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Dear Anna

Re: Innovation Stimulus Open Letter response

National Grid owns and operates the high voltage electricity transmission system in England and Wales and operates the Scottish high voltage system. National Grid also owns and operates the gas transmission system throughout Great Britain and, through its low pressure gas distribution business, distributes gas in the heart of England to approximately eleven million businesses, schools and homes. In addition, National Grid owns and operates substantial electricity and gas assets in the US, operating in the states of New England and New York.

We support the aims of the stimulus package and agree that this mechanism is a worthwhile vehicle to continue to promote innovation and support the delivery of low carbon sustainable networks.

To achieve the objectives of the Innovation Stimulus Fund, we believe the following should be considered;

1. The Innovation Funding Incentive (IFI) or equivalent should remain and the scope should include:
 - a) Continuation of opportunities to innovate and build on progress made to date.
 - b) Groundwork for Innovation Stimulus funds (similar to how Tier 1 is used in the Low Carbon Network Fund) – to develop robust, ready to initiate projects.
2. The scope of the Innovation Stimulus Fund should be limited to energy networks and any project should require the active participation of network owners and operators. A collaborative innovation model, which involves consortia with diverse membership necessary to deliver long-term commercial deliverability, is essential. Licensed third parties are not necessary to the success of the program.
3. The Innovation Stimulus Fund should focus on large scale demonstrations which go beyond pure demonstration and also include commercial frameworks necessary to get a technology or innovation through the “valley of death”. We estimate an 8-year £800m to £1.2bn fund is required (Electric Transmission £240m - £400m, Gas T&D £560m - £800m). The programme will need year over year budget flexibility rather than an annual budget cap.

In response to the four specific questions raised in the open letter, we would like to offer the following comments:

1. *what innovation might be required to facilitate a low carbon economy and securing supplies as efficiently as possible in each of gas distribution, gas transmission and electricity transmission sectors*

A wide range of technologies and innovations are required to move us to a low carbon economy. Many new and emerging technologies are promising, however, there are many variables and high uncertainty. It is naturally difficult to predict which technologies will be successful at this stage. In practice we need a range of technologies become commercially viable to provide alternative choices, competition and security in delivering a low carbon economy.

The Innovation Stimulus program should strike a balance between collaboration and competition. Given the challenges ahead, collaboration will be critical over the next several years and should be encouraged and incentivised. Network owners and operators need to look beyond their own organisations and traditional suppliers to new partners with new ideas and solutions to accelerate innovation and move us quickly to a low carbon economy. The Innovation Stimulus programs should use a collaborative innovation approach in which the whole chain from research to application is included and highly open to ideas from many players, at all stages and connects the research community, suppliers, entrepreneurs, and network owners. A requirement of each project should be a demonstration of how they have established this network. Included in this network would be all the players along the innovation value chain that are necessary to see successful commercialisation of new technologies and innovations from researcher, inventor and entrepreneur, traditional and new suppliers to owner/operator.

Central to each collaborative innovation network should be one or several energy network owners/operators. Network owners and operators are essential as they are in the unique position with:

- a) Ability to adapt: failure to respond in a timely way to changes in market conditions and technical prospects is a major risk to a programme like the Innovation Stimulus. Networks are in the best position to know when a particular technology or innovation pathway is not likely to be successful and can more easily end projects that are not working. It is important that network companies are involved in projects to ensure that value for money for the customer can be planned in terms of managing the different pathways to a low carbon economy.
- b) Capacity to conduct and take responsibility for large-scale technology demonstrations: Network owners manage complex, large-scale projects every day. They will always have the responsibility to operate their systems safely and reliably, being a partner in the project allows them to ensure safety and reliability.
- c) Capacity to fill the post-Innovation Stimulus financing gap: Ultimately network owners with the required financeability will deploy these technologies when they are commercially available post-Innovation Stimulus.

We do not see a need for third parties to pursue a license to lead Innovation Stimulus projects; we would rather work with these parties in a collaborative innovation model.

2. *how the annual level of funding to facilitate the innovation in each sector should compare to the £64m available annually under the LCN Fund*

The required level of investment is difficult to estimate at this early stage, but the overall size should be proportional to the ambition of achieving the transition to a low carbon economy. In recent times spend on innovation in the transmission and distribution sectors in the UK has been 0.5% of revenues. The R&D scorecard produced by Department for Business Innovation and Skills shows that global R&D intensity (spend as proportion of revenue) is 3.4%, with the UK leading 1,000 being at 1.6%.

We support the UK government's vision of being a world leader in the transition to a low carbon economy. Investment in the development of low carbon technologies will be crucial to creating value to the economy through international sales and green job creation. Science and research were identified

as key areas of UK expertise and areas for further investment during the comprehensive spending review with the Energy Programme as one of the high priority areas.

Therefore we suggest that spend should initially be targeted towards 3.4% of the sector's revenues. The governance arrangements of the fund would allow this to be a target and actual spend will be controlled through assessment of the value opportunity.

Our very early estimate of progressing the technologies we listed in responding to the third question for electric transmission would be in the range £30m - £50m pa. For the gas technologies, we estimate a range of £70m - £100m pa. The lower number reflects similar percentages to that used for DPCR5 and the LCNF, the upper range closer reflects the investment we believe is required and is in line with the global R&D intensity value. The fund should have year over year flexibility rather than an annual cap to be able to fund the right projects at any time.

3. details of potential projects you consider could meet the objectives of the gas or electricity stimuli and the potential cost of these projects

At this stage we would prefer not to list specific projects as this will become a competitive process; however, below we have listed some example technology areas that we believe currently don't have a clear funded development and deployment route (and consequently are or soon will be in the latter phase of the valley of death) but offer a pathway towards a low carbon economy.

Electricity Transmission -

- Deployment of GW scale energy storage to facilitate renewable integration
- Aggregation and despatch of demand response (e.g., controlling 1000 electric vehicles)
- Reducing carbon footprint of current transmission components (e.g., deploying alternatives to SF₆ switchgear with equivalent performance and costs)
- Deployment of Smart technologies (wide-scale monitoring and control of transmission operations)
- Increasing network capacity (e.g., demonstrating next generation HVDC technology)
- Demonstrating innovative alternatives to overhead lines (i.e., undergrounding options)

Gas Transmission & Distribution -

- Demonstration of Hydrogen Enriched Natural Gas (HENG) – 10%-20% concentrations of hydrogen in legacy gas distribution networks
- Integration of anaerobic digestion Renewable Gas facilities including clean-up, compression, and maintaining and managing gas quality
- Demonstration of integration of advanced gasification technologies including integration of methanation process with gasification processes
- Gas smart grids – advanced techniques to maintain and manage gas operations
- Smart Energy Grids – Optimisation of electric and gas networks (e.g., dynamic fuel switching between electric and gas to manage peak heating day – demonstration with 1000 customers)
- Demonstration on integration of offtakes to facilities to support a CNG vehicle fleet
- Reducing carbon footprint of current gas operations (e.g., step change reductions in losses from compressor stations)

General

- Development of innovative commercial frameworks to support the low carbon economy and maximise value from new technologies

All of these technologies will have to pass through two "valleys of death" to get to commercial success. The first covers the phase from the lab to field demonstration, this phase is well understood and some mechanisms to fund this phase are in place. The second covers the scale-up phase from prototype to successful commercial deployment. This stage requires substantial investments in demonstrations and

the development of commercial frameworks. We recommend projects funded by the innovation stimulus fund concentrate on the second valley.

We believe the aim of the scheme should be to stimulate innovation in how networks working with partners can deliver value for money services to consumers over the long term. For example, we would not expect the fund to be used for the development of energy storage technologies per se; however it could be used to demonstrate how storage technologies can be used by system operators to manage the intermittency of wind generation.

Costs are estimated to be from £100k at the research end of the spectrum to develop a concept increasing to tens of millions to demonstrate major transmission technology. It is paramount that safety and security of supply issues are addressed at all points of the innovation spectrum and therefore network operators are essential in any consortium requiring access to the networks.

While there has been much emphasis on technological innovation, it should be remembered that markets, business models, and commercial frameworks are as important. Consideration should be given to this type of innovation, even to the point where some projects are encouraged that focus on business model innovation that rely on using commercially available technologies.

4. what speculative investment companies should include in their business plans to be funded through the price control, versus what they should compete for through the stimulus – and the potential value and required justification for this speculative investment

Our current understanding is that the RIIO proposals do not include an IFI scheme (which would be an example of investments that networks would include in their business plans). We believe this to be a backward step and would urge Ofgem to reconsider the innovation proposals with a view to continuing with the highly successful IFI scheme which could then be included in networks business plans.

The IFI scheme has worked very well in encouraging innovation across the Energy Network Operators against specific business criteria as acknowledged by the ENA and the RPI-X@20 review workstream.

Across all industries, companies invest in innovation to deliver improvements to their core business lines, the majority of which are expected to deliver benefits within 8 years. We see this as being different to the innovation stimulus fund which is looking to deliver benefits to the wider UK economy and to meet the UK's climate change targets, the value of which may or may not accrue to individual companies, the payback for stimulus fund projects is likely to be greater than 8 years.

We note Ofgem's thinking that innovation projects to meet defined outputs can be included in business plans. We support this and believe that the innovation projects should be visible as a separate, identifiable programme of work. This has the added benefit of:

- a) allowing a long term consolidated programme to be defined that receives prominent internal focus
- b) ring-fencing of funds to assist with internal cost control and accounting and ensuring financial benefits tracking
- c) sharing the pipeline of research with academic partners and research agencies to assist their planning
- d) facilitating collaboration with other industry parties ensuring that spend is highly leveraged
- e) providing knowledge transfer to ensure benefits are shared and widely implemented
- f) creating a small expert R&D team with specific knowledge and skills that provides both an internal and external centre of excellence.

Without the focus of IFI there is the danger that research associated with the provision of safe, reliable and secure networks will significantly decline as it did following RPI-X regulation after privatisation until the advent of IFI. It has been a long journey to re-establish research and development as a valuable core business process, IFI has been a very successful mechanism in achieving this and we therefore believe it should be continued.

We recommend the current IFI mechanism is retained in the next price control period and the scope of the initiative is altered slightly to ensure that it targets innovation tailored towards businesses specific outputs as defined under the RIIO model. There is likely to be some small overlap with the broader innovation stimulus fund, however this should be manageable through the transparent reporting of both schemes. Once details of the agreed outputs are defined, we can finalise the scope of an internal IFI programme which focuses on core R&D complementing the innovation stimulus fund's low carbon focus.

The 0.5% level has required significant prioritisation of potential projects, particularly within electricity transmission, and given the challenges that businesses face we suggest this is increased to 1.0% in addition to the size of the innovation stimulus fund outlined earlier in this letter.

Some examples of areas of funding we would propose to include in the price controls are -

- Specific innovations to support delivery of the primary Outputs and secondary deliverables defined in RIIO-GD1. We have discussed some of the areas that would merit innovation funding within our Business Plans at the Ofgem working groups on RIIO-GD1 and will continue to develop our thinking. However we would expect there to be areas within all output areas of safety, reliability, customer connections, environment and social (for gas distribution). Some examples might be:
 - Asset life extension for increased reliability
 - Pipeline technology for repairs and maintenance
 - Climate adaptation
 - Live line working
 - New gas sources
 - Operator and 3rd party safety
 - Development of new commercial framework and charging models

We also need IFI to continue in order to fund the work necessary to prepare submissions to compete for the innovation stimulus funds, similar to how Tier 1 works within the LCNF.

In addition to the questions in the open letter, we would like to make the following comments on the details of the proposed stimulus fund:

- The LCNF is in a critical phase of its development and the value of it is yet to be clear although initial indications look promising. We would recommend that detailed governance and final design for the innovation stimulus fund is left for 6 months when there are more lessons available from the success (or otherwise) of the LCNF.
- We suggest Ofgem outline a list of challenge areas for the innovation stimulus fund to address, this can be assembled via a targeted workshop of interested parties. Companies would then develop proposals for projects to develop solutions to these challenges, this approach would provide a light touch guidance to aid development of the fund.
- The phrase "time limited" is used to describe the fund, our analysis indicates that innovation to deliver sustainable networks will be required beyond the 8 year price control period, probably out towards 2030, we would prefer to view the fund as a long term innovation mechanism, clearly being subject to periodic reviews of its effectiveness.
- We would advise a pragmatic and case by case approach to the protection of Intellectual Property (IP). In our experience if no one owns the IP (and can gain from the financial upside) then the innovations are not likely to be commercialised.

- Within the gas and electricity stimulus funds we would advise separating Transmission and Distribution. Electricity Transmission projects tend to be fewer in number but larger in size than Distribution projects, comparing competing projects within the same fund may not lead to the optimum use of the funds in delivering sustainable networks.

We look forward to working with Ofgem on the development and implementation of the innovation stimulus fund and would appreciate the opportunity to further discuss the inclusion of IFI in the RII model and in next price control period.

We would be happy to expand on any of the points we have raised.

Yours sincerely

[By E-mail]

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