



# SMOGATHON

FINALISTS





## Aeris Cleantec AG

Aeris Cleantec AG is a Swiss startup that aims to tackle global air pollution problems. They have implemented a set of complete solutions, including air quality sensing, adaptive air purification products, and autonomous software control system.

Our hands on and innovative team allows us to develop hardware products with good designs, and software products with smart controls, which eventually tackle air pollution at all levels.

The very first products they have developed are a variety of home and commercial air purifiers. These air purifiers provide solutions for air quality control for indoor environments for individual and business customers.

In addition to air purifiers, they offer a fleet management software that helps business owners to control a large

number of air purifiers including aeris, third party machines; moreover, this fleet management software is capable of optimizing the way HVAC system operate with aeris smart control systems.

The next step was to design a precise, compact, and yet low cost air quality sensor. With this sensor, we offer precise air quality feedback in real time, enabling our air purification products to adapt accordingly. Furthermore, this air quality sensor enables us to build up large and accurate sensor networks at controllable budget to identify pollution sources and help polluted cities to tackle pollution problems at the root.

All of aeris' products are connected, enabling us to build a meaningful data network. With this data

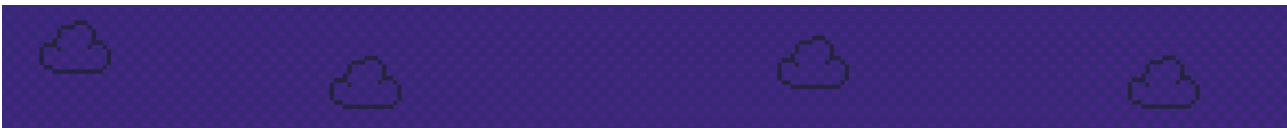
network many institutions are able to develop advanced machine learning algorithms and transfer functions to solve air pollution in a smart, efficient, and accurate way. The wide range of products invented make it possible for aeris to have a true impact on monitoring and improve air quality.



**aeris**



**aeris**



## Artveoli, Inc.

Artveoli, Inc. is a Silicon Valley based start-up company in the Indoor Air Quality space, making artistic air panels that create fresh air indoors. Smart, connected, modern design flat panels remove excess buildup of Carbon Dioxide (CO<sub>2</sub>) and convert it into Oxygen (O<sub>2</sub>), improving indoor air quality in homes, offices, schools, hospitals and other closed environments. People spend over 90% of their lives indoors, and there are multiple indoor air contaminants that make people sick. One such contaminant, CO<sub>2</sub>, is what people exhale, so it



must be removed continuously where people are present, otherwise it causes headaches, dizziness, shortness of breath, tiredness, and loss of cognitive performance. The only way to lower the CO<sub>2</sub> indoors has always been to get fresh air from the outside, until now. Artveoli Air Panels disrupt indoor ventilation by generating fresh air indoors, making healthier air inside. The Artveoli founders worked together at Stanford Bioengineering making custom microfluidic devices – the core technology of the Artveoli Air Panels. The technology is based on photosynthesis, the process plants use to convert CO<sub>2</sub> to O<sub>2</sub>.



Artveoli has developed closed, controlled photobioreactors that improve efficiency and maximize output. The team has received technology innovation awards and has established global partners for product distribution.



## Brizi

Brizi provides clean air to children and useful information to parents and adults.

Young children are the most vulnerable from air pollution. Their lungs and immune systems are not fully developed, and have greater risk for long-term health effects. At the same time, parents are not empowered to make smart choices to avoid the worst polluted areas with their children.

Brizi helps solve those problems. Our first product, Brizi Baby, is an innovative ecosystem of mobile app, portable pollution sensor, and an air filter inside a pillow meant for a child's stroller. The three devices work in unison to detect levels of air pollution, map this information for all to see, and when air pollution levels are high, trigger the pillow to turn on and filter the air in the child's breathing area.



Testing with air quality experts at the University of Surrey showed that Brizi's patented, medical-grade fan-filter can reduce air pollution in a baby's breathing area by up to 80%.



Our vision at Brizi is to provide clean air solutions for the whole family. With our data, we hope to accelerate a change of habits that can help reduce pollution at the source. We started with a product for young children because they are the most vulnerable, but we plan to apply our technology in a range of products in the future.



## Cambridge Mask Company

Mask Company believes in helping get everyone outside and enjoying life, without having to worry about the air they breathe or the way they look.

With the help of Y Combinator and a team of investors we have designed, patented and Kickstarted a smart pollution mask that can bring clean air to the next level.



The Smart Cambridge Mask is the world's first pollution mask that can actively monitor the air quality around you and tell users when to change mask filter. It's perfect for cyclists, urban residents or anyone worried about polluted air.

Cambridge Mask Co was founded in 2015 and has offices in Cambridge UK, Beijing and Hong Kong. They sell to embassies, hospitals and corporate clients such as Bank of China, British Airways and Intel. Online they sell to customers in over 50 countries and are one of the top ranked masks on Amazon.



## CGON

CGON manufacture a range of hydrogen fuel additive systems designed to reduce emissions, increase fuel efficiency and keep diesel particulate filters clean. It's the technology the world has been waiting for, and with so many possible applications, the benefits are clear – not just for the environment, but also for your bottom line.

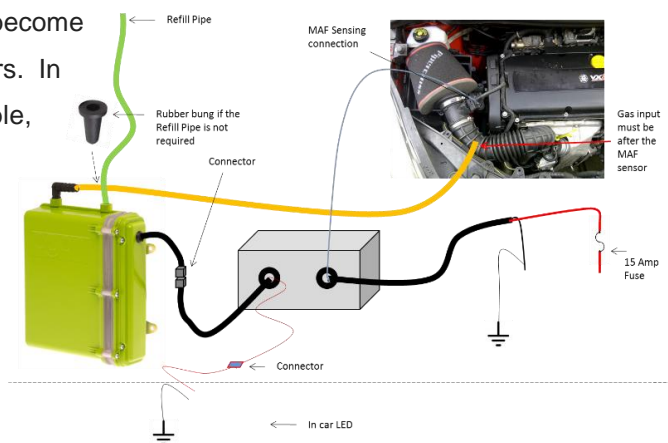


Most alternative solutions are POST-COMBUSTION technologies, such as DPFs (diesel particulate filters), currently installed in modern cars, or AdBlue additives, currently being introduced to modern lorries. But these technologies are only applicable to modern vehicles, are not easily retro-fittable to the existing fleet and add significantly to upfront and maintenance costs.

CGON is the only PRE-COMBUSTION emission reduction device which could be installed inside the vehicle, for safe, on-demand hydrogen generation. All competing technologies require high current, or produce harmful gases, thus not suitable for installation in cars. We have 4 patents to protect our tech. To-date we have sold 400+ units to Early Adopters (physical persons and small businesses).

In general, our clients are Fleet Operators (B2B) and Private Vehicle Owners (B2C). Our B2B clients are companies which operate large fleets of vehicles, such as haulage companies, delivery services, taxi companies, fork lift operators, trucks, where the emissions and fuel economy are primary concerns. Our B2C clients are car owners who want to reduce their carbon footprint and improve their mileage.

We are now actively recruiting garages to become part of our network of Authorised Installers. In parallel, we are looking to launch a visible, successful demo project with a major client, which should greatly increase the adoption of our technology, and further contribute to reducing the air pollution in cities.

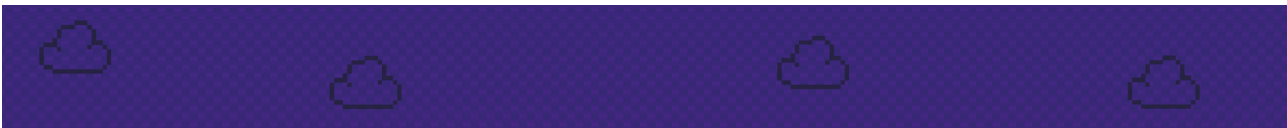


## Chakr Innovation

Chakr Innovation is a group of engineers who have developed a technology to capture emissions from the source. Their first product, Chakr shield captures particulate matter emissions (which is the PM2.5 and PM10 responsible for ambient air pollution) with a capturing efficiency of over 90%, without causing any adverse impact on the engine. The story doesn't end here, as the

captured pollution is processed and converted into inks and paints, which can be used for paintings, textile and paper printing, etc. The technology has been deployed across diesel generators in India, where they have captured over 300 kg of particulate matter in the last 12 months, which could have polluted ~1500 billion litres of air.





## Graviky Labs

Graviky Labs, a Massachusetts Institute of Technology startup/ spin-off, is an award winning Cleantech Company that has industrialized the process of recycling air pollution emissions grounds into advanced pigments and inks.

Black Carbon (Particulate Matter pollution), 2nd largest climate change agent, is the largest polluter in major urban centres across the world. Beyond the climate change, it is the biggest contributor to air pollution related mortality.



### Solution

#### Stage - I

After last few years of R&D they have developed and piloted a technology – “KAALINK” which works as a retrofit device that can be attached to any exhaust pipe be it vehicular, chimney or generator and captures the particulate matter pollution, before it enters the environment with a capture efficiency of upto 95%. Thus, instead of looking for curative solutions, Kaalink provides a preventive solution to the problem of fossil fuel based PM pollution.

#### Stage - II

We have developed proprietary processes to repurpose the captured the particulate matter pollutants into industrial grade inks and paints – AIR-INK. AIR INK is promoting the idea to look beyond conventional materials to make inks. Every 30ml of AIRINK confines 40-50 minutes of diesel car pollution.

Combined together, Kaalink-Air-Ink combo not only prevents very harmful air pollution but also binds into a very useful product – INK.

#### Achievements

- Created a global conversation around citizen driven movement on air pollution and circular economy;
- Over last one year, they have been able to make international pilot demonstration of the technology in London and Hong Kong;
- Established the commercial validation of the Kaalink – AIRINK cycle by building USD 1.1 mn revenue last year and have shipped our recycled products to more than 700 locations in 50 countries



Solvents Test May 2, 2015, SHK\_Bone, Diesel sample



## ISCLEANAIR

ISCLEANAIR is a scale - up born in 2015 following an extensive validation up to the commercial phases, with the aim to industrialize and commercialize the disruptive technology named APA - Air Pollution Abatement worldwide, performing further developments and the dissemination.

APA presents many competitive advantages in comparison to the existing products on the market:

- as a filter-less intelligent platform, extraordinary efficacy in air cleaning where people live, work

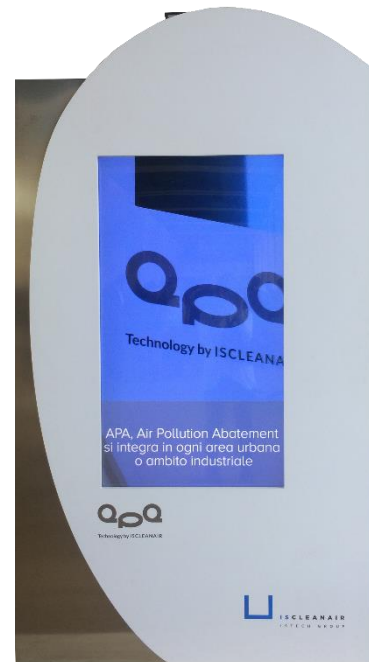
and breathe, by means of a distributed cluster of pollution absorbers at the surface level;

- high effectiveness for the removal of PM, PAH and light hydrocarbons, heavy metals, SO<sub>x</sub>, NO<sub>x</sub>, CO and O<sub>3</sub>;
- lowest Total Cost of Ownership;
- flexibility and scalability, because it is multi-function and multi-shapes;
- IPR's wide protection of the technology and related distributed strategies of application, mainly based on an extensive know-how and a number of patents already assigned in Italy and USA, and registered worldwide;
- integrated with monitoring and controls features, Internet of Things and energy efficiency solutions.

APA responds to a nearly 0-waste philosophy (rainwater like residual) and the nearly 0-emissions principle (consumptions between 5 to 10 times lower than the existing technologies). In relation to special applications (as cogeneration plants), APA can be applied also at the source of the polluting emissions as an advanced wet-scrubbing technology, improving the operational cycles and the abatement performances and saving costs.

APA is a BAT - Best Available Technology (EU IPPC Directive 2008/1 /CE), with an impressive track record of awards, grants and recognitions globally, several articles and citations in newspapers and journals.

Moreover, APA technology boasts 7 years of laboratory studies and analyses, over 5 years of experimentation on complex sites and prominent partnerships, following by the initial adopters on the different and wide addressable markets.



## Radic8

Radic8 are a new kind of technology company. They have re-imagined the problem of combatting air pollution as an opportunity, transforming it from a cost to a cost-saving. They have achieved this through a combined strategy of providing world-leading technology to deal with indoor air quality problems, and by creating innovative marketing tools to help businesses benefit from sharing clean air.

It all starts with cutting-edge air sterilisation technology, capable of removing toxic gases, particulate matter and viruses from indoor air. In 2017, Radic8 launched their exciting range of air purifiers and



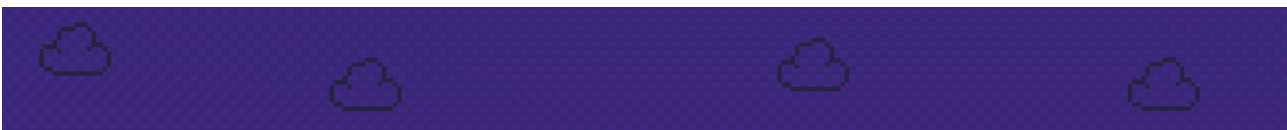
sterilisers to suit all market places and all needs. With impressive test results and stylish designs, they have attracted a distribution network that is growing rapidly around the world Radic8's latest innovation, INBAir O<sub>2</sub>, provides concentrated oxygen in a portable, stylish and discreet way. Oxygen helps open the airways, raise energy levels and alertness and reduce the harmful effect of exposure to air pollution. Designed with everyone in mind, INBAir O<sub>2</sub> is the latest in Radic8's armoury of smog-busting technology.

Creating world-leading technology is just the beginning.

Air pollution can be costly, increasing healthcare costs, reducing productivity and discouraging tourism. Radic8 technology comes with a *We Share Clean Air* certification, allowing forward-thinking businesses to reassure customers and staff the air in their building is safe to breathe. The technology will not only help reduce staff sickness and enhance productivity but also provide advertising spaces to boost revenue.

Radic8 also aims to increase awareness and education about the dangers of air pollution. A specially designed tool for children, the *Clean Air Fairies*, aims to introduce the topic in a fun and positive way. Their art installation, *Making It Visible*, displays striking images that artfully bring air

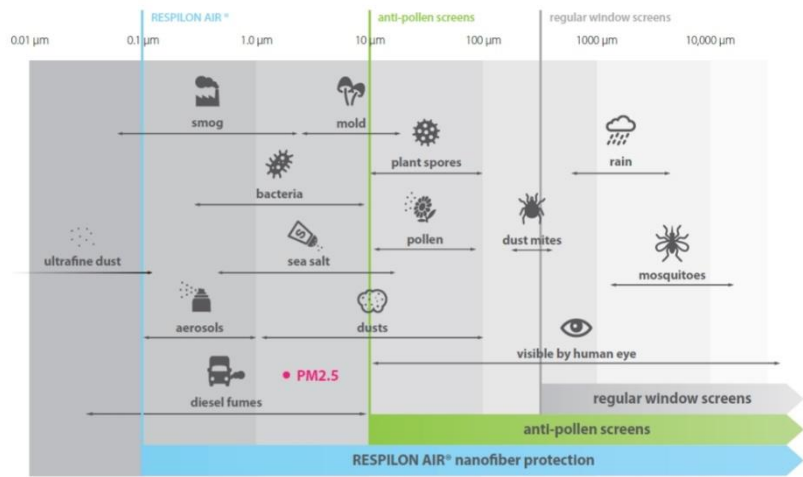




pollution into wider discussion.

## RESPILON AIR®: Nanofiber Protection of Your Home

RESPILON AIR® nanofiber membrane transforms an ordinary window screen into a filter that blocks pollen, dust, allergens and smog from entering an open window. This allows you to ventilate your home even in smoggy conditions and still breathe fresh air without harmful particles.



Nanofiber membrane works on mechanical principle without using any dangerous chemical substances.

RESPILON AIR® solution was designed especially for families with young children, the elderly, allergic people and asthmatics, pregnant women or for people with a weakened immune system – e. g. patients undergoing chemotherapy. In regions with frequent occurrence of smog situations, it is an ideal solution for any household or office. To understand the functionality of a nanofiber membrane, it is crucial to explain the term ‘nanofiber’; It is an extremely thin fiber with diameter less than 500 nanometres (0.5 µm). In comparison, human hair is thousand times thinner. These fibers form a strong structure which



boasts pores with the diameter of only 1 µm, thanks to which the fine particles are securely stopped. The membrane has the form of a three-layer sandwich, where the nanofiber filter is protected by the outside layers made from polymers. The whole represents an extremely resistant composite which is stable under UV radiation as well as under mechanical load. In the regions with intense sunshine RESPILON AIR® fulfils also a shading function and is not limited by rain when ventilating, as water trickles down the composite. Filtration efficiency for particles 1 µm, which are corresponding to diesel

fume size particles, is 82,9 %. Smog size particles 2.5 µm are filtrated in 97.6 % and particles in size 5 µm and bigger are filtered in nearly 100 %. Filtration properties of RESPILON AIR® have been independently tested by Engineering Test Institute in Brno and TUV SUD.



## REDUXCO® by DAGAS

The **REDUXCO®** catalyst is a top quality innovative product improving engine performance, reducing fuel combustion, and emissions from the engine and boiler. The **REDUXCO®** catalyst, if used regularly with fuel, is a substance that provides complete burnout of soot and naphthalene, reduces the emission of particulate matter (PM), hydrocarbons (HTC), and carbon monoxide (CO) without impairing the physicochemical properties of fuel. The **REDUXCO®** catalyst helps to eliminate smog generated by transportation. The product has been registered by the European Chemicals Agency as a new chemical compound and is solely manufactured by Dagas sp. z o.o. guaranteeing product quality. The technology does not require investments and is ready for use. It brings measurable savings and reduced emission for our clients.

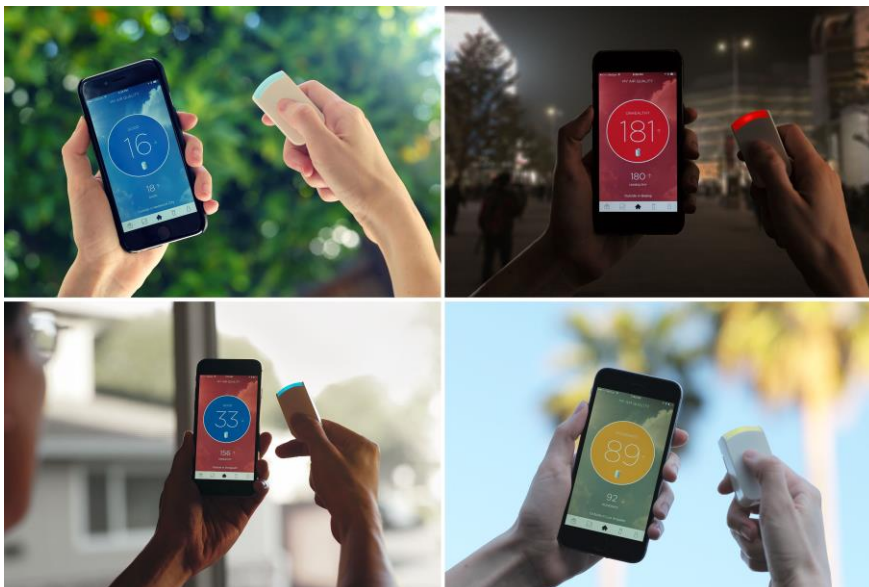




## Wynd

Wynd's mission is to help people breathe healthier air and learn more about their environment along the way. We were founded by a team of scientists and engineers from MIT, and strive to leverage a spectrum of technologies in purification, sensing, and big data to help people and communities that are impacted by poor air quality

We invented an air quality system called Wynd that is comprised of several products which work together seamlessly - a smart, portable air purifier that filters allergens and pollutants wherever the user goes, the world's smallest and most accurate air quality monitor, and a collection of software (including mobile apps and cloud services) to deliver insights about the air quality to a global user base. While the smart hardware is for individual use, as we grow our users each person can become a monitor to help their community learn more about their air quality - both indoors and outdoors. As a result we are building the world's largest air quality platform, and today stream real-time air quality from over 50,000 stations globally.



We launched the world's largest air quality crowdfunding campaign last year on Kickstarter, generating over \$600K in pre-orders from customers in over 80 countries in less than 40 days. Time Magazine also recognized Wynd as one of the 25 Best Inventions of 2016.