EUROFER
THE EUROPEAN STEEL ASSOCIATION

Position Paper

The European steel industry recommendations on Industrial Demand Side Response

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Executive Summary

- As decentralised energy systems will be dominated by variable and intermittent weather-dependent electricity generation, the provision of flexibility services under all relevant time-frames will need to be scaled massively to maintain an efficient functioning and security of supply
- The European steel industry is already a key provider of flexibility in the EU electricity system
- The need to realise in record-time new fossil-free generation capacity and expand electricity grids, key enablers of the decarbonisation of industries, shall nonetheless remain the priority
- The sector could contribute further provided that the structural challenges around the energy transition, namely the speedy roll-out of new generation capacity, the expansion of grids, and the restoration of cost-affordable electricity prices, are addressed first and as a priority
- The assessments of flexibility needs, technology potentials, and the related target-setting process shall preserve and respect the economic, organisational, and technical limits of industrial production processes such as steel
- European and national initiatives on demand-side response should create the optimal conditions for industrial consumers to provide flexibility while retaining international competitiveness and limiting overall electricity system costs:
    - Maintaining participation of industry to demand-side response schemes, voluntary
    - Ensuring that public support schemes for investments in fossil-free demand-side response can be swiftly and seamlessly accessed by energy-intensive industries under the new rules adopted with the technical reform of the Union electricity markets design regulatory framework
    - Guaranteeing that national assessments of flexibility needs under the new electricity markets regulatory framework do not overlook the untapped potential of other flexibility technologies
    - Shielding industrial consumers from additional regulatory costs due to the expansion of capacity mechanisms
- The steel sector overall welcomes the increased focus and planned actions to unlock the full potential of the wider range of DSR technologies in the pursuit of increased system resilience and more efficient use of electricity grids

The objective of this paper is therefore to inform policy-makers and stakeholders on the current uses, limits, and realistic potentials of demand-side response from the European steel industry along with a broad set of framework recommendations for an EU policy around demand-side response – ahead of future and possible policy-initiatives at EU and national level.

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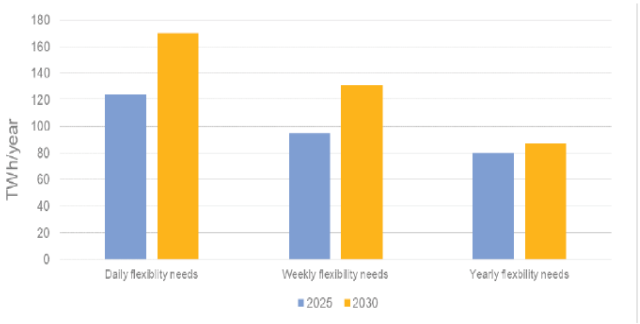
Background and Introduction

With the adoption of ambitious renewable energy targets for 2030 (i.e.,1.236GW of installed capacity with RePowerEU and 42.5% renewables as share in the final energy consumption with the third revision of the Renewable Energy Directive) the attention toward flexibility technologies as enablers of the integration of renewables in the EU from policy-makers and stakeholders alike has significantly increased[1]. This has been accompanied by equally ambitious expectations that all economic actors can indistinctively and promptly adjust their consumption patterns to the intermittent and variable character of renewables. The EU reform of electricity markets design[2] well reflects the priorities of the bloc in boosting flexibility services significantly.

Figure 10: expected evolution of flexibility needs in the EU



Source: ACER (Final assessment of the EU wholesale Electricity market design, April 2022)

As a large contributor of flexibility in the EU electricity system both via voluntary action and as a provider of ancillary services to electricity system operators, the European steel industry welcomes the renewed focus on flexibility, particularly demand-side response and grid-level storage. As decentralised energy systems will be dominated by variable and intermittent weather-dependent electricity generation, the provision of flexibility services under all relevant time-frames will need to be scaled massively to maintain an efficient system functioning and the security of supply.

The speedy roll-out of new generation capacity, the expansion and modernisation of electricity grids and the restoration of cost-affordable wholesale electricity prices must be the primary objectives. With the right conditions in place, energy-intensive industries such as steel, can contribute to demand-side response provided that the structural challenges around the energy transition are addressed adequately and as a priority.

Herewith below are our detailed views on the subject matter.

[1] European Commission, Staff Working Document, Reform of the Electricity Market Design, Proposal for a regulation (EU) of the European Parliament and of the Council amending Regulations (EU) 2019/043 and (EU) 2019/942 as well as Directives (EU) 2018/2001 and (EU) 2019/944 to improve the Union's electricity market design, 14 March 2023, SWD (2023) 58 Final

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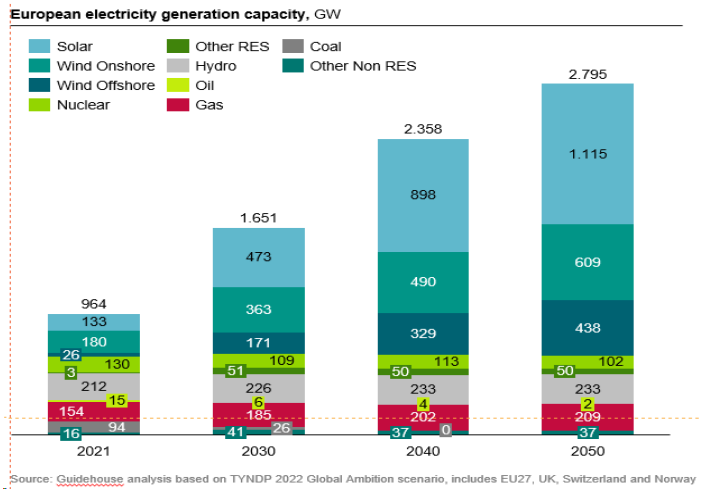
- **The need to realise in record-time new fossil-free generation capacity and the expansion of electricity infrastructure, key enablers of the decarbonisation of industries, shall nonetheless remain the priority**

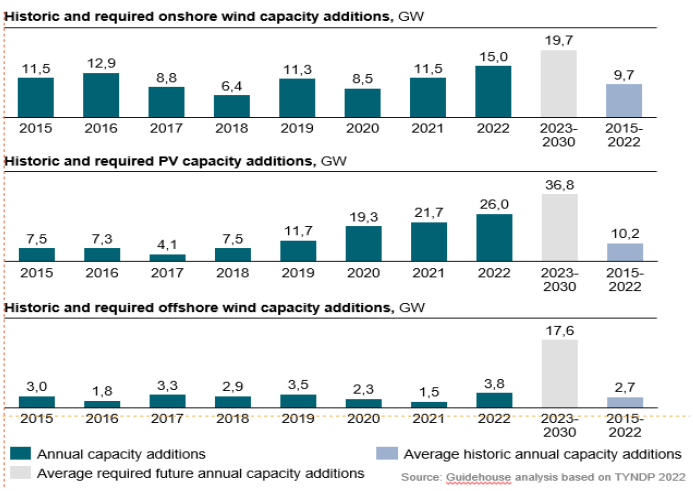
Energy is an indispensable input to produce high-quality steel. Affordable electricity, supplied stably and securely, is a necessary precondition for the competitiveness of the European steel industry and, even more for its transition to climate neutrality.

Today the sector consumes 75TWh of electricity per year, of which 55TWh are purchased from the grid, while the remaining part is generated by primary steelmaking from its industrial residual gasses. The decarbonisation of the steel sector will drive electricity consumption up to 165TWh by 2030 (twice the electricity consumption of Belgium) and to 400TWh by 2050 (close to the electricity consumption of Germany), comprising power needs for both hydrogen generation and steel production processes.

Therefore, it is urgent to quickly ramp up the installation of new generation capacity and ensure that sufficient dispatchable generation is available while minimising additional hurdles for European consumers. In this regard, we wish to highlight that the installation rates of new renewable generation capacity from 2022 until 2030 must reach record levels compared to their historical average installation rates for the EU to achieve its ambitious targets – equalling +33% for onshore wind (20GW/year), +40% solar PVs (37GW a year) and in larger magnitudes off-shore wind with from 2.7GW installed per year to 17GW per year until 2030 (see figures below)[3].

Accordingly, efforts in boosting the participation of demand-side response to the functioning of the electricity systems shall always reflect the need of industrial users to have continuity in production processes. It should therefore be an additional opportunity rather than a mandate.





[3] Guidehouse, Report "Low carbon energy transition – implications for the EU steel industry", January 2024

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- **The assessments of flexibility needs, technology potentials, and the related target-setting process shall preserve and respect the economic, organisational and technical limits of industrial production processes such as steel**

The revised EU electricity markets regulatory framework[4] mandates national governments with the duty of submitting national assessments of flexibility needs over a period from 5 to 10 years based on a European common methodology determined by the Agency for Cooperation of Energy Regulators (ACER). As an energy-intensive sector operating mostly via integrated production processes and efficiency rates close to their thermodynamical limits, and as a sector with a growing demand for a large amount of fossil-free electricity by 2030, the constraints faced by the steel sector vis-à-vis the increased flexibility needs shall be wholly reflected in any national and/or European assessments.

More specifically, there are two major constraining elements of our demand-side response potentials (see table on next page for a graphic representation of industrial DSR potentials as prepared by Guidehouse[5]):

- **Technical limit** which refers to the maximum available potential for changing the electrical load, considering safety and plant-related restrictions and the dependence on the downstream processes of a plant. The technical particularities of steel production such as electric arc furnaces , for instance, typically show a very high consumption associated with an unstable profile which makes their participation in balancing mechanisms technically impossible (e.g., FCR, aFRR) or economically difficult, depending on the design and penalties that may vary across TSOs[6].
- **Economic limit** which refers to both the opportunity cost and the investment cost for shifting or reducing consumption (hereinafter as load):
    - **Opportunity costs**: Refers to the cost of foregoing commodity production to accommodate either load shifting or load reduction in response to grid flexibility needs. Steel industrial processes, in particular, are not suited to provide flexibility over longer periods (other than that limited to a few minutes) while-intra-day flexibility (e.g. 15 min to a few hours) is constrained by economic, technical and organizational limitations (e.g, works-shift re-arrangements), which puts increased flexibility requirements on the workforce or system and on product qualities.
    - **Investment costs**: As a general rule, fixed costs recovery of assets implies full load operation of the underlying industrial processes and therefore with limited interruption cases and acceptable levels of variable costs. Although possible, any assessment of the potential of certain industrial sectors to alter their electricity load in response to volatile renewable generation should not leave aside the necessity to run production processes at full load.

[4] See footnote 1
[5] See footnote 3
[6] Acronyms in this paragraph refer to the reserves used by TSOs for frequency adjustment as defined by the electricity regulation and the EBGR : Frequency containment reserve (FCR), automatic Frequency Restoration Reserves (aFRR), manual Frequency Restoration Reserve (mFRR) and Replacement Reserves (RR). Although interruptibility schemes are not mentioned, the same variability accoss Member states can be observed

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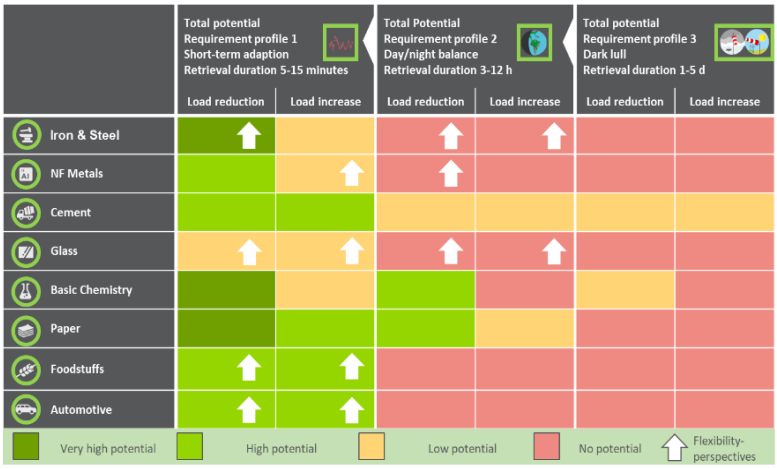

- **European and national initiatives on demand-side response should create the optimal conditions for industrial consumers to provide flexibility while retaining international competitiveness and limiting overall electricity system costs**

The European steel industry sector has been historically deploying a wide range of technologies aimed at minimising energy consumption via the integration of production processes and steps, and smart use of energy flows within the system.

In electrical steelmaking, **load reduction** is a well-established practice to provide flexibility and has been performed at best including via selling ancillary services to system operators. Additionally, other processes within the steel value chain provide flexibility increasingly to the electricity system.

Although **load shifting** in reaction to wholesale price levels is possible, it should be kept in mind that businesses still need visibility in scheduling production and that a fully adaptative organisation that would react overnight to the spot market is harder to manage on several accounts (i.e., hedging strategies, workers' shifts, maintenance planning etc). Load shifting was particularly used during the energy crisis and will continue to be used as a crisis management tool to avoid peak prices but the stress it generates on other production factors (i.e., assets aging rapidly, workforce cost) should prevent policymakers from conducting such a shift is simple for the industry.

In this context, we nonetheless welcome the renewed focus on the importance of flexibility and DSR for the renewable electrification of the European Union and additional opportunities that this sector could offer to the electricity system, having the right conditions in place.

This can be obtained by:

- Maintaining the participation of industry to demand-side response schemes, voluntary;
- Ensuring that public support schemes for investments in fossil-free demand-side response can be swiftly and seamlessly accessed by energy-intensive industries under the new rules adopted with the technical reform of the Union electricity markets design regulatory framework[7];

[7] See footnote 1

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- Guaranteeing that national assessments of flexibility needs under the new electricity markets regulatory framework does not overlook the untapped potential of other flexibility technologies such as DSR from electric vehicles, heat-pumps, storage, etc;
- Shielding industrial consumers from additional regulatory costs due to the expansion of capacity mechanisms.

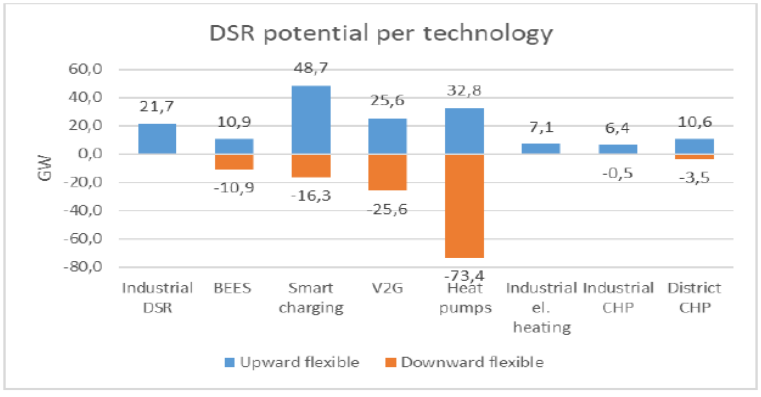
From a more general perspective, with the right framework conditions in place, industrial DSR can be a constructive opportunity for the sector to contribute further to the decarbonisation and resilience of the electricity system. This entails that policies around DSR are reconciled with current challenges faced by consumers and energy-intensive industries specifically such as the ongoing decarbonisation efforts, the need to access fossil-free electricity cost-affordably and securely, and the sector-specific constraints in the provision of additional flexibility services.

At last, it is also crucial to consider that flexibility instances of the electricity system will exert pressure on all market participants and operators from producers to, especially, industrial consumers exposed to international competition and in growing need of a stable supply of electricity. In that regard, strategic initiatives on flexibility shall not turn into artificial constraints of commodity production processes.

- **The steel sector welcomes the increased focus and planned actions to unlock the full potential of the wider range of DSR technologies in the pursuit of increased system resilience and more efficient use of electricity grids**

The European steel industry has been providing and continues to provide flexibility services in balancing intra-day and day-ahead markets – thus contributing to the stability of the system within given economic, organisational, and technical constraints. We thus cannot but welcome the European Commission's ambition to stimulate and improve the contribution of flexibility to the electricity system from other sectors of the economy and society (e.g., new dispatchable generation technologies, storage, electric vehicles, heat pumps[8]).

Figure 18: Demand side response potential per technology



Source: 'Demand-side flexibility: quantification of benefits in the EU' (2022).

[8] ACER, Public consultations on prioritising the removal of barriers to electricity demand response, 19 December 2023

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We particularly welcome the focus of the revised Union electricity markets regulatory framework[9] on the differing potentials of the existing classes of DSR technologies and on the necessity to boost their contributions to the functioning of the system.

Within this background, we would see concrete benefits in the adoption of a dedicated European strategy on demand-side response, as referred by novel Art.19d of the revised Electricity markets regulatory framework, to stimulate DSR from all sectors of the economy and society, drafted on such basis.

[9] See footnote 2

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