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Externalised Costs of Electric Automobility: Social-Ecological Conflicts of Lithium Extraction in Chile

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Working Paper, No. 144/2020

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Abstract

Nowadays, electric automobility is considered to be the magic bullet in combating the heating climate. The necessary raw materials for the transformation of automobility in the global North, however, originate mainly from the global South to where the social-ecological costs are externalised. While the global North's *externalisation society* with its *imperial mode of living* drives the electric vehicle forward in the fast lane, it is the *internalisation society* of the global South that cushions the *hidden* costs from which nature as a whole and a particular part of the population increasingly suffer. Nonetheless, the propertied class with its immense power resources, and hopeful wage earners with their desire for a *peripheric imperial mode of living* defend this construct successfully from outside attacks to this day as the Chilean case proves. This contribution intends to reveal the social-ecological costs resulting from the lithium extraction in Chile as result of the electrification of passenger cars in the EU, on the one hand, and to explain the muddle of power structures, especially in the global South, on the other, while giving the responsible actors a face and the parties concerned a voice.

Key words: electric automobility, Imperial Mode of Living, externalisation, Peripheric Mode of Living, internalisation, lithium, Chile

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Acknowledgements: I wholeheartedly thank Markus Wissen and Claudia Gather for their valuable remarks, all-out support, and confidence in my person as a young scientist. Likewise, Cristián Flores Fernández merits my sincere gratitude for unconditionally sharing all his precious expertise around the clock. A big thanks go to the members of the IPE for publishing this hopefully critical piece of work.

Abbreviations

BEV	Battery Electric Vehicle
CO_2	Carbon Dioxide
CORFO	Corporación de Fomento de la Producción
COVID-19	Coronavirus SARS-CoV-2
GHG	Greenhouse Gas
ICE	Internal Combustion Engine
FPIC	Free Prior and Informed Consent
LCA	Life Cycle Analysis
LIB	Lithium-Ion Battery
OCMAL	Observatorio de Conflictos Mineros de América Latina
SQM	Sociedad Química y Minera de Chile
SUV	Sports Utility Vehicle
UPI	Environmental and Prognosis Institute

"Hay una gran diferencia entre ser responsable y asumir la responsabilidad."[1]

1. Introduction

Anthropogenic greenhouse gas emissions (GHG), dominated by fossil carbon dioxide (CO_2) emissions (Crippa et al. 2019: 6), are the main cause of climate heating[2] (IPCC 2018), therefore a drastic reduction of such gases is absolutely necessary. Nonetheless, global CO_2 emissions have been rising steadily since 1960, reaching a historic high of around 33.1 gigatonnes CO_2 in 2018, with reference to the International Energy Agency (IEA 2019a). Accordingly, transportation is responsible for 24 per cent of direct CO_2 emissions from fuel combustion, whereas road vehicles are by far the biggest emitter, accounting for around 75 per cent of all CO_2 emissions in 2018 (IEA 2019b). Despite efficiency improvements and the progressive electrification of the transport sector, global transport emissions rose still further by 0.6 per cent in 2018 (ibid.). Awaking from a deep sleep, the European Union (EU) adopted a binding fleet limit value of 95 grammes of CO_2 per kilometre for the year 2021 and committed to achieving a reduction in its CO_2 emissions of 15 per cent by 2025, and 37.5 per cent by 2030, respectively (Haas/Sander 2019: 22). Additionally, a share of low or zero-emission vehicles of 15 per cent by 2025, and 30 per cent by 2030 completes the low-emission mobility strategy aiming at an increase in efficiency of the transport system, the deployment of low-emission alternative energy, and the transition towards low and zero-emission vehicles, such as battery electric vehicles (BEVs).

While the automotive industry, governments, and the media promote electric automobility as a decisive contribution to averting the climate crisis and air pollution (Hartung 2018), the production of high-performance batteries is also accompanied by an increasing demand for raw materials, including the light metal lithium. Due to the transformation of the automotive industry, the German Mineral Resources Agency (DERA 2017) estimates a doubling or rather tripling of the lithium demand by 2025. The world's largest lithium reserve is stored in the *Salar de Atacama*, the salt flat of Chile (USGS 2017). More than three decades of lithium mining activities have left severe traces which will certainly aggravate in the future, while affecting adversely man and nature already today (Leifker et al. 2018). But this foul play does not only

[1] Chilean proverb: “There is a big difference between being responsible and taking responsibility.” (own translation).

[2] Alberto Acosta and Ulrich Brand (2018: 82) suggest speaking of “climate heating” as “climate change” still sounds harmless, almost positive. This food for thought is gratefully accepted and makes standard practice within this element.

spawn losers. Chile constitutes the main lithium supplier for the EU (EC 2018: 5). Playing for high stakes, Chile's propertied class and a great part of the population benefit already from, or rather still strive for a *peripheric imperial mode of living* (Landherr/Graf 2019) by internalising externalised costs stemming from an *imperial mode of living* (Brand/Wissen 2017a) of the EU. Whilst Chile's internalisation society accepts the "necessary evil" (Landherr/Graf 2019: 490), Europe's "externalization society" (Lessenich 2016) drives the BEV forward, unknowingly the actual ecological impact of the lithium-ion battery (LIB), neither for the global North nor for the global South.[3] Leaving the global North, the social-ecological consequences of these externalised costs are revealed and are internalised in the society of the global South. The key players behind this obscure process, and the resulting aftermath are vague up to the present.

This contribution aims at responding to two questions that might solve some of the mysteries mentioned. The questions asked are, firstly, what mechanisms make possible the internalisation of externalised costs from the global North into the global South, resulting from the electrification of automobility possible, and, secondly, what social-ecological consequences stemming from lithium mining do occur for the respective region.

In section two, a review of ecological factors driving the electrification of the global North's automotive industry and the resulting social-ecological consequences for the global South, are linked to each other. The third part builds the theoretical framework, presenting the concept of the imperial mode of living by Ulrich Brand and Markus Wissen (2017a) to explain the externalisation process of costs coming from electric automobility, to make then use of the approach of the peripheric imperial mode of living by Anna Landherr and Jakob Graf (2019) to shed light on the internalisation process taking place in the global South. The following section comprises an empirical case study, commencing with a journey to Chile's lithium reserves and an analysis of the European BEV population, the EU's strong demand for the light metal and a

3 While being aware of the dualistic character of the terms "global North" and "global South", I exercise them herein on account of missing alternatives. I refer to the "global North" as the centre, consisting of early industrialised countries, and the "global South" comprising developing countries and emerging economies which constitute the periphery. Both are connected by an invisible strap: by (over)exploiting the global South's ecosystems, sinks and resources, as well as, by (over)using its labour and nature (cf. Brand/Wissen 2017a), the global North externalises its social-ecological costs to the global South where they become internalised (cf. Landherr/Graf 2019), and by doing so turn into social-ecological conflicts. This unequal exchange (cf. Lessenich 2016) safeguards not only the imperial lifestyle of the centre but also the peripheric imperial living of the (semi)periphery.

cunning way to ensure the best possible supply. Chile's internalisation society, already partly benefiting from and still striving after a peripheric imperial way of life, respectively, as well as the social-ecological consequences of the lithium extraction for the Antofagasta region are illustrated, thereafter. The last chapter recapitulates the main findings and assesses extractivisms as the wrong way to go since it seems to lead to a dead end.

2. State of the Art: Electric Automobility

At present, the automotive industry is facing the probably greatest upheaval in its history. The consulting firm PricewaterhouseCoopers (PwC 2017) highlights the future of automobility and summarises the research results in a five-letter word: *EASCY – electrified, autonomous, shared, connected* and *yearly updated*. The scenario delineates a pervasive transformation of automobility while highlighting the integration of digitalisation and electric motors. Although it remains still vague when the major electric transition is executed (Wissen 2019: 234), it can no longer be halted, yet. PwC (2017) predicts the breakthrough in Europe not later than 2030 and estimates that every third car will become electric-operated. Further ten years later, approximately every second car will be electrically driven, according to the Electric Vehicle Outlook (Bloomberg New Energy Finance 2019). Concerns over climate heating, air pollution, and future energy supply have stimulated the market for BEVs (Helmers/Weiss 2016). In the light of a full panoply of various ecological drivers, the electrification of automobility is gaining momentum whilst the ecological impact of BEVs is becoming an increasingly debated topic (Messagie 2017; T&E 2017). Nevertheless, the centrepiece of these vehicles, the LIB, and its *ecological rucksack*, has drawn little attention so far (Peters et al. 2012: 172). Several studies merely regard the Well-to-Tank (WTT),[4] Tank-to-Wheel (TTW),[5] or Well-to-Wheel (WTW)[6] performance of BEVs (Messagie 2017) and provide insights into energy and/or resource consumption, emissions during use, and the resulting climate impact (Helms et al. 2016, 2019), but none of the analyses involves the contested battery production process. In recent times, a growing number of studies (Messagie 2017; Ambrose/Kendal 2016; Romare/Dahllöf 2017; Dunn et al. 2016; Elligsen et al. 2014,

[4] The WTT analysis begins with the extraction of raw materials for fuel production and ends with the finished fuel in the vehicle tank (FIS 2010).
[5] The TTW system includes the operation of the vehicle (ibid.).
[6] The WTW analysis constitutes the combination of the WTT and TTW systems (Messagie 2017).

2016; Majeau-Bettez et al. 2011; Peters et al. 2012) have been springing up gradually, taking the entire life cycle performance and its ecological impact into consideration. At that point, this contribution continues along the path but goes a step beyond and embeds ecological and social consequences resulting from the battery production process into the debate to accentuate the interconnection of both parts, eventually.

2.1 Ecological Drivers of Electric Automobility

Today, the automotive industry and politics, echoed by the media, promote electric automobiles as the miracle cure for numerous diseases (Hartung 2018; Gnann/Plötz 2011) insomuch as BEVs are "locally" emission-free (Daum 2018: 12; Peters et al. 2012: 8; Petschow et al. 2018: 10). Although the use of BEVs implies fine particulates due to tire and brake abrasions, further pollutants do not become emitted on site (Helms et al. 2011, 2016; Peters et al. 2012) which is why the term *locally* emission-free is justified at this point. Taking the battery production process into account, this favourable conclusion might reverse. Hence, a BEV might even be more energy-intensive and environmentally harmful than an automobile with an internal combustion engine (ICE) (Peters et al. 2012: 139). This assumption remains to be proven, which is why ecological factors are under a careful examination in terms of air pollutants, acidification, eutrophication, summer smog, particulate matters, GHG emissions, and energy consumption as they appear to constitute the main ecological drivers, according to the reviewed literature. As part of the research project *UMBReLA*, commissioned by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Helms et al. (2011, revised in 2016) conduct a life cycle analysis (LCA) of a BEV and assess the environmental balance of the vehicle.[7] Astonishingly, the findings of the white paper prove that the environmental impact of BEVs just varies slightly from those of ICEs. The scientists (2016) go into the matter and analyse the GHG emissions stemming from passenger cars, with a specific focus on the categories

[7] Helms et al. (2016: 17) consider LCA as the most appropriate method for determining and describing the environmental impact of EVs as it takes all stages of the product lifecycle into account. If only a single step within the whole process becomes considered (e.g., only the use phase of a vehicle), erroneous assessments regarding the environmental impact are inevitable.

acidification,[8] eutrophication,[9] summer smog,[10] and fine particulates.[11] They prove that the share of sulphur dioxide experiences a drastic reduction in the countries where the vehicles are used but point out that environmental pollution arises in the countries where the resources originate from. Low environmental standards in the countries of origin, cause significant environmental impact, particularly in the production of the high-performance batteries. The eutrophication potential, when using the underlying energy mix, is comparable with a gasoline-powered vehicle whereas the major proportion is due to the production process, either. Despite the fact that BEVs are locally emission-free, the present energy mix offsets again the possible potential to reduce summer smog. With regard to the fine particulates, a spatial and temporal distinction should be made once again. Against many expectations, Helms et al. (2016: 20f.) estimate that the particulate emissions of BEVs over the entire lifecycle are approximately 60 per cent higher than those of petrol cars. Evidently, BEVs are locally emission-free but not in total, rather by law. Alfred Hartung (2018: 562f.) calls attention to a fact which has been widely overlooked as such. The scholar refers to a study of the Heidelberg Environmental and Prognosis Institute (UPI 2019) and highlights the European legal guideline ECE 101, according to which BEVs are considered as "zero emission vehicle" by definition, and not according to their real fleet emission values. There are several other studies containing data regarding the GHG emissions of BEVs during the whole life cycle (Gnann/Plötz 2011; Helmers/Weiss 2016; Dunn et al. 2016; Helms et al. 2011, 2016; Wietschel et al. 2019; Zimmer et al. 2016) which in total report a reduction of GHG emission between 28 per cent and 42 per cent. Against this background, BEVs are assessed as useful means of combating global heating (Helms et al. 2016: 18). However, Wietschel et al. (2019: 37) state that the individual GHG balance of a BEV is subject to stark variations due to a set of influential factors. The major factors are the emissions from electricity generation and vehicle production (including the battery production) which again, are largely determined by battery size, energy use in production, total vehicle mileage, battery life, and vehicle energy consumption, vehicle weight, as well as, the individual

[8] Acidification includes the decrease in the pH of water and soil (UBA 2018).
[9] Eutrophication constitutes the process by which a body of water becomes enriched in dissolved nutrients that stimulate the growth of aquatic plant life (Merriam Webster Dictionary n.d.).
[10] Summer smog is a type of air pollution which is formed under intensive solar radiation by a photochemical reaction of, essentially nitrogen dioxide and volatile organic compounds (FOEN 2019).
[11] Fine particulates are very small fragments of solid materials or liquid droplets suspended in air which can be inhaled deep into the lungs and become trapped in the lower respiratory system (Encyclopædia Britannica 2020).

driving style. According to the research results, the upstream emissions from vehicle production, mostly due to the battery production, are significantly higher than those of conventional vehicles and can thus be reduced by 30 to 50 per cent until 2030 (ibid.; Helms et al. 2019: 19), but only with the use of renewable energy sources (Hartung 2018; Brunnengräber/Haas 2018; Helmers/Weiss 2016; Helms et al. 2011, 2016). Helmers and Weiss (2016) found out that BEVs are not only less polluting than conventional cars but also more energy-efficient. Nonetheless, none of the calculations consider the "*rebound effect"*[12] even though a few critical scientists make mention of it, such as Dorn (2019), Groneweg (2017), Hartung (2018), Brunnengräber/Haas (2018), Helms et al. (2011, 2016), Peters et al. (2012) or Wietschel et al. (2019). It is again the UPI (2019) that delves more profoundly into BEVs and identifies four rebound effects in this context, namely the mental, functional, financial, and regulatory rebound effect, and hence adds further authority to Tilman Santarius' findings. According to this, the perceived low environmental impact of BEVs can lead to the substitution of public transport and bicycle traffic by electric cars (mental rebound). Electric cars are still limited in their cruising range which is why they still cannot fully replace conventional cars. Therefore, they frequently serve as a second car (functional rebound). Consequently, the car population increases while the land and resource consumption rises, at the same time (Hartung 2018). The financial rebound effect occurs when the driver of an electric car acquires it to avail of tax benefits (UPI 2019). The car manufacturers of electric vehicles might also cause a regulatory rebound effect, also known as "*back fire*". The classification as zero-emission vehicle entitles the car manufacturers to compensate their sales by heavy fuel-intensive SUVs, without any penalty payment.[13] The research findings reveal that energy efficiency improvements do not necessarily result in a reduction in energy consumption per se. A fact which leads Stephan Krull (2018) to consider EVs not as a solution but a problem. Alfred Hartung (2018: 561) puts an additional spoke in the electric-operated wheel and forecasts, on account of the discussed rebound effects, an increase in CO_2 emissions. Given the fact, that BEVs represent a new consumer in the power system,

[12] Tilman Santarius (2012, 2013) found out that efficiency gains become eradicated by the so-called *rebound effect*. Accordingly, energy efficiency improvements lead directly to an increase in energy consumption and, thus CO_2 emissions. The scientist reckons that around 50 per cent of the efficiency effects are consumed by higher consumption, in the end.

[13] Dieter Teufel, a researcher at the UPI, demonstrates that with every sold BEV, automakers are free to compensate for the savings in CO_2 emissions with seven SUVs (DLF 2017). In 2018, SUVs accounted for 42% of new vehicle sales in Europe (IEA 2019c). Still in 2010, the share amounted to 10%.

the electricity demand within the EU will lead to an increase in power generation from fossil fuels and hence boost further CO_2 emissions (Hartung 2018; Kasten et al. 2017). In short, taking the current energy mix and the penetrating power of rebound effects into account, BEVs might not only be more energy-intensive but also more resource-consuming, and thus might even provoke an intensification of ecological problems. Further research needs to be undertaken to verify this bold statement. In this line of thought, it has to be empirically proven how harmful BEVs are exactly for the environment, and how much CO_2 emissions are being emitted during the entire lifecycle. Especially the production of the LIB and the concomitant adverse environmental implications due to the metal extraction need to be fully reflected in the analyses to see the big picture as BEVs cause ecological damages and social deprivation in other parts of the world which in fact, are not *hidden* but borne by others elsewhere.

2.2 Social-Ecological Consequences of Electric Automobility

Whilst the global North might putatively keep a higher environmental impact through the electrification of the transport sector under control and concurrently can nestle into an ideal breeding ground for the further continuance of its imperial mode of living (Brand/Wissen 2017a), the ecological drivers turn into social and ecological cost when externalised to countries rich in raw materials (Acosta 2013; Svampa 2019; Brand/Wissen 2017a). Thus, grievous conflicts[14] are manifesting in a variety of serious environmental and human rights risks worldwide (Groneweg 2019), all along the supply chain (Nieuwenhuis/Wells 2015), but first and foremost in the global South where the "dirty" part of the production chain is ultimately shifted. (Brunnengräber/Haas 2018). Irrespective of these critical thoughts, Merle Groneweg (2017) refers to the discussion about electric automobility as blind to the negative consequences of the raw material extraction which is why it is high time to switch the light on. In the words of Alberto Acosta (2013: 71), one might come straight to the point: "countries very rich in natural resources […] are poor because they are rich in natural resources". Staying with the scientist (ibid.: 74), "the lion's share of the benefits of this economic orientation", referring to extractive activities, "goes to the rich countries, the importers of nature, which profit still further by processing and

[14] Maristella Svampa (2019: 3) defines *socio-environmental conflicts* as those "connected to the access and control of natural assets and territory, which imply divergent interests and values on the part of opposing actors," infolded by large power asymmetries.

selling it in the form of finished products. Meanwhile, the countries that export primary commodities", and thus nature, "only receive a tiny percentage of the revenue from mining […], but they are the ones who have to bear the burden of the environmental and social cost". While nature and cultural assets of numerous people become irreversibly destroyed (Acosta 2013), many governments of the global South themselves stress the potential for *de*colonialisation, although neither the participation rights of the local or indigenous population are respected, nor are environmental and social standards be defined, or their compliance monitored (Brunnengräber/Haas 2017: 23).Conversely, Maristella Svampa (2019: 8) calls attention to the phenomenon of *re*colonisation of nature and dispossession, instancing "land grabbing, the destruction of territories, and the displacement of populations". Again Acosta (2013: 63f.), speaks of the "mechanism of colonial and neocolonial plunder and appropriation" as well as "exploitation of raw materials essential for the industrial development and prosperity of the global North" which "aggravates the weakness and scarcity of the region's democratic institutions, encourages corruption, breaks up societies and local communities, and seriously damages the environment." César Padilla (2020), general coordinator of the *Observatorio de Conflictos Mineros de América Latina* (OCMAL), underpins the discussion with his own experiences and reports that mining does not respect protected areas, human settlements or fragile ecosystems. Likewise, the Institute for Applied Ecology (Oeko-Institut 2017) draws a similar conclusion after scrutinising the social and ecological costs associated with the extraction of metals, and summarises the overall results, as follows: high energy requirements, acid mine water, as well as water conflicts between mining companies and indigenous peoples. As if that were not enough, consequential environmental destructions, such as soil destruction, poisoning and pollution of rivers, groundwater, and air pose serious risk on surrounding rural and indigenous communities, which often live on agriculture, fishing or hunting (Padilla 2020). Their human rights to water, food, health, and an adequate standard of living can hardly be respected in this vein. To make matters worse, in a not insignificant number of cases, people lose their livelihoods. Also, not uncommon resettlements often lead to the use of violence whereas its victims barely become compensated "adequately" (Groneweg 2019: 25).[15]

[15] The upcoming questions here are twofold: is it possible to compensate someone for the unwilled, forcibly executed resettlement at all and if so, what does *adequate* then imply? Notwithstanding this moral problem of paramount importance, these questions remain unanswered.

With that in mind, Groneweg (2019) stresses the right of indigenous peoples to *Free Prior and Informed Consent* (FPIC) which is often disregarded since a wide range of relevant documents, such as *Environmental Impact Assessments* (EIAs), are frequently not publicly accessible or rarely drawn in languages spoken by those concerned. But it is not only about a linguistic barrier as Svampa (2019) remembers. The Argentinean scientist stresses that, at least in Latin America, all governments without exception try to minimise the FPIC, rendering it as weak as possible, nonbinding and manipulable. According to her (ibid.: 33), this alleged specialised tool "turned out to be one of the most difficult and controversial problems of international, regional, and national regulations related to the rights of indigenous peoples". Extractive industries[16] as Groneweg (2019: 25) elucidates, are by far the most dangerous economic sector, accounting for about one-third of all registered business-related human rights complaints worldwide. Currently, a change for the better is not in sight when faced with the advancing electrification of the automotive industry and the controversial, but yet fragmentary debate, on the one side, and the power asymmetries, predominant also in the global South, on the other. Nonetheless, it is the global North and its externalisation society which are put under the microscope first.

3. A pair of lovers: Imperial Mode of Living and Peripheric Imperial Mode of Living

The current academic debate on the externalisation of the costs of electric automobility to the global South, and the resulting social-ecological consequences, raise the questions of which part does the externalisation society of the global North play in this notoriously unfair game and what perpetuating mechanisms behind it do ensure the consistent continuation of the resource- and energy-intense imperial mode of living at the expense of others elsewhere. Notwithstanding, the unequal distribution of resources do not only exist between centre and periphery but also within the periphery itself, which is why the same questions posed beforehand, should be applied to the global South, where its internalisation society incessantly strives for a peripheric imperial mode of living.

[16] Gudynas (2019: 391) considers the term "extractive industry" as simply incorrect and a "crude distortion" since in extractivisms nothing is being produced but being extracted. It becomes an industry as consequence of the export of raw materials.

3.1 The Imperial Mode of Living

Ulrich Brand and Markus Wissen (2017a) go into the matter and examine the prevailing production, distribution and consumption patterns[17] of the upper and middle classes[18] of, first and foremost, the global North, as well as emerging economies of the global South, such as China, Brazil or India. With the concept "mode of living", Brand and Wissen (2017a: 45) follow Antonio Gramsci (1971) and assume that the capitalist development of society becomes reproduced based on deep-seated everyday practices, such as driving a car (Brand/Wissen 2017a: 125-129), which turn out to be "natural". By "imperial" they widen the concept while stressing its global and ecological dimension. Moreover, their concept highlights the asymmetries of societal structures in which social inequality is reproduced as unequal societal circumstances become manifested in "taste preferences". Thus, they interconnect the imperial mode of living with Pierre Bourdieu's (1987) idea of a way of life which implies "subtle distinctions" of taste in whom social inequality is reproduced. The two pioneers (2017a: 13-16) introduce their concept with whom they intend to highlight, *firstly*, the "modern capitalist everyday practices" and their underlying societal and international balances of power, constituted and consolidated by domination over man and nature. *Secondly*, they mean to explain how and why problems and crises of very different areas (such as economy, democracy, social reproduction, or geopolitics) become, in a sense, the norm. *Thirdly*, they point out the present crises and conflicts as a manifestation of inconsistency of the imperial mode of living, and *fourthly*, state that alternatives to this way of life have been reformulated, namely, more radical as it is the case in mainstream ecological debates so far.[19] Since the development of the capitalist world market (Brand/ Wissen 2018b: 19), "people's everyday practices, including individual and societal orientations, as well as identities, rely heavily on: (i) the unlimited appropriation of resources; (ii) a disproportionate claim to global and local ecosystems and sinks;[20] and (iii) cheap labour from elsewhere" (Brand/Wissen 2017b: 152). Therefore, everyday life in the capitalist centres becomes facilitated by these three

[17] Brand and Wissen (2017a: 13) underline that, especially the production and consumption of the global North base on the exploitation of other parts of the world wherefore the particular attention rests upon them.

[18] In this regard, Brand and Wissen (2017a: 191) refer to those functional and occupational groups that differ from the working class whereat the firstly mentioned groups are generally better paid and take on management tasks. Both are aware of the missing selectivity.

[19] While the first three intentions are addressed herein, the latter cannot even be touched on, unfortunately. For a deeper insight, see Brand/Wissen (2017a: 165-185) or Acosta/Brand (2018).

[20] Such as "forests and oceans in the case of CO_2" (Brand/Wissen 2018a: 288).

conditions where particular importance applies to *elsewhere*. Both scientists have chosen this term deliberately as it highlights the matter of course of purchase and use, facilitated by the invisible social-ecological prerequisites (Brand/Wissen 2017a: 44). By emphasising the invisibility of the commodity production conditions for the consumer, Brand and Wissen relate to Philip McMichael (2010: 612) who speaks of "food from nowhere". Applied to the present research issue, one might refer to "metals from nowhere" as an unseen precondition for the electrification of automobility, and thus manifestation and continuity of the imperial mode of living in the global North and emerging economies of the global South. Brand and Wissen (2018a: 289) further stress that the costs of this way of life "are pushed on to others across space and time" which would be unfeasible without an "*outside*"[21] (Brand/Wissen 2017a: 63), and the circumstance that "the others" waive their own proportional part (ibid.: 14). In this regard, Ulrich Brand (2018: 80) refers to a permanent externalisation of crises from the metropolises to the peripheries whilst the societies of the latter reproduce themselves more critically than those of the metropoles. Due to the missing possibility to externalise costs themselves, Brand and Wissen (2017a: 121ff.) introduce the terminology "eco-imperial tensions" as a consequence of impossible externalisation on the part of the global South.[22] Moreover, the societies elsewhere, especially in the global South, and their organisation, as well as their relationship to nature build the key basis for an imperial living in the global North as it guarantees the necessary transfer of nature and labour from the global South to the North. Conversely, with reference to Brand and Wissen (2017b: 152), the lifestyle of the global North structures the societies of the periphery decisively. Behind these "modern capitalist everyday practices", according to the academics, "stands a global consensus on their attractiveness" they are meanwhile deeply rooted and largely, unconsciously[23] reproduced (ibid.). As a result, they become a prime impetus of the ecological crisis which, then again, becomes even more pressing (Brand/Wissen 2018a: 289).[24] Against this background, the ecological crisis nurtures itself by geopolitical and geo-economic

[21] Italics have been taken over from the original.
[22] The exception proves the rule. China is currently demonstrating exemplary that the global South can be perfectly capable of finding an outside by sending its own costs over a silk road to the dead end, Africa.
[23] In this regard, Brand and Wissen (2017a: 13) speak of a lack of conscious awareness, critical reflection or even "ignorance" (ibid.: 166) of people living in the global North, as well as an increasing number of people living in the global South.
[24] According to Brand and Wissen (2018a: 289), primarily in the global North, the ecological crisis is not perceived as a societal crisis but as an environmental problem. If the same also applies to the global South is open to question.

rivalries resulting from the exploitation of natural resources and the overuse of global sinks which, in turn, function as a fundament for global capitalist development and remedy to overcome a variety of crises (Brand/Wissen 2017b). The two scholars (2017a: 13) call this living "*imperial*"[25] insomuch as the access to resources is by no means granted to everyone but restricted, predominately, to the global North with its resource-intense mode of production and living whilst the exclusiveness is guaranteed by contracts or even violence (Brand/Wissen 2017a: 50). Brand and Wissen (2017b: 153ff.) state that the imperial mode of living has been unevenly globalised in the last few years but also unequally universalised in many countries of the global South. The universalisation of this lifestyle involves risks, which Brand and Wissen (2017b: 158) take into account when they highlight the further exploitation of man and nature while exemplifying that minerals, resources, and sinks become increasingly "scarce goods". A capitalist modernisation "under capitalist conditions" would lead to increased mining activities, and turns land into "capitalist commodities" (ibid.). Nonetheless, the modus vivendi of the global North provides "a hegemonic orientation of development in many societies of the global South" as it "secures social-economic well-being and status to those who benefit from it and works as a promise to all who aspire to it" (Brand/Wissen 2018a: 289). Such a a capitalist modernisation and, at least, a partial world market integration, is generally accepted by "urban middle-classes and elites" (Brand/Wissen 2017b: 157). Despite this, more and more emerging economies of the global South, appropriate those western ideas and practices and thus compete with the global North, in terms of economy but also ecology (Brand/Wissen 2017a: 14). Societies which have absorbed the social-ecological costs a long time, look in their catch-up process meanwhile for external spheres themselves. Still chiefly internalising due to a missing outside for themselves, the resulting consequences affect nature and thereby rural and indigenous people, who live in the wrecked areas while being highly dependent on "Nature's generosity" (Acosta 2013: 77).

3.2 The Peripheric Imperial Mode of Living

While looking at the global North and its externalised costs to the global South, academia has let slide a critical view inside the global South. Anna Landherr and Jakob Graf (2019) make up for this by analysing the process of internalisation of previously

[25] Italics have been taken over from the original.

externalised costs and, thus, substantially broaden the academic perspective.[26] Although those costs become literally invisible to the societies of the global North, they do not disappear entirely. Concealed in the global North, they become internalised predominately in the (semi)peripheries (Landherr/Graf 2019), and as a result, revealed again, causing economical, ecological and political inequalities (ibid.: 488). Broadly speaking, the externalisation of social, economic and ecological costs of one society is solely possible because other societies internalise them.[27] Landherr and Graf (2019) delineate the coherence between the imperial mode of living, internal class relations and, finally, internalisation whereby they draw national and international power relations together as those are mutually dependent and therefore should not be considered separately. Class relations in the countries of the global South, according to the young academics (ibid.: 488), ensure the maintenance and safeguarding of the internalisation but also provoke the unequal distribution of resources within these countries. Building upon the concepts of Brand/Wissen (2017a) and Lessenich (2016), the option of externalisation for the centres, apart from the already alluded to international power relations, arises out of two mechanism within the peripheries, *firstly*, the power resources of a propertied class and *secondly*, the integration of one part of the wage earners into the peripheric imperial mode of living (Landherr/Graf 2019: 488) which are to be scrutinised one after another. The central agent constitutes the propertied class with its power resources. This very small part of the population shares the interest of the centres because it stands to benefit from the global dependency structures (Fischer 2011; Landherr/Graf 2017, 2019), and thus has a particular interest in perpetuating the system. This propertied class may resort to five different resources of power: *structural, territorial, institutionalised, hegemonial,* and/or *informal* power (Landherr/Graf 2017: 571).[28] Each for itself or several forms of power at once, help to defend the scaffolding, underpinned by power relations and dependency structures, against attacks from the outside. Notwithstanding, the central

[26] It should be noted that the concept has been developed on the example of Chile, and hence it is not generalisable to the global South as a whole. The two scientists stress that it might be applied to other countries but admit that this need to be empirically proven first.

[27] Although Landherr and Graf (2019: 488) are aware of the complex mesh consisting of trade and power relations, international division of labour and the resulting material flows, externalised costs, usually, become internalised into (semi)peripheries.

[28] *Structural power* results from the control over the means of production whereat *territorial power* stems from the control over natural resources. *Institutionalised power* originates from the political system whilst *hegemonial power* helps to generalise the interests of the ruling class and makes the conflicts or opposition invisible. *Informal power* arises from informal contacts/networks and illegal or in the grey area conducted monetary transfers.

axis of conflict runs along with the antagonism to the ruling class. Thus, claims of indigenous people contravene those of the propertied class. Aside from this group, there is a part of wage earners that avails itself from the internalisation in terms of an economic revaluation. This section of the population lives already partly at the expense of "the periphery within the periphery", on the one hand, or strives for this lifestyle, on the other, but still does not partake in it (ibid.: 489f.). However, the "hegemonial" progress rate within the (semi)peripheric countries promises incessantly that a western way of life will be possible for everybody (Landherr/Graf 2019: 490). The media makes sure that the information flood with the promise of happiness by consumption does not become interrupted and thus keeps up the pursuit of individual advancement. Future advancement will arise, by reason of education and wage labour. On that account, the putative beneficiaries condone the costs of the *American way of life* as "necessary evil" and accept the requisite internalisation at present (ibid.). They hope to climb the social ladder in the near future, having the possibility to externalise their own costs in turn. Thus, the peripheric imperial mode of living turns into a central mechanism of the internalisation society. Insomuch as the promise of being able to participate in the western lifestyle does not come true permanently while the economic dependencies constantly augment and the social and ecological problems accumulate, the opposition of the population against the economic model rises (Landherr/Graf 2019: 491). According to Anna Landherr, Jakob Graf, and Cora Puk (2019), indigenous communities and ecological movements, as well as politicised adolescents position themselves against social inequality and ecological destruction since the internalisation structures are experienced as economically exclusive and ecologically disastrous. The following voyage to Chile proves the threesome to be right.

4. Case Study: Chile

The empirical case study consists of several aspects. While the journey starts onto the European electric car market, it does not terminate before the last stop, which constitutes the Salar de Atacama with its fragile ecosystem and depending inhabitants, whose life is seriously jeopardised by Europe's externalisation society and, not less importantly, Chile's internalisation society as they seem to go hand in hand just as a loving couple.

4.1 The Dirty Gold of the 21st Century

Lithium, "the white gold" (Leifker et al. 2018), "the oil of the 21st century" (MarketWatch 2018), or rather "the new oil" (Bruno 2019; West 2019) as it is called nowadays, constitutes one of the most important metals for rechargeable energy storage systems in EVs. At the moment, neither alternatives to the strategic raw material currently exist nor is a substitution thereof technologically possible (DERA 2017) or recycling a serious option, at least at this stage (Leifker et al. 2018).[29] Back in time to the year 2013, merely 600 tonnes of lithium carbonate equivalent[30] were used worldwide for the batteries in EVs (Bloomberg New Energy Finance 2017), which is due to the fact that the BEV has been and still is in its infancy. Meanwhile though, the European Automobile Manufacturers Association (ACEA 2019) indicates the end of its shadowy existence. In the EU only, the number of newly registered electric passenger cars rose from 97,920 vehicles in 2017 up to 150,003 in 2018 which means an increase of 53.2 per cent within solely one year (ibid.: 3). And there is no end in sight. The German Chemical Industry Association (VCI 2018) acknowledges this assertion with research findings and forecasts the shares of electric passenger car registrations of total passenger car registrations for Europe to grow from five per cent (2020) to 16 per cent (2025), and 29 per cent (2030), respectively. As LIBs have emerged as the preferred battery system for an increasing number of EV manufacturers (British Geological Survey 2018), the interest in the light metal is still growing. By 2025, the demand is expected to at least double, possibly quadruple (DERA 2017). Even COVID-19 could not stem the increase of newly registered electric vehicles in its entirety. In Germany, for instance, the Federal Motor Transport Authority (KBA 2020) reported a sharp slump of total new registrations in the amount of 61.1 per cent in comparison to the previous-year period for April. BEVs have still noticed an increase amounting to 3.8 per cent,[31] but the procurement of lithium could become problematic and very expensive in the foreseeable future as the growth in global lithium supply is losing momentum so that producers are already currently limited in

[29] Although recycling is an option per se (Groneweg/Weis 2019), it yet remains unprofitable (DERA 2017). But even an increase in the recycling rate cannot reduce the absolute consumption of raw materials since high growth rates are expected in electric automobility (Brunnengräber/Haas 2018).

[30] Lithium cannot be found in its pure form in nature (US Geological Survey 2019), wherefore it is traded in the form of lithium carbonate.

[31] In Germany, electric car owners can obtain up to EUR 6,000 of environmental bonus, plus they could claim for a promotion for private charging stations by KfW Banking Group and/or some federal states and municipalities. Some energy companies also pay subsidies (ADAC 2020).

their ability to meet demands (Altura Mining 2018). While the supply growth still totals 22 per cent in 2019, it is expected to drop back to four per cent in 2025 (ibid.) which is why the light metal is meanwhile classified as critical (DERA 2016, 2017). But first, the global lithium supply will yet go up to 814,000 metric tonnes of lithium carbonate equivalent by 2025 regardless (starting with 346,000 metric tonnes in 2018). The lithium supply originating from Chile follows the global upward trend with a supply of 107,000 tonnes of lithium carbonate equivalent in 2019, increasing probably to 137,000 tonnes by 2025 (Altura Mining 2018). Its strong demand comes along with a permanently rising price. Between 2010 and 2018, the price of has more than trebled. According to the US Geological Survey (2019), the average price of lithium carbonate totalled USD 17,000 per metric tonne, in 2018, with an upward tendency. By contrast, in 2010, the price amounted to USD 5,180. Automobile manufacturers are concerned about this circumstance and take matters into their own hands. VW and BMW plan to conclude direct contracts with lithium producers on site (Groneweg/Weis 2019; Groneweg/Pilgrim/Reckordt 2017: 626) whereas VW also pores over direct participation in lithium mining companies (Groneweg/Pilgrim/Reckordt 2017). Due to the increasing importance of batteries, VW and Daimler have made the sustainability of the metal a key priority and intend "to push more 'sustainable' lithium in Chile" (Reuters 2020), apparently with the backing of the GIZ (2020). In 2019, the *"Deutsche Gesellschaft für Internationale Zusammenarbeit"* started the project *"Moving Chile: Upscaling electric mobility in Chile and internationally"*, commissioned by the Federal German Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), to scale up electric mobility as a means to decarbonise the transport sector. Be that as it may, neither of them explains what sustainable might mean. Acosta (2013:63), on the contrary, knows that mining "can never be 'sustainable' because [its] essence is destructive". Still in the same year, the GIZ started another project in order to make Chiles mining sector more climate-friendly and energy-efficient. Accordingly, development could be achieved and the heating climate contained. Besides, not only the car manufacturers are concerned about the security of lithium supplies but also the EU. Trade policies are a helpful instrument for securing its steady supply. Free Trade Agreements (FTAs), for example, are expected to guarantee the security of supplies. The "*EU-Chile Association Agreement*" includes areas such as more comprehensive investment liberalisation disciplines, customs and trade facilitation provisions (EC 2018b: 192) and sets already a zero-tariff on trade in lithium products (EC 2019: XV).

All this opens the doors way to more open trade from which Chile will generally benefit, according to the EC (2017b). Nonetheless, the EC (ibid.: 9) also assumes that "increased pressures on water, land and related impacts on biodiversity" as well as "limited environmental impacts" in general might occur, "but greater cooperation opportunities could arise", too. Art. 24 (Cooperation on agriculture and rural sectors), Art. 28 (Cooperation on the environment) and/or Art. 48 (Participation of civil society in cooperation) literally get lost in the shuffle of trade and investment related clauses. At the end of the day, the responsibility rests upon Chile and its policy framework which is still "under development" compared with the "well-developed" one of the EU (ibid.). Currently, both parties are in negotiations to modernise the existing Association Agreement as they see improvement potential in important trade and investment issues (EC 2017a) which could enhance "the development of two-way supply chain relationships as well as address a number of risks in the lithium batteries value chain associated with increased costs due to transportation, loss of part of the value, time delays, relinquished control on quality" (EC 2019: XV). Meanwhile known as "*Rohstoffjäger"* (Jaeger/Hachfeld 2010: 5), the EU claims 21 per cent of the global lithium market as second largest consumer worldwide, directly after China (European Lithium 2018), and receives 66 per cent of its lithium from its main supplier Chile (EC 2018a: 5f.). Owing to its big appetite, the EU is highly interested in Chile's reserves, which are the largest in the world (Padilla 2020). According to estimations by the US Geological Survey (2019: 99), its reserves totalled 8,000,000 metric tonnes in 2018, followed by Australia with 2,700,000 metric tonnes and Argentina with 2,000,000 metric tonnes. Chile represents the second largest producer of lithium worldwide after Australia (USGS 2019) with its production increasing from 14,200 metric tonnes of lithium content in 2017 to 16,000 the year after (Barrera 2019). In the Salar de Atacama, a part of the so-called "lithium triangle" which consists of Argentina, Bolivia and Chile (British Geological Survey 2016), the white metal has been extracted since 1984. Until today, lithium mining has taken place exclusively in the Antofagasta region (Leifker et al. 2018) but mining companies are now wandering farther south to Maricunga (Padilla 2020), an undeveloped lithium Salar that is second in grade only to the Salar de Atacama (Bearing Lithium 2020). The Atacama salt flat generates roughly half the revenue for *Sociedad Química y Minera de Chile* (SQM), the second largest lithium producer worldwide, which receives as a Chilean company special attention in this paper. The mining company came under scrutiny for bribery and tax

evasion allegations and sustained friction with Chile's development agency *Corporación de Fomento de la Producción* (CORFO) over lease agreements in Salar de Atacama (Benton 2017). Notwithstanding this, CORFO gave green light to SQM's expansions in production capacity, in 2018. The world's top lithium superpower is the US company *Albemarle*, which concluded a deal with CORFO at the same time that allows it to increase lithium mining at the Salar de Atacama operation. CORFO approved a tripling of production volumes based on the current lithium boom (Jerez Henríquez 2018). The oligopoly, consisting of three mining companies Albemarle (24%), SQM (14%), and Tianqi Lithium (12%),[32] controls half of the world's lithium production (Bloomberg Intelligence 2019) and is accused of conducting secret price-fixing agreements behind closed doors (Padilla 2020). Whilst Chile increases its lithium production and exports at its own expense, the EU requires more and more of the precious metal. As a result, a small proportion of the Chilean population gets ever richer while another much bulkier part strives for increasing prosperity, and yet another small part fights for its right to water, nature, and a self-determined way of life.

4.2 The Peripheric Imperial Mode of Living of Chile's Internalisation Society

During the last decades, no other South American economy has further expanded the privatisation and commodification of natural resources (Landherr/Graf 2019a), and thus exacerbated the resulting, already dramatic ecological consequences, and increased the number of conflicts to such an extent. Chile represents the country with the most social-ecological conflicts throughout Latin America (ibid.). Whilst Chile's nature as a whole and a large part of its population falls victim to the extractive economic model, the propertied class benefits the most from it.

4.2.1 Chile's Propertied Class and its Power Resources

The Chilean propertied class,[33] as a central player to guarantee and maintain the internalisation of externalised costs, capitalises on the neoliberal extractive economic

[32] Two further notable lithium producers on the world market are Livent (7%), Orocobre (4%) while the rest, consisting of many small lithium mining companies, is summed and titled as "others" (39%) (Bloomberg Intelligence 2019). Apparently, the Chinese mining company Tianqi Lithium has not started extractive activities in Chile, yet (but Australia and China on a large scale). However, the company holds shares of SQM amounting to 25.86% (Tianqi Lithium 2018).

[33] Landherr and Graf (2017: 570) understand under „propertied class" capital owners which manage their companies themselves. These are national family conglomerates with particular "ties of loyalty."

model and glories in a peripheric imperial living whilst it intends to defend all that against attacks from the outside, considerably successful so far. Social resistance notwithstanding, the propertied class makes use of different sources of power to keep up the extractive regime of accumulation (Landherr/Graf 2017: 570).

For several years, Chile leads the list of Organisation for Economic Cooperation and Development (OECD) countries (UNDP 2017) with the most unequal distribution of income and concentrates *structural power* in a particularly high degree. Accordingly, one per cent of the population (approximately 180,000 people) generates 33 per cent of total income. This corresponds to an average monthly income of almost EUR 150,000. Barely 20 families dominate Chile's entire economy, among them only four families are predominant in the mining industry (Fischer 2011: 150; Füllgraf 2019).[34] About 95 per cent of exports are controlled by large companies, so-called "*grupos econónomicos"* (Fischer 2011: 150), and national family conglomerates (Landherr/Graf 2017: 572) which dominate whole production networks (ibid.: 569). The largest national family conglomerate is run by Luksic,[35] owning the mining holding *Antofagasta Minerals* which constitutes the only majoritarian Chilean private enterprise in the "*gran minería"*,[36] behind *Codelco* and *BHP Billiton* (Fischer 2011: 150). The Angelini group,[37] which comes in second after Luksic relative to the size, owns companies such as *Minera Can-Can*, *Minera Isla Riesco*, *Minera Cerro* and *Dominador* (Fischer 2011: 153). The Matte-clan[38] is owner of the company *Minera Valparaíso* whilst the family trust Claro[39] holds the mining enterprise *Elecmetal* (Fischer 2011: 154). As the families control their own businesses, low competition and high barriers to entry make them unassailable.

In the Atacama region, over 90 per cent of the land is licensed so that the mining companies have access to 15.5 million hectares (Landherr/Graf 2017: 576).[40] Chile's

[34] The Chilean family structures are very obscure and require a greater deal of time, but to my knowledge, the family conglomerates of Luksic, Angelini, Matte, and Clara distribute the mining industry almost in its entirety among each other (Fischer 2011: 152-154).

[35] Andronico Luksic & family owns USD 4.2 billion. Luksic is Chile's wealthiest man and self-made billionaire through acquiring mines, amongst others (Forbes 2020a).

[36] The gran minería is a mammoth Chilean copper complex encompassing three mines: El Teniente, Chuquicamata, and Potrerillos. Chile is the absolute number one in international copper exports with a global export volume of almost 31%, which amounted to EUR 51.6 billion in 2017 (ITC 2019).

[37] Roberto Angelini Rossi possesses USD 1.6 billion (Forbes 2020b).

[38] Eliodoro Matte & family possess USD 4.1 billion. Interestingly enough, he studied at the University of Chicago (Forbes 2020c). See also footnote 45.

[39] In-depth research did not help to detect the real fortune of Ricardo Claro Valdés who died in 2008.

[40] To this day, the law of mining license of 1982, and the mining code of 1983 allow for the appropriation of nature on the part of private enterprises at no charge (Landherr/Graf 2017).

propertied class can thereby use its *territorial power* as effective means for gaining ever greater profits as it highly benefits from the exports of the products that have been located in the ground of its own territory. During the last 20 years, mining exports have accounted for 60 per cent of all exports (Landherr 2018). Today, around 90 per cent of Chile's exports consist of little processed or rather unprocessed raw materials, predominately from mining,[41] while two-thirds refer to private companies (Landherr/Graf 2017: 576f.). Even though mining requires large quantities of water, which is so rare in one of the driest areas throughout the world, this circumstance is unable to harm the propertied class as 90 per cent of water licenses belong to private enterprises and large export companies (Landherr/Graf 2019) which are mostly in the hands of the propertied class itself (Fischer 2011).[42] To complicate this perverse scenario further, the *institutionalised power* of the propertied class maintains the neoliberal extractive economic model although opposition from the local population is rising. However, most of the conflicts are negotiated between the private enterprises and local communities and therefore they do not gain national attention (Landherr/Graf 2017). If they can come through the surface though and reach the national level, the influence of the grupos econónomicos and family conglomerates, on the one hand, and/or the quiet politics, on the other, nip the questioning in the bud. The *hegemonic power* of Chile's propertied class can be observed in many places. The family trusts Luksic and Solari[43] own two of the four most important TV channels of the country (Landherr/Graf 2017). Sebastián Piñera himself owned the private TV channel *Chilevisión* until he became president in 2010 (Forbes 2020e).[44] 95 per cent of the print media belong to only two families. The family conglomerates also control several think tanks (Landherr/Graf 2017). The *Centro de Estudios Públicos* represents the most important think tank and still communicates the ideas of the *Chicago Boys*.[45] Neoliberal, conservative think tanks, close to the government, enjoy great financial

[41] Experts refer to lithium as the new copper since it is expected to climb from fourth to second rank of Chilean mining exports (Jamasmie 2018).
[42] The 1981 Water Code enabled the allocation of Chilean waters to private individuals/companies for free and lifelong (Landherr/Graf 2017: 575).
[43] The Cortés Solari clan ranks 8th in Chile's wealthiest families and owns altogether USD 3.4 billion (Forbes 2020d).
[44] In 2010, Miguel Juan Sebastián Piñera Echenique sold the TV channel Chilevisión to Time Warner for a reported sum of USD 150 million (Forbes 2020e). Today, he possesses USD 2.8 billion (ibid.) and constitutes the richest person on the continent (Jorge 2019).
[45] A group of Chilean economists who have studied at the University of Chicago. The members have been inspired by the neoliberal thinking Milton Friedman and experienced tremendous influence during the Pinochet dictatorship (1973-1990) (Landherr/Graf 2017). The family clans Edwards and Saieh still carry these ideologies in the media (2011: 171ff.).

assistance whereas the critical non-governmental organisations (NGOs) struggle to survive, being highly dependent on public backing or foreign support (ibid.). The latter has little chance to be heard, as the former is too loud and powerful. Chile's propertied class ensures its *informal power* in the form of, most importantly, lobbying and campaign financing (Landherr/Graf 2017). Neither the financing of political parties nor the policy advice is transparent (Matamala 2015) but it is clear as daylight that the family conglomerates assist with financial and human resources. In the 21 most important consortiums, 41 politicians take seats in the respective executive boards. Untangling the party donations is in vain due to opacity but already Michelle Bachelet received about EUR 7.2 million from the Angelini group and Pinochet's son-in-law in 2013 (Matamala 2015: 40ff., 107), who is also main stockholder of SQM.[46] (ibid.: 141). This close intertwining prevents the entrance of unwanted persons to this peripheric imperial mode of living.

4.2.2 Chile's Would-Be Middle Class and its Desire for a Peripheric Imperial Mode of Living

Chile's wage earners from an inhomogeneous group which can be separated into two categories: *first*, the "labour aristocracy" and *second*, the ordinary workers (Landherr/Graf 2019: 489).The labour aristocracy benefits partially from a peripheric living. The urban and qualified wage earners which might be encountered in relatively well-paid jobs of the extractive sector, are already integrated into a western lifestyle of consumerism, urban rental housing, and the nuclear family, in large part (ibid.). Although striving for more, they will never belong to the propertied class though. Nonetheless, the workers believe the pledge of a possible *American way of life for all* and accept the "necessary evil" (Landherr/Graf 2019: 490) in the hope of being able to live a "better life".[47] The second group of labourers represents the actual circle of disadvantaged workers: frequently informally and (thus)/or precariously employed, and on the top of everything, deeply in debt. 50 per cent of Chile's population earns less than EUR 412 monthly whereof 45 per cent goes directly to the banks in the form of principal payments (Landherr/Graf 2019: 489) so that the workers end up with about EUR 185.40 a month. According to the economist Marco Kremerman of the

[46] Julio Ponce Lerou owns a 30% stake of SQM. For several years, he headed the mining company but resigned as chairman in 2015 due to personal reasons. He is accused for corruption running into millions (Forbes 2020f). His brother Luis Eugenio Ponce Lerou is Chairman at SQM and Senior Commercial Vice President at SQM Nitratos SA (a subsidiary of SQM).

[47] In the words of Acosta (2016: 137), it is rather a "mal vivir", indefinitely and unsustainably.

government-critical organisation *Fundación Sol*, 14 per cent of Chile's population lives below the poverty line. The national minimum wage is just the equivalent of EUR 330 (with a cost of living similar to that in Germany). 81 per cent of Chileans are indebted whilst one-fifth of the 18 million inhabitants are in arrears with various debt service obligations. (Zeit Online 2017). A very basic, underfinanced public health care is available but of poor quality. A more decent social security is only achievable for those being part of the formal labour market as it is mainly supplied by private companies, such as SQM. How much employees in lithium mining de facto earn, remains unknown. Also, whether they are encumbered with debts, and if so, how heavily in debt, remains obscure even after lengthy research. SQM, for instance, turns out to be very parsimonious when dealing with payroll information of its personnel. Notwithstanding this, the mining giant (2018: 79) considers its employees as the most "valuable asset" which is predominantly male. In Antofagasta, where the most staff[48] is employed (3,244 persons: 2,811 men, 733 women (ibid.: 67) as at 31.12.2018), 2,085 men and 214 women of general staff hold an open-term[49] while 86 men and 35 women have a fixed-term contract. Likewise, SQM's labour aristocracy shows a major deficiency in women In Antofagasta, 17 male and nine female supervisors have a fixed-term contract while 594 male and 170 female supervisors have an open-term contract. In the executive positions, 29 men and five women have an open-term contract. Nobody in this group signed a fixed-term contract. "Out of concern for [its] employees' well-being" (SQM 2018: 76), SQM provides a variety of benefits to employees with open-term contracts while they are either legal obligations, given at SQM's initiative or are optional for employees. Till now, nothing is in black and white about its effective distribution and/or actual practical utilisation. According to SQM (2019), however, social benefits are national holidays and Christmas bonuses, life insurance for each employee that covers natural or accidental death and disability, supplementary and/or catastrophic health insurance, and/or dental insurance, by way of example. Again, nothing is known about the quantity or quality of those privileges.

[48] The different positions within the company are organised into general, supervisory, and executive staff (SQM 2018: 66). Miners might be classified as general staff, and hence round out the group of ordinary workers in the sense of Landherr and Graf (2019: 489). Supervisors and executives seemingly refer to the labour aristocracy. This assumption needs to be empirically verified yet, because any further information in the corporate documents is untraceable.

[49] According to Art. 161 of Código del Trabajo 2020, an open-term contract is one which does not include an end date (Dirección de Trabajo 2020: 101ff.). Thus, both contracting parties can terminate the contract at short notice. The employer is furthermore entitled to modify the terms of contract, cut wages, and/or reduce benefits.

Additionally, SQM ensures "fair and transparent salaries for non-unionised employees" (ibid.). Even though the actual salaries remain *non*-transparent so far, SQM affirms that 66 per cent (as of December 2018) of its Chilean employees have been covered by a collective bargaining agreement. What is more, SQM "protects and promotes its workers' freedom of association" (ibid.: 75) by having 20 unions, also in Antofagasta. Curiously enough, SQM is in the limelight as no other Chilean company is as often confronted with accusations of repressing trade unions (Leifker et al. 2018). Unimpressed by this, the Chilean trade unions fight for the miner's right to security in times of COVID-19. While SQM's labour aristocracy works in home office and replaces personal meetings by videoconferences, the lithium miners cannot extract from remote or keep social distancing. Despite SQM's "Combat Covid-19 Plan" (SQM 2020), the mine workers have to continue working as before since the operations are still not closed, putting some SQM's employees at high risk.

SQM has exemplified that the employment in lithium mining is reserved for men, in the first place, and entails rather precarious employment. Except for those at the very top who are additionally being equipped with social responsibility for many people. There is still no evidence in written form about their exercise of responsibility in social terms, but it came to be known that they certainly pass the buck for ecological responsibility.

4.3 Social-Ecological Consequences of Lithium Extraction in the Salar de Atacama

The Salar de Atacama constitutes a fragile ecosystem that has given a home to people and animals a long time, but still little is known about it (Padilla 2020). What came to be known is that the production of lithium carbonate is a resource-intensive production process that consumes enormous space, sheer endless litres of water (Jerez Henríquez 2018; Leifker et al. 2018) and, at the same time, releases environmentally harmful chemicals (DERA 2017: 24).

This said, the two scientists, Manuel Prieto Montt and Gino Sandoval (2018), found out that all evaporation basins in the Salar de Atacama together amount to 9,093.00 hectares.[50] To make things worse, the production increase entails even more evaporation ponds as well as a spatial extension in geographical terms. Whilst the mining companies have also started extractive activities in Maricunga, the social-

[50] Starting with 129.02 hectares, in 1980 (Prieto Montt/Sandoval 2018: 2).

ecological consequences might also shift further southward.[51] As a result, the communities located there could also have less room for their subsistence agriculture (Padilla 2020).[52]

However, it is not only about less space in territorial dimensions but also about water resources which become constantly scarcer. Due to the high evaporation and low precipitation rate in the Antofagasta region,[53] its groundwater resources can be considered non-renewable (Leifker et al. 2018). This makes any withdrawal of water, however small it may be, utterly serious. For lithium production, around 226 million litres of water per day are required (Padilla 2020). A doubling or rather tripling of the production would progressively increase the necessary water quantity to approximately 400 to 600 million litres every day. Today, 24 hours a day, 2,400 litres of water per second are withdrawn by lithium producers (Groneweg/Weis 2019: 34). For producing only one tonne of lithium, about two million litres of water are needed (Leifker et al. 2018). These are 2000 tonnes of water that simply evaporate and can never be recirculated (Padilla 2020).[54] Excessive water consumption leads to an increase in the salinity of the landscape, which affects the fragile ecosystem and the species living there (ibid.). The extraction of brine demonstrably causes the groundwater level to drop (Jerez Henríquez 2018), which consequently changes the concentration of minerals. This, in turn, brings the water balance out of whack (McCartney 2010) from which the microfauna with its vital functions for the ecosystem highly depends on (Jerez Henríquez 2018). Through that, the natural migration of birds and the breeding behaviour of endemic bird species such as flamingos are noticeably impaired (ibid.). Besides, used harmful chemicals might be blown away by the wind and then seep into the ground and the water and thus involve the risk to leave the cycle and pollute the environment (Jaeger 2012). Since there is no governmental authority in charge and the local communities have yet not been able to document the perceived changes, there have never been analyses of the salt flats before the start of lithium extraction activities (Padilla 2020). Therefore, the Salars are

[51] These developments should be necessarily closely monitored. By starting from scratch with lithium mining in Maricunga, the window of opportunity is now widely opened for profound evaluations to assessing the impacts on the environment.

[52] The indigenous community "Colla" has settled in Maricunga.

[53] According to the US Geological Survey (2020), some parts of the Salar de Atacama have gone without any rain for as long as people have been keeping track.

[54] The battery of an electric automobile requires an average of eight to 40 kilogrammes of the white metal (Leifker et al. 2018). 80,000 litres of water are consumed to extract the lithium for the production of one sole LIB (ibid.: 15).

insufficiently researched in the raw before extractive activities have taken place, which is why no before and after comparison is possible, and hence the real environmental changes cannot be traced back to the lithium mining activities with 100 per cent certainty (ibid.). For this reason, experts and the *Likanantays*[55] themselves have been calling for independent continuous studies on the effects on the environment and monitoring of flora and fauna for years (Gallardo 2011; Groneweg 2019; Jerez Henríquez 2018; Leifker et al. 2018), without any success. Thus far, the groundwater level is just determined by the companies. Environmental impact studies are commissioned by them only, but the risks and recommendations remain under lock and key (Padilla 2020). The local indigenous communities insist on the publication of that information. Chile is the only country in the world where water supply and water rights have been 100 per cent privatised (Leifker et al. 2018: 19). The concessions are in the hands of only a few, including SQM and Albemarle, according to Ana Ramos, president of the *Atacameños Peoples Council* (Boddenberg 2018). But both companies cannot get enough and are accused of extracting even more water than allowed (Horvath/Romero Medina 2019). Meanwhile, local/indigenous groups, the big mining companies, and newcomers to the region, such as *Wealth Minerals*, *New Energy Metals*, and *Lithium Chile* are waging a water war (ibid.). To sweeten the pill, the mining companies close agreements with the local communities, including direct job creations, and other contributions, such as building schools and providing scholarships to the children. SQM (2018: 108ff.) seems highly interested in the local peoples' well-being. Its current sustainability report delineates social, educational, and cultural projects with the communities of the Salar de Atacama. While some residents are confident with those agreements, others, in turn, scrutinise how to proceed after the boom, especially as a wide range of these provisions replace what used to be state services (Horvath/Romero Medina 2019). The trade unions *Central Unitaria de Trabajadores* (CUT) or the *Central Autónoma de Trabajadores* (CAT) fight for the local people's rights but experience political headwinds since the mining companies receive backing by the government that publicly defame mining critics, with the help of the media, as saboteurs or even terrorists (Vollrath 2014: 24). This is intended not only to *de*legitimise criticism of the extractive economic model but also to justify

[55] Communal statistics indicate that there were 4,068 Likanantays (the indigenous peoples located around the Salar de Atacama) as of 2017 (Biblioteca del Congreso Nacional 2020). Since not all of them live around the salt flats, they become directly and/or indirectly affected by lithium mining (Padilla 2020).

repressive measures such as stricter laws or violent police action against the social protests. At present, OCMAL (2020) counts 49 mining conflicts in Chile. Already eleven of them take place in the Atacama region (affecting 45% of the indigenous territory). All of them are related to the right to environment, one-fifth involves the right to water as well as the right to health (INDH 2020). Just two years ago, there have not been any "violations involving rights of indigenous people", according to SQM (2018: 74). On paper, the company does not break their right to consultation[56] but if the indigenous people resist mining projects on their traditional territory, the anti-terror law from the Pinochet dictatorship can be applied against them (Millaleo Hernández n.d.).[57] Against all odds, the Likanantays, Collas and several local environmental organisations are suing against the increase in production (Leifker et al. 2018). The movement "*Litio para Chile"* mobilises against the disposition to transnational companies, demands that lithium mining becomes nationalised and the metal further processed in Chile. Indeed, it is important to note that the indigenous people are not against lithium mining per se. They demand lithium production not to be expanded but to be halted temporarily until there is scientifically sound knowledge about the ecosystem and the real ecological consequences of lithium mining (Padilla 2020). Moreover, they request government support for communities concerned about their survival in the ecosystems of the salt flats, their cultures, and traditions. In the Salar de Atacama, 52 per cent of the communities near SQM operations are indigenous (SQM 2018: 109). The Likanantays and the Collas, are communities that have always lived on a subsistence economy (Padilla 2020). This very day, they use the few water sources left, such as rivers, lagoons, and wetlands to cultivate small fields and fruit plantations to either consume the products by themselves or to sell them on local markets. Also, they utilise them to breed llamas, alpacas, goats, and sheeps (Jerez Henríquez 2018). But those traditional economic forms gradually disappear due to the increasing scarcity of water (Leifker et al. 2018). Although they cannot yet prove the direct link between the drop of water level and lithium mining, they are aware of fundamental changes in nature. The case Maricunga offers the best chance to prove

[56] The right of consultation stipulates that indigenous peoples must be granted a say when laws and regulations or development and economic projects are planned in their territories. The legal basis for these consultations is Convention 169 of the International Labour Organisation (ILO), adopted by the United Nations in 1989.

[57] The current anti-terror law, Law No. 18,314, is a legacy of the military dictatorship. In the application of this law, the indigenous people might be sent to jail preventively (Llaitul Carrillanca 2014).

what local and indigenous communities have observed for years without having unequivocal proof to this very day.

5. Conclusion

This contribution built a bridge in three respects. *Firstly*, the ecological rucksack of the LIB, externalised from the global North, and the social-ecological consequences resulting from its internalisation into the global South, were identified and linked to each other. *Secondly*, global North's externalisation society with its imperial mode of living shook hands with the internalisation society of the global South and its peripheric imperial mode of living. *Thirdly*, the social-ecological conflicts stemming from the lithium extraction in Chile were determined, their source identified, and the upholding mechanisms uncovered.

Introductorily, the analysis of ecological drivers of electric automobility with increased attention to the battery production process has shown that BEVs are *locally* emission-free by law and that they do not emit harmful pollutions on site, but the present energy mix and the so-far disregarded rebound effect apparently offset the great potential of BEVs. Thus, even in the global North, the supposed advantages of BEVs can turn into drawbacks. Leaving its shadowy existence, the BEV carries an ecological rucksack which has drawn in academia little attention so far, but which is of heavy weight, especially for the global South, where the raw materials come from. Environmental destructions hamper surrounding rural and indigenous communities in leading a self-determined life. While the BEV emerges rather as problem than solution, water turned out to be part of the problem and the solution for both, man and nature. Against this background, two concepts have been used to explain, *firstly*, how the externalisation of social-ecological costs from the centres to the (semi)peripheries is possible and, *secondly*, which mechanisms help to internalise those costs and further ensure the maintenance of this unequal exchange. Making use of the concept by Brand and Wissen (2017a) has given an insight into the production, distribution and consumption patterns of the global North's upper and middle classes whose imperial mode of living hinges on an outside, where the resulting social-ecological costs might be externalised. Landherr and Graf (2019a) pick up where Brand and Wissen (2017a) leave off and scrutinise the mechanisms and key actors within the periphery to illustrate the lasting maintenance and further perpetuation of this abhorrent scenario. Both concepts emerged as excellent basis to explain where the social-ecological costs come from and where they go to, but in the end, they suffer from the same disease

since they are limited to the global North and South, respectively. A plaster is needed to stick both together.

The empirical case study took the reader on a journey to Chile to *firstly*, immerse in the dirty gold of the 21st century, *secondly*, to pay Chile's propertied class and wage earners a visit and *lastly*, to uncover the social-ecological consequences from the lithium extraction for the Antofagasta region. Since the BEV is inexorably gaining momentum and so the lithium demand, the European automotive industry and governments become pleased and worried at the same time but are pulling together and try to find ways to cope with price volatilities and uninterrupted service. The current modernisation of the EU-Chile Association Agreement might function as a door opener for securing the access to the valuable resource and concurrently as a barrier to keep uninvited guests such as environmental protection and/or human rights, outside. Rich in raw materials, Chile possesses the world's largest lithium reserves from which, apart the EU, the propertied class benefits and thus safeguards its hegemonic lifestyle. The labour aristocracy of the lithium mining sector might afford a western lifestyle, too, but the precariously employed miners very likely even do not earn enough to cover basic necessities. Local and indigenous peoples have other concerns as their basis of life is severely threatened. As unequal as all these groups may be, there is one feature they have in common: little is known about all of them for the time being. It is high time to change that. Extractivism is not an option, neither social-ecologically nor economically (Acosta 2017). The global North needs to *de*growth while the South should allow for *post*extractivisms (Acosta/Brand 2018) to make a *buen vivir for all* come true. Indigenous peoples and their solidary mode of living lead by example we all can learn from.

References

ACEA, European Automobile Manufacturer's Association (2019): *New passenger car registrations by fuel type in the European Union Quarter 4, 2018*. URL: https://www.acea.be/uploads/press_releases_files/20190207_PRPC_fuel_Q4_2018_FINAL.pdf [accessed: 31.10.2019].

Acosta, Alberto (2016): El Buen Vivir, una propuesta con potencialidad global. Revista de Investigaciones Altoandinas. In: Journal of High Andean Research. 18(2): 135-142.

Acosta, Alberto (2013): *Extractivism and Neoextractivism: Two sides of the same curse.* URL: https://www.tni.org/files/download/beyonddevelopment_extractivism.pdf [16.5.2020].

Acosta, Alberto/Brand, Ulrich (2018): *Radikale Alternativen. Warum man den Kapitalismus nur mit vereinten Kräften überwinden kann*. München.

ADAC, Allgemeiner Deutscher Automobil-Club (2020): *Förderung für Elektroautos: Hier gibt es Geld* (29.4.2020). URL: https://www.adac.de/rund-ums-fahrzeug/elektromobilitaet/kaufen/foerderung-elektroautos/ [14.5.2020].

Albemarle (2020): *Sustentabilidad.* URL: http://www.albemarlelitio.cl/careers [accessed: 4.5.2020].

Albemarle (2019): *Sustainability Report*. URL: https://www.albemarle.com/storage/components/albemarle_2019_sustainability_report_2018_activities__r153_-_final.pdf [17.5.2020].

Altura Mining Ltd. (2018): *Altura lithium. New significant supply to the battery market in 2018.* URL: https://alturamining.com/wp-content/uploads/2018/08/1833437.pdf [accessed: 30.12.2019].

Ambrose, Hanjiro/Kendall, Alissa (2016): Effects of battery chemistry and performance on the life cycle greenhouse gas intensity of electric mobility. Transportation Research Part D. In: *Transport & Environment* (47): 182-194.

Barrera, Priscila (2019): *Top Lithium Production by Country* (12.8.2019). URL: https://investingnews.com/daily/resource-investing/battery-metals-investing/lithium-investing/lithium-producing-countries/ [accessed: 30.4.2020].

Bearing Lithium (2020): *Maricunga Lithium.* URL: http://www.bearingresources.ca/projects/Maricunga-Lithium [accessed: 6.5.2020].

Benton, Dale (2017): Top 10 lithium producers (9.8.2017). URL: https://www.miningglobal.com/top10/top-10-lithium-producers [accessed: 15.5.2020].

Biblioteca del Congreso Nacional (2020): *Población según pueblo originario declarado, años 2002 y 2017*. URL: https://reportescomunales.bcn.cl/2017/index.php/Antofagasta [17.5.2020].

Bloomberg Intelligence (2019): Lithium Miner CEO Sees Shakeout in Race To Supply Electric Cars (12.9.2019). URL: https://www.bloomberg.com/news/articles/2019-09-12/lithium-miner-ceo-sees-shakeout-in-race-to-supply-electric-cars [accessed: 14.4.2020].

Bloomberg New Energy Finance (2019): *Electric Vehicle Outlook 2019*. URL: https://about.bnef.com/electric-vehicle-outlook/#toc-viewreport [accessed: 13.12.2019].

Bloomberg New Energy Finance (2017): *When Will Electric Vehicles be Cheaper than Conventional Vehicles?* URL:

http://www.automotivebusiness.com.br/abinteligencia/pdf/EV-Price-Parity-Report.pdf [accessed: 30.12.2019].
Boddenberg, Sophia (2018): *El Mundo Extracción de litio en Chile ¿bendición o maldición?* (27.4.2018). URL: https://www.dw.com/es/extracci%C3%B3n-de-litio-en-chile-bendici%C3%B3n-o-maldici%C3%B3n/a-43569558 [17.5.2020].
Bourdieu, Pierre (1987): *Die feinen Unterschiede. Kritik der gesellschaftlichen Urteilskraft.* Frankfurt am Main.
Brand, Ulrich (2018): Imperiale Lebensweise und die Produktion vom Überflüssigen im globalen Süden. In: *NÖ Forschungs- und Bildungsgesellschaft und Donau-Universität Krems* (Hrsg., 2018): *Wer nicht arbeiten will, soll auch nicht essen. Auf dem Weg zu einer globalen Gesellschaft der Überflüssigen? Tagungsband 2018 zum 7. Symposium Dürnstein*. Hamburg: tredition: 75-82.
Brand, Ulrich/Markus Wissen (2018a): What Kind of Great Transformation? The Imperial Mode of Living as a Major Obstacle to Sustainability Politics. In: *GAIA - Ecological Perspectives for Science and Society* 27(3): 287-292.
Brand, Ulrich/Wissen, Markus (2017a): *Imperiale Lebensweise. Zur Ausbeutung von Mensch und Natur im globalen Kapitalismus*. München.
Brand, Ulrich/Wissen, Markus (2017b): The Imperial Mode of Living. In: *Spash, Clive (ed., 2017): Routledge Handbook of Ecological Economics.* London: Routledge.
British Geological Survey (2016): *Lithium.* URL: https://www.bgs.ac.uk/mineralsUK/statistics/mineralProfiles.html [accessed: 27.12.2019].
Brunnengräber, Achim/Haas, Tobias (2018): Vom Regen in die Traufe: die sozial-ökologischen Schattenseiten der E-Mobilität, in: *GAIA* 27/3 (2018): 273-275.
Brunnengräber, Achim/Haas, Tobias (2017): Die falschen Verheißungen der E-Mobilität. In: *Blätter für deutsche und internationale Politik* 6: 21–24.
Bruno, Alessandro (2019): *Lithium: The New Oil.* URL: https://midasletter.com/2019/11/lithium-the-new-oil/ [accessed: 27.12.2019].
Dirección de Trabajo (2020) : *Código del Trabajo.* Chile.
Crippa, Monica/Oreggioni, Gabriel David/Guizzardi, Diego/Muntean, Marilena/Schaaf, Edwin/Lo Vullo, Eleonora/Solazzo, Efisio/Monforti-Ferrario, Fabio/Olivier, Jos G.J./Vignati, Elisabetta (2019): *Fossil CO_2 and GHG emissions of all world countries*. Luxembourg.
Daum, Timo (2018): *Das Auto im digitalen Kapitalismus. Dieselskandal, Elektroantrieb, Autonomes fahren und die Zukunft der Mobilität.* URL: https://www.rosalux.de/fileadmin/rls_uploads/pdfs/sonst_publikationen/Das_Auto_im_digitalen_Kapitalismus.pdf [16.5.2020].
DERA, German Mineral Resources Agency (2016): *Rohstoffe für Zukunftstechnologien 2016.* Berlin
DERA, German Mineral Resources Agency (2017): *Rohstoffinformationen Nr. 33, Risikobewertung Lithium.* Berlin.
DLF, Deutschlandfunk (2017): *Interview with Dieter Teufel, UPI, Deutschlandfunk-Kultur-Interview* (2.8.2017). URL: https://www.deutschlandfunkkultur.de/forscher-ueber-gesamtbilanz-von-fahrzeugen-elektroauto-ist.1008.de.html?dram:article_id=392519 [accessed: 12.12.2019].
Dorn, Felix Malte (2019): Neue Technik, neue Rohstoffe: Transformation der Automobilität und die Produktion von Lithium in Südamerika. In: Matthias Schmidt, Serge Leopold Middendorf, Sebastian Purwins (Hrsg.): *The Power of*

Political Ecology. Tagungsband zur ersten augsburger.forschungswerkstatt. Band 29. Augsburg: 19-25.
Dunn, Jennifer B./ Gaines, Linda/Kelly, Jarod C./Gallagher, Kevin G. (2016): Life cycle analysis summary for automotive lithium-ion battery production and recycling. In: *TMS Annual Meeting* (1 ed., pp. 73-79). Minerals, Metals and Materials Society.
Ellingsen, Linda Ager-Wick/Majeau-Bettez, Guillaume/Singh, Bhawna/ Srivastava, Akhilesh Kumar/Valøen, Lars Ole/Strømman, Anders Hammer (2014): Life Cycle Assessment of a Lithium-Ion Battery Vehicle *Pack. In: Journal of Industrial Ecology*, 18, 2014: 113-124.
Ellingsen, Linda Ager-Wick/Singh, Bhawna/Strømman, Anders Hammer (2016): The size and range effect: lifecycle greenhouse gas emissions of electric vehicles. In: *Environmental Research Letters 11 (5).* URL: https://iopscience.iop.org/article/10.1088/1748-9326/11/5/054010/pdf [accessed: 13.1.2020].
Encyclopædia Britannica (2020): *Fine particulates.* URL: https://www.britannica.com/science/air-pollution/Fine-particulates [accessed: 16.4.2020].
EC, European Commission (2020): *EU Proposal.* URL: https://trade.ec.europa.eu/doclib/docs/2020/january/tradoc_158589.pdf [accessed: 5.5.2020].
EC, European Commission (2019): *Sustainability Impact Assessment in Support of the Negotiations for the Modernisation of the Trade Part of the Association Agreement with Chile.* Brussels.
EC, European Commission (2018a): *Report on Raw Materials for Battery Applications.* Brussels.
EC, European Commission (2018b): *Individual reports and info sheets on implementation of EU Free Trade Agreements.* URL: http://trade.ec.europa.eu/doclib/docs/2018/october/tradoc_157473.PDF [accessed: 30.12.2019].
EC, European Commission (2017a): *EU and Chile launch negotiations for a modernised Association Agreement.* Brussels.
EC, European Commission (2017b): *Ex-ante Study of a Possible Modernisation of the EU-Chile Association Agreement- Executive Summary.* Brussels.
European Lithium (2018): *Fakten des europäischen Lithiummarktes.* URL: https://europeanlithium.com/lithium-de/lithium-in-europa-lithium-in-europe/ [accessed: 8.5.2020].
FIS, Forschungsinformationssystem (2010): *Well-to-Wheel Betrachtung der Antriebstechnologien.* URL: https://www.forschungsinformationssystem.de/servlet/is/332825/ [accessed: 2.12.2019].
Fischer, Karin (2011): *Eine Klasse für sich. Besitz, Herrschaft und ungleiche Entwicklung in Chile 1830-2010*. Baden-Baden.
FOEN, Federal Office for the Environment (2019): *Ozone - Summer smog.* URL: https://www.bafu.admin.ch/bafu/en/home/topics/air/info-specialists/air-quality-in-switzerland/ozone---summer-smog.html [accessed: 16.4.2020].
Forbes (2020a): *#132 Andronico Luksic & family.* URL: https://www.forbes.com/lists/2006/10/0CJD.html [accessed: 7.1.2020].
Forbes (2020b): *#1057 Roberto Angelini Rossi.* URL: https://www.forbes.com/profile/roberto-angelini-rossi/#77ee9a853122 [accessed: 7.1.2020].

Forbes (2020c): *#158 Eliodoro Matte & family.* URL: https://www.forbes.com/lists/2006/10/AQUG.html [accessed: 7.1.2020].
Forbes (2020d): *#395 Teresa Matilde Solari Falabella & family.* URL: https://www.forbes.com/profile/teresa-matilde-solari-falabella/#285d930d482c [accessed: 10.1.2020].
Forbes (2020e): *#804 Sebastian Piñera & family.* URL: https://www.forbes.com/profile/sebastian-pinera/#1727d4417a75 [accessed: 5.1.2020].
Forbes (2020f): *#1267 Julio Ponce Lerou.* URL: https://www.forbes.com/profile/julio-ponce-lerou/#1d01eee35484 [accessed: 18.5.2020].
Füllgraf, Frederico (2019): *Chile-Sebastián Piñera, die Ein-Prozent-Elite und die Militärs Teil 1: zwischen Absturz in den Untergrund und autoritärem Abenteuer.* URL: https://www.nachdenkseiten.de/?tag=chile [accessed: 5.1.2020].
Gallardo, Susana (2011) : Extraccion de litio en el Norte argentino. La fiebre comienza. In: *Revista Exactamente*, No. 48 (2011): 26–29.
GIZ, Deutsche Gesellschaft für Internationale Zusammenarbeit (2020): *Moving Chile: Upscaling electric mobility in Chile and internationally*. URL: https://www.giz.de/en/worldwide/80014.html [accessed: 16.5.2020].
Gnann, Till/Plötz, Patrick (2011): Status Quo und Perspektiven der Elektro-mobilität in Deutschland. In: *Working Paper Sustainability and Innovation.* 2011(14). URL: https://www.isi.fraunhofer.de/de/publikationen/sustainability-innovation.html#faqitem_437571262-answer [accessed: 16.1.2020].
Gramsci, Antonio (1991ff.): *Gefängnishefte* (hrsg.) von Bochmann, K; Haug, W.F.. Hamburg/Berlin.
Groneweg, Merle (2019): *Neue Rohstoffkapitel in EU-Handelsabkommen – eine Bestandsaufnahme.* Berlin.
Groneweg, Merle (2017): *Industrie 4.0 und E-Mobilität: Wie Zukunftstechnologien neue Rohstoffbedarfe schaffen*. Berlin.
Groneweg, Merle/Weis, Laura (2019): *Weniger Autos, mehr globale Gerechtigkeit. Diesel, Benzin, Elektro: Die Antriebstechnik allein macht noch keine Verkehrswende.* URL: https://www.misereor.de/fileadmin/publikationen/Studie-Weniger-Autos-mehr-globale-Gerechtigkeit.pdf [accessed: 16.5.2020].
Groneweg, Merle/Pilgrim, Hannah/Reckordt, Michael (2017): Diesseits der Dematerialisierung. Der Ressourcenbedarf der Industrie 4.0. In: *PROKLA,* 47(4): 623 – 633.
Gudynas, Eduardo (2019): Development and Nature. Modes of Appropriation and Latin American Extractivism. In: *The Routledge Handbook of Latin American Development*. Eds. Julie Cupples, Marcela Palomino-Schalscha and Manuel Prieto: 389-399.
Gudynas, Eduardo (2017): *Post-extractivismos en Chile : posibilidades y urgencias.* URL: http://gudynas.com/publicaciones/articulos-academicos/ [11.5.2020].
Haas, Tobias/Sander, Henrik (2019): *Die Europäische Autolobby. Eine kritische Analyse zum Einfluss der Industrie.* Rosa-Luxemburg-Stiftung. Brüssel.
Hartung, Alfred (2018): Elektro-PKW - eine ökologische Modernisierung der Automobilität? In: *PROKLA* 48(4): 561–568.
Helmers, Eckard/Weiss, Martin (2016): *Advances and critical aspects in the life-cycle assessment of battery electric cars*. URL: https://www.dovepress.com/advances-and-critical-aspects-in-the-life-cycle-

assessment-of-battery--peer-reviewed-fulltext-article-EECT [accessed: 7.12.2019].
Helms, Hinrich/Jöhrens, Julius/Kämper, Claudia/Giegrich, Jürgen/Liebich, Axel/Vogt, Regine/Lambrecht, Udo (2016): *Weiterentwicklung und vertiefte Analyse der Umweltbilanz von Elektrofahrzeugen.* ifeu – Institut für Energie- und Umweltforschung. Umweltbundesamt. Dessau-Roßlau.
Helms, Hinrich/Kämper, Claudia/Biemann, Kirsten/ Lambrecht, Udo/ Jöhrens, Julius (2019): *Klimabilanz von Elektroautos. Einflussfaktoren und Verbesserungspotenzial.* ifeu – Institut für Energie- und Umweltforschung. Heidelberg.
Horvath, Enriko/Romero Medina, Amanda (2019): *'White gold' lithium boom powers electric cars – but threatens people's water and livelihoods* (4.4.2019). URL: https://www.renewableenergyworld.com/2019/04/04/white-gold-lithium-boom-powers-electric-cars-but-threatens-peoples-water-and-livelihoods/ [accessed: 17.5.2020].
IEA, International Energy Agency (2019a): *Global Energy & CO2 Status Report 2019*. URL: https://www.iea.org/reports/global-energy-co2-status-report-2019 [accessed: 12.5.2020].
IEA, International Energy Agency (2019b): *Tracking Transport*. URL: https://www.iea.org/reports/tracking-transport-2019 [accessed: 13.5.2020].
IEA, International Energy Agency (2019c): *Global EV Outlook 2019.* URL: https://www.iea.org/reports/global-ev-outlook-2019 [accessed: 16.5.2020].
INDH, Instituto Nacional de Derechos Humanos (2020): *Mapa de conflictos socioambientales in Chile.* URL: https://mapaconflictos.indh.cl/#/ [17.5.2020].
IPCC, Intergovernmental Panel on Climate Change (2018): *Summary for Policymakers.*In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press.
ITC, International Trade Centre (2019): *List of importing markets for the product exported by Chile in 2019.* URL: https://www.trademap.org/Country_SelProductCountry.aspx?nvpm=1%7c152%7c%7c%7c%7c2603%7c%7c%7c4%7c1%7c1%7c2%7c1%7c1%7c2%7c1%7c1 [accessed: 2.5.2020].
Jamasmie, Cecilia (2018): *Lithium becomes Chile's No. 4 mining export* (10.7.2018). URL: https://www.mining.com/lithium-becomes-chiles-no-4-mining-export/ [17.5.2020].
Jerez Henríquez, Bárbara (2018): *Impacto socioambiental de la extracción de litio en las cuencas de los salares altoandinos del cono sur*. URL: https://www.ocmal.org/wp-content/uploads/2018/08/Impacto-Sociambiental-Litio.pdf [accessed: 12.5.2020].
Jorge, Martin (2019): *Neither repression nor empty concessions have stopped the Chilean uprising* (29.10.2019). URL: https://www.marxist.com/neither-repression-nor-empty-concessions-have-stopped-the-chilean-uprising.htm [7.5.2020].

Kasten, Peter/Bracker, Joß/Timpe, Christof/Hacker, Florian (2017): *Klimavorteil Elektromobilität? Handlungsempfehlungen zur Gestaltung des Beitrags der Elektromobilität zum Klimaschutz.* Berlin/Freiburg.

KBA, Federal Motor Transport Authority (2020): *Pressemitteilung Nr. 12/2020-Fahrzeugzulassungen im April* 2020 (6.5.2020). URL: https://www.kba.de/DE/Presse/Pressemitteilungen/2020/Fahrzeugzulassungen/pm12_2020_n_04_20_pm_komplett.html?nn=2562684 [accessed: 14.5.2020].

Krull, Stephan (2018): *Das Elektroauto ist keine Lösung, sondern ein Problem.* URL: http://stephankrull.info/2018/10/11/das-elektroauto-ist-keine-loesung-sondern-ein-problem/ [accessed: 3.11.2019].

Landherr, Anna (2018): El Estado de Chile y la minera. Las consecuencias internas de extractivismo en tiempos de la era de cobre. In : Schmalz, Stefan/Ramírez, Martin (Hg.): *Extracivismo en Sudamérica después del Augge de las Materias Primas.* Buenos Aires.

Landherr, Anna/Graf, Jakob (2019): Über uns die Sintflut – Zu Klassenverhältnissen in der Internalisierungsgesellschaft am Beispiel Chiles. In: *PROKLA* 49(196): 487-493.

Landherr, Anna/Graf, Jakob (2017): Neoliberale Kontinuität im politischen Wechselwind. Die Macht der besitzenden Klasse Chiles über die extraktivistische Ausrichtung des Landes. In: *PROKLA* 47(189): 569-585.

Landherr, Anna/Graf, Jakob/Puk, Cora (2019): Das Modell Chile. In: Ramírez, Martin; Schmalz, Stefan (Hg.): *Extraktivismus in Lateinamerika.* München.

Leifker, Maren/Lincoln, Sarah/Saenger, Kristina/Hilbig, Sven/Müller, Axel (2018): *Das weiße Gold: Umwelt- und Sozialkonflikte um den Zukunftsrohstoff Lithium.* Analyse. Berlin.

Lessenich, Stephan (2016): *Neben uns die Sintflut. Die Externalisierungsgesellschaft und ihr Preis.* München.

Llaitul Carrillanca, Héctor (2014): *La Ley Antiterrorista y la criminalización de la causa mapuche* (3.6.2014). URL: https://www.elmostrador.cl/noticias/opinion/2014/06/03/511660/ [accessed: 3.1.2020].

Majeau-Bettez, Guillaume/Hawkins, Troy R./Strømman, Anders Hammer (2011): Life cycle environmental assessment of lithium-ion and nickel metal hydride batteries for plug-in hybrid and battery electric vehicles. In: *Environmental Science & Technology* 45: 4548–4554.

MarketWatch (2018): *Lithium: Oil of the 21st century.* URL: https://www.marketwatch.com/press-release/lithium-oil-of-the-21st-century-2018-06-07 [accessed: 27.12.2019].

Matamala, Daniel (2015): *Poderoso Caballero. El Pe$o del Dinero en la Politica Chilena.* Santiago.

McCartney, John (2010): *Assessing hydrologic impacts of potassium/lithium extraction from salt flats.* URL: www.un.org/esa/dsd/susdevtopics/sdt_pdfs/meetings2010/EGM_ latinamerica/Presentations-and-Speeches/Session-3/3_JOHN_ MC_CARTNEY/13.Mccartney.pdf [accessed: 12.1.2020].

Messagie, Maarten (2017): *Life Cycle Analysis of the Climate Impact of Electric Vehicles.* Brussels VUB university MOBI research center. Study for Transport and Environment (T&E). Brussels.

Merriam Webster Dictionary (n.d.): *Definition of eutrophication. URL:* https://www.merriam-webster.com/dictionary/eutrophication [accessed: 13.12.2019].

Prieto Montt, Manuel/Sandoval, Gino (2018): Informe-Expansión de la Extracción de Litio en el Salar de Atacama. San Pedro de Atacama.
Nieuwenhuis, Paul/Wells, Peter (2015): *The Global Automotive Industry*. Chichester.
OCMAL, Observatorio de Conflictos Mineros de América Latina (2020): *Conflictos Mineros en Chile*. URL: https://mapa.conflictosmineros.net/ocmal_db-v2/conflicto/lista/02032300 [accessed: 12.1.2020].
Oeko-Institut (2017)*: Strategien für die nachhaltige Rohstoffversorgung der Elektromobilität: Synthesepapier zum Rohstoffbedarf für Batterien und Brennstoffzellen.* Heidelberg.
Padilla, César (2020): Contribution during webinar conducted by PowerShift, FDCL, MISEROER, Bread for the World (28.4.2020). URL: https://power-shift.de/tesla-co-pioniere-der-elektromobilitaet-und-beim-rohstoffbezug-vorbilder-fuer-nachhaltigkeit/ [17.5.2020].
Peters, Anja/Doll, Claus/Kley, Fabian/ Plötz, Patrick/ Sauer, Andreas/ Schade, Wolfgang/ Thielmann, Axel/ Wietschel, Martin/ Zanker, Christoph (2012): *Konzepte der Elektromobilität und deren Bedeutung für Wirtschaft, Gesellschaft und Umwelt. Innovationsreport*, TAB-Arbeitsbericht, 2012 (153): 303.
Petschow, Ulrich/Uhle, Christian/Böing, Heinrich (2018): *Mobilitätswende - Die deutsche Automobilindustrie im Umbruch.* Werkbericht Nr. 8. Institut für ökologische Wirtschaftsforschung, Berlin.
PwC, PricewaterhouseCoopers (2017): *eascy – die fünf Dimensionen der Transformation der Automobilindustrie*. URL: www.pwc.de/de/automobilindustrie/pwc_automotive_eascy-studie.pdf [accessed: 27.10.2019].
Reuters (2020): *VW, Daimler push for more 'sustainable' lithium in Chile* (11.2.2020). URL: https://www.autoblog.com/2020/02/11/vw-daimler-sustainable-lithium-chile/?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZWNvc2lhLm9yZy9zZWFyY2g_dHQ9bXpsMiZxPVZXK0xpdGhpdW0rQ2hpbGU&guce_referrer_sig=AQAAAMqS79xwXl8520zHww-j549TLkWb9xm4kcFjHvpJYpcXHZ1ToyPij7Jl4M0ndmgNt3uqZBE6Gs2MfcETOgnh_Rd3qcAYhBzv1NztI58DvRp4EvtyRMUpCghIVr3DLBQXI231fEiPTx1dLHQBf9n6ILs9ngpBakY4X63vBGroY7NT [accessed: 28.4.2020].
Romare, Mia/Dahllöf, Lisbeth (2017): *The Life Cycle Energy Consumption and Greenhouse Gas Emissions from Lithium-Ion Batteries. A Study with Focus on Current Technology and Batteries for light-duty vehicles*. Stockholm.
Santarius, Tilman (2012): Der Rebound-Effekt. Über die unerwünschten Folgen der erwünschten Energieeffzienz. In: *Impulse 5, hrsg. vom Wuppertal-Institut für Klima, Umwelt, Energie GmbH*. Wuppertal.
Santarius, Tilman (2013): *Der Rebound-Effekt: Die Illusion des grünen Wachstums*. URL: http://www.santarius.de/wp-content/uploads/2012/08/Der-Rebound-Effekt-Die-Illusion-des-gr%C3%BCnen-Wachstums-Bl%C3%A4tter-2013.pdf [accessed: 31.10.2019].
SQM, Sociedad de Química y Minera de Chile (2020): *SQM Implements Robust Prevention Plan to Combat Covid-19.* URL: https://www.sqm.com/en/noticia/sqm-implementa-robusto-plan-preventivo-para-combatir-el-covid19/ [accessed: 18.5.2020].
SQM, Sociedad de Química y Minera de Chile (2019): *Annual Report.* URL: http://s1.q4cdn.com/793210788/files/doc_financials/2019/ar/Memoria-Anual-2019_eng_final.pdf [17.5.2020].

SQM, Sociedad de Química y Minera de Chile (2018): *Sustainability Report.* URL: https://www.sqm.com/wp-content/uploads/2019/05/SQM-SUSTAINABILITY-REPORT-2018.pdf [17.5.2020].
Svampa, Maristella (2019): Neo-Extractivism in Latin America. URL: https://www.tni.org/files/download/beyonddevelopment_extractivism.pdf [16.5.2020].
T&E, Transport & Environment (2017): *Electric vehicle life cycle analysis and raw material availability*. URL: https://www.transportenvironment.org/sites/te/files/publications/2017_10_EV_LCA_briefing_final.pdf [accessed: 12.12.2019].
The Economist (2017): *The white gold rush- A battle for supremacy in the lithium triangle.* URL: https://www.economist.com/the-americas/2017/06/15/a-battle-for-supremacy-in-the-lithium-triangle [18.5.2020].
Tianqi Lithium (2018): *Milestones 2018.* URL: http://en.tianqilithium.com/corporation/development.html [accessed: 10.5.2020].
UBA, German Environment Agency (2018): *Überschreitung der Belastungsgrenzen für Versauerung*. URL: https://www.umweltbundesamt.de/daten/flaeche-boden-land-oekosysteme/land-oekosysteme/ueberschreitung-der-belastungsgrenzen-fuer#textpart-1 [accessed: 30.10.2019].
UNDP, United Nations Development Programme (2017): *Desiguales. Orígenes, cambios y desafíos de le brecha social en Chile.* URL: https://www.elmostrador.cl/media/2017/06/libro-desiguales-del-PNUD.pdf [accessed: 7.1.2020].
UPI, Umwelt- und Prognose-Institut (2019): *Ökologische Folgen von Elektroautos - Ist die Förderung von Elektro- und Hybrid-Autos sinnvoll?* URL: http://upi-institut.de/upi79_elektroautos.htm [16.5.2020].
USGS**,** US Geological Survey **(**2020): *Lithium Mining in Salar de Atacama, Chile*. Reston.
USGS, US Geological Survey (2019): *Mineral Commodity Summaries 2019.* Reston.
USGS, US Geological Survey (2017): *Mineral Commodity Summaries: Lithium.* Reston.
VCI, Center of Automotive Management (2018): *Prognostizierter Anteil der Neuzulassungen von Personenkraftwagen mit Elektroantrieb an den gesamten Neuzulassungen in ausgewählten Regionen in den Jahren 2020 bis 2030.* URL: https://www.vci.de/themen/energie-klima-rohstoffe/elektromobilitaet/automobilzulieferer-muessen-sich-anpassen-studie-zur-elektromobilitaet.jsp [2.1.2020].
Vollrath, David (2014): *Bergbau-Boom in Lateinamerika. Problemlagen, Konflikte und Regulierung.* URL: https://www.fdcl.org/wp-content/uploads/2015/05/FDCL-Bergbau-Boom-in-Lateinamerika.pdf [accessed: 12.10.2019].
West, James (2019): *Lithium: The New Oil.* URL: http://www.24hgold.com/english/news-gold-silver-lithium-the-new-oil.aspx?article=18078328332H11690&redirect=false&contributor=James+West&mk=1 [accessed: 27.12.2019].
Wietschel, Martin/Kühnbach, Matthias/Rüdiger, David (2019): *Die aktuelle Treibhausgasemissionsbilanz von Elektroautos in Deutschland*. Working Paper Sustainability and Innovation, S 02/2019. Karlsruhe.
Wissen, Markus (2019): Kommodifizierte Kollektivität? Die Transformation von Mobilität aus einer Polanyi'schen Perspektive. In: Dörre, K., Rosa, H., Becker,

K., Bose, S., Seyd, B. (eds.) *Große Transformation? Zur Zukunft moderner Gesellschaften*. Springer VS, Wiesbaden.
Zeit Online (2017): *Endstation Reichtum* (27.6.2017). URL: https://www.zeit.de/wirtschaft/2017-06/chile-neoliberalismus-armutsgrenze-wirtschaft-reichtum/komplettansicht [accessed: 8.1.2020].
Zimmer, Wiebke/Blanck, Ruth/Bergmann, Thomas/Mottschall, Moritz/ von Waldenfels, Rut/Cyganski, Rita/Wolfermann, Axel/Winkler, Christian/Heinrichs, Matthias/Dünnebeil, Frank/Fehrenbach, Horst/Kämper, Claudia/Biemann, Kirsten/ Kräck, Jan/Peter, Martin/Zandonella, Remo/Bertschmann, Damaris (2016): *Renewbility III: Optionen einer Dekarbonisierung des Verkehrssektors – Endbericht.* Öko-Institut, DLR, Institut für Energie- und Umweltforschung (ifeu), INFRAS. Berlin.

Imprint

Editors:
Sigrid Betzelt, Eckhard Hein (lead editor), Martina Metzger, Martina Sproll, Christina Teipen, Markus Wissen, Jennifer Pédussel Wu, Reingard Zimmer

ISSN 1869-6406

Printed by
HWR Berlin

Berlin June 2020