



LET'S DO IT TOGETHER!

**FIGHTING
CLIMATE
CHANGE
WITH FIWARE**

THE INITIATIVE

Climate change is the crisis of our time. FIWARE has a lot to say about CLIMATE – and not only to say. The FIWARE Community recognizes that climate change is impacting societies, economies, and especially humans’ daily lives. Today, we can already proudly present a wide portfolio of very concrete applications and solutions with a direct positive impact on climate change.

In December 2019, Gold Member HOPU co-organized, together with FIWARE Foundation, a workshop at the UN Climate Change Conference COP25 in Madrid to discuss the role of “Urban Decision Making to address SDG Goals and Compliance with Climate Change Mitigation Regulation.” Further speakers from the FIWARE ecosystem were invited to bring their expertise: Antonio Jara (HOPU), Juanjo Hierro (FIWARE Foundation), Martin Serrano (Insight Centre for Data Analytics), Thomas Fillis (European Commission), Clara Pezuela (Atos), Arjen Hof (Civity b.v.), Christian Jacobsson (Alpiq), and Salim Boutlendj (Telenet).

This booklet presents what the FIWARE Community is doing to tackle or minimize the effects of climate change by showcasing +35 solutions and initiatives.

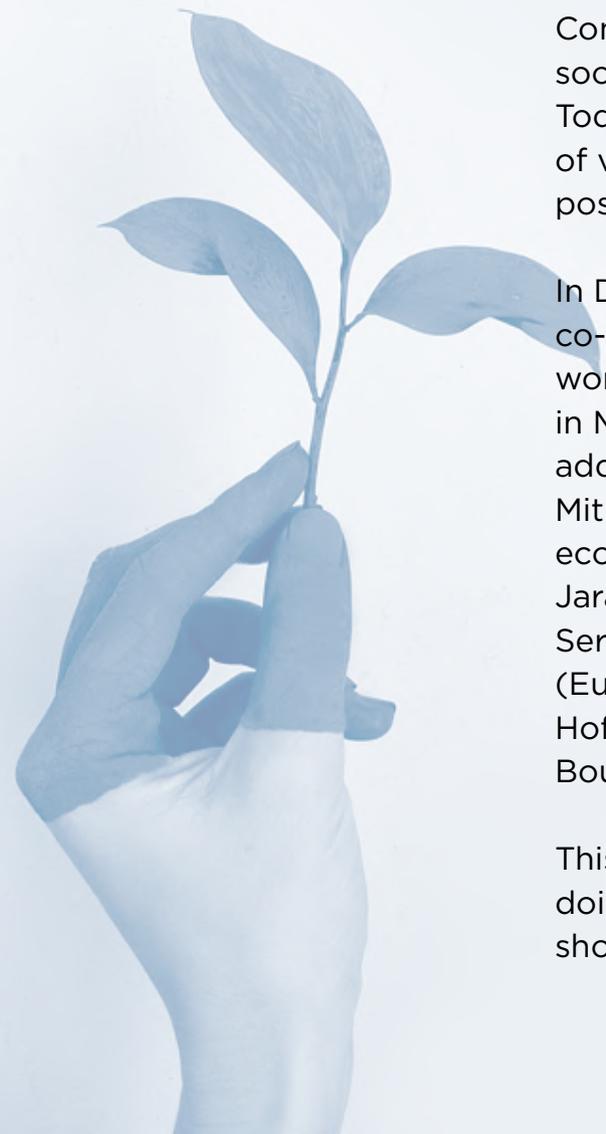


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FOREWORD



MIKE BARLOW*
& **CORNELIA**

LÉVY-BENCHETON**

Co-authors of *Smart City, Smart Future: Showcasing Tomorrow* (Wiley, 2018)

“ **Cities Are the Key to Solving Global Problems.**

By mid-century, most of us will live in cities. With amazing speed, we are becoming an urban planet. We cannot ignore the pivotal relationship between cities and climate change. Cities now account for 78 per cent of the world’s energy consumption and generate more than 60 per cent of greenhouse gas emissions, according to UN Habitat, a global organization that champions sustainable urban development.

From our perspective, that’s good news. Why do we see those harsh facts in a positive light? Because it means we know where the problems are, and we are confident that if we work together, we can devise effective solutions. Are we optimistic? Yes, absolutely!

Let’s keep fighting for more sidewalks and bicycle paths, stricter enforcement of traffic laws, and genuinely safer streets that are fully accessible to people of all ages and abilities. Our cities need more parks and playgrounds. And let’s not abandon our belief in public transit – together we can figure out how to make public transit safe, attractive and affordable.

Education is also essential. Cities like Singapore show that it’s never too early to educate children about water conservation, renewable energy and the circular economy. We love cities and we love Mother Earth. We do not see them as separate phenomena. Their destinies are joined; they are two sides of the same coin. We deeply believe that cities must take leading roles in developing practical strategies for mitigating climate change that are meaningful, effective and fair. ”

* Mike Barlow is an award-winning journalist and prolific writer. He has authored articles, reports, and white papers on technology subjects including AI, machine learning, advanced data analytics and digital transformation. He has written extensively on data science for O’Reilly Media and other publishers.

** Cornelia Lévy-Bencheton is a career professional services executive and consultant. She is a published author and marketing communications strategy consultant whose data-driven marketing and decision-support work helps companies optimize their performance and grow their business.

FOREWORD



MONICA A. ALTAMIRANO*

Program Manager Finance
for Adaptive Planning at
Deltares, an independent
institute for applied research
in the field of water and
subsurface.

“ We have seen our world take a very unexpected turn since March this year. As if the ongoing climate crisis, which materialized in an increasing number of extreme events and water-related disasters, was not enough, the current pandemic crisis has made all of us realize how vulnerable our economic growth models are and how poorly prepared we are to deal with systemic risk. COVID-19 may be the final wake-up call for all of us to take individual and collective action on driving a paradigm shift. The question is: will we?

For the first time in history, the World Economic Forum Global Risks Report of 2020 was dominated by the environment. In terms of both impact and likelihood, the following water and climate-related risks scored the highest ratings: extreme weather, natural disasters, biodiversity, human-made environmental disasters and an absolute top climate action failure.

As called for by the Global Commission on Adaptation, we need three revolutions for a better future: a revolution in understanding, a revolution in planning and a revolution in finance. And what better to enable these revolutions than these disruptive innovations in global data and real-time services? The technologies in this booklet break multiple existing barriers for coordinated action and collective investments required for a water-secure future. ”

* Committed to making water security financially viable for developing countries, Monica has 16 years of experience in advising governments on how to catalyse private sector investments in water infrastructure, and climate adaptation. She is an international author and water thought leader. She has led the World Economic Forum Disaster Resilience Workgroup by developing the 2050 Infrastructure and Urban Development Industry Vision. On behalf of the Netherlands' Government, Monica is currently heading the Peru Valuing Water Journey, which strives for systemic change towards the sustainable use of water.

VOICES FROM THE INDUSTRY



EMANUELE BOMPAN*
Environmental Journalist
& Author

“ The 2020s will be a formidable decade. Everything is at stake to avoid the climate crisis and the potential impacts on our health and our economies. It starts from a failure, that of the UN climate negotiation process, the COP25, which ran on December 15th 2019, and from a victory, that of Greta Thunberg and the millions of children around the world who go on strike every Friday to ask for a turning point in the race for decarbonisation. Where the inaction of politicians and the insufficiency of democracies and states have created concern, the active force of young people has given confidence.

A maximum increase of 1.5°C in global average temperatures is what science suggests. 3.2°C is the most optimistic projection today. There remains an immense gap between where we should be and where we are. Now it is time to increase ambition, to reduce emissions of GHG. We need new energy and new ideas to obtain results. We need to take inspiration from the millions of young people that are screaming for change. “We can do more. We have to do more”, said UN Secretary General António Guterres. Now it is time to act! ”

* Emanuele Bompan is an influential environmental Journalist and Geographer. He was featured as an Inspirational Voice at the Smart City Expo World Congress 2019 in Barcelona and has been featured again in 2020. He has covered the UN Climate Change Conference COP25 for several newspapers and radio channels. Furthermore, Emanuele is the co-author of “Atlante geopolitico dell’Acqua” (2019, HOEPLI) about water grabbing, food safety and energy. He has also co-authored several other publications.

**ROBERT BREARS***

Founder, Our Future Water
and Editor-in-Chief, The
Palgrave Handbook of
Climate Resilient Societies

“ All around the world we are seeing the impacts of climate change with floods, droughts, storms, and forest fires becoming more frequent and intense. There are multiple UN and government reports warning us that these extreme events will likely become the future norm. But rather than accepting this as our fate, there are many people and organisations who are stepping up and shaping our destiny by fighting climate change, whether it is by developing solutions for local communities to enhance their resilience or new technologies that help reduce emissions in business processes. To build a climate-resilient world, we need to implement a range of technologies that restore nature and its many services it provides us, such as storm protection, clean drinking water etc., as well as technologies that lower our carbon emissions in multiple sectors across the economy. In this booklet, there are dozens of organisations that have developed a whole range of technologies that are essential to fighting climate change at multiple levels, from the building-scale up to the city-level. These technologies shape our destiny and help make our planet great today and for future generations. As they say, there is no Planet B. ”

* Robert Brears is the author of *Urban Water Security*, *The Green Economy* and the *Water-Energy-Food Nexus*, *Blue and Green Cities*, *Natural Resource Management* and the *Circular Economy*, *Climate Resilient Water Resources Management*, and *Developing the Circular Water Economy*. He is editor of the *Climate Resilient Societies* book series with Palgrave Macmillan. Robert is a contributing author for the *World Bank's Water Blog*, *Asian Development Bank's Blog*, *United Nations Industrial Development Organization's Making It Magazine*, and the *Green Growth Knowledge Platform*.



**ANA TORRALBA
BARALLAT***

Urban Mobility & Sustainable
Cities Consultant, Learning
Designer, & System
Innovation Coach

“ We live in a vulnerable world. The environmental challenges ahead of us are global and systemic, so we need everyone on board. That means engaging all sectors of the economy and society. From my experience within the climate innovation ecosystem, the value of open culture, collective intelligence and collaborative networks - that are characteristics of the open data community, like Fiware - is becoming apparent to urban resilience practitioners, given that challenges and solutions for climate change often lie across multiple sectors and require an holistic approach.

Developed and deployed correctly, data and digital technologies are powerful tools that can support the urgently needed sustainability transition. As stated in the The UN Office for Disaster Risk Reduction (UNDRR) “Data is infrastructure for our cities and our nations across each and every sector”⁽¹⁾. From monitoring and tracking of human impacts on the environment to augmenting actions people carry out in support of sustainability goals, Climate Informatics and Mathematics are key to deliver models and solutions that make our communities more inclusive and climate-resilient. If we succeed to build trust amongst this challenging process, we will be closer to turning digital technologies into a useful tool that genuinely contributes to a greater good. ”

(1) The UN Office for Disaster Risk Reduction (UNDRR) and its partners launched the ‘Making Cities Resilient’ (MCR) Campaign in 2010. The Campaign was intended to raise awareness on urban risk reduction with city leaders and local governments to work along with local partners, grassroots networks, and national authorities.

*** As a sustainable mobility expert, Ana has more than 12 years of experience with cross-sectorial projects. Passionate about disruption and education, in 2018 she joined the EIT Climate-KIC to learn about system innovation and became part of the network of coaches. Since then, she lives and works to contribute to projects that shape a more sustainable and fair future.**

An aerial photograph of a beach with waves crashing on the shore. The water is a deep blue, and the sand is a light tan color. The waves are white and foamy, creating a textured pattern as they break. The overall scene is serene and natural.

FIWARE-BASED SOLUTIONS

30 off-the-shelf solutions ready for implementation

AGRICOLUS®

Agricolus

Company: Agricolus s.r.l.
Website: www.agricolus.com
Marketplace: [Read more](#)

Agricolus is a cloud-based ecosystem of precision farming applications, that supports the needs of farmers through decision support systems (DSS), forecast models, remote sensing or smart pest and disease control. On the platform, farmers can map their fields differentiated by crop, find weather information and satellite images with the related indexes of vigor and water stress for drawn fields. In addition, they can manage and monitor all the necessary activities such as treatments, find and recover damages, follow the crop cycles, and crop scouting for soil analysis and control. Agricolus is a complete solution for any agronomic need, allowing farmers to monitor production and improve the quality of the production.

Agricolus has several impacts on the agricultural sector in order to mitigate climate change: maintaining biodiversity and soil nutrients; preserving the balance of ecosystems; efficient use of water resources; decreased impact of agriculture on air and soil pollution, and avoidance of contamination of groundwater and the soil itself. Additionally, thanks to continuous and systematic monitoring, Agricolus allows clients to prevent and monitor the climatic and parasitic adversities of crops, allowing a healthier and more regular development of the territory, and reducing the environmental impact of agriculture.

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ApriSensor

Company: Scapeler

Website: www.scapeler.com

Fighting climate change needs a motivation to act, but many of us are not aware of the major impact that climate change will have on our environment and well-being. Scapeler creates awareness for the environment by measuring, combining (open) data and visualizing with an emphasis on air quality.

Scapeler develops sensors that can be used by citizens to measure their own backyard and visualize what is happening in their own living environment. Sensor data and context is very important to activate awareness. The combination of this sensor data with regional data reinforces this effect and that is where open data comes into place. Meteo data is very important for air quality. Wind speed and wind direction have an effect and may be indicators for recognizing the source of air pollution. Creating and combining data is therefore important and that is where FIWARE plays its role. Maintaining standardization (data models) delivers web services to store and retrieve the data (Context Broker). With Generic Enablers the data can be processed and if that is not enough, Scapeler develops functionality as layers on the FIWARE infrastructure or connectors to other information systems.



ARCHIVE

Company: EGM

Website: savethebees.green

Using a custom connected door in the beehives, the beekeepers receive relevant information regularly as well as early notifications about any anomaly allowing them to react timely to critical health threats, or even theft. Data is processed by Stellio NGSI-LD Context Broker and made available through a web and mobile app. Regular information about beehive healthiness decreases the costs of breeding per hive as well as overall maintenance of the farms in the mid and long-term period. It also provides an evaluation of the environmental quality within the beehive surroundings. With early and concise treatment, the bees are only minimally exposed to medication and sugar feeding which leads to increased quality of the final product. Based on the data collected, beekeepers receive prompt advisory support from veterinary authorities aiming to reduce bee mortality and the risk of diseases. Knowledge created from monitored beehives allows making decisions based on information and encourages the young population to start with beekeeping practices as well.



Bettair

Company:	Bettair Cities
Website:	www.bettaircities.com
Marketplace:	Read more

Bettair is an Air Pollution Mapping tool that allows, for the first time, the mapping of air pollution in urban scenarios at a large scale with outstandingly accurate Air Quality Monitors by using advanced post-processing algorithms. This information permits cities to identify appropriate urban plans to improve the air quality and to make smarter decisions to mitigate air pollution.

Air quality data is provided using the latest GIS visualization tools and it can be adapted to the individual requirements of each city. The bettair® platform is built around a grid of nodes that are strategically placed to optimize area coverage. The solution is scalable and can be adapted to any city. The raw sensor data is run through a unique post-processing algorithm. These algorithms provide precise measurements of over 9 air quality indicators with similar accuracy as traditional equipment but at a fraction of the price with an impressive Pearson Correlation ($R^2 > 0.9$) when compared with traditional AQM equipment.

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Air Quality Sensors & Environmental Intelligence Cloud

Company: Breeze Technologies
Website: www.breeze-technologies.de
Marketplace: [Read more](#)

Breeze Technologies' air quality sensors measure the most common air pollutants and climate indicators every 30 seconds (temperature, humidity, CO, CO₂, PM_{2.5}, PM₁₀, NO, NO₂, SO₂, NH₃, VOCs, O₃). Data can be transmitted to the Breeze Environmental Analytics Cloud through various wireless standards, including WiFi, LTE and LoRa. The data is calibrated through the ground-breaking Adaptive Cloud Calibration Engine, increasing data quality and accuracy.

Sensor data is checked, filtered and calibrated in real-time to increase data quality and accuracy. The calibration works on the basis of a neural network, including more than 30 different dimensions in correcting the data. In benchmarks, the system was able to achieve 90% accuracy compared to air quality monitoring equipment 1.000 times more expensive. The Environmental Analytics Cloud helps customers to interpret historic and real-time sensor data even without extensive knowledge in environmental sciences. Based on a catalogue of more than 3.500 known solutions and best practice examples, decision-makers are offered actionable insights on how to improve challenging air quality situations.

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SaaS Ciclogreen

Company: Ciclogreen
Website: www.ciclogreen.com
Marketplace: [Read more](#)

SaaS Ciclogreen is a unique tool for promoting sustainable mobility in companies (cycling, electric scooter, public transport or sharing car, among others), helping to measure and reduce the CO2 emitted due to daily commutes. Using Ciclogreen's mobile application and a customised web platform, they have launched a programme of incentives for sustainable mobility in companies, with access to a Control Panel and calculation of CO2 emission reduction.

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Atos

CityGO

Company: Atos
Website: booklet.atosresearch.eu/content/citygo-intelligent-mobility-app
Marketplace: [Read more](#)

CityGO is a mobile application powered by FIWARE, which indicates to the user what public transport options are available at any time for a particular route. For instance, it suggests options such as electric car sharing, buses, the nearest public bike rental station, available parking spaces, etc. Everything is managed in real time to obtain an optimal route based on data provided by the sensor network and open data from the city. Additionally, the web-based dashboard in the Atos Urban Data Platform for the city municipality allows civil servants to visualize all the data coming from the city sensors network to support everyday decision making and evidence-informed analysis to improve the traffic planning in the city in times of high tourist's flows and sport events, among others.

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EUROPEAN UNION
European Regional Development Fund

Connected Canteens

Company: EGM (platform provider), Hostabee (hardware & decision making tool provider)

Public Administration: City of Saint-Quentin

Digital Innovation Hub: Faubourg Numérique

The City of Saint-Quentin wishes to deploy the concept of “connected canteens” in its school restaurants, designed as a supervision tool in the service of the fight against food waste by making it possible to rationalize the management of orders and to carry out actions of sensitization. This strategy carried out by the Education Department aims to improve catering in schools with various challenges: 1. Optimize the management of meal orders to reduce waste, 2. Raise awareness and involve children in a process to fight against food waste. From this dual objective was born the concept of “connected canteens.”

A FIWARE platform has been deployed, connecting weight balance connected over Sigfox as well as menus, canteens reservation, and registered attendance from the education department through a NGSI-LD context broker (Stellio) to provide decision support to the city. The work was done in cooperation with EGM, Hostabee, Faubourg Numérique.



Digital Enabler

Company: Engineering Ingegneria Informatica SpA
Website: digitalenabler.eng.it
eng.it/en/our-platforms-solutions/digital-enabler
Marketplace: [Read more](#)

Digital Enabler™ is the Engineering's ecosystem platform, powered by FIWARE, supporting the entire value chain of data, from the discovery to the analysis, harmonization and visualization. The Digital Enabler provides cities with a single point to find, access and gather all this data. It looks for potential unknown data-sources available on the web, real-time data coming from sensors in the city, open data portals, legacy systems, data not apparently processable and makes all these information systems speak with one another, evaluating the quality of metadata and avoiding duplication. All the data sources are transformed into meaningful information accessible through user interface and standard APIs.

Thanks to graphical and map based innovative tools, decision makers, city providers and developers can design and create reusable interactive dashboards analyzing and visualizing data at right-time, and harmonize real time information to adjust, for instance, public transport supply.

Dashboards can be organized in domains like environment, mobility or manufacturing and be used by businesses and developers to create new interoperable services and apps that can be portable and replicable in different cities.

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IoT collars for livestock monitoring

Company: Digitanimal
Website: www.digitanimal.com
Marketplace: [Read more](#)

Digitanimal is a start-up company devoted to the development of technological solutions in the ICT sector. It focuses its activity on the Internet of Things, Cloud computing and mobile apps fields, for applying solutions for precision livestock farming. It is based on a SaaS platform that consists of hardware add-ons and software modules to monitor and locate livestock in farms. This helps farmers to increase farm profitability by reducing their losses and improving calving rate. The tracking solution is especially useful for extensive farming systems, as they can track their animals' movements and map their fields. The platform allows farmers to fence off the area when getting warnings that an animal is leaving an area, when the animal has higher or lower activity than it should, and thanks to Artificial intelligence algorithms is able to detect common behaviour patterns too, as calving and heat detection.

Nowadays, farming is seen as one of the major contributors to climate change. However, though farming contributes to CH₄ gas emission, it can also improve the usage of land. This, in turn, translates into full field hectares of CO₂ absorption, terrain fertilization and erosion or desertification reduction. Digitanimal collars are the most powerful tool to monitor cattle for extensive ecosystems, making it a pioneer in easing the lives of livestock farmers and encouraging sustainable models for livestock farming.

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FIWOO

Company: Secmotic and Emergya
Website: <https://www.fiwoo.eu>
Marketplace: [Read more](#)

Based on FIWARE, FIWOO is an innovative, green, connected, intelligent and safe IoT Platform. It makes decisions based on data and context information. It creates relationships between verticals to make it a whole and acts intelligently to solve complex problems.

From Data to Knowledge. FIWOO gets value from IoT Data:

- It allows users to connect, manage and interact with devices.
- It builds different types of dashboards and offers online and historical data, discovers new patterns and finds hidden patterns, which are visualized in Business Intelligence reports.

The verticals are part of the puzzle that builds a Smart City. With FIWOO you can detect the air quality in real-time, have access variables such as humidity or temperature, manage the consumption of irrigation in a park, as well as the traffic or lighting in a specific area of a city. By doing so, FIWOO is focused on generating a real impact to ensure the sustainability of the cities.

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greenApes - the digital platform for sustainability

Company: greenApes srl Benefit Corporation
Website: www.greenapes.com
Marketplace: [Read more](#)

greenApes is an award-winning digital platform rewarding sustainable living via a virtual currency, real life rewards, a social community and gamification elements. The platform is publicly available, but can be easily customised to support smart cities and companies with tailored citizen, employee and customer engagement programs.

greenApes is built on the psychological elements that drive our behaviours:

- a “Positive Impact” section to reinforce the moral motivation with fun challenges
- a social section to share and “Explore” ideas and best practices while strengthening community belonging
- a rewards section to claim real prizes via the virtual currency

The platform connects to third party apps, sensors and online services to digitally certify real actions of users, such as the choice of sustainable modes of transport, energy and water savings, volunteering and participation, sustainable consumption. The measured activities can be converted in environmental savings towards Carbon Neutrality.

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HELIOS - High Efficiency Lighting Online System

Company: Interfaces Hombre Máquina Avanzados S.L. (IHMAN)
Website: www.helioslumen.com

Helios Lumen is a control system that allows distributed intelligence control in any lighting system scenario. Helios makes it easy for municipalities to save a huge quantity of energy and money in lighting, reduce human resources, have better lighting service, and have full remote control and monitoring of the whole city.

In the late night hours, when there are less people on the streets, turning off every third lamp or dimming lights can save up to 40% of annual costs. Remotely managing and controlling the street lights from any place with an internet connection can reduce the maintenance costs and ease the management. The system also alerts on changes in voltage or other electricity-related problems more quickly, helping to provide the highest street lighting quality.



A Data-driven Solution to Support Urban Decision Making Considering Human-perception, Climate Change and Air Quality Impact

Company: HOPU
Website: www.hopu.eu
Marketplace: [Read more](#)

Smart Spot is an integral solution for human-centralised sustainable and scalable Smart Cities. Smart Spot is considered a data powered tool with dashboard and decision support tools based on Artificial Intelligence algorithms. In order to monitor air pollution, the Smart Spot solution also includes HOPU's own manufactured devices/monitors to measure the NO₂, CO, SO₂, NO and O₃ at specific points in real-time. In addition, HOPU has a sophisticated high precision lab, where, through machine learning algorithms, it improves the precision of its sensor measures, reducing the effect of cross sensitivity. These certifications and calibrations have also been verified and certified by reference institutions as Fraunhofer (Germany) and CETENMA (Spain).

In detail, air quality sensors are calibrated and validated in a laboratory with high accuracy and certified meteorological stations. This device also has other functionalities such as noise pollution, temperature and humidity, particulate matter, energy consumption and weather. Thanks to artificial intelligence and data economy, the solution is evolving with enriched.

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IDA

Company: Amigo
Website: www.amigoclimate.com
Marketplace: [Read more](#)

IDA integrates climate modelling, ground-based and remotely-sensed measures of weather variables into one web platform to provide high level software capabilities for customized climate risk assessment globally, including climate index computation, visualization and reporting.

When Insurance companies have to estimate the risk of recurring extreme events, they have to rely on internal experts for downloading, analyzing, and computing climate-related risks. Cities, banks, and farmers associations need to cover themselves with insurance and they have to estimate their risk from climate disasters. Estimating and forecasting risk implies using large datasets, involving experts and spending a large amount of time in analysis. Moreover, the risk of human errors is very high. IDA provides insurance companies with an automatic tool to individuate, monitor and estimate climate risks for the areas in which they have interest. IDA can be used also by all the actors in the chain: citizen, administrations, farmers, banks, seed suppliers and cooperatives.

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IoT Booster: Smart Watering of Community Green Spaces

Company: Faubourg Numérique

Website: [Read more](#)

Saint-Quentin (France) is aiming to find new ways of achieving the city's goals in sustainable social development and increasing accountability to citizens regarding their concerns, such as the environment and the conservation of water.

Faubourg Numérique developed the IoT Booster to tackle the interoperability and scalability challenges brought by the big data nature of the project. The cornerstone of the solution is the CEF Context Broker building block, which provides the data consolidation and analysis capabilities needed to offer services based on open data mashups. With the IoT Booster it is easy to connect to and manage the heterogeneous IoT devices installed and used on the field, such as the existing sprinklers and lawnmowers, as well as new soil sensors and valve controllers. It allows to consolidate and analyse data from sensors, and to take action with sprinklers and lawn mowers.



City Of Monheim - Smart Meter For Green Transition - Digital Enabler

Company: Engineering DSS GmbH
Website: monlightgrid.de
eng-its.de/digital-enabler

The MonLightGrid project has the objective to implement a modern, citizen-orientated lighting concept that aims to reduce energy consumption, improve local security, optimize private vehicle traffic and support citizens to raise related issues. To achieve these goals ENGINEERING's FIWARE-powered solution, Digital Enabler, integrates different data sources from lamps, street lighting systems, lighting control systems, asset management systems and geoserver. Based on the FIWARE data model for smart lighting, LoRa IoT devices are integrated and report actual environment data to improve on-demand lighting services. This new service reduces the CO2 footprint and lighting pollution, which improves also the local biodiversity.

One cornerstone of the City of Monheim's (Germany) climate plan is the development of an energy optimisation strategy for decentral energy production in a district. An optimisation strategy must combine different production curves for local block heat and power plants, photovoltaics and solar power systems to reduce the risk of energy peak loads, to help optimize short-term and cross-border trading and visualize the current status of the CO2 footprint in a district. Digital Enabler, uses smart meter data and combines this data with other IoT-sensor and asset management data to achieve these goals.



Orchestra Cities

Company: Martel Innovate
Website: www.orchestracities.com
Marketplace: [Read more](#)

Orchestra Cities embraces Open Standards, Open API, and Open Data Models, and extends them to enable City-to-City collaboration and Citizens-to-City collaboration. It aims at building a collaborative space for shaping a sustainable and participatory future for our cities, where (a) Citizens can share data from their devices with other citizens or with the city; (b) Businesses can easily build services on top of APIs that are shared across different cities; (c) Cities can benefit from data published by other cities to create analysis, comparisons, and forecast.

In one of its use cases, the power and flexibility of Orchestra Cities allows Elektrizitätswerke des Kantons Zürich (EKZ) to offer cities tailored, multi-tenant support for multiple use cases. EKZ delivers cost-effective, safe, and environmentally responsible energy to one million people in Switzerland. Here, the platform covers several scenarios and includes important climate-relevant aspects: (a) Data stream from air quality sensors, measuring ozone, SO₂, and particulate matter of different sizes; (b) Integration with Open Data stream for weather measurements and forecast; (c) Pervasive time series and geotagging on data streams, to create high-quality historical information bases; (d) Analytics and dashboards (e.g., heat map of the combined air quality for area and time).

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PIXEL

Project:

PIXEL- Port IoT for Environmental Leverage

Website:

<https://pixel-ports.eu/>

PIXEL is the first smart, flexible and scalable solution for reducing environmental impacts while enabling the optimization of operations in port ecosystems through IoT.

PIXEL enables a two-way collaboration of ports, multimodal transport agents and cities for optimal use of internal and external resources, sustainable economic growth and environmental impact mitigation, towards the Ports of the Future. Built on top of the state-of-the-art interoperability technologies, PIXEL centralizes data from the different information silos where internal and external stakeholders store their operational information. PIXEL leverages an IoT-based communication infrastructure to voluntarily exchange data among ports and stakeholders to achieve an efficient use of resources in ports.

PIXEL uses FIWARE for the data acquisition layer. The use of Orion and FIWARE Data Models allow building a simple and scalable architecture to acquire heterogeneous data from different types of sources.



Playsign LIVE

Company: Playsign

Website: www.playsign.net

The solution provides 3D visualization of real-time and historic air quality information combined with human feedback about the indoor conditions. Facility managers want to save energy, to reduce CO2 emissions, for example, by using less energy for heating and air conditioning of the buildings, for instance in schools. But at the same time, they want to guarantee that the indoor conditions are not made worse for the building users, and that there is no risk of damage to the building from e.g. moisture.

To that end, Playsign combine data from air quality sensors, and from a mobile web based service that the building end users use to easily report room specific conditions. The data is relayed via FIWARE Context Broker (Orion) and the historical data is stored to FIWARE STH-Comet, both provided by the [CityIoT project](#) in Finland. The Playsign solution is available on the market for any facility managers.

STUDIOMAPP

maps and apps for quality of life

Qirate

Company: [Studiomapp](#)
Website: www.studiomapp.com
Marketplace: [Read more](#)

STUDIOMAPP, specialised in AI and advanced ICT innovation for quality of life improvements, developed a Location Intelligence system called QIRATE that rates Quality of Life of neighbourhoods by integrating heterogeneous data types and sources. The algorithm displays the information in a map and aggregates them using different indicators that can be useful for planning and measuring impacts of urban regeneration actions. The solution can rapidly test a variety of urban configurations before putting forward the most efficient options. It can also identify areas where design efficiency could be improved, or discover correlations between design decisions and impact on people's daily lives in order to make urban areas more human-centric.

Qirate has been featured in the “Digital with Purpose” report by GeSI, the Global Enabling Sustainability Initiative, and a joint team across Deloitte Strategy and Economic Consulting, presented during the United Nations General Assembly 2019.

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Quamtra Smart Waste Management

Company: Wellness TechGroup
Website: www.wellnesstg.com
Marketplace: [Read more](#)

Quamtra Smart Waste Management is the ideal solution for cities looking to adapt the collection of solid urban waste to meet residents' needs. The solution moves municipalities away from a reactive, static collection model based on historical values towards a more proactive and innovative method. Quamtra measures and transmits the status or fill level of each garbage bin, allowing for more efficient planning by only collecting full or nearly full bins.

The IoT solution proposed by Quamtra Smart Waste Management is based on smart devices (the Q sensor and MiniQ sensor) installed in the upper interior of garbage containers. These sensors constantly measure the fill level using a measurement module based on ultrasound. In the same way, the sensors collect parameters such as the bins' interior temperature, inclination, movement, and location. The information collected by these sensors is sent to a software platform that compiles, conveniently displays, and analyzes the data. The platform creates multiple reports and alerts that allow for agile analysis and decision making by responsible parties.

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RainBrain, the Smart Blue-green Roof

Company: Sumaqua, Agilis, and Greenbeat
Website: www.rainbrain.no

Green roofs are an important climate adaptation tool for cities. They manage rainwater, reduce flood chances, increase biodiversity, reduce the urban heat island effect and can even clean the air. However, extreme weather conditions give green roofs a hard time. Extreme temperatures and long periods of drought can have a devastating impact on the vegetation. This limits the variety of plants that can survive, and leads to high maintenance costs.

RainBrain tackles this problem by optimizing the water availability in and around green roofs. The system constantly monitors the vegetation health, watering needs and available water. Hereto, RainBrain combines sensors, actuators and IoT with predictive models and open data. For instance, RainBrain detects when plants have too little water, and can automatically water the green roof. On the other hand, if a heavy rainfall event is predicted that could lead to floods throughout the city, RainBrain empties water buffers proactively to create more storage capacity.



RESPIRA Open Air Quality Station and IoT Platform

Company: [panStamp S.L.U.](#)
Website: www.calidadmedioambiental.org
Marketplace: [Read more](#)

The RESPIRA FIWARE station (hardware) follows a simple architecture. An ESP32 SoC acts as the brain of the environmental station. Ambient temperature, relative humidity, NO2 concentration and particle matter (PM) are read from three external sensors via I2C and UART. The ESP32 has sufficient space in flash and horsepower to internally store and process readings in order to filter levels and periodically run some calibration routines. Finally, processed information is transmitted to the FIWARE platform via a HTTP UltraLight 2.0 request.

RESPIRA is the open IoT platform created for the Spanish Province of Badajoz to host any kind of environmental-related IoT information, including readings coming from RESPIRA stations, official AEMET stations and the air quality stations coordinated by the European Environment Agency.

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**SNIFFER**BIKE

Sniffer Bike

Company: Civity
Website: www.civity.nl
Marketplace: [Read more](#)

Sniffer Bike measures air quality, road condition and location while cycling. Sniffer Bike (in Dutch: Snuffelfiets) is a collaboration between the province of Utrecht, Civity, Sodaq and RIVM. Participating citizens use Sniffer Bike to measure three types of particulate matter, and also location, (average) speed, wattage, temperature, humidity and organic gases.

The solution offers various advantages for individual cyclists, society as a whole and the environment:

- The solution offers cyclists the opportunity to choose healthier routes.
- Greater insight into particulate matter values helps people suffering from lung diseases to prevent air pollution, a well-known trigger.
- The collected data supports local and provincial policymakers and urban planners in making informed decisions based on new insights.
- Research agencies and national control authorities can collect more data to better understand air pollution.
- The project supports climate neutrality.

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Sosteco Intelligent Irrigation and Smart Lighting

Company: Soluciones Sosteco S.L.

Website: www.sosteco.net

Sosteco's intelligent irrigation is a complete solution for the irrigation of green areas in Smart Cities as well as precision agriculture, being able to integrate all types of sensors to optimize the amount of water and energy needed for vegetation care. The solution has a hardware and software platform, FIWARE-ready, that allows the user to have total control of the installation in addition to being able to expand it to improve or increase functionality.

Sosteco's intelligent lighting system has been developed for the efficient and optimal management of facilities, whether public or private. Through the modules in the headboard or control panels, it can control the percentage of light of each point of light as well as the electrical parameters of the installation. This can result in big savings, not only in consumption but also in the maintenance and management of the traffic or the roads. The hardware uses free band radio, mainly LoRaWAN and NB-IoT, to be compatible with installations already made. It is FIWARE-ready, meaning it can be integrated into other platforms.



Telefonica

Thinking Cities

Company: Telefonica
Website: thinking-cities.readthedocs.io
Marketplace: [Read more](#)

Telefonica's Thinking Cities platform is an integral solution to support city services, including a series of modules that allow the acquisition, processing, storage and distribution of data, on which several city services, vertical IoT solutions and Data Analytics can be implemented easily. This platform is based on the standards and interfaces developed within the framework of the FIWARE initiative.

The functionality of the Thinking Cities platform focuses on the lifecycle of the data related to the service and aspects related to the client's part.

- Data insertion in the platform - Acquisition of data from sensors and external systems to be stored on the platform.
- Data transformation in the platform - Operations carried out in the platform with the data available to generate new data.
- Query of data of the platform - Visualization and extraction of data stored on the platform, either by end users or by other modules.
- Sending data from the platform - Sending notifications or commands as a consequence of data entry on the platform or administrative tasks.

It is able to manage and interoperate different solutions to make city services more sustainable. It has already integrated mobility and transport efficiency, streetlight energy saving, reduction of water consumption in public parks and gardens.

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UNaLab Project and ICT Framework

Company: Engineering Ingegneria Informatica
and other relevant partners

Website: www.unalab.eu

The UNaLab partner cities are committed to addressing climate and water-related urban challenges with an innovative and citizen-driven approach. The UNaLab cities aim to develop smarter, more inclusive, more resilient and increasingly sustainable societies through innovative Nature-Based Solutions (NBS).

UNaLab ICT framework gives value to non-processable urban data by providing tools to discover already available datasets on the web, to plug-in new IoT devices and sensors, to find correlations among data, to harmonize datasets with respect to a standard format and to guide the creation of personalized dashboards in order to calculate and analyze Key Performance Indicators based on the data. The UNaLab ICT framework is mainly derived by the adaptation and tailoring of the Digital Enabler (digitalenabler.eng.it), the Digital Ecosystem Platform provided by Engineering Ingegneria Informatica.

ubiwhere

Urban Platform

Company:	Ubiwhere
Website:	www.ubiwhere.com
Marketplace:	Read more

Meet Ubiwhere's Urban Platform! An innovative solution that provides a global and integrated view of your city.

An easy-to-use platform that allows you to manage your city, whether you are responsible for traffic and mobility, safety, infrastructure or high-level decision making.

The Urban Platform helps the city to meet the Sustainable Development Goals (SDGs) by taking into account the Sustainable Cities and Communities Indicators from ISO 37120 and 37122, among other indicators.

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Waste4Think-Suite

- Company:** DeustoTech-Facultad de Ingeniería (Univesidad de Deusto), Engineering Ingegneria Informatica, Zabala Innovation Consulting, and other relevant partners.
- Website:** waste4think.eu/ecosolutions
- Marketplace:** [Read more](#)

The main goal of the Waste4Think project is to work towards a new waste management paradigm, shifting from conventional finalistic methods of treatment and disposal towards models of recycling and recovery of materials based on the principles of the circular economy. 20 eco-innovative solutions are therefore incorporated and checked out, some technological, others non-technological, which act throughout the value chain, ranging from raising awareness among the public to new collection systems and pricing systems.

The project also proposes a data capture and management method based on FIWARE components that enables decisions to be made reliable across the board by all actors. This method is tested and checked out in 4 different settings to help bring these eco-innovative solutions to the market at the end of the project.

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WeLight Smart Lighting

Company: Wellness TechGroup
Website: www.wellnesstg.com
Marketplace: [Read more](#)

WeLight Smart Lighting system was developed to improve the quality and efficiency of public lighting for enhanced service and a better user experience. Integrating new technologies in the public lighting infrastructure has the potential to generate savings, optimize processes, and facilitate improved decision making. It establishes a base for the implementation of a smart digital platform to manage other city services, a step towards becoming a Smart City.

WeLight monitors and controls the public lighting infrastructure, detecting irregularities in consumption or operational malfunctions, as well as compiling consumption and savings reports. The system helps managers to prepare inventories and carry out both preventative and corrective maintenance. This solution not only guarantees energy efficiency but is also key for public and traffic safety.

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Yggio IoT platform

Company:	Sensative
Website:	www.sensative.com/yggio
Marketplace:	Read more

The Yggio IoT platform is a horizontal FIWARE-based platform for cities and buildings for more efficient digitalization.

- Multipoint-to-multipoint connectivity with device and service.
- Interoperability integration with IoT devices from multiple network technologies and standards.
- Standard APIs that allow service providers to focus on application development.
- Security and personal data privacy (GDPR).
- IoT network control panel for full control of the multi-technology IoT network and the devices.

Buildings consume incredibly large amounts of energy. By integrating IoT sensors with the Building Systems using the Yggio IoT platform you stand to gain considerably, both in cost and in reduced carbon footprint. From a customer case, Sensative AB have data that shows that just by better optimization they reduce heating costs. Reducing heating with 1 degree celsius saves them 4% in heating costs, without reducing the comfort of the tenants.

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FURTHER CLIMATE INITIATIVES WITH FIWARE

CO2 MARKETPLACE

CO2 Marketplace is an open and data-driven EU Emission Trading System (ETS) to support the Green Deal objectives towards carbon neutrality. It will help cities in achieving their decarbonization goals and reduce their impact on cumulative global CO2 emissions being aligned with regulatory actions. The solution will motivate the collaboration among industries, rural areas, entrepreneurs, associations and private investors on developing a resilient and sustainable city, rewarding CO2 net-negative products and supporting the creation of a new CO2 neutral-negative economy.

CO2 Marketplace, for which FIWARE will assume the role of platform provider, aims to create more resilient and engaged local communities (cities and local companies) that carry out initiatives for CO2 compensation and reduction, setting their own green policies and monitoring whether CO2 emissions targets are achieved as expected in their region. The effects and benefits of individual actions will, hereby, be felt and shared among locals. CO2 offsetting actions will reduce emissions, being much more cost-effective than typical climate policies and will provide far more environmental benefits.



FURTHER CLIMATE INITIATIVES WITH FIWARE



Digital for Planet (D4P) is a not-for-profit association that aims to create a strong network of private, public and research institutions that advance the adoption of sustainable digital technologies for the good of our planet.

D4P is at work to design, develop and adopt sustainable technologies and practices that empower people and organisations but also help protect the environment. D4P works across several objectives like helping organisations in identifying and grabbing the correct European Green Deal call, help them increase the impact of their digital research and innovation initiatives, provide a platform to network and liaise with key people in public and private organisations, participate and engage in policy level discussions and more. More information on D4P services can be found [*here*](#).

D4P recognises 4 technical working groups on, green cloud-edge-IoT computing, climate-neutral and sustainable smart cities, sustainable next generation internet and sustainable 5G/beyond 5G networks. The objective of these working groups are to discuss, derive, propose concrete solutions and methods to bring sustainability in these sectors. More information on working groups can be found [*here*](#).



FISMEP was a project funded under the ERANET Program with the goal to expand the use cases covered by FIWARE for energy systems. FISMEP considered three different demo sites with different use cases. In Sweden, a smart city and smart building scenario was considered with the goal to increase customer participation. In Romania, the demo focused on data acquisition from Phasor Measurement Units and their processing for grid monitoring. In Germany, the work focused on grid reconfiguration and automation of Medium Voltage DC grids. The different experiments allowed the creation of new knowledge in the application of FIWARE in the energy sector and provided new enablers for the platform. A significant focus was placed on data interoperability and ontology for the energy sector.

While the FISMEP project has now been completed, the FIWARE-based development is continuing in a new ERANET project called I-Greta. In this project, involving many of the FISMEP project partners, the focus is moving to use cases for local storage. This experience will extend the set of use cases in energy that are approached with a FIWARE architecture.



Smart MaaS

The goal of Smart MaaS - Mobility as a Service is to build an open source, standardised mobility service platform, and reference architecture that allows for the creation of new innovative mobility services. This new trusted marketplace will allow for interoperability between different modes of transport. As part of the project, new mobility services will be designed and trialed.

The “Smart MaaS - Life in Smart City” stop motion video, made entirely of LEGO bricks, showcases how life in a Smart City can be made easier. The video follows TJ, who has just moved to Smart City, and the ways in which he moves around the city. Through Smart Parking, the use of public transportation, ride-sharing, and other Smart Mobility services, TJ not only simplifies his life but also reduces his own carbon footprint.

The basis of the video is the “Smart World by FIWARE”, which was developed within the framework of the Smart MaaS research project funded by BMWi. Divided into sectors, the “Smart World by FIWARE” features the potential of open source technology for Smart Cities, Smart Mobility, Smart Industry, Smart Energy and Smart AgriFood, by highlighting the various domains – and how they interact with one another – to power up cities.



Find out more about Smart MaaS in the [Find out more about Smart MaaS in the “Smart MaaS: The Beacon of Disruption for Sustainable Transportation Systems” White Paper.](#)



With the objective of fostering the digital transformation of the water sector, the H2020 projects **aqua3S**, **digital-water.city**, **FIWARE4Water**, **NAIADES**, and **SCORE Water** started their work in 2019. As a first step, they met together to join efforts and share experiences about the impact of digitalization on the water sector, including supporting a more efficient means of managing and protecting water resources, solving several challenges related to resource efficiency, climate change and sustainable development, among many others.

The **Synergy Group DigitalWater2020** has been created involving all these projects to encourage further information sharing and discuss how the outcomes collected/worked on by each project can effectively address the many challenges currently faced by the water sector. One path considered by DigitalWater2020 is to collect research-based knowledge on how to bridge the gap between theory and practical results implementation in local communities with regards to climate change mitigation, for instance. DigitalWater2020 is settling for the improvement of climate change resilience by minimising the use of energy in the management and operation of water systems, using real-time data analytics and an interoperable approach.

The members of the DigitalWater2020 understand and work on leveraging the potential of data and digital technologies for urban water management, but they are also fully aware of the importance of social and political engagement. Therefore, activities carried out by the projects involved in DigitalWater2020 also focus on reducing the environmental footprint of water-dependent activities by raising social awareness about the benefits of smart water applications with regards to water usage and water efficiency.

On that front, the DigitalWater2020 Group has established task forces to work on different areas. As all the projects involved in the Digital4Water are using the FIWARE platform, task force n°1 focuses on FIWARE and Ontology as follows:

- Fiware4Water intends to link the water sector to FIWARE by demonstrating its capabilities and the potential of its interoperable and standardised interfaces;
- SCOREwater, NAIADES and aqua3S have developed Powered by FIWARE digital solutions;
- DWC intends to use FIWARE for the development of two digital solutions.

There is a clear need to exchange best practices on the use of FIWARE for the development of digital solutions in order to solve technical issues. Such issues may be linked to the design and architecture of the solutions and the integration of multiple data sources into the platform, hence the importance of the work carried out by this task force. Meanwhile, task force n°2 strives to address sensors and demonstration issues. Each one of the 5 projects have an ambitious monitoring program that includes the development of new sensors and the deployment of real-time sensors to collect behavioral data on systems and infrastructures.

All in all, the DigitalWater2020 Group builds on the projects' synergies in an attempt to exchange and benefit from each other's development, research, communication and outreach. The ultimate goal is to ensure that the value of data and available information can be better demonstrated, and in turn, taken into account in the decision-making processes. This way, innovative water digital solutions will be brought to the market and have a wider presence, creating a long-lasting impact in utilities, municipalities, software companies, SMEs and startups, and the general public.

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