



# Transforming Earth Observation Data into Actionable Insights



## CONTEXT

For more than 125 years, Shell has been providing energy to improve people's lives. We have done so by evolving to meet our customers' energy needs: from oil products to natural gas and now, increasingly, low-carbon biofuels and renewable energies such as wind and solar power.

Even as Shell continues to provide the energy the world needs, the company aims to reduce emissions of greenhouse gases per unit of energy our customers use. We will seek to do so by transforming our product mix over time. Shell's ambition is to move with society towards achieving the goal of the Paris Agreement and decrease our net carbon footprint by around 20% by 2035, and by around 50% by 2050.

Our net carbon footprint takes into account measures that compensate for emissions. Such measures could involve working with nature to create carbon sinks, like forests and wetlands.

## CALL FOR SOLUTIONS

Earth observation from space coupled with on-the-ground measurements could enable entrepreneurs to evaluate the effectiveness of natural carbon sinks in terrestrial and marine ecosystems. Social-media platforms and artificial intelligence (AI) could help in this effort, for example, by quantifying the changes in biodiversity of over time.

For that reason, we at Shell want to build a portfolio of AI solutions based on earth observation (EO) data.

## CALL FOR SOLUTIONS

We seek solutions that use EO or other data and AI to address challenges that Shell faces in providing more and cleaner energy solutions for society. Specifically, we seek measurements to help us understand various possible aspects of our net carbon footprint (for example: forest conservation, forest management, afforestation, wetland protection/restoration, blue carbon and certain agricultural projects).

For this call for solutions we are looking for creative and robust approaches to solve the following issues:

- Quantification of above-ground biomass carbon for forestry and agricultural production systems
- Predictive forecasting of deforestation rates from direct and indirect indicators (e.g. changes in infrastructure, population growth and urban expansion mapped against topography)
- Quantification of peatland areas and depth using remote data
- Understanding and quantifying of changes in natural and human-made carbon sinks and sources\*

\*A carbon sink is a place where carbon dioxide is removed from atmospheric circulation. A carbon source is the opposite: a place where CO<sub>2</sub> is emitted into the atmosphere.

## WHAT WE ARE LOOKING FOR

- Novel AI-based solutions that utilize EO data (including those based on ultraviolet, visible and infrared wavelengths and synthetic-aperture radar) and/or social-media data (imagery/text/posts/video/sound) for identification and georeferencing of animal and plant species (including potential biomass measurements, e.g., tree diameters/heights).
- Annual detection and measurement of carbon stocks in both terrestrial and marine (i.e., coastal) systems at a country-wide scale or finer with 95% confidence.
- Solutions that are practical, scalable for global deployment, computationally efficient and robust, and applicable to a wide and diverse range of natural and built environments.

In addition to the above, we also welcome novel solutions that propose a combination of hardware (active/passive sensors, embedded systems, drones) and software and that demonstrate significant potential commercial impact.

### IN SCOPE

- Open-source or commercially available data from satellites (including multispectral, hyperspectral and synthetic-aperture radar)
- Design of complementary sensor hardware integrated into the AI solution
- Multisensor data fusion
- Land and ocean systems both natural and human-made, including but not limited to volcanoes, peat bogs, marshes, urban and industrial sites, and landfills.
- Spatiotemporal changes in carbon sinks and sources [2014 - present, multiple epochs of reporting, e.g., annual]
- 10-year forecasts for carbon sinks and sources
- Monitoring of water quality and other changes in aquatic ecosystems
- Forest-cover monitoring and deforestation detection with estimated impact on climate
- Patterns in emission (GHG and otherwise)
- Measurable indicators of progress towards the UN's Sustainable Development Goals

### OUT OF SCOPE

- Proposals related to policies and regulations
- Confidential data (at least for this Call for Solutions; however, the end product might well rely on restricted-access data)
- Results that cannot be independently verified
- Solutions that are beyond proof-of-concept or minimum-viable-product stage, i.e., existing commercial solutions

### HOW TO SUBMIT YOUR PROPOSAL

- Go to the [GameChanger portal](#) to access the submission form (shell.com → Energy and innovation → Innovating together)
- In the “Is this application in response to an ongoing Call for Solutions?” field, type “Transforming Earth Observation Data into Actionable Insights”.
- Fill in the other fields of the online form.
- Submit your proposal by: 24<sup>th</sup> of April 2020
- For questions contact [GameChanger-Solutions@shell.com](mailto:GameChanger-Solutions@shell.com)

### WE CONSIDER THE FOLLOWING CRITERIA IN THE SELECTION PROCESS:

- 1. Novelty:** Is your solution fundamentally different than what is available now and unproven?
- 2. Value:** How much would a customer be willing to pay for your solution if it works?
- 3. Feasibility:** Can the underlying concept be proven quickly and affordably? Is the right team in place to deliver this?
- 4. Relevance:** Does your solution truly answer this call for solutions?
- 5. Scalability:** If your solution is proven, how scalable is it?

Any information submitted as part of the process must contain only NON-CONFIDENTIAL data and information at this stage. The funding opportunity will be in the range **USD 150,000** to progress a “proof of concept” in a phased approach over a period of no more than **6 months**. Further development may be supported and or facilitated by Shell depending on the overall outcome of the initial award.

For more information about Shell’s Nature Based Solutions click [here](#).