www.pipelinepub.com
Volume 17, Issue 8

Combating Climate Change with IoT

By: Adam Cousin, Michael Sharratt

Most of the time, when we think about the effects of climate change, we think about the lasting potential damage to the global environment. But climate change has plenty of short-term effects as well, including those that affect the lives of individuals around the world on an everyday basis. For many, tackling the climate change crisis is no longer just about securing a better, cleaner world for their grandchildren. It's also about living long enough to meet them.

Rapid, largely unchecked growth in the number of vehicles on the road is a huge contributor to both global climate change and declining human health in densely populated cities. The transportation sector accounts for around a quarter of CO_2 emissions globally and roughly 385,000 people worldwide died prematurely in 2015 from air pollution caused by vehicle exhaust emissions. Additionally, 14 percent of global greenhouse gas emissions come from the transportation sector and vehicle emissions, contributing to 3.2 million deaths globally per year.

While scientists, environmental activists, and policy makers battle over what to do about the long-term effects of climate change, the rest of us are left to deal with those effects as we go about our daily lives. In the meantime, people in many parts of the world have turned to the use of individual air quality monitoring systems, many of which are literally wearable devices that they can use to track air quality—or the lack thereof—as they go about their daily routines.

A unique opportunity

In an environment where there's so much at stake and infinite potential for improvement, there is also a unique opportunity for technology companies across the entire spectrum to create

tangible long-term change while also capitalizing on a rapidly emerging growth market. A recent GSMA study addressed increased attention to air quality and noted that, "There is increasing interest from the public, city administrators and regulators in the air quality within cities; there is also much greater awareness of the costs and impact of poor air quality. There are strong market forecasts for continued growth in this sector, in part driven by the needs of governments to reduce air pollution. Governments, cities, and entrepreneurs will continue to invest in this sector, as without safe, clean air, cities and communities cannot flourish. Advances in computing power, big data and the IoT, coupled with emerging mobile IoT communications technologies, create opportunities for mobile operators to develop new revenue streams from air quality data products, services and solutions. This guide has identified multiple roles that operators can fulfill, a range of different customers and many different air quality services. The case studies show that operators are actively delivering air quality services and adopting the roles identified; some operators have commercial service offerings. In general, roles higher up the value chain require more change and investment to deliver, but deliver higher-value revenues.

The GSMA study revealed that the global market for air pollution control equipment is expected to increase from around $14 billion in 2016 to more than $20 billion in 2021, a compound annual growth rate (CAGR) of 7.8 percent. Business-to-business spending on IoT technologies and solutions was expected to reach $267 billion by the end of 2020, with spending on air quality sensing devices alone expected to reach $5.64 billion by the end of 2021.

As big as these numbers are, their overall benefits are even more significant for all parties involved. Governmental bodies can avoid fines for poor air quality, reduce health spending and obtain higher taxation revenues from increased economic output. City administrators can benefit from carbon trading, green bonds and more informed urban planning that delivers an improved urban environment. Regulators can ensure regulatory compliance through a new independent monitoring platform while also reducing societal impact from poor air quality. Third-party solution developers can create value by offering new products and services to businesses and consumers.

The necessity of innovation

The current generations of public pollution monitoring stations, which are already too cost-prohibitive for widespread deployment, simply aren't effective enough to provide a complete picture and hence to make a real impact. A low-cost alternative is critical for improving public health—even if this alternative could potentially sacrifice some accuracy in individual pollution readings in favor of overall geographical density and frequent reporting. This monitoring network would produce a wealth of insights into how pollution moves, evolves, and responds to weather, rerouting of road traffic, changes to speed limits and other factors. It would enable local authorities to make informed decisions and perform "what-if" experiments to improve air quality within a given area. Companies such as heavy construction firms, which must monitor their operations' effect on local populations, would also benefit from such a system.

In the UK alone, nitrogen dioxide poisoning contributes to the death of an estimated 40,000 people every year, and nearly 40 million people overall live in areas where vehicle emissions are

high enough to damage their health. There's an economic price to pay as well, around £20 billion every year. The push for more and better public air-pollution monitoring stations has led to a partnership between Telit and TerOpta to help to minimize air pollution in the UK.

The partnership has produced a cloud-connected air-quality sensing system that is tightly integrated with a cloud-based artificial intelligence (AI) system. This enables applications such as pollution mapping and prediction, created as part of the UK government-funded Real-Time Emission Visualization (REVIS) project. The project also uses satellite navigation technology to help consumers map travel routes that create and experience the least pollution. It can even monitor noise pollution and identify the traffic types and road speed creating pollution.

Of course, the primary purpose for gathering this information is to make sure it can be properly collected, analyzed and ultimately used to make data-driven decisions and policies that can help stem the tide of pollution and climate change. Another goal is to provide local authorities with actionable insights that were previously unavailable to them, enabling them to make faster progress in meeting air quality directives. To this end, the TerOpta system is also currently being trialed with a large construction company and is expected to significantly improve its mandatory pollution monitoring.

Looking to the future, vehicle emissions and air quality are increasingly becoming part of larger smart city initiatives, enabled by new IoT technologies and solutions. Transportation is the largest contributor to CO2 emissions, of which road traffic accounts for about 80 percent of vehicle pollution. Making matters worse, the percentage of the world's population living in cities is expected to grow to nearly 70 percent by 2050. To combat emissions and climate change, city planners have sought solutions to improve traffic management, reduce congestion, lessen commute times, and decrease the amount of time overall that vehicles are in operation on roadways.

Many of today's solutions either don't provide the highly granular, real-time data needed to address vehicle air pollution, or high-quality sensors are too expensive for widespread deployment. However, using cost-effective, innovative new IoT integrations to monitor and even anticipate unhealthy levels of pollution, we can look forward to a future where we can confront climate change on a truly global scale.