Just Transitions Within Sectors and Industries Globally

Wind Energy and the Just Transition

Political and socio-economic pinch points in wind turbine manufacturing and windfarm communities in Europe and South Africa

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About Just Transitions within Sectors and Industries Globally
The programme examines how just transitions whilst tackling climate change and biodiversity is key to supporting inclusive economies and societies in the future. Through the programme, the Academy awarded funding to nine research projects exploring the actions required in sectors and industries globally across supply and value chains, with a focus on key economic emitters or areas of society that will help reduce and/or eliminate greenhouse gas emissions. The programme was funded by the UK's Department for Business, Energy and Industrial Strategy.

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Executive summary

The Just Transition literature discusses narrow and broad conceptions of the Just Transition, with distributive and procedural justice being key dimensions of the concept.

Focussing on the wind turbine industry and communities where windfarms have been built over the past four decades, this research project explored four key questions related to the realisation of a Just Transition.

1. How is the Just Transition defined by workers, managers, social partners, and community stakeholders in the industry?

2. What are the political and socio-economic pinch points at windfarm manufacturing sites and in communities where windfarms are located?

3. How are work intensification and intensified use of the natural environment resulting from the political imperative to deploy wind turbines quickly and at large scale dealt with?

4. How can the process of structural change, meaning here the expansion of the wind turbine industry, be managed equitably so that communities and workers benefit more broadly?

These questions and the project joined two areas of scholarship under the umbrella of Just Transition research, the exploration of the foundations of the social license to operate windfarms in communities and the power relations between capital and labour in wind turbine manufacturing which are mediated through a variety of national, sector and company level institutions. The project analysed data from Denmark, Germany, South Africa and the UK, which we collected between the years 2012 and 2022. The bulk of our data consists of semi structured interviews and focus groups from 156 participants including industry experts, local citizens, activists, trade union and industry representatives, managers in the industry and workers, managers and instructors from skill formation providers, and municipal policymakers. We complemented this data with secondary sources.

The data shows country differences in the conception of the Just Transition. While Denmark, Germany and England have no explicit Just Transition policies, Scotland and South Africa do.

Participants from the manufacturing industry in Denmark, Germany and the UK had relatively narrow conceptions of the Just Transition with hopes that the energy transition would not lead to more social harm, that the individuals affected would receive some form of compensation, and that the process would involve social dialogue between employers and worker representatives. One important finding is that while trade unions and worker representation structures within companies need to be strong to protect skill formation, job quality and social dialogue, the wind turbine industry is mostly lacking these strong structures.

The conception of the Just Transition in windfarm communities across the countries tended to be broader; for instance, co-ownership schemes and community ownership schemes were seen as opportunities to challenge existing power relationships in the electricity supply industry.

Political and socio-economic pinch points included questions of the distribution of economic benefits and burdens, questions of inclusivity of decision making processes, the speed of the energy transition and electrification and concerns over rising energy costs, political and economic power struggles between local citizens' windfarms and large utilities and manufacturers, and – in the wind turbine manufacturing industry – global competition between manufacturers, the trend to ever larger turbines, and the implications of highly ambitious or 'stop and go' renewable energy policies and the impact of local content requirements. These issues are far from being resolved.

Pressures on the cost of energy and of wind turbines put pressure on working conditions at the manufacturers and the service and maintenance industry for instance. The sector is not highly unionised and hence social dialogue and good labour standards are far from being ensured throughout. Participants reported that the sector still lacks the strength of labour rights and the level of perceived social and environmental commitment of more established energy industries. Although some good practice examples could be identified, for example in Scotland, South Africa and Nordfriesland, Germany, where windfarms provided important community benefits and at one of the two studied manufacturers where social dialogue and collective representation are relatively strong due to historical legacies of trade union presence and works councillors' effectively used rights of co-determination at the originally German mother company.

Our findings have important implications for the potential of success when framing the Just Transition as a 'global project of saving the planet' or as a 'global project of social solidarity'. While saving the climate de facto needs a global effort, individuals' specific, local identities and concerns and their material interests in the energy transition need to be taken into account and concretely addressed so that a global change can gain momentum.

Our policy recommendations therefore address two areas:

1. local co-ownership and community ownership schemes should be facilitated by policymakers as these, if implemented transparently and inclusively, increase local redistribution of economic benefits and participation in decision making with a concern for local social and environmental impact;

2. worker representation rights and social dialogue should be strengthened to ensure skill formation and good jobs in the wind turbine industry in the context of cost pressures and global competition.

1.0 Introduction

"The concept of a 'Just Transition' encompasses political and policy imperatives to minimize the harmful impacts of industrial and economic transitions on workers, communities, and society more generally, and to maximize their potential benefits." [1]

The global wind turbine industry is key to developing low carbon energy systems. The EU's Green Deal Offshore Renewable Energy Strategy proposes actions to deploy an additional 300 GW of offshore wind by the year 2050.[2] The wind turbine industry is also lauded as an important provider of new green jobs and a source of income and identity for the communities where wind turbines are manufactured and installed. The Danish wind turbine industry employed about 33,000 individuals and had a revenue of 128.5 billion DKK (roughly £13 billion) in 2020.[3] In 2021 the German wind industry boasted one hundred thousand FTE.[4] Similarly, highlighting the importance of the industry, the UK Prime Minister's 'Ten Point Plan for a Green Industrial Revolution' estimated that the UK offshore wind industry would provide 60,000 jobs by 2030.[5] Onshore and offshore wind energy also play a key role in South Africa where economic development experts estimate that leapfrogging into the large-scale expansion of renewable energy technology, such as wind, will help job creation and development.[6] However our findings suggest that local job creation and the wider redistribution across communities of the economic benefits of windfarms and the wind turbine industry are very much contingent upon policy choices and the underlying economic structure, as well as the distribution of political power within countries and the sector.

The academic literature on the Just Transition attaches diverse meanings to the concept.[7] [8] [9] [10] These conceptions however are not systematically grounded in research that gives voice to the individuals directly affected by the transition. With the concept originating from the North American labour movement[11] much empirical

1 Krawchenko, T. A. and Gordon, M. (2021), 'How Do We Manage a Just Transition? A Comparative Review of National and Regional Just Transition Initiatives', *Sustainability*, 13(11), pp. 60-70. Retrieved from https://doi.org/10.3390/su13116070 [accessed March 2022]

2 European Commission (2020), *Boosting Offshore Renewable Energy for a Climate Neutral Europe*, Press Release, 19th November, 2020. Retrieved from https://ec.europa.eu/commission/presscorner/detail/en/IP_20_2096 [accessed September 2021]

3 Wind Denmark (2021), *Employment, Export and Revenue*, Retrieved from https://en.winddenmark.dk/wind-in-denmark/statistics/employment-export-and-revenue [accessed March 2022]

4 Deutsche Windguard (2021), *Status des Windenergieausbaus an Land in Deutschland. Halbjahr 2021*. Retrieved from https://www.windguard.de/veroeffentlichungen.html?file=files/cto_layout/img/unternehmen/windenergiestatistik/2021/Halbjahr/Status%20des%20Windenergieausbaus%20an%20Land%20-%20Halbjahr%202021.pdf [accessed March 2022]

5 UK Government (2020), *New plans to make UK world leader in green energy*, Press Release, October 6th, 2020. Retrieved from https://www.gov.uk/government/news/new-plans-to-make-uk-world-leader-in-green-energy [accessed March 2022]

6 IRENA (2021), *The Renewable Energy Transition in Africa. Powering Access, Resilience and Prosperity*. Retrieved from https://africa-energy-portal.org/reports/renewable-energy-transition-africa-powering-access-resilience-and-prosperity [accessed March 2022]

7 Galgóczi, B. (2020), 'Just transition on the ground: Challenges and opportunities for social dialogue', *European Journal of Industrial Relations*, 26(4), pp. 367-382. Retrieved from https://doi.org/10.1177/0959680120951704 [accessed March 2022]

8 Heffron, R. J. and McCauley, D. (2018), 'What is the 'Just Transition'?', *Geoforum*, 88, pp. 74-77. Retrieved from https://doi.org/10.1016/j.geoforum.2017.11.016 [accessed March 2022]

9 McCauley, D., and Heffron, R. (2018), 'Just transition: Integrating climate, energy and environmental justice', *Energy Policy*, 119, pp. 1-7. Retrieved from https://doi.org/10.1016/j.enpol.2018.04.014 [accessed March 2022]

10 Newell, P. and Mulvaney, D. (2013), 'The political economy of the 'Just Transition'', *The Geographical Journal*, 179(2), pp. 132-140. Retrieved from https://doi.org/10.1111/geoj.12008 [accessed March 2022]

11 Mazzochi, T. (1994), 'A superfund for workers', *Earth Island Journal*, 9(1), p. 40.

research focusses on the Just Transition of fossil fuel industries.[12 13 14 15 16] Virtually no publication explores how renewable energy technologies may support the Just Transition, although great hopes are attached by policymakers to the renewables industry's ability to provide quality jobs and economic development (see for example US president Biden's widely received speech from April 2021[17]). Moreover, the attention to fossil fuel industries comes with a focus on regions that still have a strong industrial base, whilst neglecting the position and lack of bargaining strength of communities who welcome renewable energy industries hoping to revitalise their local economies and recreate identities after many decades of industrial decline.

The academic literature identifies a spectrum of approaches to the concept Just Transition.[18] The narrow approach focusses on social dialogue and equitable outcomes for trade union members. In contrast, the broad approach is a more radical social project that focusses on the eradication of inequality and the inclusion of stakeholders across the globe in the process of greening economies and societies. Both conceptions have in common a concern with distributive and procedural justice. Put simply, the literature accepts that distributive justice means the equal or equitable distribution of burdens and benefits and procedural justice means transparent and fair processes with participation of stakeholders. Who these stakeholders are and who are the burden bearers or beneficiaries defines the scope of one's concept of the Just Transition, narrow or broad. The ILO Guidelines,[19] the Solidarity and Just Transition Silesia Declaration[20], and the UNFCC Gender Action Plan[21] are examples of a broad conceptualisation of the Just Transition. The table below gives a summary overview of the distinguishing features of the narrow and the broad conceptions.

12 Evans, G., & Phelan, L. (2016), 'Transition to a post-carbon society: Linking environmental justice and just transition discourses', *Energy Policy*, 99, pp. 329-339. https://doi.org/10.1016/j.enpol.2016.05.003

13 Goddard, G., & Farrelly, M. A. (2018), 'Just transition management: Balancing just outcomes with just processes in Australian renewable energy transitions', *Applied Energy*, 225, pp. 110-123. https://doi.org/10.1016/j.apenergy.2018.05.025

14 Harrahill, K., & Douglas, O. (2019), 'Framework development for 'just transition' in coal producing jurisdictions', *Energy Policy*, 134, 110990. https://doi.org/10.1016/j.enpol.2019.110990

15 Kuriyama, A., & Abe, N. (2021), 'Decarbonisation of the power sector to engender a 'Just transition' in Japan: Quantifying local employment impacts', *Renewable & Sustainable Energy Reviews*, 137. https://doi.org/10.1016/j.rser.2020.110610

16 Obeng-Odoom, F. (2021), 'Oil Cities in Africa: Beyond Just Transition', *The American Journal of Economics and Sociology*, 80(2), 777821. https://doi.org/10.1111/ajes.12390

17 The White House (2021), *Fact Sheet: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies*, Press Release, April, 4th 2021. Retrieved from https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/ [accessed March 2022]

18 Galgóczi, B., ibid, p. 4

19 ILO (2015), *Guidelines for a Just Transition Towards Environmentally Sustainable Economies and Societies for All*, Geneva

20 UNFCCC (2018), *Solidarity and Just Transition,* [Silesia Declaration]. COP24 Katowice

21 UNFCC (2020) *Report of the Conference of the Parties on its twenty fifth session, held in Madrid from 2 to 15 December 2019,* [UNFCC Gender Action Plan], Madrid

Table 1: The differences and commonalities of narrow and broad conceptions of Just Transition

Points in common:

Concern with questions of distributive and procedural justice

Narrow	**Broad**
How can negative effects of transition be mitigated for trade union members/workers in fossil fuel/polluting industries?	How can the transition be achieved while increasing or at least maintaining equality/equity in political processes and economic transactions?
Aims to transform the jobs vs environment narrative -> creation of a 'win-win scenario'	Aims to transform economic relations within societies and between the global North and South
Selective view on polluting industries	Inclusive/cosmopolitan view
Workplace and industry	Power relations in society/economy
No challenge to the status quo of power relations	Expand participation of a range of actors who decide and benefit
Avoiding more inequality and social harm	More equality; decent work for all, eradicate poverty
Compensation, retraining, supporting transition to low-carbon jobs Support of decent, 'good quality' low carbon jobs	Broadening ownership of (energy) industry Benefits for disadvantaged individuals Cleaning up local pollution Creating income options for local communities Inclusive employment and training Improving living conditions
"Green Keynesianism" – Green growth Shared solutions: benefits all parties and is advocated by both industry and labour movement	Radical project of redistribution Transformative action Social/Environmental/Global energy/ Recognition/Restorative/Intergenerational/ Climate justice

Based on a review of Bainton al. 2021, Galgóczi 2020, Heffron and McCauley 2018, Krawchenko and Gordon 2021, McCauley and Heffron 2018, Newell and Mulvaney 2013, Stevis and Felli 2015

Galgóczi from the European Trade Union Institute (ETUI) states that the shape of the Just Transition will depend on existing capital and labour relationships, the way they are mediated by state institutions, the given socio-economic context, and the either conflictual or cooperative relations between social and economic stakeholders.[22] In his words, there will be 'Varieties of Just Transitions'.

We intuitively agreed with Galgóczi's proposition and decided to explore it in more depth in case studies from countries chosen based on their institutional differences – liberal (England, Scotland, South Africa) and coordinated market economies (Germany and Denmark, the latter is sometimes also referred to as hybrid between coordination and liberalism[23])[24], as well as their differences in welfare state provisions

22 Galgóczi, B., ibid, p. 4

23 Campbell, J.L. and Pedersen, O.K. (2007), 'The Varieties of Capitalism and Hybrid Success: Denmark in the Global Economy', *Comparative Political Studies*, 40(3), pp. 307–332.

24 Hall, P. and Soskice, D. (2001), *Varieties of Capitalism,* Oxford University Press.

– liberal (England and Scotland), conservative (Germany), social democratic (Denmark)[25] and developmental/unconventional (South Africa), and their geographic location – Europe and the global South.

In our case studies we considered dimensions that fit a narrow and a broad conception of the Just Transition. These dimensions are the distribution of community benefits in windfarm communities, possibly leading either to acceptance or resistance, and the challenges to skill formation, job quality, and social dialogue at wind turbine manufacturers. Our exploratory research indicated that these were salient issues in the wind turbine industry.[26] [27] [28] Our report addresses four key questions, which were derived from the British Academy's call:

1. How is the Just Transition defined by workers, managers, social partners, and community stakeholders in the industry?

2. What are the political and socio-economic pinch points at windfarm manufacturing sites and in communities where windfarms are located?

3. How are work intensification and intensified use of the natural environment resulting from the political imperative to deploy wind turbines quickly and at large scale dealt with?

4. How can the process of structural change, meaning here the expansion of the wind turbine industry, be managed equitably so that communities and workers benefit more broadly?

Our findings are based on data from windfarm communities and the wind turbine industry in Germany, Denmark, South Africa and the UK, which we collected over the past decade between the years 2012 and 2022. The bulk of our data consists of semi-structured interviews and focus groups with a total of 156 participants including industry experts, local citizens, activists, trade union and industry representatives, managers in the industry and workers, managers and instructors from skill formation providers, and municipal policy makers. We conducted the most recent wave of interviews between November 2021 and March 2022 and explored the four research questions stated above in a more systematic manner.

We complemented our interviews with data from secondary sources, industry reports, policy documents, news clippings, publicly available statistics and academic articles. We discussed our research design, preliminary findings and their implications for achieving a Just Transition in two roundtable events with stakeholders and academics held in South Africa in February 2022, one roundtable event with stakeholders in the UK held in March 2022, and two research advisory board meetings held in November 2021 and January 2022 with representatives from Unite the Union, Danish Trade Union Confederation, Oxfam Ibis, WAB e.V., ITUC Africa, Slaughter and May, IG Metall and the Confederation of Danish Employers, as well as academics from the University of Leeds, the University of Greenwich, the University of Bremen, and Middlesex University.

25 Esping-Andersen, G. (1990), The Three Worlds of Welfare Capitalism, Polity Press.

26 Schulte, L. (2016), *Industrial Policy, Skill Formation, and Job Quality in the Danish, German and English Offshore Wind Turbine Industries* [PhD Thesis], University of Greenwich, London. https://gala.gre.ac.uk/id/eprint/21891/

27 Robinson, B. and Stephens, S. (2021), 'The moderating and mediating role of local government in the community engagement strategy of a renewable energy company in South Africa', *Journal of Energy in Southern Africa*, 32(3), pp. 14–23.

28 Stephens, S. and Robinson, B. (2021), 'The social license to operate in the onshore wind energy industry: a comparative case study of Scotland and South Africa', *Energy Policy*, 148.

This summary report presents our findings in two sections (1) Local acceptance and resistance in windfarm communities and (2) Skill formation, job quality and social dialogue. We conclude by answering our four research questions and giving our policy recommendations.

2.0 Local acceptance and resistance in windfarm communities

In order to investigate the way in which community acceptance and protest regarding wind energy can aid in our understanding of the Just Transition we undertook research in five countries. Our sample is summarised in table 2.

Table 2: Sample of the research on community acceptance and resistance

	Interviews	Focus Groups
England	1 x 'Expert Interview' with County Council ecologist	Two residents of Community 2, who sit on the Parish Council
	1 x 'Expert Interview' with leading member of organized campaign against further onshore wind development in the county	
	2 x Residents in Community 1 (also classified as 'expert interviews' due to involvement in more organized campaigning and environmental groups)	
Germany	1 x Co-owner and mayor	Two experts on community engagement
	1 x Co-owner and manager	One local activist and one industry expert
	1 x Co-owner and farmer	Two co-owners of windfarm
	1 x Local activist	Two employees at company that manages the windfarm
Denmark	1 x Social Democratic councillor who is also the vice-mayor of the municipality	Four protesters, all members of the Coordination Group against the Expansion of Lem Kær.
	1 x Lobbyist from Wind Denmark, an interest group representing the Danish wind sector	
	1 x Follow-up interview with protestor who participated in the focus group	
Scotland (data collected 2018)	4 x Company employees involved in policy and planning/ ecology/ community engagement	
	4 x Windfarm staff in a variety of roles	
	2 x Local council representatives, from two different local councils	
	2 x Beneficiaries of the community investment fund	
South Africa (data collected 2018)	2 x Representatives from company management	
	1 x Community Liaison Officer	
	6 x Members of local communities	
	1 x CSI fund recipient	
	1 x Local Councillor	

Below we summarise our findings as they relate to procedural justice, distributive justice and the other emergent themes of insider/outsider tensions, environmental impact and the David & Goliath dynamic.

Procedural Justice

Failures of procedural justice, understood here as to do with the fairness of how processes and rules are applied, were identified by respondents in England, Denmark and to a lesser extent Germany (case 1). In England, there were concrete concerns to do with the polices in place during the time of the 'windfarm boom' of the early 2000s, and it was viewed as unfair that decisions which had such significant local impacts were made with minimal local input. In Germany and Denmark, it was believed that some local opponents had benefited from direct payment, effectively targeted to neutralise their opposition. In Denmark in particular, this was viewed as a significant barrier to procedural justice. The German case studies 2 and 3 offer insight into the benefits of procedural justice when well-applied; and the transparency of the co-ownership structure and the local management and decision making were identified as significant contributors to legitimacy and fairness. In South Africa, no comment was made on policies which facilitated the community ownership of the windfarm, and it seemed likely that there was little awareness of the relationship between the policies in place and the outcome in terms of windfarms and community benefit.

Distributive Justice

Issues of distributive justice, here understood as relating to the fairness in the allocation of resources, were raised in reference to a range of specific benefits and harms posed to the relevant communities. In Scotland, South Africa, and Germany, the benefits of the local windfarms were clear. In South Africa, however there was also some indication of resentment and a belief that some communities were receiving more than others, and that this was unfair. In Germany, the benefits of co-ownership fostered a sense of distributive justice, particularly when bolstered by support from banks which made shared ownership accessible to almost everyone. In Denmark, there was a more mixed picture; the proposed expansion was not going to offer community ownership and so the main benefit offered to the community would be the highly-skilled jobs which would be offered by the new development. In England and Denmark, there was also a sense that the distribution of windfarms themselves was unfair, and this was particularly strong in the English case study.

Insider / Outsider Tensions

A perceived threat from what might be termed 'outsiders' was evident in much of the opposition found in our data. In England, the lack of consultation regarding the placement of new windfarms was viewed as painful imposition by private foreign actors. In Scotland, where the windfarm was owned by a wholly-owned-subsidiary of a foreign company, the outside threat against which the community were steeling themselves was the UK government, and the windfarm was considered to be aligned with local, Scottish, interests.

Community acceptance could be found most clearly in those operations which entailed an element of community ownership, as in Germany and South Africa. It should be noted that Community Ownership, or 'Co-Ownership', in the European case studies indicated something different to the South African context, and while in the European case studies the ability of (non-local) private citizens to buy shares in windfarm operations was identified as a potential barrier to local participation, this was not a relevant concern in South Africa. Nonetheless, it should be noted that in South Africa awareness among the community of the Community Development Trust was very low, and indeed some raised concerns about what they believed to be a private company siphoning money away from the community.

Environmental Impact

Many of our participants indicated a discomfort around their difficulty reconciling the urgency of the global climate crisis with the immediacy of their experiences as someone living near a windfarm. There was a widespread acceptance of the reality of climate change and the need for action. In England, this was coupled with a believe that onshore wind was not an effective way to meet this challenge, and in Germany (case 1) opposition was initially made due to the environmental impact of turbines perceived by local residents. The Danish protestors identified the destruction of a beautiful area and the destruction of animal habitats as two key reasons for their opposition and in South Africa there was some minor mention of concerns relating to the impact of the windfarm on the local environment.

David & Goliath

Many of the communities consulted felt that they were the 'little guy' facing an up-hill battle against powerful forces. Danish protestors felt that they were facing insurmountable structural power, designed to benefit private companies and profit makers. This view was shared by the communities in England, while in the German cases the fear of such imposition was hypothetical, but sufficiently present to be commented on. The 'David & Goliath' dynamic was absent in Scotland and South Africa.

3.0 Skill formation, job quality, and social dialogue

This section summarises our findings on skill formation, job quality, and social dialogue in the wind turbine industry. Whereas countries' specific institutional frameworks on skill formation and social dialogue as well as individual employment rights play a role, the fact that the wind turbine OEMs are internationally operating conglomerates has two important implications: (1) Institutional frameworks of the OEMs' home and host countries dynamically interact, (2) the international structure of OEMs and the maturation of production processes across the industry enable OEMs to stage competition among their production sites, allowing for the dumping of working conditions and the restriction of labour rights.

Our findings show that the strength of trade union and workplace representation are, quite unsurprisingly, important bastions in protecting labour rights and standards – but their strength is not a given. Trade Union activity in the wind turbine manufacturing industry is, by far, less well organised than in the fossil fuel industries. Consequently the transition to low carbon economies lacks a mechanism – strong trade unions and worker representation – that ensures that the transition leads to similar or better levels of skill formation, job quality and social dialogue.

Whilst in Denmark and Germany, domestic wind turbine industries developed thanks to existing domestic engineering industries and favourable industrial policies in terms of R&D support, infrastructure, and available skills bases, the United Kingdom did not develop a significant domestic supply chain.[29] [30] The location of manufacturing sites of wind turbine OEMs in the UK resulted from the development of significant demand for wind turbines for offshore wind farms around the UK coast, but most components are supplied by manufacturers on the European mainland, and research and development take place in Denmark. The reliance of the UK industry on international suppliers impacts the structural power of production sites and workers.

The largest wind turbine OEMs have manufacturing sites near their international markets. Participants across the countries reported that local content requirements played a significant role in term of location decisions for manufacturing sites, although UK respondents found the content requirements of the UK as inadequate. High levels of competition resulted in ever larger turbines and continued technological adaptation. In high wage countries like Germany and Denmark the trend towards automatization reduced skill requirements and put pressure on wages as workers found themselves employed in 'unskilled' jobs with wages at the bottom of trade union wage scales or below. However, wages and working conditions were still attractive when compared with alternative jobs available to workers in the local labour markets around production sites.

29 Simmie, J. (2012), 'Path Dependence and New Technological Path Creation in the Danish Wind Power Industry', *European Planning Studies*, 20(5), pp. 753-772.

30 Simmie, J., Sternberg, R., & Carpenter, J. (2014), 'New Technological Path Creation: Evidence from the British and German Wind Energy Industries', *Journal of Evolutional Economics*, 24(4), pp. 875-904.

The volatility of the market due to changing government supports, the cost of raw materials and transport and the availability of transport routes for ever larger wind turbine components were additional challenges. For the largest OEMs, access to markets in various countries provided a certain degree of stability. Thanks to their international production networks, OEMs were not committed to specific production locations, and factories were relatively mobile and routinely closed and opened.

Although the growth of the renewable energy industry may have been seen as an opportunity to do things differently, particularly in liberal market economies,[31] [32] our data collected in Germany, Denmark, and the UK over the course of the past decade shows that this new industry has, over time, morphed into similar patterns as the institutional framework in which they developed. This may inspire hope for workers in Denmark and Germany and despair for workers (and policymakers) in the UK (and by analogy South Africa). But if we zoom in on our cases, and the distinct ways in which company A and B (operating in Denmark, England, and Germany) managed skill formation, social dialogue and job quality, the picture becomes more nuanced and helps us to identify the factors that are likely to bring wind turbine manufacturers on track for a Just Transition, notably strong levels of worker organisation and statutory worker representations rights and strong employment rights.

In Denmark, OEMs worked with the existing institutions for vocational skill formation, recruitment and worker representation, although one OEM was much more invested than the other. Our data from the mid 2010s showed high levels of agency work, job insecurity due to recurrent waves of redundancies, frustration among the workforce and mismanagement of workers by the temporary work agency company A worked with. Our more recent data shows that temporary work had been discontinued by the OEM thanks to pressure by the trade union, while company B continues using agency workers. Company A, together with a skill formation provider, had established vocational training for workers in the industry and both remained connected through training contracts and the fact that the vocational school hired former factory workers as instructors.

Our data from Germany documented trade union and works councillors' partly successful efforts to organise the wind turbine OEMs and negotiate collective agreements. However, most collective agreements stayed below the level of the general metal workers collective agreement. OEMs increasingly automated production, which reduced skill requirements and put downward pressure on wages. Interviewees reported that the OEMs collaborated with vocational education and training schools and universities for dual training programmes but also ran their own training programmes for more specific skills. However, the wind turbine industry overall still had a low vocational training quota, while in the same time suffering from a lack of skilled workers. Company A and company B, as in Denmark, followed distinct paths, with Company A having a collective agreement, valuing the acquisition of transferable skills and having effective social dialogue; Company B had no collective agreement, lower quality terms and conditions, valued company specific skills and had limited social dialogue.

31 *for example* Klein, N. (2015). *This Changes Everything*. Penguin Books.

32 *for example* Mazzucato, M. (2018 [2013, 2015]), 'Pushing vs. Nudging the Green Industrial Revolution', *The Entrepreneurial State. Debunking Public vs Private Sector Myths*, 3rd edition. Penguin Books.

Supportive industrial policies and strong worker representation are key features of the Just Transition across the German and Danish cases. High levels of worker organisations and company-based worker representation are preconditions for social dialogue between management and workers, which in turn is key for ensuring that change takes into account both companies' and workers' interests.

Our recent UK data does not permit a detailed view of what happens inside manufacturing sites. However, our industry-level stakeholder interviews provided a picture of much more fragmented relations between management, worker representatives, policymakers, and training providers. Data from the early 2010s documents efforts of local policymakers, skill formation providers, and a trade union to engage with the OEMs. Data from the mid 2010s show that there had been some success in terms of developing training collaborations with local colleges, and at one OEM in terms of trade union organisation and worker representation. By the time of our most recent data collection, the training collaboration with a local college had been terminated by one of the OEMs and skill formation had moved back into the company. Only one site had a collective agreement.

The narrative of policy and market challenges in the UK was unchanged between our data collection in the early 2010s and the most recent in 2021-2022. Interviewees deplored the lack of an industrial base due to the implosion of UK industry since the 1980s, the volatility of the market, the lack of uniform and high standard skill formation. On a positive note, the high demand for turbine technicians in offshore wind turbine installation provided employment although not job security for skilled workers. It may be that as long as the UK government does not provide consistent and long-term industrial policy for emerging technologies[33] and strong statutory backing for worker representation there is little hope for a Just Transition in the UK.

Our South African case showed the complexity of transitioning from a predominantly coal-based economy to a more diversified electricity supply industry in the context of high levels of poverty and unemployment, a low skill workforce, and the geographical distance between the existing coal industry and renewable energy work opportunities. Another constraint has been the policy uncertainty in the energy transition. We identified ambitious Just Transition and renewable energy policies, but interviewees doubted the commitment of leading politicians to these, and the scale of policy efforts seemed too modest compared with the enormous task at hand.

Table 3 summarises our sample of interviews on skill formation, job quality and social dialogue.

33 Mazzucato, M., ibid, p. 11

Table 3: Interviews conducted between 2012 and 2022

Denmark		**Germany**	
Wave 1 – 2014		**Wave 1 – 2012-2013**	
Manufacturer B	Former manager	Trade Union	Organiser
Manufacturer B	Former worker	Trade Union	Officer HQ A
Manufacturer A	Manager	Trade Union	Officer HQ B
Industry body	Sector expert	Trade Union	Officer local branch
Manufacturer A	Manager	Trade Union	Officer sector
Training provider A	Manager	Training provider A	Manager
Training provider B	3 Instructors	Training provider B	Instructor and officer
Manufacturer A	2 Shop stewards	Training provider C	Manager
Trade Union	Officer	Training provider D	Manager
Training provider B	Manager	Municipality A	Manager and PR officer
Wave 2 – 2018		Training provider E	Owner
Trade Union	Officer	Manufacturer A	Work councillor
Manufacturer A	Shop steward	Training provider F	Instructor
Training provider A	Instructor	Manufacturer C	Work councillor A
Training provider A	Manager	Manufacturer D	Work councillor
Training provider A	Instructor	Training provider G	Manager and Instructor
Manufacturer A	Former worker	Manufacturer E	Work councillor
AMU Aalborg	Training provider	Manufacturer B	Work councillor
Wave 3 – 2022		Training provider A	Training provider
Manufacturer A	Manager and shop steward	Manufacturer E	Manager A
Manufacturer A	5 Production workers	Industry body A	Manager
Trade Union	Officer	Manufacturer E	Manager
Manufacturer A	2-hour guided tour	Industry body B	Officer
Training providers B and C	2 Managers	Manufacturer C	Work councillor B
		Wave 2 – 2021	
		Trade Union	Officer
		Manufacturer A	Work councillor A
		Manufacturer B	Work councillor A
		Manufacturer B	Work councillor B
		Training provider A	Instructor
		Manufacturer B	Work councillor C
		Industry Body	Officer
		Manufacturer A	Work councillor B
		Manufacturer A	Manager
		Training provider B	Manager

Table 3: Interviews conducted between 2012 and 2022

United Kingdom		**South-Africa – 2021-2022**	
Wave 1 – 2012-2014		Renewable Energy Institute	Director
Trade Union	Officer HQ	Training provider A	Instructor
Industry body	Officer	Training provider B	Instructor
Local authority	Sector officer	Wind Farm	Worker
Training provider A	Manager	Wind Farm	Manager
Training provider B	PR officer	Manufacturer H	Manager
Local authority	2 Officers	SME	Manager
Trade Union	Sector Officer	Trade Union	Officer
Trade Union	Skills Officer	Association for the unemployed	Officer
Manufacturer G	2 Managers A and B	University	Activist/academic
Manufacturer G	1 Manager C	Trade Chamber	Officer
Training provider C	Manager	Industry body	Officer
Training provider D	Manager and PR officer	Anti-nuclear campaign	Activist
Financial Institution	Manager and officer		
Wave 2 – 2017			
Local authority	Manager		
Manufacturer A	Shop Steward		
Wave 3 – 2021-2022			
Trade Union	Officer HQ A		
Trade Union	Officer HQ B		
Training provider	Manager		
Sector support organisation	Officer		
Think Tank	Sector expert		
Public body	Officer		

Conclusions and answers to the research questions

This summary report presents the findings from research we conducted in Denmark, Germany, the UK, and South Africa over the past ten years, with a particular focus on the most recent wave of data collection in 2021-2022. Our research aimed to address four questions related to the four pinch-points: community acceptance and resistance, skill formation, job quality, and social dialogue. This conclusion will summarise our findings addressing each of the questions and will then present our policy recommendations.

1. How is Just Transition defined by workers, managers, social partners, and community stakeholders in the industry?

Workers, managers, and social partners in Denmark, Germany, and the UK had fairly narrow definitions of the Just Transition, with compensation for workers and avoiding the problems of large-scale unemployment principally in mind. In South Africa, governmental policies explicitly refer to the term 'Just Transition' and address both increasing participation in domestic policy making and redistribution of economic benefits, and the international community with calls for financial and logistic support in the transition to renewable energy. In the UK, some industry groups were seeking to monitor progress towards a Just Transition in a more fine-grained way, emphasising themes of "people, place and planet". However, among most interviewees there was a sense that the terminology had little currency and recognition in the industry. While the devolved Scottish government had a more developed Just Transition framework than the UK government, this was still considered to be quite limited in its practical impact.

It needs to be noted that social partners in Denmark, Germany, and in the UK play very different roles in public policy making and decision making within companies. Whilst social dialogue is institutionalised by strong trade unions in Denmark and Germany, in the UK the marginalisation and curtailment of trade union rights make it in practice much harder for trade unions to stand up for workers. There is potential to use the Just Transition as a lever to argue for a shift in power relations in favour of more worker and trade union participation in the UK. For instance, trade unions in the UK could argue for social criteria in the procurement for windfarms, as do German trade unions and industry associations, or the UK government could push for state or part-state ownership in windfarms to better influence procurement decisions.

Broad conceptions of the Just Transition could be identified in our case studies on community acceptance and resistance, where local co-ownership schemes and ownership by local community trusts increased participation and the range of beneficiaries of the electricity supply industry. In the South African case, there was still potential to increase transparency regarding ownership structures of the community trust. Overall, examples of acceptance and resistance to windfarm projects showed how important it is for local communities to partake in decision making processes (procedural justice) and the economic benefits generated from local windfarms (distributive justice).

2. What are the political and socio-economic pinch points at windfarm manufacturing sites and in communities where windfarms are located?

Large scale windfarm projects, like the offshore projects around the UK coast, have advantaged the largest OEMs and contributed to the consolidation of the landscape of OEMs. Moreover, market competition and instability make it difficult for SMEs to enter and survive in the wind turbine industry. OEMs, and therefore jobs, follow countries' local content requirements, but ultimately, the investments of OEMs into specific production sites are temporary, as they globally compete for markets. As the production process of wind turbines is entering the mature phase, increasing numbers of sites move to automated and lean production, which will significantly reduce skill requirements and the bargaining power of skilled workers.

As the wind turbine industry has grown rapidly and dynamically over the past three decades, institutions – such as social dialogue and skill formation – were established in a context of volatile markets and changing industrial policies, mergers and acquisitions, rapid technological advances in terms of products and automatization of production processes, internationalisation of production networks and markets. These contextual challenges have created conditions within which companies relied on agency work, decommissioned plants, and were hostile to trade unions and worker representation. The maturation of the sector and the passing of time have provided trade unions with opportunities to challenge these – for workers – detrimental practices. Skill formation and job quality continue to be negotiated as part of social dialogue and, in some companies, social dialogue itself still needs to be more strongly established.

Political and socio-economic pinch points at windfarm manufacturing sites in Germany and Denmark can therefore be summarised as the struggle to set social dialogue, employment relations and skill formation on par with the standards of the respective industrial relations model. We identified one manufacturer – Company A – where trade unions and works councillors/shop stewards had been quite successful in achieving this in its German and Danish operations and one manufacturer – Company B – where trade unions and works councillors/shop stewards have so far been less successful. Overall, the level of trade union membership and representation in the wind turbine industry is lower than in more established industries.

The UK provides a bleaker picture, where social dialogue between employers and trade unions appears absent in much of the industry. While we were not able to get insights from within manufacturing workplaces in our most recent data collection, the lack of social dialogue is likely to have negative consequences for skill formation and job quality. The key socio-economic pinch-points for our UK interviewees were the lack of a domestic supply chain for wind turbine components and the UK government's inability to provide a framework for growing its own industrial base. In other countries, like Denmark and Germany, domestic industries developed as industrial policies helped domestic demand for onshore wind turbines to pick up.[34] From this industry the offshore wind turbine industry developed. Another pinch-point reported by UK interviewees was the over-reliance on narrow, company-focused training schemes which, in the view of trade unions, were reactive and failed to develop transferable skills.

34 Bednarz, M. & Broekel, T. (2020), 'Pulled or pushed? The spatial diffusion of wind energy between local demand and supply', *Industrial and Corporate Change*, pp. 29(4), 893–916

In South Africa, there currently is no manufacturing by large OEMs. Socio-economic pinch points are the transition from coal to a more diversified energy supply industry, including wind energy, the provision of alternative jobs for coal workers and upskilling of workers to make jobs in renewable energy industries accessible. Foreign aid plays an important role in this. The need for upskilling coal workers to help them transition to new jobs was also brought up in interviews with UK and German participants. In Germany, vocational skill formation for wind turbine maintenance and installation for unemployed job seekers is provided through active labour market policy programmes – but the uptake has slowed down due to job losses in the local industry. In South Africa, the geographic distance between the coal district and wind farm locations provided an additional obstacle to transferring workers from one sector to another.

Socio-economic pinch points in windfarm communities across the four countries were surprisingly similar. Questions of the redistribution of economic benefits, participation in decision making processes were common to all case studies, as was the wish of local participants to stand up against large companies and investors from outside when these were perceived to make unfair amounts of profits while not giving back enough to the community, which we termed 'David and Goliath' and 'outsider vs insider tensions'.

Wind farming was often associated with land that was still or had previously been used for agriculture and the decision to build windfarms depended on landowners – mostly farmers – seeing an economic opportunity in wind energy. This means that particularly these landowners benefitted from wind turbines, but not necessarily the wider community. Some interviewees noted that this could lead to, or had led to, jealousy and opposition by other locals. German (wind) farmers in our sample (case 2 and 3) had anticipated this problem by initiating co-ownership schemes for local citizens.

3. How are work intensification and intensified use of the natural environment resulting from the political imperative to deploy wind turbines quickly and at large scale dealt with?

Manufacturers relied on agency work to scale up their workforce in times of high demand and automated or reorganised production processes. They also experimented with different shift patterns, and increasingly used their international production networks for staging competition between their sites. This poses a challenge to the Just Transition. Where trade unions and workplace representation are involved, potential negative effects of this can be addressed in social dialogue.

Government subsidies and policies, as well as demand for green energy, have motivated large utilities to invest in wind farms onshore and offshore. The subsidisation of onshore wind in particular has been met with local opposition, even where the population more generally is supportive of wind energy.

Given the success in terms of local acceptance when wind turbines are deployed under co-ownership or community ownership schemes, it is surprising that these have not been used more broadly. Overall the legal obligation to create some form of co-ownership or community ownership scheme exists so far only in South Africa and the German *Land* Mecklenburg-Vorpommern (since 2019)[35], and has existed for

35 Spiegel-Online (2021): Anwohner bekommen verpflichtend Windkraftanteile angeboten, Spiegel-Online, January 19, 2021. Retrieved from https://www.spiegel.de/wirtschaft/unternehmen/mecklenburg-vorpommern-anwohner-erhalten-windkraft-anteile-a-bcfa58c1-2324-45eb-999b-800e49e13df2 [accesses March 2022]

a limited amount of time in Denmark (until 2019).

In particular, local citizen-initiated co-ownership schemes in the German Land Schleswig-Holstein have proven very successful in increasing local participation, redistribution of economic benefits and acceptance. In our Scottish case, the developer provided funds for projects in the community and opened up the windfarm as a recreation area. In one of our German cases, it was highlighted that the windfarm owners contributed funds and land for nature conservation and research projects on the local flora and fauna. The windfarm's management company also invested in research and development to decrease the environmental impact of wind turbines.

One German interviewee – an opponent of local windfarms – noted that the coal industry had engaged in renaturation and research and development in making coal less impactful on the environment. Similarly in one of our English cases, interviewees praised coal companies' social engagement and saw windfarm operators as lacking in this regard. The bottom line here is that wind energy can gain acceptance if the industry gets (locally) visible on par with the level of community engagement, labour relations and research and development of the energy industries it is deemed to replace.

4. **How can the process of structural change, meaning here expansion of the wind turbine industry, be managed equitably so that communities and workers benefit more broadly?**

In brief, the process of structural change could be managed more equitably through more inclusive participation in decision making and redistribution of economic benefits. Different countries' policy and institutional frameworks incorporate these already to different degrees. Our cases showed that local co-ownership schemes' success depended on access to affordable finance for stakes in windfarms and that participation in decision making processes would require not only the opportunity to participate, but also access to sufficient information, to expert advice and knowledge transfer to promote effective participation. Moreover, co-ownership schemes initiated by locals required willingness of local landowners to support these projects.

Further, effective worker participation in co-determination and social dialogue requires a certain level of knowledge transfer and access to expert advice as can be provided by trade unions. In places where trade unions themselves are not strong, governmental policies and the law need to change and back this important bulwark against the exploitation of workers.

The following summarises our policy recommendations.

4.0 Policy recommendations

Fostering a Just Transition in windfarm communities

- Local consultation and transparency of decision-making regarding windfarm location are key.
- Our Scottish case showed that framing wind as a 'national resource' may help to gain support from local citizens.
- Local co-ownership schemes of wind turbines can be effective in redistributing economic benefits and broadening participation in decision making.
- Local co-ownership schemes require access to finance, information, and expertise – see German cases.
- The benefit of local co-ownership schemes is that profits are more likely to stay local, may be reinvested locally, and hence can have economic multiplier effects in the communities where they are located.
- Alternatives to local co-ownership schemes can be wind farm-funded community trusts that can provide expertise and funding for social community projects or mediate windfarm co-ownership – see Scottish and South African case. The last point was discussed as a possible future development at our round table with windfarm stakeholders in South Africa.
- Local benefits should also be generated through windfarms paying municipal business/corporate tax where they are located – see Danish and German cases.
- Windfarms and windfarm management companies can contribute in additional ways to communities and more broadly through providing land for nature conservation, renaturation projects, funding organic agriculture (German cases) and investment into new equipment to raise productivity of farming (South African case), participating in research and development on mitigating the environmental impact of wind turbines (German case 3), providing local jobs (Scottish case, German cases 2 and 3).

Skill formation, job quality, and social dialogue

- Government could introduce legislation that supports procurement for windfarms based on manufacturers' recognising trade unions as suggested by the German trade union IG Metall.
- Government or employers should fund the certification of skills used in the sector and include transferable skills training ideally through training in multi-company run training schools and accessible to unemployed job seekers (Germany).

- Government should provide an adequate social security system and/or obligate manufacturers to provide adequate 'reconciliation of interest' and compensation packages (German cases).
- Government should enhance or protect trade unions' collective bargaining rights.
- Government should enhance or protect workplace representation rights and trade unions must ensure adequate skills and knowledge transfer to workers who take on this role.
- Trade unions and employers should support the development of global union networks in the wind turbine industry to enhance the strength of local worker representation and facilitate exchange of information.
- Government should strengthen existing labour law with regards to working conditions, in particular in terms of working time and health and safety.

Industrial policy

- To tackle risks of policy uncertainty, government should craft policies engaging multiple stakeholders. This would increase the likelihood of policies being appropriate and implementable, engendering investment in the wind energy sector and contributing to skills formation and job creation.
- While the REIPPPP in South Africa will de facto lead to the privatisation of electricity generation in the country, it also sets a number of social standards; hence this might be a way out of systemically poor governance of the Electricity Supply System in the country. However, there is the risk of becoming political hostage to large foreign manufacturers, servicing companies, and investors.
- In Europe long-term and consistent policy support in terms of research and development, skill formation, and subsidies for, in particular, the deployment of small windfarms, was helpful for the growth of medium sized manufacturers and citizen-owned generation infrastructure (see Germany and Denmark). Later, when the industry and turbines grew in size, support of large-scale deployment helped to interest large utilities in the technology (see UK and Denmark). However the staged competition for subsidies and, later, strong market competition led to negative outcomes for workers in the sector. Hence, we recommend close monitoring of the working conditions in the industry and stronger involvement of trade unions and community stakeholders in industrial policy making.
- Domestic demand has been an important driver for domestic wind turbine manufacturing.[36] Industrial policy needs to support the early developmental stages, as well as the commercialisation of technologies.[37] Governments' growing ambitions regarding wind turbine deployment will be beneficial for large manufacturers and large utilities, but may ultimately jeopardize broad acceptance, if local citizens and workers in the industry are excluded from the process and do not receive any tangible benefits. It may be too late for the revival of a genuinely domestic wind turbine industry in the UK, but sufficient demand for (onshore) wind turbines, combined with effective local content requirements, worker representation and vocational skill formation, and co- and community

36 ibid, p. 14
37 Mazzucato, M., ibid, p. 11

ownership schemes may enable a Just Transition with the support of the UK wind energy industry.

- Discussion of the role of public actors in the wind energy supply chain should also be on the table. A well-resourced public or part-public wind energy manufacturer or operator may be able to use procurement policies to stabilise local supply chains and absorb more risk itself rather than downloading it to SMEs. It might also be able to develop more comprehensive and transferable skills programmes and promote higher levels of social dialogue. However, there is a risk that public actors may act as any other commercial company. Policy makers need to therefore establish rules for public actors involved in the energy supply chain with the purpose of protecting working conditions, workers' rights, and nurturing the domestic component supply chain.

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