company's near-term focus. These products provide sports, health and other information from devices attached to the human body and currently use rigid alkaline batteries or those with lithium materials. The market for skin patches is forecast to grow to USD 27 billion by 2033<sup>1</sup>.

However, significant development success by the team has opened a potential R&D pathway for **larger-scale Energy Ink systems** either through packs with multiple connected cells or larger cell sizes. Over a 14-day testing period, a pack previously successfully generated more than 2.4 Ah (2400 mAh) of charge. Investigations into whether Energy Ink™ cells generate more electrical power as they increase in size have also been successful, with a single 100 cm<sup>2</sup> cell generating over 1.4 Ah (1400 mAh) of electrical charge. AAM has access to equipment that can print features as large as 3m<sup>2</sup>, and the Company is designing a program of work that will significantly increase the cell size under development. Further information on the program is expected in Q1, 2023.

100% owned Australian Advanced Materials and The University of New South Wales recently signed an agreement for a \$1,600,000 federal government funded Project to develop a potential next-generation power source that can directly **generate electricity from moisture in the air** for wearable electronics.

### Strategic Elements – Pooled Development Fund

The Australian Federal Government has registered Strategic Elements as a Pooled Development Fund with a mandate to back Australian innovation. The Company supports leading Australian scientists and innovators in high-risk-high reward ventures. SOR majority funds the initial development of each venture whilst seeking a major strategic investor/partner able to assist commercialisation. The Company is backing projects across robotics, artificial intelligence, printable technologies (battery, storage) and strategic technology metals. Investors in SOR potentially pay no tax on capital as the Company operates under the Pooled Development Program. More information is available on the Company's website.

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*This announcement was authorised for release by the Strategic Elements' Board of Directors.*

<sup>1</sup> <https://www.idtechex.com/en/research-report/electronic-skin-patches-2021-2031/821>