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The resource-making state: liquefied natural gas production networks and state strategies for domestic market development in Indonesia

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Abstract: In this paper, we suggest that Global Production Network (GPN) scholars have yet to deal more substantively with how nation-states, often in alliance with firm actors, actively work to create markets for resources in global production networks. We argue in this paper that GPN scholars should be better attuned to both resource-making interventions and the governance of market development. Resource-making highlights the heterogeneity of the biophysical characteristics of physical entities which entails that certain natures are not readily made available as commodities in markets, but require specific infrastructures, technology, and organizational structures for commercialization. When private capital fails to create markets for resources on its own initiative, states may intervene by facilitating resource-making and governing market development through configurations of ownership, commodification, and risk allocation. In this paper, we explore how the relationship between resource-making and market governance shapes the possibilities and limitations for state strategies in global production networks. Our discussion in the paper is informed by an empirical case study of failed plans by the Indonesian government from 2016 to 2019 to draw upon public-private partnerships to create markets for LNG in the peripheral regions of the country. Despite Indonesia's status as a globally significant LNG exporter, we find that the interorganizational structures and infrastructure needed to deliver natural gas to markets in peripheral regions contradict with the configurations of ownership, commodification, and risk allocation through which the Indonesian government has sought to realize state strategies, thus resulting in the underdevelopment of liquefied natural gas markets in Indonesia.

Keywords: global production networks; governance; resource-making; natural gas; Indonesia

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1 Introduction

Since the 1990s, economic geographers have drawn upon the Global Production Network (GPN) approach to highlight the diversity of organizational and spatial arrangements through which a range of actors interact across multiple geographic locations to produce goods and services for worldwide markets (Coe and Yeung 2015; Henderson et al. 2002). Inherent within the networked and space- and time sensitive conceptualization of GPNs is the notion that the spatial and inter-organizational configuration of GPNs is continuously evolving (Bridge and Bradshaw 2017; Coe et al. 2008). To explain the evolution of GPNs, scholars have typically emphasized the strategies and practices of lead firms and their suppliers (Bridge and Bradshaw 2017; Coe and Yeung 2015). However, several scholars have also attributed particular significance to nation-states as key actors that shape the evolution of GPNs and have more recently accounted for how states actively create and govern markets in global production networks through a variety of institutional forms such as state-owned enterprises and public-private partnerships (Dodge 2020; Glassman 2011; Mayer and Phillips 2017; McGregor and Coe 2023; Smith 2015; Werner 2020).

Exploring how states create and govern markets in alliance with private actors and/or through state-owned enterprises is particularly relevant taking into consideration what Gong et al. (2022) pinpoint as a contemporary juncture at which crises and shocks, geopolitical uncertainties, climate change, and new technologies are instigating a multifaceted transformation of global economic activities. Through these transformations, the state has increasingly played a role in shaping market development in global production networks for specific resources and technologies through varying degrees of derisking and/or state participation in markets through state-owned enterprises and state-led public-private partnerships (Dodge 2020; Gabor and Sylla 2023; McGregor and Coe 2023; Wijaya and Camba 2023). Many of the responses to crises and shocks are related to material transformations which rely on complex, capital intensive infrastructure to bring resources to market as is the case in sectors such as natural gas, carbon capture

and storage, and hydrogen (Coe and Gibson 2023; Hunt and Tilsted 2024; Steen et al. 2024).

A key focus in scholarship on global production networks is the role of material transformations and resource-making in shaping interfirm and spatial dynamics in global production networks (Bridge and Bradshaw 2017; Gibson and Warren 2016; Hudson 2008; Irarrázaval 2020). Resource-making entails accounting for the heterogeneity of the biophysical properties, scarcity, or ecological contradictions surrounding nature and physical entities and the various specialized technological and financial interventions in different industrial sectors deployed to produce, value, and commercialize resources for markets (Bridge 2008; Gibson and Warren 2016; Irarrázaval 2020; Irarrázaval and Bustos-Gallardo 2018). We note that the literature has yet to explore the relationship between resource-making and state strategies for market development, and therefore the key question in this paper is: *how does the relationship between resource-making and market governance shape the possibilities and limitations for state strategies in GPNs*. To further explore this question, we analyze three critical dimensions: ownership, commodification and risk allocation. We argue in this paper that the configuration of these three dimensions constitute the mechanisms through which resource-making interventions are intertwined with market governance in ways that shape market development outcomes.

The theoretical framework presented in the paper is informed by an empirical case of state strategies from 2015 to 2019 in Indonesia for developing domestic markets for liquefied natural gas (LNG) in the more peripheral regions of the country. Although Indonesia has historically been one of the world's largest exporters of LNG, inter-organizational dynamics and practices in LNG production networks have limited domestic market development in Indonesia. More recently, however, global LNG production networks have become more flexible and geographically diversified than they have been in the past, resulting in the possibility for reshaping the geography of LNG markets (Bridge and Bradshaw 2017; Dodge 2020). Within this context, the Indonesian government has sought to draw upon state-led public-private partnerships for domestic natural gas development, while simultaneously trying to take advantage of emerging practices and organizational dynamics to secure more flexible contracts from LNG suppliers. In our empirical study, we find that the Indonesian government has struggled to develop domestic markets for LNG in the peripheral regions in the country due to contradictions between market governance and resource-making.

In the following sections, we develop our conceptual framework on the relationship between resource-making

and governance by first theoretically addressing how and why states intervene in market creation in global production networks. We then draw upon scholarly work on resource-making which we use to explore the relationship between resource-making and market governance through three critical dimensions: ownership, commodification, and risk allocation. We then outline our conceptual framework which we coin: *the resource-making state*. The discussion is continued by analyzing the empirical case of strategies for domestic market development for LNG in Indonesia.

2 Theory

2.1 Market development and state strategies in global production networks

Since the outset of the GPN approach, states have been considered significant actors in shaping and capturing value from GPNs, particularly in relation to natural resources which are often embedded in the proprietorial, institutional, and cultural-political structures of nation-states (Bridge 2008; Bridge and Dodge 2022; Coe et al. 2008; Stephenson and Agnew 2015). GPN scholars have explored the variety of roles (facilitators, regulators, producers, and buyers) that states play in enabling the conditions for capital accumulation in GPNs (De Marchi and Alford 2022; Horner 2017). More recently, scholars have explored the role of states in governing market development in global production networks (Alford and Phillips 2018; Dodge 2020; Horner 2017). For example, Horner (2017) notes how states, through public procurement, often make large-scale purchases from private firms which constitute considerable opportunities for market development in GPNs. While sustaining market development is a key competitive dynamic driving the evolution of firm strategies and inter-organizational dynamics in GPNs (Coe and Yeung 2015), private firms may insufficiently allocate resources to market development in ways that address societal challenges (climate change, regional disparities, etc.) due to risk aversion, coordination failures and focus on short-term gains (Mazzucato 2015). In these cases, states may intervene in market development through various schemes and mechanisms ranging from early-stage funding, loans and guarantees, subsidies, tax incentives, etc. The state is particularly prevalent in developing markets where lumpy investments¹ in capital intensive

¹ Lumpy investments is a financial term for large long-term investments that are difficult to liquidate as assets can not be easily divided or sold in parts (Jiao and Zhang 2022).

infrastructure is required to deliver essential goods and services to consumers (Bakker 2003; Bridge et al. 2018). In countries with significant disparities regarding the access and affordability of infrastructure, infrastructure development can be closely tied with the project of nation-building (Bridge et al. 2018).

2.2 Resource-making in global production networks

Thus far, the focus on the role of the state in market development in global production networks has largely focused on various state actions and mechanisms where the state is a key procurer of goods or services or facilitates market development in the private sectors through various incentives and schemes (Alford and Phillips 2018; Horner 2017). In various industrial sectors market development is not only a question of resource allocation to address societal needs, but also a matter of material transformations and resource-making, where physical entities and nature are not easily produced and consumed as resources without significant technological and financial interventions (Bridge 2009). The provision of energy and water, management of waste, carbon capture and storage are all examples of sectors where nature/physical entities must be transformed into resources before they can be commercialized through markets. In such cases, attention should be paid to the processes of resource-making in global production networks.

Accounting for resource-making processes entails attention to the different technological, organizational, and political interventions that different firm and non-firm actors deploy to transform physical entities and nature into exploitable resources that can be owned, commercialized, and commodified in markets (Irarrázaval 2020; Valdivia et al. 2021). At the outset, resource-making entails that not all natures are immediately and easily accessible as resources, but whose “becoming” as a resource are co-constituted with the knowledge, technologies, infrastructures, and valuation systems deployed by firm and non-firm actors to bring resources to markets (Richardson and Wszkalnys 2014). Resource-Making is inherently non-deterministic, materials may be transformed into resources in a myriad of ways, the presence, form, character, and meaning of which are politically and historically constituted. At the same time, processes of resource-making are shaped by the materiality of nature and physical entities which refers to the ways in which their biophysical characteristics are implicated in the biological, chemical, and mechanical processes involved in the material transformations and the social relations by

which resources are produced, transported, and consumed (Bakker and Bridge 2006; Hudson 2008).

While resource-making opens for non-reductionist perspectives on nature-society relations, it can also be equipped for identifying and explaining political-economic possibilities and limitations by exploring the ways in which materiality “enables and constrains the social relations necessary for resource production” at specific historical and geographical junctures (Bakker and Bridge 2006, p. 21). In the global production network literature, Irarrázaval (2020) builds upon the resource-making literature to compare inter-firm dynamics in the natural gas industry in Bolivia and Peru. Irarrázaval (2020) unpacks how the greater depth and higher quality of natural gas deposits in Bolivia which required more specialized drilling services for a longer period, in combination with a more proactive state in developing supporting infrastructure and attracting foreign investment, led to the development of a more robust and specialized local supplier industry in Bolivia in comparison to Peru. Similarly, Bridge (2008) notes that states play a key role in the production of oil as they have often proprietary rights over natural resources and are involved in configuring relations of control and appropriation within GPNs.

The focus of Bridge (2008) and Irarrázaval (2020) is primarily on how states work facilitate the production of resources, and less on how states actively shape markets for natural resources. As Dodge (2020) notes, nation-states can also play a crucial role in reconfiguring the positionality of resource peripheries in global production networks from exporters to emerging markets by creating domestic markets for resources. Here the question is then on market governance and the relationships between public and private actors by which markets for resources are created.

2.3 Market governance in global production networks

In the GPN literature, several scholars have observed that state roles tend to combine and overlap with forms of private governance in ways that shape global production networks (Dodge 2020; Hess et al. 2021; McGregor and Coe 2023). McGregor and Coe (2023) conceptualize the blending of public and private governance as ‘hybrid governance’, which refers to the “ways in which the diverse apparatuses of the state operate, intersect, and come together in the governance of GPNs” (McGregor and Coe 2023, p. 718). Through hybrid governance, states play different roles (regulators, producers, investors, buyers, etc.), pursue different levels of ownership (minority interest to full ownership), and exercise various degrees of control (active or passive) in the pursuit of realizing specific state strategies. Hybrid governance

is part of a broader trend of state capitalism where states are increasingly playing a more active role as promoter, supervisor, and owner of capital (Alami and Dixon 2024). In this paper, we conceptualize market governance as a particular form of hybrid governance, where states, together with firms, shape the development of markets in pursuit of policy objectives. Following the work of Jessop (1999) on governance, we posit that the extent to which market governance is successful is dependent upon the capacity of both firms and governments to jointly govern and coordinate complex inter-organizational networks to balance the realization of political strategies with the processes of capital accumulation in markets.

2.4 Ownership, commodification, and risk allocation

To explore how resource-making is implicated in the possibilities and limitations for the governance of market development in global production networks, we outline three critical dimensions: ownership, commodification, and risk allocation, that constitute the mechanisms by which market governance and resource-making are intertwined in ways that shape market development outcomes. Within scholarship on critical resource geographies, ownership and commodification have been central questions to exploring the political economy of nature (Bakker 2005; Castree 2003; Valdivia et al. 2021). Here scholarship has focused neoliberalism and privatization, but state-capitalism has revived interest on relations between public and private ownership in market development (Christophers 2024; McGregor and Coe 2023). At the same time, scholars examining energy transitions have been particularly focused on the role of state-owned enterprises, public-private partnerships and “de-risking” – placing a greater emphasis on complexity of public-private relations and risk allocation (Christophers 2024; Gabor and Sylla 2023; Hunt and Tilsted 2024). As we will discuss in the rest of the section: ownership, commodification, and risk allocation are highly intertwined and co-dependent, such that the causal power of the three dimensions is a function of their particular configuration and combination in different cases.

2.4.1 Ownership

Economists have long recognized that the production and delivery of certain kinds of resources to markets in certain sectors (natural gas, electricity, water) require high-fixed costs, economies of scale to lower the cost-per unit, and networked-infrastructures resulting in natural monopolies

(Mosca 2008). Historically, natural monopolies as a market failure have justified public-ownership in sectors with high-fixed costs, reliant on economies of scale to reduce per unit costs. For example, Christophers (2024) notes that due to the “unruliness” of electricity (where electricity systems require constant grid balancing), electricity was historically overwhelmingly publicly owned by vertically integrated state enterprises.

High-debt levels and structural adjustment programs initiated by the IMF/world bank have led to a wave of privatization in different sectors typically controlled and managed through public-ownership in different parts of the world (Harvey 2017). In sectors where market failures are rife, public-private partnerships (PPP) have been instituted as a key mechanism for states to attract private investment in public infrastructure while avoiding market failure and securing socially necessary infrastructure, particularly in peripheral areas deemed “uneconomic” by private capital (Bakker 2005). Through PPPs, states play an active role in creating markets for public services and infrastructure in global production networks by offering long-term contracts to third-parties, usually after a bidding process (Birch and Siemiatycki 2016). While PPPs typically fits within the mantra of neoliberal governance, several scholars have noted how PPPs are becoming increasingly state-led, where state-owned enterprises in conjunction with private partners or other state-owned enterprises drive infrastructure development to advance state development objectives (Anguelov 2024; Jones and Bloomfield 2020; Wijaya and Camba 2023).

Through emerging trends in state capitalism, the state becomes an active market participant, competing and/or partnering with private sector actors to advance state-led alternatives when market-based models fail to address development needs (Anguelov 2024). A key dimension of state-led PPPs is the extent to which certain public or private actors have a monopoly over certain markets, how that monopoly power is perused, and according to which objectives (Wijaya and Camba 2023). An exploration of ownership in PPPs should evaluate the extent to which state-owned enterprises are involved, to what extent is state-ownership is wielded to pursue state objectives, and the extent to which the capacity to pursue state development objectives is shaped by the monopoly power of state-owned enterprises (McGregor and Coe 2023).

2.4.2 Commodification

Public-private partnerships in key industrial sectors such as energy and water has opened for a market in global

production networks by privatizing the ownership and control of key infrastructures in waste management, electricity generation, waterworks, etc. Nevertheless, as Bakker (2005) explains, while privatization through PPPs of certain sectors is often intended to bring public infrastructure into markets, one needs to make the distinction between privatization and commodification. Whereas privatization involves a transfer of ownership from the public sector to private sector, commodification is a process of turning resources into an economic good that can be traded in a market.

Commodification involves transforming goods or services into economic products by applying processes that standardize and appropriate them, allowing these products to be sold at market-determined prices. According to Bakker (2005), a key element of transforming a public good into a commodity sold in markets involves both privatizing and unbundling public monopolies and into separate entities that can handle different stages of production and distribution. This is crucial for commodification as it introduces competition and facilitates the development market mechanisms such that prices for resources are determined by market actors rather than state actors (via tariffs). Bakker explains that some resources, such as water, are difficult to commodify due to its materiality. In her research on the failure of the British state to commodify water, Bakker notes that water is an “uncooperative commodity” as it is a heavy resource that is cheap to store but expensive to transport relative to unit volume – thus requiring extensive, localized infrastructure making it difficult to trade across long distances and to “unbundle” the management of water systems.

While commodification in certain sectors may be difficult, it is often made possible through extensive regulation and forced unbundling as Christophers (2024) explains has been the case with wholesale electricity markets in countries such as the UK. Bridge and Bradshaw (2017) explain that in global gas markets, the commodification of liquefied natural gas is not only a question of vertical disintegration of producer and buyer monopolies in the natural gas production networks, but also a matter of evolving network practices from long-term supply and purchase agreements between buyers and sellers to short-term, flexible contracts along different parts of the LNG value chain. As we will discuss in the next section, commodification is highly related to risk allocation between public and private partners.

2.4.3 Risk allocation

The perception and management of risk is a key driver of firm strategies in global production networks because it influences organizational decision-making processes,

shapes strategies choices, and impacts the spatial and organizational architecture of global production networks (Coe and Yeung 2015). Depending on the industrial sector, certain infrastructures have different risk profiles related to the stability/volatility of markets and the cost structure of projects (Christophers 2024). Christophers notes how wind and solar, despite having lower costs than coal or natural gas power plants, are less attractive as investments due to the high-fixed capital costs and inability to produce electricity on demand (particularly when market prices are high), entailing higher risks related to revenue streams. In another sector, Hunt and Tilsted (2024) notes that high capital costs, combined with high operational and safety risks regarding handling and transporting hydrogen in addition to the lack of an established market creating financial uncertainty has entailed the need for state intervention in the creation of hydrogen markets.

PPPs are often promoted by international financial institutions as a technocratic fix by which public entities may transfer operational, delivery, and financial risks onto the private sector by relinquishing ownership over assets (Hodge 2004). However, this portrayal obscures the political nature of risk allocation, where governments in pursuit of state objectives may be expected to make certain infrastructure projects “bankable” by derisking projects to reduce uncertainty and fit projects into the risk-return preferences of developers (Hunt and Tilsted 2024; Wijaya and Camba 2023). Christophers (2024) notes that state subsidies such as feed-in tariffs and cost-for-difference schemes stimulated investment in wind and solar power generation not only because they cushioned the profits of private developers, but because they ensured guaranteed revenue streams which reduced financial uncertainty. Gabor and Sylla (2023) notes how the Namibian government uses public private partnerships and blended finance (combining public, private, and philanthropic capital) to reduce the risks of green hydrogen projects to attract private investors and develop a green hydrogen economy.

Questions on how risk is allocated between states and private actors regarding the delivery and consumption of resources in markets will be highly related to commodification. As Dodge (2020) and Bridge and Bradshaw (2017) exemplifies in the natural gas sector, vertical disintegration in global LNG production networks has led to commodity traders playing a growing role in off-taking market risk in LNG spot markets by arbitraging trade between different markets and offering flexible supply agreements to customers. Thus, in sectors with more mature and liquid commodity markets, private actors may not require the state to “derisk” market development.

2.5 The resource-making state

Firm actors in global production networks, particularly those with low costs and high capabilities, are continuously driven to develop new markets and to benefit from first-mover advantages in terms of market creation (Coe and Yeung 2015). However, with the rise of state capitalism, climate change, and geopolitical positioning, states are likely to be driven to play a larger role in market development in key industrial sectors where resource-making entails high capital costs and high risks, and the private sector is either unwilling or unable to develop markets without state intervention (Alami and Dixon 2024; Christophers 2024; Gabor and Sylla 2023; Mazzucato 2015). We coin the term *The resource-making state* to describe state with governments that play an active role in resource-making and governance related to the development of markets.

Based on the literature review presented earlier and the findings from our empirical study which will be presented in the later sections, we conceptualize that resource-making states will play two key roles in global production

networks related to market development and creation: a) facilitating resource-making by supporting the implementation of key technologies and infrastructures related to the production, transport, and delivery of resources (instead of other, alternative technologies) and b) Governing market development by jointly coordinating, together with private firms, complex inter-organizational networks to balance the realization of political strategies with the processes of capital accumulation in market. The configurations of ownership, commodification, and risk allocation constitute the mechanisms that determine the extent to which resource-making and market governance are successful in shaping market development outcomes in global production networks. Figure 1 below outlines our conceptual framework for the resource-making state.

As explained previously, the biophysical characteristics of certain natures (water, natural gas) and physical entities (electricity, hydrogen), such as their density, weight, energy content, etc. will entail the need for specific infrastructures and technologies for their commercialization in

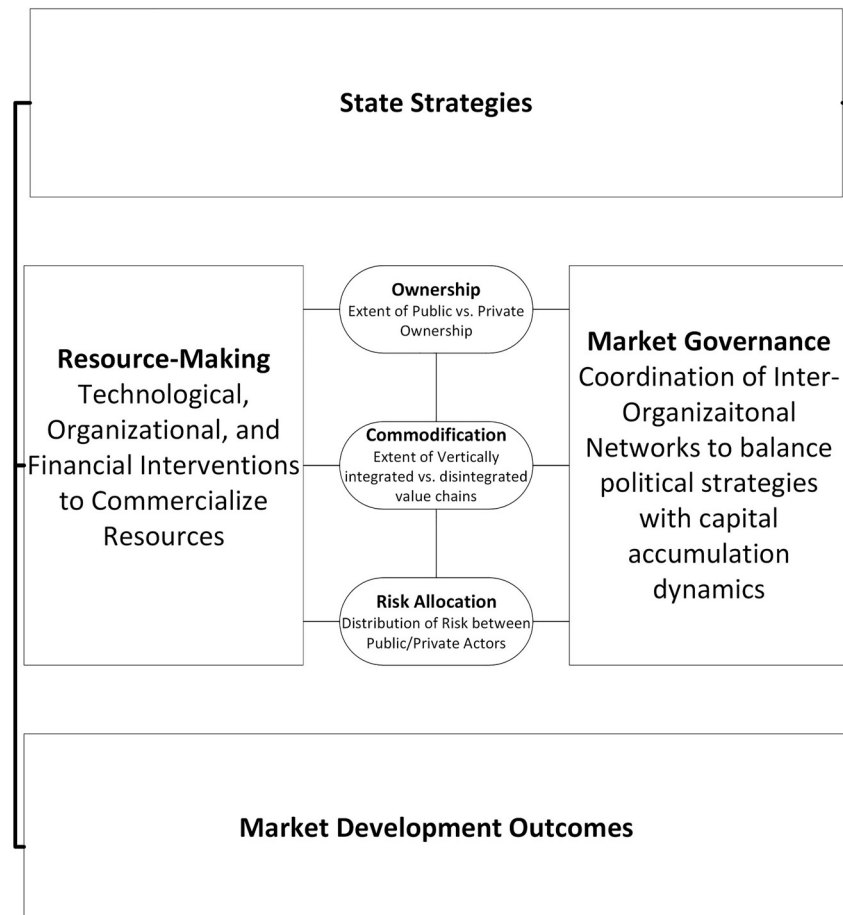


Figure 1: Conceptual framework of the resource-making state: own illustration.

markets. While the specific infrastructure and technologies required will change based on technological and organizational development over time, resource-making as a process will nevertheless have implications for state-capital relations regarding ownership, commodification, and risk allocation. Resource-making in certain sectors may entail capital intensive infrastructure, high transport costs, networked infrastructures, etc. which in turn has implications for market failures, risk and uncertainty, and profitability in delivering resources to specific markets.

Resource-making will then have implications for the extent of public and/or private ownership, the extent of vertically integrated or disintegrated value chains, and the allocation of risk between parties. If private parties are unwilling or unable to develop markets due to capital intensive and lumpy investments in the infrastructure needed for resource-making, states may have the option (or a combination of options) to a) publicly invest in infrastructure and procure resources through public ownership b) exert monopoly power through state-ownership (in electricity markets and/or resources) to coerce private enterprise to invest in infrastructure and deliver resources to markets or c) “de-risk” private investment to facilitate market development.

Resource-making states, in conjunction with private capital, may see the delivery of resources through vertically integrated monopolies or through privatized, vertically disintegrated value chains that unbundle the ownership of different infrastructures and services. Vertical disintegration can facilitate commodification, allowing goods to be traded in markets, however this will be dependent on the practices coordinating the relationship between buyers and sellers (i.e. long-term, inflexible or short term, flexible supply and purchase agreements). Commodification is related to risk allocation as the extent to which states can distribute risk to private partners in certain sectors may depend on the extent to which private partners can hedge their risk through commodity trading. Certain resources, however, will present difficulties to the processes of commodification, and therefore commodification will be shaped by resource-making processes.

While highly interrelated and dependent upon each other, the configurations of ownership, commodification, and risk allocation that states draw on will vary based on ideological, political, and economic reasons related to state strategies. Nevertheless, the success of these strategies will ultimately depend on the alignment of public-private interests. In the following sections we will draw on an empirical case of state strategies for LNG market development in the peripheral regions of Indonesia to highlight the strategies

and resource-making practices behind the particular configurations of ownership, commodification, and risk allocation used by the Indonesian government for market development, and show the contradictions between resource-making and governance that led to project failure.

3 Methods and data

The theoretical framework presented in the paper is informed by an empirical case of state strategies from 2015 to 2019 in Indonesia for developing domestic markets for liquefied natural gas (LNG) in the more peripheral regions of the country. In the remainder of this paper, we will use this empirical case to outline further the implications of resource-making practices for the governance of market creation in GPNs. By using a case study, we aim, following Yin (2014), to examine a real-world phenomenon that is embedded in its context, and we use the case for conceptual development by inductively deriving patterns from observed data. This case is, for several reasons, interesting for understanding the dynamic between resource-making and the governance of market creation. First, in the time period of the empirical case study, a surplus of capacity in global LNG production combined with lackluster demand in mature LNG markets led to interesting developments regarding technology development and commodification that was reshaping the geography of LNG markets (Bridge and Bradshaw 2017). Second, the election of Joko Widodo, saw a regime change in the Indonesian government, where the state played a more interventionist, developmentalist role which is resemblant of a wider phenomenon related to state capitalism in the global economy (Alami and Dixon 2024; Warburton 2016). Accordingly, using this case, we aim to combine conceptual development with a context-sensitive approach and thus contribute to a deeper understanding of how state strategies interact with resource-making and evolving market imperatives in LNG production networks.

The empirical data used to gain insight into this case was collected following Yin’s suggestion to draw upon from data multiple sources, including documents, interviews and research literature. Data collection and analysis follows what Yeung (2003) describes as a process-based methodological framework to conduct *in situ* research which involves triangulating interviews with different data sources (interviews, document analysis, research articles, grey literature, etc.), to gain a deeper understanding of the context for economic actions and to verify the consistency and accuracy of findings from interviews. A detailed desktop study

drawing on grey literature, research articles, newspaper articles, and government documents generated insights into changing paradigms in LNG production networks, a historical analysis of market development in Indonesia, and government plans for LNG market development was key in developing a causal explanation on why LNG projects in Indonesia failed and to develop the critical dimensions presented previously in the conceptual framework. The desktop study was informed by and supplemented with 24 in-person interviews conducted in 2016 as part of a larger project on LNG market development in Southeast Asia with executive managers at LNG-related firms in Upstream (oil company, EPC management), midstream (commodity trader and ship-owners) and downstream (storage terminal owners/operator, regasification terminal owners/operator, state-owned utilities) parts of the value chain. Most of these firms had their base of operations in Singapore, but a couple interviews were also conducted with state-owned electricity and natural gas utilities in Jakarta. Content analysis of the interview material focused on identifying the challenges and disagreements between the government and companies involved in the LNG projects in Indonesia. Given the lack of involvement of regional authorities and actors in the LNG market development plans due to the centralized nature of governance in the natural gas sector in Indonesia, the analysis primarily focused on the national level.

4 Background: Natural gas as an uncooperative commodity and historical limitations to market development in Indonesia

Before we present our empirical case study of LNG projects in Indonesia, we start by discussing historical resource-making processes in the LNG industry and why market development for LNG in Indonesia has been limited to provide context for the case study. Bridge (2004) describes natural gas as an uncooperative commodity, as the energy density of uncompressed natural gas is 958 times less than the density of diesel, and therefore substantial amounts of natural gas must be transported to generate equivalent amounts of energy. Until the 1970s, the difficulty of commercializing natural gas entailed that natural gas played only a minor role in the Indonesian petroleum industry (Mehden and Lewis 2006). This situation changed in 1971 when the Mobil Oil Corporation discovered the Arun natural

gas field in Northern Sumatra (Mehden and Lewis 2006). At the time, the majority of natural gas around the world was mainly transported through pipelines; however, authorities perceived that the Arun gas field was too far from population centers in Indonesia and domestic demand was too low and too distributed to warrant the development and financing of pipelines.

While commercializing Indonesian natural gas assets was difficult, it was not impossible. Natural gas in Indonesia was made exploitable by cryogenically liquefying natural gas so that it could be shipped and exported to Japan (Mehden and Lewis 2006). The material transformations within LNG production networks that make natural gas into an exploitable resource, i.e. resource-making, can be characterized by the transformation and management of the thermodynamic entropy of natural gas. First, LNG is produced at liquefaction facilities by cryogenically cooling natural gas below its boiling point of -163°C (Tusiani and Shearer 2007). Second, LNG is loaded onto carriers specifically designed to insulate and handle the cryogenic liquid during transport. Third, LNG is offloaded at import terminals, where it is stored in cryogenic tanks and later regasified for use in power plants and other end users. Throughout the GPN, LNG has the tendency to “boil-off”, which in turn increases the pressure and heat of the cargo. Therefore, boil-off gas must be removed from the tank and reliquefied or used as fuel (Tusiani and Shearer 2007).

Managing the thermodynamic entropy of natural gas requires specialized equipment and personnel for operation and a high degree of compliance with standards and regulations for safety. Thus, the infrastructure and operations necessary to commercialize natural gas in LNG production networks is extraordinarily capital intensive, and daily shipping and storage costs are high. Consequentially, compared with other production networks wherein logistics account for 10 to 15 percent of the final cost of the finished products (Coe 2014), logistics (liquefaction, shipping and import) account for nearly 85 percent of the final costs in LNG production networks (Corbeau and Ledesma 2016). High logistical costs entails that in order to reduce costs per unit and therefore generate surplus value, LNG producers generally increased the size of liquefaction terminals, ships and import terminals to develop economies of scale in LNG projects (Songhurst 2014). Historically, the consequence of resource-making interventions in LNG production networks has entailed that domestic markets in Indonesia have been excluded. Most of the natural gas consumed domestically in Indonesia is transported via pipelines, however pipeline infrastructure is largely limited to the western parts of the country in Sumatera and Java. In 2015,

Indonesia produced 919,723 million standard cubic feet (MMSCF) of LNG, but only 9 % (106,066 MMSCF) was used domestically (ESDM 2016). LNG infrastructure for domestic market consumption was largely limited to the central regions of Java and Lampung at the time of the empirical study.

We identify two key limitations for domestic market development in the peripheral regions in Indonesia. The first key limitation for utilizing LNG for energy development in Indonesia has been that the population is fragmented and dispersed across numerous islands in the archipelago nation. Delivering LNG to multiple islands in Indonesia would require the development of capital-intensive harbor infrastructure and regasification terminals. Physical distance and low rates of consumption limited the possibility of achieving economies of scale; therefore, producers have generally excluded small, lower income demand centers from production networks in favor of higher-income urban markets in countries such as Japan and South Korea. The second key limitation of LNG markets in Indonesia has been that to secure financing for infrastructure, investment decisions by lead firms (usually globally significant O & G majors and national O & G companies) for LNG projects have traditionally been underpinned by guaranteed revenue via take-or-pay clauses in contracts (Corbeau 2016; Corbeau and Ledesma 2016). Take-or-pay clauses can be conceptualized as network practices where buyers, usually regulated or state-owned natural gas utilities, are obligated to pay for contracted volumes of LNG over a 15- to 20-year period, even if the buyer does not need these volumes. Take-or-pay forces the buyer to assume the risk of investments in LNG production facilities, transport, and import terminals by guaranteeing to pay regardless of the actual market demand over a long-term period. The Indonesian government subsidizes electricity through tariffs, and compared with buyers in higher-income countries that pass costs onto customers, a significant financial risk is associated with signing long-term contracts with take-or-pay conditions (Corbeau and Ledesma 2016; Seah 2014). Signing such contracts implies that the government needs to assume the risk of shocks to energy demand, such as during an economic downturn, by continuing to pay for contracted volumes – even if the LNG cargos are not needed – or pay a fine. The consequence of these arrangements is that LNG production infrastructure in Indonesia was dedicated to specific export-oriented, long-term contracts. However, as we will discuss in the next section, new state strategies have emerged where domestic utilization of natural gas in the peripheral regions of the country is prioritized.

5 Developing natural gas markets in Indonesia through resource-making and market governance

5.1 State strategies for market development

In an annual independence day speech in 2016, the president of Indonesia, Joko Widodo (Jokowi), claimed that “We will develop areas such as Entikong, Natuna, and Atambua so that the world sees Indonesia as a great nation that pays attention to every inch of its land” (The Business Times 2016). Jokowi’s statement reflects a situation where large economic disparities persist between the core and peripheral regions of Indonesia despite high economic growth. During his 2015 presidential run, Jokowi promised to relieve poverty in Indonesia by “modernizing” physical infrastructure, particularly in rural Indonesia (Yusuf and Sumner 2015). Warburton (2016) characterizes Jokowi’s approach to governance as appeasing a nationalist, state-centric development narrative that was focused on reducing unprocessed mineral exports and enhancing the countries industrial capacity through infrastructure development. At the time, key challenges for national development included substantial energy infrastructure deficits and a high reliance on expensive imported fuel oil for electricity generation, particularly in the peripheral regions of the country (Ray and Ing 2016; Seah 2014). The use of fuel oil subsidies accounted for 18 % of government expenditure in 2014 (Seah 2014), which was considered by authorities as a significant hinder for increasing the electricity generation capacity needed for industrial development (ESDM 2016).

Between 2002 and 2015, LNG trade expanded from 100 million metric tons per annum (MTPA) to 248 MTPA (Bridge and Bradshaw 2017). As LNG demand in Japan, Korea, and China had been slowing, particularly after 2014, LNG producers were dependent upon the significant expansion of LNG markets in order to maintain their capital gains (Dodge 2020). In the context of emerging market imperatives in LNG production networks, President Jokowi’s government launched plans in 2015 to reconfigure the country’s energy system through a 35 GW (GW) fast-track power project to be installed by 2019, with 13 GW to be supplied by natural gas (see Figure 2 below) (Seah 2014). According to an interviewee at the national electricity utility, these plans were based on the government’s strategy to reduce the use of expensive fuel oil which was almost double the price of

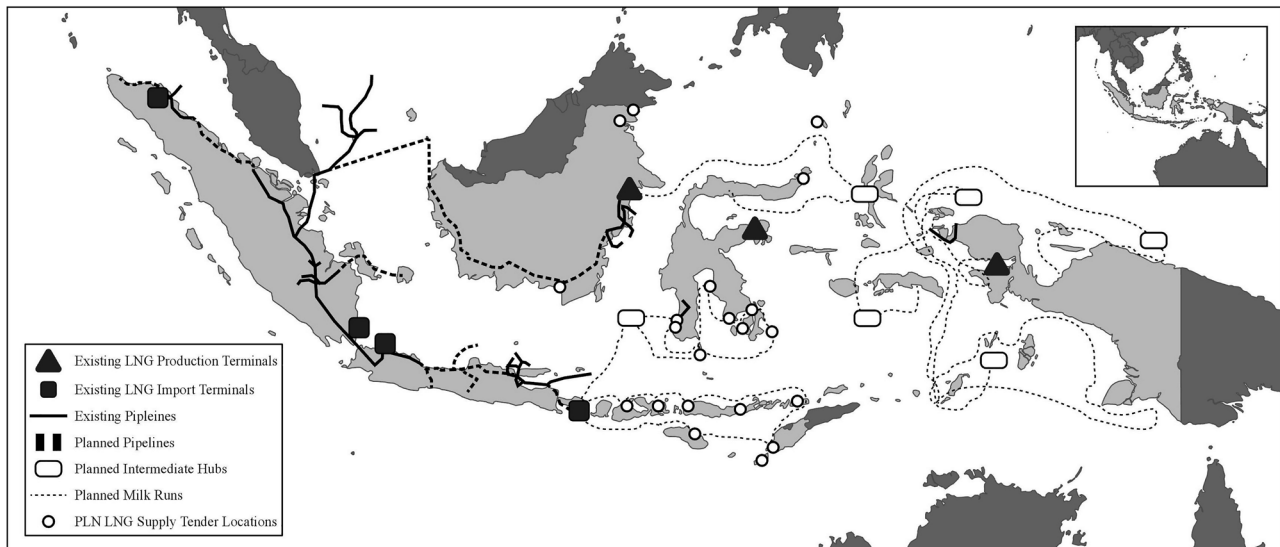


Figure 2: National gas infrastructure road map (drawn by authors based on plans from PLN).

LNG and to increase access to electricity, particularly in the peripheral regions of Indonesia. A report by a global energy consultancy, Wood Mackenzie, noted that replacing half of the current oil product consumption with LNG in the central and eastern parts of Indonesia would save the government nearly US\$365 million per year in fuel procurement² (WoodMackenzie 2015).

Despite the potential cost savings of replacing fuel oil with natural gas, a significant challenge for developing the nationwide distribution and supply of natural gas in Indonesia was the lack of infrastructure needed to distribute natural gas to domestic markets across the Indonesian archipelago (Choy 2011). To secure the financing and technology required for distributing natural gas to the peripheral regions of Indonesia, the Jokowi regime directed the state-owned electricity company, Perusahaan Listrik Negara (PLN), to launch a “request for proposals” for LNG supply to 21 power plants on the islands of Kalimantan, Sulawesi, and Nusa Tenggara in March 2015 (Poten and Partners 2015).

The LNG supply tender attracted considerable interest from major LNG-related companies, such as Shell, Gas Natural Fenosa, Marubeni Corporation, and Osaka Gas, who desired to capture value through market development opportunities (Hwee 2015). However, despite considerable interest in the project, interviews with LNG firms both directly and indirectly engaged with the PLN tender during the research period revealed that little progress was being made on the project and the tender was never awarded. In the next sections we will explore the intersection between

resource making and market governance to explore why the capacity of the Indonesian government to develop markets for LNG in the peripheral regions of the country was limited.

5.2 New resource-making strategies in Indonesia

While traditional resource-making processes have entailed the exclusion of peripheral markets from LNG production networks, the industrial relations by which natural gas has historically been produced and commercialized are not fixed. New technological interventions and infrastructures in global production networks may enable new possibilities and limitations for developing markets in previously excluded places in global production networks. As mentioned in Section 4, resource-making in LNG production networks relies on economies of scale to reduce logistics costs, which is why supplying LNG to small demand centers has been historically considered unprofitable. According to interviews with several LNG technology companies and a report published by the multi-national classification society DNV-GL, economies of scale and cost reductions can nevertheless be achieved by developing and utilizing intermediate storage hubs for the delivery of large LNG cargos and then aggregating the demand of urban locations with smaller, more remote islands through small-scale value chains (SSLNG) called “milk runs” (Choy 2011). Milk-Runs are defined as routes where small LNG carriers offload partial cargos to multiple supply points. The small-scale LNG value chain is visualized in Figure 3 below.

² at an oil price of \$85 per barrel.

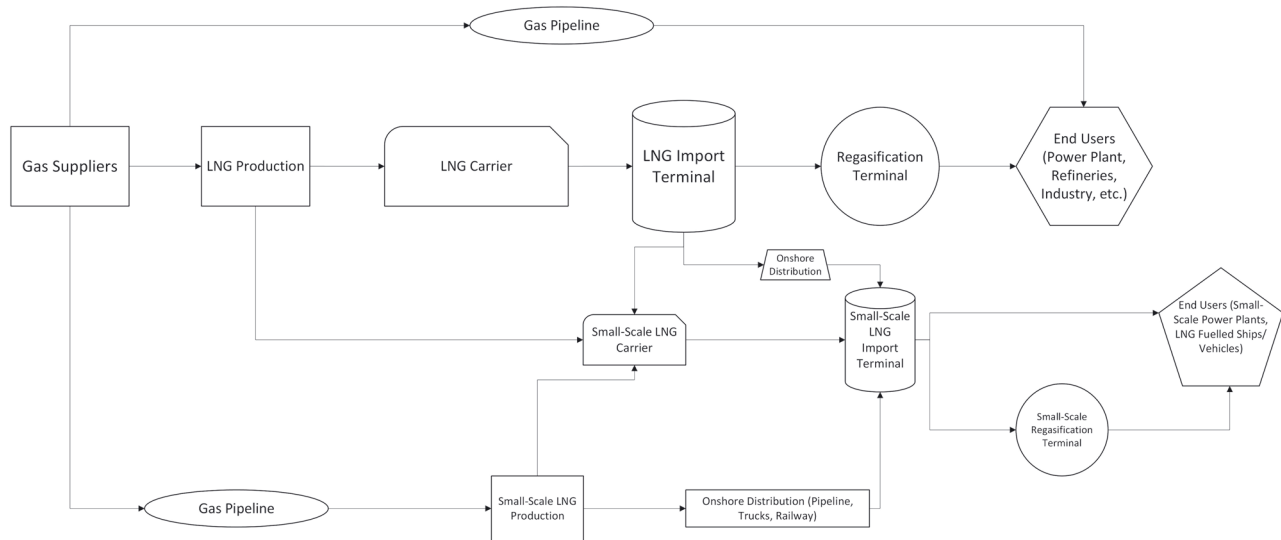


Figure 3: Diagram of small-scale LNG (SSLNG) value chain: own illustration.

Milk-runs make it economical to supply low-demand centers, by sharing infrastructure with high-demand centers. Another key resource-making intervention that makes supplying smaller demand centers more feasible was the development of floating storage and regasification (FSRU) facilities. According to interviews with technology suppliers, floating terminals removes the complications (such as permitting issues) related to onshore terminal construction, reduces costs, and allows for more flexibility as these terminals can be repurposed for use in other locations. In the LNG supply tender launched by PLN, the locations of the power plants included both high-demand centers, such as Makassar in Sulawesi (1.3 million people), and low-demand centers, such as Palau Rote in Nusa Tenggara (119,000 people). Whereas traditional large-scale LNG production networks have entailed that natural gas markets have largely been limited to large, urban demand centers, milk-runs and small-scale FSRUs open for developing markets for LNG in smaller, more peripheral demand centers that have historically been excluded from LNG production networks.

5.3 Ownership, commodification, and risk allocation in LNG market development

While small demand centers in Indonesia have been traditionally excluded from LNG markets due to the organization of LNG production networks around economies of scale and take-or-pay contracts, emerging market imperatives and resource-making interventions are reconfiguring such arrangements. As we will discuss in this section, the Indonesian government has sought to draw on state-led PPPs for LNG supply to small demand centers in Indonesia. As we

will discuss, issuing a tender to private parties does not entail a full privatization of LNG markets in Indonesia. On the contrary, state ownership remains a key part of pursuing state strategies. Based on the critical dimensions outlined in the theoretical section, we will now explore the particular configurations of ownership, commodification and risk allocation that constitute market governance in the Indonesian case.

5.3.1 Ownership

In Indonesia, PLN has a monopoly on the transmission and distribution of electricity in Indonesia, however it often buys electricity from independent power producers through power purchase agreements. According to a sales manager at an LNG technology firm, PLN has sought to leverage its monopoly position and purchasing power by requiring the winning bidders to supply LNG to all locations in the tender. The sales manager noted the following:

PLN, being a government organization, is in a position to do things in a different manner compared to an open market. I mean, if it was an open market, LNG would never take off, not in these circumstances.

Here the sales manager is referring to the fact that companies involved in the tender are largely uninterested in supplying LNG to small demand centers such as Palau Rote with low profit margins and would prefer to supply LNG directly to larger demand centers where profit margins would be higher. By utilizing PLN's monopoly power, the government is using state-ownership as a tool to coerce companies to supply all demand centers to achieve the governments infrastructure development objectives.

At the same time, PLN did not simply delegate the project to the state-owned oil and gas enterprise, Pertamina, which has the capacity to procure the necessary infrastructure for the project and is obligated to supply domestic markets through Government Regulation No. 55/2009 (Purwanto et al. 2016). Instead, PLN designed the project as a PPP based on a 10-year “build-operate-transfer” basis,³ with the initial investments and LNG supply secured by private developers. Shortly after the competitive auction for the tender was announced, 11 prequalified consortia were approved. An agreement with the winning bidder was expected to be signed in the middle of 2016, and operations were slated to commence by late 2018 (conveniently in time for the 2019 presidential elections) (Poten and Partners 2015).

PLN developed a strategy to secure financing and the best and most flexible terms and conditions for LNG supply across the Indonesian archipelago by actively creating markets and leveraging purchasing power for public infrastructure. As will be discussed more in the next section, the objective of perusing public-private governance rather than drawing solely on state-owned enterprises is rooted in the governments objective to allocate the risk of LNG projects to private partners.

5.3.2 Commodification

A key shift in LNG production networks is that established production networks for natural gas have been in a state of flux in the past decade. Bridge and Bradshaw (2017) note that the traditional organization of production networks is being disrupted through price volatility and emerging network development practices and, consequentially, LNG production networks are becoming more spatially diversified and organizationally fragmented. This trend is an outcome of vertical disintegration in LNG production networks where the ownership of liquefaction facilities is being separated from upstream gas production and ownership of LNG carriers and regasification facilities are separated from downstream gas buyers (Bridge and Bradshaw 2017; Corbeau and Ledesma 2016).

The expansion of LNG markets has greatly increased the liquidity and flexibility of LNG markets as producers began to build LNG terminals without fully dedicating production capacity to specific long-term contracts based

on increasing liquidity and allowing for commodification through sales in spot markets⁴ (Corbeau 2016; Corbeau and Ledesma 2016). FSRU technology has further improved the flexibility of LNG markets, as FSRUs can more easily be repurposed, reducing the “lumpiness” of investments in infrastructure. The growth in spot markets has allowed buyers to reduce take-or-pay obligations by purchasing LNG through market exchanges (Stern 2014). While spot market prices had been traditionally priced at much higher premiums than long term contracts, spot prices have decreased significantly since 2014 due to the boom in domestic shale gas production in the US and declining demand for LNG in Japan, Korea and China (Bridge and Bradshaw 2017).

As infrastructure has become less dedicated to specific long-term contracts between producers and buyer consortia, numerous major oil and gas corporations have invested in multiple liquefaction and regasification projects globally to reallocate risk and capture value along production networks. These investments have subsequently increased the liquidity and flexibility of LNG markets (Corbeau and Ledesma 2016). Such investments allow corporations to aggregate LNG supplies from different sources into “portfolios”, which are then shipped to the most favorable destinations instead of dedicating LNG projects to particular customers (Bridge and Bradshaw 2017). The flexibility of LNG markets is being further developed as emerging players, such as commodity trading houses, are purchasing LNG on long-term contracts from lead firms to arbitrage opportunities between markets through spot trading (Corbeau and Ledesma 2016).

While commodification in global LNG markets is related to processes primarily occurring outside of Indonesia, PLN nevertheless sought to take advantage of commodification processes by opening for LNG imports from global markets rather than solely using domestic LNG produced by the state-owned natural gas producer Pertamina. At a 2016 natural gas industry conference in Jakarta attended by one of the authors, the head of the oil and gas division at PLN explained their strategy:

Should we import LNG now or later? Currently, PLN has received many offers for importing LNG at a much lower price than domestic prices. Should we deny all of those offers and stick to domestic LNG? Wouldn't this hinder PLN from trying to reduce the electricity subsidy? If developing gas production in Indonesia is currently not economical, why don't we just wait until it becomes economical? The gas in the belly of the earth is not going anywhere. The reason why PLN prefers an open tender is that the discussions with Pertamina take too long, sometimes over three years.

³ In addition to procuring LNG, the winning bidders are expected to commission and operate the necessary infrastructure required for supply, including intermediate storage hubs, LNG carriers, storage, and regasification terminals, including the necessary jetties, ports, and pipeline infrastructure. At the end of the concession agreement, the facilities are to be transferred to public administration.

⁴ Spot markets are markets for spot (single-cargo) and short-term contracts (4 years or less) for LNG trade.

Here the head of the oil and gas division at PLN is referring to partnering with private companies rather than Pertamina, as private actors can import competitively priced LNG on global markets. As will be more discussed in the next section, the decision to import is also related to questions on risk allocation related to LNG supply.

5.3.3 Risk allocation

As mentioned previously, traditional network practices related to take-or-pay contracts have entailed that buyers should offtake the risk of LNG supply projects. The government has previously encountered this risk surrounding take-or-pay contracts with a large LNG import terminal project in Sumatra that ended up standing idle for several months due to unexpected low economic growth and energy demand in the region. Due to contract inflexibility and caps on energy prices, the state lost approximately US\$250 million (Tempo.co 2015).

According to interviews, a key difference between purchasing oil and LNG is that oil can be purchased on flexible contracts. Commodification and development in FSRU technology in global LNG markets has nevertheless opened for more flexibility in LNG contracts. As an LNG storage terminal owner/operator explained:

In the oil market, we build a terminal on a speculative basis. It's like real estate, if you are in a triple AAA credit location, we can to a certain extent predict the market. We have done the same in Indonesia. We had a bit of an empty terminal because of delays, but we were a first mover and we got the last piece of land in the Jakarta harbor, so when liberalization took place, that was a beautiful spot. Liquidity is key, but so is capital intensity. Oil is 10x less capital intensive than LNG. LNG might be a good balance sheet, but a speculative built onshore LNG terminal without (take-or-pay) contracts for the time being, no. However, a floating LNG terminal – on a speculative basis – could be because there you have much more flexibility.

In order to avoid market risks of LNG projects, PLN has sought to take advantage of spot-markets and portfolio trading by allocating risk to private partners through the LNG supply tender. According to interviews with LNG market consultants, this was a key reason for why PLN opened for private partners to import LNG from global markets rather than solely using domestic LNG produced by the state-owned natural gas producer Pertamina, who would more likely require take-or-pay contracts compared to commodity traders. However, as we will explain in the next section, the LNG tender was never realized due to disagreements in the negotiation processes.

5.4 Market governance failure and development outcomes

While the low-boiling point of natural gas makes distributing LNG across the Indonesian archipelago difficult, natural gas can nevertheless be made exploitable in domestic markets through resource-making interventions by aggregating the demand of the 21 locations in the LNG tender through “milk runs”. Despite these strategies, the LNG project was unsuccessful. Figure 4 below outlines the strategies and interventions of the Indonesian resource-making state and the associated outcomes in relation through the conceptual framework developed in the theoretical section (Figure 4).

As discussed in the theoretical section, the extent through which governance for market development is successful is dependent upon the balance and alignment of public and private objectives. According to interviews with companies involved in the LNG tender, negotiations around the supply of LNG had largely stalled. Interviews with companies involved in the LNG tender revealed that the failure of extra-firm bargaining between PLN and the companies involved in the LNG tender revolved around two key issues related to market governance. The first point of disagreement was PLN's requirement that LNG companies supply all 21 locations in the tender. The second point of disagreement was PLN's refusal to “derisk” LNG projects by committing to take-or-pay clauses in the LNG supply agreement. A consultant from an energy advisory firm described the situation as a “tug of war”, in which LNG producers seek to create markets for excess supply on LNG markets, but require that the state “derisks” small-scale LNG projects by committing to take-or-pay contracts, while PLN bargains for contracts that are more flexible, where risk is allocated to private partners.

The failure of market governance is related to how resource-making through milk-runs limits the possibility for commodification, which in turn shapes the willingness for private actors to offtake risk in LNG projects. According to the sales manager at the LNG technology firm, although milk runs may reduce the costs of supplying remote demand centers, the logistics of supplying multiple locations increase the need for developers to systematically coordinate LNG supply with investments in ships, storage, and regasification facilities across multiple locations. As mentioned previously, LNG tends to boil-off when exposed to heat and compression under storage and transport which increases capital and operational costs for shippers. According to an interview with an LNG shipping consultant, the challenge

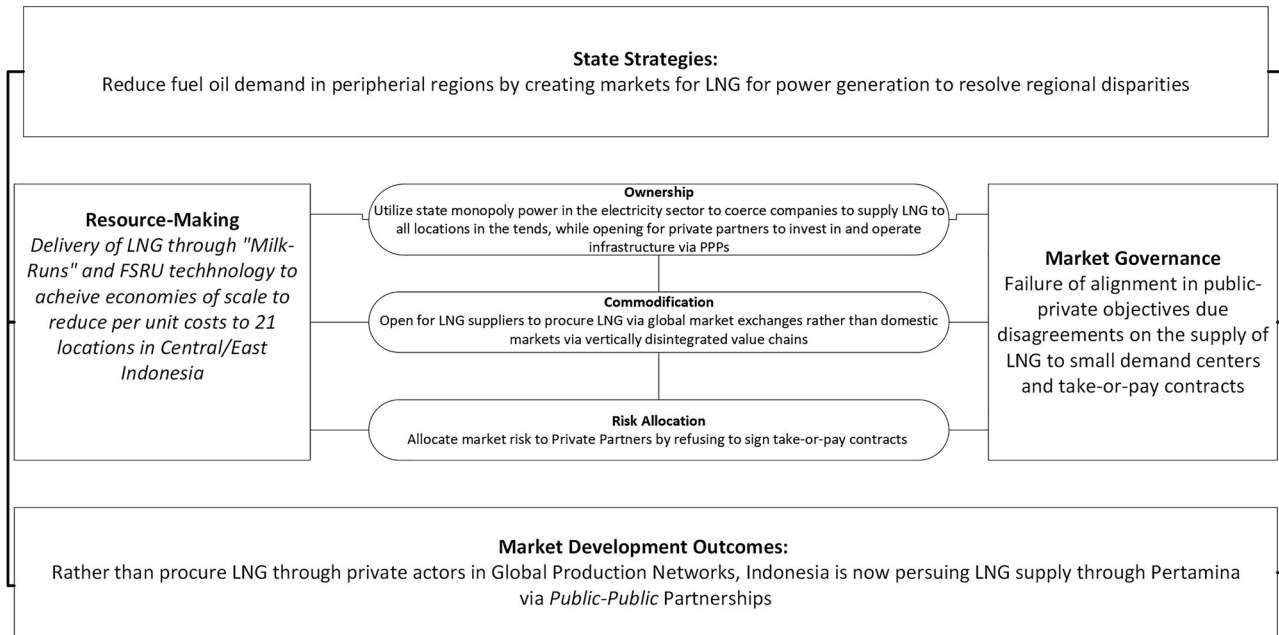


Figure 4: The resource-making state in Indonesia: own illustration.

of milk runs is that establishing intermediate hubs and terminals at all 21 locations in the tender increases the total amount of LNG stored in the system, thereby expanding storage costs due to the management of boil-off gas. In addition, offloading a single carrier at multiple ports increases the daily shipping costs. Shipping and storage costs can nevertheless be optimized by tightly coordinating storage with LNG shipping routes to reduce how much LNG is stored in the system.

Here resource-making through milk-runs limits the vertical disintegration necessary for private actors to mitigate risk through spatial flexibility and market arbitrage (Ledesma 2016). Resource-making through milk-runs is dependent upon the coordination of simultaneous investments in facilities at intermediate hubs, procurement of LNG carriers and development of FSRUs and the necessary supporting infrastructure at each of the locations specified in the tender. The organization of these investments in infrastructure would entail the organization of projects through point-to-point flows governed under vertically integrated value chains. Through vertical integration, LNG carriers and import terminals become “dedicated” to LNG supply agreements (despite the flexibility that FSRU’s offer), thus limiting the possibility of flexible short-term arrangements between partners involved in the LNG tender. A technical advisor at a classification society noted the following:

Doing milk runs could be economical, but then you have 5 to 6 points of contact that need to line up, and they all need investment, and then you need a person to build the carriers, so you need to have very good contractual arrangements between them, and therefore, you will need long-term contracts. However, the people taking the gas, they want to avoid buying LNG on long-term agreements.

A consequence of systematically coordinating milk runs in Indonesia is that such agencies would contradict the processes by which LNG production networks are becoming increasingly spatially and organizationally fragmented. A sales manager at an LNG technology company explains:

Because it is small scale, you have a logistics chain involved, and the risks multiply. This power plant, with so much capacity factor, will offtake so much, but what happens if it doesn’t offtake? Because you have stored a certain volume, with a basis that it will be regasified and consumed, and if it doesn’t get consumed, the vessel is wasted. One time, fine, you can adjust it. But you have 90 deliveries a month, and then your offtake has come down by 15–20 percent, and you still need to pay your supplier.

This quote reflects a situation in which milk runs limit the capacities of suppliers to mitigate risks by arbitraging trading opportunities between markets. Such limitations are displayed in the skepticism of LNG-related firms to engage in speculative markets and financing for LNG infrastructure.

Overall, the capacity of the Indonesian government to realize state strategies through state-led PPPs is limited as

the resource-making interventions used to supply all locations in the tender contradict the vertical disintegration and commodification processes that would enable private partners to mitigate the risk of market volatility in LNG projects. Consequently, the disagreement between the government and private partners on how risk should be allocated and which locations should be included in the tender resulted in the failure of the government to realize domestic market development for LNG through PPPs. Consequentially, the Indonesian government shifted tactics. In 2020, the Indonesian government issued a ministerial decree ordering Pertamina to supply LNG to 52 power plants with a combined capacity of 1,870 MW operated by PLN (Kristoff 2021). An investment of 1.5bn to 2.5bn was estimated for the project. Whereas the 2016 LNG supply tender relied on the blending of public and private institutions, market governance has shifted to *public-public partnerships* to realize state strategies of developing develop “every inch” of Indonesia as quoted by President Jokowi in Section 5.1.

The status of this project is unclear, but as Kristoff (2021) notes there continues to be considerable risks for PLN, Pertamina, and the government. Because electricity tariffs in Indonesia are capped at specific rates, PLN would have needed to bear the costs of price increases in global LNG markets (Seah 2014). In addition, the electricity demand in the peripheral regions of the country is unstable and uncertain, and PLN would have needed to bear the risk of demand shortfalls. Although the objective of LNG projects in Indonesia was to reduce subsidies, the government would most likely need to step in with subsidies and guarantees in periods of price increases and sudden demand reduction. Overall, the capacity of the Indonesian government to develop LNG markets in peripheral regions in the country seems to be limited. The case of Indonesia also reflects wider challenges related to small-scale LNG infrastructure, and the limited market potential due to the need for states to “derisk” the development of small-scale LNG value chains.

6 Conclusion: A research-agenda for the resource-making state

In a period of geopolitical uncertainty and climate crisis, where states are driven to both decarbonize industry and electricity generation and to securitize supply chains in resource-based sectors such as critical minerals – the *resource-making state* is likely to play a more prevalent role in global production networks in developing markets for resources which require complex, capital intensive infrastructure for commercialization. In this paper, we

have developed a conceptual framework of the resource-making state which brings together and outlines the relationship between resource-making and market governance in the analysis of state strategies and market development outcomes in global production networks. Here we explore these relationships through three critical dimensions: ownership, commodification, and risk allocation- the configuration of which constitute the mechanisms by which resource-making and market governance are intertwined in ways that shape market development outcomes.

In this paper, we draw on an empirical case study of an LNG supply tender in Indonesia to answer the following research question: *how does the relationship between resource-making and the governance of market development shape the possibilities and limitations for state strategies in GPNs*. The LNG supply tender in Indonesia is a case of a state-led public-private partnership where state ownership and monopoly power are crucial for intervening in markets to realize state strategies for market development in the peripheral regions of the country, but at the same time private parties are involved in order to secure financing, technology, and offtake risk through global production networks. In such cases, the success of partnerships are dependent upon the balance and alignment of public/private objectives in global production networks.

In Indonesia, PLN has sought to expand LNG markets to peripheral regions in the country while securing flexible contracts for LNG supply, while private firms have sought to access new markets for excess LNG supply. However, due to the tendency of liquified natural gas to “boil-off” and the coordination needed to develop “milk-runs” to supply all locations in the tender which hindered vertical disintegration and risk management, private parties required that the Indonesian government “derisk” LNG projects, which led the Indonesian government to develop public-public partnerships between Pertamina and PLN instead of PPPs.

The analytical value of our approach is that it opens for resource-making to feature more prominently in the analysis for why particular state strategies may or may not result in market development in global production networks. The ways in which resource-making is implicated in market governance is likely to differ in different industries and political settings. We suspect that similar contradictions detailed in this paper between resource-making and market governance are likely to be found in industries with complicated logistics due to the biophysical characteristics of resources and capital intensive nature of infrastructure development where the dimensions of ownership, commodification and risk-allocation are present such as hydrogen and carbon-capture and storage (Hunt and Tilsted 2024;

Steen et al. 2024). At the same time, we suspect that the specific configurations of ownership, commodification, and risk allocation are likely to differ on a case-by-base basis and there is a need to further explore how resource-making is implicated in different kinds of market governance. Furthermore, we expect that other critical dimensions beyond ownership, commodification, and risk allocation are likely to be relevant in other industrial and institutional contexts – requiring the need for further case studies and conceptual development of the resource-making state.

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