

To:

Biofuels Consultation
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From:

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Concerning:

Reaction of Bernal Institute / UL on the “Consultation on the development of the Biofuels Obligation Scheme for the period 2021 to 2030, including the implementation of the elements relating to renewable transport fuels in the recast Renewable Energy Directive”

Answers to section 4 questions

1.

- (a) Do you consider these blending levels to be a suitable balance of feasibility and ambition?
- (b) Do you consider the approach to increasing the biofuel obligation rate appropriate?

1a) Extrapolating from the status of 2019, the scheme is very ambitious. However for specific sectors such as aviation; back-casting from commitments such as the Irish commitment to emission reduction of aviation as in the original CORSIA agreement there is significant concern about the rate of development. In an earlier white paper (2017, attached), we have recalculated the associated GHG emission reduction targets in the framework of a fast growing (currently 4%/ year) aviation sector and historic development of alternative measures for emission reduction (approximately 1..1.5% / yr) into the corresponding ramp-up of availability and use of sustainable aviation fuels (SAF). Under further assumptions laid out in the attached paper, aviation fuel consumption will have increased from around 800 000 ton/yr today to approximately 1 000 000¹ ton/yr in 2030. To achieve the required emission reduction commitment, SAF production and use must have increased from practically 0 to around 400 000 ton/yr, and fossil kerosene use must have reduced from 800 000 ton/yr today to 600 000 ton/yr. This corresponds to a blending ratio of 40% SAF (‘biofuel’) in 2030. Obviously the Irish biofuel obligation is across various transport sectors, but also other sectors struggle to comply. So the ambition across sectors needs to be high.

Feasibility deals with technological readiness, installed capacity as well as commercial readiness. At this moment, there is no manufacturing of SAF and any demand has to be satisfied by imports. This large Irish import need, for advanced biofuels will find very limited supply in Europe in (at least) the first years of RED-II. This will likely have a considerable effect on the price of the final products to the

¹ For comparison – Irving Oil in Whitegate , Ireland’s only (fossil) refinery, consumes 75 000 barrels of crude oil per day, which is approximately 3 000 000 ton per year to serve 40% of the Irish transportation and heating requirements. Kerosene consumption in 2030 is equivalent to 33% of the Whitegate production. Projected SAF requirements to comply with Irelands international commitments in 2030 are equivalent to 13% of Whitegate’s capacity.

consumers, with all negative impacts on (business and tourism) travel affecting directly the GDP of the island nation. So feasibility is very challenging, requiring significant efforts to develop the domestic SAF manufacturing capacity as well as the associated feedstock availability. While challenging, this also bears a significant economic and job creation opportunity.

1b) While Ireland takes its EU obligations seriously, the numbers in the footnote indicate the significant scale of the challenges on technological development, scale of investment and realizing the commercial potential of the biofuels opportunity in general and for SAF / aviation in particular. We have scoped this also in the White Paper on 'BioPort Ireland ' of 2017, although further detail is necessary. Hence, stimulus is urgent and requires a bold approach.

2.

- (a) What do you view as the technical and consumer challenges associated with a blending level of 10% by volume in petrol on average?
- (b) What do you view as the technical and consumer challenges associated with a blending level of 12% by volume in diesel on average?
- (c) What types of biofuel would you expect to be used to meet these increased blending levels?
- (d) Are such fuels available in sufficient quantities to meet the needs of the Irish market?
- (e) What actions are needed (outside of the Biofuels Obligation Scheme) to support the increase in blending levels (e.g. consumer communication)?
- (f) What is the expected cost to consumers associated with increasing the blending levels?

2a-f) Road transportation and associated technical challenges are not our field of expertise, but manufacturing of Sustainable Aviation Fuels (SAF) and biorefinery development for fuels, chemicals and materials, in more general terms are core competencies. We have worked and published extensively for approximately a decade on this topic with our industry and academic partners in The Netherlands², Brazil³, Malaysia, Ireland and others. From that perspective, we think that SAF made from advanced feedstocks and within a biorefinery context in Ireland, can contribute significantly to the Irish RED-II and CORSIA targets, as well as offer a significantly broader opportunity to develop a new economic sector, create new jobs, provide an alternative for the conventional Irish agro-industry while solving some of the challenges mentioned under Section 4 Question 1.

3

- (a) Do you consider the move to an energy-based obligation appropriate?

3a. Yes.

² The Netherlands policy is based on the vision document downloadable via <https://www.rijkswaterstaat.nl/zakelijk/innovatie-en-duurzame-leefomgeving/lef-future-center/succes-met-lef/duurzame-brandstofvisie.aspx> (2014, in Dutch with English summary) . Authors can provide a copy.

³ Franco, T.F., and L.A.M. van der Wielen Report of the 3rd AgroPolo Campinas Workshop Bioeconomy "Advanced biofuels for aviation and other heavy transport". School of Chemical Engineering (FEQ), State University of Campinas (UNICAMP) Campinas, October 17-18, 2016. Available for download via www.agropolocampinasbrasil.org .

4a)

(a) Do you consider the timing of changes to the Biofuels Obligation Scheme appropriate?

4a. Yes, would argue that actions are timely or even a bit late..

5

(a) Do you consider the approach to introducing an advanced biofuel obligation appropriate?

(b) What biofuels do you envisage contributing to meeting this obligation?

5a. Yes. We would even argue that sub targets are critical.

5b) Sustainable Aviation Fuels of course!

6a)

(a) Do you consider the approach to include both the road and rail transport as obligated parties appropriate?

6a All but aviation are RED-II obligated end-markets

7

(a) Do you consider the approach to exempting certain fuels from the obligation to be appropriate?

7a Certainly not; exempting will delay the transition to sustainable, low carbon modes of transport. We need to reduce the use of **all** fossil energy carriers.

8

(b) Do you consider the approach to issuing energy credits appropriate?

8b) Yes. As long as the CO2 savings associated with the energy credits can also be claimed by the party using the actual fuel.

BTW we are not convinced that electricity-for-transport should be left outside this obligation scheme. The indicated administrative load can be automated. It should be prevented that there is double counting of use (eg renewable power supported as well as converting renewable power to SAF), but developing a common level playing field (Carbon tax) for all consumption that leads to GHG emission: (final) polluter pays.

9

(a) Do you consider the approach to applying multipliers to be appropriate?

(b) Do you consider the approach to applying multipliers impacts the risk of fraud?

9a) We think that multipliers are arbitrary. Creation of actual, volume/energy-based markets based on real percentages and obligations lead to more transparency and clarity. However, if there is no sector mandate such as is the case for aviation, using multipliers may be necessary to make the business case work for SAF.

9b) No, at least not more than alternatives. Government has a role to monitor and check. This regulation could be facilitated by the CER and CRU. (Northern Ireland Utility Regulator Inclusion)

10.

(a) Do you consider the approach to biofuels produced from feedstocks that are considered a high risk (from indirect land use change perspective) appropriate?

10a) Yes. The general methodology including indirect displacement effects- should be applied to relevant waste and residue streams as well.

(a) Do you consider the approach to biofuels produced from food and feed crops appropriate?

11a) NO, we don't think this is appropriate at all. A biofuel from waste/residue is not per definition sustainable, and a food crop-based biofuel is not per definition unsustainable. In the multi (137) author SCOPE Report *Bioenergy and Sustainability* (linked to UNESCO and UNEP⁴), many cases showed evidence of how biofuels from food crops can actually enhance the sustainability of food production, fight poverty and hunger. This EU approach is a (wrong) oversimplification of the sustainability-income-poverty problem and an inappropriate solution. What should be created is an objective assessment methodology including LCA⁵ for the sustainability of full supply chains. The sustainability of a biofuel is determined by the complete system and its impact on other markets/systems.

12

(a) What approach do you think should be adopted in relation to the 1.7% limit on biofuels produced from UCO and animal fats?

(b) Do you consider it appropriate to seek the European Commission's approval for a higher limit and, if so, what evidence would you suggest be used to support such a request?

12a) See the remark under 11a. This limit makes no sense, as long as full supply sustainability analysis is completed.

12b) Yes! In consultation with other Irish and international aviation partners, we propose to further explore and quantify the relevance and feasibility of a waste oil based SAF supply chain in Ireland, **while preparing for a lignocellulosics based future generation**. Today's most mature conversion technology to produce Sustainable Aviation Fuel is called HEFA (Hydrotreated Esters and Fatty Acids). Under the RED-II the Part B feedstocks are the most logical options to use for the HEFA technology and there are Part A feedstock options as well. There is a strong case to be made for an Irish, waste oil based HEFA supply chain, supplying SAF to Irish airports. The SAF can be blended up to 50% with conventional jet fuel and can be used in the existing jet fuel distribution infrastructure and commercial aircraft operations. Preconditions for this "Irish HEFA" case:

- The multiplier of 1.2 for aviation is installed in Ireland
- Double counting for Part A & B feedstocks
- SAF can generate biotickets under the BOS (i.e. contribute to the Irish RED-II targets)
- The CO₂ reduction associated with the use of SAF can be claimed by the airline/aviation sector

Technologies to produce SAF from lignocellulosic feedstocks is emerging, and will require further development in view of the specific situation of potential Irish feedstocks such as forestry derived products. This includes solving logistic opportunities given the dispersed feedstocks across Ireland.

⁴ 800 p document is downloadable from <http://bioenfapesp.org/scopebioenergy/>, as well as a number of policy briefs etc. Document was presented at Worldbank, Washington; European Commission, Brussels, FAPESP, Sao Paulo and at UN Nairobi.

⁵ LCA – Life Cycle Assessment for integral social, economic and environmental performance.

Therefore, in our view it is critical to perform a detailed macro-economic evaluation including LCA and ecological analysis that supports a national level roadmap in terms of technology innovation, supply chain and market development for the full product spectrum , including SAF and other sustainable energy carriers.. We at Bernal Institute are more than willing to help the Irish government better understand the potential of this integral opportunity.

13

(a) Do you consider the approach to carryover appropriate?

13a) Carry over makes sense in the developing market with manufacturing plants coming on-line. It takes time to build capacity, units have an operational bandwidth and not unlimited flexibility. Carry-over may help streamline this process. Please note that governmental attempts in the 2000s to support planting of willow etc for energy purposes were unsuccessful because of lack of market development, of which carry-over and other schemes can be very helpful.

14.

(a) Do you consider the approach to setting the level of compliance fee (or 'buy out charge') to be appropriate?

14a) Makes sense to control non-compliance.

15.

(a) Do you consider the approach to dealing with a potential supply disruption appropriate?

15a) In our view, this serves the same purpose as under 13. In the developing market with multiple manufacturing plants coming on-line. It takes time to build capacity, units have an operational bandwidth and not unlimited flexibility, and developing supply chains have the same issues. The proposed approach may help streamline this process. In a mature industry, this is the domain of insurance companies, like in any business sector.

16.

(a) What is your opinion on the potential for an obligation scheme (similar to the Biofuels Obligation Scheme) in the heat sector?

(b) What do you see as the technical barriers to introducing such a scheme?

(c) If a heat obligation scheme was to be introduced, what level of obligation (e.g. in percentage or energy terms) would be appropriate?

16a) An obligation towards the heat sector would accelerate transforming especially rural Ireland fast with limited (costly hardware) investments in households (eg in heatpumps and solar/wind systems) under the situation that local grids are not yet ready (insufficiently 'smart' and flexible) for regional and microgeneration systems. Obviously long term, those solutions (heatpumps and solar/wind microgeneration) benefit a robust and diverse energy matrix, but short term any reasonable measure to reduce fossil fuel is better!

16b) Can't see real tech barriers. Level playing field is important, and maybe also taking CPI into account since it applies mostly for rural Ireland (anything non-Dublin). Mention of 'technical barriers' often comes from vested interest.

16c) As stated before, this need further work such as a detailed cost-benefit-analysis (macro-economic study) plus roadmap to explore overall development of energy matrix, in view of the collective Irish obligations. Bernal Institute is positioned to help generate such a quantitative roadmap.

17) Final comments:

- There is a strong case for sustainable (bio and other renewable) fuels, and especially Sustainable Aviation Fuel supply chain in Ireland, including:
 - Maximized use of national feedstocks, for instance as related to the (re-) forestation policy of the Irish government.
 - Investments in local production capacity, high quality jobs, and import independence
 - Use of domestic fuel at national airports; benefitting trade balance and even export.
 - Bio-economy spin-out effects with this new supply chain as backbone (e.g. development of biobased materials, R&D capacity etc)
 - Positive impacts for Ireland (economic activity, jobs, rural development, CO2 savings and meeting related EU and UN targets, license to operate for aviation sector, sustainable tourism opportunities etc.)
- A detailed integral cost-benefit-analysis (including a macro-economic study, LCA and ecological analysis, and a wider sustainable energies, efficiencies and further carbon emission effort⁶) flanking a multi-annual roadmap is critical to understand the full economic /job creation and climate potential of the liquid biofuels opportunity within the context of the overall development of energy matrix and the further co-product spectrum of sustainable chemicals and materials. This is urgent, given the collective Irish obligations in terms of emission reduction and renewable energy use. Bernal Institute is positioned and willing to help generate such a quantitative roadmap; given earlier experiences (see footnotes before) in other jurisdictions.
- It should be noted that regarding the use of domestically produced feed stocks, the various feedstocks such as forest resource is spatially dispersed and many of the plantations are very small. This requires a systematic and well thought-through approach for the longer term supported by macro-economic impact study, proper LCA and scenario analysis using a roadmapping process to ensure Ireland positions itself well to capture the biofuels as well as the broader Bioeconomy opportunity for Ireland in the best possible manner.
- Having said that, especially Sustainable Aviation Fuels provide a cost effective measure to reduce emissions in aviation, a critical sector for the island state Ireland given its potential to also stimulate sustainable economic growth and job creation especially for rural Ireland.
- To realize a SAF supply chain in Ireland, there is need to transpose the RED-II in a way that works for aviation:
 - Ensure the possibility to generate tradeable certificates across fuel types/uses
 - Decouple the CO2 savings related to the SAF, from the actual fuel volumes
 - Installing the multiplier of 1.2 will make the business case easier, and gets us closer to parity with road transport biofuels
- The blending percentage of most of today's SAF in conventional (fossil) fuel is 50%. With a carbon reduction potential of >85% and an energy content of 43GJ/ton, SAF in a full biorefinery framework also serving other sectors (chemicals, renewable materials, etc) is a very interesting option to consider for the Irish government.

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⁶ See among others disruptive developments for renewable energy and emission reduction from the Bernal Institute such as but not limited to <https://www.irishtimes.com/news/science/limerick-researchers-develop-material-that-produces-water-from-air-1.4065959>, <https://www.irishtimes.com/business/innovation/university-of-limerick-drives-vehicle-battery-research-1.3736718>, and the many projects in composite materials.