Supplementary written evidence submitted by the Secretary of State for Business, Energy & Industrial Strategy, Department for Business, Energy and Industrial Strategy
(SPA0101)

Following the evidence session held by the Science and Technology Select Committee on 9 February 2022, I would like to provide information to the Committee on work my Department is undertaking to explore the potential of Space-Based Solar Power ("SBSP").

The National Space Strategy of September 2021 set out our plans to build one of the most innovative and attractive space economies in the world. The strategy lays out UK strengths and opportunities, and Space-based energy is identified as an emerging sector where the UK has opportunity to lay the foundations for our future leadership. Work in this area is exploratory and at an early stage, but SBSP presents an exciting opportunity for the UK to lead in a new market, enhance our energy security, and contribute to UK Net Zero.

Introduction to Space-Based Solar Power

SBSP is a renewable technology which provides continuous baseload power without intermittency, which could potentially be available at large scale. It could offer new energy mix options and contribute to UK Net Zero pathways. It functions by collecting solar energy using a satellite placed in geo-stationary orbit with a large-scale photovoltaic panel(s) which beam the electricity using radio technology to a fixed point on the Earth. Its main advantages over wind and terrestrial solar energy are the ability to deliver clean, baseload electricity, day and night throughout the year and in all weather conditions since the satellite is placed into an orbit where there is no night.

The concept of SBSP has been explored since the 1970s and was seen as unaffordable. However, new highly modular designs have been introduced which are more affordable than previous concepts. In addition, the underpinning technologies for SBSP and space robotics are rapidly maturing, and the cost of space launch has decreased dramatically, a trend which is expected to continue.

Development of SBSP would be a substantial mission, primarily because of the size of the system, and the need to assemble and integrate this in space. The solar power unit would be an order of magnitude larger in mass and extent than any spacecraft currently in orbit.

BEIS' work in this area

In September of last year, the Government published an independent study commissioned to explore the technical feasibility, cost and economics of SBSP[1]. The study concluded that it is technically feasible to develop a substantial SBSP capability for the UK based on existing technologies and to complete this well before 2050.

The Levelised Cost of Energy (LCOE) of SBSP is estimated to be between £35-£80/MWh (central cost £50/MWh) for a nth-of-a-kind system commissioned in 2040. This is comparable to BEIS projections for other renewable technologies such as offshore wind (£40/MWh) and biomass with carbon capture & storage (£193/MWh).

There are broader economic benefits for the UK to pursue the development of SBSP, with a favourable GDP multiplier and benefit-cost ratio. In addition, the development could lead to substantial spill-over benefits.

Following the publication of this study, my department is developing a small-scale 'no-regrets' innovation programme to support the development of key technologies associated with SBSP, and that also have broader terrestrial applications, and therefore, will contribute to the UK's Net Zero ambition whether a space based solar power system is deployed or not. This programme aims to kickstart important technological development that will place the UK in a better position to lead and attract international collaboration in the areas where it is strong. In October of last year, we invited organisations interested in carrying out work under the programme to express their interest to the Department and will be engaging with stakeholders on this in the coming weeks.

Collaboration

UK companies, universities and other organisations interested in the development of Space Based Solar Power have established the Space Energy Initiative[2] to take forward its development in the UK with the ultimate goal of developing a SBSP system in the UK. Both my department and the Department for International Trade are currently members of the Space Energy Initiative and support its work. We continue to assess how the Government can most effectively support the development of this technology in the UK. The Space Energy Initiative will launch publicly on 10 March and continues to publish resources related to the development of SBSP in the UK.

The scale of investment and technology development required to successfully develop a Space-Based Solar Power system means that international collaboration will likely be required. We are currently assessing international interest in the field to identify where there may be opportunities for us to work together with our international partners.

We will continue to explore how the Government can best harness the opportunities presented by this exciting technology to contribute to our prosperity, security and Net Zero ambitions.

---

[1] https://www.gov.uk/government/publications/space-based-solar-power-de-risking-the-pathway-to-net-zero

[2] https://spaceenergyinitiative.org.uk/