

IONEX improves EU road safety

Air ionization technologists IONEX d.o.o have developed a working prototype of their solution, IONEXAir. The IONEX air ionizer project was recently awarded an SME Phase 1 grant

The IONEXAir ionizer, a negative ion generator – for installation in vehicles – adds a sufficient number of negative ions into the air in order to normalise conditions inside cars. The key lies in its uniquely designed and patented carbon brush which emits large amounts of negative ions without generating harmful ozone, whilst clearing the air of carcinogenic particles.

The innovation is significant, as it improves the indoor air conditions in all types of vehicles by integrating air ionization, resulting in a calmer, more focused and cautious driver. In some studies, concentration can be improved by 30%.

As a result, this solution:

- Increases safety, meaning fewer accidents;
- Protects health; and
- lowers governmental health treatment expenses.

IONEX delivers an environmentally friendly innovation, contributing to the safety of transport, and with thus, helping to achieve European transport and mobility goals, as defined in the 2011 Transport White Paper.

EU and global issues

As we all know, the EU is confronted by a large number of road accidents, resulting in both deaths and severe injuries. According to the European Commission, the social cost (rehabilitation, healthcare, material damages) of road fatalities and injuries in 2015 was estimated to be a minimum of €100 billion.¹

According to EC Road Safety Report² and American studies, 10-20% of road crashes ensue due to fatigue and approximately 7% of all



Indoor air in vehicles

crashes are partly caused by driver attention problems, where fatigue is not a factor.

Another traffic problem stems from the severe air pollution passengers are facing in traffic. According to the European Environment Agency (EEA), air pollution is the single largest environmental health risk in Europe, decreasing the average life expectancy in the EU by 8.6 months, due to exposure to particulate matter resulting from human activities. Exhaust fumes and soot are carcinogenic sub-micrometre particles, which unavoidably enter through car structure and get inhaled by drivers and passengers. These particles accumulate in the lungs and cannot be removed, causing irreversible damage to people. The Institution of Occupational Safety and Health (IOSH) estimates that the total health-related external costs in 2010 were *circa* €330–940 billion per year.³

The automotive industry is already aware of these problems and tries hard to solve them. To stop pollutants from entering the vehicle they use air filters, but this solution is insufficient as these particles are so small (0.01 micrometre), that no

filter capable of retaining them exists. Some manufacturers are trying to solve the problem of negative ion shortage in an inadequate way by using available solutions – air ionizers, operating on metal needles, and dehumidifiers – which emit harmful ozone and do not clean the air efficiently. Ozone is harmful for people to inhale; amongst other complications, it causes:

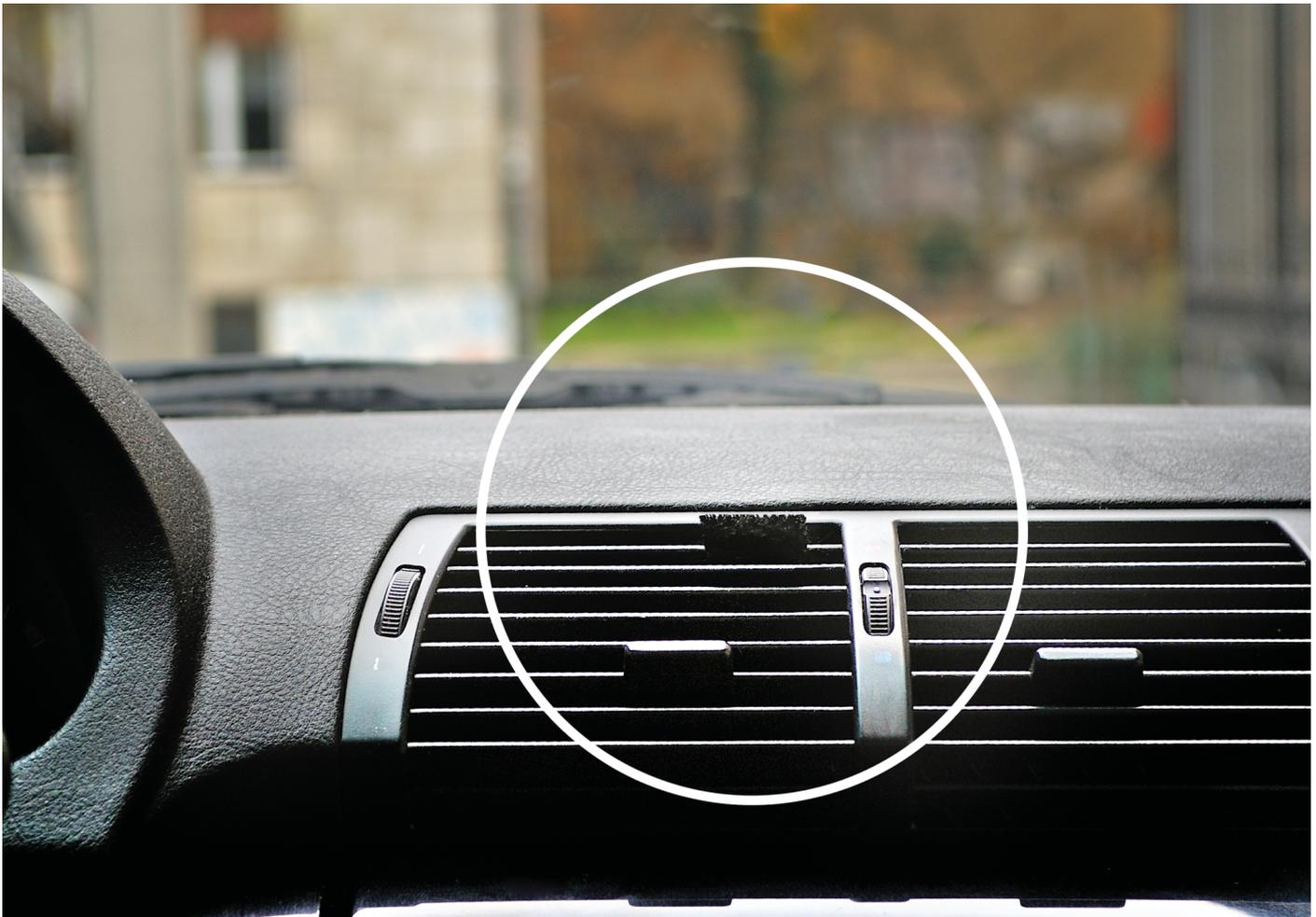
- Shortness of breath;
- Dry cough, damages lung cells;
- Aggravation of asthma and chronic lung diseases;
- Irritation of the respiratory system; and
- Reduced lung function.

The good news

Luckily, IONEXAir can solve both issues.

We can remedy concentration loss and fatigue simply by adding negative ions into a car cabin. How?

Loss of concentration and fatigue in vehicles is caused by a lack of negative ions in cabin air. According to the laws of physics, the vehicle body acts like a Faraday cage and is completely depleted of negative ions, in that they cannot



IONEXAir - for installation in vehicles

enter the structure. In addition, air conditioning destroys negative ions which would otherwise enter the cabin through ventilation from outside, due to their high sensitivity to air friction. Living in environments with no, or low, quantities of negative ions is scientifically proven to be harmful for human health, therefore they have to be added to the depleted air artificially, through negative ion generators (ionizers). The lack of negative ions causes:

- Somnolence;
- Fatigue;
- Slow reactions;
- Loss of concentration; and
- Increased irritation.

Negative ions emitted from an air ionizer can prevent these risks by reducing the level of stress hormones, increasing the level of oxygen in the blood, thus improving driver concentration and contributing to safer driving. Stress is constantly produced while driving, according to the 2011 Occupational Safety and Health in transport sector.⁵ If we lower the stress hormone, concentration and performance increase, and

therefore the traffic calms and the number of accidents can decline.⁶

We can solve the problem of polluted air inside a vehicle cabin

The key advantage of IONEXAir is the unique carbon brush which emits large quantities of negative ions, without harmful ozone (up to 2.7×10^7 negative ions/cm³/sec and 0.31×10^{13} ions/sec). As a result, every second the IONEX air ionizer emits 27×10^{10} negative ions per litre of air, of which can instantly clean the cabin air. In comparison, there are about 100 million (1×10^7) particles of exhaust gases in each litre of air in cities, and 1×10^{10} particles in a litre of air on highways. Negative ions instantly clean the indoor air in cars by attaching to pollutants and completely removing them from the air. Large quantities of negative ions offer a much more efficient solution than current ionizers/filters offer.

How does IONEXAir work?

The ionizer activates automatically when the car engine starts. Air ventilation carries negative ions around the cabin air, and because negatively charged particles cannot exist by themselves, they bind to the nearest sub-micrometre particle of exhaust fumes, soot, and dust in the air, and bring

them down onto surfaces. Being ionized, the pollutants cannot become airborne again and are therefore efficiently eliminated from the air we breathe, preventing enormous amounts of pollutants from accumulating in the lungs of passengers.

Therefore, the air is completely clean and enriched with remaining negative ions, which have beneficial effects on health. Entering through lungs into the blood system, they:

- Lower the level of the stress hormone;
- Enable the driver to be more focused, alert and careful; and
- Prevent fatigue and sleepiness.

Scientific evidence of the beneficial effects of negative ions on humans have been published by many world-renowned institutes and famous scientists. Installation is easy, flexible (simply added to the air conditioning system in cars), and therefore cost efficient.

This solution provides a healthier environment to each individual in all types of vehicles, including electric vehicles. Car manufacturers are interested in the IONEX solution because it makes use of vehicles safer, healthier, and it provides financial



IONEX Core Team

benefits due to market advantage, all of which can be used in marketing.

What are the benefits?

IONEXAir automatically provides immediate health protection and contributes to EU and global challenges. The solution is most useful for professional drivers and passengers. Through the integration of the IONEXAir ionizer, the car industry as a target customer could solve the current issues with excess ozone creation through inefficient air ionising solutions, and provide their users with an environment that is safer, human-friendly, stress-free and healthy. As a result, manufacturers can add value to their vehicles, as well as providing noticeable market advantage and revenues. It is easy to install, therefore the car industry does not have to implement big changes into their production process.

With integration of IONEXAir into cars, governments would also benefit due to less costs spent for health treatments, and specifically those caused by traffic accidents. The novelty of the solution is in the patented carbon brush, which never oxidates – never emits ozone – like ionizers operating on metal needles and reaches optimum levels of performance through producing the

largest number of negative ions among current solutions. IONEX solution can be implemented in all types of vehicles.

IONEX aims to finalise and commercially deploy this solution both in the EU and worldwide during Phase Two and Three. We have already attracted interest from the automotive industry for further development of product; the solution is a novelty on the market and can be implemented into other industries such as heating, ventilation and air conditioning (HVAC), amongst other production industries, by adding it to air cleaning devices (dust collectors, air filters). In these industries, workers often suffer from polluted indoor air; the solution would increase the efficiency of air cleaning. HVAC products fitted with the IONEX solution will provide a market advantage and improved competitiveness.

IONEX's goal is to integrate the solution into major EU car brands by 2025. IONEX would like to attract different health organisations, such as IOSH and the World Health Organization (WHO), as a means of co-operation on market education.

IONEX company profile

IONEX was founded in 2002 as a family business, and as a continuation of the first company,

POTENCIAL, which was established in 1990. The owner of the company and patent, Lorena Leonardos, was a great enemy of cigarette smoke and when she found out that smoke can be removed by negative ions, she started to research air ionization and its impacts in greater detail. At the same time, she discovered that negative ions also remove all bacteria and viruses from the air and are vital for human health. She founded her own company to explore the vast potential that air ionization has for the population, and soon contributed to the air ionization field with a groundbreaking patent.

From the beginning, IONEX's core business has been focused on air ionization research and the development of products within this field. The company is located in Ljubljana, Slovenia, of which is a member of the EU. Since 1998, we have been a SME manufacturer of different types of air ionizers for:

- Indoor spaces;
- Vehicles;
- Saunas; and
- Audio systems.

**PROVEN TO BE THE BEST
IONIZER ON THE MARKET!**

VIEW MODELS



All models of IONEX air ionisers

All of which have been successfully marketed to many EU, and other, countries including Belgium, Germany, Poland, Italy, Denmark, UK, Norway, and the UAE.

Through the years we have gained rich experiences, developing many patents and designs in this area. The business has expanded, and we are market leaders in the domestic market; we are succeeding in increasing our market share in countries worldwide. In 2015, we received the Silver Regional Award from the Slovenian Chamber of Commerce for IONEXAir.

The main products developed by IONEX are air ionizers for home use, as well as portable ionizers for installation in cars. The demand for a model developed specifically for saunas and spas, and an audio model, is also increasing. By adding a unique product like IONEXAir into our portfolio, we plan to focus more on the automotive sector.

The main achievement of IONEX so far has been the innovation of the carbon brush, which does not release harmful ozone besides large amounts of negative ions; it is therefore unique on the market. Due to this characteristic, asthma, allergic and high blood pressure patients were able to perform negative ion therapies, in order to lower their histamine levels, significantly longer than with current air ionizers, which emit ozone. The result of this prolonged performance and increased supply of negative ions was permanent, whereby it removed symptoms in 6 to 12 months if therapy was performed on regular basis. We are very proud of this achievement. As a result, many doctors of such patients have informed themselves about this advanced solution and are now users and are therefore recommending it to more patients.

Some of these references and scientific studies regarding the impact of negative ions on human

health are gathered in *Negative ions as a method of healing – Evidence by scientific institutes worldwide*, written by Lorena Leonardos (2016).

The goal of all our projects is to improve:

- Wellbeing and public health;
- Protect the public from the accumulation of carcinogenic exhaust gases into the lungs; and
- Treat with our negative ion inhalation method, by which allergies, asthmatics, and hypertonic diseases, can be cured.

References

- 1 EC press release: <http://bit.ly/1RI4Vgr>
- 2 <http://bit.ly/2gSDMm9>
- 3 Institution of Occupational Safety and Health, 2014, Factsheet »Diesel Engine Exhaust Emissions«: <http://bit.ly/1FzfaAR>
- 4 a) »Ozone and your health«, U.S. Environmental Protection Agency: <http://bit.ly/2dwyQgM> and <http://bit.ly/2wu00py>; b) »The Ozone We Breathe«, Earth Observatory, NASA; <https://go.nasa.gov/2v21lsY>
- 5 European Agency for Safety and Health at Work: page 198, <http://bit.ly/2iyFhTb>, ISBN 978-92-9191-303-9: Workers in transport sector have more stress than the avg. working population. Within the EU-27, about 22% of the workers report work affects their health in terms of stress. This % is much higher in the land transport sector where about 33,3% of the workers report stress.
- 6 Severe stress reaction may disrupt driver's attention, so may impair driving safety and also can lead to driving violations. »Examining factors influencing safe driving behaviours and traffic safety culture«, Agnes Hoge-Nagy, 2016, Doctoral School of Human Science, Page 3, <http://bit.ly/2xpkckq>



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