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20 December 2018

Dear Robert,

RE: Climate Change Advisory Council response to proposed changes to the Public Spending Code

The Climate Change Advisory Council welcomes the publication of the reviews of the 'Central Technical Appraisal Parameters' and on 'Valuing Greenhouse Gas Emissions' in the Irish government's Public Spending Code. The papers, and the underlying research by the Irish Government Economic Evaluation Service, provide a very good basis for the finalisation of the Spending Code.

The Council has some recommendations on how the final version of the Code could be improved to take account of the challenges posed for Ireland in tackling the problem of climate change.

The Council notes that the review has recommended that the social discount rate should be reduced from 5% to 4%, and the implementation of a new approach of declining discounting into the future. The Council welcomes the proposed introduction of declining discounting and further commends the proposal that the discount rate is kept under review. There has been a clear trend towards lower discount rates throughout developed countries, as noted in the [OECD \(2018\)](#) survey. This survey also notes the emergence of 'dual discounting' which involves applying different discount rates for financial and natural capital to improve appraisal practices.

Ireland's objective of transitioning to a low-carbon, climate-resilient and sustainable economy and society by 2050 should guide the approach of the Public Spending Code. This implies that the damage done to society in 2050 by a tonne of carbon dioxide emitted by sectors covered by the ETS will be the same as that for emissions from the rest of the economy. As a result, we should use a single price of carbon in valuing long-lived projects, irrespective of differing prices today in the ETS and the non-ETS sector.

The Council has repeatedly suggested that the current ETS price and the carbon tax are too low, given Ireland's objective for decarbonisation by 2050. Hence the Council has recommended that Ireland join with other countries in introducing a carbon price floor. The Council has also recommended a steady increase in the carbon tax to bring it closer to a price that reflects the long-term damage done to society from carbon emissions.

In the Draft Code, the present value of future costs and benefits of projects will be determined by the discount rate proposed by the Department. Accepting that discount rate, and taking the Department's proposed cost of carbon dioxide emissions in 2050 of €265 a tonne, this is not consistent with the value for carbon proposed by the Department for 2020. Using the Department's proposed discount rate, and the proposed 2050 value for the cost of carbon dioxide, this would suggest that the appropriate price to use for 2020 is around €80 a tonne.

Target consistent studies in developed countries routinely give higher values, with the UK at £68 per tonne in 2020 (tonne CO₂e in 2017 £ values) ([BEIS, 2018](#)), as have global studies detailed by the [High-Level Commission on Carbon Prices \(2017\)](#)¹. The other key empirical approach, as damage costs often termed the 'social cost of carbon', also supports higher values.²

In terms of the costs used in appraisal by governments in practice, both the average cost surveyed across the OECD countries at \$49³ per tonne in 2020 (in 2017 dollar values) ([OECD, 2018](#)) and those specifically applied to Ireland by the [European Commission](#) at €41 per tonne in 2020 (2017 euro values), also support the view that the proposed cost is low.

Noting the example of the investment in 100 hybrid buses detailed in Budget 2019, if the full welfare costs of this public spending were internalised in the appraisal of this spending decision, it is possible that a cost-benefit analysis could point to a different outcome - leading perhaps to the purchase of a zero-carbon fleet. To ensure the full welfare cost is evaluated requires consideration of the shadow price of carbon, the timespan of the analysis and the discount rate applied overall.

The Council believes that it is important that the complete lifetime costs of emissions, the benefits of the avoided emissions and of 'co-benefits', are fully capitalised throughout the technical lifespan of long-lived infrastructure. The Department's review of parameters noted the importance of the [OXERA](#) (2002) report, which was a report that specifically addressed long-term impacts on welfare. To be consistent with the logic of this long-term focus in appraisals, impacts on welfare for many long-lived infrastructural projects are commonly

¹ Global target-consistent studies also give higher initial values at £150 - £250/tCO₂ in 2025, as a range of results to include 16 different countries representing 74% of 2010 global emissions in the [Deep Decarbonization Pathways Project \(2017\)](#).

² A prominent damage cost in the literature is the US regulatory price ([Interagency Working Group on the Social Cost of Carbon, 2013](#)), estimated at \$51 per metric ton of CO₂ in 2020 (in 2017\$ money values). It must be noted, that it has been widely acknowledged that this value is conservative and too low according to both the Intergovernmental Panel on Climate Change ([Pachauri and Reisinger, 2007](#)) and the Interagency report itself.

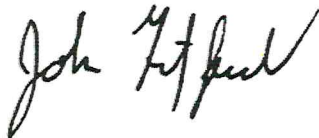
³ This is skewed downwards by Ireland's lower price.

included in government appraisals on timescales up to 100+ years.^{4,5} A shorter timeframe for financial or economic appraisal of a road investment, such as a period of 30 years, requires a longer timespan to include the 'residual impact'. This residual impact must include the cost or benefit of emissions to welfare throughout its operational lifetime. Such longer timeframes are consistent with practices now common across [OECD countries](#), and with the provisions of the Climate Action and Low Carbon Development Act (2015) and the National Adaptation Framework ([DCCAE, 2018](#)).

In accordance with this longer-term time frame that has emerged in appraisal practices, it is also important to consider not only emissions and mitigation. The Council believes that it also necessary to consider climate change impacts and adaptation as part of the amendments to the Code, including for cost-benefit calculations that might take account of potentially increasing risk and damages over time. European Commission guidance on Cost-Benefit Analysis of EU co-financing ([Sartori et al., 2014](#)) requires that climate change mitigation and adaptation needs, as well as of disaster resilience, are demonstrably taken into account. It is important that public spending has due regard to adaptation using an appropriate range of global warming scenarios, including those of potential higher warming, in addition to cost-effective risk management.

Should you wish to clarify any of the points above, please contact myself directly or through the Climate Change Advisory Council's Secretariat via [REDACTED] or phone [REDACTED]

Yours sincerely,



Prof. John FitzGerald
Chair
Climate Change Advisory Council

⁴ The example of France is pertinent where the economic impacts are appraised to 2070 but the residual environmental and social impacts on welfare are analysed up to 2140.

⁵ The IGEES review notes two points to support applying shorter timeframes of analysis; i) that discounting renders long-term costs and benefits negligible, and ii) uncertainty in forecasts makes longer term analysis less desirable. However, as declining discounting will now be applied, this means that long-term costs and benefits will not be rendered negligible as per [Pearce et al., \(2006\)](#). In addition, forecast uncertainty is dealt with in practice through a range of techniques that allow the required long-term timeframe to be applied. Examples include scenarios and sensitivity analysis in French ([Ministère de l'écologie, 2014](#)) and Dutch national guidance ([CPB/ PBL, 2013](#)).



**Response to the Public Consultation on the shadow price of carbon in the
public spending code**

**Muireann Lynch (Research Officer)
Miguel Angel Tovar (Research Officer)**

We welcome the opportunity to contribute to the consultation on the Shadow Price of Carbon. In our response, we have focused on a subset of the questions where we believe we have a particular expertise.

1) Is applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions the best way of capturing the climate consequences of these investments?

The use of shadow prices for appraisal of public projects is rooted in the economic literature. Dreze and Stern (1990) define shadow prices as the social valuation of the resources used to finance a project. They argue that projects that make positive profits at shadow prices should be accepted because they will increase social welfare. The use of shadow prices in the appraisals of public projects is a well-known tool when market prices are not available for the social planner and it can be applied to evaluate potential benefits in different markets (e.g. see Marchand et al., 1984 for an evaluation of employment projects). Measuring pollution externalities and translating them into shadow prices is a challenging endeavour. For this reason, an important amount of research has focused on providing reliable shadow prices. Dang and Mourougane (2014) have estimated historic shadow prices for greenhouse emissions for different OECD countries. The use of shadow prices for appraisal of projects is not limited to public-investment projects. Kruger (2017) argues that shadow prices can also be useful for private companies when investing in the energy sector because it can help them to reduce the risk of future carbon regulation and technological change.

In short, applying an accurate shadow prices of carbon to estimate the greenhouse gas emission attributable to public investment decision is an appropriate metric for the climate consequences of these investments.

2) Of the models available, is linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets the most appropriate means of pricing carbon in project appraisal?

Given the constraints facing decision makers, it is our view that the estimated marginal abatement cost is the most appropriate means of pricing carbon.

The inherent uncertainties in calculating the social cost of carbon, outlined in the consultation paper, render it unsuitable as a means of pricing carbon.

Expert assessment is a new and relatively untested means of calculating the social cost of carbon. This calculation is complex and requires knowledge of various unrelated disciplines, including, but not limited to, climate science, physics, geology, engineering and economics. Identifying an appropriate pool of experts who also have sufficient knowledge of Irish-specific aspects of this question to identify the correct social cost of carbon within Ireland is likely to prove challenging, if not impossible.

The marginal abatement has merits in that it is linked to a clear and transparent policy goal, namely that of GHG emission reduction targets. However, it should be noted that the arising shadow price of carbon is determined and limited by the targets themselves. Policy-makers should continue to evaluate Irish carbon reduction targets under the criteria of fairness, cost-effectiveness and environmental integrity.

3) Is the projected abatement cost for greenhouse gas emissions across the energy sector likely to represent an appropriate proxy for the cost of economy-wide emissions reductions?

In short, no. The non-CO2 emissions from the agricultural sector are a significant contributor to non-ETS emissions and are unlikely to decrease in the short to medium term (EPA, 2015). This means that the carbon price required in order to reduce energy sector emissions by 80% is likely to be lower than the price required to reach economy-wide emissions reduction targets, assuming agricultural emissions do not decrease. There may be a value in including some flexibility in the Public Spending Code to update the shadow price of carbon as new evidence from economy-wide environmental models becomes available.

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Response to Valuing Greenhouse Gas Emissions in the Public Spending Code

14th December 2018

Introduction

Ervia is a commercial semi-state company with responsibility for the delivery of gas and water infrastructure and services in Ireland, through Gas Networks Ireland and Irish Water. It also provides dark fibre broadband infrastructure through its business Aurora Telecom.

Gas Networks Ireland develops, operates and maintains the natural gas transmission and distribution networks in Ireland, consisting of 13,954km of gas pipelines. Gas Networks Ireland provides gas transportation services to all gas suppliers and shippers.

Irish Water is the national water utility responsible for providing safe, clean and affordable water and wastewater services to 1.7 million customers in the Republic of Ireland. Irish Water is responsible for the operation of all public water and wastewater services.

These national gas and water utilities underpin the social and economic development of Ireland and will play strategic roles in the transition of Ireland to a low carbon, climate change resistant and sustainable economy by 2050.

This is Ervia's response to the Valuing Greenhouse Gas Emissions in the Public Spending Code consultation, our subsidiaries IW and GNI will submit separate responses to the consultation.

Ervia welcomes the opportunity to respond to this consultation. Human driven climate change presents a significant challenge. There are some indications that climate change is already having an effect, e.g. melting ice caps, more frequent and more intense storms, so action now is ever more important. A number of international agreements, most notably the Paris Agreement, provide a framework for cooperation and sets a greenhouse gas (GHG) emissions limit to avoid the most damaging effects of climate change. Article 2 of the Agreement sets out the aims of the agreement which, importantly for this consultation, includes the aim of "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

The Public Spending Code (the Code) applies to all public bodies and is used to evaluate policy proposals and investment decisions. The value of GHG emissions is an important component in the evaluation methodology and influences which policies are selected and whether investments are made or which option is selected.

The Code is important to Ervia and its subsidiaries, Irish Water and Gas Networks Ireland, as it is used to determine which infrastructure investments represent the best value for the State. Private firms may also use the GHG values in their investment decisions. It is important to place the correct value on GHG emissions.

The following sections set out Ervia's views in detail on the matters under consideration and provide detailed answers to the questions posed. The following is a summary of key points made:

- It is important to place the correct value on GHG emissions; placing too low or too high a value may lead to suboptimal investment.
- The value of GHG emissions should be the same whether emitted by the traded or non-traded sector; setting different prices may lead to distortions.

- The abatement cost approach to value GHG emissions seems to be the most practical and transparent to implement. A more detailed methodology note is needed to set out how the abatement costs are calculated, what assumptions are used and the justification for the key assumptions.
- Further analysis should be carried out to understand the impact of a greatly increased shadow price of carbon on current investment plans by both public and state bodies.

Valuing Emissions

Undertaking a review of the value of GHG emissions is timely. The value currently used in the Code is too low, neither valuing the full social cost nor the cost of carbon abatement. The current prices in the traded carbon sector (or ETS) indicates that the value of carbon emissions is higher than the value in the Code. In the non-traded sector (or non-ETS) the Irish carbon tax stands at €20 per tonne emitted, also higher than the value in the Code.

It is important to place the correct value on GHG emissions; placing too low a value may support investments that have carbon intensities higher than optimal leading to greater GHG emissions and consequently higher environmental damage in the future; while placing too high a value may lead to efficient investments being cancelled or more expensive than necessary options being selected.

The social cost approach outlined in the consultation paper has the attraction of being the theoretically correct approach. The practical difficulties of calculating the value in this approach however means that applying it may lead to an arbitrary value which is not transparent and without any underlying rationale in the Irish context. In any event the social cost approach has been superseded by Irish and European targets. The EU has set a target of reducing GHG emissions by 40% by 2030 which implies that the social cost is greater than the cost of abatement needed to meet this target. Ireland has a target reduction of 30% and has set a national objective of reducing emissions related to energy by 80% to 95% by 2050.

The abatement cost approach links the value of GHG emissions to the cost of measures that will meet Ireland's emissions target. Opinions on the costs and technology options modelled to achieve targets will change and currently there is no consensus on the measures needed to achieve Ireland's longer term objective.

The ETS provides a market price for GHG emissions. The current price does not reflect the true cost of abatement. Low carbon measures (e.g. wind power) have to be subsidised to make them viable. In future it is likely that subsidies will be phased out however, the current market prices for ETS carbon permits include the depressing effect of subsidises so are not a true reflection of the cost of carbon abatement.

It is proposed to use a forecast of ETS prices contained in the EU Reference Scenario 2016 to value emissions from the traded sector¹. It is not clear if the methodology used to derive this forecast has removed the distortion caused by subsidies. Also the current ETS spot price² is greater than the forecast for the 2020 price which suggests that the forecast needs to be updated.

It is proposed to use different valuation methods for the ETS and non-ETS sectors. **GHG emissions from the ETS and non-ETS sectors cause the same climate damage and hence should have the same value.** Using different valuation methodologies for each sector may lead to distortions. The proposals in the consultation paper value non-ETS emission nearly three times greater than ETS emissions. This means an investment that has emissions in the ETS sector can emit nearly three times those of an equivalent

¹ Table A below shows the forecast ETS from the EU Reference Scenario 2016

² €20.14 per tonne on 11th Dec 2018 - 14:15 – EEX.com

investment with emissions in the non-ETS sector for the same cost. This will lead to suboptimal investment decisions. Therefore, to avoid this distortion **we recommend using the same valuation methodology for the ETS and non-ETS sector.**

On balance the abatement cost approach to valuing GHG emissions for both the traded and non-traded sectors is the favoured approach. The next section lists some issues with this approach that may need further consideration.

Implementation Issues

The following is a brief overview of issues that may need further consideration.

TIMES Model

Regardless of which approach is taken a model will have to be used to calculate the forecast GHG emissions prices. The model will be complex with many inputs and assumptions. The outputs of the model may not be easy to understand by the casual observer. For instance, the curve given in figure 1 in the consultation paper shows a price that initially increases to €174 by 2025 and then falls to €99 by 2030. It is not clear why the price increases and then falls as it would be expected that the optimisation approach would select the lowest cost options first. There is limited information provided in the consultation paper on the model inputs and assumptions. **It is recommended that the key inputs and assumptions used by DPER are published** as this will provide increased transparency and confidence in the model and allow parties a better understanding of the model and able to contribute further at periodic reviews.

Also, **consistent with using the model to value emissions from both the ETS and non-ETS sectors, the model should include abatement measures from both sectors.**

Impact Assessment

The TIMES model is used to calculate the GHG value to 2030 thereafter the value is increased annually by 5% with limited justification provided for using 5%. We understand the model uncertainty increases the further into the future one goes. Many of the investments undertaken by Ervia have long asset lives and this assumption may have a significant impact on these projects. **Given the uncertainty Ervia recommends that the impact of implementing the proposed shadow price of carbon in the Public Spending Code is fully assessed nationally before making a final decision to implement it.**

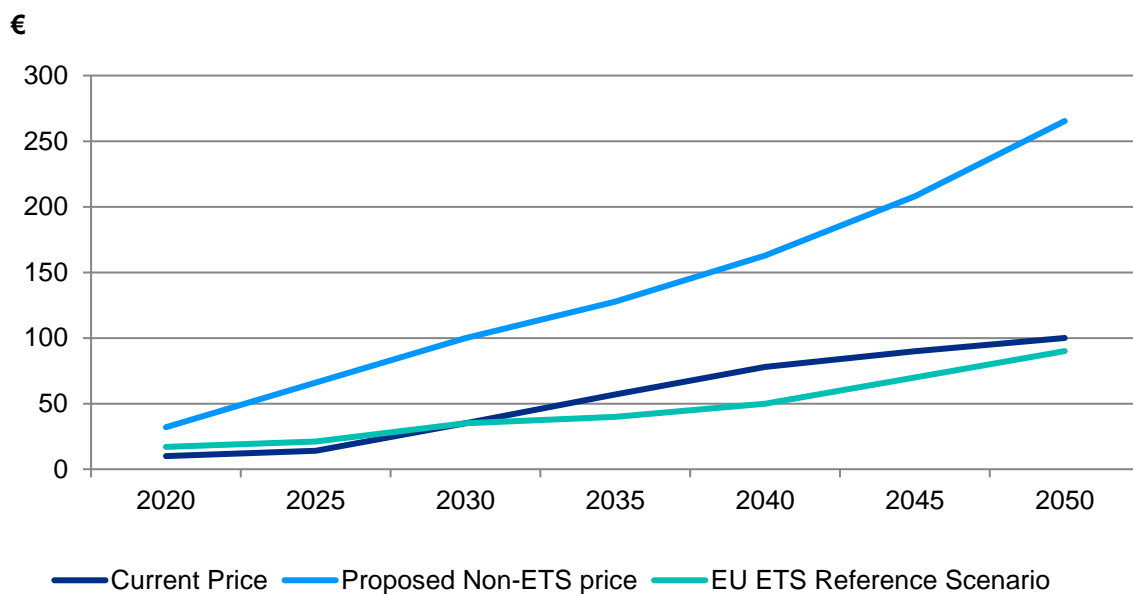


Figure A Options for valuing GHG emissions

Year	Current Price	Proposed Non-ETS price	EU Reference Scenario 2016 ETS Forecast
2020	10	32	17
2025	14	66	21
2030	35	100	35
2035	57	128	40
2040	78	163	50
2045	90	208	70
2050	100	265	90

Table A Options for valuing GHG emissions

Response to Consultation Questions

1. **Is applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions the best way of capturing the climate consequences of these investments?**

Yes. Placing a value on an externality is normal practice when assessing the costs and benefits of public policy or investment decisions. Greenhouse gas emissions fit the classic definition of an externality – a consequence of an activity that affects other parties but is not reflected in market prices.

While the public spending code applies only to public bodies many private firms also use it as a guide to forecast the value of carbon. Therefore it is important for public bodies and private firms to have a transparent, stable and predictable approach to valuing greenhouse gas emissions.

2. **Of the models available, is linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets the most appropriate means of pricing carbon in project appraisal?**

There is significant uncertainty on what is the optimum methodology to determine the shadow price of carbon; each of the models has advantages and limitations.

- The social cost is the price that a rational person would be willing to pay today to avoid the costs of climate related damage in the future. This approach has the attraction of being directly related to the damage caused by greenhouse gas emissions; however there is significant uncertainty associated with the complex models used to simulate climate change and the consequential damages. Also the price derived from these models is determined by the assumed stabilisation level of greenhouse gas emissions. The lower the assumed stabilisation level the lower the social cost, i.e. the climate related damage will be less. However conversely the lower the stabilisation levels the more abatement measures are needed and this will increase the abatement cost.
- Poling experts may produce a robust estimate, but in effect it internalises all the assumptions and uncertainty with the social cost models in the minds of the experts. This approach may also produce wide ranges of estimates necessitating the calculation of an average which undermines the transparency of this approach.
- The ETS price of emissions is the only one derived from a market. The price should reflect the availability of carbon permits which is affected by the reducing amount of permits allocated, energy demand elasticity and the production of electricity from low carbon sources. However, the market has been affected by the subsidisation of low carbon electricity (wind, solar, etc) and the recent recession have reduced the demand for permits so it may not reflect the true cost of avoiding emissions. As the subsidies are withdrawn and economic activity returns to normal the ETS price may begin to reflect the true price of avoiding emissions.
- The marginal abatement cost approach relies on a study of measures needed to achieve the abatement targets, in this case the 2030 non-ETS targets, with the lowest cost measures implemented first, leading to a cost of abatement increasing incrementally as more expensive measures are implemented over time. This has the attraction of placing a value on

carbon emissions equal to the cost of achieving Ireland’s near term reduction target. However opinions on the costs and technology options modelled to achieve targets will change and currently there is no consensus on the measures needed to achieve Ireland’s longer term targets of 80% to 95% reductions.

On balance using the cost of abatement to quantify the shadow carbon price seems a reasonable approach for the near term, however, beyond 2030 abatement costs become more speculative.

3. Is the projected abatement cost for greenhouse gas emissions across the energy sector likely to represent an appropriate proxy for the cost of economy-wide emissions reductions?

Much of the current focus on reducing emissions is in the electricity, heating and transport sectors with specific renewable energy targets in each. In the longer term options for decarbonisation from all sectors of the economy will have to be considered when modelling abatement costs. The agricultural and land use sectors have important contributions to make, likely through bio-energy and afforestation.

4. Is the continuation of the current methodology for estimating the direct greenhouse gas emissions attributable to a project and the subsequent conversion of these emissions to carbon equivalent values appropriate?

Yes.

5. Should cost benefit analyses also be required to quantify the impact that non-greenhouse gas emissions may have upon air quality and are the values suggested for these gases appropriate?

Yes. Many non-greenhouse gas emissions have adverse impacts on human health and the local environment. Where practical this should be reflected in CBAs of public policy and investment decisions.

6. Are there any other considerations that are omitted from this paper which should have been considered by the Department regarding valuing greenhouse gas emissions in the Public Spending Code?

A number of further actions should be considered:

- An impact assessment should be carried to better understand the consequence of these proposals.
- A detailed note detailing the key inputs and assumptions used in the model to derive the abatement costs.

ervia



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14 December, 2018

Valuing Greenhouse Gas Emissions in the Public Spending Code

Friends of the Irish Environment is pleased to comment on the document for consultation 'Valuing Greenhouse Gas Emissions in the Public Spending Code'. We welcome the initiative of the Dept. of Public Expenditure and Reform in implementing the agreed National Mitigation Plan (NMP) measure to review the existing public spending code and broadly support its recommendations. We look forward to participating in the proposed workshop on the PSC over the coming months.

However, to put our responses to the questions in context, we would refer the Dept. to both the [recommendations](#) of the Citizens' Assembly 2017, and the most recent [IPCC report](#) into the impacts of 1.5 degrees of global warming, along with the Climate Action and Low Carbon Development Act of 2015. These reports are we believe the basis upon which national policies should be determined, alongside existing EU environmental, climate and energy law relating to both strategic environmental assessment and mitigation targets.

The Citizens' Assembly made a number of recommendations of particular relevance to the Department of Finance and DPER:

- Recommendation 3: 80% willing to pay higher taxes on carbon intensive activities;
- Recommendation 7: 97% recommend that the State should end all subsidies for peat extraction;
- Recommendation 9: 96% recommended that Government take immediate steps to support the transition to EV's;
- Recommendation 10: 92% recommend that the State should prioritise the expansion of public transport over new road infrastructure spending at a ratio of no less than 2-to-1;
- Recommendation 11: 89% recommended that there should be a GHG emissions tax on agriculture, as well as rewarding farmers for carbon storage and re-investing any resulting revenue to support climate friendly agricultural practices.

These recommendations are important because they provide evidence for strong public support for climate action, including carbon pricing measures across a range of sectors. Public support for carbon pricing is essential if we are to design carbon pricing measures that are equitable as well as efficient and effective. Academic research has shown that deliberative approaches to controversial

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policy issues can often yield shifts of position and high degrees of agreement, where none was thought possible. This should be borne in mind by all Departments in designing and evaluating policy responses in respect of climate change.

The danger of relying on the Public Spending Code (PSC) to deliver policy changes in the background is that project and programme appraisal is not something which captures public interest. Nor is the methodology easily understood or usable by members of the public. So while the document's recommendations for shadow carbon pricing are broadly ones we support, it is important to emphasise that the PSC is no substitute for strong and effective climate policy, and that explicit carbon pricing increases need to be introduced urgently if Ireland is to meet its 2030 climate and energy targets under the EU Effort Sharing Decision.

Abatement cost values

The document adopts a proxy for abatement costs, based on the values compiled for use in the now discredited NMP.

“Since there is as yet no confirmed national model which can provide these values for the economy as a whole, the abatement cost values compiled for use in the National Mitigation Plan, which estimate abatement costs for measures in the energy sector sufficient to reach climate targets, will be used as a proxy for abatement costs for the economy as a whole.”

We appreciate that there are different approaches to setting a shadow price, based on contingent valuation, revealed preferences, expert elicitation, estimates based on the Social Cost of Carbon (SCC) in addition to specific modelled abatement costs. There is no single way to derive an *objective* answer for which approach to use – each has advantages and disadvantages, and all approaches benefit from some form of expert judgment which is necessarily a subjective exercise.

However, what would be useful is an estimation of the different shadow prices that would follow from the use of the different approaches. It is possible for example that some forms of appraisal would be more suited to certain kinds of projects, especially infrastructural ones, than others. We note that the estimated abatement cost for 1 tCO₂e can properly represent, or be rendered equivalent to, measures of lost environmental and social welfare that are irreversible or life-threatening. Not everything that has value is commensurable, never mind fungible (see Lohmann, 2005; Lohmann, 2008; Lohmann, 2009; Spash, 2007; Spash, 2006; Spash, 2010; Spash and Aslaksen, 2015). Some forms of appraisal are better at capturing risk (of damage, and stranded assets) than others, and in addition, the use of any discount rate above zero necessarily pushes decarbonisation further into the future.

The document recognises that “modelled abatement costs are inherently uncertain and reflect a snapshot in time of technology costs which, as the recent falls in renewable energy technology costs have demonstrated, can be subject to rapid change.” For this reason, the code recommends linear increases of 5% after 2030. However the climate may be changing in a non-linear fashion. We consider this approach to be unnecessarily conservative. If decarbonisation needs to be undertaken at year on year rates of between 5-15% per annum, we consider that the shadow price of carbon should reflect what is necessary to be achieved, and should reflect the financial and environmental risks of overshooting the 2030 targets for Ireland and associated carbon budgets.

Questions

1) Is applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions the best way of capturing the climate consequences of these investments?

Not on its own. The shadow price is only applicable where there is a proper estimation of greenhouse gas emissions arising from a particular project. In our experience of tracking the Strategic Environmental Assessment process for many individual projects and programmes, in addition to the National Planning Framework and the National Development Plan, these assessments are highly inaccurate and vague. Without an estimate of the quantity of emissions arising from a project, the shadow price applied to it will make little difference, especially when it is applied in a Cost Benefit Analysis which puts undue emphasis on variables such as ‘time travelling’. These CBAs are designed in such a way as to skew investment in favour of road-based transport and even a high shadow price may not highlight the long-term environmental and social impact of road investments (for example, the effect on settlement patterns, spatial planning and health).

2) Of the models available, is linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets the most appropriate means of pricing carbon in project appraisal?

We consider that it is unrealistic to expect a single MAC to reflect what is both feasible and environmentally necessary across a range of sectors, from agriculture to energy and buildings. We think the DPER should consider tailored approaches to different sectors that reflect both the real policy changes required to improve environmental quality and achieve targets. For instance, getting people out of cars and into cycling has a number of co-benefits to both individuals and society that will not be reflected in the shadow price, which will only reflect abatement costs of GHGs. In some sectors no substitutes exist, and alternative, new policies will be required.

In addition, the principle of using offsets as a way of meeting targets is ethically problematic. Offsetting is essentially a way of avoiding taking responsibility, paying for ‘indulgences’ to pollute. Climate policy has failed in Ireland precisely because the key sectors responsible for emissions increases – agriculture and transport – have been insulated from the social costs of emissions.

3) Is the projected abatement cost for greenhouse gas emissions across the energy sector likely to represent an appropriate proxy for the cost of economy-wide emissions reductions?

We think it is a mistake to think that all abatement costs can be commensurate with energy costs. While it is important to have an economy-wide sense of what mitigation will cost, different sectors have different policy challenges – and opportunities – that will not be reflected in one shadow price. For instance, if the agricultural sector does not respond to the urgency of the Irish greenhouse gas emissions trajectory and continues to pursue BAU policies of ‘sustainable intensification’, the costs of abatement will surely go up for other sectors that have to meet higher targets instead. Meanwhile we miss out on the opportunity to reform Irish agriculture and land-use policies in ways that would harness the potential for local rural development, afforestation and sequestration, wetland restoration and a shift to sustainable diets and local food production.

4) Is the continuation of the current methodology for estimating the direct greenhouse gas emissions attributable to a project and the subsequent conversion of these emissions to carbon equivalent values appropriate?

The revised PSC should reflect the best and most recent science, which now estimates a different GWP for CH₄ than previously. It is vital that the DPER does not respond to lobbying from the agri-food industry which is seeking to have a different approach applied to methane than other GHGs.

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However the estimation of direct GHGs attributable to project is completely inadequate. FIE believes that there was no adequate environmental assessment of the likely significant effects of implementing the National Planning Framework.

For instance, various alternatives are identified at Chapter 7 of the Environmental Report in which 5 alternatives are identified. These are each briefly described, and each alternative is given either a 0/-/+ or in many cases a combination of these. These are intended to indicate potential neutral, negative and positive effects of the alternatives. There is no explanation of how these assessments were made or how or for what reason these values were assigned or the qualitative or quantitative basis for their inclusion. There is no indication as to whether or not, or to what degree, the targets (identified in Chapter 6 for each environmental issue) are expected to be achieved by each alternative under consideration (singly or in combination). These targets are not referred to in the alternatives or assessment sections and only reappear when monitoring is being discussed. In those circumstances there is no adequate description or evaluation of the likely significant environmental effects of each of the alternatives identified in the Environmental Report.

Our experience of this process has revealed that only the vaguest information is included as “discussion” in relation to what likely significant environmental effects are anticipated, and information about the estimated quantities of additional GHGs is not actually available. Many of the targets set out in the NDP and NPF (such as most of the climate targets set out below) are quantifiable, with numerous national and international emissions inventories available, and therefore well suited for robust analysis. But in the absence of such analysis, a shadow price makes no difference to the quality of the appraisal process.

For example, SEA best-practice guidance produced by both the Environmental Protection Agency and the European Commission on integrating climate change into decision making on plans and programmes highlight the imperative of describing the emissions baseline and relevant projections; identifying other relevant plans and programmes that have climate change impacts or that could affect the options being considered; and to develop climate change objectives and indicators for mitigation and adaptation (and, where relevant, links between them) taking into account the uncertainty of future climate change. However, in the case of the NPF SEA not only are the targets not referred to, the analysis has no benchmark or quantitative basis. In those circumstances there is no or no adequate description or evaluation of the likely significant environmental effects of the National Planning Framework.

5) Should cost benefit analyses also be required to quantify the impact that non-greenhouse gas emissions may have upon air quality and are the values suggested for these gases appropriate?

Yes. In addition to other non-quantifiable social costs such as community severance, lack of play areas for children, and such. We recommend that a specific study be carried out to get an appropriate methodology to replace CBA for transport projects in particular.

6) Are there any other considerations that are omitted from this paper which should have been considered by the Department regarding valuing greenhouse gas emissions in the Public Spending Code?

Below we have a number of comments in relation to the transport expenditure proposed under the NDP, in order to highlight the policy deficit that will still remain even with a revised PSC:

The NDP was adopted by government before any climate impact assessment was carried out. That assessment has still not been carried out. So it is not acceptable for the government to say that its investments under the NDP are consistent with the National Mitigation Plan. Money is pouring into road-based solutions and this only adds to our problems of congestion and unsustainable car

dependency. Most areas in Land Transport receive negligible capital investment. The two which stand out in 2018 are Road Improvement/Maintenance at €815M (or 65% of the total) and Public & Sustainable Transport Investment Programme at €398 (or 32.1% of the total). This clearly demonstrates the disparity between the capital allocation for roads as opposed to all other modes of transport including cycling.

According to a study carried out by a [Maynooth-based](#) cycling campaign, the level of expenditure on cycling equates to 1.37% and 2.22% for 2018-2021 - a long way from what is required to significantly impact on health, congestion, sustainability and climate change. Even doubling this expenditure would be a relatively insignificant burden on the exchequer. The money needs to follow the policy and the project appraisal. But in transport particularly, that is just not happening.

Urban and rural areas are crying out for public transport, better cycling and walking infrastructure. Yet in most countries the rural transport programmes under Leader do not even have bus stops or publicly advertised timetables!

The Minister for Finance has been keen to highlight the fact that 1 in every €5 under the NDP will be spent on climate action. But the real question is what impact the other €4 will have, and how much of the total expenditure will be borne by the Exchequer as opposed to the private sector.

The IIEA recently conducted a study of the NDP planned investments and found that over 60% of the climate action expenditure would come from non-exchequer sources. So it is not clear what the State is actually committing to climate mitigation in terms of actual non-roads expenditure, or what the resulting emissions will be. A shadow price is a good start to correcting policy deficits but it is not going to be enough on its own to reverse decades of poor planning and insufficient resourcing of public transport infrastructure.

Sadhbh O'Neill

Friends of the Irish Environment

14 December, 2018

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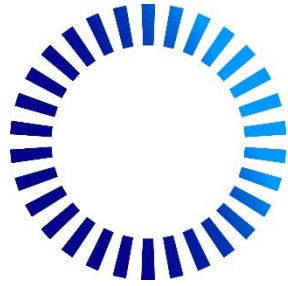
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**Gas
Networks
Ireland**

**Department of Public Expenditure and
Reform**

**Valuing Greenhouse Gas Emissions in
the Public Spending Code**

Gas Networks Ireland Response

14th December 2018

Background

Gas Networks Ireland (GNI) is a fully owned subsidiary of Ervia (formally known as Bord Gáis Éireann). It owns, operates, builds and maintains the gas network in Ireland and ensures the safe and reliable delivery of gas to its customers. The network consists of over 11,000 km of distribution pipelines and almost 2,500 km of transmission pipeline. It supplies energy to 14 power stations, more than 23,000 multi-nationals and businesses and over 654,000 homes. GNI believes that the gas network is integral to Ireland's energy system and to delivering a low carbon economy.

GNI is leading a project called the Causeway Study which will deliver a pilot network of CNG refuelling stations on the core road network in Ireland. An important element of this project is the installation of renewable gas injection facility which will deliver renewable gas to the gas network. This project is part funded by the European CEF¹ Transport Fund and will help to decarbonise Ireland's transport sector with a strong focus on HGV. GNI has recently been approved for additional EU funding of €11.6m from the CEF Transport Fund for a project called Green Connect. The Green Connect project will deliver an additional 21 CNG refuelling stations, 4 renewable gas injection facilities, 4 CNG mobile refuelling units and a CNG vehicle grant scheme to give some support to circa 400 CNG vehicles. GNI is also working on a project called GRAZE Gas which is focused on building the first transmission connected Central Grid Injection (CGI) facility and a renewable gas logistics operation to facilitate delivery of renewable gas to the CGI facility. This project has been shortlisted for funding of €8.5m from the Climate Action Fund being administered by DCCAIE.

Introduction

GNI welcomes the opportunity to respond to the consultation on Valuing Greenhouse Gas Emissions in the Public Spending Code issued by the Department of Public Expenditure and Reform (DPER).

GNI believes that developing appropriate shadow carbon prices is an important policy objective. If done correctly, they can be a critical tool in ensuring that investment decisions are taken that help Ireland secure its carbon reduction targets, at minimum cost and with the optimum technology mix. Equally, if incorrect shadow prices are used, they have the potential to distort investment decisions, increase costs for customers, undermine the development of critical national infrastructure and, ultimately disrupt Ireland's low carbon transition.

GNI therefore fully supports a review to ensure that the correct shadow carbon prices are utilised. However, before a final decision on shadow carbon prices is taken, a stronger evidence base is needed. The remainder of this submission includes GNI's responses to the consultations questions as well as a number of concerns regarding the methodology and approach outlined in the consultation.

¹ Connecting Europe Facility (CEF) Fund is a European fund administered by the Innovation and Networks Executive Agency (INEA).

Consultation Questions and Responses

GNI has reviewed the consultation document and has the following comments:

Question 1

Is applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions the best way of capturing the climate consequences of these investments?

GNI considers that applying a shadow price of carbon to estimated greenhouse gas emissions attributable to public investment decisions is a reasonable approach. However, it is important that proposals to change the levels of the shadow carbon prices are subject to an appropriate assessment of likely impacts that provides a thorough assessment of the risks of unintended consequences arising, and mitigation measures. This assessment should consider potential ways in which changes to shadow prices might distort investment decisions in infrastructure because this investment may itself be an important enabler of future carbon reduction activity, and thus can affect the scope for different potential carbon reduction trajectories to develop.

Question 2

Of the models available, is linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets the most appropriate means of pricing carbon in project appraisal?

The marginal abatement cost (MAC) approach to setting a shadow price of carbon is a reasonable approach to adopt in principle. However, that does not imply that it will be reasonable to set the shadow price for project appraisal equal to any particular measure of MAC in practice. The assessment of what shadow prices to set should, in addition to the evaluation of evidence on MAC levels, include careful consideration of the likely impacts of introducing new shadow price levels, including the risks of unintended consequences arising. Proposals to introduce higher shadow prices should include careful consideration of the project appraisal contexts within which they will be introduced. For gas networks, those investment decisions can have a major bearing on the trajectories that future carbon reduction actions might take, and it is important to consider the extent to which changes to the carbon price might risk distorting decision making in that 'systems' context. The potential for distortions to arise as a result of large differences between the treatment of carbon emissions from ETS and non-ETS sectors merits careful attention.

Question 3

Is the projected abatement cost for greenhouse gas emissions across the energy sector likely to represent an appropriate proxy for the cost of economy-wide emissions reductions?

There are inevitable difficulties and considerable approximations involved in arriving at a broad estimate of the cost of emissions reduction. Given this, it is particularly important that the purpose of setting the shadow price of carbon is kept firmly in view when proposals are being developed and assessed. That purpose is to seek to ensure that public investment decisions assist in the achievement of challenging emissions reduction targets in efficient and effective ways. A key part of assessing proposals to change the shadow prices for carbon should be to assess the extent to which the proposed changes are likely to assist with the achievement of the intended purpose, and where there may be significant risks of unwanted adverse effects. Adverse effects can be particularly pronounced

when large changes are introduced without adequate consideration being given to transition arrangements.

Question 4

Is the continuation of the current methodology for estimating the direct greenhouse gas emissions attributable to a project and the subsequent conversion of these emissions to carbon equivalent values appropriate?

GNI believes that particular consideration should be given to the following two areas:

- Where non-ETS emissions can be substituted for ETS emissions (for example, where switching to an electric vehicle involves a switch from petrol/diesel engine use to the use of electricity supplied from power stations), the use of a very different carbon price for ETS and non-ETS emissions can distort relevant investment decisions, including the relative assessment of electricity and non-electricity based options. The current guidance on incorporating carbon emissions into capital project appraisals² also appears to raise the prospect that electricity network investments which would be expected to result in increased use of electric vehicles may be assessed as generating a carbon saving (from the switch away from a conventional vehicle) but with no account taken of the associated carbon cost, because that would sit within the ETS. The way in which ETS emissions are accounted for in public investment decisions – and the potential distortions this may give rise to – merits further attention.
- For network investment decisions it is important that ‘whole system’ effects are taken into account in terms of carbon emissions. A particular issue here concerns the way in which the need for back-up and/or storage capacity are taken into account in project appraisal, as the extent (and carbon implications) of that need can vary significantly across different technology options. Given that, if broader carbon implications are ignored, relative assessments of different options may be distorted.

Question 5

Should cost benefit analyses also be required to quantify the impact that non-greenhouse gas emissions may have upon air quality and are the values suggested for these gases appropriate?

Many non-greenhouse gas emissions have adverse impacts on human health and the local environment. Air quality is particularly important and particulate matter emissions can have a negative impact on air quality. GNI believes that in some cases non-greenhouse gas emissions should be reflected in the CBAs of public policy and investment decisions but that this does not necessary need to be a mandatory requirement.

² An excerpt of the current guidance on incorporating carbon emissions into capital project appraisals is provided in Annex I of this response.

Question 6

Are there any other considerations that are omitted from this paper which should have been considered by the Department regarding valuing greenhouse gas emissions in the Public Spending Code?

It is important that there is a practical assessment of the impacts of substantially increasing shadow prices, including in the short term, and an assessment of the risks of adverse unintended consequences arising from any changes. Further explanation is given in Annex I of this response.

Conclusion

The role that gas networks play in carbon reduction efforts is typically one of actual or potential enabler. That is, network investments can provide an input into other carbon reduction actions and opportunities. This can make network investments difficult to evaluate, because the case for those investments can be heavily affected by assumptions with respect to what other carbon reduction actions are likely to follow. For example, the impact on carbon emissions of converting customers from oil to gas, will ultimately depend on the successful deployment of renewable gas or hydrogen solutions. However, the economic case for developing renewable gas or hydrogen in turn depends on the number of customers connected to the gas network.

This means that the effects of distortions to network investment decisions can be magnified, because those distortions may undermine carbon reduction trajectories that would have been socially desirable. This is important because it means that the consequences of adverse effects that arise may be long-lasting and highly material. GNI considers it important that proposed changes to the shadow carbon prices are carefully assessed in terms of potential effects on carbon reduction trajectories, recognising the importance of gas and other network infrastructure provision decisions to the availability and likely attractiveness of different trajectories.

GNI would welcome the opportunity to discuss this consultation response in more detail. GNI would also like to express an interest in attending the workshop mentioned in the consultation paper (to review the responses received and hear the Department's reaction to the responses).

Annex I: Further Comments

The consultation provides a review of the different methodologies that might be applied when determining the shadow price of carbon to be used in the Public Spending Code. However, the recommendations of the paper go well beyond the consideration of methodologies. There are specific proposals for changing the shadow price of carbon in the Public Spending Code through to 2050, including a proposed substantial increase in the shadow price of carbon for 2020 (to €32 per tonne), with the price then rising by €6.80 per year to reach €100 per tonne in 2030.

If implemented, these would be highly material changes that could have some major and relatively immediate implications for public infrastructure development decisions. The paper does not provide an assessment of what these impacts might be. Instead, it takes a relatively theoretical approach, identifying the Marginal Abatement Cost (MAC) method as the preferred approach, and then using some available MAC-type figures to arrive at shadow price levels.

Adopting this type of approach is not unreasonable as a starting point. However, given the potentially significant impact on important investment decisions GNI believes that the analysis should be supported by a careful assessment of the likely impacts of adopting such an approach, with this then informing subsequent development and refinement. Such an assessment is an essential pre-requisite to any proposal to implement a revision to the Public Spending Code.

The current lack of consideration given to the assessment of impacts is a serious concern and could give rise to unintended consequences. The risks of adverse unintended consequences arising in relation to gas network infrastructure development look to be highly material. In particular:

- The proposed changes to the shadow price of carbon are substantial, and under the proposal would come into force in the short-term.
- There could be significant implications for existing budgets and for affordability.
- The scale of the proposed increase may risk undermining the treatment of other factors that are innately difficult to value.
- There appears to be material risks from boundary-related distortions, as a separate and very different price would be used for ETS and non-ETS emissions.
- Distortions to the development of the gas network can have a major bearing on potential carbon reduction trajectories, as gas network assets can be a key input for other carbon reduction activity.

GNI therefore strongly supports further analysis before any recommendation is reached regarding a revision of the public spending code. Further explanation on some of these points is included below.

1. The scale of the proposed increase in the shadow carbon price

Figure 1 below compares the current recommended shadow price levels with the levels proposed in the consultation paper. The proposed shadow price for 2020 would be three times higher than the current recommended level, and the 2025 shadow price almost five times higher. While updating the current levels to reflect the most recent (2016) EU reference scenario would dampen this effect to some extent for some years, the scale of the increases proposed in the consultation would nevertheless be substantial. Since it is proposed that these changes be introduced in early 2019, they could have a major bearing on investment decisions with near immediate effect.

Figure 1 Proposed changes to the shadow price of carbon (€/tCO₂)

	Current recommended levels	Proposed levels
2020	10	32
2025	14	66
2030	35	100
2035	57	128
2040	78	163
2045	90	208
2050	100	265

Source: <Department of Public Expenditure and Reform: Consultation paper - Valuing Greenhouse Gas Emissions in the Public Spending Code (Table 2 and p2)>

Note: <The current recommended levels (which use EU Reference Scenario projections) are in 2010 prices. The price base for the proposed levels is not specified. >

The magnitude of the proposed changes, and extent of the potential consequences for public investment decisions, have clear implications for the form and extent of assessment that should be considered necessary (on grounds of proportionality) ahead of any decision to implement. The consultation considers the issues associated with setting shadow carbon prices only in very high level terms, and doesn't really evaluate the potential impacts of the change other than (to some extent) in terms of the achievement of long-term carbon reduction targets. Consideration needs to be given to the potential for unintended consequences to arise.

The importance of carefully considering impacts, and risks of unintended consequences, is further amplified when the basis upon which the proposed shadow prices have been set is considered. The underlying Marginal Abatement Cost (MAC) estimates were drawn from research that examined scenarios generated by the Irish TIMES energy systems model. We understand that this involved using a model that includes ETS and non-ETS emissions over time, and then trying to infer the appropriate MAC for non-ETS emissions only. However, this type of approach raises a range of potential methodological issues that the paper simply does not engage with. One important factor here is the profile of assumed emissions reductions, as MAC figures can be heavily affected by when particular reductions as assumed to be required. The fact that a MAC figure of €174 is estimated for 2025 only for the estimate to fall to €99 in 2030 highlights the extent to which the analysis is capable of generating non-credible results.

The consultation paper recognises this to some extent when it notes that using the implied MAC figures would result in an 'uneven and sharply increasing' shadow price of carbon over time and that this would not be appropriate. However, the proposal seeks to address this simply through smoothing. While smoothing can help to address the concern that particular values are unrepresentative, it does not provide a basis for testing the appropriateness or likely impacts of the shift that is being proposed. That is, the MAC estimates presented in the paper – in line with a range of other international data (some of which is noted in Section 11 of the paper) – are supportive of the view that a much higher shadow price of carbon would be appropriate in future years. But it does not provide an adequate basis for assessing what an appropriate shadow price profile should be in transition to a much higher price. Given the potential effects that this profile could have for public investment decisions, which themselves can have a major bearing on future carbon reduction options, we consider this to be a major omission.

2. Implications for existing budgets and affordability

The scale of the proposed increase in the shadow price of carbon poses a risk to the achievement of other policy objectives. The importance of considering expenditure levels and affordability stems from the fact that the proposed increases in the shadow price of carbon are intended to materially change behaviour in terms of public investment decisions. This raises the question of what the financial implications of such changes in behaviour might be, and whether that might create unwanted adverse effects.

The use of much higher carbon prices could potentially result in more costly investments being selected than would otherwise have been the case, at least in the short/medium-term (cost may be lower in later years as a result of earlier development/adoption). This could have very real budgetary and affordability consequences which could themselves have knock-on effects for the scope for carbon reducing investments.

As legally binding emissions targets are already in place, it could be argued that there is effectively a commitment to fund their achievement over time. However, the (direct and indirect) costs of meeting those targets are likely to be heavily affected by the policy approaches that are adopted, and budgetary and affordability impacts will continue to require careful consideration.

This is particularly so given the timeline presented in this proposal. Implementing it would involve a requirement to use substantially higher shadow carbon prices for public investment decisions being introduced in only a few months' time (early 2019). GNI considers it important that the potential implications this may have for existing budgetary forecasts – including in terms of potential knock-on effects (e.g. for customer prices), are carefully assessed ahead of a decision being taken on what changes are appropriate.

3. Implications for factors that are innately difficult to value

The assessment of gas network investments decisions involves evaluating which projects are likely to be most appropriate from a 'whole system' perspective. That is, the identification and quantification of benefits and costs typically includes consideration of different scenarios over how network usage might evolve in the future. This poses a number of challenges. It is exacerbated by the fact that some factors – such as aspects of security of supply - are also innately difficult to value, and hence subject to measurement error.

The impact of the proposed substantial increase in shadow carbon prices on gas network investment decisions would depend on how it affects the appraisal of projects in this context. There look to be a number of risks that merit careful consideration. For example:

- Much higher shadow prices for carbon may undermine the case for proceeding with investments that would otherwise provide a positive contribution to security of supply.
- The case for projects that deliver 'smaller' carbon reducing steps (such as network provision that enables a switch from oil to gas) may be diminished relative to those delivering 'larger' steps (such as the development of Carbon Capture Storage).

In both of these cases, it might be argued that the effect should be unproblematic, and indeed may be considered a desirable and intended effect of the higher shadow prices. However, the risks arise here because the appropriateness of the outcomes of using a much higher carbon price depend on other relevant factors in the project appraisal process also being sufficiently well captured. For example if security of supply benefits are under-estimated, it could result in projects that have a net benefit not proceeding. When considering the case for a substantial change in approach with respect

to one factor (the shadow price of carbon), the potential for material imbalances to arise in the assessment process merits careful consideration.

This would not be expected to raise insurmountable issues over time: attention could be given to developing other parts of the assessment process so as to try to avoid any undue diminution in the weight put on other factors that might otherwise result. But such changes are often not straightforward and will take time to develop, particularly when – precisely because of the growing shift to lower carbon technologies – the assessment context is very much a moving target. This strongly points to the importance of introducing material changes of the kind proposed in this consultation in a staged manner that allows for project appraisal approaches to incorporate the changes in a coherent and balanced manner.

4. Boundary issues: ETS vs non-ETS emissions

The current arrangements involve setting the shadow carbon price for non-ETS emissions on the basis of ETS-based prices and forecasts. The consultation paper highlights a number of reasons why it considers ETS prices not to provide an appropriate basis upon which to set the carbon price for the non-ETS sector. However, the proposed approach involves carbon in non-ETS emissions being valued very differently to carbon in ETS emissions.

From an economic perspective, having different carbon prices can be problematic. Clearly a tonne of carbon in a given year is the same, regardless of which sector it comes from, so it doesn't make economic sense to have such significant divergence in shadow price between sectors. In theory, it could be argued that in the short-term divergence is reasonable, as it takes time to change the policy that would allow the marginal abatement cost (MAC) across sectors to be aligned. However, the idea that this divergence would continue to 2050, does not make sense from an economic perspective.

Secondly, the consultation gives no consideration to the potential consequences that may arise from the use of very different carbon prices across sectors. It may be that this lack of consideration follows from the observation (on p32 of the paper) that the existence of a fixed cap and trade system within the ETS essentially means that emissions in the two different sectors – ETS and non-ETS – are different commodities. But this observation does not remove the potential for distortions to arise if there are material differences in the value of carbon between those sectors.

This can be illustrated by considering the case for Compressed Natural Gas (CNG) facilities for transport against electric vehicle (EV) charging facilities. In both cases, a carbon saving could be made as result of switching away from conventional vehicles, and under the approach proposed in the consultation this expected saving would be valued at the new, higher shadow carbon price.

For CNG vehicles, the carbon cost of emissions (which replace those of the conventional vehicles) would also be valued at this higher carbon price. But that would not be the case for EVs, because the emissions would effectively have been transferred from the non-ETS sector to the ETS sector. Instead, the expected carbon costs of the new EVs would – under the approach proposed in the consultation paper – be valued at the (currently quite a lot lower) ETS price. In the Department of Finance Guidance Note on Incorporating CO₂ Emissions into Capital Project Appraisals (2009), it might be viewed that no carbon costs for EVs would be taken into account in this scenario:

'Direct emissions from a transport project/programme include the marginal increase/decrease in emissions in the jurisdiction from fuel and other energy associated with the increased/decreased usage of vehicles and any increase/decrease caused by the provision of the new/improved transport infrastructure. It includes emissions from both stationary and mobile sources. It will also include CO₂e

emissions generated from the materials used in the construction process bearing in mind not to double count emissions. In order to avoid double counting of emissions, CO2 emissions from inputs/materials purchased from organisations/installations/facilities in the EU ETS should not be included in the quantification of emissions for a project scenario’.

The example above highlights one context where this kind of distortion might arise, but the wider issues stem from the importance of evaluating options on the basis of ‘whole system’ effects. The broader point here is that care is needed to ensure that efforts to increase the account that is taken of carbon emissions do not have the effect of distorting energy network development decisions in ways that may be ultimately more costly both in terms of financial requirements and carbon emissions. As noted above, the consultation paper provides no recognition or assessment of the potential materiality of this issue.

Response on behalf of the Green Party / Comhaontas Glas
to the
Consultation Paper
on
Valuing Greenhouse Gas Emissions in the Public Spending Code.

14th December 2018

To: climate.change@per.gov.ie

Introduction

We very much welcome the fact that the Irish Government Economic and Evaluation Service / Department of Public Expenditure and Reform propose to improve the handling of greenhouse gas emissions in the evaluation of public spending.

In recent years we have seen many public spending decisions being taken at both programme and project level which are leading to lock in to high carbon emissions pathways. Such pathways are not consistent with avoiding dangerous anthropogenic interference in the climate system, the ultimate objective of the UNFCCC. Clearly therefore the current evaluation approach is leading to the wrong results and the proposal to review it is vital.

Valuation of emissions in the service of transition

The Introduction to the paper refers to Ireland's international law commitments, including our signing of the Paris Agreement and participation in the EU's Nationally Determined Contribution, as well as the targets set at an EU level. It refers to the National Policy Position but doesn't address the Climate Action and Low Carbon Development Act, 2015. The national legislation is a vital part of the context for considering greenhouse gas valuation in a number of respects:

- The 2015 Act requires all public bodies, including DPER, to have regard to the national transition objective in the exercise of their functions.
- The numerical targets set in the National Policy Position are not consistent with the Paris Agreement, in particular the 1.5°C target. Therefore, given the wording of the 2015 Climate Act, they are not consistent with that Act either.

In line with climate science and international, EU and Irish law, we approach the issues in the consultation paper from the point of view of climate science rather than economic theory. We see the various economic theoretical approaches discussed in the paper as tools to be evaluated for their usefulness in dealing with the

unprecedented threat that climate change poses to humanity and the natural environment.

A number of important and successful public policies are already in place to abate greenhouse gas emissions at marginal costs well above the valuations proposed in the paper. This is because of a recognition that the overall public goal is the transition to a low carbon economy.

While in previous decades climate policy in Ireland was based on analysis relying on the various approaches to pricing, and selecting policies and measures based on marginal abatement curves, current policy, as set in the Climate Action and Low Carbon Development Act, is to achieve a transition to a low carbon, climate resilient and environmentally sustainable economy. Therefore, the valuation of greenhouse gas emissions in the Public Spending Code should be designed to achieve that transition and to reach the 1.5°C target in the Paris Agreement.

Some elements considered in the document are consistent with such a climate policy based approach, e.g. the option of a carbon price based on marginal abatement costs consistent with reaching a target. However, options which could lead to exceedences of targets are at variance with global and national climate policy.

An approach based in economic theory which aims at an “optimum” is at variance with the climate science analysis which warns of catastrophe as the result from the emissions path we are on and emphasises the need to reduce emissions as fast as possible. It is also at variance with the political response at international, EU, and national levels, which aims at rapid transition on an emergency basis and acknowledges the higher responsibilities borne by high-emitting countries like Ireland. Given the nature of the crisis, any uncertainties in the analytical framework should be resolved in favour of more ambitious transition.

Emissions within or outside the jurisdiction

The paper asks whether the current methodology for estimating the direct greenhouse gas emissions attributable to a project is appropriate. The most glaring defect in the current process isn't itself mentioned in the paper. It is that the current definition in the Public Spending Code explicitly limits consideration to “emissions in the jurisdiction”.

Given that climate change is a global problem, emissions from outside the jurisdiction have exactly the same environmental impact as emissions within the jurisdiction. It makes no sense to disregard them. Additionally, applying such analysis in decision-making would risk driving the “offshoring” of emissions, or “carbon leakage”, a perverse incentive creating an economic loss without environmental benefit.

Application to all emissions

The analytical approach chosen should be applicable not just to the challenges of decarbonising energy and transport systems, but also to the challenges of greenhouse gas mitigation in the agriculture forestry and other land use sectors and to the decarbonisation of the material economy and the wider challenges of the circular economy.

ETS

The analysis of the relationship of non-traded emissions and EU Emissions Trading Scheme (ETS) emissions risks creating unintended consequences. We recommend that all emissions are analysed at the same cost, with predicted ETS prices being balanced out where they are already in the calculations. The analytical approach should not risk driving emissions to move between the ETS and non-ETS sector simply to take advantage of different prices in the valuation.

As the paper points out, the ETS is still significantly underpricing emissions, although they have increased in recent months. This underpricing is not consistent with the EU's Nationally Determined Contribution (NDC) and even less consistent with our commitment in the Paris Agreement to aim at the 1.5°C target, which is now generally recognised will require an improvement in the NDC. Like the valuation of greenhouse gases in the Irish Public Spending Code, the ETS is an instrument of public policy and is intended to achieve the goals of the UNFCCC and the Paris Agreement. Therefore the paper should not assume that the ETS will continue to underprice.

Discounting and future impacts

We do not understand why the current pricing of future greenhouse gas emissions, when a discount is applied, should be inconsistent with the pricing of current greenhouse gas emissions. The proposal suggests that 2050 emissions are valued at €250/t, while 2020 emissions are valued at €30/t. To be consistent with the proposed approach to discounting, 2020 emissions should be valued at €80/t.

We are concerned by the ethical aspects of the discounting proposed. Given the exceedingly long time scale over which carbon dioxide will remain in the atmosphere, carbon emissions are legacy burdens to be borne by future generations. In this respect, carbon emissions are similar to nuclear energy installations. We consider that it would not be ethical to burden future generations with costs which are not matched with benefits. Furthermore, given the economic and social impacts predicted of climate change due to emissions to date, we should not assume that future generations will be in a better position to deal with these legacy costs than we are.

Health

The proposal in chapter 12 of the paper to strengthen the analysis of non-greenhouse gas pollution impacts on health is welcome. It says that “It will now be a requirement for the cost benefit analysis of those projects which may give rise to significant increases in air pollution to estimate the level of these emissions over the lifetime of the project and price them according to the values presented in the table above.”

There are two important elements which should be included in this. Firstly the analysis should be carried out both for projects which will give rise to increases in pollution and for those which will lead to reductions in pollution. Secondly the health impact should be described both in terms of the impact itself and in terms of the monetary value assigned to it.

In the case of many of the projects or policies which give rise to improvements or disimprovements in air pollution there is another set of public health impacts, which in epidemiological and public health terms is of similar or greater magnitude, the health impacts of active or inactive travel. We recommend that the same analysis be applied to the effect of projects on active travel.



IRISH
FORUM
ON
NATURAL
CAPITAL

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14th December 2018

Submission on the Valuing Greenhouse Gas Emissions in the Public Spending Code

Dear Sir/Madam,

Thank you for the opportunity to make a submission on the above consultation paper. We welcome the ambition of this paper which is most timely as:

- The World Economic Forum ranked extreme weather as the [#1 threat to the global economy](#) in 2018
- According to scientists it's the final call. The world is now completely off track, heading towards 3°C instead of 1.5°C. The [new IPCC report](#) states that going past 1.5°C is dicing with the planet's liveability
- Ireland has been ranked the worst performer for action on climate change in the Europe by the [Climate Change Performance Index for 2019](#)

Due to our limited resources, we are unfortunately not in a position to develop a more comprehensive response but we would like to highlight the synergies between the work we are doing and your consultation. Indeed, we would welcome your input to our forum as a two-way medium to inform public sector thinking on this very important topic.

Please do get in touch if you would be interested in joining our [Steering Committee](#) which already includes senior representatives from various public bodies all of which are very much involved in climate change and natural capital policy formation (see over leaf).

Yours faithfully,

Raoul Empey, BA BAI, MSc, CEng MIEI, CEM-I
[IFNC Steering Committee](#) Member / Principal at [Sustineo](#)

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Page 1 of 4

Response to your consultation paper

1. Synergies between your consultation paper and the IFNC

The Irish Forum on Natural Capital (IFNC) notes that your consultation paper has referenced “natural capital” once. You may be interested in becoming involved with our [Steering Committee](#) that includes senior representatives from the National Parks and Wildlife Service, Environmental Protection Agency, Coillte, Bord na Mona, Trinity College Dublin, University College Dublin, Business in the Community Ireland, Chartered Accountants Ireland, Department of Communications, Climate Action and Environment, Department of Agriculture, Environment and Rural Affairs (NI), Northern Ireland Environment Link, South Dublin Chamber, the CDP, Teagasc, the Local Authorities Waters and Communities Office, and independents.

The IFNC believes it is necessary to account for natural capital assets in order to maintain them, better understand the risks and opportunities inherent in their management, and ultimately, make more informed decisions about their use. A recent publication from the National Economic and Social Council ([Bullock, 2017](#)) noted the following:

“Given the challenges we face in the coming years from population growth, rising aspirations, pressures for economic development and possibly, a return to nationalism and inward-looking politics, **it will be essential that decision-makers and political leaders fully appreciate our dependence on natural capital** and the need to protect it from over-exploitation, degradation and the effects of climate change. **This will require that the relationship between accounting measures and social values be mapped out and agreed, and that natural capital accounts become an integral part of national and international reporting, planning and development.** Ultimately, our prospects of seeing out the century depend on the protection of the natural capital on which our economic growth, livelihoods and quality of life depend.”

There is always the danger of cutting off your nose to spite your face when focusing on one particular issue – carbon in this instance. On a massive scale, think for example of the policy move across EU member states to switch to diesel cars. It seemed like a good idea at the time to help meet our long-term global climate commitments and reduce CO₂ emissions. But now the focus is on the local air pollution health risk, particularly since the WHO’s cancer research agency classified diesel engine exhaust fumes as cancer-causing in 2012. Indeed, the European Environment Agency estimates that air pollution causes 467,000 premature deaths a year in Europe, and about half of these are from traffic emissions. In Ireland, four people die every day due to air pollution and yet most deaths linked to poor air quality are preventable ([Independent 2017](#) and [EEA 2013](#)).

The Natural Capital approach takes a broader look at environmental costs and benefits such that focusing on a single issue does not shift the burden onto another area.

2. About Natural Capital

Natural capital is defined as the planet's stocks of renewable and non-renewable resources (e.g. plants, animals, air, water, minerals, soils) that work together to yield a flow of benefits to people. This flow of benefits is delivered by ecosystem services, which are commonly divided into three types:

1. *Provisioning services*, which are goods obtained directly from nature, such as food, fuel and fibre;
2. *Regulating services*, which are indirect benefits from nature, such as mitigation of climate change as carbon is sequestered in vegetation, water filtration by wetlands, erosion control and protection from storm surges by vegetation and crop pollination by insects;
3. *Cultural services*, which are intangible benefits from nature, such as outdoor recreation, spiritual inspiration, mental health and education.

These three types of ecosystem service are all underpinned by *Supporting services*, which are the life-support systems on the planet, including primary production, oxygen provision, soil formation.

Throughout human history, natural capital has benefitted people in the most fundamental ways: giving us life and health, and providing the raw materials and enabling environment for social and economic development. However, in Ireland and all over the world, the modern economic system fails to account for the degradation and depletion of natural capital, with the result that we are blind to both the risks this presents and the opportunities that can come from enhancing it.

The 2020 EU Biodiversity Strategy and Ireland's National Biodiversity Action Plan call for natural capital to be valued and accounted for at the national level alongside national accounts, and work is underway to start this in Ireland through the Mapping and Assessment of Ecosystem Services project (MAES). Other countries have recognised the risks associated with the mismanagement of natural capital and have taken steps to address it. In 2016, for instance, Scotland made 'increased natural capital' a national performance indicator and incorporated it into national economic strategy.

A conservative estimate in 2008 found Ireland's natural capital to be worth at least €2.6 billion per annum, though experts suggest that the true figure is significantly higher. By valuing our natural capital, using a combination of qualitative, quantitative and monetary values, we can begin to account for nature and make its worth visible in both public and private sector decision-making.

Furthermore, we can use natural capital assessments to reveal the value of specific ecosystems to the economy and generate national or regional natural capital accounts to inform economic policy and national performance indicators, support urban and regional land use planning, develop financial mechanisms to enhance and restore ecosystem services and improve private sector sustainability.

3. About the Irish Forum on Natural Capital

The Irish Forum on Natural Capital (IFNC) is a special interest group that brings together a diverse range of organisations and individuals from academic, public, private and NGO sectors who are interested in the development and application of the natural capital agenda in Ireland.

Our vision is for an Ireland in which natural capital and ecosystem goods and services are valued, protected and restored.

Our mission is, through the collaboration and leadership of our diverse members, to help to value, protect and restore Ireland's natural capital and ecosystem services. We will do this by supporting the adoption of natural capital concepts in public policy and corporate

The IFNC has over 450 individual members and a [Steering Committee](#) that includes senior representatives from the National Parks and Wildlife Service, Environmental Protection Agency, Coillte, Bord na Mona, Trinity College Dublin, University College Dublin, Business in the Community Ireland, Chartered Accountants Ireland, Department of Communications, Climate Action and Environment, Department of Agriculture, Environment and Rural Affairs (NI), Northern Ireland Environment Link, South Dublin Chamber, the CDP, Teagasc, the Local Authorities Waters and Communities Office, and independents.



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Public Consultation on “Valuing Greenhouse Gas Emissions in the Public Spending Code”

Dear Madam/Sir,

Thank you for the opportunity to comment on the current public consultation on “**Valuing Greenhouse Gas Emissions in the Public Spending Code**”

Irish Water is one of the largest energy users in the public sector. We are currently preparing, and will implement, a Climate Change Adaptation and Mitigation Strategy. This strategy will support national objectives for climate change mitigation and adaptation to ensure the resilience and sustainability of our water and wastewater services.

Climate change is predicted to have a significant impact on our water services. Reduced rainfall with a growing economy and population will put increased pressure on our water supplies and the receiving waters into which our treated waste water discharges. Our wastewater collection networks and treatment plants will also be tested as we experience more regular storms, rising sea levels and more intense rainfall leading to increasing likelihood of flooding.

In order to reduce and manage the risks associated with climate change, a complementary approach to mitigation and adaptation is necessary. We are mitigating the effects of climate change by improving the energy efficiency of our services and reducing our emissions of carbon dioxide and other greenhouse gases. We are also ensuring a resilient water and wastewater service by making climate change a key consideration of our water resources and wastewater planning.

In the coming years Irish Water will be investing some €5.5billion in our water and wastewater services assets. This investment will ensure we have safe drinking water and a clean environment.

Stiúirtheoirí / Directors: Mike Quinn (Chairman), Eamon Gallen, Cathal Marley, Brendan Murphy, Michael G. O'Sullivan

Oifig Chláraithe / Registered Office: Teach Colvill, 24-26 Sráid Thalbóid, Baile Átha Cliath 1, D01 NP86 / Colvill House, 24-26 Talbot Street, Dublin 1, D01 NP86

Is cuideachta ghníomhaíochta ainmnithe atá faoi theorainn scaireanna é Uisce Éireann / Irish Water is a designated activity company, limited by shares.

Uimhir Chláraithe in Éirinn / Registered in Ireland No.: 530363

Irish Water sees effective stakeholder engagement as necessary to meet the challenge of decarbonising our society. If a workshop is organised by the Department in relation to this consultation and the valuing of greenhouse gases in public spending, Irish Water would welcome the opportunity to share our experience with managing significant public spending.

Please find below Irish Water's responses to specific questions asked in the consultation.

1) Is applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions the best way of capturing the climate consequences of these investments?

Based on the options described in the consultation document the applying of a shadow price of carbon as set out in this consultation appears to be a pragmatic and the best way of capturing the climate consequences of public investments.

2) Of the models available, is linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets the most appropriate means of pricing carbon in project appraisal?

Yes, the option to link the shadow price of carbon to estimated marginal abatement cost is appropriate at this time.

3) Is the projected abatement cost for greenhouse gas emissions across the energy sector likely to represent an appropriate proxy for the cost of economy-wide emissions reductions?

While pragmatic, it is unlikely that the projected abatement costs for greenhouse gas emissions across the energy sector will represent an appropriate proxy for the cost of economy wide emissions reduction given the cost for emissions reductions in other sectors such as transport and agriculture.

4) Is the continuation of the current methodology for estimating the direct greenhouse gas emissions attributable to a project and the subsequent conversion of these emissions to carbon equivalent values appropriate?

Given the level of effort required by Ireland to decarbonise our economy the current methodology for estimating only direct greenhouse gas emissions attributed to a project will likely need to be more ambitious and in time indirect emissions should be considered. The conversion of GHG emissions to carbon equivalent values as set out by IPCC's 5th Review (AR5) is appropriate.

5) Should cost benefit analyses also be required to quantify the impact that non-greenhouse gas emissions may have upon air quality and are the values suggested for these gases appropriate?

Yes, cost benefit analyses should be required for non-greenhouse gas emissions. Irish Water cannot comment on the appropriateness of the values suggested at this time.

6) Are there any other considerations that are omitted from this paper which should have been considered by the Department regarding valuing greenhouse gas emissions in the Public Spending Code?

Irish Water suggests that the revised Public spending code set out a methodology to measure the effectiveness of the revised spending code on mitigating climate change while considering the impact of the increases in the shadow price of carbon on operational and capital expenditure that can be used for future reviews.

Yours faithfully,

A handwritten signature in blue ink, appearing to read 'G. Galvin', with a long horizontal stroke extending to the right.

Gerry Galvin,

Chief Technical Officer

12th December 2018



An Taisce

The National Trust for Ireland

**An Taisce's Response
to the DPER Public Consultation:
*Valuing Greenhouse
Gas Emissions in the Public
Spending Code***

December 2018

Join Us

An Taisce, the National Trust for Ireland, is a membership-based charitable organisation committed to enhancing our quality of life, heritage and environment.

www.antaisce.org/membership

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An Taisce' Responses based on the *Suggested Consultation Questions for Consideration*

Question 1

1) **No**, applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions **is not** the best way of capturing the climate consequences of these investments?

Instead strictly observed declining carbon quotas are required.

An Taisce's primary question for DPER for this consultation response is: How will the shadow pricing of public investments *guarantee* reductions in absolute emissions, aligned with fair share effort to align action with the Paris Agreement, *unless* an enforced carbon constraint exists to ensure the required reduction path is met? Applying an inadequate shadow carbon price trajectory that is not aligned with Ireland's "fair share" of mitigation action toward staying within the Paris temperature limit logically cannot be the best way of capturing the climate consequences of public (or private) investments.

Shadow pricing policies apparently hope that a pricing effect will somehow reduce emissions in future years, and yet do not provide any certainty that they will do so. The far more certain policy for DPER and government to adopt for Ireland's near-term governance would require an absolute commitment to enforcing a limit on total future nett CO₂eq emissions of long lived GHGs (CO₂ and N₂O) – as well as steady reductions in short-lived GHG emission rates – from the year of the Paris Agreement onward within an equitable share, a "National Carbon Quota", of the remaining global carbon budget to avoid dangerous climate change. Such an explicitly defined cap on total future nett emissions is necessary to *guarantee* that the cost savings resulting from mitigation efforts and efficiency gains will in fact result in the required reductions in absolute whole-economy emissions, as Ireland and the EU agreed to achieve at Paris (Article 4, Paris Agreement).

The Consultation Paper bases its carbon pricing on meeting the pre-Paris National Policy Position and the EU 2030 CAR, both of which fall far short of delivering the extreme urgency of reducing both fossil fuel use and non-fossil greenhouse gas emissions now required to align action with the Paris goals. The proposed shadow carbon prices and MAC methodology rest on

questionable modelling. First, they rest on energy demand based on economic growth projections with “questionable predictive power” (Milner and McDermott, 2016). Second, they use complex and closed-access energy system modelling and input data sets that lack transparency even for experts. Third, the energy system modelling is dependent on perfect foresight, idealised “rational actor” policy choices by decision-makers and overstated energy intensity improvements (Stern, 2017). These assumptions systematically underestimate the costs of carbon lock-in effects, leading to low shadow pricing that reinforces myopic (sub-optimal) decision-making, as is widely understood by researchers using these models (Nerini *et al.*, 2018).

Even within the Irish TIMES modelling approach used by TRAM, estimates of carbon prices are far greater for Paris-aligned cumulative CO₂ quotas for Ireland (Yue, 2018). Given excess emissions already emitted since 2015, due to climate policy failing to constrain emissions relative to a Paris-aligned pathway (as shown in Figure 1 in Glynn *et al.*, 2018), the remaining carbon quota is rapidly being reduced and thereby quickly pushing the 2050 abatement cost above €1000/tCO₂ (see Fig. 3; Yue, 2018). Therefore, simply in terms of the TRAM modelling proposed here for use by DPER for shadow pricing, the additional post-2030 abatement costs due to inaction before 2030 now need to be accounted in the abatement costs up to 2030.

Ireland’s Climate Act makes clear that the National Transition Objective (including measures set out in the National Mitigation Plan) is supplementary to international agreements including, of course, the overriding Paris Agreement. The Act therefore requires cost-effective action to achieve a “fair share” National Transition Objective, including aligning action with the Paris Agreement. This necessarily constrains Ireland’s economic planning within a maximum amount of future fossil fuel use compatible with Ireland’s fair share of the internationally agreed level of tolerable risk, as embodied in the Paris temperature limits that have been globally agreed as the best way of capturing the collective climate consequences of all future investments globally:

“Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change” Article 2, Paris Agreement

At present no such near-term political economic governance exists in Ireland. Without this basis, shadow carbon pricing cannot add up to the urgent annual reductions in emissions now required. Despite the existence of a limited carbon tax and shadow pricing, Ireland has

evidently failed to constrain absolute emissions under its own National Policy Position (NPP) or within the EU 2020 targets, resulting in potential compliance costs of hundreds of millions of euro. Moreover, published analyses have shown that these policy targets and collective global pledges at Paris fall far short of staying within the limits on future emissions required to limit global warming as agreed.

Regarding Ireland's national carbon quota of total future CO₂ emissions as a fair share of a Paris Agreement-based global carbon budget, peer-reviewed work at University College Cork estimates Ireland's maximum equitable (global per capita) national carbon quota from 2015 onward at 766 MtCO₂ (Glynn et al. 2018); on the same population basis, we understand that more recent analysis at DCU (McMullin *et al.*, currently in peer-review) estimates a more prudent, risk averse Irish quota as 500 MtCO₂ (see Ch. 8 in Price *et al.*, 2018). As of Jan 1st 2019, these values are now reduced by emissions since 2015 of about 170 MtCO₂. Moreover, the carbon budget of future emissions need to include cumulative nett land use emissions which are projected, based on current policies to exceed 97 MtCO₂ by 2036 (and at that point still adding to this total at a rate of 5.9 MtCO₂/yr) and cement emissions of about 2 MtCO₂/year. Therefore, it seems likely that, relative to even a minimally equitable Paris target, Ireland is currently on a trajectory that is aligned with going into deep 'carbon debt' even with urgently needed new policies for deep decarbonisation in energy and land use. Therefore, if shadow pricing were to be meaningful, which may not be possible at all, it would need to reflect the full cost of negative emission technologies to capture and store carbon in land-based, mineral and/or geological storage to pay back accumulated "carbon debt" to return to a Paris-aligned national carbon quota (after overshooting it, as appears to be inevitable under current policies).

As the recent IPCC SR15 report lays out in detail, the escalating costs of excessive and rising emissions, and the uncertain but high costs of achieving negative emissions, mean that urgent near-term reductions in fossil fuel usage and land carbon losses are now required of all developed nations. This reality must be reflected in any fit-for-purpose economic evaluation of public and private projects. **In line with peer-reviewed research, An Taisce see the proposed levels of shadow carbon pricing as entirely inadequate compared to research that estimates minimum pricing levels that are far higher than those proposed by the Consultation Paper (van den Bergh, 2014).**

Question 2

2) **No**, of the models available, linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets **is not** an appropriate means of pricing carbon in project appraisal.

Costs must include total costs of aligning action with a Paris CO₂ quota, including any requirement for negative emissions.

No, such a view fails to acknowledge, first, the serious problems with MAC analysis acknowledged in the literature, including noted by the Climate Change Advisory Council,

"The marginal abatement cost does not reflect the cost-effectiveness of measures in achieving the long-term goal for which inter-temporal dynamics may be important. Prioritisation and policy support also need to be informed by understanding of transaction costs, co-benefits and trade-offs of the policies and measures. "

CCAC 2017, p. 29

And second, the inadequacy of current emission targets as embodied in the NPP, which does not set 2030 targets, and the EU Climate Action Regulation to 2030 for non-ETS emissions, which does. MAC studies with a 2030 deadline completely fail to price in the significant costs of achieving full decarbonisation including near-term sustained, deep reductions in fossil fuel energy demand (requiring scaling down of high carbon activities such as aviation). This practice also fails to acknowledge early investment in technologies to achieve the critical last step in decarbonisation, enabling sufficient energy storage (particularly in heat and chemical form) and some limited dependence on negative emissions. Focusing on a 2030 target, as the Consultation Paper does, is insufficient, and likely to result in higher costs, to meet a Paris aligned goal – requiring a 'nett zero' emissions energy system in richer nations:

"Focusing solely on mitigation objectives for 2030 or 2050 could lead to blindsiding of the challenge, inadequate ambition in the near term, and poor investment choices in energy infrastructure." Pye et al . (2018)

Furthermore, we know that the collective global National Determined Contributions (NDCs) fall far short of alignment with the Paris Agreement goals so that a ratchet mechanism of increasing ambition has been agreed as being necessary (Fawcett *et al.*, 2015). The IPCC SR15 report and the UNEP Emissions Gap Report clearly show that greatly increased ambition is needed up to and beyond 2030 by all richer nations. In the proposed Long Term Strategy and Governance

Regulation, the European Commission have acknowledged that greater ambition is needed over and above existing commitments. These factors additionally increase the marginal abatement costs.

DPER need to make it clear that there are significant methodological issues with MAC analysis that are not referenced in the Consultation Paper. Kesicki and Strachan (2011) finds that "*their simplistic use has been misleading and finds that the limits of the MAC curve concept can lead to biased decision making*" and "identifies some steps to overcome present shortcomings in the generation of MAC curves". Ward finds that:

"Marginal Abatement Cost curves fail to rank energy efficiency measures correctly. If they are to be used they must exclude all measures with net positive benefit. Optimisation of efficiency measures using MAC curves should be revisited urgently."
Ward, 2014

In short, MAC analysis fails to rank measures reliably, too easily underestimates or excludes implementation, institutional and monitoring costs, and underestimates market barriers and uncertainties, all findings that strongly indicate MAC analysis results in substantial under-estimates of economically correct shadow carbon prices. This means that cost-benefit analysis using MAC-based shadow pricing is likely to systematically undervalue and delay mitigation action.

Question 3

3) **No**, the projected abatement cost for greenhouse gas emissions across the energy sector **is not** likely to represent an appropriate proxy for the cost of economy-wide emissions reductions **unless the full long-term costs of near-term failure to reduce emissions and the costs balancing excess emissions are included in shadow pricing.**

No, the projected abatement shadow costs indicated by the Consultation Paper to 2030 and beyond fall far short of the level of pricing now required to align action with Paris targets or even to get back onto an NPP linear pathway ("illustrative" pathway form, as presented by the CCAC). The shadow prices given in the pathway are €20/tCO₂ in 2019, rising to €32/tCO₂ in 2020 and steadily to €100/tCO₂ by 2030. These prices are far below even the lower bound estimates of *current* carbon social cost of carbon (SC-CO₂) costs as surveyed by van den Bergh *et al.* (2014) aggregating high as well as low discount rates:

"The lower bound to the SCC [Social Cost of Carbon] of US\$125 per tCO₂ is far below various estimates found in the literature that attribute a high weight to potentially large climate change impacts. Therefore, the proposed lower bound can be considered a realistic and conservative value." van den Bergh *et al.* (2014) p.256

In fact, van den Bergh *et al.* are clear that current shadow prices are commonly estimated to be far higher than this, indicating that the abatement costs proposed are likely far too low and therefore mitigation choices that need to be taken will be postponed. Unlike unscientific climate economics purporting to give an "optimal" economic cost benefit analysis (e.g. Nordhaus, 2018) based on unjustifiable damage functions and discount rates (Dietz and Stern, 2015), the IPCC reports and recent climate change science make it abundantly clear that the Paris climate target sets a critical guardrail limit that cost-effective valuations of greenhouse gas emissions would do well to observe:

"Today, Earth system science has come of age and can provide robust evidence for the intuitive assumption that it is not a good idea to leave the "safe operating space" of humanity and that this space is well within the Paris confines. The keywords in this context are non-linearity and irreversibility. Impacts research indicates that unbridled anthropogenic climate change would be most likely to play out in a disruptive and irreparable way."

In particular, the very real and potentially very high costs of critical uncertainties in maximum rates of mitigation that can be achieved, the speed of deployment of renewables or other low carbon energy sources, the total (global, life cycle, including "upstream") emissions intensities of such sources, and development of energy storage and 'backstop' negative emissions technologies, must be included in current and pre-2030 costs. Typical MAC analysis fails to acknowledge that in fact substantive near-term abatement investment, possibly prioritising the most expensive option early on, can be the optimal economic approach at the very beginning of a low carbon energy transition (Vogt-Schilb *et al.*, 2018).

Question 4

4) **Yes**, the continuation of the current methodology for estimating the direct greenhouse gas emissions attributable to a project and the subsequent conversion of these emissions to carbon equivalent values are appropriate.

However, science-based adjustments for annual and cumulative impacts of short-lived climate pollutants may be needed in the near future.

Yes, the emissions conversion factors based on the most recent IPCC AR5 GWP₁₀₀ CO₂eq values are appropriate for the time-being. However, recent science more clearly differentiates between long-lived and short-lived gases to give a generally more reliable weighting to the effect on nett climate forcing of increasing or decreasing emissions of short-lived climate pollutants such as methane, via an alternative equivalence methodology called GWP* (Allen *et al.*, 2018). Accordingly, any evaluation involving such short-lived pollutants should already include a sensitivity analysis to assess whether this variation in methodology would impact materially on decision making; and if so, the precautionary principle should be applied as appropriate.

Question 5

5) **No, if national limits are being breached, cost benefit analyses are not appropriate** to quantify the impact that non-greenhouse gas emissions may have upon air quality. **Existing or proposed activities that sum to breaching national air pollution limits need to be restricted as a matter of regulation not pricing, to ensure that no breach occurs.**

At present we cannot say if the values suggested for these air polluting gases are appropriate.

Yes, given their serious health impacts – as per the EEA/WHO premature mortality data for Ireland mentioned by the Consultation Paper – the costs of non-GHG air pollution emissions, including NO_x, NMVOCs, ammonia and PM_{2.5}s, do need to be quantified and included in all investment decisions, public and private. This is particularly important, collectively at national scale and at individual project scale, for the intended increase in biomass combustion under the Renewable Heat Support Scheme (RHSS) policy, given the EPA's strong view in scoping of the Draft Bioenergy Plan that the policy is likely to greatly increase air pollution and contribute to serious resultant health issues.

A Cost Effectiveness Analysis is urgently needed to evaluate how the RHSS will ensure that PM_{2.5} and other air pollution levels are not raised above the absolute limits agreed under EU air quality limits. Current projections show ammonia values greatly exceeding limits.

Question 6

6) **Yes**, there are other considerations that are omitted from this paper which should have been considered by the Department regarding valuing greenhouse gas emissions in the Public Spending Code **as listed.**

The assumed use of shadow pricing in Cost Benefit Analysis (CBA) or Marginal Abatement Cost (MAC) assessment is not aligned with the clear advice given by the existing Public Spending

Code (PSC). These methods are used as a basis for determining whether or not a project should be undertaken where *all* costs and benefits can be accurately estimate. As we have discussed, the basis of the CO₂ abatement prices proposed by the Consultation Paper are highly uncertain, in no way providing a sound basis for CBA or even MAC assessment. In fact, in climate action policy, Ireland's ratification of the Paris Agreement means that the good faith commitment to undertake the whole-economy measures has already been made, therefore any cost analysis depends on the requirement to restrict Ireland's future CO₂ emissions in line with a fair share national carbon quota aligned with Paris. What is needed is a determination of a least cost analysis of *collective* policy that guarantees meeting this quota without fail. The PSC defines this kind of assessment as Cost Effectiveness Analysis (CEA):

"CEA is not a basis for deciding whether or not a project should be undertaken. Rather, it is concerned with the relative costs of the various options available for achieving a particular objective." Public Spending Code p. 133

CEA would only make sense for climate policy in the sense of assessing entire, alternative policy pathways that meet the available carbon quota, not for individual projects unless as part of that overarching assessment. Our point is that this is the sense of 'cost effective' as defined in economics:

"In CEA modelling, exceeding the externally (politically) specified 'safe' target is assumed to be unacceptable: in economic terms, the shadow price of exceedance is effectively deemed to be infinite (Ackerman et al., 2009, p. 312). A defined carbon budget target (such as "well below 2°C") or emissions pathway is therefore a definite requirement to be met with certainty by the cost effectiveness methodology. An absolute goal is therefore properly regarded as a feature of CEA – rather than a "limitation" (Price 2018 p.71)

Limiting global warming to a set temperature target such as "well below 2°C" can be directly related to a defined budget of future cumulative CO₂ emissions. Therefore, logically, any economic evaluation of climate change must ultimately achieve a sharing or rationing of this budget globally and through future decades, most urgently in the near-future for developed nations like Ireland (with very high per capita GHG emissions) that have agreed to act earliest to achieve whole economy emission reductions. Ensuring and enforcing a pathway cap on total

emissions, as per EU policy, is the only definite way to limit impacts without rebound effects (Alcott, 2010)

Within Ireland's NPP, the basis of the National Mitigation Plan, An Taisce estimates (see Fig. 1) that a 5-year plan to 'get back on track' with a linear pathway for 2015 to 2050 would now already require annual emission reductions in fossil fuel use equating to 2.3 MtCO₂/yr in each year from 2019 to 2023 inclusive, equating to annual percent reductions rising from 6%/year in 2019 until back on the NPP linear pathway. This original pathway would only require a much easier and presumably much less costly 0.8 MtCO₂/yr. Therefore, we ask DPER to show how shadow pricing public investments will guarantee reductions in absolute emissions, unless an enforced carbon constraint exists to ensure the required reduction path is met. We note that public service emissions increased by nearly 7% in 2017 and absolute national emissions continue to increase steadily. Clearly the existing climate action policies, including carbon pricing, are completely inadequate.

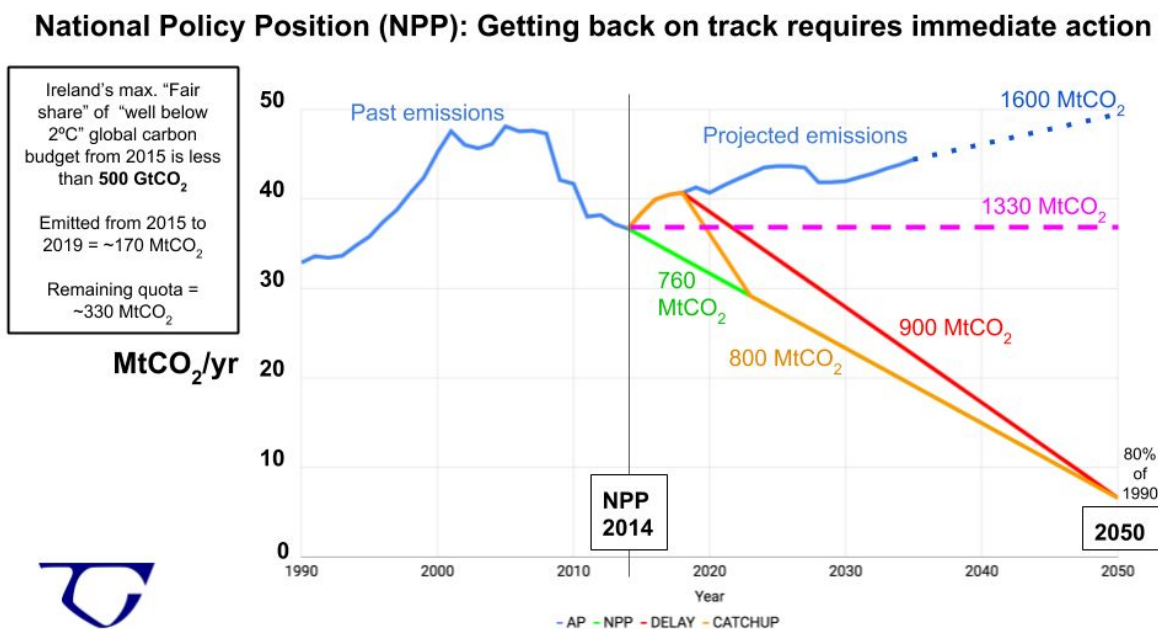


Figure 1. National Policy Position with linear pathway, used as per advice of the Climate Change Advisory Council. Stated CO₂ values indicate cumulative emissions colour coded to each pathway. "Flatlining" annual emissions (magenta line) continually adds each years annual emissions to cumulative emissions. AP (blue) = as past or projected; NPP (green) = National Policy Position indicative pathway as per CCAC; Delay (red) = linear path from current, end 2018 level to target; Catch-up (orange) return to NPP pathway by 2023.

5 year carbon budget for 2019-2023 to get back on NPP track: **Total = 169 MtCO₂**

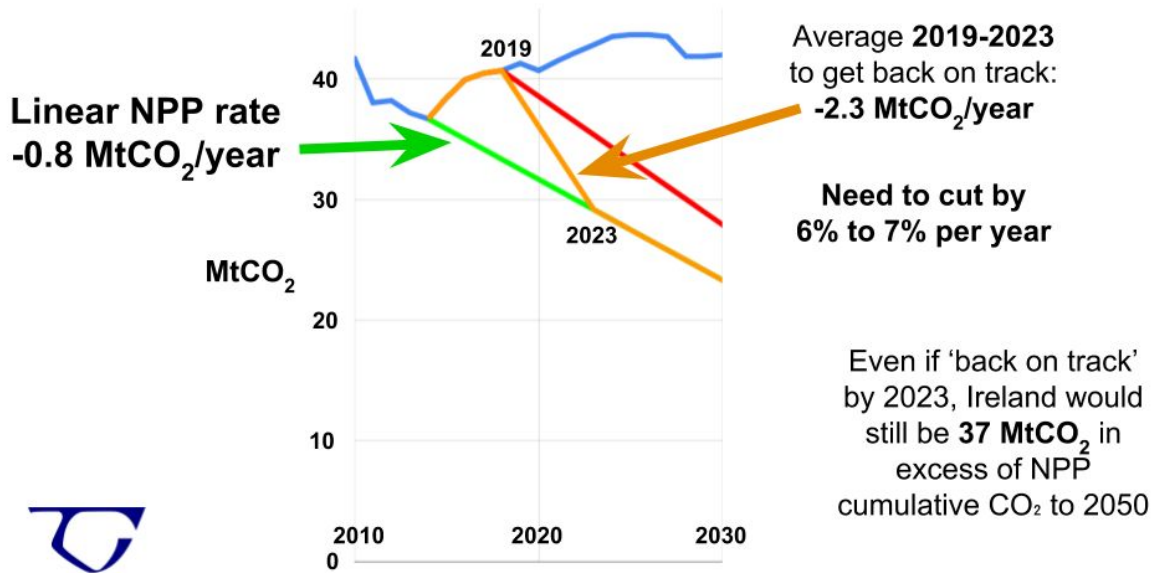


Figure 2. National Policy Position as in Fig. 1, showing a possible 5 year carbon budget to 'get back on track' to return to the NPP linear pathway. An Taisce would like to know what marginal abatement cost would be needed to achieve this pathway.

The Consultation Paper relies on the TRAM Irish TIMES modelling for deriving MAC values relative to meeting the NPP and yet the Paper (unacceptably) fails to acknowledge that Ireland is already far off track from the modelled least-cost pathway of fossil fuel reduction specified in the TRAM analysis. Therefore, as shown in Figure 1, a higher cost and cost ineffective pathway has already been taken from 2014 to 2019 such that near-term shadow carbon prices to 'get back on track' starting in 2019 must already be far higher than they were for the Irish TIMES modelling basis. Therefore, TIMES modelling needs to be constantly updated to reflect the most recent emissions, especially in cumulative excess CO₂ over the pathway, and requirements to get back on to the NPP pathway including shadow carbon pricing also need to be updated. Otherwise the modelling becomes immediately irrelevant to policy, as is the case now within 5 years of the NPP issuance. As per the An Taisce analysis noted above, a 2019-2023 plan just to get back onto the NPP pathway (still not aligned with the Paris temperature goals) would require annual reductions of 2.3 MtCO₂/year.

Conclusion: underpricing CO₂ adds future cost

- The critical requirement for valuing GHGs is that *collective* national climate action policy must *add up* to meeting a now very limited, fair share carbon quota of total future CO₂ emissions. This reality needs to be made very clear in all GHG assessments *and* incorporated into any economic analysis attempting to value GHG emissions.
- This DPER consultation needs to be reissued with an appropriately updated Irish TIMES analysis to account for recent excess emissions above a Paris-aligned pathway.
- The well understood undervaluing of climate risk by CBA and MAC methods needs to be made very clear by DPER. Combined with the increased costs of ongoing emissions well above any Paris-aligned pathway, underpricing risks enables delay and adds to costs.
- Ireland's Climate Act specifies a requirement for "cost effective" action; the definition of "cost effective" in economics means that the target in this case is a limit on total future national emissions which must be observed *without fail*. Therefore, any valuation of GHGs in terms of cost effective action must guarantee such success in restricting emissions to a Paris aligned CO₂ total (with specified negative emissions allowance) including pricing uncertainty and negative emissions costing to ensure timely action and meaningful costing.
- A much more thorough presentation and acknowledgement of the severe limitations of the economic modelling and energy system model analysis is required.
- As discussed, the proposed shadow pricing is clearly inadequate to affect near-term decisions significantly. The CBA and MAC methods being advocated in the Consultation Paper fail to reach the level of reliability required to achieve sufficient policy relevance, or even to meet Public Spending Code definitions.
- To the contrary, as a national priority, economic planning for regulation of future fossil fuel use within a Paris-aligned decarbonisation pathway of rapidly reducing 5 year carbon budgets is now urgently required to ensure cost effective reduction of fossil fuel use and maximisation of public welfare within Ireland's fair share effort to limit global warming.

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Original DPER “Suggested Consultation Questions for Consideration”

- 1) Is applying a shadow price of carbon to the estimated greenhouse gas emissions attributable to public investment decisions the best way of capturing the climate consequences of these investments?
- 2) Of the models available, is linking the shadow price of carbon to the estimated marginal abatement cost that Ireland is projected to face to meet 2030 national (non-ETS) emissions targets the most appropriate means of pricing carbon in project appraisal?
- 3) Is the projected abatement cost for greenhouse gas emissions across the energy sector likely to represent an appropriate proxy for the cost of economy-wide emissions reductions?
- 4) Is the continuation of the current methodology for estimating the direct greenhouse gas emissions attributable to a project and the subsequent conversion of these emissions to carbon equivalent values appropriate?
- 5) Should cost benefit analyses also be required to quantify the impact that non-greenhouse gas emissions may have upon air quality and are the values suggested for these gases appropriate?
- 6) Are there any other considerations that are omitted from this paper which should have been considered by the Department regarding valuing greenhouse gas emissions in the Public Spending Code?