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The future of UK Carbon pricing: Artificial Intelligence and the Emissions Trading System

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THE FUTURE OF UK CARBON PRICING: Artificial Intelligence and the Emissions Trading System

ABSTRACT

As well as highlighting factors which should be taken into consideration in the Design of a UK Emissions Trading System,

This paper aims to address particularly, the question relating to how “in the absence of historical emissions data, the regulator is able to make an environmentally robust assessment of the eligibility and emissions target of a new entrant for the Small Emitter Opt-Out or the Ultra-Small Emitters Exemption, without undermining the environmental integrity of the system”.

Key words: Emissions Trading System; Artificial Intelligence; Vertical Integration; Block chain systems; Sustainable Development; energy; climate, environment; Ultra-Small Emitters Exemption; trade relationships; transparency; information disclosure

THE FUTURE OF UK CARBON PRICING: Artificial Intelligence and the Emissions Trading System

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Introduction

Whilst coal has been considered to be the greatest source of greenhouse gas emissions at 24.5% - owing to its cheap value, deforestation was also considered to be the second major source at 18% (see *The Economist*, 2006 : pages 23 and 24). Various measures aimed at addressing the emission of greenhouse gases include a combination of technological advances and economics, namely (page 23):

- Carbon sequestration (whereby carbon dioxide is stored underground or below the oceans) in dealing with emissions from coal fired power plants. It is argued that even though the sequestration of carbon emissions may raise the price of coal generated power by 50%, that coal is so cheap that even such a rise in price would not deter its attractiveness as a source of power.
- The use of renewable sources of energy is also another means proposed in the fight to offset carbon emissions
- The role of economics in making technologies viable is proposed in two ways, namely, the subsidization of early stage research and development to bring down prices of alternatives; and ii) the taxation of carbon or the establishment of a “cap- and -trade system” which is similar to that which exists in European countries – known as ETS – as a means of pushing up the price of fossil fuels.

As highlighted in the joint consultation document of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland,” the Carbon Emissions Tax (CET) announced at Budget 2018 could form the initial basis of a tax alternative to the EU ETS. If a tax were pursued as a long-term carbon price policy, the UK Government would consult on options. Development of any carbon tax would be a reserved matter for the UK Government.”²

- The CET was designed to work in a similar way to the EU ETS. It would cover all stationary installations currently within the EU ETS. These would continue to report their

¹ Centre and Institute for Innovation and Sustainable Development Visit www.ciinnovationsd.org

² See HM Government THE FUTURE OF UK CARBON PRICING: A joint consultation of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland at page 17

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activities annually under the existing Monitoring, Reporting and Verification (MRV) scheme to establish how many tonnes of greenhouse gases they emit during the reporting period. Each installation would be set an emissions threshold, based on their level of free allowances in the ETS.”³

Background and Literature to the Topic and Issues to be Addressed

With ever expanding possibilities for innovative advances and technological breakthroughs, the need for facilitating techniques to ensure that economic and environmental sustainability measures can match or rather keep up with such pace of development, is becoming more evident.

Artificial Intelligence (AI), vertical integration and block chain systems and technologies will have increasing roles to play, particularly in respect of areas which relate to global climate change, trade and energy, in facilitating transitional processes, complex transactions and changes which are consequential of such developments.

Artificial Intelligence tools “use advanced algorithms and machine learning to predict activity and manage business processes, such as projecting inventory levels, managing cash flow needs, or by enhancing monitoring and other activities in internal audit.”⁴

Particularly in response to question 24 of the Consultation Document, namely “In the absence of historical emissions data, how could the regulator make an environmentally robust assessment of the eligibility and emissions target of a new entrant for the Small Emitter Opt-Out or the Ultra-Small Emitters Exemption, without undermining the environmental integrity of the system?”

Regression techniques which facilitate forward looking statements and are not independent on historical emissions data are very relevant.

³ See *ibid*

⁴ See The Centre for Audit Quality “EMERGING TECHNOLOGIES, RISK, AND THE AUDITOR’S FOCUS A RESOURCE FOR AUDITORS, AUDIT COMMITTEES, AND MANAGEMENT” at page 8. The potential of Artificial Intelligence in developing accounting estimates is further highlighted: “AI may be used in developing accounting estimates and potentially could incorporate data previously determined to not be relevant into the overall development of the estimate. AI may identify correlations in the data that were previously unknown.”

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More recent advances which are regarded as having “propelled Artificial Intelligence into reality” and which are considered important in implementing Artificial Intelligence to solve business problems include: Classification , Clustering and Regression techniques.⁵

Classification techniques are more suitable for historical based and related actions “This involves training machines to recognize patterns in data, then categorizing new data into categories – such being illustrated through reconciliation – a process whereby reconciliatory functions are performed between internal and external systems and a history of actions which have taken, also being recorded.” Further, it is added that “ AI systems can learn patterns based on historical actions – as well as recommend actions for an unreconciled item.”

Clustering techniques: “This involves training machines to create sets of categories for purposes of fraud detection – as illustrated with insurance industries which engage machine learning facilities and technologies to identify clusters of fraud from historical claims, thereafter comparing to ascertain whether new claims are fraudulent.”

With regression techniques, these are considered to engage training a machine to “ estimate next numerical value in a sequence – as exemplified through forecasting, predicting techniques and forward looking statements.”

When the Chinese government announced plans to impose a 65% tax on HFC projects and channel the funds into a “sustainable development fund”, doubts were raised as regards not only the effectiveness of achieving such a goal, but also the cost benefit effectiveness of such schemes and projects.

Zhu (2014:447- 466) highlights that the Chinese approach may be unique in its discriminatory tax approach on Clean Development Mechanism projects whereby the Chinese government takes 65% of the carbon credits from HFC-23 (trifluoromethane) projects, 30% from N2O (nitrous oxide) projects, but only 2% from other types of projects. It is added that whilst “previous studies have expected that this tax has multiple effects: rent-seeking effect, a deterrent effect on the HFC-23 and N2O projects, a channelling effect that switches the investment from HFC-23 and N2O projects to other types of projects, and a market distortion effect,

with the positive analysis and empirical evidence, the present study shows that this tax only has rent-seeking effect, thus China's discriminative tax has been over read.”

It is certainly the case that possibilities may present themselves whereby the government’s initial intentions are diverted as a result of other commitments to more pressing infrastructural or social

⁵ Centre for Audit Quality, “ *Emerging Technologies: An Oversight Tool for Audit Committees* ” December 2018 page 3 and also ibid

needs. Social attitudes to climate change and environmental pollution, current government budget deficits – as well as welfare structures and systems will also determine the willingness of different governments to commit themselves to the goals of carbon offsetting and the reduction of carbon emissions – particularly where cost benefit analysis and determination hinge upon overly uncertain and unpredictable variables.

However, global initiatives and efforts aimed at combatting the all important issue of global warming and the reduction of carbon emissions cannot be achieved without a unified approach which embraces a coordinated, cooperative system and which encompasses and requires a common framework of rules, standards – as well as the commitment to abide by such rules even where it appears that cost benefit analyses appear uncertain and that costs of complying with carbon offsetting initiatives outweigh benefits to be derived therefrom.

According to Tsai and Jhong (2018:1), “Climate change has become a global issue that not only requires comprehensive solutions to prevent serious environmental, social, and economic impacts, economic development has been greatly affected by carbon emissions, which has resulted in greenhouse gases”.⁶

The impact of innovation and climate action in generating employment has also been highlighted. The following also constitute factors which are considered to be driving forces in stimulating competitiveness (Nordic Council of Ministers, Nordic Council of Ministers Secretariat, 2018:22,23):

- Digitization and high level of technological competence
- High levels of education
- Innovation and R&D
- Automation
- Political stability
- Low government debt
- Good reputation and international credibility
- High quality products
- High energy security
- Weak currency
- Customer Awareness

⁶ In this sense they cross reference Ding, H.; Zhao, Q.; An, Z.; Tang, O. Collaborative mechanism of a sustainable supply chain with environmental constraints and carbon caps. *Int. J. Prod. Econ.* 2016, 181, 191–207

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FACTORS BEHIND NEGATIVE DEVELOPMENT OF COMPETITIVENESS being considered to include (page 23) :

- High cost level
- Competitors with production in or employees from low-cost countries.

Hydro-fluoro carbon projects have been undertaken in different jurisdictions over the past decades. Even though Norway is not an EU member state, its HFC regulations are governed and subject to EU regulation (Currently No 842/2006, No 517/2014 in preparation) – “Tax and Refund scheme for HFC-gases – HFCs being defined as harmful waste in waste regulation (collection and safe destruction obligatory).”⁷

Conclusion

Factors which should be taken into consideration in the Design of a UK Emissions Trading System include the following:⁸

- governance⁹ related matters which revolve around system and technological advances,
- the need for changing tastes and preferences,
- socio cultural needs, as typified and characterized by the growing use and preferences for environmental friendly products
- Factors which are considered to be driving forces in stimulating competitiveness¹⁰

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⁷ See Norwegian Environment Agency “Norwegian Regulation on HFCs and Incentives on Alternatives” 2016

Presentation at ATMosphere 2016 “Natural Refrigerants – Solutions for Europe” Torgrim Asphjell, April 19, 2016

⁸ See M Ojo, (2019) “Facilitating Artificial Intelligence and Block Chain Systems, Partnerships and Technologies: Emerging Global Actors and Players in Sustainable Development and Facilitating Artificial Intelligence and Block Chain Systems, Partnerships and Technologies: Emerging Global Actors and Players in the Financial Reporting Framework, June 2019.

⁹ See Particularly Ojo, M. (2019). Facilitating Artificial Intelligence and Block Chain Systems, Partnerships and Technologies: Emerging Global Actors and Players in the Financial Reporting Framework, June 2019.

¹⁰ See Nordic Council of Ministers, Nordic Council of Ministers Secretariat (2018). Nordic Businesses on Climate Transition, Competitiveness and Growth: An Interview Study Among Leading Businesses in the Nordics pages 22,23
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