

# BARMETAL



## Digitalization, Automatization and Decarbonization: Opportunity for strengthening collective bargaining in the Metal Sector

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## 1. Introduction

This toolkit summarizes the instructions for qualitative data collection in the BARMETAL project. The analysis covers the metal sector, predominantly including the following NACE codes:

C24 - Manufacture of basic metals

C25 - Manufacture of fabricated metal products, except machinery and equipment

C29 - Manufacture of motor vehicles, trailers and semi-trailers

Individual research teams are free to select the specific sector(s) to be analysed for the country cases assigned to them, choosing according to a criterion of scientific interest and availability of company case studies<sup>1</sup>.

The toolkit informs the empirical analysis in WP3.

## 2. Country reports – sectoral and company level analysis

The project covers 12 countries that represent different types of political economies and industrial relations systems. The sample includes both countries with well-developed and coordinated bargaining structures and countries with underdeveloped or fragmented sectoral bargaining structures, with however identified opportunities for addressing the topics of re-skilling, work intensification and control through artificial intelligence via collective bargaining. A preliminary classification of the countries of interest according to the typologies identified in the literature could be as follows:

- Visegrad countries: Czechia, Hungary, Poland, Slovakia;
- South-Eastern European countries: Romania, Serbia;
- Nordic countries: Denmark, Sweden;
- Mediterranean countries: France, Italy
- Continental Western Europe: the Netherlands, Germany (Germany as a background case based on desk research without new data collection).

A policy report will be prepared for each individual country. The report is based on novel data collected via desk research, document analysis and especially through two company case studies conducted through semi-structured interviews with trade unionists, workers and key company figures. The number of interviews to be conducted per country is 15 (except Germany which is based on the analysis of secondary data).

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<sup>1</sup> Metal producers are often integrated in supply chains covering also other sectors (e.g. rubber industry, glass industry, textiles as suppliers to the car manufacturers). These can be acknowledged in the overall picture on digitalization, automatization and decarbonization, but should not be at the centre of analysis or selected as company case studies.

The analysis focuses on formal and informal negotiations, bargaining procedures, outcomes and proposed bargaining adjustments that direct, shape or influence the design, introduction and implementation of digitalisation, automation and decarbonisation processes at various levels (national/sectoral, company/workplace), both directly and mediated by other aspects (work organisation, skills and qualifications, product choice and business strategies, personnel and labour market policies, etc.).

Data collection on these levels, although functionally distinct, should not be conceived as separate, but as integrated from an analytical point of view.

## 2.1. National/sectoral level

1. The report provides evidence on the country's economy, labour market and industrial relations structure in the chosen sectors of interest. It also presents the general situation on DAD and related developments in collective bargaining, including:
  - national-level discourses in general and policies, measures and challenges in the chosen sector(s) and in the broader metal industry;
  - implications for the labour market, the skill formation regime, working conditions and collective bargaining;
  - developments in collective bargaining in response to DAD – major innovations, gradual introduction of new topics into bargaining (e.g. reskilling and upskilling), stability and change in bargaining practices, institutional resistance to acknowledge the relevance of DAD, mimicking/learning from other sectors, pattern bargaining, etc.

Note: in countries with highly politicized or statist-centred industrial relations, sectoral bargaining and thus the pick-up of topics derived from DAD may be limited. In countries with this experience (e.g. the Visegrad countries), social dialogue at the national level can be considered as the platform/structure to address DAD related challenges in case of absent sectoral collective bargaining. The whole array of relevant industrial relations structures should be considered, which is country specific.

### Data collection:

- Primary desk research, analysis of the pertinent scientific and secondary literature and relevant document collection and analysis;
- Possible interviews with social partners and other stakeholders in the chosen sector(s) or in the broader metal industry  
(Suggested interview respondents: national policy makers, persons participating in tripartite committees, representatives of trade union federations and employers' associations in the metal sector, key civil society actors (e.g., NGOs, environmentalist and climate justice movements), academics or experts who can assess the impact of DAD on the labour market and the role of social partners, collective bargaining and social dialogue in channelling this impact).

## 2.2. Company case studies

Two company case studies will be conducted in each country. Each team should identify several potential companies for case studies and discuss the identified potential cases collectively with the other partners. In this way, the final selection can be made in a coordinated manner, so that globally all variables of interest are explored in the project. It is furthermore necessary that the potential case studies identified are not only theoretical, but that their feasibility has been already assessed with the respective gatekeepers, so that when they are discussed there is the certainty that they are available for research.

### **Selection strategy:**

Company case studies should be selected according to several variables of interest:

- a) distinguishing between OEMs and suppliers (it is not necessary that the identified OEMs and suppliers are part of the same supply chain. However, it is useful to collect information on the OEMs supplied by the identified suppliers, especially if these OEMs have production sites in the countries of interest for the research project);
- b) distinguishing between production sites whose process or product can be identified as "green" or not (the same site can obviously have "green" processes and "non-green" processes or produce "green" products and "non-green" products);
- c) distinguishing production sites according to their current level of automation and digitalisation, differentiating between sites with a "high" level and sites with a "low" level of automation and digitalisation (the same observations made with respect to the previous variable concerning the coexistence in the same site of processes with different levels of automation and digitalisation also apply to this variable);
- d) distinguishing case studies according to interesting developments in collective bargaining on DAD (e.g. revival of sectoral bargaining, or innovative bargaining practices due to digitalisation, etc.) and/or to the strength of unions and collective bargaining at firm/workplace level (strongly unionised firms/workplaces with well-developed bargaining system vs. poorly unionised firms/workplaces with under-developed bargaining system).

The selection strategy template and a case study overview sheet are provided in the appendix (1.1, 1.2) to this document.

### **Data collection:**

- Semi-structured interviews (between 5 and 10 per case study, 15 in total) with trade unionists, workers and key company figures  
(Suggested interview respondents: TU officers, TU representatives, work council members; plant managers or managers of individual production areas, HR managers, industrial relations officers at company and/or site level, R&D technologists, production engineers, data management experts, time and methods experts, process monitoring and product quality managers; production operators employed in areas affected by digitalisation, automation and decarbonisation processes);
- Relevant document collection and analysis.

### 3. Interview guidelines

The chosen interview method is the semi-structured interview. Interviewers will be provided with three different interview templates (for trade unionists, for workers, for key company figures). Each template consists of a series of questions divided into macro-themes. It is not necessary for each interview to cover all the questions in the template. The interviewer may decide to adapt the interview template to the specific profile of the interviewee and the conditions of the interview itself (e.g. time available, space, presence of other people), choosing to focus on only some aspects if he/she considers it appropriate.

The interview should be conducted as an open discussion that moves from the more directly personal aspects to the broader issues of the work context directly experienced by the individual. The interviewer will keep an eye on the list of topics to be investigated and will guide the interview in such a way as to try to cover as many of them as possible. Interviews will be recorded, assuring the interviewee that the recording is for internal use only; in the case of sensitive points, on which the interviewee points out a problem, the recording will be interrupted and resumed later.

Interview templates are provided in the appendix (2.1, 2.2, 2.3) to this document.

### 4. Structure of the BARMETAL country report

The final structure of each country report should as far as possible conform to the following outline and cover the subsequent list of topics:

1. Introduction (research questions, methodological note);
2. National and sectoral labour market situation (metal sector):
3. Insight into industrial relations: general characteristics (a guiding table will be provided) and sectoral developments in metal, cover the past 10 years;
4. DAD and its effects:
  - a. National discourses, policies and measures on DAD, also the role of social dialogue at national level for shaping DAD policies and measures;
  - b. Sectoral relevance of DAD – which challenges does it pose to the sector (production, employment, skill levels, etc.);
  - c. Sectoral relevance of DAD – responses via collective bargaining (e.g. new bargaining topics and practices emerging? Which and in what subsectors and type of companies?);
5. Bargaining outcomes – in CBAs and changes to the bargaining process;
6. Findings from company case studies – how DAD creates opportunities for changes in bargaining, and how bargaining helps addressing, directly or indirectly, the goals and challenges derived from DAD. Also assessing which part of D-A-D has which effect, in some cases decarbonisation may prevail, while in others digitalisation and automatisisation are the most reflected in bargaining;
7. Policy recommendations.

# Appendix

## 1.1. Selection strategy template

### List of sectors

C24 - Manufacture of basic metals

C25 - Manufacture of fabricated metal products, except machinery and equipment

C29 - Manufacture of motor vehicles, trailers and semi-trailers

### Criteria of selection

Feasibility of the case study (High/Low)\*

Position in VC (OEMs and suppliers)

Degree of green conversion (Yes/No)

Degree of automation and digitalisation (High/Low)

\*Please specify for each company the degree of the feasibility of the field-study

Position in VC	Green		Not Green	
	High degree of Automation/ Digitalisation	Low degree of Automation/ Digitalisation	High degree of Automation/ Digitalisation	Low degree of Automation/ Digitalisation
OEMs				
Suppliers				

## 1.2. Case study overview sheet

<b>Basic information about the establishment</b>	Name of the company/establishment	
	Name of corporation if applicable	
	Participation in value chains and/or outsourcing activities	
	Type of business entity (stand-alone or part of a corporation/organization)	
	Year of establishment	
	Geographic location of the establishment	
	Period during which the fieldwork was carried out	
	Entry point (management, trade union, other - specify)	
	Company ownership (public, private, joint venture, etc.)	
	Size of establishment (number of employees)/volume of production	
	Workforce composition (by gender, by contractual status)	
	Sector of economic activity	
	Type(s) of goods manufactured	
	End user(s) (capital goods, intermediate goods, final goods)	
	Type(s) of technology adopted (eg. robotisation, collaborative automation, digitalisation, interconnection, machine-to-machine, IoT, etc.)	
	Type of decarbonization process in place (for example, of products, of processes)	
Form of employee representation within the establishment (for example, trade union, work council, etc.)		
<b>Information on adopted technology (automation and digitalization)</b>	When digitalization and automation processes began	
	Reason for digital and automation technologies adoption and main purpose/use of these technologies (id. specify if there are targets to meet)	
	Application areas (for example, production, service or product delivery, interaction with customers)	

	Extent of digitalization and automation integration within the establishment	
	Maturity level in the uptake of digitalization and automation	
<b>Information on decarbonization processes</b>	When decarbonization processes/introduction of green products began	
	Reason for transition to decarbonized processes/products and main purpose/use of decarbonized processes/products (id. specify if there are targets to meet)	
	Application areas (eg. waste management, input acquisition, control of emission, etc.)	
	Extent of integration of decarbonization processes within the establishment	
	Maturity level in the transition to decarbonized products/processes	



## 2.1. Template for union or workers' representatives

Date .../.../..... Company .....

Interview code (to be defined) .....

*The interview should be conducted as an open discussion that moves from the more directly personal aspects to the broader issues of the work context directly experienced by the individual. The interviewer will keep an eye on the list of topics to be investigated and will guide the interview in such a way as to try to cover as many of them as possible. Interviews will be recorded, assuring the interviewee that the recording is for internal use only; in the case of sensitive points, on which the interviewee points out a problem, the recording will be interrupted and resumed later.*

### **SEZ. 0. Profile**

Gender ...

Age ...

Education ...

Company seniority (if any) ...

Job title (if any)...

How long have you held this job (years)? ...

What is your professional qualification? ....

Are you a union member (for workers' representative) ? If yes, which one and for how long? If no, have you been a member in the past? ...

What position do you hold within the union/work council?

How long have you held this position?

## **SEZ. I. General questions about work and labour relations**

- 1) In general, how do you judge work relations within the company/plant? Is there communication between workers and supervisors/managers? Is the workers' voice heard?
- 2) Do any schemes exist in your company/plant that allow workers to make suggestions to the company (e.g. kaizen, team meetings)? Do workers use them? Are they effective?
- 3) How are labour relations structured in your company/plant? How would you judge the relationships between the union/work council and the company/plant management? How often do you hold meetings with them? What kind of meetings are they? What do you discuss in these meetings?
- 4) What kind of contractual activity does the union/work council carry out in your company/plant? How often is a new contract negotiated? What topics do negotiations usually cover? Are investments, technological innovation and work organisation usually part of the negotiation topics?
- 5) In your opinion, what relationship do workers have with the union/work council? Is the union/work council supported by the workers? How many workers are union members? Do workers participate in trade union activities (assemblies, elections, meetings)? And in strikes?
- 6) (If applicable) In your opinion, what is the relationship between the union and the work council? Is the work council composed of representatives who are union members? Is there cooperation or competition between these two actors? Which of the two has better relations with the company? And with the workers?

**SEZ. II. Investment in digitalization/automatization/  
decarbonization and trade union's/work council's role  
(adoption/design)**

7) Have digital technologies or forms of automation been introduced in your company/plant over the last X years? If yes, which ones?

8) Can you briefly reconstruct how the decision was made to adopt/design/introduce these technologies?

9) Is your company/plant going through or has it recently gone through a phase of decarbonisation/electrification of products or processes? In what respect?

10) Can you briefly reconstruct how the decision was made to start a transition towards electrified/decarbonised products/processes?

11) Are the technological innovation processes (digitisation, automation) we mentioned earlier linked to this decarbonisation/electrification process or are they independent? If they are linked, can you explain how?

12) When was it decided to invest in digital or automation technologies, was the union/work council involved? What about the decarbonisation/electrification process?

- At what level (company/plant or/and other level)?
- How (information, consultation, negotiation)? On what issues?
- Were there points of divergence? If so, which ones? What was the discussion about?

13) Can it be said that in the adoption and/or design phase of these technologies and of the decarbonisation process the trade union/work council played a role and exerted some influence?

- How? Which one?
- Explain/describe

14) And were the workers involved/consulted on the topic of the adoption of these new technologies and of the decarbonisation process? Did they express fears, concerns? Was there any resistance on their part? Of what kind? Why? How were they addressed/resolved? What role did the trade union/work council play?

**SEZ. III. Introduction/implementation of the technology of interest and trade union's role (introduction/use)**

15) Later, when it was time to introduce digital or automation technologies in the production process or to implement the decarbonisation process, was the trade union/work council involved?

- In what way? On what issues?
- Were there points of divergence? Which ones? What was the discussion about?

16) Can it be said that digital and automation technologies were negotiated in the way they were integrated into work processes? Did the trade union play a role? Did it influence their integration?

- What was negotiated?
- What were the different positions?
- What were the results?

17) Can it be said that the decarbonisation/electrification implementation process was negotiated? Did the trade union/work council play a role? Did it influence this implementation?

- What was negotiated?
- What were the different positions?
- What were the results?

18) If you had to identify some issues/aspects of work organisation on which bargaining focused when these technologies were introduced and when decarbonisation/electrification was implemented, which ones would you identify?

- Why precisely these?
- What were the results?

19) Were workers involved/consulted during the implementation phase? Did they raise any problem/issue? How were they addressed/resolved? What was the role played by participatory schemes in addressing the issues arising in the integration and implementation phase? What role did the trade union/work council play?

#### **SEZ IV. Consequences at level of organization of work and expectations**

20) In general, what consequences has the introduction of digital and automation technologies had on the organisation of work so far? What consequences has the transition towards electrified/decarbonised products/processes had?

By work organisation we mean in this analysis "how work is planned, organised and managed"; decision-making processes, work flows, quality controls and standards; monitoring and control of employees; definition of tasks and their content

21) How did the work process change and which parts underwent major changes? Why?

- Which workers (or groups of workers - occupations) were affected by these changes?
- What have been the changes in the tasks and activities of workers working with these technologies/in these processes? Of what kind (Do they perform more or less tasks? Has there been professional enrichment or deskilling? Have their working times and rhythms changed? Is the work they do more or less standardised? Is there more or less interaction and cooperation between colleagues or in teams?)
- Have there been or will there be substitution of workers? Or shifts of workers from one unit to another, from one task to another? Who, what tasks? Which roles? In which departments/units?
- What was the role of the union/work council on these issues?

22) Has the introduction of digital and automation technologies and the transition to decarbonised/electrified processes/products required new skills? Which ones?

- Were they found on the market? Are new professional figures being sought/recruited? What kind? Why?
- Have they been trained internally? Was it necessary to carry out training courses in this regard? What kind? Why?
- What was the role of the union/work council on these issues?

23) Did these changes or, in any case, the introduction of these technologies also correspond to

- a change in the workers' job classification or career path (both at contractual level and in terms of professional qualification)? In what way?
- a change in the hierarchical line?
- a change in the way workers' performance is monitored (e.g. how productivity is measured and evaluated, have new criteria been adopted)?
- What was the role of the union/work council on these issues?

24) In perspective (over the medium to long term), what consequences will the introduction of digital and automation technologies and the transition towards decarbonisation have on work organisation and the way of working? And at inter-organisational or sectoral level, what changes?

25) Do you think that these new technologies and processes will help to change relations between the trade union/work council and the company/plant management? If yes, in what way?

26) Do you think that these new technologies and processes will help to change relations between the trade union/work council and the workers within the company/plant? If yes, in what way?

## 2.2. Template for workers affected by the introduction of technological innovations linked to digitalisation, automatisisation and decarbonisation

Date .../.../..... Company .....

Interview code (to be defined) .....

*The interview should be conducted as an open discussion that moves from the more directly personal aspects to the broader issues of the work context directly experienced by the individual. The interviewer will keep an eye on the list of topics to be investigated and will guide the interview in such a way as to try to cover as many of them as possible. Interviews will be recorded, assuring the interviewee that the recording is for internal use only; in the case of sensitive points, on which the interviewee points out a problem, the recording will be interrupted and resumed later.*

### **SEZ. 0. Profile**

Gender ...

Age ...

Education ...

Company seniority ...

Type of contract ...

Job title ...

How long have you held this job (years)? ...

Did it require any special training? ...

What is your professional qualification? ....

Are you a union member? If yes, which one and for how long? If no, have you been a member in the past? ...

**SEZ. I. Brief description of the job and general transformations related to the introduction of digital/automation technologies and to the transition to decarbonisation of products/processes**

1) Can you explain/describe exactly the job you currently do? What is your role/task, what are your activities? Where, at what stages of the production process?

- Have her/him describe the production flow and have her/him place her/his activity in the flow.
- Who or what determines the pace and the time/schedule with which you do your work? How?
- Who or what decides how tasks/operations are to be carried out (e.g. their sequence)? How?
- Who or what monitors the output and the method? How?

2) Have digital or automation technologies recently been introduced in your work? If so, which ones?

3) What operations/activities do you perform with these technologies?

- Have him/her explain/report/describe when, how and why he/she uses the technology of interest

4) Besides you, who works with or around these technologies? Who, in the production process, has to deal with these technologies?

6) Did the introduction of these technologies require special professional training? Which kind of training was it? How long did it last? By whom was it provided?

7) Has your workplace or work area recently been affected by transformations or changes related to the transition towards decarbonisation/electrification of products/processes? If yes, in what way?

- Have her/him detail the effects of these transformations.

9) Apart from your own, which other areas within the company/plant have been affected by transformations related to decarbonisation/electrification of products and processes? If yes, which ones?

10) Did the transition to the production of decarbonised/electrified product/to decarbonized/electrified processes require special professional training? Which kind of training was it? How long did it last? By whom was it provided?

11) To your knowledge, is the adoption/integration of these technologies linked to a product or process change related to its electrification/decarbonisation?



**SEZ. II. Task analysis (I): digital and automation technologies' impact on work contents and methods.**

12) If you were there before digital and automation technologies were introduced or even if you also work in areas where these technologies are not present, can you describe in general how they have changed the way you work?

- Has your job title changed?
- What do you do differently than before?
- Do you do more or fewer tasks/activities?
- Do you do different tasks/activities? More or less complex?

13) How have digital and automation technologies changed the way your work is controlled and monitored? Did they limit or extend control?

14) Do digital and automation technologies limit or expand the possibilities for you to decide when and how you do your work? Do they affect the possibility of taking breaks, deciding on the pace of work, choosing the time/schedule with which you do your work, deciding how tasks/operations are to be carried out (e.g. their sequence)?

15) How and to what extent have digital and automation technologies changed/impacted on the interactions with colleagues and supervisors? Has communication changed? How?

16) Do digital and automation technologies increase your dependence on what your colleagues do? In what way?

17) Do digital and automation technologies play any role in changing teamwork (e.g. meetings, team meetings) and/or team formation itself? In what way?

18) Have digital and automation technologies made your work more or less repetitive? In what way?

19) Have digital and automation technologies stiffened procedures or made them less rigid? In what way?

20) When faced with problems or unforeseen events, do digital and automation technologies allow you to intervene to solve them? In what way?

**SEZ. III. Task analysis (II): decarbonisation/  
electrification impact on work contents and methods.**

21) If you already work in these area before the transition to decarbonised/electrified products/processes or even if you also work in areas not affected by this transformation, can you describe in general how it has changed the way you work?

- Has your job title changed?
- What do you do differently than before?
- Do you do more tasks/activities? Do you do fewer tasks/activities?
- Do you do different tasks/activities? More or less complex?

22) How has the transition to decarbonised/electrified products/processes changed the way your work is controlled and monitored? Did this limit or extend control?

23) Does the transition to decarbonised/electrified products/processes limit or expand the possibilities for you to decide when and how you do your work? Does this affect the possibility of taking breaks, deciding on the pace of work, choosing the time/schedule with which you do your work, deciding how tasks/operations are to be carried out (e.g. their sequence)?

24) How and to what extent has the transition to decarbonised/electrified products/processes changed/impacted on the interactions with colleagues and supervisors? Has communication changed? How?

25) Does the transition to decarbonised/electrified products/processes increase your dependence on what your colleagues do? In what way?

26) Does the transition to decarbonised/electrified products/processes play any role in changing teamwork (e.g. meetings, team meetings) and/or team formation itself? In what way?

27) Has the transition to decarbonised/electrified products/processes made your work more or less repetitive? In what way?

28) Has the transition to decarbonised/electrified products/processes stiffened procedures or made them less rigid? In what way?

29) When faced with problems or unforeseen events, are you able to intervene to solve them in the same way that you did before? If not, what has changed?

## **SEZ IV. Digitalisation, automation, decarbonisation impact on job quality and career prospects**

30) In general, how have digital and automation technologies and the transition to decarbonised/electrified products/processes impacted on your working conditions?

- Have they increased or decreased your workload?
- Have they increased or decreased the pace and rhythm with which you work?
- Have they increased or decreased the physical effort associated with your work?
- Have they made your work more or less stressful?

31) Have these new technologies/processes changed the health and safety conditions of your work (more/less hazards/risks etc.)?

32) Have do digital and automation technologies and the transition to decarbonised/electrified products/processes impacted on your career prospects? Do they offer the possibility of professional growth or not?

33) Can these technologies/processes have an impact on the contractual dimension?

- e.g.: part-time -> full time or vice versa; regularisation or precarisation

## **SEZ V. Work and labour relations**

34) Do any schemes exist in your company/plant that allow workers to make suggestions to the company? Do you use them? Are they effective?

35) In general, how do you judge work relations within the company/plant? Is there communication with supervisors and managers? Is the workers' voice heard?

36) How are your relations with the union/work council? Do you support them? Do you think they defend the workers' interests? What role do they play within your company/plant? What are they primarily concerned with? How do you judge their activity overall?

37) When the adoption of digital or automation technologies was announced, what was your reaction and that of your colleagues? Were there concerns about the consequences/risks of such an adoption? What about the transition to decarbonised/electrified products/processes? Has the company listened to your concerns? What about the union/work council?

38) In your opinion, what role has the union/work council played in the company's decision to introduce digital or automation technologies? And in the decision to start a transition towards electrical/decarbonised processes and products?

39) In the subsequent implementation phase of these technologies and processes, did problems arise?

- If so, did you or your colleagues point them out to your supervisors/managers? In what way? Were you listened to? If you were not listened to, how did you react?
- Did you present them to the trade union/workers' representatives? How did they act accordingly?

25) Do you think that these new technologies and processes will help to change relations between the workers and the company/plant management? If yes, in what way? What about the relations between the workers and the union/work council?

## 2.3. Template for hrm and tech specialists

**Date** .../.../..... **Company** .....

**Interview code (to be defined)** .....

*The interview should be conducted as an open discussion that moves from the more directly personal aspects to the broader issues of the work context directly experienced by the individual. The interviewer will keep an eye on the list of topics to be investigated and will guide the interview in such a way as to try to cover as many of them as possible. Interviews will be recorded, assuring the interviewee that the recording is for internal use only; in the case of sensitive points, on which the interviewee points out a problem, the recording will be interrupted and resumed later.*

### **SEZ. 0. Profile**

Gender ...

Age ...

Education ...

Company seniority ...

Type of contract ...

Job title ...

How long have you held this job (years)? ...

What is your professional qualification? ....

Are you a union member? If yes, which one and for how long? If no, have you been a member in the past? ...

## **SEZ. I. Brief description of the technology of interest**

- 1) Have digital technologies or forms of automation been introduced in your company/plant over the last X years? If yes, which ones? Can you briefly describe what they are used for and how they work?
- 2) Is there a general automation/digitalisation strategy for the company/plant or are the technologies to be adopted evaluated on a case-by-case basis?
- 3) Is your company/plant going through or has it recently gone through a phase of decarbonisation/electrification of products or processes? In what respect?
- 4) Are the technological innovation processes (digitisation, automation) we mentioned earlier linked to this decarbonisation/electrification process or are they independent? If they are linked, can you explain how?
- 5) How would you define the market position of your company/plant with respect to the sector in which it operates? How does this company compare with other players in the sector in terms of technological equipment? And of products?

**SEZ. II. (Direct or indirect) Investments in digitalization and automatization, drivers of adoption and expectations**

6) When and how was it decided to invest in digitisation and automation? Could you give some concrete examples of specific technologies?

7) What was the rationale for investing in these technologies?

8) What effects/benefits did you expect from the introduction of these technologies? With what timing?

9) Are these technologies usually acquired externally or developed in-house (how and to what extent)? Why?

- In the case of external acquisition, what is the relationship with the supplier companies? Do the latter play an active role in the 'management' and 'implementation' of the technologies?

10) Besides technological investments, what other investments (organisational, layout, training) were necessary for the effective implementation of the technologies we are talking about? Can you describe them?

11) In addition to the above, has the implementation of these technologies changed relations with suppliers and customers or other operators/businesses in the sector (either directly or indirectly)? Can you give us some examples (delivery times/processing stages)?

12) Did you adopt/introduce these technologies with internal or external funding? Please detail the source of funding.

13) What were the main problems during the implementation phase of these technologies?

**SEZ. III. (Direct or indirect) Investments in decarbonization, drivers of adoption and expectations**

14) When and how was it decided to invest in electric or decarbonised products or production processes instead? Could you give some concrete examples of specific processes or products?

15) What was the rationale for investing in decarbonisation/electrification of processes and products?

16) What effects/benefits did you expect from this choice? With what timing?

17) Has the decision to decarbonise/electrify some processes/products required the outsourcing of some parts of the production process that were managed in house?

- If yes, to what extent? What is the relationship with supplier companies? Do the latter play an active role in the 'management' of these processes?

18) What types of investments (technological, organisational, training) were necessary to support the decarbonisation/electrification process? Can you describe them?

19) In addition to the above, has the implementation of decarbonisation/electrification processes changed relations with suppliers and customers or with other operators/companies in the sector (either directly or indirectly)? Can you give us some examples (delivery times/process stages)?

20) Did the implementation of decarbonisation/electrification processes take place with internal or external company funding? Please detail the source of funding.

21) What were the main problems during the implementation of the transition to product/process decarbonisation/electrification?



#### **SEZ IV. Consequences at level of organization of work**

22) In general, what consequences has the introduction of digital technologies and automation had on the organisation of work so far? What consequences has the transition towards electrified/decarbonised products/processes had?

By work organisation we mean in this analysis "how work is planned, organised and managed"; decision-making processes, work flows, quality controls and standards; monitoring and control of employees; definition of tasks and their content

23) How did the work process change and which parts underwent major changes? Why?

24) Which workers (or groups of workers - occupations) were affected by these changes? (Get detailed occupation details so that you can trace the occupational categories as far as possible)

25) What have been the changes in the tasks and activities of workers working with these technologies/in these processes? Of what kind (Do they perform more or less tasks? Has there been professional enrichment or deskilling? Have their working times and rhythms changed? Is the work they do more or less standardised? Is there more or less interaction and cooperation between colleagues or in teams?)

26) Have there been or will there be substitution of workers? Or shifts of workers from one unit to another, from one task to another? Who, what tasks? Which roles? In which departments/units?

27) Has the introduction of new technologies required new skills? Which ones?

- Were they found on the market? Are new professional figures being sought/recruited? What kind? Why?
- Have they been trained internally? Was it necessary to carry out training courses in this regard? What kind? Why?

28) Did these changes or, in any case, the introduction of these technologies also correspond to a change in the workers' job classification or career path (both at contractual level and in terms of professional qualification)? In what way?

29) Did these changes or at any rate the introduction of these technologies also correspond to a change in the hierarchical line?

30) How have the technologies adopted changed, if at all, the way workers' performance is monitored (e.g. how productivity is measured and evaluated, have new criteria been adopted)?

31) In perspective (over the medium to long term), what consequences will the introduction of these technologies and the transition towards decarbonisation have on work organisation and the way of working? And at inter-organisational or sectoral level, what changes?

## **SEZ V. Consequences at level of industrial relations**

32) How are work relations structured in your company/plant? How do you judge relations between workers and hierarchy? Are there participation schemes to collect suggestions from workers (e.g. kaizen, team meetings)? Are they effective?

33) How are labour relations structured in your company/plant? What are the relationships like with trade unions and workers' representatives? How often do you hold meetings with these actors? What kind of meetings are they? What do you discuss in these meetings?

34) Was the trade union/work council involved/consulted in the decision to invest in digital and automation technologies? And in the decision to start a transition towards decarbonised/electrified products/processes? How were they involved/consulted? Were there any divergences? What was the discussion about?

35) And were the workers involved/consulted on the topic of the adoption of these new technologies and of the decarbonisation process? Did they express fears, concerns? Was there any resistance on their part? Of what kind? Why? How were they addressed/resolved? What role did the trade union/work council play?

36) Was the trade union/work council involved/consulted in the subsequent phase of integration of digital technologies and automation in work processes and during the implementation of the decarbonisation process? What was their role in addressing the problems arising in this phase? Were there any divergences? What was the discussion about?

37) Were workers involved/consulted during the implementation phase? Did they raise any problem/issue? How were they addressed/resolved? What was the role played by participatory schemes in addressing the issues arising in the integration and restructuring phase? What role did the trade union/work council play?

38) Do you think that these technologies will help to change relations with trade unions and workers within the company/plant? If yes, in what way?