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Sacrifice zones and the construction of urban energy landscapes in Concepción, Chile

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Abstract

This article examines how national energy policies in Chile constitute urban energy landscapes characterized by environmental and spatial inequalities. The concept of urban energy landscapes is deployed to explain the spatial patterns resulting from energy governance and energy conflicts in the metropolitan area of Concepción, a metropolitan region of strategic importance in the configuration of national energy policy. These urban energy landscapes result from the constitution of 'sacrifice zones' that reflect an extractivist model of energy production. The combination of qualitative interviews and transect walks reveals different aspects of a dual arrangement of energy infrastructure and urbanization. The city's fragmented landscapes emerge from the coexistence of energy infrastructure and associated industries, with daily activities of communities that have little to do with these industries but live in their shadow. Conflicts in these urban energy landscapes are intense, with every inch of space contested by competing modes of 'being urban.' The urban energy landscape in Concepción is an expression of a clash of social and economic power with local priorities.

Keywords: urban energy landscapes, industrial landscapes, sacrifice zones, energy conflicts, coal energy, Chile

Résumé

Cet article examine comment les politiques énergétiques nationales au Chili constituent des «paysages énergétiques urbains» caractérisés par des inégalités environnementales et spatiales. Le concept de paysages énergétiques urbains est déployé pour expliquer les schémas spatiaux résultant de la gouvernance énergétique et des conflits énergétiques dans l'aire métropolitaine de Concepción, une région métropolitaine d'importance stratégique dans la configuration de la politique énergétique nationale. Ces paysages énergétiques urbains résultent de la constitution de «zones sacrificielles» qui reflètent un modèle extractiviste de production d'énergie. La combinaison d'entretiens qualitatifs et de marches de transect révèle différents aspects d'un double arrangement d'infrastructures énergétiques et d'urbanisation. Les paysages fragmentés de la ville émergent de la coexistence des infrastructures énergétiques et des industries associées, avec les activités quotidiennes des collectivités qui ont peu à voir avec ces industries mais vivent dans leur ombre. Les conflits dans ces paysages énergétiques urbains sont intenses, chaque centimètre d'espace étant contesté par des modes concurrents «d'être urbain». Le paysage énergétique urbain de Concepción est l'expression d'un choc entre le pouvoir social et économique et les priorités locales.

Mots-clés: paysages énergétiques urbains, paysages industriels, zones sacrificielles, conflits énergétiques, charbon, Chili

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Resumen

Este artículo estudia la constitución de paisajes energéticos urbanos caracterizados por desigualdades ambientales y espaciales cómo resultado de las políticas energéticas nacionales en Chile. El concepto de paisajes energéticos urbanos sirve para explicar los impactos de la gobernanza energética y los conflictos energéticos en el área metropolitana de Concepción, prestando atención a la manifestación de los impactos en el espacio urbano. Concepción es una región metropolitana de importancia estratégica para la política energética nacional. Sus paisajes energéticos urbanos demuestran la constitución de "zonas de sacrificio" como resultado de un modelo extractivista de producción de energía. El análisis en este artículo combina entrevistas cualitativas y transectos a pie para explicar la configuración de un paisaje energético dividido en dos: una parte que sirve a la política energética nacional y otra que sostiene el consumo energético local. Los paisajes fragmentados de la ciudad reflejan la coexistencia de grandes infraestructuras de la industria energética con comunidades urbanas que tienen poca relación con esas industria pero que viven bajo su sombra. Los conflictos en estos paisajes de energía urbana son intensos. Cada centímetro de espacio está en disputa y sirve para reclamar un modelo de vida urbana alternativo. El paisaje energético urbano en Concepción refleja el choque del poder social y económico con las prioridades locales.

Palabras clave: paisajes energéticos urbanos, paisajes industriales, zonas de sacrificio, conflictos energéticos, energía del carbón, Chile.

1. Introduction

In January 2015 the notion of 'sacrifice zones' entered the public debate in Chile after the municipal leaders of five boroughs (Tocopilla, Huasco, Quintero, Coronel, and Puchuncaví) met to demand action from the national government. Sacrifice zones, they argued, are urban areas exposed to extreme degrees of environmental pollution and degradation caused by the concentration of industrial activities, such as coal mining or electricity generation. The recognition of their boroughs as sacrifice zones, they argued, is the first step towards a radically different model of development. In Chile, the notion of sacrifice zones is a compelling narrative that has galvanized feminist social movements against extractivist models of economic development (Bolados García and Sánchez Cuevas 2017).

Energy industries are an integral part of national imaginaries of modernization (Kale 2014), and Chile is not an exception. In Chile, the social, economic, and environmental costs of energy industries have been justified in the name of achieving national development and economic growth. In the 1950s, the country's development strategy promoted the construction and operation of large and state-owned energy infrastructures to boost industrialization and improve living standards. In the 1980s, neoliberal policies enacted by Pinochet's dictatorial regime led to the commodification of energy alongside the privatization and liberalization of energy production and distribution. Since the 1990s, foreign capital has fostered the expansion of the country's electricity production and distribution capabilities. This aggressive model of energy development has become increasingly contested, with the mobilization of local governments, civil society organizations and grassroots groups concerned with the environmental and health impacts of energy infrastructure (Schaeffer and Smits 2015). Nevertheless, these movements have not shifted the extractivist logic that prevails over local concerns about energy development projects in Chile (Feron *et al.* 2019).

This article asks, to what extent do the urban energy landscapes of the metropolitan area of Concepción reflect extractive models of energy development? The metropolitan area of Concepción, including Coronel (one of Chile's sacrifice zones), is a paradigmatic example of the materialization of an extractivist model of energy production in an urban area. The whole energy landscape of the metropolitan area of Concepción reflects profound spatial transformations that have taken place to serve the fossil fuel industry. Resource extraction and electricity generation infrastructures shape—through pollution and stigma—the physical and the representational setting of the areas hosting them (Castán Broto *et al.* 2010). Studies of energy landscapes contribute to political ecology because they relate landscape transformations to community mobilization against extractive models of energy production and use (e.g., Pasqualetti 2001). Communities' concerns have gained weight worldwide as regulators, empowered communities, and energy innovators have sought to respond to climate change and global sustainability challenges (Pasqualetti 2011; Soini *et al.* 2011). However, calls for greater community autonomy and energy sovereignty are few and far between (Avila Calero 2017; Castán Broto

2017a). Current practices of energy production and use continue to appropriate space and transform settlements all over the world.

Sacrifice zones emerge from highly disputed systems of energy provision. Landscape research methods can support place-based analyses to reveal the political ecology of energy and the constitution of sacrifice zones in cities such as Concepción. For example, the boroughs in the metropolitan area of Concepción, especially the Borough of Coronel, have a history of resource and labor exploitation that has constituted them into sacrifice zones. The extraction and transformation of energy resources has taken precedence over preserving local livelihoods. However, the narrative of sacrifice zones does not capture Concepción's energy landscape in its entirety. Another inhabited energy landscape emerges in the interstices of large infrastructure networks.

Many large energy infrastructures in Chile are nowadays either operating, under construction, or planned within city boundaries. An analysis of the constitution of energy landscapes in urban areas—urban energy landscapes—requires distinct analytical tools to reflect the landscape dynamics that result from the proximity of large infrastructures and dense human settlements. However, urban areas have largely been absent from analyses of energy landscapes because this literature has mainly focused on large-scale landscape transformations in rural settings (e.g., Blaschke *et al.* 2013; Cowell 2010; De Boer *et al.* 2018; Jefferson 2018; Nadaï and Van Der Horst 2010; Pasqualetti 2000; Soini *et al.* 2011).

Concepción in Chile is the capital of Bio Bio, the country's central energy-producing region. The city presents a paradigmatic case that demonstrates how the transformation of landscapes threatens local economic growth, energy transitions, and the well-being of local populations. Our analysis focuses on the governance of energy, urban energy conflicts, and the spatial constitution of energy landscapes to develop two main insights concerning the construction of urban energy landscapes in Concepción. **First**, the constitution of Concepción's boroughs as sacrifice zones is visible spatially. **Second**, a close examination of these urban energy landscapes reveals a dual model of spatial differentiation, that separates the networks that support an extractive social metabolism from the structures of inhabitation that prosper at the interstices of the dominant landscape. The landscape perspective shows that place-based experiences and discourses also shape the political ecology of energy.

In Section 2, we engage with the concept of sacrifice zones as a means to bridge the literature on the political ecology of energy, and debates about energy landscapes. Sections 3 and 4 provide a brief overview of the case study and the methodology employed in the article. Following the analysis of empirical data, Section 5 analyses three dimensions that characterize the urban energy landscapes in Concepción: the local impacts of nationally-dictated energy projects, the expression of socio-environmental conflicts associated with energy extraction, and the spatial distribution of energy infrastructures and their impacts on local life. The discussion in Section 6 examines the implications of the empirical analysis for the emergent literature on urban energy landscapes. The article concludes that urban energy landscapes result from contradictory processes of strategic transformation and contingent occupancy. Alongside extractive practices, urban energy landscapes reflect patterns of habitation that seek to reimagine urban life under the shadow of energy infrastructures.

2. Sacrifice zones and urban energy landscapes

The spatial transformations associated with the extraction, production, and distribution of fossil fuels have long been a central concern for political ecology. Pricken (2019) argues that the hydrocarbon complex—the assemblage of physical and institutional infrastructures that support fossil-fueled capitalism—produces distinctive landscapes according to configurations of space and nature that serve capitalism's energy needs. Pricken (2019) takes inspiration from Auch's (2014) *Hydrocarbon industrial complex map*, an online representation of the interconnected network of fossil fuel industries in the United States, and a haunting vision of the web of energy industries that sustain nation-making projects in contemporary capitalism. In the same way, the hydrocarbon complex in Chile relies on a national imaginary of 'the public interest' that sweeps under the carpet the tangible impacts of this industry on the lives of people.

A characteristic of the hydrocarbon complex, well known to political ecologists, is that the appropriation of space at large for the energy demands of capitalism relies on the transformation of specific locales to support its metabolism (Arboleda 2016). As the hydrocarbon complex becomes visible in specific landscapes, energy

infrastructures are built to support the multiple flows of the metabolism of capitalism. Capitalism's thirst for energy leads to the constant appropriation of space for energy production, in a process of land colonization that reproduces inequality even when it happens under the banner of clean energy and ecological transitions (Dunlap 2018). Studies of energy landscapes have examined how such changes affect those who inhabit the landscape, often perceived as the external imposition of somebody else's project on one's life (Calvert 2016). In Chile, this process of land appropriation has relied on the construction of a national ideal of public interest that implies the designation of certain areas as energy hubs—that is, areas that can be forgone to support the infrastructures of the fossil fuel industry. Indeed, the recognition of these energy areas as *sacrifice* zones represents a symbolic victory for marginalized communities against the naturalization of the extractive dynamics of capitalism in that country.

Within the environmental justice literature, the notion of sacrifice zones helps to characterize areas in which communities suffer the concentration of environmental burdens and industrial activity (Little 2017; Lerner 2010; Mitchell *et al.* 1999). Sacrifice zones are built on discourses of sovereignty, economic growth, and jobs while arguments about technical efficiency and legal constraints, community compensation, or even threats are deployed to avoid contestation. Activist struggles, community mobilization, and judicial sentences may force the revision of standards and policies, but rarely change the fundamental discourse of modernization that drives the activities in sacrifice zones (Hooks and Smith 2004; Pellow, Weinberg and Schnaiberg 2001). In Chile, sacrifice zones are seen as the result of the imposition of large infrastructure projects on communities and ecosystems, following top-down, national policies. In particular, energy sacrifice zones reflect unsustainable landscapes of energy production and consumption (Fox 1999; Hernández 2015). Within the tradition of research in energy landscapes, the link between sacrifice zones and landscape transformations has been studied mostly for agricultural, industrial, and military environments. Our contribution demonstrates the parallel constitution of energy sacrifice zones in urban settings.

A landscape perspective enables an analysis of the production of space with the material and symbolic networks that support capitalism. Such a perspective forces the analyst to examine spatial transformations in their full diversity, looking at energy infrastructures alongside the places that people inhabit. Hegemonic strategies of land appropriation emerge alongside the agencies of the people who contest them. This aligns with a political ecology tradition that uses ethnography as a means to explore the relationship between resource governance, environmental conflicts, and spatial transformations. Political ecology scholars develop rich and complex portraits of the people who confront environmental and spatial transformation, and thus, they reject victimization as a workable strategy in environmental justice struggles. Conflict is seen as a constitutive feature of landscapes.

LeBillon and Duffy (2018) have argued that the political ecology tradition moves away from reductionist, dualist conceptions of conflict, looking instead for a nuanced characterization of power differentials as well as the abilities of marginalized groups to resist environmental injustices. This view of conflict resonates with what Ahlborg and Nightingale (2018) have characterized as a 'relational turn' in political ecology's conceptualization of power. They argue that the exercise of power depends on multi-layered sociotechnical networks that involve different institutional, material, and ecological arrangements. Energy landscapes are the spatial materialization of the sociotechnical networks through which this form of relational power operates.

The concept of energy landscapes depicts the co-constructed nature of environmental change (Bridge *et al.* 2013). Many of the factors that shape current energy systems, from electricity networks to the type of houses in which people live, have emerged over time as part of a historical process through which different features of energy systems became embedded in societies and economies. Also, energy landscapes direct attention to a temporal and a spatial process of differentiation of energy provision and use that depends on cultural changes, access inequalities, and resource distribution (for recent analyses see: De Boer *et al.* 2018; Jefferson 2018; Stremke and van de Dobbelsteen 2012). Thus, energy landscapes can also be understood as the material and cultural footprint of the environmental and social injustices that result from ongoing processes of energy production, distribution, and consumption.

Landscape scholars have sought to transcend analyses that emphasize either identities and ideologies or those stressing materiality and practices, what Nadaï and van der Horst (2010: 147) call the "the split between

experience and representation." Relational perspectives have overcome this split, by looking at landscapes as constituted through the social (Massey 2006). Landscape-making is always an ongoing and unfinished task (Bender 2006; Massey 2006), "historically particular, imbricated in social relations and deeply political" (Bender 2002: 104). Blaschke *et al.* (2013: 9) argue that "whereas the environment provides the inescapable physical setting for human existence, landscapes, both urban and rural, provide a concept of 'place' that is linked to the community." Methods of analysis should seek to 'animate' the landscape as Rose and Wylie have theorized (2006). In this way, relational perspectives focus on the tension between perceptions, material practices, and interests, all of which are visible in urban energy landscapes.

Pasqualetti's work on wind energy landscapes tracked local opposition to the siting of wind turbines in the California desert (2000, 2001, 2011). This kind of analysis has inspired a view of energy landscapes as landscapes of power, in which people resist projects perceived as external impositions, regarded as "someone else's idea, for someone else's benefit, and for someone else's profit" (Pasqualetti 2011: 914). Nadaï and Van Der Horst argue that, as renewable energy infrastructures have dispersed across the land, their spatial impacts have become highly perceptible, providing societies "with new visual reminders that our energy comes from somewhere" (2010: 144). Vocal opposition to energy projects among local communities in different contexts emerges as a manifestation of the gap between national discourses of energy development and the local experiences of their impacts (Batel and Devine-Wright 2015). Communities' ability to influence the processes that shape their landscape, however, will depend on political and environmental histories. Thus, landscapes play an active part in conflicts between deprived communities, the state, private actors, and the surrounding environment where conflicts take place.

A landscape perspective facilitates an analysis of planning conflicts, situating the process of technological change in a given political and social milieu (Möller 2010). For example, Cowell's account of wind turbine siting disputes in Wales explained how "any initiatives across the Welsh countryside were seeking to enhance its existing ecology, aesthetics, and accessibility as a basis of future social regeneration, but were invisible to the strategic planning exercise which relied on extant demarcations of existing landscape value." (Cowell 2010: 228-229). This is an example of how a landscape perspective challenges current policy and planning practices. By engaging with the complex relationships between social and ecological processes, a landscape perspective also exposes the tensions that define what kind of future is possible. These contributions open up debates on energy and society beyond dominant views from engineers and economists on improving its efficiency, revealing the complexity of planning conflicts around energy and the integration of normative ideas of landscape within community identities.

Debates about large-scale energy production have also emphasized the relationship between landscapes, and constructions of community and locale. Wheeler (2015), for example, describes how existing wind farms in rural areas can become integrated into local representations of rurality and landscape. Using the example of the cultivation of biofuels in Yorkshire, Van Der Horst and Evans relate community identities to their history and to the potential responses to landscape transformations, because "the legacy of living in a landscape that has at least partially been an energyscape for the last 200 years may make the local community more accepting of 'growing' energy" (2010: 189). In this sense, energy landscapes emerge from the agencies of seen and unseen forces, including those of people, and therefore landscape itself can be understood as embodying "differing forms of energy and labor" (Olwig and Mitchell 2007: 526). One strategy deployed in the constitution of sacrifice zones is discounting the history and affective connections of the communities with their surrounding environment, to the point that their presence is only visible in marginal spaces of habitation.

Urban energy landscapes, in particular, result from the co-evolution of the built environment, systems of energy provision, and situated energy uses in an urban setting (Castán Broto 2017b). Although the concept of energy landscape emerged from the analysis of large energy infrastructure projects in rural settings (Batel and Devine-Wright 2015), insights from debates on energy landscapes explained above are directly relevant to urban contexts.

This article aims to engage with *urban energy landscapes* as a core concept in the political ecology vocabulary. Understanding the political ecology of urban energy requires analyzing the diversity of actors, human and non-human, that shape landscapes through daily practices and strategic projects at different scales. Urban energy landscapes emphasize historical contingency and geographical particularity. An analysis of urban

energy landscapes builds upon partial accounts, and approximations to environmental transformations developed within the complexity of urban environments, rather than developing a general theory of urban landscapes (e.g., Larkham and Whitehand 2013). The study of urban energy landscapes reveals the relationship between land use and socio-technical change in urban areas, and thus, helps to unpack the political ecology of landscape transformation in urban settings. In this vein, we take Olwig and Mitchell's (2007) suggestion of thinking "against" landscape, diving below social representations and digging into the materiality of energy and the everyday social practices below the existent and contradictory narratives of an energy hub and sacrifice zone in metropolitan Concepción. Following the insights of the literature on energy landscapes, the landscape perspective draws attention to three aspects that characterize the political ecology of energy:

1. the governance conflict between nationally-determined and local interests,
2. the development of place-based conflicts around the energy industries, and
3. the spatial manifestations of the operation of extractive infrastructures.

3. Metropolitan Concepción as an energy hub

Chile's power industry is better known for the sector's deregulation reforms, than for its impact on international energy markets (Rudnick 1994). Imported oil, coal, and natural gas still account for more than two-thirds of the country's primary energy matrix (Ministerio de Energía 2015a). Energy security concerns have motivated the construction of large hydropower projects, subsequently triggering conflicts in the Andean landscapes involving rural and indigenous communities (Schaeffer and Smits 2015; Romero-Toledo 2014). In recent years, a boom in renewable technologies for electricity production has diversified the country's power grid (Condell and Pereira 2014). Increasingly, conflicts have been displaced to urban areas (Sanzana Calvet 2010).

With nearly one million people distributed in eleven boroughs, and run by eleven mayors, Concepción is the country's second largest metropolitan area and the capital of the Bio Bio region. Spread along the Bio Bio river and the Pacific coastal shore in a halved radial structure, since the 1990s its expansion has been filling in the gaps between central and peripheral boroughs, increasing the population and urban areas to form a metropolitan conurbation (Salinas Varela *et al.* 2010). Despite this spatial transition, the functional structure of jobs and services still concentrates on the two main central boroughs, which suggests an unbalanced bi-central structure (Rojas Quezada *et al.* 2009).

The metropolitan area spreads over hills, coast, rivers, wetlands, and lagoons, subjected to continuous earthquakes and tsunamis and displaying a long and troubled history of war and social unrest (Pacheco 1997). As Aliste and Musset (2014) have suggested, these events have left indelible footprints on local identity. Concepción's imaginaries of development follow a narrative of struggle against the natural environment, and the detachment of local roots. The constitution of a sacrifice zone depends on a split between the ideals and processes of development and the territories where such development takes place. In Concepción, this split follows the perception that local conditions prevent modernization and development (Aliste and Musset 2014).

Concepción today hosts one of the country's most extensive industrial estates, with power plants, oil refineries, steel industries, fisheries, the glass, forest and paper industries, and four export ports. The estate is a legacy of both the state-led national developmental period and the extractivist, neoliberal reforms promoted after Pinochet's Coup in 1973 (Aliste, Contreras and Sandoval 2012). Also, the area has a historical bond to energy production. In the 19th and 20th Centuries, the metropolitan area of Concepción provided almost all the coal for mining, transport, industrial, and heating uses in Chile (Pacheco 1997). Chile's attempts to increase the share of renewables in the national energy budget has led to the construction of a series of dams in the Bio Bio river, suggesting that a green turn will not be sufficient to change the status of the region as an energy producing hub (Condell and Pereira 2014).

Roughly a quarter of the GDP of the Bio Bio region depends on the industrial sector, while the commodity export economy accounts for another quarter (Banco Central 2014). Private utilities and operators under public-private partnerships (PPPs) provide basic services, following a system of concessions and fully liberalized markets. Poverty affects 20% of the population and is concentrated in peripheral urban districts,

where energy infrastructures are also concentrated (Mideplan 2017). The frequent conflicts related to air pollution and the degradation of water ecosystems add to a troubling record of urban struggles that ultimately reflects the extractivist logics of the developmental state in Chile (Aliste, Contreras and Sandoval 2012; Fuenzalida and Quiroz 2012; Sanzana Calvet 2010).

4. Methodology

Urban energy landscapes are the repository of both imaginaries and experiences. They enable visualizing the interplay between conflict, and the production of the urban fabric. We used semi-structured qualitative interviews and transect walks to characterize three aspects of urban energy landscapes: governance, conflict, and spatial patterns that make conflict visible.

First, we conducted semi-structured interviews to characterize the governance of energy in Concepción. Interviewees were identified through a purposive sample. A review of grey literature and press articles was used to map the institutions involved in energy debates and conflicts in the city. These included national agencies, regional and local government, energy companies and consultants, universities, non-profit organizations, and community-based groups. Representatives of each institution were contacted for an interview. In total, the sample includes 21 interviews with a variety of actors in public, private, and civil society sectors (Table 1). The gender and age distribution of the interviewees reflects the gendered structure of energy governance institutions and their representatives (note that all female interviewees worked in government institutions).

Interviewees					
Gender	<i>Female</i>	4	Institutions represented	<i>Public Sector (National)</i>	6
	<i>Male</i>	17		<i>Public Sector (Subnational)</i>	3
	<i>Other</i>	0		<i>Private sector</i>	6
Age	<i><40</i>	1		<i>Civil society</i>	6
	<i>40-59</i>	19		<i>TOTAL</i>	21
	<i>>=60</i>	1			

Table 1: Summary of interviews.

All interviews were conducted and analyzed in Spanish with an interview guide exploring different aspects of the energy landscape, including perceptions of energy provision, energy use, and energy governance. Interviews were coded in NVivo. The analysis sought to characterize different aspects of discourse by looking at how each interviewee described the networks of the energy system, the system of governance (which actors are involved in energy governance and how), and the future of energy.

Using background literature and insights from the semi-structured interviews, we examined seven cases of conflict around the energy industry in Concepción, attending particularly to the expression of those conflicts within the landscape. Rather than focusing on the history of each conflict (a common point of entry in political ecology), we sought to examine them comparatively, in the context of energy governance in metropolitan Concepción. The focus of the analysis was to identify the tools of energy governance, and how they are materialized in urban energy landscapes.

The third part of the analysis focused on examining the spatial patterns emerging in the urban energy landscapes of the metropolitan area. Transect walking as an ethnographic research method originated in ecological studies of bio-geographical regions, but it has been adapted in ethnographic studies of infrastructure landscapes (Shortell and Brown 2016; Sanzana Calvet 2016). Walking along an itinerary helps survey, map, and observe the landscape (Hammersley 2018). In our case, the itineraries departed from one of the infrastructure features at the core of one of the conflicts identified. Walking was used as a means to connect infrastructures with places of inhabitation. Apart from their connecting purpose, the itineraries were flexible enough to enable explorations of main roads and secondary routes. In total, five transects were conducted

between November and December 2015, aiming to capture variation across different instances of conflicts and different boroughs of the metropolitan area (Figure 1 and Table 2).

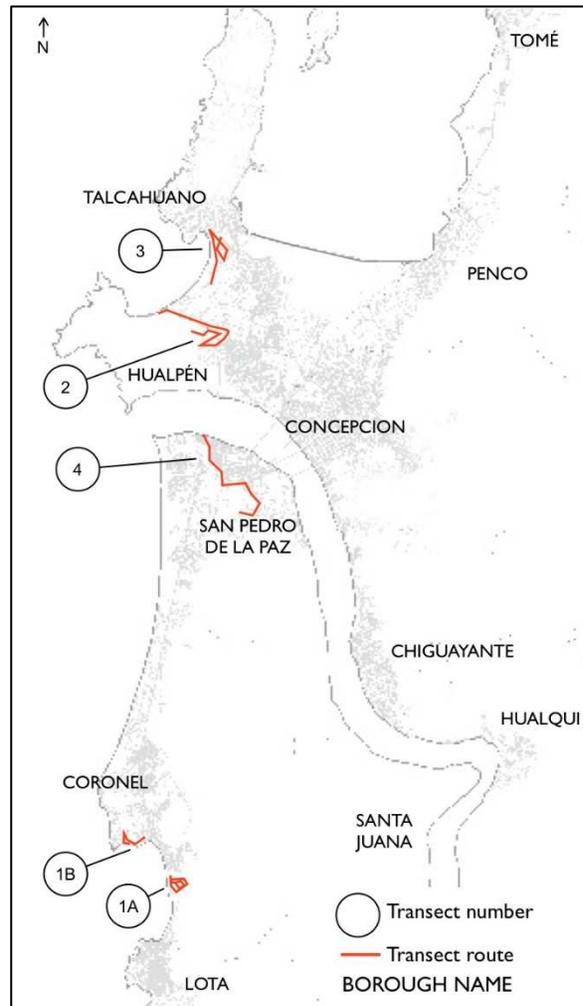


Figure 1: Transect walks routes.

Visual data photographed in the field shows evidence of the configuration of energy infrastructure, and social use. As an ethnographic tool, transect walks bring the researcher's perceptions in the form of observation notes. Each transect walk took a day. The transects include observations from roughly 10 km of pedestrian walks across highly diverse urban environments. The transect material was analyzed to characterize the spatial patterns visible in Concepción's urban energy landscapes.

5. Urban energy landscapes in Concepción

Discourses of energy governance in a sacrifice zone

The analysis of interviews, in the context of a document review, revealed the dominant discourses of energy governance shaping the urban energy landscape. Several interviewees presented metropolitan Concepción as a national leader in energy production, with the largest share of electricity generation happening

in thermal coal plants. Both coal and oil production are deeply rooted in local identities. Until 1997 the metropolitan boroughs of Coronel and Lota hosted the largest coal mines in Chile. Since the 19th Century, these mines provided coal for transport, heating and mining industries. The miner's identity remains deeply rooted in the social memory of local people. Moreover, the national oil company ENAP remains a relevant source of local jobs and investments, and its example represents for many a project of modernization through the development of heavy industries. Both industries are locally celebrated, despite the apparent links between fossil fuel production and the deterioration of health and the environment in the area.

Transect	Land use	Income groups	Production	Distribution	Consumption
1A	Industrial	Low to Middle-low	Coal power plant	Maritime coal terminal	Port
	Industrial port			Power lines	Residential
	Peri-urban			Coal strap	Export
	Residential			Coal storage	
1B	Industrial	Low to Middle-low	Coal power plant	Maritime coal terminal	Industrial
	Industrial port			Power lines	
	Residential		Biomass power plant	Coal strap	Residential
	Fishing port			Coal storage	Export
2	Industrial	Low to Middle	Refinery and petrochemical compound	Pipelines	Industrial
	Residential			Oil/fuel/gas tanks	Residential
	Natural reserve			Power lines	Export
3	Industrial	Low to Middle-low	Distribution and storage only	Pipelines	Industrial
	Industrial port			Oil/fuel/gas tanks	Port
	Fishing port			Tanker trucks	Residential
	Residential			Power lines	Rail
4	Industrial	Middle-low to High	Biomass power plant	Pipelines	Residential
	Residential			Fuel station	
	Horticulture			Power lines	Export

Table 2: Transect walks. (source: own elaboration)

There is a strong sense that discussing energy policy in Concepción is irrelevant because decisions are made elsewhere. The governance of energy in Chile is highly centralized. The Ministry of Energy, created in 2005, sets, implements, and controls all national plans and policies. Large energy companies, most of them privately owned, have their headquarters in the country's capital, Santiago. In the words of an MP and former regional councilor, regional authorities have sometimes tried to integrate energy production distribution and consumption in their development strategy, but they seem to lack any decision-making power (regional councilor, int.1). Branches of the environmental agency or regional governments have sometimes challenged the local impacts of an energy project, only to see national agencies overriding their decisions to favor low-cost energy policies (regional councilor, int.1; researcher, int.11).

According to interviewees involved in local planning processes, the processes of siting industrial energy infrastructure tend to reverse planning priorities including those established in the city's master plan (local activist, int. 6; regional planning officer int. 10; environmental agency officer int. 14) (see also Spoerer 2016). An officer from the regional government planning bureau stated: "the link between energy and urban planning? None. Indeed, this gap is the cause of problems" (regional planning officer, int. 10). When branches of the environmental agency or regional governments have challenged an energy project locally, national government institutions override their decisions and favor low-cost energy efficiency policies (regional councilor, int. 1; regional planning officer, int. 10). For an influential civil society commentator, the absence of a centralized metropolitan authority further hinders an integrated strategy for sustainable energy at the metropolitan scale (researcher, int. 11).

It appears, however, that institutional reform and decentralization will have a limited effect on the current governance model. Representatives of energy companies argued for the recognition of their role in regional development but did not see any need for coordination with local or regional authorities (gas company operations manager, int. 2; electricity utility operations manager, int. 8; LNG terminal manager, int. 15; and energy company community manager, int. 17). In their discourses, the spatial dimensions of energy production are secondary. Instead, they claim that they comply with the law and complain about the lack of recognition given locally to their corporate responsibility programs and their contributions to regional development.

Civil society actors described energy governance processes as elitist and opaque, led by companies and authorities that hardly consider community interests. Private actors are criticized by both government and civil society representatives because public involvement efforts follow the need to provide commercial attention to customers or to implement conflict mitigation measures (municipal officer, int. 14 and community organizer, int. 16). Large energy companies are reported to be lobbying against the environmental impacts of other competitive energy producers, without taking responsibility for the social and environmental impacts of their own (ministerial officer, int. 3). For example, in Concepción, large energy companies lobby against the firewood industry, of small producers, which supplies poorer neighborhoods. The local government has little discretionary power, and its actions focus only on energy efficiency and education campaigns with limited powers to change industrial land use or to control the emissions from industrial facilities (municipal officer, int. 14). In summary, regional and local government representatives perceive large energy companies as influential stakeholders who can lobby governmental authorities to overcome regulations, and focus on low-cost energy efficiency policies (regional councilor, int. 1).

In 2015 the Chilean government drafted a new long-term national strategy *Energía 2050* (Ministerio de Energía 2015b) with three aims:

1. to overcome the energy shortages threatening economic growth,
2. to increase the weight of the energy industry in the national GDP, and
3. to increase the share of renewables in the national energy mix.

Aware of the scale of the impacts of energy projects—as well as the recent record of spiraling conflicts—the government presented this as an unprecedented effort to facilitate massive participation in energy planning (ministerial officer, int. 4). According to ministry representatives, this included a consultation process with almost 130 meetings with more than 3,500 people, and thematic consultations with over 1,000 experts involved.

The strategy raised questions about the territorial strategic assessments that conform to centralized decision-making processes in Chile. It also led to concrete initiatives to address the conflicts in sacrifice zones.

In 2016, electricity consumers in 65 Chilean boroughs—including the five sacrifice zones—received a letter from the Minister of Energy to announce the reduction of their electricity bills after the approval of the Law for Tariff Equity in Electrical Services (*Ley de Equidad Tarifaria*). Since 2016, this Law has provided a reduction of tariffs for the communities bearing the brunt of the impacts of energy generation (Ministerio de Energía 2017). Households in the city of Concepción and the region of Bio Bio could see a reduction of up to 36% of their energy costs (CNE, 2017). This unprecedented exception for energy-producing boroughs in a context of de-territorialized national policies follows the Ministry's declared a commitment to reconcile economic growth with environmental care through technological and institutional modernization. These initiatives show that organizing action bears an influence on existing discourses of energy development. The problem is that this can only be a solution in the short term, not only because it depends on political changes, but also because it does not question the drivers of the extractive model of development. In the end, neither the national strategy or the equity tariff have challenged the dominant models of energy development in Concepción. There is a disconnection between the emerging discourses of energy justice and sustainability at the national level and the actual impacts on the ground of the operation of energy infrastructure.

A conflict-shaped urban energy landscape

Since the 1990s the Chilean energy sector has been a source of socio-environmental conflicts, mostly related to the opposition of communities to the construction of new energy projects and opposition to the impacts of the already-operating industries. However, until recently, the majority of these conflicts concerned rich biodiversity spots in rural or less urbanized areas, such as Hidroaysen dam in Patagonia (Romero 2014), the Barrancones coal plant in a marine reserve in La Higuera (Spoerer 2016), and the conflict for the Ralco dam in the Bio Bio region (Román 2012). The year 2011 was a year of intense social mobilization in Chile and also when civil conflicts about energy projects took hold of the public agenda.

Examples of protracted conflicts between resident communities and the industry emerge in several boroughs. For instance, in the borough of Hualpén, residents nearby the ENAP's petrochemical compound have mobilized against the industry's atmospheric emission of particles and gases. New mobilizations have taken place after the approval of a wind power park in an urban natural reserve. In Coronel, the main conflicts relate to the expansion of the Bocamina coal thermoelectric plant and the construction of another one, projects led by private companies (ENDESA and COLBUN). In the boroughs of Penco and Talcahuano, the central conflict emerges from popular opposition to the construction of two maritime LNG regasification terminals in the bay of Concepción, the BIOBIOGENERA in the borough of Penco and GNL TALCAHUANO in the borough of Talcahuano. Table 3 provides an overview of urban energy conflicts that have taken hold of the public agenda since 2011. Large and potentially polluting energy projects in the metropolitan Concepción cluster, produce uneven industrial landscapes in some boroughs and across the city (Figure 2).

Diverse stakeholders in metropolitan Concepción, from government officials to consultants and activists, explained that local communities near to large energy projects fight against the unequal distribution of environmental impacts. Pollution is seen as a social burden that falls on the shoulders of impoverished communities. As an ecologist and former regional councilor described:

There are those who make profits, which are the companies, right? And there are other people who are the losers and have to pay with their health for negative externalities (regional councilor, interview 1).

Local communities have a well-articulated discourse about how large energy infrastructures drive significant environmental impacts on their surroundings (community activist, int. 6; sustainability NGO officer, int. 12). Even new non-conventional renewable energy projects—such as an offshore gas maritime terminal or a new wind farm—are currently being contested by those communities and activists who argue that their economic, social and environmental impacts surpass any possible compensation (community activist, int. 6; sustainability consultant, int. 12; community leader, int. 16). Fundamentally, activists question the choice of location for infrastructure siting and the decision-making process:

So why do they want to place it [LNG terminal] just there? [...] I think they will continue to have opposition, right? This is so because it's so badly planned. This project clashes with everything that is already there. Maybe if they would build it in another place... (community activist, interview 6).

Energy Project and Borough	Power Plant	Declared problem	Trigger	Year	Coalitions	Status
Enap, Hualpén	Petroleum refinery	Health problems and stigma	Emergency episodes	2008	State company and authorities v. local community and authorities	Mitigation and compensation measures in progress
Bocamina, Coronel	Coal thermal	Air pollution and health risks	Project's expansion	2012	Private company and authorities v. fishing community	Judicial indemnity agreement
Santa María, Coronel	Coal thermal	Air pollution and health risks	Plant's construction	2012	Private company and authorities v. neighborhood and activists	Mitigation and compensation measures in progress
Biobiogenera, Penco	Offshore LNG regasification terminal	Chemical and visual pollution on the bay	Project presentation	2013	Private company and authorities v. fishing, local community and activists	Project approval reinforces protest
GNL Talcahuano, Talcahuano	Offshore LNG regasification terminal	Chemical and visual pollution on the bay	Project presentation	2014	Private company and authorities v. activists	Project lobbying for approval reinforces protest
Enhol, Hualpén	Wind park	Natural reserve site	Project's approval	2015	Private company and authorities v. activists and authorities	Company suspended construction
Bocamina, Coronel	Coal thermal	Air pollution and health risks	Health exams on school children	2017	Municipality and non-fisherman neighbors v. company and national government	Health authority schedules new exams, conflict over metropolitan masterplan.

Table 3: Socio-environmental 'energy conflicts' in metropolitan Concepción (source: own elaboration).

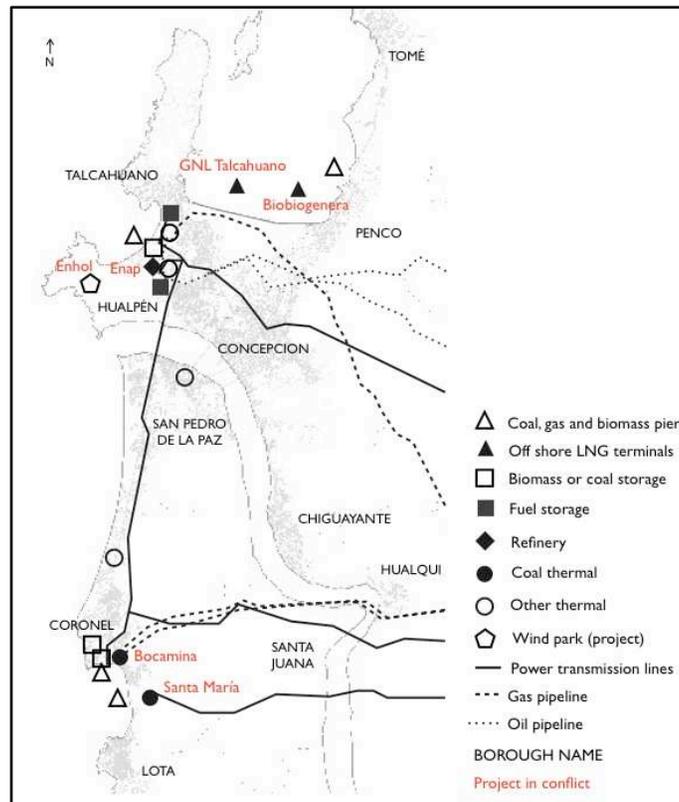


Figure 2: Energy infrastructure and conflicts in the metropolitan Concepción.

One interviewee raised the case of a primary school located next to a coal energy plant, where recent studies have found alarming levels of arsenic in children's blood (regional councilor, int. 1). The health impacts in the metropolitan area are well documented (e.g., Ugarte-Avilés *et al.* 2017). At the same time, most interviewees acknowledged the persistence of a culture of overlooking or minimizing the social and environmental impacts of energy developments. There is a sense of inevitability, embedded within a call for endurance. A public officer, for example, argued that: "we all know that [energy projects] are needed, but no one wants them" (ministerial officer strategy, interview 4). Central to this call for endurance is the idea that landscape transformations—and hence, the transformation of peoples' lives—is minimal compared to the overall benefits from the siting of major of energy facilities. For example, an environmental officer complained that there is often a social 'over-dramatization' of energy projects (environmental assessment officer, interview 13). She argued that these projects could be objectively assessed in terms of health, economic, or ecological variables, rather than by attending to the 'perceived' landscape impacts. Measurable variables take precedence over peoples' experiences. Officials from the regional branch of the Ministry of Energy blamed environmental conflicts on the public's lack of technical knowledge and political manipulation (ministerial officer energy efficiency, interview 5). This kind of account not only deemphasizes the political nature of environmental knowledge, but also denies that those conflicts emerge in a historical context of the progressive accumulation of impacts.

Stakeholders from the energy industry claimed that the primary drivers of conflict are the growing economic needs of the local population, and the local authorities' lack of political skill in managing conflict (energy company external relations officer, interview 15 and electricity company public relations officer, interview 17). This represents a displacement of responsibility to the city's inhabitants. In interviewees' accounts the worst cases are those that deny the history of environmental conflicts in Concepción, with experts lamenting

the lack of planning measures to control people from settling in risky or inappropriate areas (researcher, interview 7 and university professor, interview 9). As a regional planning officer states, "what happens is that people build [homes] in risky areas... And it takes a lot to detach them from those places" (planning officer, interview 10). To an experienced energy company community manager, local land-use conflicts are caused by an "army of lawyers who make their living by gathering people to sue us" (electricity company public relations officer, interview 17), rather than by the mobilization of communities around issues that affect their own lives.

The denial of the historical legacy of environmental degradation and the displacement of responsibility towards communities has its most visible expression in the local debates around air pollution. Energy companies and authorities from the Ministry of Energy blame the use of firewood for domestic heating as the primary cause of air pollution in Chile's southern cities, and enforce national campaigns to regulate, restrict, and ban this source (Ministry of Energy 2017). Meanwhile, a coalition of small firewood producers and traders argue for the sustainable use of wood as a cheaper and equitable energy source (certification agency officer, interview 3). Amid this debate, there is little concern about the air pollution of the industries, in part because, while there exists a menu of options to reduce pollution from firewood, there are less apparent enforceable proposals to control pollution from large industrial plant. For interviewees, this reflects the imbalance between nationally-dictated priorities and how local communities bear the brunt of both impacts of, and measures against, pollution.

Often the discourses on long-term planning and sustainability strategies have turned into a debate about how to improve conflict resolution and, if possible, avoid allowing environmental conflicts to arise. The main reason mentioned is that these conflicts are perceived to challenge the business-as-usual community management techniques based on assistance and patronage, and to demand that powerful actors transform their discourses and practices. An authority from the regional environmental assessment agency stressed that their agency's programs to integrate cleaner and more efficient technology in the city stopped conflicts and boosted socio-economic development (environmental assessment officer, interview 13).

A range of participation and compensation strategies are already part of the conflict management repertoire of industrial actors. For example, one community leader explained that, since they lived in the shadow of a petrochemical compound, the wellbeing of his community depended on his participation in talks for pollution mitigation and compensation measures with both the regional government and the industry (community leader, interview 16). A public relations officer of an energy company admitted that they had developed a community development plan based on education and neighborhood improvement projects as a form of energy diplomacy (electricity company public relations officer, interview 17). He explained how they "hosted a community activity with 1,200 participants, while only 300 [community members] were protesting." In contrast, refusing dialogue is an activist strategy that has proven effective in new conflicts (community activist, interview 6).

Most interviewees acknowledged that the impacts resulting from industrial infrastructure had shaped the metropolitan landscape. To interviewees as diverse as state officials, energy companies, scholars, and activists, landscape impacts were also at the center of the conflicts, as an issue to be either mitigated or fought. For instance, in the case of the LNG maritime regasification terminals in the bay of Concepción, landscape impacts were said by activists to be a combination of visual impacts, physical barriers to movement, and territorial displacement of traditional economic and cultural activities (community activist, interview 6). The company, however, is keen to develop proposals for landscape beautification to win the local community over (energy company external relations officer, interview 15). In the case of the petrochemical compound in the borough of Hualpén, a community leader explained that the visual impact of such a vast industrial compound is not a problem because they are already used to the industrial infrastructure. Instead, their chief concern is the smell from the plant, because foul odors constitute a reminder of the threats that air pollution pose to their health and the local landscape (community leader, interview 16). An NGO official in charge of the company's social intervention program explains that the rehabilitation of small parks within the neighborhood was one of the most supported measures in a recent local referendum (sustainability NGO officer, interview 12). Beautification efforts have, however, not dispelled local fears about health, and the conflicts continue.

Using transects to characterize a divided energy landscape

While the discourse of energy has been mobilized to unite the nation behind a shared modernization project, its production and distribution rip apart livelihoods and spaces. In the metropolitan area of Concepción,

this produces a segregated energy urban landscape. Transect walks offered the opportunity to experience the material side of the infrastructure-governance-conflict nexus. Each transect revealed a unique configuration of energy infrastructure and urbanization in Concepción (See Table 2). Transects characterize the physical and ecological expression of national-local imbalances and ongoing conflicts related to electricity generation and energy production.

Transect 1A traversed a landscape dominated by a new coal-fired power plant in a peri-urban site. The plant has added a new network of energy and transport infrastructure that cuts through residential areas and the seashore. Departing from the flank of the power station, besides a newly built walled motorway, power lines run away from the city to meet the national high-voltage grid. There is an industrial pier to disembark the coal. A water pipeline is visible, which enables the circulation of water for the cooling process. Transect 1A demonstrates the segregation of people and energy developments, reflecting a two-scale dynamic between industrial infrastructures and residential buildings. Large-scale industrial buildings and networks around the port coexist with streets, street lights, and households whose energy supply depends on firewood.

Transect walk 1B explored a small and geographically contained district of fishers within an industrial area (Lo Rojas). The transect revealed competing, conflicting, and overlapping activities between industries, a working-class neighborhood, and a fishing village. The transect walk route began in the industrial compound: another large thermal power plant, with massive coal transport and storage infrastructure, besides a set of industries producing fishmeal, canned fish, and frozen fish. The walk ended in a low-income neighborhood of fishers with an artisanal port. During the walk, massive energy facilities and infrastructure were always within view. This infrastructure is a constant reminder of the role of Concepción as an energy hub. It stands in contrast with the modest structures that support traditional uses of energy, such as the rods and sticks that local communities use to dry their fish under the sun. Graffiti protesting against the coal-power plant are frequent, often in areas where settlements encounter large industrial development. These graffiti mark lines of rupture between these two coexisting landscapes. Figure 3 includes photos taken during this transect that demonstrate the contradictions embedded in the landscape.

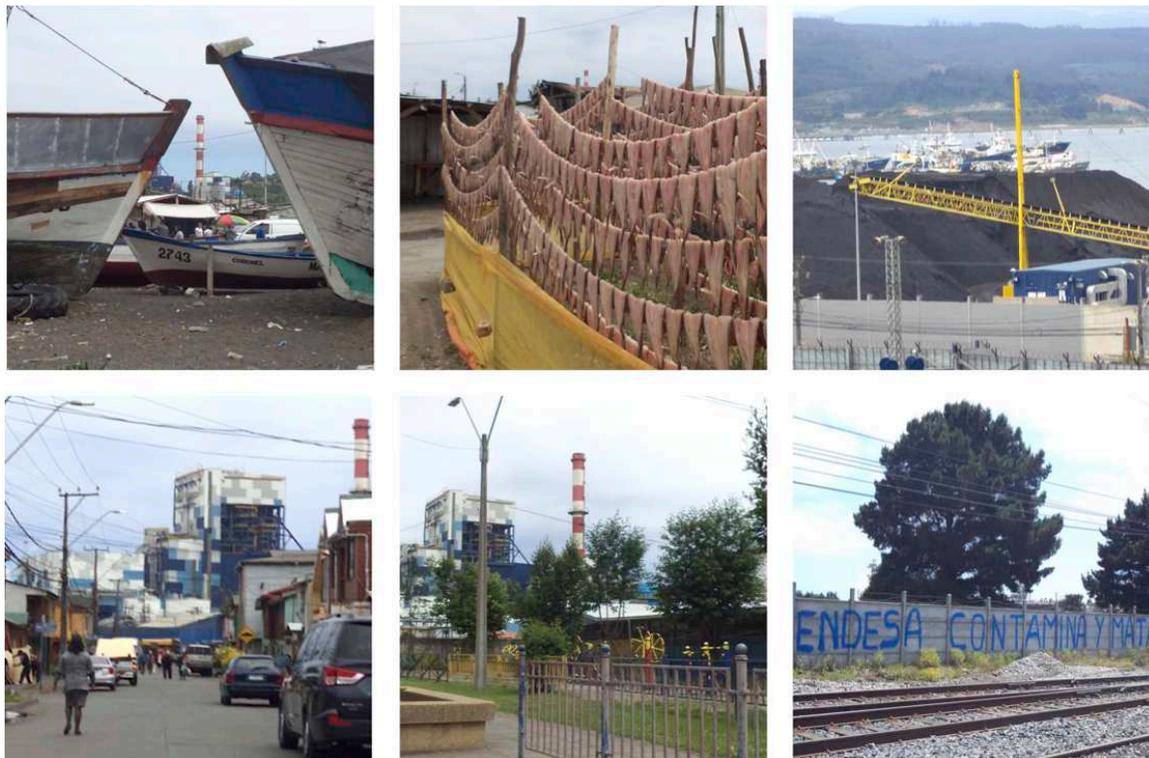


Figure 3: Pictures of an urban energy landscape (Transect 1B).

Transect 2 examined the urban landscape produced by the urbanization of a peripheral industrial area alongside a low-income neighborhood. The transect explored the boundary area between a large refinery and petrochemical compound in Hualpén and a nature conservation area, or natural sanctuary, known for the wildlife of its wetlands. The landscape results from the interactions between heterogeneous elements: the industrial oil pier, the nearby neighborhood, the slag deposits from the Huachipato steel company, and the roads to the nature conservation areas. At first developed as an emergency disaster village after the 1960 earthquake, the Emergencia (Emergency) neighborhood grew along the front of the petrochemical compound. Communities use residual spaces below the power lines as football fields and green areas. Industrial activities and routine daily lives coexist with the activities of the tourists who visit the nearby seafood village of Lengua Beach and the peninsula of Hualpén, a natural sanctuary.

Transect 3 examined large industrial districts and well-serviced working-class urban areas near the San Vicente port in Talcahuano. In the northern part of the bay, the transect walk explored the commercial port, the fishers' cove, fishing industries, and the residential area. The transect continued until reaching a large steel and chemical industry compound south of San Vicente. This industrial sector is one of the region's main employers with a working force of about 10,000 workers (Henríquez 2016). This industry produces visually striking deposits of slag. Eyes and ears follow the busy activity of tanker trucks seeking to refill around two tanks supplied by underground pipes. Fish industries and parked containers obstruct the residents' views of the sea. The lack of trees is the result of restrictions on digging holes in the pavement, to protect fuel and gas pipelines. It gives the place a more inhospitable character than other areas in the city. Two high-voltage lines slice the area into two parts. Despite the many constraints imposed by the industrial sector, life follows its own pace: kids play outside, the laundry hangs from the windows, and the street market thrives with activity.

Transect 4 explored a fast-growing and income-segregated suburban environment. Power lines cross the area from the southern thermal plants in Coronel to reach the metropolitan industrial and central districts. Social stratification follows a clear topographical distribution: low-income households in the coastal plains and the riverside, middle-income households in the piedmont plains, and high-income households up in the hills surrounding the lagoons. Here, gas is king. Gas is distributed in cylinders and pipes. Green areas occupy spaces below high-voltage lines. However, the quality of these green areas differs depending on the neighborhood. In the poorest sectors such as Candelaria, high-voltage lines preside over urban wastelands. In high-income areas such as Villa San Pedro, they include landscaped paths and cycle lanes. Another factor that distinguishes neighborhoods is the quality of the electricity distribution infrastructure. While hanging low-voltage wires may be visible in low-income neighborhoods, they are entirely underground in higher-income ones.

Low-income areas in the coastal plains often deal with large industrial compounds housing energy industries, while distribution lines often cross middle-low neighborhoods. Middle and high-income areas seem free of energy productive infrastructures and tend to use gas, either as methane through urban pipelines or as butane and propane in bottled cylinders. In contrast, firewood (and occasionally coal, or charcoal) is frequently used for residential heating and cooking in deprived areas of the peripheral belt of the metropolitan area. While gas is processed and distributed by three large operators, the biomass supply chain depends on small-scale firms and informal operations for wood supply, storage, and consumption. Thus, alongside large energy infrastructure, everyday practices of energy use also reinforce a divided landscape between areas which are integrated into the national model of energy provision and those which depend on local biomass resources because they are disconnected from it.

6. Discussion: fragmented energy landscapes in metropolitan Concepción

Conflicts around the energy industries in Concepción emerge linked to the accumulation of environmental impacts in certain locations, as the landscape transects in the previous section make visible. Large infrastructure dominating the landscape mark the division between irreconcilable models of development (Baigorrotegui *et al.* 2018). Defending the operation of the energy industry requires the denial of both landscape experiences and the history of environmental conflicts imprinted in the landscape. Persistent myths about the need to endure environmental impacts in the name of economic development and the displacement of

responsibility towards poorer communities in the metropolitan area are central to the constitution of sacrifice zones.

Interviews and transects suggest that the urban energy landscape in the metropolitan area of Concepción results from the coexistence of multiple sources of energy. Transects show a deep division between the areas of the city serviced by piped gas and reliable electricity supply and those that depend heavily on charcoal and firewood, echoing the analysis of energy flows of fossil fuels and biomass. The national rhetoric of energy production has dominated a century of urban history in Concepción since the conurbation started to grow in the shadow of the coal mines. As the supply of resources and the national demands changed, so the landscape of Concepción changed. The role of the region as a national energy generation and storage hub, however, never altered.

There is a fundamental division between the city that is integrated into national and international networks of energy provision, and the city that depends on local flows of biomass. The urban energy landscape expresses the dominant narratives of energy. Thermal power plants (T1A and T1B) and petrochemical compounds (T2) were visible from almost everywhere in a large radius. They constitute a visible reminder of the role of the urban region in supporting the national energy system. They also interrupt and fragment the more diverse neighborhood landscapes. Overlapping and competing land uses are visible in several locations, with indications of how residents find alternative ways to organize their lives and activities alongside (and despite) the overwhelming presence of large energy infrastructure. The experience of these large facilities is multi-sensorial. They are not only visible. Transects are also audible. Noise—including metallic bangs and motor buzz—is constant immediately beside the energy plants (T1A, T1B, and T2) and in some cases as an electric hiss below/beside the high-voltage power lines (T1A, T1B, T2, and T4). Each place had a smell signature, sometimes mixing the pungent smell of fuels with that of drying fish. Coal smells followed particulates. There were instances in which industrial smells vanished, substituted by the smell of cars, grass, the sea, or the food cooked in local markets, but the smell again became distinct when blowing your nose left black mucus in the tissues.

The transects provide a spatial view that illustrates the qualitative analysis of energy-related conflicts. The interviews point towards a collective wish to redefine current energy and territorial policies, and increasing weight is given to environmentalists' and activists' concerns about local and regional policy. In some cases, such as *Energía 2050*, Chile has embraced an institutional change at the national level. This note of optimism, however, contrasts with the dual fragmentation of the energy landscapes in Concepción. Fragmentation persists because of dominant mythologies of energy development that deny the history of environmental conflicts and its materialization in energy landscapes. The city's fragmented landscapes reflect the coexistence of energy infrastructures and associated industries with daily activities of communities that have little to do with such industries but live in their shadow. For example, without seeking to romanticize it, the fishing community of Lo Rojas emerges as a stronghold of land use resistance, occupying unused spaces and wastelands. However, most everyday landscapes of energy use remain hidden under the dominant structures that characterize the city as a sacrifice zone. The constitution of the sacrifice zone depends on the historical coupling of energy flows and economic processes, and the development of effective mechanisms to mute the expression of local concerns in the constitution of the urban landscape.

7. Conclusion

Clashing local land uses constitute the urban energy landscape as a unique mosaic. In this case, the urban energy landscape of the metropolitan area of Concepción reflects its role as a national energy hub because its fate depends on the city's contribution to the national economy. Boroughs like Coronel have been called sacrifice zones because of the disproportionate burden of environmental impacts that they suffer. Our analysis shows that the spatial expression of inequalities in a dual, divided pattern of settlements and the historical legacy of exploitation, often denied in narratives of energy management, extend an urban energy landscape of conflict over the whole city. The whole metropolitan area of Concepción is a sacrifice zone.

Urban energy landscapes reflect the dominant narratives of energy and urban development. In Concepción, the visible presence of large infrastructure constitutes a reminder of the symbolic dominance of

the actors behind national energy interests (cf. Batel and Devine-Wright 2015). Efforts to recognize local inequalities within the national energy system and to open up social participation in energy planning are subsumed under technocratic arguments and community co-optation strategies. However, this history of energy exploitation has not entirely alienated the landscapes of Concepción for local people, even though it has fragmented it, and it has created forms of spatial differentiation that reflect social inequalities. The making of sacrifice zones is always an incomplete project.

The transects invite one to read the urban energy landscape as constituted through an ongoing conflict: as a material and subjective expression of a clash of social and economic powers. Activism and mobilization may be co-opted in local negotiations, or integrated into short-term initiatives that do not challenge the extractive model in the long term, but the everyday strategies of space appropriation at the interstices speak of communities' power in urban energy landscapes. Although silent in contrast with techno-economic arguments that dominate energy conflicts, low-income communities continue their daily activities despite changes to their surrounding environment. Their actions may be read as attempts to appropriate the landscape, with every inch of space being fought by a competing mode of being urban.

Urban energy landscapes matter, because urban life in sacrifice zones cannot be explained without attending to a history of dominance of energy generation facilities and infrastructures. Moreover, urban energy landscapes matter because they make visible social and political processes of urban change. Urban energy landscapes illuminate multiple perceptions of landscape. Their systematic analysis can help to influence energy policy and to realize instances of participation through truthful engagements with peoples' experiences of environmental degradation.

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