



Original research article

The political ecology of oil and gas corporations: TotalEnergies and post-colonial exploitation to concentrate energy in industrial economies

Marcel Llaveró-Pasquina^{a,*}, Grettel Navas^{a,b}, Roberto Cantoni^a, Joan Martínez-Alier^a

^a Institut de Ciència i Tecnologia Ambiental, Universitat Autònoma de Barcelona, Spain

^b Facultad de Gobierno, Universidad de Chile, Chile

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ABSTRACT

Industrial economies require a steady supply of energy to reproduce and grow. Oil and gas companies fulfil that socio-economic function by constantly finding, extracting and transporting energy sources. The steady extraction and concentration of fossil resources in industrialised centres requires the constant expansion of extraction frontiers and the exploitation of the environment and local communities in unindustrialised areas. This leads to conflicts where local environmental justice organisations fight for the preservation of their lives, livelihood and culture, while companies defend their profits. Thus, oil companies become vectors of an oppression that links the societies enjoying the benefits of lavish energy with those that suffer the impacts of extraction. In this work, based on the Environmental Justice Atlas database, we systematically analyse 50 environmental conflicts related to one of such companies - the French oil major TotalEnergies. Our research reveals the social and environmental cost of the energy resources that power industrial economies. We find that, despite a recent narrative focused on the company's 'greening', TotalEnergies' extraction and concentration functions remain inextricably linked to fossil fuels. Furthermore, the interests and operations of TotalEnergies and the French State are inextricably intertwined and reproduce colonial relationships of power. Our findings support theories of change based on the abandonment of colonial and extractive State models, rather than pursuing fiscal and regulatory measures alone.

1. Introduction

Fossil fuel companies have been singled out as the main culprits behind the global climate crisis [1–4]. The iconic cases of five Indigenous Peoples suing Chevron in their struggle against oil extraction in Ecuador, and the resistance by Ogoni and Ijaw peoples to Shell's operations in the Niger Delta, Nigeria, have brought to the fore the severe social, ecological, and political impacts of fossil fuel companies' operations [5–8]. Here we take the French energy company, TotalEnergies, as a case study to analyse the political ecology drivers behind the impacts of the fossil fuel industry and the ways in which resistance movements respond to them.

TotalEnergies is an investor-owned oil and gas company, which

“produces and markets oil and biofuels, natural gas and green gas, renewables and electricity”.¹ It is the world's fourth-largest Big Oil company,² with a combined oil and gas production of 2.77 mboe/d³ in 2022 [9], after ExxonMobil (3.70 mboe/d; [10]), Chevron (3.0 mboe/d; [11]) and Shell (2.86 mboe/d; [12]).⁴ The fossil fuels extracted by TotalEnergies from its foundation to 2018 have contributed to the emission of 14.96 GtCO₂e, ranking it as the 14th worst greenhouse gas emitter in history, accountable for 0.83 % of global historical emissions [13].

Our rationale for choosing TotalEnergies is that it is bolstering a ‘greening narrative’ – to the point of deciding to change its name from Total to TotalEnergies in 2021 to portray an image of renewable energy diversification. On that occasion, the CEO of TotalEnergies, Patrick Pouyanné, declared: “Since 2016 [and the Paris Agreement], we have

* Corresponding author at: Edifici ICTA-ICP, Carrer de les Columnes s/n, Campus de la UAB, 08193 Cerdanyola del Vallès, Barcelona, Spain.

E-mail addresses: marcel.llaveropasquina@uab.cat, marcelllaveropasquina@gmail.com (M. Llaveró-Pasquina).

¹ <https://totalenergies.com/company/strength/integrated-business-model>.

² “Big Oil” refers to the five largest privately owned fossil fuel companies: BP, Chevron, ExxonMobil, Shell and TotalEnergies. This journalistic label is often employed to refer to the similarities in operating traditions and strategies among the larger oil corporations.

³ Mboe/d = million barrel oil equivalents per day. 1 mboe is approximately equivalent to 6.1 GJ.

⁴ These levels of production are still far from the world's largest state-owned fossil fuel companies, such as Saudi Aramco (13.6 mboe/d; [13]) and China National Petroleum Corporation (CNPC) (6.31 mboe/d; [14]).

embarked on a significant move into new energies, with a view to meeting our mission of generating more affordable, more available and cleaner energy".⁵ However, TotalEnergies' energy mix is still more than 99 % based on fossil fuels,⁶ and the company has launched 30 new fossil projects since January 2021.⁷ In addition, TotalEnergies and its predecessors have used their diplomatic and political power to perpetuate France's colonial and post-colonial links in its former colonies, especially within Africa [14]. A further characteristic that makes TotalEnergies worth investigating is that, unlike US companies, it has a history as a state-owned company, its actions are coordinated with the French administrations, and its policies are subject to public scrutiny.

There have been previous approximations at documenting the conflicts of TotalEnergies through a political ecology lens. For instance, in 2008, a report by "Amis de la Terre" [Friends of Earth's French chapter] denounced TotalEnergies' climate and environmental impacts through an analysis of seven company projects [15]. In 2019, a report by a group of climate justice NGOs addressed the climate strategy and future trajectory of TotalEnergies in the context of the diffused responsibility and unequally distributed impacts of the climate crisis [16]. Moreover, Bonneuil and colleagues [17] have analysed the role that TotalEnergies and its predecessors have played in denying anthropogenic climate change for at least five decades. Another study has analysed TotalEnergies' role in managing a decline in fossil fuel extraction through a study of the company's internal social dynamics [18]. Finally, in 2023, Greenpeace France released a report analysing the global distribution of TotalEnergies 33 "carbon bomb" projects [3,19]. Yet, to our knowledge, no systematic analysis of the local impacts of TotalEnergies' operations has been published to date. Here, we focus on the local environmental, social and political impacts of the company's fossil fuel operations to explain the global political ecology of TotalEnergies. This article is part of a series of three publications examining the discourses of TotalEnergies in environmental justice conflicts [20] and the environmental conflicts related to TotalEnergies' renewable energy and carbon offset developments (Llaverio-Pasquina, forthcoming).

With this article we seek to understand how TotalEnergies works from a political ecology perspective. Who benefits and who is affected by its infrastructural projects? And how do the affected communities resist its actions? We explore these questions combining theoretical approaches from the fields of ecological economics, political ecology and decolonial environmental justice. Most importantly, the ideas that underpin this article come from both academia and the movements of resistance organising at the intersection of environmental justice and anti-imperialism. Empirically, we draw from the information collected in the Global Atlas of Environmental Justice (EJAtlas) (see Temper et al. [21,22] for methodological details). The EJAtlas has already proven to be a useful tool to systematise and analyse environmental conflicts from a critical business studies perspective (see [23,24]).

After this introduction, we describe our theoretical framework. Section 3 explains the study's methodology. In Section 4, we systematically analyse a collection of 50 entries in the EJAtlas involving TotalEnergies' projects. In presenting and discussing the results in Section 5,

⁵ "Total devient TotalEnergies pour s'orienter vers la transition énergétique", Hello Watt, 10 March 2021. <https://www.hellowatt.fr/blog/total-devient-totalenergies/>.

⁶ In 2021, 99.54 % of TotalEnergies total 8735 petajoules primary energy production came from oil and gas. 0.28 % from solar, wind, and hydro. And 0.18 % from biogas. Conversion factors: 1 TWh = 3,6 PJ, 1 kb/d = 2,19 PJ/y, 1 Mcf/d = 0,28 PJ/y. Source: TotalEnergies Universal Registration Document 2021: p.48, 51, 53, 71.

⁷ Candice Authier, "« Total utilise les énergies vertes comme un totem d'immunité »: derrière sa com, le groupe pétrolier continue d'investir dans les énergies fossiles", L'Obs, 26 March 2023. <https://www.nouvelobs.com/ecologie/20230526.OBS73801/total-utilise-les-energies-vertes-comme-un-totem-d-imm unite-derriere-sa-com-le-groupe-petrolier-continue-d-investir-dans-les-energies-fossiles.html>.

we take into account the hydrocarbon life-cycle stages going from extraction to refining. Our results suggest that first, TotalEnergies' operations are heavily influenced by its colonial history and the firm's relationship with the French state; and second, TotalEnergies' political ecology function is to funnel energy from 'peripheral' extraction frontiers to the industrial 'cores' while exacerbating global environmental injustices. We conclude that these extractive dynamics and the company's environmental and social impacts cannot be explained fully by technological innovations. Colonial and neocolonial relations of domination are key in explaining the political access to oil and gas resources by industrial economies.

2. Theoretical background

2.1. Ecological economics of energy extraction

In 2022, the world economy consumed 604.04 EJ of energy, breaking once again the historical record. Eighty-two percent (82 %) of the primary energy needs of the world economy were met through oil, gas, and coal [25]. One of the foundational ideas of ecological economics is that the economy is embedded within a larger physical system, and thereby natural, social and political subsystems [26]. This has overarching implications for the energy sector. Since economies are entropic and not circular [27], new energy sources must be constantly found and extracted for the current level of consumption to be not just assured but *increased*. Thus, the industrial economy must constantly expand its energy inflow from, and its waste outflow to, the environment [28]. For instance, of the approximately 100 Gt of materials entering the world economy per year less than 10 % are recycled [29,30]. The main reason is that the energy provided by energy carriers is used only once, and it then "dissipates" as heat. Also, a large proportion of materials are employed in the construction of built structures, and these need further materials and energy for maintenance. There is then a large "circularity gap" or "metabolic rift" (a term used by Eco-Marxists) [31] or an enormous "entropy hole". Consequently, even without economic growth, the economy constantly needs to find and extract new energy supplies [32].

In order to sustain and increase the energy flows into the global economy the extraction frontiers inexorably expand, and larger areas become affected by the negative consequences of extractive practices. Environmental distribution conflicts often appear wherever and whenever extraction frontiers expand and extraction intensifies [21]. At a global level this state of economic affairs can be labelled as "extractivism". The term originated in Latin America, it first and foremost qualified the depredation of that continent's natural riches and, by extension, that of other formerly colonised regions of the South. "It echoes above all the idea that those riches, hoarded by foreign powers and corporations, do not benefit the countries that pay the environmental and human costs of their exploitation" (Bednik, 2016: 18 [33]). Extractivism is a product of, and necessary condition for the perpetuation and reproduction of colonial power relationships between subjugated peripheral regions and dominating core societies [34]. In other words, extractivism is "a mode of accumulation that started to be established on a massive scale 500 years ago" (Acosta, 2013: 62 [35]) and which was "moulded since then by the demands of the metropolitan centres of nascent capitalism" (Svampa, 2019: 6 [36]). In biophysical terms, such asymmetric relationships between world regions have been theorised and measured as "ecologically unequal exchange" [37,38] - a concept that posits that asymmetric net flows of biophysical resources exist from poorer to richer countries.

Only between 1990 and 2015, Hickel et al. calculated that countries in the Global North have drained 650 EJ of energy from the Global South, or 11 % of the energy consumption in the North [39]. Oil and gas high energy density, their transportation versatility (by rail, road, tanker or pipe), and the possibility to store and market them based on energy demand make them ideal vectors of such ecologically unequal exchange

[40]. Fossil fuels are central to an industrial economy that extracts energy from the world peripheries to concentrate it in economic cores. Oil and gas facilitate such asymmetric ecological relationships between distinct and generally distant human geographies in intersection with colonial and socioeconomic injustices. Through the unequal distribution of environmental burdens in the geographies of extraction, transport and processing, and the concentration of energy use in the geographies of consumption, oil and gas embody and perpetuate colonial relationships and exacerbate global inequalities. In this vein, fossil fuel extractivism is intimately connected to the concept of environmental justice and decolonial studies, to which we now turn.

2.2. Extractivism and decolonial environmental justice

As a theoretical concept, environmental justice was born in the USA to illustrate how toxic industries and other types of polluting activities were systematically placed in the neighbourhoods of African-American and poor communities [41]. Over the past decades, the term has burgeoned, and new critical perspectives, such as decolonial approaches to environmental injustices, have arisen to include non-Western-centred perspectives [42]. For example, building on Kimberlé Crenshaw's intersectional approach [43], David Pellow proposed the “critical environmental justice perspective” as a theoretical framework which includes, besides race, other intersectional identities that can lead to such environmental injustices (i.e. gender, ethnicity) [44]. Here, we analyse environmental conflicts encompassing both its social and ecological characteristics, and their cultural, historical and political determinants: most importantly the continuous colonial legacies between France and its former colonies. We show how TotalEnergies is not only a protagonist of old colonial conflicts, but it is also currently reproducing the same historical dynamics of injustice and inequality.

Together with Roy and Hanaček (2022: 307 [45]), we find that “decolonial thinking is crucial when conducting research on environmental conflicts and injustices”, as the struggle for environmental and energy justice is principally a struggle for decolonisation. Colonisation may refer both to “domestic colonialism” (as coal extraction in central India [46]) and to international colonialism. In most environmental conflicts, both domestic and international power dynamics play an intertwined role in determining environmental injustices, as it is generally the case for the TotalEnergies' conflicts analysed here.

In recent years the intersection between decolonisation and environmental justice has received increasing academic attention. Temper (2019) argues that the established triad of distribution, recognition and representation paradigms of environmental justice [47,48] is unfit to meet the demands and grievances of Indigenous land defenders in environmental conflicts [49]. She highlights the importance of “epistemic justice” in struggles between Indigenous Peoples and colonising actors, and argues it goes beyond the paradigm of representation, as even the notion of justice is contested between colonial and Indigenous worldviews. In this regard, Svarstad and Benjaminsen (2020) propose a “sense of justice” framework where the perception of environmental justice served is uniquely determined by those who are affected by an environmental intervention [50]. Although they leave unaddressed the definition of “who” qualifies as affected, and who has the power to determine it. Tornel (2023) proposes a framework of justice that moves away from liberal universalism and adopts a place-based paradigm that focuses on the community's construction of an autonomous sovereign territory that encompasses the land and all its associated ecological reciprocal relationships, identities, and traditional knowledge that make life possible [51]. In stark contrast with the remedy of state recognition and participation proposed in Fraser's framework of social justice [47], decolonial struggles seek to reaffirm land-based knowledge, values and identities in the face of the historical, violent and colonial process of cultural and state assimilation [52]. These proposals highlight the ontological rift between liberal traditions of justice that are universalising and grounded on an instrumental dualism between human

and nature, and the place-specific relational ontology mobilised in the struggles for decolonisation [49,51,53].

In this struggle, territories are seen as land waiting to be occupied, or “developed”, with extractive projects by colonial developmentalist actors. Territories, relationships, epistemologies, bodies and ways of life are worth sacrificing in the name of civilizational progress and economic development. This introduces the concept of Sacrifice Zones, a term often used to describe the systematic socio-ecological degradation of a particular territory and community [54]. A paradigmatic case involves the Quinteros-Puchancaví Sacrifice Zone in Chile, where numerous heavy industries are placed at the expense and sacrifice of the local territory, ecology, community and bodies [55,56]. Sacrifice Zones are the product of a relationship of power, a rapport de force which “decides” that the permanent disturbance of a place's ecology and its peoples' dignified life is to be sacrificed for “the greater good”. In analysing TotalEnergies cases for this study, we have encountered several refineries that are part of larger industrial complexes that bear all the hallmarks of Sacrifice Zones.

2.3. TotalEnergies' extractivist history

The strong ties between large oil companies and the state apparatuses of the countries in which they are headquartered, as well as the profound influence of extraction operations on both the ecosystems and the economic and political history of the countries in which these companies operate, have generated a rich literature over the decades. Several works have been produced on the history of TotalEnergies and its predecessors [57–59]: mostly, however, these were data-rich chronicles, and company actions were rarely problematized.

One important and rather recent work on TotalEnergies [14], and more broadly, on multinational oil companies and right, focuses on the all-embracing power exerted by these companies on national states and their citizens. Deneault reviews all major scandals connected to TotalEnergies in Asia, Africa, and South America along the history of the XX and early XXI centuries, and argues that such scandals are not exceptions but normal ‘modus operandi’ of the company: basically, the “deployment of a generalised logic of predation” (Choquet, 2017: 90 [60]). Reflecting more in general on oil companies, Deneault extends their instrumentalization of law and right to their benefit, even by threatening states to move their headquarters if favourable legislation is not passed that allows them to continue doing what they do, ethical considerations notwithstanding. Other works on TotalEnergies have taken a historical perspective: Melby (1981) [61], author of the first sizeable monograph on the history of the French oil industry, is a valuable source for all of TotalEnergies predecessors' activities until the late 1970s, and highlights some of the points mentioned by Deneault: in particular, the tight collaboration between French oil executives and political class with a view to the independence of Algeria and the consequences for France's oil and gas strategies, and the esprit de corps characterising the technocratic elite of France. The latter element is also highlighted in Yates [62,63]: the French oil industry – and its energy industry more in general – could count on a small network of tightly connected high-profile soldiers-engineers, financiers, and state functionaries, initially from the Corps of Mines, and later from the Corps of Finance Inspectors, steering the French energy policy. The great political leverage and degree of operational discretion permitted by the French government to its oil executives in foreign territories is also emphasised in Cantoni (2017) [64], where he shows that a similar modus operandi was also proper to other national oil companies.

3. Methodology

3.1. Data sources

Two main sources of data have been used for this analysis: TotalEnergies' Universal Registration Documents from 1999 to 2022 and the

Global Atlas of Environmental Justice (EJAtlas).⁸ The EJAtlas provides a dataform to systematically characterise and codify the main dimensions of a conflictive project [21,22]. At the end of 2023, the EJAtlas is reaching 4000 entries. The EJAtlas data collects information using a predetermined case entry sheet that combines both free text descriptions of various aspects of the conflict with a set of categorical variables for the contributor to check when applicable. EJAtlas cases include qualitative and quantitative variables such as a case description, geolocation, the main sources of conflict, project details and actors, data on the conflict stage and on forms of mobilisation, impacts, outcomes, and a reference list. This combination of open text and categorisation allows describing the specificity of the conflicts in their local contexts and at the same time conduct large comparative studies across regional, global or thematic scales.

Through a global network of collaborators, the EJAtlas gathers information from local sources, always trying to be as faithful as possible to the local narratives and concerns, and referencing all data and significant claims with secondary data. All data submitted by collaborators is then moderated by a central team following a standard set of rules and format. This allows harnessing the geographic coverage and local specificity of a widespread and diverse network of contributors, while systematising information across the data sample. We found the EJAtlas well suited for this study since the repository already contained a significant amount of information on TotalEnergies environmental conflicts and its methodology facilitated the investigation of global patterns of impacts and resistances to TotalEnergies operations. We also draw on complementary information from conflicts not yet documented in the EJAtlas.

3.2. Data analysis

All Universal Registration Documents for the company from 1999 to 2022 were screened to extract names of specific projects in seven categories: Coal (8), Oil and Gas exploration and production (368), LNG Terminals (47), Pipelines (64), Refineries (49), Power plants & Renewables (78) and Offsets, Recycling and CCS (15). The project names are reported in Supplementary Table 1. This database of TotalEnergies projects was used to understand the global geographic and operational scope of TotalEnergies, as well as to identify environmental conflicts related to specific projects using specific search strings in Google and Google Scholar (see search strings in Supplementary Methods). The identified conflicts were studied in greater depth and documented in the EJAtlas.

We selected all EJAtlas cases involving TotalEnergies, its predecessors Total, Fina and ELF or its subsidiaries during the time of development of a conflict, notably CEPSA until 2011 and Novatek until 2022. At the start of this research, 43 cases involving TotalEnergies were already present in the EJAtlas database. We have subsequently added 7 more conflicts and updated some existing cases to include more detail, and contemporary information on the conflicts: we obtained a final list of 50 cases. We codified the cases by type of operation following the energy flux from extraction to consumption including exploration (11), extraction (17), pipeline (5), LNG (7), oil spills (3), refinery (5) petrochemical (1), and climate litigation (1). A full list of the conflicts is shown in Supplementary Table 2 and an EJAtlas featured map⁹ allows the reader to browse the different cases.

4. Results and discussion

The 50 cases of environmental conflicts analysed in this section are referenced in the text in order of appearance (Fig. 1, Supplementary Table 2). It is worth noting that TotalEnergies¹⁰ has different levels of involvement in the different cases, and a case with the involvement of TotalEnergies does not necessarily imply the company has direct responsibility on the impacts of the given conflict (see Supplementary Table 2). In 15 cases, TotalEnergies is the project's majority partner and/or operator, in 18 it is a minority partner with limited operational role, and in another 17 cases TotalEnergies' facilities are one of multiple industrial projects that are involved in the conflict. However, for all projects included, TotalEnergies is a relevant actor in the environmental conflict, which in its free judgement chose to remain involved in the project while a conflict unfolded.

To evaluate the complete networks of injustice in energy supply chains one needs to look at the sites where energy is being extracted, transported, transformed and consumed. In other words, to guarantee environmental and social justice, energy systems and the energy transition need to be examined from "cradle to grave" [65] using a whole systems approach [66,67]. As such, we analyse the 50 environmental conflicts in our sample from the extraction well to the industrial economic cores to illustrate the ways in which local impacts and resistances to TotalEnergies projects reveals the company's eco-political functions in the global energy system. To provide a structured analytical discussion, we divide the process into two stages: extraction and concentration.

4.1. Expanding oil and gas extraction frontiers: political and technological determinants

Consistent with a growth agenda, TotalEnergies needs to constantly expand its production capabilities to replace depleting wells and exhausted reservoirs, and increase its capacity to extract energy resources. Hence, the early-stage activities in the oil and gas business process - namely exploration and extraction - also need to constantly expand geographically. New technological developments are often cited as the key to the expansion of the fossil fuel industry beyond conventional oil and gas [68,69]. Indeed, fracking, deepwater drilling technologies, and the development of a market for liquified natural gas (LNG), have allowed TotalEnergies to tap into previously inaccessible resources. For example, directional drilling and hydraulic fracturing have made shale gas and coal seam gas reserves accessible in Queensland (Australia) (Case 1), Denmark (Case 2), Algeria (Cases 3, 4 and 5) and Vaca Muerta (Argentina) (Case 6).

Significantly, TotalEnergies prides itself on being a leader in deepwater projects,¹¹ such as those in South Africa (Case 7), Suriname (Case 8), Angola (Case 9), and Mauritania (Case 10). Deepwater extraction deserves a specific discussion from a political ecology perspective. One of the drivers pushing for the development of this kind of project is that easy-to-extract resources on land are depleting, and new frontiers are being opened in more challenging settings, such as the oceans' sea bottom. This physical reality is also favourably paralleled, for the firm, by political factors. Offshore projects minimise conflicts related to land and landscape, and bring the impacts further away from human communities - in principle, reducing the potential of socio ecological conflict. However, offshore projects cause environmental conflicts through the possibility of oil spills covering swathes of ocean and reaching shores far away: a geographical extension which is not characteristic of on land

⁸ <https://www.ejatl.org>.

⁹ <https://ejatl.org/featured/totalenergies>.

¹⁰ "TotalEnergies" is used throughout this section to refer to the current company, any of its subsidiaries or any of its previous namesakes, including but not restricted to Total or Elf.

¹¹ <https://web.archive.org/web/20210302105101/https://www.ep.total.com/en/areas/deep-offshore/exploration-production-deep-offshore-technical-responses-new-challenges>.

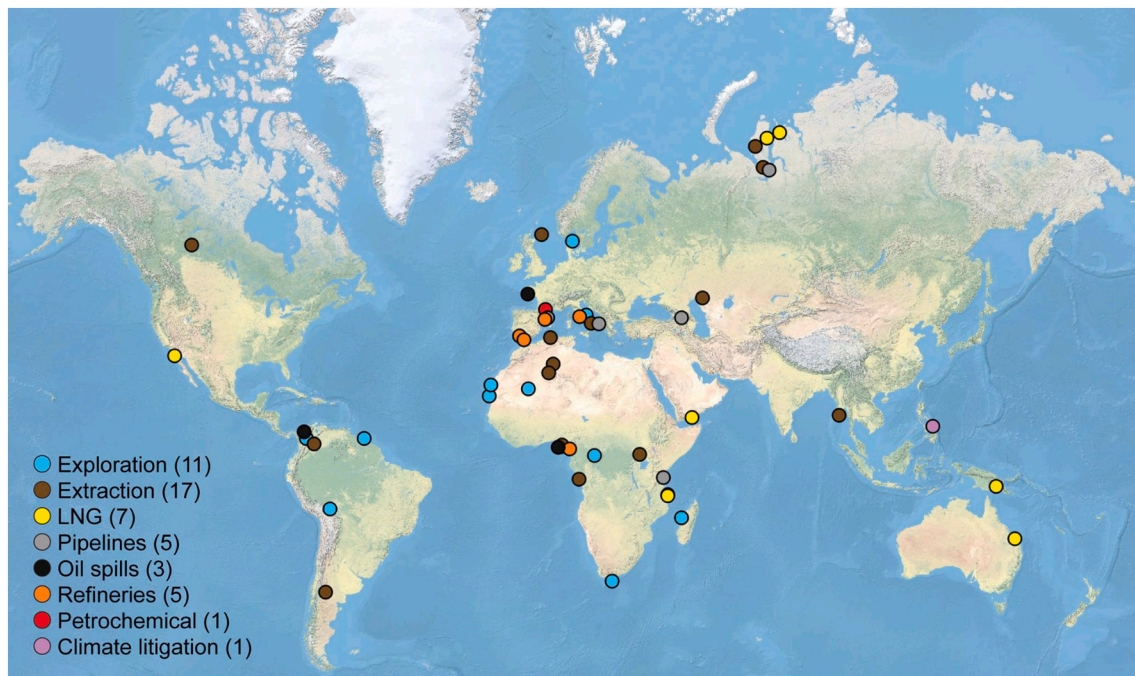


Fig. 1. Map with the location of 50 environmental distribution conflicts related to TotalEnergies' analysed in this study. The location markers are colour-coded depending on the type of conflict. A legend is provided with the number of cases in each conflict category.

spills. Indeed, 13 out of the 50 cases studied here involve offshore operations, also considering ocean pipelines and oil tankers. Coastline communities, especially those dependent on the ocean for their livelihood, know of the magnitude of consequences of potential oil spills, like the one resulting from the Erika shipwreck in 1999 (Case 11) [70]. That is why, in many cases, we see fisherfolk ($n = 7$) and/or coastal communities ($n = 7$) resisting offshore projects, as seen in the cases of the Trans-Adriatic Pipeline in southern Italy, Case 12 [71], or the resistance against offshore exploration in Argentina [72] (not yet in the EJAtlas). Despite escaping land-based conflicts, offshore projects are immersed in distributional struggles and often meet resistance by campaigners that oppose the project on political economy grounds, either because the projects fund a repressive government (Western Sahara, Case 13; Myanmar, Case 14), or because it syphons the wealth from national resources away from the local population and into the coffers of transnational corporations and domestic elites [73] (South Africa, Case 7; Suriname, Case 8; Mauritania, Case 10; Papua New Guinea, Case 15; Italy, Case 16; and Mozambique, Case 17). While physical distance between the mainland and offshore projects may weaken protestors' ability to stage blockades, occupations and sabotage actions, offshore projects do not prevent conflicts in the political economy arena. Protestors scrutinise the advantageous tax regimes that countries give to multinationals to extract and plunder their national wealth. In this specific sense, these conflicts leave the physical realm to enter the ideological struggle in full force.

Besides technological drivers, the expansion of extractive activities also needs to be politically sanctioned - requiring state support, protection and enforcement. New projects face resistance from environmental defenders concerned by the climate and ecological impacts of oil extraction [74,75]. As a consequence, political access remains a significant challenge to the development of new projects and is arguably more determinant than technology in defining where extraction frontiers expand and intensify. However, the roles of technology and political access are best understood in relation to one another. Challenging political landscapes force the industry to develop new technologies that allow the extraction frontier to move towards other geographies. And vice versa, new technologies allow access to a broader diversity of

deposits and geographical areas of extraction increasing the industry bargaining power to lower the cost of political access. Indeed, technology and politics are so intertwined that in her seminal 2009 work on the French nuclear industry, historian and sociologist of technology, Gabrielle Hecht, coined the concept of "technopolitics" to refer to "the strategic practice of designing or using technology to constitute, embody, or enact political goals" (2009: 56–57 [76]), thus pointing towards both the technological construction of politics and the political construction of technology. The relation between energy and power is a particular case of the relation between technology and politics, one that defines much of the relations of power between nations and between sociopolitical classes, which Boyer has synthesised in the concept of "Energopolitics" [77].

To assess the weight of political access as a determinant of the expansion of extraction frontiers, an analysis of the current extraction operations of TotalEnergies is highly informative. The production results of the company reported in their 2022 Universal Registration Document reveal that most of the oil and gas extracted comes from Africa (22 %) and the Middle East (20 %), followed closely by Russia (17 %) (Fig. 2a). In contrast, most of the petroleum product sales of the group have been in Europe (56 %), especially in France (30 %), even ahead of the whole of Africa (26 %) (Fig. 2b). The importance of Africa as the primary extraction frontier is coherent with the conflicts documented in the EJAtlas: 14 out of the 28 TotalEnergies' conflicts involving exploration and extraction operations are in Africa, compared to 102 oil and gas exploration and extraction conflicts being in Africa versus 314 total EJAtlas cases in that category (Chi-squared p -value: 0.038). As noted by Le Billon (2005) resource-dependent countries are at higher risk of environmental and social conflicts and Africa, in particular, at higher risk of armed conflicts [78]. The Middle East is generally underrepresented in the EJAtlas, mostly given to restrictions on political and press freedoms and because of language barriers. Only the Baku-Tbilisi-Ceyhan pipeline conflict is documented in the database (Case 18).

Africa and the Middle East are areas where, as a consequence of French colonial or diplomatic influence, the predecessors of TotalEnergies have historically enjoyed political access, guaranteed by a strong colonial power (a similar argument can be made for British oil

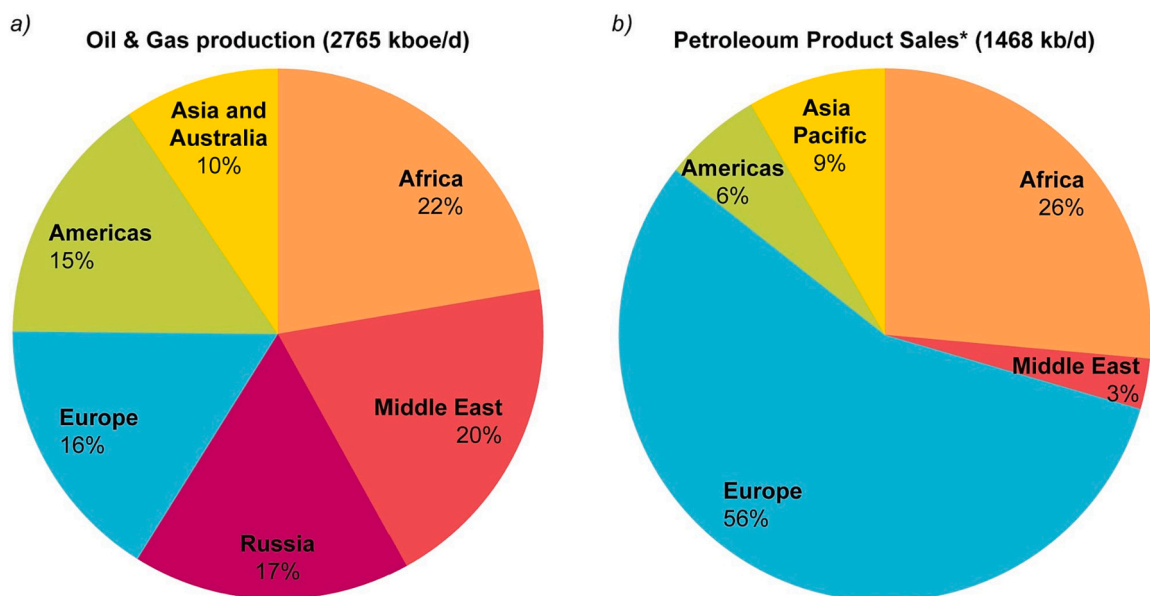


Fig. 2. TotalEnergies total fuel extraction and petroleum product sales by region in 2022. *Not including international trading (2012 kb/d) and bulk refining sales (411 kb/d). Source: TotalEnergies Universal Registration Document 2022.

and gas concerns until the 1970s) [64]. A French State eager to secure and expand a critical energy supply, has collaborated with its oil companies in the making of what Verschave coined as “La Françafrique” [79], that is the connection between France's neocolonial interests in her former colonies and those of Africa's political elites. This troubled history was uncovered most patently with the Elf Affair, when it was proven that Elf, a TotalEnergies predecessor, was a key asset to maintain former African colonies under French influence throughout the last quarter of the 20th century by way of a network of kick-backs and crony deals involving African heads of state and French politicians [79,80].

The French neocolonial influence on several African former colonies has shaped the evolution of TotalEnergies up until our days. The Republic of Congo is a notorious example where TotalEnergies and its predecessors' continued presence has been interwoven with the relations between France and the dictatorial regime of Denis Sassou-Nguesso [81]. As recently as 2019, TotalEnergies obtained the licence for the Mokélé-Mbembé exploration block (Case 19). The licence was awarded three months after a visit of Sassou-Nguesso to Paris, where Sassou-Nguesso met with the French President, Emmanuel Macron, and the following day with Patrick Pouyanné, CEO of TotalEnergies.¹² On the third day it was the turn of Macron and Pouyanné to meet. International organisations oppose oil exploration in the region, as it overlaps with the river Congo's Cuvette Centrale, a unique peatland ecosystem that stores 31 gigatonnes of carbon [82]. Local communities also oppose the plans, out of fear that the development of roads and infrastructure for oil exploration could open the way for other more harmful economic activities such as logging, mining or agribusiness to encroach on their traditional means of living linked to the local ecosystem. However, the Sassou-Nguesso government has been backing TotalEnergies' oil exploration through a production sharing agreement with the national oil company Société Nationale des Pétroles du Congo (SNPC), which would

receive a significant size of the oil profits in the event of commercial discoveries.¹³ The SNPC is notorious for deviating profits to the pockets of the Congolese ruling elite, providing no remedy to the poverty of the population.¹⁴ TotalEnergies predecessors' history with oil concessions in the Republic of the Congo and kickbacks to the president's entourage has raised alarms regarding the fact that once again, the political access to fossil fuel resources could have been bought from a repressive regime at the cost of a suffering population.¹⁵

The Republic of the Congo is not an exception: 16 out of 50 TotalEnergies conflicts are in countries under authoritarian regimes including Algeria (Cases 3, 4 and 5), Angola (Case 9), Kazakhstan (Case 20), Mauritania (Case 10), Uganda (Case 21), and Cameroon (Case 22). The cases recorded in the EJAtlas support the idea that authoritarian and corrupt regimes can lead to more violence and environmental conflicts [83]. Those States are specifically suited to protect the interests of multinational extractive companies to the detriment of their populations. A notorious example is TotalEnergies exploitation of the Yadana gas field in Myanmar and its export pipeline to the Thai border from the 1990s until 2021 (Case 14). According to US-based nonprofit human rights and environmental organisation, EarthRights (2009: 42 [84]), the Yadana project injected US\$4.83 billion into the bank accounts of the military junta between 2000 and 2008, while TotalEnergies only obtained \$483 million during that period. US\$4.80 billion of the junta revenue was diverted to accounts in Singapore banks denying the Myanmar population's access to basic services and relief from Cyclone Nargis (see also Larsen, 1998 [85]). EarthRights accused the joint venture led by TotalEnergies of working in close collaboration with the Myanmar military for the construction of the onshore section of the pipeline, leading to increased military abuse over civilians. The allegations include an increase in military attacks on civilians, targeting of ethnic minorities including Karen groups, forced displacement, political repression, land confiscation, forced labour, rape, torture and

¹² <https://redd-monitor.org/2021/04/16/anatomy-of-a-nature-based-solution-total-oil-40000-hectares-of-disappearing-african-savannah-emmanuel-macron-norwegian-and-french-aid-to-an-election-rigging-dictator-trees/>.

¹³ <https://www.resourcecontracts.org/contract/ocds-591adf-8502309542/view#/>.

¹⁴ https://www.liberation.fr/international/petrole-congolais-cash-manuel-valls-tout-comprendre-a-laffaire-orion-oil-20230114_I477Q3JHHZEGPJ7J65IXCVQ45Q/.

¹⁵ <https://www.globalwitness.org/en/campaigns/oil-gas-and-mining/rigged-republic-of-congo-oil/>

extrajudicial killings (EarthRights, 2009: 44 [84]). In 2002, TotalEnergies was brought to court in Belgium for complicity in crimes against humanity by four Myanmar refugees, but the case was dismissed in 2008, “after several years of deliberations over whether the plaintiffs had the standing to bring the lawsuit because they were not Belgian citizens”.¹⁶ The project received renewed attention after the latest military coup in 2021. The Blood Money Campaign, led by Myanmar activists, called on TotalEnergies and its partners to withdraw their involvement in Yadana and cut the financial flow to the military junta. After nearly a year of continued operations and dismissing their contribution to the junta clamp-down on the population,¹⁷ TotalEnergies bowed to pressure and withdrew definitively in July 2021, after 30 years operating in the country.^{18,19}

The Yadana gas field conflict is one example that illustrates how TotalEnergies has pivoted from its historical strongholds on the former French colonies towards new extraction frontiers. The depletion of reserves, the industrial economy's expanding fossil fuel voracity, and the changes in the colonial regimes, have led to the expansion of the political and geographical reach of the alliance between the French state and TotalEnergies. The quest for new fossil fuel resources intensifies the commodity frontier and pushes it to new territories, reproducing colonial forms of political-economic interaction. We can see this global process playing out in a few of the local conflicts recorded in this study. In the Yamal peninsula, TotalEnergies has partnered with the Russian state-owned Gazprom and Novatek, controlled by oligarchs Leonid Mikhelson and Gennady Timchenko, in the Yamal LNG project (Cases 23–26 [86]). Yamal LNG taps into the largest known reserves of gas in Russian territory to commercialise LNG to the European and Asian markets through the North Sea Route. However, the gas extraction, transportation and liquefaction facilities, together with all ancillary roads, rails, bridges, ports and airports have transformed the landscapes of the traditional lands of the Nenets Indigenous Peoples. The Nenets' traditional means of life are dependent on reindeer herding, and the encroachment of fossil infrastructure has impaired their customary practices blocking transhumance routes and potentially polluting the pastures. Additionally, environmental defenders denounce that the dredging operations to make way for large LNG tankers to enter the River Ob's estuary and the increased shipping traffic through the Arctic Ocean are at odds with the preservation of the marine wildlife, on which local populations depend for traditional fishing activities (see Hanaček et al., 2022 for more details about the Arctic as a global extraction frontier [86]). Furthermore, sacred sites and customs for the Nenets are also being impacted by fossil operations, eroding their heritage and cultural traditions, deeply rooted in the nomadic herding lifestyle. Out of the 50 TotalEnergies' conflicts studied, 23 are resisted by Indigenous Groups, for instance in the Alberta (Case 27) and Madagascar tar sands (Case 28), in Bolivia (Case 29) and Colombia (Cases 30 and 31) or in Nigeria (Cases 32–34).

The role of the French state comes again to the fore in TotalEnergies relations with Russia. As recently as 2018, TotalEnergies struck a deal with Novatek (itself 19.4 % owned by TotalEnergies) to become a minority partner in the Arctic LNG project in the Gydan Peninsula, also in Nenets' Land (Case 35). The agreement was signed in May 2018, during a bilateral meeting between Macron and the Russian President, Vladimir

Putin, at a time when Russian troops had already invaded Ukrainian territory and Western sanctions were in place (Fig. 3).²⁰ Even after the February 2022 full-scale invasion of Ukraine, TotalEnergies justified its Russian position,²¹ and it only bowed to pressure and underwrote its Russian assets six months later.²² TotalEnergies environmental conflicts are not only located in settler-colonial nations such as Russia or Canada, they are also linked to the ongoing colonial occupation of the Western Sahara by Morocco through the Anzarane block operations (Case 13).

Despite not focusing on the climate impacts of TotalEnergies in this study, we shall not close without mentioning the multinational's greenhouse gas emissions. It is important to state that the magnitude of the distributed socio-ecological impacts associated to TotalEnergies' GHG emissions linked to its operations and products can be as high as or higher than the direct local impacts of its operations. The share of global historical emissions attributable to TotalEnergies' operations (0.83 % according to Carbon Accountability Institute, 2020 [13]) corroborates the argument regarding the firm's responsibility in the present climate crisis. In fact, 27 out of the 50 TotalEnergies conflicts studied record global warming as a visible or potential environmental impact of concern in the EJAtlas. Most notably, a national inquiry in the Philippines investigated the role of 47 “Carbon Majors” (large GHG-emitting companies), including TotalEnergies, for violations of human rights through their contribution to the climate crisis (Case 36). This provides substance to the argument that the company's distributed climate impacts add up with local extraction impacts to perpetuate a colonial extractivist logic in which TotalEnergies' has been involved since its foundation. While the core - in this case, Europe and France - reaps the benefits of fossil-based energy, the peripheries - whether they were part of the former French colonial empire or not - suffer disproportionately from the climate impacts. This is a protracted form of extractivism and oppression, through the appropriation of the commons embodied in a stable climate and an equilibrated atmosphere.

4.2. Concentrating energy: pipelines, LNG and refineries

If fossil fuels are the substance that materialise asymmetrical relationships of domination and oppression, pipelines are the necessary infrastructures to connect the extraction frontiers with the geographies of accumulation and consumption [64,87,88]. By their own nature and purpose, pipelines are long infrastructures that cross a large amount of land, impacting numerous communities and ecosystems during construction and threatening them with toxic spills throughout their operation. It is therefore not surprising that local communities organise and rise against the infrastructure they perceive as a threat to their way of life. Additionally, pipelines connect diverse landscapes with their own unique political geography, often crossing national borders. This regularly leads to political conflicts, which in the best case can be solved through settled negotiations, but in certain cases can also lead to violent political conflict (see Case 18). The possibility of violent political conflict and community resistance is enhanced by the natural vulnerability of pipelines. The combination of their length and the lack of redundancy to fulfil their transport function makes pipelines ideal political targets (e. g. in actions of sabotage) [89]. Their full length is nearly-impossible to police and a single blow to the infrastructure stops the transport of energy. The link between oil, companies and violence, has been at the centre of reflections on scholars working on political ecology: only to mention a few, Philippe Le Billon has worked extensively on this topic, producing analyses of the role of natural resources in armed conflicts

¹⁶ <https://www.reuters.com/article/us-myanmar-politics-energy-fac-tbox-idUSKBN2B11XX>.

¹⁷ <https://totalenergies.com/media/news/news/myanmar-totals-full-response-business-human-rights-resource-centre>.

¹⁸ <https://totalenergies.com/media/news/press-releases/totalenergies-withdraws-myanmar>.

¹⁹ <https://totalenergies.com/media/news/press-releases/totalenergies-has-definitively-withdrawn-myanmar>.

²⁰ <https://totalenergies.com/media/news/press-releases/russia-total-expands-partnership-novatek-through-arctic-lng-2-project>.

²¹ <https://totalenergies.com/media/news/press-releases/russia-total-energies-shares-its-principles-conduct>.

²² <https://totalenergies.com/media/news/press-releases/russia-total-energies-decides-withdraw-its-directors-novatek-and-will-no>.



Fig. 3. Patrick Pouyanné, TotalEnergies CEO (left), sealing an agreement with Leonid Mikhelson, chief executive of Novatek (right), under the approving look of Presidents Macron and Putin, for the development of the Gydan LNG project in the Arctic. Saint Petersburg, 31st of May of 2018. Photo credits: AFP/SCANPIX.

[90–92]; in his study of Nigeria, Michael Watts has proposed the concept of ‘economies of violence’ [93] arguing that oil capitalism produces economies and spaces characterised by violence and instability; Matthew Huber has focused on the role of violence in socially producing the scarcity necessary for the oil market to function in the 1930s US [94].

There have been many high-profile environmental distribution conflicts over pipelines in North America that have caught the attention of scholars, such as the Dakota/Lakota populations of Standing Rock resisting the Dakota Access Pipeline (No DAPL) [95], the Wet’suwet’en Nation resisting the Transmountain Extension Pipeline and Coastal GasLink [49,96,97], or the Keystone XL Pipeline struggle [98,99]. The political ecology of pipelines can also be illustrated through several environmental conflicts registered in the EJAtlas, and in which TotalEnergies has been involved, for example the MidCat in Spain (Case 37), the TAP in Italy (Case 12) and OSCENSA in Colombia (Case 38). Such conflicts have often been fertile ground for theorising in political ecology as well as in other disciplines. For example, the Baku-Tbilisi-Ceyhan pipeline has been the focus of two works, one academic - by the geographer Andrew Barry (2013) [87] - and the other journalistic - by Marriott and Minio-Paluello, reflecting on the materiality of the pipeline, the transnational routes followed by the flows of money employed in its construction, and the environmental damage and disputes it caused along its length [100]. Amber Murrey has investigated structural violence in the Chad-Cameroon pipeline, highlighting the socio-political significance of witchcraft as a logic of resistance against hydrocarbon capitalism [101]. Finally, an older but more comprehensive work on conflicts around pipelines by Doug McAdam and colleagues investigated 11 oil and gas pipeline projects spanning 16 countries in the developing world, examining the causes of opposition to these projects [102]. They found that Western funding of projects and public consultation serve as necessary political opportunities encouraging mobilisation, as do non-compensation of the host country for involvement in the project and the existence of risks from the project.

A prominent environmental conflict of recent years is the opposition of local communities to the East Africa Crude Oil Pipeline (EACOP; Case 39) [103]. The pipeline follows the development of TotalEnergies’ Tilenga oil field in Uganda (Case 21), the oil from which is mostly not intended for local consumption but for export to industrial economies.

Hence, the construction of the EACOP, crossing Uganda and Tanzania for 1445 km, is required to export the oil through the Indian Ocean’s port of Tanga. The pipeline’s construction involves land acquisition conflicts with hundreds of thousands of small land holders, who claim they have not received adequate compensation, and fear the negative environmental and health impacts from the pipeline operation [103]. An international coalition, STOPEACOP,²³ has assembled to fight against the project, with international actors decrying the climate impact associated with the project and the poor human rights record by European standards. There are links between local complaints and international climate justice movements. Thus, on 17 March 2022 it was reported that four young Ugandan environmental activists against EACOP were received by the French National Assembly to pressure the government to take a stance on the project. They were led by Vanessa Nakate, a young Ugandan climate activist.

Campaigners have managed to get the European Parliament to make a declaration against the project, and continue to campaign for financial institutions and insurers to withdraw their support for the project. Amis de la Terre, Survie, and four Ugandan organisations (AFIEGO, CRED, NAPE/Amis de la Terre Ouganda and NAVODA), members of the international coalition, have filed a court case against TotalEnergies in Paris, based on the French duty of vigilance legislation to prevent the construction of the project.²⁴ The case was deemed inadmissible by the Paris court in early 2023 because their claims were “substantially different from the claims” first brought against TotalEnergies.²⁵ The organisations are considering appealing the decision at the time of writing. A similar case of conflict combining resistance against extraction and against transport infrastructure is also documented in Tempa Rossa, Italy (Case 40).

Where pipelines are deemed physically or politically impractical, Liquefied Natural Gas (LNG) provides an ideal alternative for the fossil fuel industry to transport gas from producing regions to industrial centres. LNG has received renewed interest in recent times given the breakdown of gas trade between Russia and Europe, with TotalEnergies

²³ <https://www.stopeacop.net/our-coalition>.

²⁴ <https://www.totalincourt.org/>.

²⁵ <https://www.amisdelaterre.org/communiqué-presse/totals-tilenga-eacop-p-projects-paris-civil-court-dodges-issue/>.

boasting of its privileged market position in the sector.²⁶ From a political ecology perspective, LNG terminals open up the possibility to import/export gas from anywhere in the world and with ample supplier/consumer flexibility compared to pipelines which lend themselves to rigid trade arrangements. Moreover, Floating and Regasification Units (FRSU) offer the possibility for countries to develop an LNG import capacity in the matter of months compared to time-consuming construction of new pipelines. However, LNG terminals can only occupy limited sites in the coastline and despite having a certain degree of redundancy compared to pipelines, they concentrate impacts and resistances in specific geographic points. They are thus highly sensitive infrastructure, politically targeted by their strategic function, which require protection by companies and state forces. In this vein, LNG terminals also represent key nodes to mediate the relationships between the geographies of extraction, and geographies of accumulation and consumption. LNG terminals become important signifiers of the relationality of a place with the world, distinctively between export and import facilities. Import facilities remind the hosting societies that their energy systems are dependent and vulnerable. And people with systemic sensibilities are reminded that their energy privilege (in most cases) is a credit taken from the geographies of extraction, that accounts as a liability which ought to be compensated. Export facilities, in turn, remind the local inhabitants that their land is being exploited, their resources being hoarded, not for their enjoyment, but for the fulfilment of other people's desires, far away from where they are.

The Mozambique LNG project in Cabo Delgado province, one of the most prominent and complex conflicts involving TotalEnergies, is a very clear illustration of the commodification of land, colonial relationality and strategic vulnerability of LNG terminals (cases 17 and 41) [104]. The international alliance Stop Moz Gas,²⁷ led by the local environmental justice organisation Justiça Ambiental (JA!), opposes the project for several reasons. Firstly, for its climate impact, with its estimated 735,7 bcm gas resources, the project has the potential to emit 1.31 GtCO₂, which merits the label of “carbon bomb” [3]. Secondly, for its potential environmental impacts on the coastal ecosystem, which can impact fish stocks and the traditional livelihoods of local fisherfolk communities. Third, for the expropriation and displacement of entire villages without appropriate compensation to make way for fortified onshore LNG export terminals and ancillary infrastructure to facilitate the transport of foreign workers in what Martínez-Alier termed “bunker extractivism” [28]. Fourth, the contestation of the official development narrative, denouncing that the project is not contributing to the economic welfare of the local population, and instead negatively impacting on traditional economic practices. And fifth, for the corruption related to the case, with multibillion dollar public loans diverted to fund the military protection of the gas extraction operations. Cabo Delgado is a neglected region of Mozambique, where young people lack opportunities and face hardship in finding their place in society. Far from alleviating the problem, the LNG developments are further infuriating the local population for denying them opportunities while promising billions to overseas companies. Together with the spread of jihadism, these have been some of the key determinants for the emergence of an Islamist insurgency that has terrorised the local villagers with pillages and heinous murders, while the military makes strides to protect foreign companies and their construction sites [105–108].

At this particular point, the binomial of French diplomacy at the service of TotalEnergies interests and TotalEnergies as a diplomatic aide of the French state gains protagonism once again [109]. In April 2021, in response to the jihadist uprising TotalEnergies stopped all Cabo Delgado operations and declared *force majeure* on the Mozambique LNG

project.²⁸ Two days later, the President of Mozambique, Filipe Nyusi, visited the strongman President of Rwanda, Paul Kagame, seeking military assistance.²⁹ In May 2021, Macron hosted a Summit on the Financing of African Economies in Paris thoroughly documented by the conflict observatory Cabo Ligado.³⁰ Representatives from South Africa, Rwanda and Mozambique attended the meeting, and Macron had bilateral talks with their respective heads of state Ramaphosa, Kagame and Nyusi. Nyusi also met Kagame and Ramaphosa, and Pouyanné in Paris. Two weeks later, Macron visited Rwanda³¹ and South Africa.³² In July 2021, Rwandan troops, and a contingent of South African Defense Forces integrated in the Southern African Development Community Mission in Mozambique arrived in Cabo Delgado to help the Mozambique army fight-back the insurgency. The rapid mediation and sanctioning of the French state for a military intervention in the interests of TotalEnergies cannot escape scrutiny. A potentially similar highly complex armed conflict is related to the Yemen LNG terminal; however, very little information is available about it (Case 42). Another case in the north of Mali (Case 43) also involved armed conflict with jihadists and fossil fuel exploitation undertones, this time with the direct intervention of the French military [110]. Other conflicts related to TotalEnergies LNG projects have been recorded in Yamal (Case 23) and Gydan (Case 35) peninsulas in Russia, Gladstone (Case 1) in Australia, Papua New Guinea (Case 15) and Ensenada in Mexico (Case 44).

The relationality embedded in the nature of LNG terminals and pipelines creates a specific context for movements of resistance to forge international solidarity links. Such international coalitions of resistance between geographies of extraction and consumption are unique in their potential to transcend political dichotomies of winners and losers in the world resource distribution. International coalitions, especially those bridging core and periphery like STOPEACOP or StopMozGas, are fertile ground for the imagination of political utopias that leave behind coloniality-informed asymmetric relationships to create a world system based on relations of respect, solidarity and mutual support. Such spaces of imagination and transcendence of the status quo are essential for the global environmental movement to overcome cultural, political and social inertias and put forward political alternatives in their discourses and daily organising.

Together with pipelines and LNG import terminals, refineries are the “gates” through which energy is concentrated and put at the disposal of a privileged few in industrial cores. Refineries and petrochemical facilities are the necessary middle stage between the processes of extraction in the peripheries and the consumption in core economies. Through them, an intangible energy flow goes from periphery to the core, and an equally disembodied counterflow of social, political and environmental impacts goes from core to periphery. TotalEnergies fully owned refineries are in Europe (7), especially in France (4), and North America (1). Europe and North America concentrate 83 % of the refining capacity,³³ with a minor role for refineries partly-owned by TotalEnergies in Algeria, Senegal, Ivory Coast, Cameroon, South Africa, Saudi Arabia, Qatar and South Korea (TotalEnergies, 2023: 106–108 [9]). TotalEnergies' refineries are generally situated within core countries and generate important environmental and social impacts in the territories

²⁸ <https://totalenergies.com/media/news/press-releases/total-declares-force-majeure-mozambique-lng-project>.

²⁹ <https://www.cabolidado.com/monthly-reports/cabo-ligado-monthly-april-2021>.

³⁰ <https://www.cabolidado.com/monthly-reports/cabo-ligado-monthly-may-2021>.

³¹ <https://www.gov.rw/blog-detail/president-emmanuel-macron-visits-rwanda>.

³² <https://www.gov.za/speeches/president-cyril%C2%A0ramaphosa-hosts-president-macron-france-state-visit-28-may%C2%A027-may-2021>.

³³ 1384 kb/d from fully owned refineries + 99 kb/d from Zeeland Refinery (55 % equity of 180 kb/d). Total refining capacity is 1792 kb/d.

²⁶ <https://totalenergies.com/features/lng-total-investing-energy-tomorrow>.

²⁷ <https://stopmozgas.org/>.

where they are placed, configuring sacrifice zones and marginalised communities within the territories of rich countries where energy is being concentrated.

The placement of refineries is a decidedly political choice. Firstly, for security reasons, the few “energy gates” for each country concentrate considerable power in a relatively small place, in both the physical and political sense. This makes refineries highly strategic as objectives of politically motivated attacks. Secondly, for its geographic importance, since they require both access to a secure flow of crude oil coming from the periphery, most of the time refineries are placed on the coast with access to sufficiently large docking facilities for large tankers, leaving limited placement options. Thirdly, for its environmental justice relevance, because its position will determine in great measure which communities are going to shoulder the social and environmental costs associated with the refining process. The violent political targeting of refineries is best illustrated by TotalEnergies-participated refinery in Limbe, Cameroon (Case 22). The refinery was the object of a violent bombing in 2019 apparently orchestrated by the Anglophone separatist militias of the north of the country. Another example of the vulnerability of refineries is the strikes that French trade unions stage in the country's refineries. With support from just several thousand workers, the trade unions have the capacity to inflict major disruption triggering queues and depletion at gas stations. The tactic has been used recently as a cornerstone of the social unrest against Macron's pension reform of 2023.

Moreover, refineries and petrochemical plants are subject to environmental conflicts given the social and environmental costs inflicted on their surrounding communities. One of the most notorious of all cases related to TotalEnergies - given its death toll, widespread impact, and media coverage - is the Toulouse AZF explosion that took place on the 21st of September of 2001 (Case 45). The AZF factory produced ammonia-based fertilisers using methane gas as main raw material. A stockpile containing 300 tonnes of ammonium nitrate was negligently mixed with chlorinated products by a contractor employee.³⁴ The mix ignited the explosion that left 31 dead, mostly workers on site, but also members of the public, and produced significant short and long-term damages to the surrounding communities [111]. A conflict ensued where the organised civil society demanded explanations, responsibility and compensation from the company, and measures to avoid the repetition of such a catastrophe to the government. The demands reached the judiciary, which after a protracted process of 20 years, only resulted in minor fines for TotalEnergies. The company claims to have paid more than €2.5bn in compensation, but the associations of the bereaved and affected are still demanding that TotalEnergies recognises its responsibility and receives a conviction commensurate with the damage inflicted, and hold the government co-responsible for its soft hand towards the company. The AZF explosion cannot be claimed to be an isolated incident, for TotalEnergies has had other industrial accidents in its refineries (See cases 46 and 47),³⁵ and had a minor role in the Piper Alpha disaster (Case 48). In refinery accidents, subcontracted workers are often the victims. This speaks of a corporate culture of cutting corners on health and safety training to reduce labour costs and maximise margins.

But far from the eventful nature of industrial accidents, refineries are contested by local communities by the sustained environmental impacts inflicted to their surroundings. The CEPESA refineries in Huelva,

Gibraltar and Tarragona (Cases 46, 47 and 49), the refinery in Rome (Case 50) and Port Arthur refineries³⁶ (case not in the EJAtlas yet) have faced resistance from local communities. All these refineries are inserted in the so-called “sacrifice zones” [54,112], areas with a high density of industrial activity with detrimental socio-environmental impacts. The resistances are generally framed against the concentration of hazardous activities and not against a singled-out industrial project. However, refineries play a critical role in establishing sacrifice zones, as their presence fosters the establishment of a petrochemical industrial sector and thermal power plants in their vicinity. The effects are also compounded by the fact that refineries need to be placed in areas with access to high-volume logistics infrastructure like ports and railway links, which also attract other large-scale industrial activities. The socio-environmental grievances recorded in the EJAtlas conflicts around TotalEnergies' refineries include impacts on health related to air, soil and water contamination, the loss of landscape aesthetics and the degradation and disinvestment in communities that end up being occupied by those most marginalised. TotalEnergies' refinery conflicts recorded in the EJAtlas support the view that to maximise profits and the energy concentrated in the industrial centres, companies like TotalEnergies shift costs to the marginalised through labour and environmental dispossession alike [113,114].

5. Conclusions

Following ecological economics principles, we have argued that industrial economies need to continue expanding the fossil fuel extraction frontiers to reproduce the economy and make it grow further. Our analysis of the environmental conflicts registered in the EJAtlas shows that the geographic distribution of extractive operations and impacts is partly explained by technological innovations, but most importantly by historical and existing relations of domination that shape the political access to oil and gas resources. We have shown multiple instances where TotalEnergies' extraction deals in the peripheries are made with undemocratic regimes and backed by French neocolonial diplomacy, and even its military. In this vein, we argue that one cannot understand TotalEnergies today without the political history of French colonialism. For the prevailing power structures granting access to oil and gas are passed on through the decades, partly reproduced by the ecologically unequal exchange mediated by TotalEnergies itself that leaves the negative impacts in the peripheries while concentrating the power in the core. Attesting to the historical significance of French colonialism, the African continent is disproportionately represented in both oil and gas extraction volumes, related environmental conflicts, and petroleum product sales.

We have also unpacked the usually overlooked energy concentration role that fossil fuel companies assume in the world system. Our analysis shows that TotalEnergies political ecology function is to maximise energy concentration in core economies, specifically in Europe. Hence, we conclude that TotalEnergies past, present and future are indissociable from fossil fuels, which, unlike renewables or biofuels, have unique biophysical properties that allow their intensive extraction in the world peripheries and subsequent concentration in a small geographic consuming core. While fossil fuels embody relationships of oppression, TotalEnergies LNG terminals, pipelines, refineries and petrochemical facilities are the necessary bridges between the societies enjoying the benefits of cheap energy, and those that suffer the impacts. These infrastructures are fertile ground for conflict, including armed conflicts, in some cases with the involvement of the French state. Furthermore, refineries often crystallise sacrifice zones with a high concentration of industrial activity around them, shifting costs to marginalised communities in core economies contributing to environmental racism. Often oil

³⁴ https://www.legifrance.gouv.fr/juri/id/JURITEXT000039776817?init=true&page=1&query=Grand+Paroisse&searchField=ALL&tab_selection=all.

³⁵ <https://reporterre.net/Les-accidents-industriels-se> and <https://www.industrialall-union.org/archive/icem/uk-unions-want-answers-to-totals-lindsey-refinery-blast-killing-one>.

³⁶ <https://www.texasattorneygeneral.gov/news/releases/paxton-announces-14-million-settlement-totalenergies-over-unlawful-pollution>.

and gas extraction, transport and refining do not benefit local populations, with the profits being syphoned to shareholders and local elites while cheap energy is concentrated in industrial societies. In turn, this concentration of energy brings power to the former metropolis, thus reproducing a global distribution of power based on relationships of domination inherited from colonial histories.

We believe these conclusions can be generalised to encompass all private Oil Majors: ExxonMobil, Chevron, BP, Eni and Shell. Their function is to explore for and expand the energy extraction frontiers in the world peripheries to concentrate it in economic cores. The expansion of these extraction frontiers is in large part defined by political access to territories and reserves, which require from local state sponsoring. So, they all receive support (to different degrees) from their respective countries of origin's diplomatic (and military) forces to secure oil and gas deals in a mutually dependent relationship with the state. In the case of American, and to a lesser extent British companies, the extraction frontiers are also expanded to domestic peripheries generally impacting on marginalised communities to satisfy energy independence for the perpetuation of the state.

Our findings produce actionable knowledge for practitioners, activists, and scholars engaged in environmental and energy justice. Firstly, our analysis of conflicts supports the view that TotalEnergies function hinges on the biophysical properties of fossil fuels, and campaigns or regulations pushing for a change of energy sources and carriers alone will not lead to environmental justice (see a follow up article on environmental conflicts resulting from TotalEnergies' "new energies" projects: Llaveró-Pasquína et al., upcoming). Striving for the orderly folding of the company should be prioritised. An alternative energy system ought to be built with a new foundation leaving behind old colonial framings that lead to environmental injustice, and should be based on locally and democratically controlled forms of energy extraction and consumption with regional mutual support and reciprocity ties.

Secondly, given the inextricable nature of the French political elite and TotalEnergies, addressing environmental injustice demands revisiting resistance strategies vis-a-vis the State. Like TotalEnergies, the French government's actions on a just socio-ecological transition are far behind their professed narrative. For if we consider the operational interconnection and mutual benefit between TotalEnergies and the State, it is highly unlikely that the French government will reign in on the colonial and fossil-based energy concentration function of TotalEnergies. Moreover, TotalEnergies distributes a "fossil rent" [115] not only to the national treasury, but also to oil and gas consumers through cheap energy, media advertising outlets, higher education, health and cultural institutions, the French political ruling class, shareholders and finance lenders. In return, this "fossil rent" knits a support network to provide essential services to sustain the reproduction of TotalEnergies' function, namely sociopolitical stability, a favourable public opinion, new managers and engineers education, diplomatic support, financial backing, etc. Activists and scholars shall learn to see Big Oil, and by extension the industrial economy, as a complex and interconnected, but vulnerable system. Its reproduction relies on an interdependent network of key social processes with non-redundant links. If one of those essential processes stalls, the company cannot reproduce.

Henceforth, our findings support the view that central government fiscal measures or environmental regulations alone will not lead to a phase out of the fossil fuel industry. Instead, effective change would come from a political reimagining of the State leading to a constitutional reform that leaves behind outdated colonial and extractive models, or even to counter-hegemonic solutions that build alternative institutions to organise society in a way that dismantles existing extractive ideals, institutions and infrastructure.

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CRediT authorship contribution statement

Marcel Llaveró-Pasquína: Writing – review & editing, Writing – original draft, Visualization, Investigation, Data curation, Conceptualization. **Gretel Navas:** Writing – original draft. **Roberto Cantoni:** Writing – review & editing, Writing – original draft, Investigation. **Joan Martínez-Alíer:** Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

All data is publicly available in the EJAtlas database and in TotalEnergies publications.

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