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Abstract

Industrial trade unions in Europe and North America often struggle to develop a coherent strategy on climate change and overcoming fossil fuel production patterns. Trade union policy in the German steel industry is an interesting example of this: the "green" restructuring is firmly in favour, as it is easily compatible with positions on maintaining production sites. However, the hydrogen technology required for this brings with it new contradictions. At the same time, the IG Metall trade union recently held a collective bargaining round on reducing working hours in the socio-ecological transformation. This working paper analyses this situation by reconstructing the fundamental structures of industrial relations, the coming hydrogen economy and working time policy.

JEL code: J51, J59, L50, L61, O14, Q55

Keywords

Steel, Hydrogen, Working Time Policy, Just Transition, Socio-Ecological Transformation

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1 Introduction

For industrial trade unions in Europe and North America, the ecological crisis and the political disputes surrounding crisis management are a strategic challenge. They are often faced with the choice of weighing up long-term ecological goals against short-term labour interests. Should the preservation of existing industrial jobs, including the co-determination and comparatively high wage levels achieved in past struggles, take centre stage? Or should the interests of wage earners in preserving the natural foundations of life be prioritised?

Attempts to overcome this "jobs versus environment dilemma" (Räthzel/Uzzell 2011) are referred to in the international debate as just transition strategies. These can take different forms. Sean Sweeny and John Treat distinguish between a social dialogue approach and a social power approach. While the former focuses on asserting the immediate interests of particular workforces in the mode of social partnership, the latter sees the transition as a deeper socio-ecological transformation. It inevitably questions power relations and is more conflict-orientated. However, its concretisation continues to pose considerable difficulties for trade unions in Europe and North America. (Sweeny/Treat 2018)

This working paper focuses on the disputes surrounding the decarbonisation of the steel industry in Germany and the approach taken by IG Metall. It provides an interesting example of how a trade union is attempting to position itself as a "driver of transformation" (Lehndorff 2023) and shows the contradictory relationship between dialogue- and conflict-oriented approaches. In the 2023 collective bargaining round, the union demanded a reduction in working hours to 32 hours a week or a 4-day week. Such a reduction in working hours, chief negotiator Knut Giesler explained, would not only be a "real relief" for employees but an advance in quality of life and health. The four-day week would also make the steel industry more attractive for young people, who are urgently needed in the conversion of coal-based heavy industry to low-emission production processes. At the same time, a reduction in working hours could also prevent job losses in connection with this restructuring. (Handelsblatt, April 5, 2023) Although the negotiations on the working time issue ended with a moderate result (see Chapter 5.2), it is worth taking a closer look at this attempt by IG Metall to bring together "social" and "ecological" progress in the transformation.

As will become clearer later on in this working paper, the given constellation in the steel industry is not primarily structured as a jobs versus environment dilemma; it is not the industry as a whole and its products that are questioned for climate policy considerations, but certain aspects of the production process. (Blöcker 2022) Compared to other industries, this makes it easier for a trade union to affirm change and focus on influencing it in a spirit of social partnership. IG Metall has been doing this for several years with the slogan "Our heart of steel has a green future".

This working paper examines the outlined constellation in more detail. The first chapter presents fundamental considerations on the system of steel production as an example of industrial-societal natural relations. Chapter 2 takes a look at the relations between capital and labor in this system and the relatively far-reaching rules for co-determination in coal and steel (Montanmitbestimmung). These rules also exert a strong gravitational pull in favor of trade union policies based on social partnership and compromise. Chapter 3 discusses the technical, economic, and political challenges of decarbonization via the shift to hydrogen-based production processes. Finally, chapter 4 returns to the collectively bargained working time policy, places it in the previously elaborated framework, and addresses the question of its significance for the trade union strategy of transformation.

This paper aims to highlight the difficulties and contradictions in IG Metall's endeavours to position itself as a "driver of transformation". The attempt to link the representation of skilled workers interests with the policy orientation toward decarbonized production processes remains entangled in the specific contradictions of German "conflict partnership" (Walther Müller-Jentsch). On the one hand, safeguarding production sites and competitiveness are cornerstones of the trade union strategy, which largely coincides employers' positions on ecological modernization.

On the other hand, the revival of the working time debate in this context signals that technological-ecological modernisation could also be linked to social progress for wage earners. This connection of ecological-technical modernization and the conflict for better working and living conditions also makes the debates about IG Metall's transition policy interesting for those activists who advocate a "labor turn" in the climate movement – which can only be successful if it corresponds with a "climate turn" of the trade unions. However, the 2023 collective bargaining results for the steel industry remain very cautious about working hours and thus also show that this approach is not a guarantee for immediate success.

In addition to scientific literature, this work is empirically based primarily on publicly available documents from trade unions and other associations, studies by think tanks in the field of energy transition and the hydrogen economy, and current press coverage. The findings from two interviews with experts were also included. When the positions of "the" union are referred to in the following, this refers to official statements of the organization on a national level. The positions and experiences of employees and the concrete making of the "green" transformation at a company level must be omitted from this working paper. It must be limited to an overview of industrial relations and the hydrogen debate.

2 The steel industry as a socio-technical metabolic system

Steel production is responsible for around 7 percent of global CO_2 emissions. It represents a striking example of the limitations of a climate policy approach that focuses primarily on individual lifestyles and consumption. Of course, a consumption figure per capita can also be given for steel – according to the World Steel Association (2023: 17), this was 379 kg per person in Germany in 2022, for example. However, numerous uses of steel as an industrial raw material elude any alleged consumer power: mechanical engineering and construction industry, wind turbines, and LNG pipelines... Steel production exemplifies why Simon Pirani, in his Global History of Fossil Fuel Consumption, insists "that fossil fuels are consumed by and through technological systems, which are in turn situated in social and economic systems" (Pirani 2018: 173).

Steel production can be seen as a gigantic metabolic machine. The metaphor of society's metabolism with nature was coined by Karl Marx when he studied the work of Justus Liebig – society as an organism that eats what it needs, utilizes what is useful, and ejects what is consumed or useless. Liebig, and so Marx, were concerned with the disruption of metabolism in the face of urbanization in the industrial age. While in the countryside the soils are depleted, consumption and feces are concentrated in the cities without the latter being able to be utilized as fertilizer in a balanced cycle. Instead, nitrogen and phosphorus are extracted in industrial processes and traded as commodities. (v. Redecker 2020: 43-49)

The metaphor of the metabolic rift can also be applied to mining and steel. A blast furnace takes a lot of time and effort to start up, which is why it is in operation around the clock 365 days a year – and it wants to be fed with hard coal and iron ore[1] just as continuously. The result is the desired pig iron, which can be further processed into steel, and the useless CO_2 (as well as heat, gases, and slag, some of which are put to other uses and some of which are waste). The traditional locations of steel production in Germany, for example in Saarland and the Ruhr area, can be explained by their proximity

[1] Strictly speaking, blast furnaces do not require ore and coal in the form in which they have been extracted from the earth, but rather ore and coal that have been prepared accordingly in a sintering plant or a coking plant. I will come back to this at the beginning of Chapter 3.

to the "feed sources", the pits, and collieries. Following their closure, the materials required now have to be procured over much greater distances.

Where exactly they come from is not only a geological question. For competing capitalist companies, the lowest possible raw material costs are an important factor (especially in the steel industry, where they accounted for 58.5 to 70 percent of total costs from 2003 to 2017, depending on price fluctuations on the world market, see Küster Simic et al. 2020: 21). Raw materials are sourced from where they can be obtained at low cost because labor is cheap and environmental regulations are less strict. It is no coincidence that Stephan Lessenich introduces his book on the mechanisms of the "externalization society" with a description of the 2015 dam burst at the iron ore mine in Bento Rodrigues, Brazil. The sludge from the mine's tailings pond killed 19 people, destroyed homes, and cut off hundreds of thousands of people from drinking water supplies. (Lessenich 2016: 9-17)[2] The most important countries of origin for iron ore imported to Germany are (2021) South Africa with just under 11 million tons, Canada with just over 9 million tons, and Brazil with about 7.5 million tons. (Statista 2023) The ore requirements for primary steel production will not be fundamentally affected by current decarbonization efforts. However, global natural reserves with relatively high iron content are shrinking. If lower-grade ore is used, correspondingly larger quantities will have to be excavated. (Shahabuddin et al. 2023: 14)

The German steel industry produced 36.8 million tons of steel in 2022; this puts the country in seventh place in the global ranking of steel production volume. Approximately 30 percent of the steel produced in Germany is accounted for by the so-called secondary route, i.e. the processing of steel scrap in electric arc furnaces (World Steel Association 2023). This paper focusses on the 70 percent primary steel production via so-called iron ore reduction in the blast furnace. This process for producing pig iron as a steel precursor accounts for the vast majority of the steel industry's CO_2 emissions. In 2022, German steel industry's production of 36.8 million t steel processed 18.2 million t of hard coal. The most important countries of origin for coal imports to Germany were Russia, Colombia, the USA, and Australia (VdKi 2023: 11f.). There are still five locations in Germany for primary steel production in the blast furnace route. These are Duisburg with an annual production capacity of 11.5 million t, Salzgitter (5.2 million t.), Bremen (3.8 million t.), Völklingen (3.2 million t.), Dillingen (2.7 million t.) and Eisenhüttenstadt (2.4 million t.) (Eurofer n.d.) In the course of decarbonization, coal is to be replaced by hydrogen as a reducing agent.

The capitalist form of the steelmaking metabolic system has further implications for the following analysis. Economically, the production facilities must be viewed as constant capital, tied up in time and space: It takes time to build a steel mill to pay for itself, and the mill is hardly mobile but will remain in the place where it was built until it is finally shut down. The state often plays a crucial role in mobilizing capital for such long-term investments, providing infrastructure and fundamental research, and minimizing risks. (cf. Harvey 2003: 87-135)

The socio-technical metabolic system of steel production is also a system of cooperation between a large number of workers based on the division of labor. Thus, it also stands for what humans are capable of achieving through coordinated action. However, labor and cooperation are also subject to the control and command of capital; in this sense, it is alienated labor. Historically, the steel industry was an industry not only characterized by quasi-military hierarchies but whose economic success was also based on extreme physical demands on workers (Hien 2018: 71-80); even though health protection and accident prevention have been considerably improved, the physically demanding work, especially in a three-shift operation, remains stressful to health.

[2] In 2019, a disaster along the same lines occurred near Brumadinho (Brazil), this time with 270 deaths.

The large-scale structure of the industry (Blöcker 2022: 6f.) favors unionization. The representative mode in the German system of industrial relations, however, implies that the interests and demands of workers articulated by trade unions cannot be regarded as an authentic reflection. As intermediary organizations, trade unions condense essential member interests and mediate them with the organization's interests of its staff. What different variants of this mediation of interests have in common is "the pragmatic recognition of the capitalist constraints of exploitation and the laws of the market as the framework conditions for trade union action (however these may be transcended ideally in programmatic pronouncements)." (Müller-Jentsch 2009: 66) A compromise-oriented strategy of distribution is necessarily dependent on growth: "Economic growth creates the material basis for consensus and compromise between capital and labor." (Müller-Jentsch 2009: 65)

3 Social partnership and corporatism in the German steel industry

The co-determination rules in the coal and steel industry (Montanmitbestimmung) were developed in the British zone after World War II and adopted for the Federal Republic in 1951. It includes parity co-determination on the supervisory board of a company and the appointment of labor directors on the management board, who are usually proposed by the trade unions. In addition, there are the co-determination mechanisms under the Works Constitution Act, i.e., the establishment of a works council that is obliged to cooperate "in a spirit of trust" with the management and that has limited rights of co-decision, information, and control. In addition, union shop stewards (Vertrauensleute) can be of importance as representatives of the union.

The coal and steel codetermination in Western Germany was established against the backdrop of widespread anti-capitalist sentiment among the population and not least among union members (Fuhrmann 2017: 83-86). Unions threatened to call for massive strikes, which had already been decided by ballot. In this respect, Timothy Mitchell's thesis of a "carbon democracy" seems to be confirmed: According to Mitchell, the emergence of the Western model of parliamentary democracy in the 20th century, including its welfare state institutions and social rights, can be largely explained by the power of organized workers in coal-based energy and basic material production. The ability to disrupt the production and transportation of coal through strikes – which had been repeatedly demonstrated in numerous labor struggles with mass participation in the coalfields of Western Europe and North America since the 19th century – has thus worked as a catalyst for the expansion of social and political rights throughout society. (Mitchell 2012: 12-42) However, the hopes of the trade union that co-determination in the coal and steel industry could be extended to the entire economic order proved to be an illusion. Instead, the political price of its introduction was the "complete abandonment of the goal of economic democracy and a reorganization of the economic and social order within the framework of supra-company co-determination" (Testorf 2017: 100f.) – even if important trade union actors such as Hans Böckler were more inclined to interpret coal and steel co-determination as a "first modest step (...) on the way to democratizing the economy" (cited in Müller-Jentsch 2021: 21).

Instead, coal and steel co-determination tended to promote the formation of corporatist relations between companies, trade unions, and the state and the development of a corresponding trade union conception. Among key officials, a "proto-corporatist attitude" (Fuhrmann 2017: 73) developed early on, which was directed toward recognition as a serious negotiation partner. For the unions, their recognition as part of the corporatist bloc results in a position of power with limited reach. It secures pragmatic policy options that can be used to represent members' interests. A success story told in this context is the management of redundancies in times of crisis using social plan policies, which were first practiced in the coal mining industry and later (first in 1962) in the iron and steel industry. After social plans had become a common instrument in the coal and steel industry in the 1960s, and after gross hardship resulting from corporate decisions had been cushioned in many cases, it was declared mandatory in the case of major operational changes in the amendment of the Works Constitution Act in 1972. In the steel industry, structural adjustment and rationalization measures were then to become a permanent task for works councils from the mid-1970s onward, as in the mining industry. (Müller-Jentsch 2021: 30)

As will become clearer later in this working paper, the orientation toward social partnership corporatism is also a determinant for the union's strategy in the current shaping of decarbonization. Nevertheless, this model has not been without crises and contradictions over the past decades. A special date here is the so-called September strikes of 1969, in which about 140,000 workers participated in spontaneous strikes. They successfully opposed the wage restraint that had been agreed upon within the framework of the "Concerted Action" of government, business, and unions. (Lauschke 2007: 146-157; for context: Birke 2007).

While the September strikes took place against the backdrop of the boom, in 1975 a crisis began under which such workplace struggles for improvements no longer existed. The crisis, however, caused other kinds of cracks in the corporatist model. Faced with accelerated job losses, the IGM in 1977 (a year in which 1,300 jobs were lost each month, see Martens 1979: 10) sought state flanking in the form of "structural investment guidance" and subsidies that should be linked to job security. When the IG Metall's efforts to achieve "structural investment control" and subsidies (Lauschke 2007: 235) were unsuccessful, the demand for a reduction in working hours as a means of dealing with the crisis came to the fore. This resulted in the extremely confrontational collective bargaining round in the winter of 1978/79. While the IGM had committed itself to a reduction in working hours through the introduction of the 35-hour week, the employers' side, within the framework of the BDA, had pledged not to allow such an example of further reduction in weekly working hours. All steel companies responded to the IGM strike with lockouts. The strike ended after 44 days with a result that did not reflect the central union demand: Instead of a reduction in weekly working hours, an extension of vacation, as well as six additional free shifts for night shift workers and three free days for those over 50, were agreed. (Martens 1979)

As the crisis progressed, a "steel policy program" was adopted at the 1983 IGM trade union conference that went beyond the scope of social partnership compromise. Against the will of the union executive board, a majority of delegates demanded the socialization of the steel industry to expand political options in the course of the crisis. (Lauschke 2007: 299ff.) The idea was to combine all steel operations in a holding company that would be responsible for planning production, personnel, and sales. The individual plants, however, would have remained independent. Parity co-determination was to apply at all levels. The holding company was to be set up as a stock corporation; the expropriated employees would have been compensated through shares, without any resulting power in the control of the company. (Judith/Peters 1986) However, the model lacked an implementation strategy (Hoffrogge 2021).

The reduction in employment slowed in the 1990s. From 1960 to the present, the number of employees in the German steel industry has shrunk from 420,000 to around 80,000. These figures conceal huge productivity gains. The annual record of steel produced in Germany was reached in 2007 with 48.5 million tons. (Giertz 2017: 8)

The representation of industry interests in a spirit of social partnership has also been a determining factor in important political disputes in the recent past. Globally, the steel market is characterized by large over-capacities, mainly due to Chinese capacity expansions. In the 2010s, therefore, the motive of protection against low-price competition was central; together with capital, it was possible to gain several protectionist measures at the European level: *Anti-dumping measures* take effect when steel is sold below its production price or cheaper than in the country of origin; special subsidies in international trade are also to be prevented. In addition, so-called *safeguards* take effect in the event of unforeseen increases in imports of certain products – these are not country-specific but product-specific and are also intended to protect against "trade diversion" via third countries. (Küster Simic et al. 2020: 35f.)

At the same time, trade unions and business associations have worked to influence the reform of the European Emissions Trading Scheme ETS. The trade union federation IndustriAll, whose largest member organization is IG Metall, is of central importance for trade union influence on European policy decisions. The Eurofer association represents the steel employers. In the first two trading periods of the ETS, the German steel industry received CO_2 certificates on average from 2008 to 2020 to such an extent that no climate protection incentives were created, but instead, extra profits were generated. (Witt 2022: 13) IndustriAll and Eurofer jointly opposed efforts to reform this ineffective system using both lobbying in the background and public campaigns. The dismantling of free certificate allocation was unanimously seen as a competitive disadvantage; by the trade unions, the changes were interpreted not as an incentive to develop more climate-friendly production processes, but as pressure to reduce European production capacity. Against the vote of several affiliates (including the French CGT and the Italian FIOM), IndustriAll took part in a demonstration initiated by Eurofer in Brussels in February 2016, criticizing Chinese dumping and European climate protection as a threat to the steel industry. IndustriAll again mobilized for a demonstration in November of the same year but rejected Eurofer's offer to participate so as not to exacerbate its internal conflict. However, this did not prevent several steel companies from paying for travel expenses and meals for demonstrating employees. (Thomas 2021) IG Metall was still contesting these demonstrations under the slogan "Our heart of steel must continue to beat". With the adoption of the EU's Green Deal and the reform of ETS in 2019, it was adapted as "Our heart of steel has a green future" to reflect the increased political pressure for climate protection measures. In the current ETS trading period, free allocations will be phased down from 2026 on; the total quantity of certificates auctioned will be reduced. As a safeguard against "carbon leakage" (relocations due to CO_2 costs), a special tariff will be introduced (see below: CBAM).

To summarize: The basic idea of corporatism is a convergence of interests between companies, unions, and the state – a stable political framework and moderate wage policies serve the global competitiveness of domestic industry, which in return recognizes works councils and unions, offers jobs with above-average pay and contributes to the stabilization of the (welfare) state through taxes and social security contributions. The term "social partnership corporatism" distinguishes the model from the authoritarian type and emphasizes the moment of consensual integration: Trade union representation of interests is institutionally recognized and provided with specific rights and competencies. Especially in times of crisis, however, it becomes clear that this position remains a subordinate one.

4 Decarbonization and the coming hydrogen economy

Changes in climate policy have led not only IG Metall but also the German Steel Association (Wirtschaftsvereinigung Stahl), the main representative body of the German steel industry, to make decarbonization of the sector the strategic focus for the next years. With the expiry of free emission allowances, CO_2-intensive primary steel production will become unprofitable in the medium term. Protection against "carbon leakage" (relocations or price competition from non-sustainable products), which previously justified free allocation, is to be ensured in the future by trading rules (see below: CBAM). (Fritz 2022)

As mentioned in Chapter 2, coal coke in the blast furnace does not simply act as a source of energy, but as a so-called reducing agent. The aim of the process (the reduction) is to free the oxidized iron ore from rust (oxygen). Oxygen and carbon combine to form CO_2, leaving pig iron which is further processed into steel in subsequent steps. This chemical importance of carbon in steel production is the reason why climate-damaging emissions cannot be reduced by electrification. If hydrogen is used as a reducing agent instead of coke, water is emitted instead of carbon dioxide (H_2O instead of CO_2); the intermediate product is so-called sponge iron, which can be melted down in the electric arc furnace and processed into steel. While pig iron from the blast furnace and also the finished steel product still have a certain carbon content, the sponge iron / Direct Reduced Iron (DRI) does not have this content. Therefore, not only steel scrap is added during melting in the electric arc furnace, but also some coal to achieve the desired composition. (Albrecht et al 2022: 34)

With this conversion, new production facilities become necessary, old ones become redundant (coke plant and sinter plant). The blast furnace itself is giving way to the direct reduction plant. As a result, jobs and work requirements are also changing. It can be assumed that such modernization investments will be accompanied by productivity increases because investments will be made in state-of-the-art technology. Even if iron ore processing via direct reduction is not in itself less labor-intensive than the blast furnace route, plants that are, for example, state of the art in digital process technology will lead to a reduction in work necessary. Accordingly, job losses in the transformation process are a real risk even if production volumes remain roughly constant. The union assumes that more labor will be needed in the short term due to the coexistence of the two processes, but that less will be needed overall once the changeover has been completed.

A blast furnace is a plant with a limited lifetime. Every 14 to 18 years, the so-called relining has to be carried out, i.e. the replacement of the refractory and heat-resistant materials. High labor and material costs and a longer production downtime make relining an expensive investment. (Blöcker 2022: 18) At all five German blast furnace locations it would be due within the next few years. This means there is a clear time slot for the investment decision: Relining, direct reduction plant, or shutdown? Relining or even the complete construction of new blast furnaces is hardly a sensible option under the given climate policy requirements. The alternative is more likely to be a switch to "green" steel production or a reduction in capacity. Thus, the IGM slogan "Our heart of steel has a green future," should also be understood as insistence on decisions to safeguard the site. A necessary component of the "green future" is the availability of hydrogen as a reducing agent. However, the expansion of the hydrogen economy, which IG Metall strongly supports, is fraught with some difficulties.

4.1 Green hydrogen: a scarcely developed branch of industry

Hydrogen is in use in various industries, especially in refineries and ammonia and methanol production. The EU consumed 8.32 mt of H_2 in 2020; Germany accounted for the largest national share (1.66 mt). Hydrogen production on this scale has so far been based on the use of fossil fuels (gas); it usually takes place in close proximity to reuse, so transport and storage capacities exist only to a very limited extent. The possibility of producing "green", greenhouse gas-neutral hydrogen on an industrial scale still awaits realization. (Battaglini/Ceglarz 2023) It is being promoted by various interest groups and is receiving extensive government support; however, due to the sheer quantity and several technical problems, official expansion targets must be treated with caution.

4.1.1 The role of the steel industry in the hydrogen "market ramp-up" and the comeback of industrial policy

Whether and to what extent the switch to H_2 direct reduction reduces emissions depends on the process used to produce the hydrogen. It is described as "green" if it has been produced in an electrolysis plant powered by electricity from renewable sources.

In the development of the hydrogen economy, government institutions play a key role in initiating and coordinating necessary investments. The role assigned to them is to assist in the birth of a market-shaped, profitable industry based on private ownership. This is also the reason why the main challenge often is called "the market ramp-up" of green hydrogen. This ideological term narrows the possible targets to the market-based organization of the hydrogen economy. Private actors, coordinated through price signals, are expected to satisfy demand by pursuing their profit interests. To achieve this situation in the future, far-reaching policy prescriptions, subsidies, and coordinating interventions are needed in the present – which is the opposite of self-regulating market activity. The notion of market ramp-up involves, on the one hand, the admission that the central problems of building a hydrogen economy cannot be solved by market mechanisms, while at the same time, it categorically excludes alternative forms of coordination and ownership.

The major challenge of the "market ramp-up" is a chicken-and-egg problem in mobilizing private investment: Who can guarantee customers (e.g., steel producers) that their expensive hydrogen processing facilities will be supplied in sufficient quantities in the future? Conversely, who guarantees the hydrogen producers that they will find customers in the future who are willing to pay for the expensive green hydrogen, i.e. that the major investment in corresponding power generation and electrolysis projects will pay off? Who guarantees both sides that the infrastructure for transport and storage is in place?

All stakeholders in the emerging hydrogen economy therefore are interested in establishing the steel industry as a major customer; measures to provide political support for its conversion are supported by a broad consensus. The main argument is that direct reduction plants can be operated with natural gas in the short term and a switch to hydrogen can be made gradually. Therefore, the steel industry represents an "ideal anchor for the market ramp-up of a system-serving electrolysis for the production of renewable hydrogen." (Agora Industrie et al. 2022: 21; cf. Albrecht et al. 2022: 36f .)

In principle, the state-backed modernization of steel production is favored by the fact that a comeback of targeted industrial policy at the German and European level has been evident for some years. Industrial policy as a "strategic and intentional concept" (Rehfeld/Dankbaar 2015: 492) conflicts with a fundamental, liberal skepticism about political intervention. Typical instruments are "grants, subsidies, tax credits, low-interest loans, public guarantees, procurements, credit provisions, and equity investments" (Bulfone 2023: 23) Accordingly, targeted ("vertical") industrial policy in the neoliberal 1980s and 1990s had taken a back seat to ("horizontal") competition policy approaches. Protagonists of the liberal European single market, for example, explicitly associated the latter with the hope that it would make the implementation of industrial policy projects more difficult or impossible (cf. Schneider 2022: 241). There is now a broad consensus in the debate that industrial policy is making a comeback (Johnstone et al. 2021) for several reasons: Dependencies on strategic raw materials and inputs; supply chain disruptions; geopolitical rivalries with China on the one hand and the U.S. on the other. Targeted support for certain companies and industries had already begun in the USA under Trump; finally, the "Inflation Reduction Act" under Joe Biden is a comprehensive package of measures to promote domestic industry

Efforts to build a large-scale hydrogen economy meet precisely this political conjuncture, in which active industrial policy is more opportune than it has been for several decades – especially if it is decidedly "green". "Green industrial policy seeks to build new industrial trajectories around the green economy and, thus, explicitly addresses environmental policy objectives. There is a recognition that green industries are often 'infant industries' that require additional support before they can become competitive with dominant technologies." (Johnstone et al 2021: 3) From a global perspective, there is an unmistakable competition about who will take a leading role in future "green" key technologies (cf. Europäische Kommission 2023a).

With regard to the decarbonization of the steel industry, the industrial policy approaches at the German level are outlined in the Steel Action Plan (Bundesregierung 2020b) as well as in the National

Hydrogen Strategy (Bundesregierung 2020a) and its update (Bundesregierung 2023). Instead of summarizing these papers and the declarations of intent set out in them, in the following I address the most important individual measures adopted/announced.

4.1.2 Subsidies, grants, and other funding instruments

Investments in direct reduction plants are subsidized at various political levels in Germany. Significant here, for example, is an initial subsidy of €1 billion for the Salcos project in Salzgitter; for the replacement of one of two blast furnaces in Duisburg, Thyssenkrupp will receive a total of €2 billion from the German government (€550 million as a direct subsidy, €1.45 billion as compensation for the use of expensive green hydrogen instead of blue hydrogen). (Parkes 2023)

The production costs of green hydrogen are still significantly higher than production with fossil fuels. This cost difference can be offset by subsidies. Such an approach is to be the main starting point of the European Hydrogen Bank, which was announced by the EU Commission in March 2023. The bank is to use an auction procedure, as is also common in the licensing of RE plants. In this process, a certain contingent of subsidy commitments or production premiums will be awarded per auction. A fixed amount will be paid out per kilo of green hydrogen produced. The first of these auctions is to take place in December 2023 and have a volume of €800 million. The Commission's draft also envisages that, in addition to these Europe-wide auctions, the European Hydrogen Bank will also act as an auction service provider for member states, so to speak; the individual states are thus to be enabled to award premiums for the production of green hydrogen on a national scale without coming into conflict with EU state aid law. (Europäische Kommission 2023a: 6ff.)

The Carbon Contracts for Difference (CCfD) work similarlay to these bidding procedures for premium payments and can be concluded with the Federal Ministry of Economy and Climate Protection at the end of 2023. A first round of applications has already been running since June 2023. CCfD do not only apply to the production of hydrogen but also to investments in decarbonization measures. If companies from emissions-intensive sectors are planning investments that will lead to a significant reduction in CO_2 emission equivalents (at least 90% fewer emissions than the most efficient conventional plant), they can apply for a climate protection contract by bidding. An approval grants government subsidies that compensate for the cost difference between the conventional production process including emission certificates and the climate-friendly production process. The exact amount of the subsidy develops depending on rising ETS prices and possibly falling costs for the climate-friendly production process. If conventional production becomes more expensive than climate-friendly production, surplus payments are to be made by the companies to the state. (BMWK 2023) The use of CCfD can "enable such investments early on that, driven by the market, would otherwise only be profitable later at much higher CO_2 prices. This is particularly important for investments where, due to natural investment cycles, the question of which technology to use arises promptly." (Witt 2022: 22)

4.1.3 Debate on "green lead markets" and certification

So-called green lead markets are to be established through regulatory requirements and financial stimuli. In the update of the National Hydrogen Strategy, the German government announces the development of a lead market concept "that identifies definitional bases and instruments for creating demand for climate-friendly basic materials, starting with steel and cement. Possible levers for this are labels, product standards, and criteria and quotas in public procurement." (Bundesregierung 2023: 20)

In October 2022, the German Steel Association presented a draft certification system for "green steel" to promote the lead market concept and influence its design. This proposition includes a categorization of steel depending on CO_2 emissions per ton of steel and the scrap content in production. Taking the scrap content into account means applying less stringent CO_2 criteria for achieving a certain categorization in primary steel production from iron ore than in the secondary route (recycling-based production in the electric arc furnace). According to the Steel Association, the decisive objective is mapping the "process-related ambition level", instead of working with fixed carbon dioxide values. (WV Stahl 2022: 2) The labeling obligation, which according to the proposal is to be mandatory from 2035, does not mean that steel not certified as climate-neutral would be excluded from trade altogether.

4.1.4 Trade policy: CBAM

Investment and production cost subsidies in the steel sector in the narrower sense are supplemented by trade policy instruments aimed at improving the competitive position of "green" steel. In principle, European manufacturers who will have to purchase (successively more expensive) emission allowances in the future will find themselves in competition with companies from countries that do not participate in this form of emissions pricing at all or do so on more favorable terms. Competitors could therefore offer their steel more cheaply and thus become a threat to the existence of European production sites. The policy instrument designed to prevent this so-called carbon leakage is the Carbon Border Adjustment Mechanism (CBAM). It works like an emissions-specific tariff: importers must purchase CBAM certificates for import into the European Union. Any carbon levies paid in the country of origin are to be credited in the process.

4.2 Problems of the hydrogen economy

4.2.1 Permanent scarcity / Blue hydrogen?

There is a consensus among experts that the steel industry and other energy-intensive basic material industries are reasonable areas for the application of hydrogen. In contrast to most mobility applications and the heating of buildings, for example, there are no competitive technical alternatives here. The challenge of creating the necessary hydrogen production capacities for the so-called hard-to-abate industries is huge and can only be met on the envisaged scale under exceptional conditions. Here, however, the use is particularly efficient from a CO_2-saving point of view. Producing green hydrogen beyond the need for industrial decarbonization would require rapid exponential growth in electrolysis capacity. Even if electrolysis capacities can be expanded at a rate comparable to that of renewables, green hydrogen will remain a scarce commodity for the foreseeable future (Odenweller et al. 2022).

Steel manufacturers therefore assume that new direct reduction plants cannot be operated with green hydrogen from the outset but that its use will increase gradually depending on availability. A gradual switch to the use of green hydrogen is planned, for example, in Thyssenkrupp's plant, the construction of which in Duisburg is being subsidized to the tune of €2 billion (see above). It is scheduled to come on stream in 2026 but will run entirely on natural gas (hydrocarbon) until 2029, then gradually switch to hydrogen by 2038. (Parkes 2023)

Another option would be to use hydrogen that has not been produced with the help of renewable energies. The status of so-called "blue" hydrogen, which is produced using fossil energy and in which carbon dioxide emissions are captured and stored (carbon capture and storage, CCS), is particularly contentious. Whether the use of CCS-based hydrogen is ecologically sound is highly controversial (CEO 2023). In addition to differing assessments of the capture process, it seems relatively unclear what should be permanently suitable storage sites for the captured emissions. One common method is to use the carbon dioxide to squeeze otherwise inaccessible oil deposits out of their natural reservoirs (Barnard 2022: 17) – for the global emissions balance, classifying blue hydrogen produced in this way as sustainable would be sheer labeling fraud.

However, both the potential use of natural gas in direct reduction plants and the possibility of using blue hydrogen explain the commitment of large gas suppliers in the efforts to shape the hydrogen economy. One major success of their influence is that blue hydrogen has found its way into the update of the German government's National Hydrogen Strategy as eligible for funding (CEO 2023). Given the extensive difficulties and pitfalls in the expansion of the hydrogen economy, gas companies can hope that the ostensible transition technologies will be of importance for far longer than they currently appear to be.

4.2.2 Struggle over Hydrogen Import Strategies - Land Grabbing and Neocolonialism?

Despite efforts to accelerate the development of European production capacities for green hydrogen, all scenarios assume that it will not be possible to meet demand at the targeted level. In its RePowerEU strategy, formulated in response to the Russian war on Ukraine, the European Commission issues a handy fifty-fifty formula for 2030: 10 mt domestic production, and 10 mt imports from around the world. Of this, 1.5 mt is earmarked for the steel industry (Battaglini/Ceglarz 2023: 7) The European Hydrogen Bank is also to serve as a funding institution for the import capacities to be built up and ensure that green hydrogen is price-competitive with other variants – but the details of the process have not yet been decided. The German government is also keen to push ahead with the establishment of supply relationships: "According to the German government's assessment, evaluating the current scenarios, around 50 to 70 percent (45 to 90 TWh) of the 95 to 130 TWh demand forecast for 2030 will be covered by imports from abroad (in the form of hydrogen and hydrogen derivatives). The import share to meet hydrogen demand will continue to increase in the years after 2030." (Bundesregierung 2023: 9)

The import perspectives are confronted with political uncertainties, as can be illustrated by two examples. Until the start of the Russian war, Ukraine played a role in various concepts as a possible hydrogen production location; occasionally (e.g. Arepo 2022), the West African country of Niger also was mentioned, which seemed interesting not only because of its solar wealth but also because of its democratic state. This changed abruptly with the military coup on July 26, 2023.

Production-wise, one difficulty may be the water supply for the electrolysis plants. At sites with limited water resources, the demand for the electrolysers can conflict with local water demand (Arepo 2022: 7). Freshwater can be a scarce resource, especially at such sites, which are particularly suitable for PV installations due to intense solar radiation or for wind power installation due to their coastal location. However, resorting to seawater desalination on a larger scale comes with strains on the local maritime ecosystem. Apart from having a high energy demand themselves, desalination plants produce a concentrated brine mixed with other chemicals as waste, which is discharged into the sea. However, strict criteria (!) in site selection, choice of desalination process, and procedures for seawater withdrawal and wastewater discharge can make seawater desalination an ecologically sound process. (Sharifinia et al. 2019)

More fundamental criticism refers to the establishment or perpetuation of global inequality and dependency if the production of hydrogen is to be located in countries that are hardly industrialized and in which large parts of the population sometimes have no access to electricity. As possible injustices in connection with hydrogen projects, Müller/Tunn/Kalt (2022) mention conflicts over the availability of renewable energy, water use, land use or resettlement, the impairment of indigenous ways of life, and the strengthening of authoritarian governments.

If, according to one concern, the most favorable locations for the production of renewable energies are reserved for Europe's hydrogen requirements, this can present itself as a barrier to local or regional sustainable development. In countries with relevant industrial production based on fossil energy, the question arises whether the electricity from renewable sources or the hydrogen produced here could be used more reasonable and with a stronger decarbonization effect. Hamouchene (2022) refers to the example of the fertilizer industry in various countries in North Africa.

Differences in the critical debate can be noted with regard to the use of the term "neocolonialism." In Hamouchene (2022), for example, it stands for industrial projects that are linked to state-military violence (specifically, projects in the Moroccan-occupied Western Sahara); in other contributions, it is used in a broader sense and stands for the perpetuation of the current world economic order and its North-South inequalities; the hydrogen projects are neocolonial in the sense that they fit into established dependency relationships instead of breaking with them.

Notwithstanding these terminological issues, it can be noted that the aforementioned social, political, and environmental concerns are anticipated in key strategy papers of government institutions – for example, in the update of the German government's National Hydrogen Strategy, which refers to the future development of good governance standards at G7 or G20 level. (Bundesregierung 2023: 10) The paper promises the German government's commitment to the development of meaningful certification systems and guarantees of origin "taking into account high environmental and sustainability criteria such as the avoidance of water scarcity and conflicts, pollution and conflicts over land use, and the protection of human rights in supply chains" (ibid.: 28). However, the operationalization of these criteria is not further specified.

The consulting firm Arepo proposes the principle of additionality 2.0 as a criterion for "fair green hydrogen". This would not only ensure that hydrogen production does not simply use renewable energy that would otherwise contribute to the energy transition in the country of production (principle of additionality). The certification system should also consider the possibility of neocolonial dependencies:

> "'Additionality 2.0' means that before German (or Western) companies start hydrogen projects in African countries (or countries of the Global South more generally), they have to ensure that the infrastructure built directly benefits local communities and regions in various ways. For example, it would be insufficient to ensure that existing desalination plants are not repurposed to provide water for electrolysis instead of drinking water first (i.e., 'do no harm'), and the project developers would have to provide for new freshwater production facilities for their hydrogen production, but in addition to that, they might be required to build additional capacity to provide water for local communities. The same could hold true for renewable energies." (Arepo 2022: 65)

4.2.3 Transportation problems

Further challenges arise in the transport of hydrogen, especially over longer distances. For example, it is significantly more voluminous than natural gas for the same weight and would need correspondingly extensive ship capacities (Liebreich 2022); there are always losses in ship transport (Barnard 2022: 12). The preconditions for transporting the targeted volumes by ship are hardly given: Currently, only one tanker exists worldwide that is designed to transport liquefied hydrogen.

Temporary binding of hydrogen in organic compounds (LOHC) for transport purposes has a similar need for development. It would require an independent infrastructure and is fraught with environmental risks. Hydrogen transport via pipelines is not feasible over arbitrarily long distances; however, it is being considered within Europe and from North Africa to Europe. The conversion losses mentioned would not occur here. However, a high input would be required to fill a pipeline, meaning enormous amounts of renewable energy for the production of the hydrogen and its compression at the beginning of the pipe. "For a pipeline with a diameter of about 1,000 millimeters and a transport capacity of 6,000 to 7,000 metric tons of hydrogen per day (about 50 terrawatt-hours of hydrogen per year), operating at about 60 percent capacity, about 85 terrawatt-hours of electricity would have to be provided in the exporting country. This corresponds to a combined plant capacity of wind and photovoltaic plants of about 35 gigawatts." (acatech 2022: 12) For example, with a wind power capacity of 6 MW, this would result in over 2900 wind turbines for 17.5 GW and a plant with 17,500 ha, or 175 km², for another 17.5 GW of solar power.

The conversion into ammonia (NH_3) and reconversion into hydrogen and nitrogen (in the so-called ammonia cracker) leads to additional conversion losses. (Witt 2022b) Cracker technology is not mature and only available on a very small scale (Albrecht et al 2022: 18). However, technology and infrastructure for ammonia transport exist. Particularly where it is not a matter of converting back into hydrogen (chemical industry), the import of ammonia based on green hydrogen would therefore be feasible in the short term and energetically justifiable (Acatech 2022) – but this approach is unlikely to play a role for the steel industry.

4.3 Location issues: Relocation of production instead of hydrogen trade?

Considering the energetically and financially expensive transport of hydrogen – and this brings us back to the transformation of steel manufacturing in the narrower sense – the question of steel production locations is also raised. Liebreich (2022), for example, declares that it makes no sense at all to maintain steel production in the global north with high subsidies instead of locating it where electricity or hydrogen is produced for its needs. The locations in Germany originally had economic-geographical reasons, which have historically become obsolete since the essential raw materials – iron ore and hard coal or coke – are no longer mined at the locations but transported from great distances. Given the energy losses and high costs involved in transporting hydrogen over comparably long distances, the question arises whether relocating production would be a more sensible – a more cost-effective – option from the management point of view.

However, there are several reasons why this is not the case. Both the steel producers and the trade unions point to the established relationships with customers and the design of steel grades and forms in line with customer requirements. Germany offers a comparatively reliable infrastructure, well-established transport systems, stable political conditions, and a skilled workforce. Lastly, the investment costs of building a completely new plant would be far higher than replacing a blast furnace by direct reduction. Thus, complete relocation seems rather unlikely in the short to medium term.

However, the (current) production of pig iron in the blast furnace and the (future) production of sponge iron in the direct reduction plant are only part of the production process in a steel mill. A partial relocation would also be conceivable: the production of sponge iron at the hydrogen production site and further processing into steel or different steel products at the previous industrial site in Germany. Here, too, technical challenges arise: Sponge iron cannot be transported without risk (explosive oxyhydrogen gas forms under certain conditions). Conversion hot briquetted iron (HBI) for transport is therefore common, which then has to be melted again at high temperatures (i.e. with additional energy input). The transportation of HBI does not require special cargo ships. In view of the problems listed above for transporting hydrogen and its derivatives, this approach could also prove to be more cost-effective. However, the lower international transportation costs are countered by the higher energy efficiency of an integrated steel plant, where the sponge iron can be further processed in the electric arc furnace without intermediate steps. (Albrecht et al 2022: 31-35).

Researchers at the Wuppertal Institute nevertheless see a relevant "renewables pull effect", a significant pull effect of favorable production conditions for renewable energy and hydrogen in investment decisions. (Samadi/Fischer/Lechtenböhmer 2023) Accordingly, there are indications of production relocations in the context of decarbonization processes ("green relocations") for both sponge iron and ammonia production. For sponge iron production, interesting locations are those that combine the availability of renewable energies with iron ore deposits and the necessary infrastructure requirements, which would apply to Australia, Canada, Brazil, South Africa, and northern Sweden, for example. Reference is made to several examples of planned direct reduction plants at new sites designed to supply steel mills located elsewhere (including ArcelorMittal's plan to supply other sites in Germany from its direct reduction plant in Hamburg; the group is also thinking about building a DRI plant in Mauritania/Northwest Africa). (ibid: 8) In South Africa, ArcelorMittal is also considering producing sponge iron or HBI locally as a precursor for European steel production. (Kalt et al. 2023) The country offers iron ore deposits as well as industrial clusters, port infrastructure, and ambitious plans to expand renewable energies. The Swedish company H_2 Green Steel is already involved in the construction of an electrolysis plant in Brazil, without yet committing to whether hydrogen, DRI/HBI or finished crude steel will be produced there. (Parkes 2022)

A study commissioned by the European Commission also models various decarbonization scenarios. If all possibilities for relocating value-adding steps were used, Europe's demand for hydrogen would be reduced by around one third. In steel production, this would affect the outlined production of sponge iron or HBI at other locations and the further processing into crude steel at the established steel locations in Europe. (Europäische Kommission 2023b: 12) A study commissioned by the German Hydrogen and Fuel Cell Association takes stock of the prospects for relocated sponge iron production:

> "It would be associated with lower efficiency, lower value creation, loss of control over pig iron supply quality (contractual hedging required), new political or time dependencies in the supply chain (need for c-DRI stockpiling), and potentially higher environmental impacts along the supply chain without influence. At the same time, however, with innovative electric smelting (ES) technology, the more important and know-how-intensive value-added share of crude steel production remains in Germany, which continues to ensure a secure supply of high-quality crude steel close to consumption." (Albrecht et al 2022: 62f.)

From the perspective of a trade union policy that gives priority to preserving production sites and jobs, the outsourcing and partial relocation outlined above are a threat to workers' interests. On this point, a transformation conflict between "green" and "red" strategies is emerging for the next few years that extends beyond the steel sector: Are "green relocations" to exploit cost advantages a welcome facilitation of the energy turnaround and industrial decarbonization, which moreover shifts value creation to peripheral, weakly industrialized countries? Are they desirable in terms of ecology and development policy? (according to Samadi/Fischer/Lechtenböhmer 2023) Or does such an approach represent a (renewed) disregard for the interests of industrial workers in early industrialized countries, which plays into the hands of anti-transformation resentment instead of opening up a perspective of just and democratic change?

4.4 Trade union positions on decarbonization

The considerations so far allow a more precise understanding of the IG Metall position as "driver of transformation" in the steel industry. As early as 2020, a "Hydrogen Position Paper" set out the IGM Executive Board's view of the development of the hydrogen economy; it formulated the guiding orientation: "Preservation of industrial work through consistent transformation." (IG Metall 2020: 1) The paper refers to the central role of the steel industry and advocates a focus of hydrogen use on industry and freight transport; hydrogen-based individual transport is – in line with the relevant research – attributed a marginal importance.

The switch to hydrogen-based direct reduction is the technological option for decarbonization being pursued by a broad consensus of all stakeholders. Its enormous potential for reducing CO_2 emissions can only be realized using "green" hydrogen. Both the corresponding conversion of the steel mills and the necessary development of the hydrogen economy are moving along the lines of profit-oriented entrepreneurial activity, despite enormous government expenditure of public funds, research and development, and needs assessment and capacity planning (another lesson in the fact that functioning markets are not natural institutions, but ones that require a high degree of political preconditions). Essential for trade union policy here is the effort to persuade state institutions to adopt an industrial policy that makes invests in "green" production capacities attractive for steel companies at the existing locations.

How these positions are advocated corresponds to the established paths of social partnership corporatism. The competences within the framework of coal and steel co-determination can be used to press for a long-term transformation strategy at the company level; political frameworks at the state, national, and European levels can be influenced by lobbying, sometimes flanked by appealing action days or demonstrations. In terms of content, the focus is on positions formulated in consensus with companies on behalf of the industry: Subsidies, green protectionism, and targeted development of sales markets. In addition, there is advocacy for the qualification of employees in order to prepare them for the new requirements.

Positions according to which state subsidies should be linked to job preservation and extended co-determination rights can be found in trade union discourse, but they do not come to the fore. For example, they were not a topic of trade union communication around this year's steel action days in Duisburg. (e.g. IG Metall Duisburg 2023) In line with the positions of the German Steel Association, the focus was on swift subsidy commitments.

A key motion by the IGM Executive Board on shaping the energy and mobility transition at the trade union conference in October 2023 calls for the development target for domestic hydrogen production to be increased from 10 to 15 GW to prioritise domestic production over imports. The hydrogen network to be established should be developed nationwide. To accelerate the hydrogen ramp-up, blue hydrogen should also be recognised as eligible for funding. (IG Metall 2023d)

In addition, the union (as an "intermediary organization", see ch. 2) also sees itself in the role of convincing the steel workers of the hydrogen consensus. (Reese 2023) This also means that possible pitfalls of the hydrogen strategy are at best touched upon. With regard to the very ambitious expansion targets for the production of "green" hydrogen, IG Metall does not raise any doubts but urges greater speed. This applies firstly to the quantitative dimension: in view of the lack of electrolysis, transport, and storage capacities and the partly unsolved technical challenges, doubts about the targets set by the German government and the EU are justified. In agreement with the companies involved, the union is relying here on so-called bridging technologies, namely natural gas and "blue" hydrogen. Compared with the established blast furnace route, these enable significant CO_2 reductions in primary steel production. However, there is a risk that the envisaged transition phase will be of longer duration than assumed in the current scenarios.

The second dimension of criticism concerns issues of international justice, the accusation of perpetuating neocolonial relations of exploitation, and fears that hydrogen projects in peripheral countries could slow down rather than accelerate the energy transition there. IG Metall, in alliance with development policy and environmental NGOs, is advocating an Act on Corporate Due Diligence Obligations in Supply Chains at the German and European level, which would also affect the most important companies in the German steel industry and the sourcing of hydrogen. However, because meeting the "green" demand for hydrogen is an industry in the making, questions of product standards have also not yet been conclusively clarified; the possibility exists of drafting them in such a way that they go beyond compliance with elementary labor rights and environmental protection requirements.

5 Just transition and the reduction of working hours

5.1 Recent developments in union's working time policy

There are several reasons why the demand for a general reduction in collectively agreed working hours has for years been no more than a marginal topic of union debate. The compromise on the introduction of the 35-hour week in 1984 regulated a slow, gradual implementation and coupled this with flexibilization concessions at the expense of employees. In addition, the system of regional collective agreements has lost scope and binding force: the proportion of companies bound by collective agreements is falling, while at the same time deviations from the collectively agreed standard are increasing. Heterogeneity in real working hours is increasing, which makes it more difficult to standardize target lines. (Liebig 2021: 279ff.) New forms of company control make improved protection against work intensification necessary (Wagner 2023: 224-228).

Despite these hurdles, however, there has been renewed momentum in working time policy for some years now. Not to be underestimated here are the new options that have been part of several collective agreements in recent years: They open up the possibility for employees to opt for reduced working hours instead of additional wage increases. In the TV Zug, which IG Metall concluded in the metal and electrical industry in 2018, certain groups of employees – shift workers and employees with childcare or care obligations – can take eight additional days off instead of 27.5 percent of a month's pay. The widespread desire for self-determined, flexible working time arrangements tailored to specific phases of life has thus been enshrined in collective bargaining law. Shift workers in particular take advantage of this in large numbers. (Wagner 2023: 229f.)

As the name suggests, short-time work, as it was used in many cases during the Coronavirus pandemic, also represents a temporary reduction in working hours – by means of state wage replacement benefits, companies can significantly reduce their volume of work without laying off employees. Even before the pandemic, IG Metall called for the introduction of a "transformation short-time allowance" as a modified version of this instrument, in which phases of a decline in employment are used specifically for qualification or retraining measures. (IG Metall 2019)

The dynamics of working time policy in recent years (in particular the approval of the option models in collective agreements) nevertheless show that there is potential for trade union mobilization here despite all the adversities. The idea of a 4-day week is also popular among employees. A representative survey of full-time employees in Germany showed that 80 percent of them would welcome the introduction of a 4-day week (73 percent provided that this does not mean a loss of pay). Among the possible reasons for this desire to shorten the workweek, the desire for more time for family (89 percent), more time for hobbies, sports, or volunteer work (87 percent), and for a reduction in workload (75 percent) are significant. At 97 percent, however, the desire for "more time for myself" has the highest approval rating (Lott/Windscheid 2023) – not an external purpose, in other words, but the self-explanatory striving for an expansion of the "realm of freedom" at the expense of the "realm of necessity."

Central to union success in collective bargaining rounds is organizational strength and mobilization capacity. Both can suffer from social headwinds or be boosted by external support. "The struggle for time is predestined for alliance politics" (Wagner 2023: 240) – it strikes an important nerve of different movements. With the bargaining of the option model in 2018, IG Metall "politicized an expanded concept of work" (Dörre 2019: 84), as it is central for feminist discussions about the (in)equality of gainful and caring activities. In the context of transformation in the steel industry, the intersection with ecological movements seems to be particularly large. Under catchwords such as "post-growth" or "degrowth," reductions in working hours are discussed there as a contribution to a socially and ecologically sustainable economic order. Less production and less consumption are supposed to combine to form a new model of prosperity thanks to reduced working hours.

The sociopolitical perspective of change is also fed by expectations directed at the lifestyle of employees: Less time for paid work could mean more time for sufficiency-oriented activities – repairs, gardening, cooking for oneself, etc. – and would therefore be a meaningful contribution to sustainable development. Justified doubts have been raised about this perspective (for a detailed discussion, see Liebig 2021); empirically, these doubts can also be justified by the experience of the 4-day week at VW from 1994 to 2006. The effects on a more environmentally compatible lifestyle of workers must be assessed with the greatest caution. Many used the time that became available to pursue less resource-intensive activities, but an automatism cannot be assumed in this respect. (Liebig 2021: 304)

This discussion on the reduction of working hours as an answer to the growth problem is also echoed in IG Metall. The section on socio-ecological transformation in the executive board's basic motion to the trade union congress at the end of October 2023 states:

> IG Metall will [...] have to formulate concrete answers for dealing with the limits to growth. The previous post-growth proposals from the ecological spectrum of civil society may not be convincing in detail, but they are gaining interpretive power. We will refine our concept of a democratic model of progress for socially and ecologically sustainable and inclusive prosperity. One possible component: a different organization and distribution of working hours. Shorter working hours – for example, within the framework of a 4-day week – can make jobs more attractive, secure employment also through the redistribution of working time, and also support gender-equitable reconciliation and contribute to the upgrading of care work. Employees can realize their desire for shorter working hours. However, time prosperity is a question of distribution and justice. (IG Metall 2023: 33)

For all the indecisiveness in the formulations, this at least indicates the need to broaden the understanding of transformation beyond the prevailing concepts of technical modernization – transformation not just as the implementation of constraints, but as change toward a more just and livable society.

5.2 Working time negotiations in the steel industry

The 2023 round of collective bargaining in the north-west German steel industry was the first attempt to combine the challenges of transformation with an offensive working time policy. However, in view of the moderate outcome, its importance for the future strategic direction should not be overestimated.

IG Metall called for a reduction in working hours to 32 hours per week and also boldly labelled this as a demand for a 4-day week. The aim was to achieve full wage equalisation. It is only at first glance a contradiction when the justification of the demand mentions working time reduction as a measure to remedy recruitment difficulties alongside working time reduction as a measure to prevent job losses. Although the conversion to hydrogen direct reduction as such is not expected to result in a large reduction in the volume of work, the corresponding modernization investments will continue the incremental increase in productivity of recent decades because the new plants are, for example, at the cutting edge of digital monitoring and control functions – a resulting reduction in employment can be avoided by reducing working hours. At the same time, new job profiles are emerging for which new, appropriately trained workers must be recruited.

Following a series of warning strikes, a differentiated model without a binding collective reduction in working hours was agreed in December 2023. Under this model, companies can reduce working hours to up to 32 hours if management and the works council agree that there is pressure to cut jobs as part of the transformation; wage compensation is only granted partially (for example, 33 hours are paid if working hours are reduced to 32 hours). However, working hours can also be increased if, for example, additional work is required for the parallel operation of old and new plants or for qualification measures; the overtime premium of 25 percent then applies.

In the steel industry, there is a 5-shift model, i.e. two days early, two late- and two-night shifts. This is followed by two times two days off. In practice, this results in an actual working week of 33.6 hours, which is paid based on a 35-hour week. The additional 1.4 hours of paid work must be completed in additional, so-called availability shifts (Verfügungsschichten). One concern of the IGM's working time demand was to abolish these extra shifts over and above the fully continuous 5-shift system.

Individually, the collective agreement allows working hours to be reduced to 33.6 hours without pay compensation, "provided this does not conflict with operational interests". Employees aged 60 and over cannot be denied this; they are paid 34.1 hours for 33.6 hours of work. Over the next few years, it will be very interesting to see the extent to which individual workers make use of this regulation and how corresponding applications are dealt with in the companies.

Politically, the negotiations were overshadowed by budgetary disputes within the German government, not least with regard to the climate and transformation fund. Although the state subsidies for the first expansion steps have been bindingly agreed for the large steel companies (see Chapter 4.1.2), the budget judgement of the Federal Constitutional Court made it clear that the industry and trade unions cannot rest assured with regard to further subsidies. This is also echoed in the IGM negotiator's statement: "The steel industry is facing an economically uncertain future. This was also reflected by the employers in the negotiations. (...) The next year will be more challenging than initially assumed." (IG Metall 2023c)

6 Conclusion

The corporatist policy of technological-ecological decarbonization and the socio-ecological transformation approach of reducing working hours are not free of contradictions in their political operationalization – nor can they be in a contradictory reality. Under the given conditions, it is in the interest of the employees to maintain the possibility of selling their own labor power at the conditions they have fought for so far. It is in the trade unions' interest to maintain the industries with the strongest membership and co-determination rights. Under the given relations of power, this is translated politically as the need for the state to shape favorable investment conditions. The attempt to use the coming restructuring in the steel industry not only to defend but also to improve working conditions remains subordinate to this corporatist goal.

With regard to the question of possible convergences between the climate and trade union movements ("climate turn" / "labor turn"), however, it is important to note that IG Metall is both giving signals in precisely this direction and that this discussion is associated with growth-critical perspectives within the organization. Disputes about working time transcend the usual framework of collective bargaining arithmetic and are always sociopolitical conflicts as well. For the far-sighted part of the climate movement, it is important to observe further developments of working time policy in the industrial trade unions.

A solidary reference makes sense despite differences on other issues. With regard to the hydrogen economy, this concerns firstly the handling of fossil "bridge technologies" or blue hydrogen, the use of which is rejected in the activist climate movement for good reasons (e.g. Konzeptwerk Neue Ökonomie 2022); secondly, the imperial North-South relationship plays at best a marginal role in trade union discourse. However, those parts of the movement for which questions of work and production are a topic at all are mostly decisive advocates of a general reduction of working hours (e.g. Konzeptwerk Neue Ökonomie 2023), for which, without a trade union backing, there is no perspective for implementation beyond well-meaning niche projects.

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