How the Net-Zero Transformation Affects Fossil Fuel Exporters – Security Implications and Policy Options for the EU

Deliverable D3.7: Discussion papers on the impact on the EU's main partners dealing with the respective dimensions (Paper 4)

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1. Introduction

The EU has set itself ambitious targets to achieve climate neutrality by 2050 (European Commission 2019) and with the "Fit for 55 package" has adopted concrete measures to achieve this goal (European Commission 2021a). Achieving a net-zero economy requires an almost complete shift away from unabated fossil fuel use (i.e., fossil fuel use that does not involve carbon capture, utilization and sequestration). Thereafter, emissions can only be released to the atmosphere to the extent to which they are counterbalanced by 'negative emissions' elsewhere, such as greenhouses removed from the atmosphere by afforestation or direct air capture (Minx et al. 2017). Even though fossil fuels might still be used in combination with carbon capture and sequestration (CCS), this technology seems unlikely to be deployed on a large scale due to its high costs, potential environmental risks and public resistance (Hepburn et al. 2019).

As a consequence, the transformation to a net-zero economy can be expected to go hand in hand with drastically reduced demand for fossil fuels in the EU and other regions that decarbonize their economies. Reducing emission by 55% below 1990 levels by 2030 means that consumption of coal, oil and natural gas will need to decline by a similar proportion. Depending on global developments, such as cost declines for renewable energy technologies or climate policies in other countries, world market prices for oil and natural gas may then be significantly lower than today.

For many countries outside the EU, revenues from exports of fossil fuel account for a sizable share of GDP or the public budget. Lower fossil fuel prices and reduced sales volumes could hence undermine the economic model of these countries, and as a result put political and social stability in these countries at risk and might even spark regional conflicts or intensify existing ones. This paper focuses on the potential security implications for the EU resulting from climate policy-induced fossil resource devaluation in third countries. While the security implications of climate change impacts have received research attention (see Section 2), there is relatively little research on the security implications of the structural and economic changes needed to achieve climate neutrality by 2050. In view of the recent rise of geopolitical tensions, it is of particular salience for the EU to have a comprehensive understanding of policies to support countries dependent on fossil fuel exports to adapt to changing world market conditions to avoid that the net-zero transformation creates serious geopolitical security risks.

This paper addresses this gap by providing a conceptual basis to further the understanding of security implications of the EU's transformation to a net-zero economy. It first defines the aspects of security under consideration (Section 2) and proposes a typology to classify fossil fuel exporting countries based on their exposure to world market prices, their capacity to adjust and their importance to the EU in terms of security issues (Section 3). It then takes stock of policy options that can be adopted in other countries to reduce adjustment costs to a changed economic environment (Section 4) and discusses how the EU can support these policies (Section 5). Finally, it highlights key implications for EU policy makers (Section 6).

2. Security implications of a net-zero transformation

The literature on climate change and security has extensively discussed the security implications of climate impacts (Busby 2021; von Uexkull and Buhaug 2021). A recurrent topic of analysis concerns the question of how increased prevalence of e.g., droughts, water scarcity and biodiversity loss can negatively affect political and social stability, increase the risk of violent conflict and lead to internal and transboundary displacement of people (Rüttinger et al. 2022). Some authors have also addressed governance implications at the supra-national and the international level, such as the EU, NATO and the UN (Dellmuth et al. 2018; König and Vivekananda 2020; West et al. 2021).

Some authors have assessed the geopolitical implications of the energy system transformation, for instance regarding energy trade or great power competition over areas with high potentials for renewables (Blondeel et al. 2021) Others have assessed how increasing demand for e.g. green hydrogen and its derivatives, critical raw materials (e.g. cobalt and nickel) and technologies (e.g. batteries and solar panels) could trigger distributional conflicts within certain countries or affect the balance of power between countries competing for regional supremacy (Vakulchuk, Overland, and Scholten 2020; Van de Graaf et al. 2020).

By contrast, the focus of this paper is on the security implications of – potentially drastic – changes in the demand for fossil fuels in the wake of a move to net-zero. The security aspect that has arguably received most attention in the literature is how reduced reliance on fossil fuels reduces import dependence (Cherp and Jewell 2014; Metcalf 2014). From the perspective of fossil fuel producers, the literature on 'stranded assets' (Caldecott et al. 2021; van der Ploeg and Rezai 2020), has highlighted the potential economic losses arising from a transformation of the global energy system. This line of research does not, however, put security issues center stage. The link between stranded assets and political stability is addressed by Goldthau et al. (2020), who assess the implication of a transformation of the global energy systems for low-income countries and Overland et al. (2019), who develop an index of geopolitical gains and losses from the energy transition.

Our study extends this strand of research by discussing how stranded assets may imperil social and political stability in third countries and as a result also impact EU security. It also goes beyond previous studies by linking security considerations to policies that can be adopted in countries that are negatively affected by declining demand for fossil fuels and discussing how the EU can support these policies in other countries.

In many cases, a plentiful endowment with natural resources has been observed to act as an impediment to socio-economic development. The literature on the so-called 'resource curse' has identified several channels through which reliance on extractive industries can stifle innovation and structural economic change (Ploeg 2011a) and presented potential avenues for resource-

dependent countries to diversify their economies (Lashitew, Ross, and Werker 2021). The necessary move away from reliance on fossil fuel extraction, however, requires political guidance and is unlikely to succeed simply as a result of changing market conditions, as illustrated by the dismal economic performance of many oil and gas exporters in times of price slumps.

For this reason, this paper will focus on measures to actively support a managed decline of fossil fuel extraction (Rinscheid et al. 2021; Trencher et al. 2022), especially in countries that are highly dependent on the associated revenues and face difficulties diversifying their economies (Asheim et al. 2019; Lazarus and van Asselt 2018). We hence discuss ways to support measures that can prevent the most adverse outcomes for fossil fuel exporters (rather than how the EU could react to individual security issues).

Several ways are conceivable how lower demand for fossil fuels may undermine social, economic and political instability in other countries. For instance, reduced resource rents could diminish the government's ability to pay for redistributive policies, thus undermining its legitimacy and provoking civil unrest. The academic literature has identified numerous cases in which declining revenues from natural resources within 'boom-and-bust-cycles' have created economic instability and damaged long-term economic prospects (Ploeg 2011a). Likewise, in many countries the government is closely entangled with vested interests in the oil and gas industries (Ross 2013). Weakening their position would have a direct impact on the government's ability to carry out its tasks of providing public goods and creating an enabling environment for economic activity. This would, in consequence, impair social and political stability, at least in a transitory phase. Concentrated economic losses in some countries that are not matched by comparable losses for regional rivals could change the regional balance of power and result in increased tensions and even armed conflicts, e.g., if the dominance of a declining power is challenged by other countries in the region. In multilateral fora, countries losing out from the transition might increasingly unite to openly block ambitious international climate policy and in this way undermine progress on the multilateral level.

All of these trends first and foremost affect the stability of resource-rich and fuel-exporting countries, but they can thereby also affect the security of the EU in numerous ways. For this study, we focus on three key aspects of security:

- **Security of critical supply chains**: Instability and conflict in EU trade partners can disrupt vulnerable supply chains and thus have a negative impact on security of supply, e.g., of critical raw materials. This aspect of security is most relevant for imports from trade partners on which the EU is highly depends.

- **Migration**: Rising poverty and lack of economic perspectives in fossil fuel exporting countries can raise the pressure to migrate to the EU. Already in the past, migration has proven to be highly contentious and divisive in the EU, for instance during the 2015 refugee influx. This would come on top of an already increasing migratory pressure, not least due to climate impacts.

- **Military involvement**: Armed conflicts in or between countries outside of the EU entail the risk of military involvement of EU Member States. Reasons for military involvement include the necessity to protect own borders or to assist a NATO partner, as part of a humanitarian intervention, but also to maintain regional stability.

In the next section, we discuss how these considerations could be operationalized to establish a framework that allow to identify those countries that might pose the most relevant security risks for the EU.

3. Analytical framework and its application

This section first sketches a general framework how countries affected by declining fossil fuel prices could impact EU security. It then applies the framework to selected countries using 2019 data.[1]

3.1 Analytical Framework

To better understand the potential security implications of the EU'S transformation to climate neutrality (and resulting elimination of fossil fuel imports), we develop a conceptual framework comprising three elements, as depicted in **Error! Reference source not found.**. First, the extent to which a country may be negatively affected by declining fossil fuel prices through its exposure to fossil fuel markets. Second, a country's ability to adjust to these changing conditions. And third, the density of relations of that country with the EU (or, short, its entanglement with the EU). The first two elements are considered from the perspective of the non-EU country, whereas the third element is assessed from the EU's perspective.

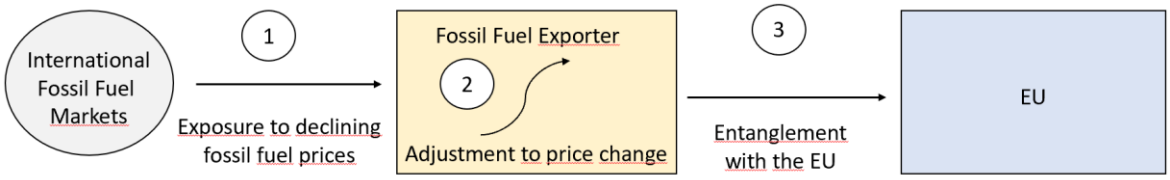

Figure 1: Three elements of the analytical framework to identify countries that are most relevant for EU security with regard to the net-zero transformation.

[1] Since this is a discussion paper rather than a full analysis, the analysis uses an illustrative set of indicators. With further analysis, it would be desirable to develop a more complete set of indicators. Indicators generally use 2019 data, this being the last year in which energy and trade patterns were not affected by the pandemic or the Russian attack on Ukraine and the political response to it. One exception of this is the data on voting behaviour by countries in the "entanglement" category, which uses 2021 / 2022 data.

3.1.1 Exposure

To identify countries that may be affected by the declining demand for fossil fuels as the EU progresses towards climate neutrality, it is crucial to have a sense of how important fossil fuel rents are for the political and social stability of major suppliers of fossil fuel to the EU. Thus, we operationalise this element by selecting the following indicators:

- Fossil fuel rents as a percentage of the country's GDP (World Bank data)
- Fossil fuel rents as a percentage of the country's public expenditure (World Bank data)

For many fossil fuel exporters, rents from fossil fuels account for a substantial share of GDP and export revenues. They are also an important source of government spending, either directly through state-owned companies, or in the form of royalties paid by international oil and gas companies. Sharp declines in revenues from fossil fuel exports could potentially undermine the government's ability to provide access to social services like healthcare and education, or to pay for redistribution, be it via social support systems, payments to elites and privileged groups, or through other mechanisms such as subsidised food or fuel. Reduced fossil fuel income might also have ripple effects throughout other sectors of the economy, negatively affecting wages and employment and possibly leading to economic contraction.

3.1.2 Ability to adjust

The second element considers the ability of the fuel-exporting country to adjust to declining fossil fuel revenues. Countries with greater institutional capacity and a more diversified economy are generally in a better position to manage a structural change process successfully. More specifically, well-developed climate and energy policies are an indication to what extent the country is ready to embrace a post-fossil future, and to put the needed medium- and long-term strategies in place – or whether it has even embarked on the transformation away from fossil fuels. In this regard, other than policy ambition, the share of renewable energy in the country's own energy mix provides another measure of the country's readiness for its own, domestic transformation.

To operationalise this element, we thus look at

- Institutional capacity (Worldwide Governance Indicators)
- Extent of economic diversification (Economic Complexity Outlook Index)
- Existing climate and energy policy (multi-layered analysis)
- Share of Renewable Energy in total generation (IRENA)

Government capacity is likely to be critically important to orchestrate the restructuring of the economy away from fossil fuels and towards other types of value generation. Governments' capacity to devise and implement transition plans, develop funding mechanisms, and regulate

markets is captured through the World Governance Index sub-indicator, Government Effectiveness. Government Effectiveness evaluates a country's public services, administration and civil service, as well as policy implementation and the government's relative commitment to maintaining and improving the above. Countries with higher Government Effectiveness scores may be more likely to have the institutional capacity to prepare for the transition away from fossil fuels, and to manage this transition successfully.

To reflect how ready the country's economy is for a successful transformation to climate neutrality, we consider economic complexity and flexibility as measured by the Economic Complexity Outlook Index (COI) from the Harvard Growth Lab (The Growth Lab at Harvard University, 2019). The COI estimates the ease with which countries can diversify their production. A country which produces low-complexity products with few similar products, and hence fewer options to diversify to, is likely to have a low COI. This means that it will struggle more to mobilise the capacity and knowledge needed to increase the complexity of its economy. High COI countries already produce complex products and are more likely to have the capacity and knowledge needed to develop other complex products and supply chains.

Several sub-indicators serve to evaluate the climate policy ambition along different time scales. For climate ambition in the short- and medium-term, we use an average of the Climate Action Tracker's ratings of a country's domestic NDC target and their fair-share target projection, asking if a) modelled domestic pathways show the country is on track to achieve its target, and b) if that target is 1.5ºC compatible (Climate Action Tracker, 2023). Long term policy is similarly evaluated in a two-step fashion, where we ask whether the country in question has c) submitted an LTS to the UNFCCC and d) if a submitted LTS contains robust modelling and planning as determined by expert judgement. Finally, the share of renewable energy in total electricity generation provides an indication how far a country has progressed in its domestic energy transition, and its ability to power its own economy without fossil fuels.

3.1.3 Density of relations / Entanglement

The third element in this analytical framework is a measure of the density of the relations, or entanglement, of the EU with other (non-EU) countries. The rationale for including this indicator is that eroding political stability in third countries will be felt more acutely in Europe if the country in question has closer (economic, political, or cultural) ties to the EU. A combination of different indicators intends to capture this aspect. The flow of people into the EU serves a proxy for migratory pressure: with growing social tensions and diminished economic perspectives, people might increasingly seek to migrate to the EU or, in the case of civil unrest, be forced to flee from their home countries. When doing so, people will often follow pre-existing emigration pathways, therefore existing data on migration patterns can serve as an indicator of possible future migration. Second, the overall bilateral trade volume between the EU and a third country provides a measure of their economic integration, and the possible disruption of supply chains if the third country's economy is impacted by falling fossil revenue and eroding stability. A third aspect is the

third country's geopolitical attitude towards the EU: if the country suffers economically from declining fossil revenues (including from the EU), to what extent does this create a risk of geopolitical backlash and increased opposition or even hostility towards the EU. To evaluate this risk, we consider the quality and intensity of a country's political relations with the EU, ranging from close cooperation and political alliance at the one extreme, to opposition and open hostility at the other. Since there is no single indicator for this, the assessment includes two considerations: first, the third country's integration and the extent and type of cooperation with the EU and / or EU Members in multilateral fora and initiatives.; and second, the country's voting record in the UN general assembly on Russia's invasion of Ukraine, as an indicator to what extent the country aligns itself diplomatically in a (partly energy-related) matter of high significance for the EU.

To operationalise this element, we thus looked at the following indicators:

- First Time Residence permit applications and Asylum registrations (Eurostat). These indicators provide a partial picture at best, given the difficulties inherent in tracking unofficial / illegal / undocumented migration flows.
- Overall volume of trade (Eurostat)
- Membership in international alliances and groups, and voting record in the United Nations General Assembly Resolutions ES-11/1 and ES-11/4 on the Russian invasion of Ukraine.

3.2 Application of framework

To evaluate the impact of the EU's drive for climate neutrality on its international security, we opted to focus our analysis on the top ten countries exporting oil to the EU in 2019.[2] These countries include Russia (which, in 2019, provided 28.66% of the EU's oil imports), the United States (8.81%), Norway (7.7%), Iraq (5.95%), Libya (5.94%), Kazakhstan (5.77%), the United Kingdom (5.40%), Saudi Arabia (5.30%), Nigeria (4.72%) and Azerbaijan (3.28%) (Eurostat 2023c). These ten suppliers also provide geographic, political, and economic diversity to test the framework. Oil exports were prioritised since the high rents characteristic of oil extraction render it a proxy for political stability within the exporting state (Caselli & Tessei, 2016).

We rated oil rents over 21% of GDP as high exposure, risk between 11% and 20% as medium risk and up to 10% as low exposure risk; we applied these same ratings to the share of fossil fuel rents in public budget. For the first two 'ability to adapt' indicators (Institutional capacity, economic diversification), we applied the existing indices' ratings. The transformative, long-term ambition of existing climate and energy policy ratings consists of a qualitative assessment based on the Climate Action Tracker and an assessment of the Long Term Strategy of each country.

[2] Using this year allows to circumvent anomalies brought about by the COVID pandemic and responses to it. It also provides for a more coherent picture, as not all the datasets are updated frequently enough for 2022 data to be available at time of writing.

Table 1: Exposure and ability to adjust elements

	Exposure		Ability to adjust			
	Oil rents (% of GDP)	Share of fossil fuel rents in public budget[3] (%)	Institutional capacity	Economic diversify-cation	Transforma tive LT climate and energy policy	Share of RE in electricity generation (%)
Azerbaijan	22	82.5	Medium	Low	Null	7.3
United Kingdom	0	1.0	High	High	Medium	37.3
Iraq	39	92.6	Low	no rating	Null	5.4
Kazakhstan	14	52.0	Medium	Low	Low	11.0
Libya	44	108.7	Low	Low	Null	0.02
Nigeria	7	133.1	Low	Low	Medium	25.3
Norway	5	11.7	High	Medium	Medium	97.0
Russian Federation	9	53.1	Medium	Medium	Low	17.6
Saudi Arabia	25	69.0	Medium	Medium	Null	0.1
United States	0	1.8	High	Medium	Low	17.5

Indicators of countries' exposure to changing fossil fuel prices and their ability to adjust for selected countries.

Combining the assessments of the two first elements (based on 2019 data),

[3] For Libya and Nigeria, fossil fuel rents exceed public expenditures on account of the rents being split between a variety of stakeholders, the primary of which are governments and investors. In these particular instances, the government revenues for that year have been significantly lower than expenditures according to the CIA World Factbook, meaning other stakeholders have captured a greater proportion of fossil fuel rents.

Table 1 categorises countries according to their exposure to falling fossil fuel revenue and their ability to adjust. Clearly, countries that are challenged on both accounts face the highest risks: this applies to Azerbaijan, Iraq, Kazakhstan and Libya. For some cases, political judgement will be necessary to determine how to evaluate the relative importance of the two dimensions. For instance, Saudi Arabia is very exposed to changing fossil fuel prices, but also has some ability to adjust, whereas Nigeria's exposure is only medium, but its ability to adjust is rated as low.

Table 1: Categorisation of countries according to their exposure to changing fossil fuel prices and their ability to adjust, based on 2019 data

		Exposure to changing fossil fuel prices		
		Low	Medium	High
Ability to adjust	Low		Nigeria	Azerbaijan, Iraq, Kazakhstan, Libya
	Med		Norway, Russia, USA	Saudi Arabia
	High	UK		

The next analytical step is to apply the third element (density of relations) of the framework. Table 3 below shows the combination of this assessment with the indicators for our third element.

Table 2: Indicators for countries' entanglement with the EU

	Density of relations / entanglement				
	First residence permit (%)	Number of asylum registrations as % of total	Imports in millions of EUR (2019)	Voting record UN GA ES-11/1 and 11/4	International fora and alliances
Libya	0.0%	0.4%	15,962	+ / +	None
Iraq	1.01%	4.5%	17,281	o / +	None
Saudi Arabia	0.0%	0.0%	26,347	+ / +	G20
Azerbaijan	0.0%	0.5%	10,598	abs / abs	None
Kazakhstan	0.38%	0.2%	18,403	o / o	None
Russian Federation	2.5%	2.1%	144,942	- / -	None
Nigeria	1%	3.6%	21,493	+ / +	None
Norway	0.0%	0.0%	54,146	+ / +	Nato
United Kingdom	no data	0.0%	194,284	+ / +	Nato, G7/20
United States	2.5%	0.0%	235,186	+ / +	Nato, G7/20

Note: "+" denotes that countries voted in favour of the respective UN General assembly resolution (ES-11/1 and ES-11/4) condemning Russia's attack on Ukraine and annexation of Ukrainian territory; "o" denotes abstention, "abs." their absence, and "-" a vote against the resolution.

From the table, the following picture emerges:

- Of the four countries that combine high exposure and low ability to adjust (Azerbaijan, Iraq, Kazakhstan and Libya), none are highly significant in terms of their overall trade volumes – but particularly Iraq stands out with regard as a source country of migration to the EU.[4] In terms of their geopolitical positioning, particularly Azerbaijan and Kazakhstan are not closely aligned with the EU.

- Of the "interim" category with either medium ability to adjust or medium exposure, the Russian Federation stands out with a relatively large share of migrants, (at the time still) significant trade with the EU, and of course a high risk of geopolitical hostility. Nigeria is also notable for its relatively high share of migration to the EU, but less significant in terms of trade, and less adversarial in geopolitics.

4. How vulnerable countries can deal with declining fossil fuel prices

This section discusses how countries affected by declining fossil fuel revenue could adapt to changing world market conditions. The question how to transition out of dependence from natural resource rents has been a central theme of the environmental economics literature. This literature has examined the depletion of exhaustible resources, but the main insights from this research can be equally applied to cases in which resource rents decline because of diminishing demand. We thus discuss the role of long-term sovereign funds, the possibility to build up alternative industries – especially in clean sectors – and just transition policies to alleviate social hardships.

Establish long-term sovereign funds: There is ample academic literature on managing the revenues of exhaustible resources. A robust recommendation from this literature is to establish a sovereign fund that can invest resource rents with a long-term perspective and smooth out price volatility (Ploeg 2011b). In practice, this approach has been applied for e.g., oil revenue in Norway, Singapore and many Gulf countries, Chile's copper revenues and Botswana's diamond revenues. For such funds to work well, transparent rules related to how revenues are spent are required, as well as a certain degree of independence to isolate spending from the short-term needs of the political process (Sala-i-Martin and Subramanian 2013).

Building up alternative industries: Economic development can be maintained if the resource rents are invested in some form of capital that can yield long-term economic benefits, such as physical capital stock, education or innovation (Hartwick 1977; World Bank 2022). A crucial question for the real-world application of this rule is how to choose desirable areas of investment, e.g., which new industries to build up. This issue has been subject to an intensive debate on

[4] Libya, by contrast, is less relevant as a source country but all the more so as a transit country.

industrial policies. Whereas some authors have stressed that deliberate action by governments has played a major role in the industrial development of 'economic miracles' such as Japan and South Korea, others emphasize the difficulty of 'picking winners' and the potential for regulatory capture and misspending (Harrison and Rodríguez-Clare 2010). Perhaps the most appropriate way to think about industrial policies is that governments should not promote specific economic activities, but rather design their industrial policies in ways that address the most important barriers (Aiginger and Rodrik 2020; Chang and Andreoni 2020). For this reason, appropriate industrial policies largely depend on the specific country context – that is, the barriers prevailing and the policies that are feasible within given social, economic, political and institutional constraints. Such constraints include inter alia lack of human and physical capital, lack of long-term credibility and political resistance by vested interests (Staub-Kaminski et al. 2014).

The potential of green sectors: A straightforward way to ease the burden of the transition out of fossil fuels would be building on economic activities which will likely benefit from the move to net-zero. This includes inter alia production of renewable energy technologies, such as solar cells and wind turbines, batteries, and carbon-free energy, such as electricity and green hydrogen (Van de Graaf et al. 2020). Whether countries can harness these arising opportunities depends on numerous factors. Generating carbon-free energy for export is only feasible for countries with sufficient renewable energy potentials and exporting electricity or green hydrogen is only feasible for countries in geographic proximity to the EU. For instance, for some countries with ample capital reserves that have the infrastructure and experience to handle gases, such as Saudi Arabia, exporting green hydrogen might be a promising alternative to oil and gas (see Box 1 below). In a similar vein, certain countries might be able to benefit from the extraction of critical raw materials, such as cobalt or nickel, that will see increasing demand from the EU. Yet, good care needs to be applied that this does not result in a 'resource curse' that has often been observed for extractive industries.

Just transition policies: The concept of 'just transition' has rapidly gained traction to account for the social implications of phasing out fossil fuels (Jenkins et al. 2020). Just transitions have predominantly been discussed in relation to coal phase-out policies, but the key insights equally apply for oil and gas as well. While discussions on just transition policies had initially mainly focused on labour issues, effects on consumers, regional economic futures and the influence of politically powerful industries are increasingly addressed as well (Jakob et al. 2020). A common recommendation to instigate a just transition include sequencing of policies to provide alternative economic opportunities for workers and regions that heavily depend on fossil fuel revenues. This perspective also emphasizes the importance to involve key stakeholders early on to ensure that policies are well-designed (Bolet, Green, and Gonzalez-Eguino 2023). Finally, it will be necessary to devise compensation schemes for those losing out from the transition, e.g., measures to retrain workers and provide financial assistance for those that are unable to find alternative employment.

Box 1: Strategies for economic diversification

Several countries that are heavily reliant on fossil fuels have announced strategies to diversify their economies. Saudi Arabia's Vision 2030 plan seeks to "transform Aramco from an oil-producing company into a global industrial conglomerate" by developing a large market share of blue (from fossil gas) hydrogen and ammonia and developing domestic blue ammonia supply chains. In NEOM, a planned smart city, Saudi Arabia will seek to build one of world's largest green hydrogen facilities, while in Abu Dhabi Emirate, the Government-owned ADNOC energy group aims to build on fossil gas as a bridge to hydrogen. The UAE's draft Hydrogen strategy sets a goal of capturing 25% of major hydrogen markets globally, capitalising on geography, fossil gas reserves, and solar power potential. In Norway, the state-owned energy company Equinor announced plans to supply hydrogen and target a European clean hydrogen market-share of roughly 10%. Equinor is additionally planning to diversify its investments and increase the share of renewable energy investments to 30% by 2025, and to 50% by 2030.

5. How the EU can support adjustment in third countries

The EU can use its economic power and leverage to actively support third countries to reform their economies in line with a post-fossil world. This section first describes some key aspects which the EU can foster, including financial assistance, market access, technology transfer and capacity building. It then discusses on which level of governance the EU can work with third countries.

5.1 EU activities to support adjustment by fossil fuel exporters

The EU could support policies to facilitate adjustment in economies that are highly dependent on fossil fuel revenues. Concrete measures that can be implemented include policies to provide financial assistance and facilitate market access, technology transfer and capacity building.

Financial assistance: Possibilities to build up new industries are often severely constrained by high capital costs. This is of particular importance for long-term projects that require large up-front investment. For example, high capital costs due to investment risks can make investment in renewable energy sources uncompetitive even in locations with very favourable potentials. The EU can help third countries build up new industries by providing direct financial support, either in the form of grants or preferential loans. Another possibility with probably more leverage consists in instruments for financial de-risking (Steckel and Jakob 2018), such as credit guarantees that

guarantee that interest will be paid even if a project fails and thus significantly require the risk premium that project developers have to pay to investors.

Market access: An important reason why certain countries fail to build up industries in which they could enjoy a comparative advantage is lack of access to key markets, such as the EU single market. Important trade barriers include tariffs as well as non-tariff-barriers, such as technical standards. The EU could facilitate the ramp-up of industries that substitute for extractive industries by lowering import tariffs and removing red tape for goods that are of prime importance for structural economic change in key fossil fuel exporters. In addition, nascent industries in novel economic sectors, such as production of green hydrogen and derivates, are often held back by uncertainty regarding demand. This can also result in a coordination failure, as firms in the EU will only invest in new production processes, such as production of steel with green hydrogen, if they expect sufficient supply of key inputs and suppliers of inputs will only invest in production capacity if they expect sufficient demand. The EU could help reduce this uncertainty by establishing key markets, for instance by requiring that a certain share of steel is produced in a climate neutral manner. In third countries, this would also increase demand for activities that could substitute fossil revenues, such as production of green hydrogen.

Technology transfer and education: Building up new industries requires access to the appropriate technologies. Even though the respective hardware can be acquired on the market, adoptions to local conditions are often required. The EU can support third countries by joint programs for research, development and deployment of new technologies (Pandey, Coninck, and Sagar 2022). In addition, such technologies also require skilled labour to install and operate. Training of the workforce and upgrading the education system can facilitate technology adoption and have wide-ranging implications for the entire economy. Such measures would not only contribute to building up specific sectors, but would also have wide-spread positive spil-overs on economic activity resulting from a higher level of human capital and the demand for complementary services and goods.

Capacity building: Good governance is a key aspect of economic transformation. Implementing policies to incentivise certain economic activities, such as support schemes, requires a well-functioning administrative base (Klinsky and Sagar 2022). In addition, weening the public budget of fossil fuel revenues will require implementing new forms of taxation, such as income taxation or value-added taxes, to maintain public spending. This can only be achieved with a system in place that is able monitor economic activities and collect taxes. As natural resource rents constitute a windfall gain that can easily be appropriated, countries with large resource endowments frequently suffer from high levels of corruption (Ploeg 2011b). This increases transaction costs and risk premiums for new investments. Hence, measures to strengthen intuitional capacities and to control corruption make a substantial contribution to economic reform in fossil fuel exporting countries.

An important question in this regard is who should receive most support. Arguably, any kind of support can be applied more efficiently in economically advanced countries with good access to

finance and technologies and good governance. Yet, countries with lower incomes and less well-developed institutions are more likely to be destabilized by dwindling fossil fuel revenues and hence more in need of support, even though handling this support efficiently is a greater challenge. Navigating this trade-off to determine where to target support requires a detailed analysis of causal relationships, ranging from exposure to reduced fossil fuel rents over the effect of support to the security implications of political and social instability for the EU. Such a more comprehensive analysis would thus allow to assess how available financial resources can be spent most effectively to reduce security risks for the EU. A pragmatic approach could be to develop scenarios for EU support for countries that are vulnerable to declining fossil fuel revenue, have low ability to adapt and are closely entangled with the EU, and to prioritise efforts accordingly.

Finance

Financial support to build up alternative industries
Financial support for just transition policies
De-risking instruments for investments in alternatives

Market access

Lower tariffs and non-tariff trade barriers for alternative industries
Long-term contracts for non-fossil imports
Create lead markets, e.g. for hydrogen and green basic materials

Technology Transfer and education

Preferential access to intellectual property rights
Joint programs for technology adaptation to local needs
Training of skilled labor force

Capacity building

Policy exchange, e.g. on RE support and integration
Training of administrative staff
Support for institutional reforms, e.g. anti-corruption measures

5.2 Governance levels to support fossil fuel exporters

A further question that needs to be addressed is on which level of governance support for fossil fuel exporters shall be given. Support could be provided on the level of individual EU Member States, on the EU level and as part of existing or newly established international pluri- and multilateral arrangements.

Member State level: EU Member States entertain numerous relations with other countries which could be used to further economic reform. One avenue of cooperation could be via bilateral development cooperation. Another option might be an expansion of existing partnership related to energy and climate issues. In any case, if cooperation with fossil fuel exporters to facilitate structural economic change is undertaken on the level of individual Member States, close coordination is necessary to avoid overlapping (or even contradictory) activities. The division of labour across EU Member States could, for instance, be defined by geographic regions to build on existing cooperation, or by issue, to benefit from specific strengths of certain Member States. Experiences gained withing the Paris Declaration on Aid Effectiveness (OECD 2005) could help align support schemes for fossil fuel exporters.

EU level: The European External Action Service (EEAS) acts as diplomatic representation for the EU in other countries and is a cornerstone of EU foreign and security policy (European Commission 2020). The EEAS is in charge of a broad spectrum of task, ranging from training of police and security forces in third countries to coordinating humanitarian interventions. It has also played an important role in EU climate diplomacy (Biedenkopf and Petri 2019). Hence, the EEAS could be an important instrument to support economic reform in fossil fuel exporting countries in combination with the European Commission Directorates. Such efforts could be part of the EU's 'Global Gateway' (European Commission 2021b). This initiative aims to mobilize up to €300 bn between 2021 and 2027 to „boost smart, clean and secure links in digital, energy and transport sectors and to strengthen health, education and research systems across the world".

Pluri- or multilateral level: The EU and its Member States can also work towards strengthening existing multilateral institutions and mechanisms for economic reform. Prime examples are programs undertaken by the International Monetary Fund and the World Bank to e.g., upgrade the administrative infrastructure for taxation and strengthen social security systems. Recently, there has also been a keen interest in Just Energy Transition Partnerships (JETPs, see Box 2 below) to support coal phase-outs in South Africa, Indonesia and Vietnam. These partnerships could be a promising blueprint for an approach to transform the economies of countries heavily dependent on fossil fuels. Furthermore, the initiative for a 'Climate Club' brought forth by the G7 (2022) might offer a promising opportunity to decarbonize energy-intensive industries and thus support economic modernization in fossil fuel dependent countries.

Box 2: Just Energy Transition Partnerships

Just Energy Transition Partnerships (JETPs) have been concluded with South Africa (2021), Indonesia and Vietnam (2022). These JETPs aim to mobilize US$ 9, 20 and 15 billion, mainly via loans, but also include some grants. These funds shall be disbursed in exchange for coal phase-out in the respective countries. Further JETPs with India and Senegal are under consideration.

6. Conclusions

The transition out of fossil fuels will have beneficial effects for climate change and beyond. It will, however, also entail some negative effects for countries whose economies are highly dependent on fossil fuel revenues. For some countries a significant drop in world market prices for oil and gas would pose enormous economic challenges and could pose a risk to social and political stability. This, in turn, could have important repercussions for EU security, in particular regarding the possible disruption of critical supply chains, increased migration pressure, and geopolitical tensions.

In this paper, we have sketched the contours of a diagnostic toolkit to identify for which countries declining oil and gas revenues could turn into a security risk for the EU or intensify existing risks. The framework is based on three central elements: first, the exposure of a given country to declining fossil fuel revenues. Second, the country's ability to adapt its economy to this new reality. Third, its entanglement with the EU. We have also identified indicators that could be used to assess these three dimensions and applied them in an illustrative way. While these indicators do not capture the full complexity of the issue at stake, they do provide an idea of which indicators will need to be developed in the future to provide a more robust analysis.

Some adverse impacts in fossil fuel exporting countries will be impossible to avoid. For this reason, the EU will need to be prepared for the possible disruption of critical supply chains, increased influx of migrants and refugees and even increasing intensity of regional conflicts, but also hostility towards the EU. Yet fossil fuel exporting countries also have a broad range of policies at their disposal to facilitate the adjustment to declining fossil fuels revenues. We have provided an overview of these policies and discussed how the EU could support countries in implementing them. Whether such international cooperation succeeds will depend on coordination with other major economic powers, especially the US, China and India. In the light of current geo-political tensions, however, such coordination will be difficult to achieve. Nevertheless, joint action in the international climate and trade regime, the G7 and G20 or via multilateral development banks is conceivable even in times of tensions between major powers.

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About the project

4i-TRACTION – innovation, investment, infrastructure and sector integration:
TRAnsformative policies for a ClimaTe-neutral European UnION

To achieve climate neutrality by 2050, EU policy will have to be reoriented – from incremental towards structural change. As expressed in the European Green Deal, the challenge is to initiate the necessary transformation to climate neutrality in the coming years, while enhancing competitiveness, productivity, employment.

To mobilise the creative, financial and political resources, the EU also needs a governance framework that facilitates cross-sectoral policy integration and that allows citizens, public and private stakeholders to participate in the process and to own the results. The 4i-TRACTION project analyses how this can be done.

Project partners

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