

# RENEWABLE POWER CHALLENGE – TECHNOLOGY SOLUTION

## Innovative solutions for renewable power supply of mobile base-stations

Vodafone Group has ambitious targets to fully eliminate Greenhouse Gas (GHG) emissions from our own operations by 2030 while continuing to provide mobile connectivity in rural areas ranging from the Scottish Isles to remote villages in Africa.

Whilst we continue to improve our energy efficiency and source renewable electricity via the grid, we are seeking innovative solutions to the challenge of generating renewable electricity directly at mobile phone sites. This is especially important for sites without a connection to the public grid and sites with frequent power outages, where we rely fully or partially on diesel generators.

We have deployed solar PV and fuel cells on more than 1,500 sites and with our vendors are developing other solutions including wind turbines, fuel cells, micro turbines, and energy storage technologies. We have also installed several community power systems that supply schools and our mobile masts from the same installation.

But we continue to seek innovative solutions to the challenge of providing reliable, climate-friendly, and cost-effective solutions that can power all or a significant share of the electricity at the site

That is why we have launched the **Renewable Power Challenge** – to find innovative technologies and partnership models for micro-grids and community power systems. Our goal is to identify and develop solutions that we can deploy across a significant share of our **160 000+** sites in both Europe and Africa.

The Renewable Power Challenge is a joint initiative between Vodafone Group, Vantage Towers and Vodacom as companies that could deploy these solutions, and [Tomorrow Street](#), which helps leading-edge technology firms in scaling their solutions.

We are inviting innovative organisations to submit a brief proposal to us. Our aim is to select up to three submissions for both technology solutions and partnership models, then move towards a **Proof of Concept** (PoC) at our sites.

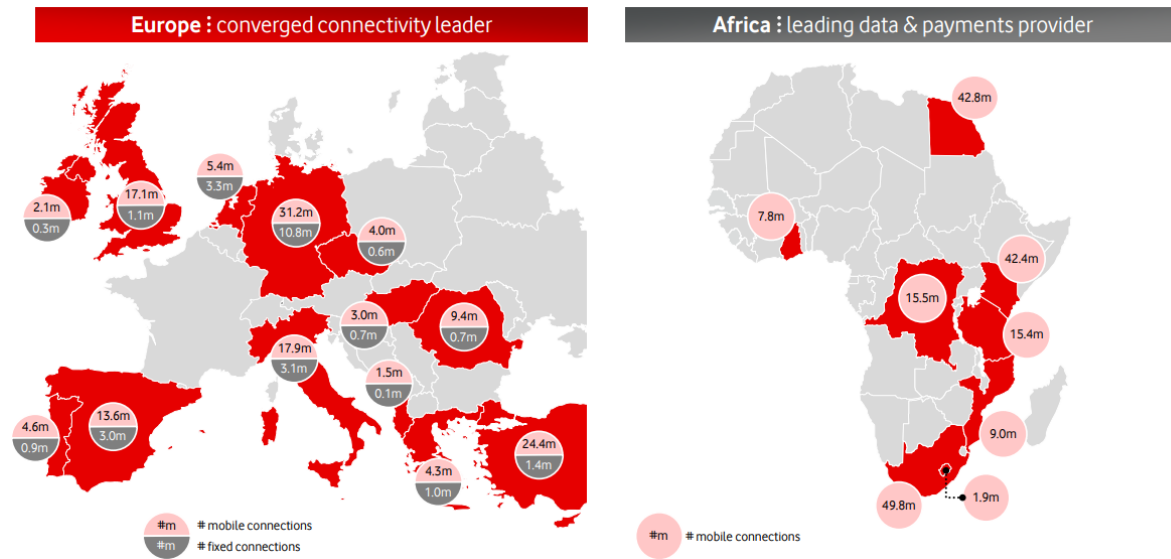
Those solutions successfully selected for a PoC or further development will be announced at the [ARCH Summit on 26-27<sup>th</sup> October 2022](#), the flagship event of Vodafone and Luxembourg's joint venture Tomorrow Street. At this high-profile event, the winners will be able showcase their solution to an audience of more than 4,000 visitors including Vodafone decision makers, partners, suppliers, investors, and wider members of the technology community.

For more detail on the challenge, please see the following information on our global footprint and Planet ambition, the problem statement for renewable supply at mobile base stations, and our requirements and timeline for the selection process.



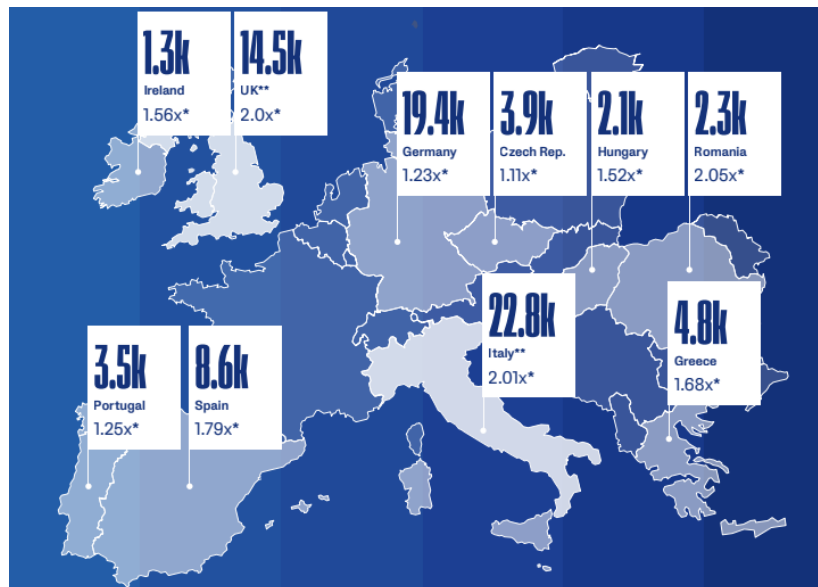
## Vodafone, Vantage Towers and Vodacom Footprint and Planet Ambitions

Vodafone operates mobile and fixed networks in [20](#) countries across Europe and Africa.



Source: [vodafone-FY22-Results-presentation.pdf](#)

Most of our sites in Europe are managed by Vantage Towers, a subsidiary of Vodafone covering 83,000 mobile sites.



[vt-group-annual-report-2022-eng.pdf \(vantagetowers.com\)](#)

We have set ourselves very ambitious **Planet targets** to purchase 100% of our electricity from renewable sources by 2025, eliminate the GHG emissions from our own operations by 2030 and achieve Net Zero including our supply chain, investment, and products/services we sell by 2040.

[Vodafone Purpose/ESG](#)

[Vodacom Purpose/ESG](#)

[Vantage Towers Ambition/ESG](#)

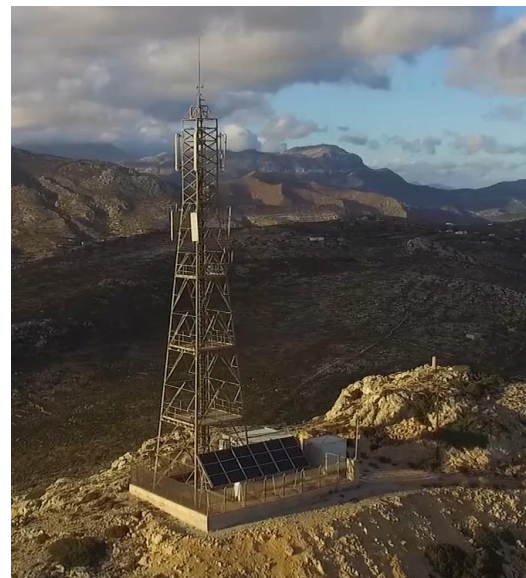
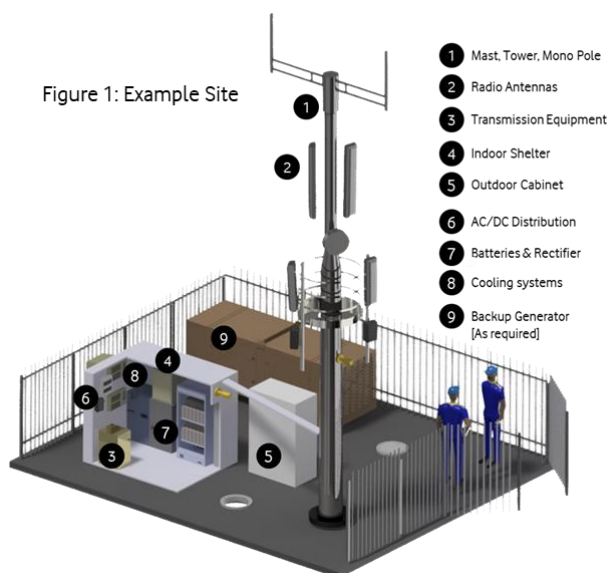
## Renewable Challenge at Mobile Base Stations

Between the Vodafone Group entities, we have 160,000+ mobile base stations which range from small rural sites with a typical load of 1-3 kW to larger urban sites with 10-15 kW (shared urban sites can reach up to 25 kW). The power is typically supplied by the public electricity grid, but mobile towers are often required in areas where the electricity grid has not been developed yet (such as rural Africa) or where it is not cost effective to do so (like the Scottish Highlands). We therefore depend on alternative power sources to provide 100% of the electricity at these sites.

All mobile base station locations are provisioned with back-up batteries to ensure service continuity during grid outages, with battery technology mostly based around Valve Regulated Lead Acid [VRLA] but progressing towards Lithium Ion.

For sites where a grid connection is unavailable, or subject to frequent or extended outages, the current standard is to deploy diesel generators with an option for either a battery or battery/solar hybrid mode, to reduce associated emissions. In some locations we have installed renewable generation systems (mainly solar PV)

The images below show the typical components of a mobile base station and an example for a rural site with solar PV. Equipment can either be in a shelter or in outdoor cabinets.



The main challenges for a wider deployment of renewables in general, and specifically for off-grid sites, are:

- Vandalism and theft of equipment and fuels, in certain countries and in high-risk locations.
- Limited space within the site footprint, including the fenced compound (often 10 x 10 meters including the tower)
- Shading from surrounding trees, buildings, and the tower itself impacting solar yield
- Landlord consent and charges especially on roof top sites, including on third-party office buildings
- Planning requirements for wind turbines
- Noise and vibrations from engines and wind turbines
- Reliability of systems, especially if they have moving parts
- Maintenance and repair effort and cost, including the availability of skilled service providers in remote regions

- Cost-effective storage for fluctuating renewable generation profiles vs. relatively flat load profile of site.
- Availability and quality of clean renewable fuels, considering environmental and social impacts (for example, biofuels for oil seeds take away agricultural areas for food production)
- Handling and logistics of alternative fuels like hydrogen and ammonia; number of refuelling visits
- Cost vs. conventional grid supply or battery/diesel generator systems
- Resource allocation for continuous community engagement
- Regulation e.g., electricity supplier licence for supply of 3<sup>rd</sup> parties (community, school, or hospital)

We are therefore looking for innovative solutions that address these challenges or barriers. It is not likely that just one solution will be suitable for all sites and we will consider specific configurations that help us towards our goal. Typical use cases could be for:

1. A rural site with 1-5 kW load without grid connection where renewable energy generation technologies should provide power 24/7 so that we can replace the use of diesel in backup generators
2. A medium site with 5-10 kW load but limited footprint of 100-200 m<sup>2</sup> which is grid connected but faces frequent power outages.
3. A large site with 10-25 kW load, with limited footprint, typically in urban areas, typically grid connected.

Submissions of **Technology Solutions** could cover, but are not limited to, power generation technologies (e.g., wind, solar, fuel cells, micro turbines), alternative fuels (e.g., hydrogen, ammonia, HVO) storage solutions (different to lead acid / Li-ion batteries that we currently use), integrated systems, etc.

As a minimum the proposed technology solution must meet the following requirements:

- Compliance with all international electrical and health & safety standards.
- Carry the necessary international product certifications.
- Market-ready solutions and not conceptual or developmental stage.
- Already deployed on customer sites, not necessarily in telecoms.
- Easy to integrate into the site power infrastructure at either mains AC or -48 V DC level.
- Consideration around anti-theft measures
- Vendor will support our existing field teams during implementation and on-going maintenance.

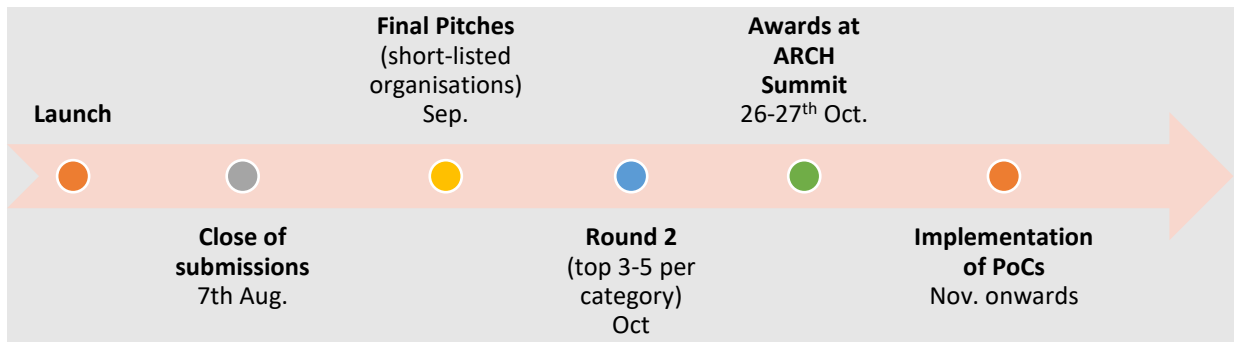
### **Timeline and Selection Process**

We are inviting a wide range of organisations to submit proposal covering commercial enterprises from start-ups to mature companies, as well as non-profit organisations.

The **closing date** for the submission of proposals is on the **7<sup>th</sup> Aug**. We will then set up a **Final Pitch** session where a shortlist of around 5-10 organisations can present their solution to our technology and commercial experts.

In **Round 2** we will have more detailed discussions on the solution and discuss ways of working together going forward. Our aim is to implement a **Proof of Concept** of the selected solution so that we can assess the practical operation on our sites towards the end of the year.

The winners of the Renewable Power Challenge will have the opportunity to present their solution at the **ARCH Summit** in Luxembourg at the end of October, giving visibility to a wide range of decision makers within the Vodafone group, our partners, and the wider industry.



We are looking forward to your submissions and are excited about working together with innovative partners to make a Net Zero emissions world a reality.