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Annex 1 – Priority Areas

Detail on the priorities which underpin the Thematic Areas for this call are presented here.

Thematic Area 1: Low carbon technologies

a. Managing performance of low carbon technologies deployment in the clusters, this includes start-up and for the initial phase of operations before steady state operations are reached.
b. Synergies among various decarbonisation technologies and activities that have potential for high impact, including how can these be optimised to enhance a business case; for example, regional opportunities for CCUS considering quality/purity to uses available at different clusters and potential displacement of UK chemical imports.
c. Improving process energy efficiency of electrolysers, CO_2 capture, compression and pumping systems, heat recovery and re use, etc.
d. Reduced capital and operational expenditure for industrial CCUS technologies.
e. Synergies between blue and green hydrogen production and transition pathways.
f. Hydrogen production - accelerate delivery to meet expanded ambition, including higher efficiency electrolyser and compression technologies, also including heat reuse, O_2 applications and by-products.
g. Hydrogen transport and storage options for clusters, including mapping optimum approaches for particular geographies and transportation scenarios (eg pipe vs rail vs shipping, etc.).
h. Negative Emissions Technologies (NETs) / Greenhouse Gas Removal (GGR) technologies relevant to decarbonisation of clusters and that can be optimally located for clusters and large scale, for example DACC and BECCS.

Thematic Area 2: Systems and scale-up

a. Intercluster infrastructure looking holistically at infrastructure scale-up needs for a UK wide cluster programme to help determine the "right sizing" of pipelines and facilities in individual projects. This work should consider the economics and policy/regulatory mechanisms required to enable rightsizing of facilities. Examples may include pipelines and road/rail transportation, shipping infrastructure, large-scale hydrogen and CO_2 storage solutions, diversity and integration within the energy grid, etc.
b. Technologies for upscaling CCU and produce higher value products/large volumes.
c. Understanding/characterising and reducing risk of cluster systems taking an integrated approach and potential interactions on infrastructure between clusters, including de-risk and scale up lower TRL technology for industrial commercialisation, and flexibility of processes to run with larger dynamic fluctuations upon seasonal lower availabilities.

Thematic Area 3: Policy and Regulation

a. Holistic policy and regulatory frameworks for key enabler technologies for net zero, e.g. DAC, CCUS, H_2; for example, roadmap for industry on supply of hydrogen to support their decision making for transitioning/switching to new fuel technologies. This includes a global review of other relevant policy mechanisms and interventions.
b. Integration of business models, business risk, project finance and needed policy mechanisms to develop the pathways for the UK clusters to support the UK's decarbonisation and security aims. The delivery of this work should include a review of the evidence-based policy mechanisms needed and appropriate.
c. Planning, permitting, regulation and standards. Standards and requirements are key enablers for an efficient supply chain and project design. This includes a compendium of regulatory barriers (not fiscal incentives – separate topic) that are impediments to cluster decarbonisation and learning from international projects and policies. Standards to be included are for example low carbon H_2 and CO_2 transport and storage (e.g. pipeline/road/shipping), including effect of impurities, CO_2 leakage and methane, where these standards will be critical for industries engaged in common infrastructure and clusters and will simplify the procurement process, supply chains and costs.

Thematic Area 4: Skills and training

a. Skills and training. Understanding demand of existing and expected skills pools required for low carbon technologies and supply chains, including transferable skill sets from high carbon industries, as well as training provision and monitoring, and standards and certifications.
b. Skills policy. Review of policies, business models and funding levers for education and training within the UK Government and the devolved governments and compare and contrast with other international leaders (e.g. Norway, Germany, Japan, USA, etc.) and net-zero targets.
c. Equality, Diversity and Inclusion (EDI). Designing and developing programmes to engage harder to reach groups and address the imbalance and inequality in the industrial workforce.

Thematic Area 5: Environmental considerations

a. Environmental issues associated with capture systems, including amine emissions and degradation products, monitoring and atmospheric dispersion, human health and ecological risk, site licensing and regulation.
b. Hydrogen. Environmental impacts from scale up of hydrogen, including storage, hydrogen derivatives such as ammonia, fugitive emissions, etc.
c. Life cycle analysis (LCA) to quantify the net environmental impact of projects and ensure decarbonisation is real and sustainable, e.g. carbon, water and environmental analysis (territorial and overseas) of the materials and supply chain to deliver deployment of decarbonisation technologies.

Thematic Area 6: Social and economic aspects

a. Economic modelling and forecasting. An integrated analysis of social and economic benefits garnered to date from current clusters to illustrate the potential benefits at this early stage of the cluster programme and to further Government investment, as well as to consider the broader socio and economic benefits of cluster decarbonisation. This should include updated estimates for higher cost of energy and goods and included in the analysis the value associated with improved energy security, job growth and economic resilience.
b. Social licence and public acceptance. Public support (or lack thereof) of low carbon technologies, including providing a best practice toolkit about the necessity of net zero technologies (drawing from both UK and international evidence). This also includes identifying ways in which clusters can support a just transition for local communities impacted by cluster developments.