Disruptive innovation in clean energy technologies

Proposals are invited in (only) one of the following two sub-topics:

- Photovoltaic windows ('transparent' solar cells): development of transparent and economically viable PV cells for integration in building applications. Projects should demonstrate a prototype 'PV window' which allows the visible light to pass through unhampered, and has the potential to achieve the lifetime and conversion efficiency of commercial PV modules (resp. 25 years and at least 12%).
- Bionic leaf technology: advanced renewable fuel production through biological conversion of CO2 and renewable hydrogen in the presence of inorganic catalysts. The process is based on first using solar energy to split water molecules and then using bacteria to consume the hydrogen together with CO2 to produce fuel, and currently has an efficiency of 10%. Projects should advance the overall efficiency of the process for existing or new biosynthetic systems up to 15% under ambient air conditions by enhancing the water splitting efficiency and improving the engineering of bacteria and their interface with the catalysts in order to boost their growth at all conditions.

Proposals are expected to bring the technologies from TRL 3 to at least 5. Proposals need to demonstrate a clear technology development roadmap for their solutions, including a strong exploitation plan presenting their business opportunities and impact potential. The technological development risks need to be clearly identified and relevant mitigation measures given. Life cycle analysis shall be considered.

Projects selected under this pilot will follow a stage-gate approach based on milestones and periodic reviews. A first review by the Commission - with the help of independent experts - will take place after 6 months, based on an assessment by InnoEnergy[[http://www.innoenergy.com/]] of the feasibility and innovation potential of the proposed solution or application, analysing a.o. the business and innovation strategy, the technology readiness level of the proposed application, the consortium's freedom to operate (e.g. background, foreground, IP), and the market. This review will lead to a first go/no go decision.

Throughout the duration of the Grant Agreement, and agreed therein, Inno Energy will be involved in providing support to innovation and business development, including completing the market uptake supply chain, using external expertise, with the aim to strengthen the consortium's innovation performance.

The Commission considers the proposals requesting a contribution from the EU of between 2 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

The challenge is to take exceptionally promising and innovative energy solutions with high potential impact to real breakthrough and market application. Boosting the breakthrough of particular promising technologies requires both a focused and adaptive approach, to secure that investment brings innovation that is taken up by the market - or discontinues an investment that has too limited expected impact. Specific fields where disruptive rather than incremental innovation is needed are the integration of renewable energy into smart buildings, and sustainable fuels. A specific challenge is to develop efficient fully transparent photovoltaic (PV) cells that only absorb light in the non-visible part of the spectrum, so that they can be integrated on a wide scale as windows in buildings. Another specific challenge is to enable production of sufficient quantities of liquid fuels that do not compete with food for land, do not displace land uses, are cost competitive to fossil fuels and substantially reduce greenhouse gas emissions.

Transparent, visually non-intrusive PV windows have a significant market potential, because they could be fitted to existing buildings, without the need to cover large new areas to collect solar energy; every glass surface could produce solar power. As such PV windows block much of the infrared radiation, they would cut down on air conditioning needs, further reducing energy use and operating costs in buildings.

An economically viable bionic leaf technology with increased efficiency well beyond the state-of-the-art has significant market potential and environmental impact, because it will enable development of sustainable fuel for transport that will completely replace fossil fuels and their best alternatives. Converting 50% of all industrial CO2 emissions into fuels using this process at an efficiency of only 15% would avoid half of today's transport GHG emissions. Moreover, this will improve Europe's energy security while at the same time create economic growth.

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