



Supercharging Smart Cities Through the Recovery and Resilience Facility

Recovery and Resilience
How Vodafone Supports Smart Cities

Vodafone Business – April 2021



Together we can
vodafone
business



Executive summary

The EU Recovery and Resilience Facility offers a rare opportunity, through balanced reform and investment, to accelerate sustainable economic recovery from the coronavirus pandemic.

[Find out how to access funding to create smart and more sustainable cities.](#)

Vodafone is uniquely positioned to help regional and local governments to achieve their digital and green goals and to create smart cities that are better connected, digitally enabled and more intelligent. Using the latest Internet of Things (IoT) technology, cities can drive economic growth, care for the environment and increase citizen wellbeing by:

- transforming the way services are constructed and delivered through better understanding of citizens' needs, priorities and desires;
- delivering services digitally, reducing costs compared to manual and less automated delivery methods; and
- combining data to generate insights that can lead to greener, cleaner and more efficient services, while ensuring an improved quality of life.

Read on to find out how Vodafone's smart city applications can help you achieve the goals identified by the EU's Recovery and Resilience fund in the catalogue of smart city solutions.

For more information, please contact us at <https://www.vodafone.com/business/iot>

Contents

The purpose of the EU's Recovery and Resilience Facility	3
Timeline and process	3
Smart city objectives	4
Solutions qualifying for funding	6
Why Vodafone?	7
Next steps	7
Smart cities solutions catalogue	8
Fleet management	9
eCar charging	10
Smart lighting	11
Air quality monitoring	12
Smart City Platform	13
Smart waste	14
Smart metering	15

The purpose of the EU's Recovery and Resilience Facility

The EU's Recovery and Resilience Facility (RRF) will make €672.5 billion in loans and grants available to support reforms and investments undertaken by Member States. It aims to mitigate the impacts of the coronavirus pandemic by making European economies and societies more sustainable and resilient, and better prepared for the challenges and opportunities ahead.

Each Member State's recovery and resilience plan must include a minimum of 37% and 20% spend for green and digital investments, respectively. As a result, the RRF offers an unprecedented opportunity to accelerate recovery in Europe and reinforce the commitment to the twin green and digital transitions.

Timeline and process



Member States are currently preparing recovery and resilience plans for submission by the end of April 2021.



After review, successful applications will be approved by the EU institutions in summer 2021.



Further detailed proposals by Member States will be finalised at national level with funds expected to start flowing in summer 2021 at the earliest.



Funds will be administered by relevant administrations at national level for priority projects, and reforms and investments should be completed by 2026.



Smart city objectives

The European Commission's (EC) guidance to Member States on their Recovery and Resilience Plans addresses the ideas behind smart cities¹ – it includes examples of reforms and investments that Member States could propose in their plans, and the information needed to describe the expected green and digital impact, as well as project targets and milestones.

Two of the EC's strategic priority areas are especially relevant for smart cities: the 'Renovation wave' and 'Clean, smart and fair urban mobility' strategies. Solutions that meet these objectives are most likely to qualify for funding.

Renovation wave

Aimed at renovating existing buildings and making them more energy and resource efficient – particularly public and commercial buildings, social infrastructure and housing, and more generally worst-performing buildings – the Renovation wave strategy has three broad objectives:

Jobs and growth: create local jobs, stimulate local investments, foster the adoption of digital technologies, improve the resilience of the building stock and support small medium enterprises.

Social resilience: renovate the existing stock of buildings and alleviate energy poverty concerns through reduced energy and water bills, while improving affordability of housing and living conditions.

Green transition: reduce energy consumption compared to a business-as-usual scenario and reduce greenhouse gas emissions during the 2021-2026 period, while improving environmental and health performance. The Renovation wave aims to prevent, reuse and recycle construction waste, and increase uptake of sustainable construction materials. This would increase resource efficiency and realise climate benefits across the entire lifecycle of buildings.



Guidance issued to national ministries includes the following recommendations²:

- Energy and resource efficiency scheme for public buildings, health and social infrastructures based on comprehensive energy performance contracts.
- Develop, publish and promote comprehensive energy performance contracts for the green public procurement process to renovate public buildings and social infrastructures.
- The contracts will also enshrine the use of resource-efficient building materials, the use of recycled building materials, the prevention of construction waste, digital technologies (e.g., smart meters, smart building elements), climate and disaster resilience and affordability.
- Increase the number of public buildings with digital technologies (e.g., smart meters), ensured by the comprehensive energy performance contracts that take into account digital developments, in particular for buildings occupied by low-income households.

¹ Renovation wave guidance can be found at https://ec.europa.eu/info/files/example-component-reforms-and-investments-renovation-wave_en.

Clean, smart and fair urban mobility can be found at https://ec.europa.eu/info/files/example-component-reforms-and-investments-clean-smart-and-fair-urban-mobility_en.

² See template set out in **Recovery and Resilience Plans: Example of component of reforms and investments – Renovation wave aimed at enhancing energy and resource efficiency.**

Clean, smart and fair urban mobility

By promoting future-proof technologies, the mobility strategy aims to accelerate sustainable, accessible and smart transport, zero and low-emission vehicles and more extensive public transport. Digitisation will enable innovative businesses and services, such as capacity planning and traffic management systems. Smart mobility will benefit from 5G rollout, the development of artificial intelligence, blockchain and other technologies.

The Clean, smart and fair urban mobility strategy has three broad objectives:

Twin transition: jointly promote the green and digital transition through smarter and more integrated urban mobility services.

Jobs and growth: create a significant number of jobs and contribute to growth both at local and national levels.

Social resilience: a wider access to sustainable urban mobility and the reduction of travel times to increase labour market participation and productivity. The investments in clean and smart urban mobility will improve public health through decreased pollution and noise, increased safety and more active lifestyles.

The **Clean, smart and fair urban mobility** strategy also aims to facilitate the entry of new and innovative digital mobility solutions, driven by access to mobility data.



Guidance issued to national ministries includes³:

- Create a framework for cities to adopt and implement individual Sustainable Urban Mobility Plans (SUMP).
- Support the deployment of sustainable shared mobility services.
- Simplify and harmonise permitting procedures for alternative fuels infrastructure.
- Create a subsidy scheme to allow cities to procure smart, safe and clean public transport fleets, as well as publicly accessible recharging points for private and commercial vehicles.

³ See template set out in **Recovery and Resilience Plans: Example of component of reforms and investments – Clean, smart and fair urban mobility**.

Solutions qualifying for funding

Smart cities are becoming essential as cities scale and urban density increases driving congestion, emissions and higher consumption of services, from energy to public transport.

IoT technology is at the heart of any smart city, providing the capability to measure, act and improve. An IoT-enabled smart city is consistent with the EC's objectives and has the following benefits:

Cutting costs and carbon emissions

IoT can help local municipalities take control of their energy usage. For example, smart meters installed in offices, depots, call centres and other sites collect and report data on electricity, gas and water use.

Improving urban air quality

IoT monitors installed around the city sense and report live data on local humidity, dust levels, harmful chemicals, air pressure and other factors.

Improving city efficiency through remote monitoring

IoT-enabled lights can cut the need for regular engineer check-ups by alerting authorities before they fail. They can also reduce electricity costs by detecting when there is little or no traffic and intelligently dimming or switching off. IoT also enables electric vehicle (eV) charging stations to be remotely monitored and managed and helps customers to find their closest station.

Optimising city waste collection

With IoT solutions, refuse collectors can make fewer journeys and use less fuel, and municipalities can run fewer trucks.

Optimising urban mobility

IoT solutions can support more efficient transport around a city, whether by car, bike or e-scooter, as well as more efficient parking.



Why Vodafone?

Vodafone has the experience, local capability and existing relationships in the smart city ecosystem to help deliver digital and green goals. Vodafone has already delivered smart city solutions that generate measurable financial and sustainable returns, including:



1.6m
tonnes of
CO₂e saved

Over 12 million smart meter connections using IoT technology, saving an estimated 1.6 million tonnes of CO₂e⁴



68%
reduction
in energy
consumption

13,500 LED lights in Guadalajara, Spain, connected to a central management system, reducing street lighting energy consumption by 68%⁵



18%
reduction in
CO₂ levels

Smart bin solution in partnership with Mic-O-Data in the Netherlands, which tracks and secures 6,000 refuse collection points in public housing estates across 25 local authorities. Councils have saved an estimated €92,035 in capital and operational costs, and studies have shown that the more efficient refuse collection can reduce CO₂ levels by 18%⁶

Next steps

Vodafone can help you identify and successfully implement your smart city projects. For more information, please contact us at <https://www.vodafone.com/business/iot>



Vodafone's IoT technology is at the heart of Europe's new smart cities. As an example, implementing a city data platform paired with smart energy and mobility solutions across the top 80 EU cities by population could yield a reduced cost to cities of €876m per year⁷. Together, we can transform the city agenda for the better. See our smart city solutions.

⁴ Vodafone's European network to go 100% green.

⁵ Ibid.

⁶ ERT: Smart Cities – Advancing the deployment of technology solutions to make Europe's cities smart, safe, healthy and sustainable.

⁷ Smart cities: Growing cities, greener cities.

Smart cities solutions catalogue



How do we qualify our smart cities solutions?

Vodafone solutions are designed with sustainability at their core. However, understanding the impact of different solutions is complex and that is why for every solution we provide a simple way to understand grading. This grading is based on a model of the carbon impact developed by the Carbon Trust, along with simple indicative measures of which areas are best improved by the solutions.

Green impact key

Green impact score

A qualitative measure of the overall impact of the solution, taking into consideration energy, waste, recyclability, citizen impact, quality of life and ease of deployment.

Carbon saving

A quantitative measure of the carbon saving in kgCO₂e that can be achieved by using the solution. This uses the carbon impact model developed independently by the Carbon Trust and is based on the arithmetical average abatement factors for Germany, Italy, Spain and the UK.

Benefits

An indicative qualitative assessment of how well the solution delivers against the goals of sustainability, efficiency and improvement in quality of life.



Sustainability

A qualitative measure of the sustainable benefits of the solution that takes into account the entire lifecycle including the build, operation and end-of-life, with particular emphasis on in-life and end-of-life benefits such as recyclability.



Efficiency

Qualitative assessment of how the solution reduces wastage during its operational lifetime – for instance by reducing energy use, improving the use of raw materials, optimising processes and increasing yield. Examples would include reduced fertiliser use, more efficient vehicle routing or improved driver behaviour to reduce emissions.



Quality of life

Qualitative assessment of the benefit of the solution to the surrounding ecosystem, for instance in reducing road congestion, improved air quality, citizen health and access to services.

Operational benefits

These icons show the three core benefits of the solution.

Fleet management

Category: Cutting costs and carbon emissions

The distribution of goods by road has become a key part of city life and seen significant increases for the last mile. However, moving goods creates congestion and emissions, affecting air quality in many cities. While electrification may improve emissions, the large number of vehicles will continue to cause congestion. Fleet management can have a major impact by optimising routes, which in turn drives down wasted miles and improves driver behaviour. This creates a better customer experience with lower impact on the environment and quality of life.

How it works

Vehicles are fitted with advanced telematics from Vodafone Automotive that provide fleet managers with insights to maintain their fleets with optimal performance, improve scheduling and routing and improve the behaviour of their drivers by encouraging them to drive more consistently. Fleet management can be applied to commercial fleets and public transport vehicles and can generate significant savings.

Green impact



Car

145

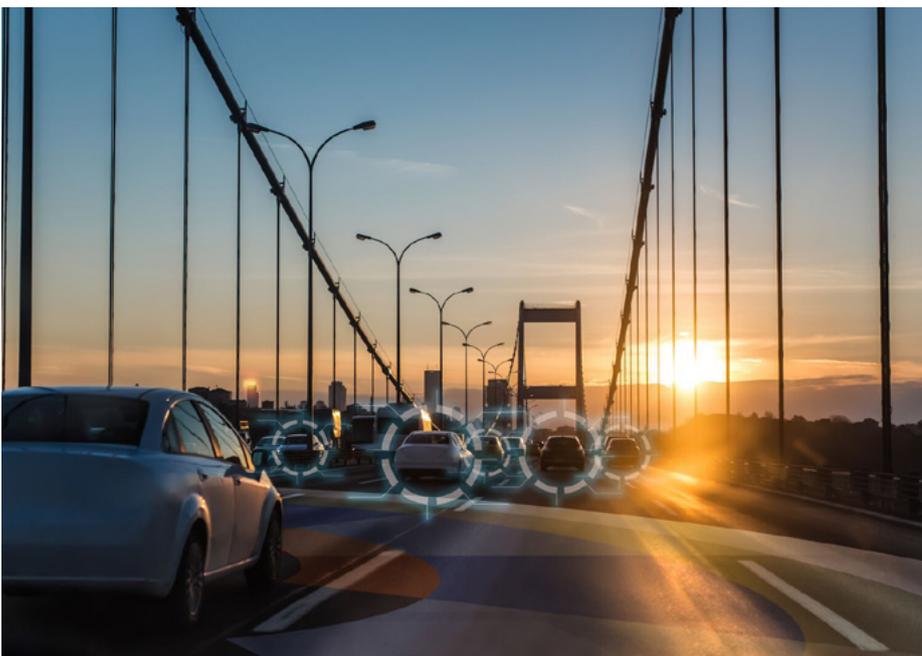
kgCO₂e per connection per annum

Taxi

344

kgCO₂e per connection per annum

Benefits



Operational benefits



EFFICIENT JOURNEY ROUTING



IMPROVED DRIVER BEHAVIOUR



OPTIMUM FLEET MAINTENANCE

eCar charging

Category: Cutting costs and carbon emissions

Electric vehicles are the future of mobility and many countries have already set the deadline for the conversion from petrol and diesel to eVs. At the heart of the transition will be enterprise and commercial fleets, with many organisations, like Vodafone Germany, planning to convert 50% of their fleets to hybrid or electric by 2025.

But unlike mobility today, the eV can play a much bigger role by offering connectivity to wider ecosystems such as energy. Connectivity then becomes essential to enable access to charging infrastructure, balancing energy consumption and storage and even enabling payment and accounting for electricity used for mobility.

How it works: Connecting the eV

For public charging, connectivity is essential to allow chargers to be reserved and take payment. Vodafone global IoT connectivity is the backbone for many eV charging systems.

For corporate and home charging a solutions approach is required like Vodafone charge@Home, which provides eV chargers integrated with the expenses system, making it simple to charge at home and settle energy used for business and personal mileage. This will help achieve the target of a 50% reduction in CO₂e emissions across the fleet.

Green impact



Carbon impact

3,615

kgCO₂e per connection per annum

Benefits



Operational benefits



EASE OF USE



INCENTIVISATION



REDUCED EMISSIONS

Smart lighting

Category: Improving city efficiency through remote monitoring

Light and lighting are ever-present elements of city life; their infrastructure is not only essential for the safety of inhabitants but can also be a key attraction for those exploring the city at night. However city street lighting also creates light pollution and consumes energy, which contributes to carbon emissions as well as creating a substantial cost for the council or lighting operator. The installation of smart lighting can not only improve city efficiency through better management of energy but can also create an efficient balance between operating cost, safety and an attractive and vibrant night-time scene.

How it works

Connected controllers are mounted onto the street lights and send data back to the management system; this enables light intensity and timing to be remotely controlled. This means lighting can be controlled based on ambient light conditions, location, throughput and weather, and adjusted to optimise energy use. The system also enables city authorities to receive alerts, such as when bulbs are about to fail, reducing the number of truck rolls, disruption when changing bulbs and the poor image caused by failed bulbs and lights not being switched off during the day. For public buildings and sites of interest, smart lighting opens up new opportunities for attractive displays and events.

Green impact



Carbon impact

5 kgCO₂e per connection per annum

Benefits



Operational benefits



REDUCE ENERGY



MINIMISE LIGHT POLLUTION



SAFER STREETS

Air quality monitoring

Category: Improving urban air quality

World Health Organization findings show ambient air pollution causes 4.2 million deaths a year. Air quality can be especially bad in cities, where industry and mobility cause high levels of pollution. Monitoring this pollution is becoming critical to improve health and to comply with more stringent regulation. Rapidly deployable Vodafone air quality monitor sensors provide data to inform decisions and to enable connected signage that makes citizens aware of particular air quality risks.

How it works

Using Vodafone's narrowband IoT, battery-powered sensors can be rapidly deployed to measure NO_x, PM2.5, CO and other particulates. Sensors can be connected to the global IoT Platform, enabling data sharing with government agencies, cities, transport authorities and citizens. This increases safety and awareness, encouraging people to consider more environmental forms of transport, such as bicycles and e-scooters.

Green impact



Carbon impact

Dependent upon use case

Benefits



Operational benefits



IMPROVED QUALITY OF LIFE



IMPROVEMENT ACTIONS BASED ON DATA



INCREASED AWARENESS

Smart City Platform

Category: Improving city efficiency through remote monitoring

City authorities are planning for the future – and that future is the smarter city. However, significant challenges exist in the state of the built environment, the fragmentation of city services and budgetary constraints: to make the right decisions, data is essential. The Vodafone Smart City Platform integrates data from a wide variety of IoT connected solutions, providing real-time information in a holistic view, enabling authorities to better understand their city's dynamics. This unification of data can optimise the use of resources, such as parking, traffic and lighting – reducing cost and energy consumption while improving the safety and quality of life.

How it works

The Smart City Platform uses Vodafone's extensive networks across cities to gather data from a variety of sensors tracking smart bins, car park occupancy, buses, trams, air quality and more. Data feeds are combined by the Platform and advanced analytics can be applied to create new insights into how city services are being used. This enables cities to make informed decisions about how to invest in areas such as public transport, health, housing, events and entertainment.

Green impact



Carbon impact

Dependent upon use case

Benefits



Operational benefits



INCREASED CITIZEN QUALITY OF LIFE



IMPROVED ACCESS TO SERVICES



EFFECTIVE INVESTMENT

Smart waste

Category: Improving city efficiency through remote monitoring

The effective management of household waste is essential not only to keep cities clean and improve quality of life, but also to optimise collection routes and maximise the amount of waste that can be recycled. For commercial waste especially, being able to understand which bins need collecting is incredibly helpful and enables waste collection agencies to efficiently manage their routes – saving fuel, avoiding bin overflow and environmental risk and allowing cities to monitor how waste collection contracts are performing. Our Vodafone smart waste solutions improve city efficiency, reduce carbon impact and enable high levels of recycling.

How it works

A connected device is installed on the bin which sends a status signal alerting the operator if the bin is getting full, as well as sending other alerts such as if the bin lid has not been closed properly. A connected bin also overcomes one of the biggest problems: actually locating it on the route. Not only can local authorities monitor the level of waste produced in their city, they can also better manage their customer base, improve billing accuracy and encourage better behaviours in waste management. This smart bin solution enabled by Vodafone is helping local authorities in the Netherlands to reduce CO₂ emissions by almost a fifth, while improving services and cutting refuse collection costs.

Green impact



Carbon impact

5 kgCO₂e per connection per annum

Benefits



Operational benefits

-  **EFFICIENT VEHICLE ROUTING**
-  **REDUCE BIN OVERFLOW**
-  **CLEANER LOCAL ENVIRONMENT**

Smart metering

Category: Improving city efficiency through remote monitoring

Residential heating and lighting are major contributors to carbon emissions, with significant wastage caused by household residents not fully understanding how their behaviour impacts energy consumption and bills. Smart metering provides a highly effective solution for utility companies to read meters and improve the quality of their services, while also giving householders detailed information on their energy use patterns. This helps them save energy, save money and reduce their environmental impact.

How it works

Smart meters for electricity, heat, gas or water are connected via the mobile network to a central reading platform. This enables utilities to read meters remotely and provide high-quality customer services, for example through detailed billing. By being able to read meters in real time, customers can identify when energy is being wasted. The same concept applies to water meters, which enable leakage to be quickly identified and repaired. Smart metering drives the customer experience and encourages energy-saving behaviour, cutting emissions and reducing environmental impact.

Green impact



Gas

49

kgCO₂e per connection per annum

Electricity

34

kgCO₂e per connection per annum

Benefits



kgCO₂e per connection per annum



Operational benefits



MONITOR EQUIPMENT, CONSUMPTION AND PERFORMANCE



INSIGHTS INTO AREAS OF IMPROVEMENT



ALERTS

© 2021 Vodafone Group Plc

Registered Office:

Vodafone House

The Connection

Newbury

Berkshire

RG14 2FN

Registered in England No. 1833679

Telephone: +44 (0)1635 33251



Together we can

vodafone
business