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To whom it may concern, ahead of COP27 meetings on steel

Concern about IEA definition of "Near Zero Emissions" materials production.

Ahead of COP27, the International Energy Agency has released the report "Achieving Net Zero Heavy Industry Sectors in G7 Members" developed in co-operation with the incumbent industrial players. The report contains an invaluable survey of technical and political measures for supporting change in the emissions of the "heavy" industries.

However, this note is to raise concern about the IEA reports' proposed definition of "near zero emissions" materials production applied to the steel industry. This definition focuses on improvements relative to today's emissions, rather than on total emissions, which is all that matters in climate science and compliance with climate policy.

The current proposal may help to stimulate decarbonisation of primary steel production but does so at the expense of disguising the much greater emissions saving delivered by steel recycling. It may therefore have unintended consequences, including:

- Procurement decisions favouring higher emitting primary production when procurement from significantly lower emitting Electric Arc Furnace production is possible;
- Inconsistent communication of the embodied carbon in steel products – allowing primary producers a form of 'greenwashing' if labelling steel as "lower emissions" even when it causes much higher emissions than Electric Arc Furnace production;
- Lack of distinction between production scrap and end of life scrap, which reduces the motivation for material efficiency in steel processing;
- Reduced incentive to invest, innovate and promote the growth of Electric Arc Furnace production;
- Displacement of domestic Electric Arc Furnace steel production in favour of imported high-emitting, primary production.

The technical context of this concern is that the surest path to zero emissions steel production is to expand global capacity for steel recycling and power it with nuclear or renewable electricity:

- Steel is made today almost entirely by two processes: two-thirds of it is made with coal in high-emitting blast furnaces, with an average emissions intensity of 2,945 kg CO_{2e}/tonne (according to the IEA report). One third is made by recycling scrap steel in electric arc furnaces, with an average emissions of intensity of around 285 kg CO_{2e}/tonne crude steel.
- The emissions of recycled steel are already ten times lower than those of blast furnace steel. Most of the emissions associated with steel recycling arise in electricity generation, so could be eliminated if supplied by renewables or nuclear power. Thus, existing EAF technology can already deliver close to zero emissions steel.
- Global supply of steel for recycling will double or more in the next thirty years. On average steel products (mainly in construction, vehicles and industrial equipment) last 35-40 years in service, and then are almost all recycled. The supply of scrap steel therefore tracks the history of total global steel production with a delay of 35-40 years. The great expansion of steel production driven by China's construction boom starting in the 1990's will therefore soon lead to a rapid expansion in scrap supply. All of this expansion will lead to near zero emissions steel production, if global electricity supplies continue to decarbonise.
- It is a myth that "blast furnace steel is good quality, while recycled steel is poor quality." Liberty Steels in Rotherham in the UK make aerospace grade steels from recycled scrap, and Nucor in the US now delivers car-body sheet steel from recycling.
- For twenty years, incumbent blast furnace operators have talked about carbon capture and storage as key to their future but have delivered only the small-scale demonstration plant in Abu Dhabi. Recently, their focus has turned more towards hydrogen steel making, with hope focused on the Hybritt demonstration in Sweden. Yet, as Vattenfall said in their early publicity for Hybritt, "hydrogen electrolysis requires a vast supply of emissions-free electricity." It takes seven times more electricity to make a tonne of steel with hydrogen made by electrolysis, than to make a tonne of steel by recycling in an electric arc furnace.

The political context of the concern, arising from this technical context, is that the steel industry can no longer speak with a single voice: all existing blast furnace operations must close (or be retrofitted with CCS, although such retrofit has yet to be deployed at scale on any existing blast furnace) to meet zero emissions targets; meanwhile electric steel recycling will expand with the scrap supply, and creates a natural path to near zero emissions steel.

- The blast-furnace steel operators are concentrated, with few large players having significant influence within WorldSteel. Meanwhile, the electric arc furnace operators are fragmented, but have no independent international representation.
- As a result of this uneven lobbying power, the IEA report introduces in figure 3.7 (page 127) a sliding scale of progress towards "near zero emissions" steel, to reward relative progress. However, the maximum achievement anticipated on this scale for blast furnace steel production would still lead to greater absolute emissions than today's average electric arc furnace production.

- Were this scale adopted and used to influence procurement decisions, government subsidies or any other form of support, it would probably cause the closure of local low-emissions electric steel recyclers, in the face of imported competition, while giving licence to the continued much higher emissions of blast furnace production.

The IEA's proposal appears to reflect a power-imbalance between high and low emitting steel makers today, would perpetuate high-emitting steel making, and greatly inhibit the achievement of zero emissions by 2050. The only metric of importance is the total emissions per tonne of steel produced, and the only scalable option for zero-emissions steel production over that time period, is the expansion of high-quality electric steel recycling. In parallel, the strategies of material efficiency and associated demand-side policies must be deployed to reduce total demand to match available zero-emissions supply, adding more value to less steel, with growth and innovation opportunities throughout the steel supply chain.

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