FUELS Industry UK

ANNEX A – part of our response to the UK ETS Free Allocations Review Carbon Leakage Consultation

Review of NERA Report: "Updated Carbon Leakage Indicators for the UK Emissions Trading Scheme"

1. Executive Summary

The main findings are that there are shortcomings as follows:

- For the refining sector there are clearly issues with the mismatch between the scope of the ETS and the ONS Annual Business Survey, where many other activities are included under NACE Code 19.20.
- With the mismatch in scope, there are also issues with the mapping of CN Codes against NACE Code 19.20.
- Use of verified emissions from the UK ETS Compliance Report as a proxy for direct emissions also misrepresents the sector which has significant heat and electricity imports and exports. This slightly overstates direct emissions, but more importantly understates indirect emissions, with a net underestimation of the emissions Intensity and consequently the CLI.
- Use of company data from annual financial reports is also a compromise as the company reports for all eight companies with installations included in the UK ETS under NACE Code 19.20 are also involved in other activities classified under other NACE Codes.
- The methodology used by NERA to determine indirect emissions is not robust and will inevitably result in different emissions intensities to the methodology used by the Commission in determination of the EU CLIs. Fuels Industry UK understand that the EU determination was based on energy flows and associated indirect emissions reported by the 98 refinery installations included in the baseline data collection for EU ETS Phase 3 rather than the average under NACE Code 19.20 reported in Eurostat for 2007/2008 (over 800 business entities for EU-28). This leads to underestimation of indirect emissions intensity.

There are clearly issues found with data quality and applicability when assessed against the criteria set for the study – in particular, transparency, quality and coverage (including mismatches in scope between the ONS Annual Business Survey and UK ETS Compliance Report). On close inspection, the quality of the HMRC Trade

Info Data is also open to question due to the inclusion of suppressed and unclassified data, along with imports or exports where no quantity or data has been recorded.

As a result of these shortcomings, the CLI determination for the refining sector outlined in the NERA Report understates the carbon leakage risk in the following way:

- The trade intensity is understated (by up to 20%?) due to the inclusion of products not produced by refineries. Although this leads to increased import and export values, it leads to a greater increase in turnover, part of the denominator in the determination of trade intensity.
- The GVA is overstated due to the inclusion of business entities other than refineries; Fuels Industry UK believe the net effect is that the direct emissions intensity is understated by around 25%.
- Fuels Industry UK estimate the indirect emissions intensity for the refining sector to be at least a factor of three greater than that determined by NERA at a similar level to that found in the EU determination of CLI. NERA are thereby understating the CLI.
- Based on past assessment of trade and emissions intensity and CLI performed by Fuels industry UK for the refining sector, we believe the CLI is over 5, significantly higher than that reported by NERA.

Similar issues will be found for other sectors where there are significant differences in the range of business activities and products covered by the ONS ABS and installation permitted under the UK ETS.

2. Context

The NERA Report "Updated Carbon Leakage Indicators for the UK Emissions Trading Scheme" was published by the UK ETS Authority alongside the UK ETS Authority consultation "UK Emissions Trading Scheme: free allocation review - carbon leakage", which considers options for use of the Carbon Leakage List (CLL) to determine UK ETS free allocation eligibility. The Report was commissioned by the Department of Energy Security and Net Zero (DESNZ) to support the UK ETS Authority in developing updated Carbon Leakage Indicators (CLI) based on UK data.

The Report states that the UK ETS Authority and NERA assessed the quality and applicability of different UK data sets against the following criteria:

- Longevity: Whether there is high confidence that the data will be produced in future ETS phases.
- Transparency: Whether the data is easily accessible, transparent, and available for scheme participants.
- Data quality: Whether the data is accurate and produced to robust standards.
- Data coverage: Whether the data has enough coverage for the relevant ETS sectors.

- UK focus: Whether the data is based on UK firms and representative to the scheme participants.

The assessment prioritised key sectors with sector specific data issues where significant differences were seen in the CLI calculated using UK data compared to the CLI values previously developed for the EU Carbon Leakage List and those sectors close to the CLL threshold. As a consequence, attention was largely focussed on sectors with an existing EU CLI between 0.15 and 1[1].

Although the CLI calculated by NERA using UK data for NACE Code 19.20 "Manufacture of refined petroleum products", is above the CLL threshold, the value reported by NERA is significantly lower than the EU CLI value (Table 1), with marked differences in the direct and indirect emissions intensities.

Table 1. Comparison of EU CLI against values calculated using UK data

Component	EU	UK	
		NERA	Fuels Industry UK Internal[2, 3]
Trade Intensity, %	25.8	43	52.4
Direct Emissions Intensity, (kg CO_2/€)	11.44	5.07	8.61
Indirect Emissions Intensity, (kg CO_2/€)	1.031	0.37	1.16
Emissions Intensity, (kg CO_2/€)	12.471	5.44	9.78
CLI	3.22	2.35	5.13

Unfortunately, it is not possible to replicate the NERA determination of the CLI for NACE Code 19.20 using data from the ONS Annual Business Survey for the years 2019, 2020 and 2021, as the data for 2020 is not included[4]. It is unclear what value NERA have

[1] EU ETS phase 4 Preliminary Carbon Leakage List, Carbon Leakage Indicator underlying data.

[2] Fuels Industry UK assessment using refining sector turnover and cost of sales data taken from company annual reports filed at Companies House for the years 2018, 2019 and 2022 (see Section 4). Direct emissions have not been corrected for heat and electricity exports and indirect emissions intensity is based on total as opposed to purchased electricity consumption recorded in DUKES Table 5.1, but there is no publicly available data that would support a more accurate determination of both direct and indirect emissions.

[3] The HM Treasury Green Book GDP deflator values have not been applied but the emissions intensities and CLI have been converted to a € basis using the Bank of England Annual Average £/$ Exchange Rate at 31st December 2014 used in the NERA assessment.

[4] Note [c] is given for GVA, this "denotes confidential information suppressed to avoid disclosure".

used for GVA in the determination of emissions intensity – use of a high value would lead to much lower emissions intensity than anticipated.

Fuels Industry UK has previously undertaken an evaluation of carbon leakage risk for the refining sector based on UK data – this has shown that the sector is at higher risk than suggested by the EU CLI, largely due to higher UK trade intensity. Due to the nature of refining processes, the emissions intensity for UK refineries would be expected to be similar or higher than the EU average, due to their higher complexity and configuration, resulting in a CLI higher than the EU value of 3.22.

In the absence of a UK CBAM for petroleum products, free allowance allocation is a key policy measure for the sector in providing mitigation against carbon leakage, which has been a factor involved in the closure of four refineries since 2008 and in reconfiguration resulting in lower crude distillation capacity of three of the remaining five UK refineries[5]. Continued access to free allowances at 100% of the benchmark value is therefore of critical importance to the sector.

In view of concerns regarding data sources used in the NERA analysis, Fuels Industry UK has carried out a detailed review of the NERA Report and quality and applicability of the data used against the criteria set out by the UK ETS Authority and NERA. This paper identifies a number of data and scope issues, with recommendations also made on use of alternative data in the public domain.

3. Sector definition

The NERA Report seeks to identify CLI for sectors identified by DESNZ at 4-digit NACE Code level. Refining activities fall under NACE Code 19.20 "Manufacture of refined petroleum products". This is defined as follows:

"the manufacture of liquid or gaseous fuels or other products from crude petroleum, bituminous minerals or their fractionation products. Petroleum refining involves one or more of the following activities: fractionation; straight distillation of crude oil; and cracking."

The class includes:

- production of motor fuel: gasoline, kerosene etc.
- production of fuel: light, medium and heavy fuel oil, refinery gases such as ethane, propane, butane etc

[5] Refinery closures since 2008 have been Petroplus Teesside (2008), Petroplus Coryton (2011), Murco Milford Haven (2013) and Petroineos Grangemouth (2025). Significant capacity reductions have been implemented at the EET Fuels Stanlow (2014), Esso Fawley (2012), Prax Lindsey (2018) and PetroIneos Grangemouth (2020) refineries. Closure of the Coryton refinery in 2011 followed failure of the Petroplus business, but the remaining refinery closures and capacity reductions have been made following strategic decisions by the operators faced by poor refining margins and loss of competitiveness. Fuels Industry UK understands these have not been taken due to carbon pricing and ETS compliance costs directly, although these have contributed to the decisions.

- manufacture of products for the petrochemical industry and for the manufacture of road coverings
- manufacture of oil-based lubricating oils or greases, including from waste oil
- manufacture of various products: white spirit, vaseline, paraffin wax, petroleum jelly etc.
- manufacture of petroleum briquettes
- blending of biofuels, i.e. blending of alcohols with petroleum (e.g. gasohol)
- manufacture of peat briquettes
- manufacture of hard-coal and lignite fuel briquettes

Use of NACE Code 19.20 clearly includes many activities not associated with refinery operation (highlighted in red). The ONS Annual Business Survey used as a data source for the NERA Report records 94 business entities under SIC Code 19.2 for 2019; 94 for 2020 and 111 for 2021. This is a far higher than the number of installations recorded under NACE Code 19.20 in the UK ETS Compliance Report – Emissions and Surrenders and EU ETS Transactions Log during the same period (see below), when only eight refineries were in operation.

Under the UK[6] (and for that matter, the EU ETS), refining is included as an Annex 1 activity as "Refining of mineral oil". This is further defined in the Free Allocation Rules (FAR) Regulation (EU) 2019/331 and EC Guidance Document No 9 "on the harmonised free allocation methodology for the EU-ETS post 2020: Sector-specific guidance" as activities involving a "Mix of refinery products with more than 40 % light products (motor spirit (gasoline) including aviation spirit, spirit type (gasoline type) jet fuel, other light petroleum oils/light preparations, kerosene including kerosene type jet fuel, gas oils) expressed as CO_2 weighted tonne (CWT). Refineries with other product mixes are not covered by this product benchmark."[7] and are so-called atypical sites producing mainly lubricants or bitumen.

The UK ETS Compliance Report – Emissions and Surrenders referenced by NERA includes only nine installations under NACE Code 19.20 (Table 2).

[6] The activities covered by the UK ETS are identified in Annex 1 of the version of the ETS Directive 2003/87/EC taken into UK law after the UK left the EU (see also The Greenhouse Gas Emissions Trading Scheme Regulations 2012 SI 2012 No. 3038 (as amended).

[7] The links above are to the versions taken into UK law, except for EC Guidance Document No. 9, which is the latest version. The activity description is the same as in the previous version issued on 14th April 2011 and last updated on 20th December 2011, which is understood to be the version currently applicable for the UK.

Table 2. NACE Code 19.20 - UK ETS Installations

Installation	Permit No.	Benchmark
Eastham Refinery	UK-E-IN-11540	Fallback approach (heat benchmark)
Essar Oil Stanlow Refinery	UK-E-IN-12052	Refinery benchmark
Esso Petroleum Fawley CHP	UK-E-IN-12019	No free allocation
Esso Petroleum Fawley Refinery	UK-E-IN-11402	Refinery benchmark
Haltermann Carless Harwich Refinery	UK-E-IN-11818	Fallback approach (heat benchmark)
Petroineos Grangemouth Refinery	UK-S-IN-12340	Refinery benchmark
Phillips 66 Humber Refinery	UK-E-IN-11607	Refinery benchmark
Prax Lindsey Oil Refinery	UK-E-IN-12795	Refinery benchmark
Valero Energy Pembroke Refinery	UK-W-IN-13017	Refinery benchmark

The Eastham and Haltermann Carless Harwich refineries are both atypical refineries and receive free allowances under the fallback approach. There are also two entries for Esso Fawley under permit numbers UK-E-IN-11402 (Fawley Refinery) and UK-E-IN-12019 (Fawley Refinery CHP); Fawley Refinery CHP should rather be classified under NACE Code 35.11 "Production of electricity" for the purposes of the CLI assessment.

The inclusion of nearly 100 other business entities involved in activities other than refining (as identified above) impacts turnover and GVA figures directly, along with the trade and emissions intensity. The majority of these business entities are believed to be involved in the manufacture and blending of lubricating oils and greases, where unit prices and margins are much higher than for the bulk fuels manufactured by refineries. Fuels Industry UK has been unable to identify any installations involved in these other activities in the UK ETS Compliance Report.

4. Mapping of import and export trade data to NACE Code 19.20

The issue with inclusion of activities not associated with refining under NACE Code 19.20 is also seen when mapping CN codes to the NACE Code, with approx. 24 of 73 CN Codes referring to products not produced by refineries. This increases the import and export trade values (in particular, due to many packaged lubricants being much higher value products than bulk fuels), again impacting the trade intensity.

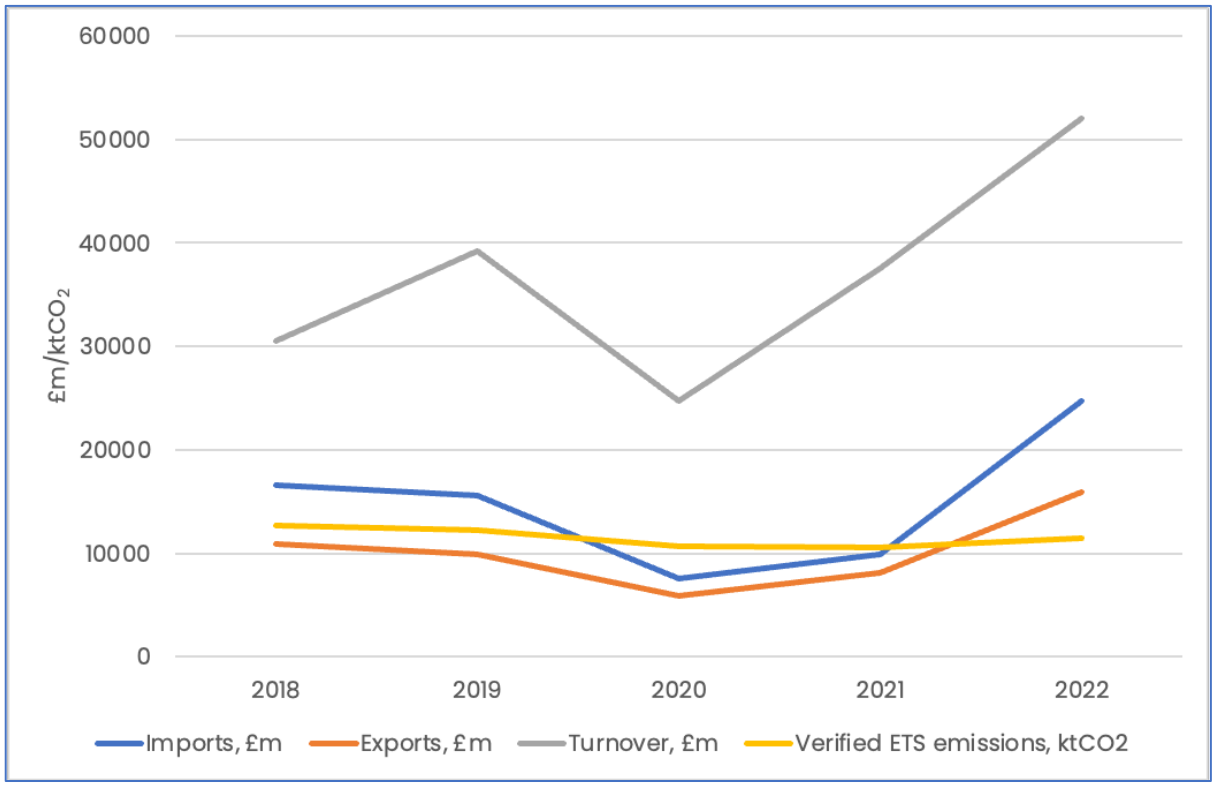
5. Assessment period

There are clearly issues associated with the determination of CLI based on 2020 and 2021 data due to the impacts of COVID 19 on product volumes, ETS emissions and trade flows, which will vary across different sectors. These impacts can be seen in the data used for calculation of trade and emissions intensity, especially when viewed across a longer period, for example 2018 to 2022 (Diagram 1 and Table 3).

Table 3. Key Input Data for CLI Determination for NACE Code 19.20

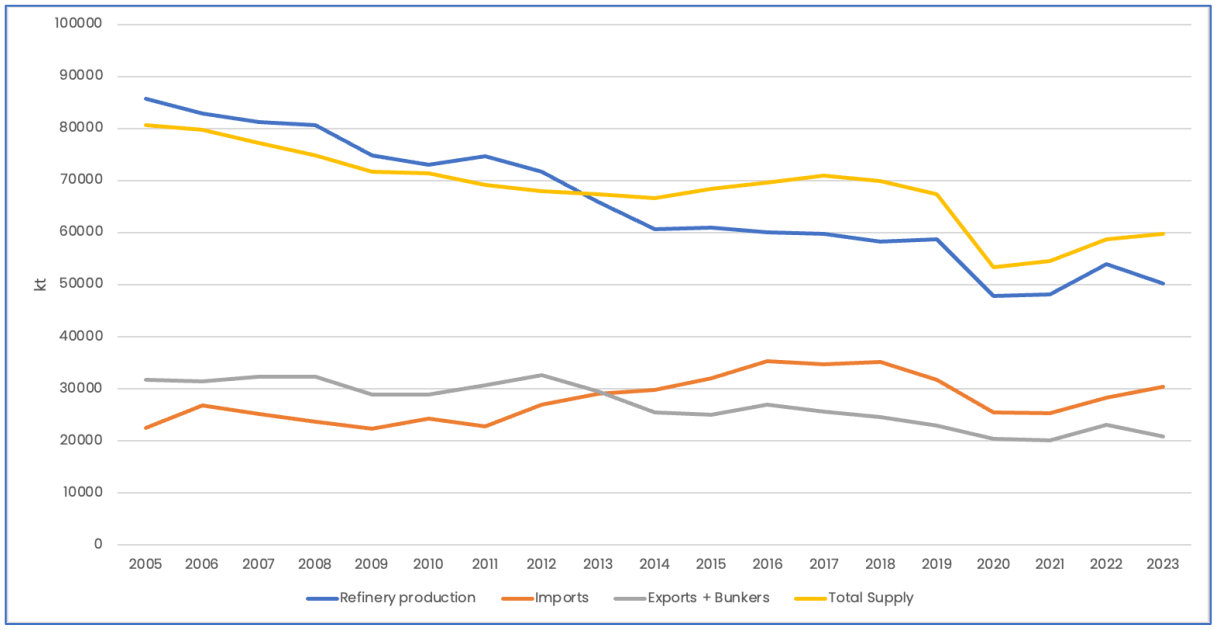
	2018	2019	2020	2021	2022
Imports, £m	16644	15551	7537	9868	24715
Exports, £m	10917	9932	5941	8145	15923
Turnover, £m	30542	39173	24748	37594	52059
Verified ETS emissions, $mtCO_2$	12.71	12.19	10.64	10.52	11.41

Diagram 1. Impacts of COVID pandemic on key input data for NACE Code 19.20



The impacts of COVID 19 can also be seen in longer term supply breakdown from 2005 to 2023 (the period covered to date by the EU and UK ETS), with the UK becoming a net importer of petroleum products in 2013 (Diagram 2).

Diagram 2. Supply of petroleum products – 2005 to 2023



Data source: DUKES Table 3.3

Fuels Industry UK therefore believe strongly that the CLI determination should not be based on the period 2019 to 2022, but on either a longer period excluding 2020 and 2021 or on the years 2018, 2019 and 2022.

6. Emissions intensity

The assessment of direct emissions intensity performed by NERA for NACE Code 19.20 considers only verified emissions for the nine installations assigned to NACE Code 19.20 in the UK ETS Compliance Report. The balance of approx. 90 business entities recorded in the ONS Annual Business Survey are not covered by the UK ETS but will inevitably include manufacturing plants with small boilers or furnaces, although many will use electricity imported from the grid with associated indirect emissions.

However, there are also more fundamental issues associated with use of verified ETS emissions as a measure of direct emissions and sector level estimates of indirect emissions for the six major refineries, due to differences in the supply arrangements for heat and electricity (Table 4).

Table 4. Supply of heat and electricity to major UK refineries

Installation	Emissions from heat and electricity generation/use
Essar Oil Stanlow Refinery	Included in direct emissions. Limited electricity and heat export.
Esso Petroleum Fawley Refinery	Significant heat and electricity imports and exports.
Petroineos Grangemouth Refinery	Significant heat and electricity imports.
Phillips 66 Humber Refinery	Significant heat and electricity imports.
Prax Lindsey Oil Refinery	Significant heat and electricity imports.
Valero Energy Pembroke Refinery	Significant electricity imports in some years.

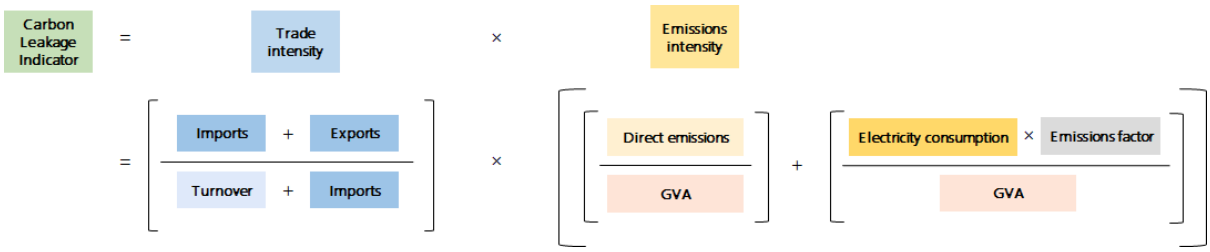
Verified emissions for the refineries should therefore be corrected for emissions associated with heat imports and exports and for emissions associated with electricity exports. This information is not in the public domain, but is reported to the UK ETS Authority in the baseline emissions data.

The methodology used by NERA for determination of indirect emissions as an average across all business entities included under the NACE Code is also open to question. According to DUKES Table 5.1, electricity use by refineries is significant, averaging over 4200GWh/year in the period 2019 to 2021. The NERA sector estimate, which appears to average around 3900GWh/year Is significantly lower than refinery use alone recorded in DUKES. During this period, only one of the six refineries imported significant electricity from the grid, with the other five either generating their own electricity or importing electricity from adjacent or integrated power generation facilities over private networks.

As pointed out to DESNZ in the Fuels Industry UK response to the consultation on the Free Allowance Allocation Review, the EU and UK CLI values should not be compared unless corrections are made to the emissions intensity. Whilst trade intensity is dimensionless, the emissions intensity is not, with the EU direct and indirect emissions intensities likely to be higher due to use of the € as a denominator in place of £. This has been considered in the NERA Report with adjustments applied to the monetary values using the HM Treasury Green Book GDP deflator values and Bank of England Annual Average £/$ Exchange Rate at 31 December 2014. This correction has not been applied in the same way in analysis carried out by Fuels Industry UK, as the underlying estimation methodology for emissions intensity is not robust.

Fuels Industry UK note that the CLI formula includes only emissions associated with electricity consumption in the term for indirect emissions (Diagram 3).

Diagram 3. Carbon Leakage Indicator Formula



This is likely to understate refinery indirect emissions where significant heat imports are found and thereby understate the resulting CLI.

7. Sectors with significant changes in CLI

There are significant differences between the EU CLI and CLI determined by NERA using UK data for the margarine and edible oils and fats (Tables 4 and 5) and cement (Table 6) sectors.

Manufacture of oils and fats and margarine and similar edible fats

Data obtained from the ONS Annual Business Survey and UK ETS Compliance Report does not support the determination of CLI identified in the NERA Report for NACE Code 10.42 "Manufacture of margarine and similar edible oils and fats", as there are no installations permitted under this NACE Code in the UK ETS (Table 5).

Table 5. Comparison of EU and UK CLI values – manufacture of margarine

Component	EU[1]	UK (NERA)
Trade Intensity, %	14.9	116
Direct Emissions Intensity, (kg CO_2/€)	0.02	2.58
Indirect Emissions Intensity, (kg CO_2/€)	0.18	0.22
Emissions Intensity, (kg CO_2/€)	0.20	2.80
CLI	0.030	3.25
No. of permitted installations in UK ETS		0
No. of business entities operating UK ETS installations		0
Number of business entities in ONS ABS		1 (2021)

Manufacture of edible oils and fats

Following failure to replicate the NERA analysis for NACE Code 10.42, Fuels Industry UK have also reviewed the CLI calculation for NACE Code 10.41 "Manufacture of edible oils and fats (Table 6).

Table 6. Comparison of EU and UK CLI values – edible oils and fats (NACE Code 10.41)

Component	EU[1]	UK (NERA)
Trade Intensity, %	43.4	77
Direct Emissions Intensity, (kg CO_2/€)	0.586	1.18
Indirect Emissions Intensity, (kg CO_2/€)	0.379	0.84
Emissions Intensity, (kg CO_2/€)	0.965	2.02
CLI	0.419	1.55
Turnover, £m		1103(2021)
GVA, £m		222(2021)
No. of permitted installations in UK ETS		10
No. of business entities operating UK ETS installations		9
Number of business entities in ONS ABS		84 (2021)

Again, there is a significant difference between the EU CLI and that determined by NERA, but here the number of business entities included in the ONS Annual Business Survey under NACE Code 10.41 is an order of magnitude above the number of installations and operators permitted under the UK ETS. This is a similar situation to that found for the refining sector under NACE Code 19.20, increasing turnover, GVA and import and export values due to the inclusion of business entities and products not produced by UK installations permitted under the UK ETS.

Manufacture of cement

The higher CLI determined by NERA for the cement sector (NACE Code 23.51) is due to the much higher UK trade (x4) and direct emissions intensity (x2) compared to the EU average. There is close correlation between the number of business entities recorded in the ONS Annual Business Survey and the UK ETS Compliance Report (Table 7). A high-level analysis of HMRC Trade Info and ONS Annual Business Survey data suggests that mapping of CN Codes to NACE Code 23.51 is important in the determination of import and export values – use of CN Codes under HS Heading 2523 only results in a lower trade intensity (22.5 for 2021) than that calculated by NERA.

Table 7. Comparison of EU and UK CLI values – manufacture of cement

Component	EU[1]	UK (NERA)
Trade Intensity, %	10.1	45
Direct Emissions Intensity, (kg CO_2/€)	22.89	54.93
Indirect Emissions Intensity, (kg CO_2/€)	1.33	1.34
Emissions Intensity, (kg CO_2/€)	24.22	56.27
CLI	2.445	25.26
No. of permitted installations in UK ETS	11	
No. of business entities operating UK ETS installations	6	
Number of business entities in ONS ABS	6	
Turnover, £m	427 (2021)	
GVA, £m	171 (2021)	
Imports, £m	61.8 (2021)	
Exports, £m	48.4 (2021)	

Fuels Industry UK has been unable to determine why the UK cement sector has a significantly higher direct emissions intensity than the EU sector.

8. Key conclusions

The mismatch between the activities included under NACE Code 19.20 and the ETS scope clearly causes distortion in the trade intensity and direct and indirect emissions intensities. The value of imports and exports taken for HMRC trade info data will be inflated by the inclusion of products not produced by refineries, with the turnover figure inflated by the inclusion of business entities other than refining. To put this in perspective, the ONS ABS for 2019 includes 94 business entities under NACE Code 19.20, when there are only 8 refineries permitted under the UK ETS. A similar issue arises with use of ONS ABS GVA data in the direct and indirect emissions calculation.

The way in which NERA have determined indirect emissions intensity for electricity consumption is also subject to challenge and may bear no relation to electricity use and associated indirect emissions for the refineries. Again, the indirect emissions intensity will also be distorted by use of ONS ABS data for NACE Code 19.20 and the estimation of consumption for 2019 and 2020.

In summary, the CLI determination for the refining sector outlined in the NERA Report is not robust and understates the carbon leakage risk:

- The trade intensity is understated (by up to 20%?) due to the inclusion of products not produced by refineries. Although this leads to increased import

and export values, it leads to a greater increase in turnover, part of the denominator in the determination of trade intensity.

- Use of verified emissions from the UK ETS Compliance Report as a proxy for direct emissions misrepresents the sector which has significant heat and electricity imports and exports. This slightly overstates direct emissions, but more importantly understates indirect emissions, with a net underestimation of the emissions Intensity and consequently the CLI.
- The GVA is overstated due to the inclusion of business entities other than refineries; Fuels Industry UK believe the net effect is that the direct emissions intensity is understated by around 25%.
- The methodology used for determination of indirect emissions is not robust due to the wide variation in indirect emissions across the range of activities covered by NACE Code 19.20. Fuels Industry UK estimate the indirect emissions intensity for the refining sector to be at least a factor of three greater than that determined by NERA at a similar level to that found in the EU determination of CLI. This would Increase the UK CLI number.

Similar issues will be found for other sectors where there are significant differences in the range of business activities and products covered by the ONS ABS and installation permitted under the UK ETS.

[ENDS]