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Mapping networks of export credit for fossil and clean energy infrastructure: trends, persistencies, and policy options

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make history.

Mapping networks of export credit for fossil and clean energy infrastructure

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Abbreviations

ADB Asian Development Bank

ASEAN Association of Southeast Asian Nations

CCSU Climate Change Sector Understanding (OECD Arrangement)

ECA Export-Credit Agency

EMDE Emerging Markets and Developing Economies

EU European Union

IEA International Energy Agency

JBIC Japan Bank for International Cooperation

NZE Net-Zero Emissions

OCI Oil Change International

OECD Organization for Economic Cooperation and Development

SACE Sezione speciale per l'Assicurazione del Credito all'Esportazione

Executive Summary

Official Export Credit Agencies (ECAs) are major investors in the global energy sector. Established to support national exports through the provision of credit and insurance products that reduce the risks of international trade and investment, ECAs account for tens of billions USD per year in global fossil fuel financing. ECAs are also potentially critical players in the global energy transition; their capacity to derisk large infrastructure projects can help accelerate progress towards global climate financing targets such as the New Collective Quantified Goal on Climate Finance, which calls for at least USD 100 billion per year in global climate-related financing. This study provides the first network analysis of ECA financing in the energy sector in the Asia-Pacific, allowing unique insights into the quality, geography, and relational characteristics of ECA lending patterns. Using data from the Public Finance for Energy Database, we provide an overview of the networks of ECA energy investment in fossil fuels and clean energy, highlight substantive patterns in lending behaviour and interpret their implications for global energy investment, and provide policy recommendations that could increase the role of ECAs in supporting the global energy transition.

Applying a network approach offers advantages not found in standard descriptive statistics and econometric techniques. Specifically, it allows us to identify the extent to which ECAs tend to lend in countries in which they have previously offered financing (friends), whether they tend to lend more to countries that have previously received financing from a country for which the ECA has previously lent or received financing from (friends of friends), and how these patterns manifest in exclusive clusters, or groups of countries which tend to lend to one another. This approach leads us to a number of important conclusions. For example, export credit lending for fossil fuels has evolved into a tightly integrated architecture; the lending network is broadly inclusive of rich and poor countries, is reciprocal, and does not reflect dominant geopolitical divisions. On the other hand, the clean energy network is highly fragmented, and reflects a "China vs. the rest" dynamic represented in two distinctive global cliques. Further, while countries have used ECAs to heavily finance domestic fossil fuel infrastructure that supports future export potential, such uses for clean energy are rare.

Our findings have broad implications for the global energy transition. Geopolitical constraints on clean energy lending depress needed gains from trade, while ongoing and broadly geographically distributed fossil fuel investments, particularly in natural gas infrastructure, suggest that ECAs continue to play a role in facilitating global carbon lock-in. The concentration of clean energy investments between high-income countries suggests ECAs have not contributed much to global goals for renewable energy infrastructure in the developing world.

There are a number of steps ECAs and their governments can take that would increase their contribution to global energy transition goals. First, they could stop financing fossil fuel infrastructure, which continues in spite of pledges at COP 26 to end new public financing for foreign fossil fuel projects. Second, they could further reduce domestic content requirements for clean energy financing, which constrict the extent to which ECAs may support foreign renewable energy projects. Third, they could broaden the ability of ECAs to provide equity and working capital for domestic renewable energy firms that are likely to benefit from export-driven growth. Fourth, they can increase the role of ECAs in blended finance for development packages that include clean energy products.

1. Introduction

To achieve a global goal of net zero emissions by 2050, the International Energy Agency (IEA) estimates that annual energy investment must expand from current levels of USD 2 trillion per annum to nearly USD 5 trillion by 2030 and 4.5 trillion by 2050.

Underlying the Net Zero Emissions scenario (NZE) is a transformation of how and where energy finance is spent; fossil fuel investments shrink from 25% to 7% of total annual investment, while spending on electricity generation more than triples from USD 500 billion to 1,600 billion by 2030 (IEA 2021:A). The NZE requires massive investment in green infrastructure throughout Emerging Markets and Developing Economies (EMDEs), where the majority of forecasted growth in global energy demand will come from. The IEA emphasizes that because energy projects in EMDEs tend to be reliant on public financing, "policies that ensure a predictable flow of bankable projects have an important role in boosting private investment." (IEA 2021:B). In this context, export-credit agencies are a critical tool for policymakers to accelerate the deployment of private financing into renewable energy projects.

Export-credit agencies (ECAs) are state-owned or state-supported financial institutions that offer insurance and credit products to support national exports. Governments form ECAs to respond to a market failure. When firms wish to export a good or service to a foreign market that is characterized by a high level of commercial or political risk, they may seek to cover against losses by purchasing export-credit insurance policies from the private market (firms such as Allianz, Atradius, and most insurance majors offer such policies). Instruments such as buyer credits (where the ECA finances the foreign buyer's purchase of the sale, assuming the risks of nonpayment) and insurance against expropriation or currency devaluation can be necessary to make a transaction commercially viable. But where the buyer or buyer country's risk profile is too high for private insurers, exporting firms can seek export finance from their countries' official ECA (Morrison 2012).

ECAs are major players in global energy infrastructure investment, with ECAs from the G20 countries accounting for over USD 1 trillion in fossil fuel-related financing from 2006-2022 (OCI 2022). Because energy infrastructure projects (oil wells, power plants, refineries, oil and gas terminals, pipelines) carry inherent risks owing to their capital-intensive nature, long lead times, heavy regulation, and the frequent involvement of state-owned counterparties, energy firms frequently seek export-credit insurance cover (Morrison 2012; Stephens 2009). Even in highly developed countries, energy infrastructure projects attract uniquely high levels of political risk (Janzwood et al. 2023). Official ECAs thus play a substantial role in enabling global energy and energy services trade, particularly for long-lived capital projects that contribute to carbon lock-in (Fisch-Romito et al 2021).

Unlike private insurers, ECA lending is governed by public law and policy. Western governments have generally sought to establish ECAs under commercial principles, with operational autonomy from political interference. However, executive actions and legislative reforms influence ECA lending in ways that depart from purely commercial logics. For example, ECAs may be enlisted to support foreign and industrial policy goals, in some cases being directed to finance a particular transaction or blacklist a particular country or borrower. ECAs may also be compelled to adopt environmental and social due diligence polices; more recently, pressure from political coalitions of activists, journalists, and politicians has led some ECAs to adopt fossil fuel exclusions (Censkowsky et al. 2022). Similarly, ECAs are responsive to the obligations set by some global governance institutions, notably the Organisation for Economic Cooperation and Development (OECD) Export Credits Group facilitates the OECD Arrangement on Officially Supported Export Credit Agencies, a non-binding agreement that sets best practices, guidelines, and soft law, primarily to avoid subsidy competitions, but more recently to adopt enhanced social and environmental procedures (Peterson and Downie 2023).

In this paper we explore ECA energy-related lending patterns, and associated implications, in the Asia Pacific using a network-based topological approach. Section 2 provides a brief overview of the context in the region in which export credit for energy is taking place. Section 3 outlines our methodological approach. In Section 4 we analyse the ECA lending landscape using a series of methods derived from network science. Based on this, we provide a series of policy options to optimize ECA support for the energy transition (Section 5).

2. Export-credit for energy in the Asia-Pacific

The infrastructure financing gap in the Asia-Pacific is vast. The Asian Development Bank estimates the annual financing gap for Asia-Pacific EMDEs at USD 300 billion per year (ADB 2017). In order to meet global climate goals, the gap will need to be filled by low and zero-carbon infrastructure.

The IEA estimates that India and Association of Southeast Asian Nations (ASEAN) member states will need to increase clean energy investment from the USD 28 billion per year spent from 2016-20 to USD 130 billion by 2030 (IEA 2021:B). Thus far, the ECAs of China, Japan, and South Korea have been major forces for energy infrastructure investment in the region.

However, commercial opportunities and sustainable development are not the only forces driving this investment; the filling of the Asia-Pacific infrastructure financing gap is taking place around the geopolitical fault lines of the greatest resurgence of great power competition since the end of the Cold War. As tensions between China and Western-allied rivals mount across the Asia-Pacific, "cheque book diplomacy," or the leveraging of infrastructure financing for political influence, has taken centre stage, and ECAs are leading actors (NBR 2020). Chinese ECAs underwrite much of the global Belt-and-Road Initiative, the PRCs global diplomatic and development push, which has been responsible for hundreds of billions of dollars in infrastructure investment in the Asia-Pacific (Chen 2021). The announcement of competing initiatives, such as Japan's "Partnership for Quality Infrastructure," and the United States' "Partnership for Global Infrastructure and Investment," suggests the emergence of competitive, if not openly rivalrous, state-backed investment in the region's energy and power sectors (Rajah 2020).

Scholars increasingly study security competition and the energy transition through the lens of complex, interdependent systems of institutions and actors bound together through the flows of finance, goods, services, and technology. For security scholars, this is articulated through the language of weaponized interdependence, which examines the ways in which states attempt to seek asymmetric positions in economic, technological, and transportation systems to extract concessions or information from adversaries (Drezner, Farrell, and Newman 2021). Energy and climate scholars have long seen the climate change problem as characterized by complex interdependence between state and non-state actors, where distributional and policy conflicts between economic, security, and environmental interests take place across a multidimensional landscape (Cherp, Jewell, and Goldthau 2011; Beyza, Garcia-Paricia, and Yusta 2019). A key goal for both research programs is to identify and track relevant connections (financial, technological, and physical) between actors in security and energy systems. Mapping export-credit flows is an important contribution to this effort.

Export-credit flows for energy infrastructure constitute state-supported trade and investment in a sector that is critical for development, climate, and security. Where states' ECAs choose to invest (and not invest), and how ECAs respective choices relate to one another, can reveal important dynamics that cut across global security, financial, and energy systems. It enables us to answer questions of interest to scholars across disciplines and research programs. For example, do ECAs engage in energy infrastructure financing in countries that are already receiving financing from a geopolitical rival? To what extent are wealthier ECAs underwriting the energy infrastructure of poorer nations, and what kind of energy production/consumption are they promoting (brown or green)? Do ECA investments follow geoeconomic strategies that are not predicted by purely commercial logics? Global energy transition goals require a "collaborative international environment" that facilitates the relatively open trade of clean energy fuels and technologies (IEA 2021:B); the distribution of ECA financing can tell us much about how collaborative and open that environment is shaping up to be.

3. Methodological approach

In line with advances in computational social science, network-based approaches have arisen as a powerful way of understanding complex social systems (Hafner-Burton, Kahler and Montgomery 2009; Conte et al 2012; Lazer et al 2009). At its most basic, a network is an abstraction of a real-world system that captures the connections between nodes (or actors). Network analysis makes use of a broad suite of tools that range from visualization, to statistical measurement of network topology, to inferential network models (Borgatti and Lopez-Kidwell 2014; Block, Stadtfeld, and Sniders 2019). This toolkit allows for the detection of key actors (nodes), classification of different types of relationships between actors, and the identification of clusters or cliques of actors (Pauwelyn and Alschner 2015).

Network analysis has challenged traditional conceptualizations of power found in the fields of International Relations and International Political Economy. A network approach shifts the analytical lens away from the nodes and their associated attributes, like economic and military power, and towards their position within the network. That position, in turn, is a function of a given node's relationships with other actors in the network. We are not suggesting that power, in a network sense, is more important, or even as important, as material power, but simply that position within a network can constrain and enhance the power of a particular actor (Frank 2021).

Networks tools complement existing structural approaches that focus on the attributes of actors and static equilibria, and offer several advantages over traditional quantitative and qualitative methods (Barabási and Albert 1999). Broadly, network analysis allows scholars to measure the architecture of systems robustly and reproducibly. Measuring architecture is vital to understanding how systems operate and evolve as the patterns of relationships between actors determines, in conjunction with individual actor attributes, outcomes within complex systems.

To the best of our knowledge, the ECA energy network as a whole, or in the Asia-Pacific in particular, has yet to be mapped using network tools.

While it is beyond the scope of this paper to employ the entirety of the network analysis suite of tools, our paper marks a first, and hopefully important, step in the use of a network-based approach to understand the state of the ECA energy lending system in the Asia-Pacific region.

Our data on ECA lending patterns was sourced from the Public Finance for Energy Database (see OCI 2022), covers ECA lending from 2006-2020, and disaggregates ECA lending by source, recipient, and category (fossil fuel and clean). We cleaned the data (removed unidentified countries and double instances) and converted all lending values into constant (2015) USD dollars to facilitate comparison. We broke the network into three waves (2010, 2015, 2020) in order to achieve a more equal distribution of values across the analysis and to enable analysis of the overall characteristics and trends of the network. We focused our analysis on countries (35) in the Asia-Pacific region (i.e. the nodes in the network) that either provided or received ECA finance for clean energy or fossil fuel projects. The network includes 1,330 total ties between countries. As we had data on source and recipient countries and could show the direction of investment flows, we were able to construct directed multigraphs.[1]

1. A directed graph is a type of graph where the ties between nodes have a direction. These ties are usually represented as arrows between nodes. A multigraph (as opposed to a simple graph) is one where multiple ties between nodes are permitted.

4. Mapping the ECA energy network in Asia-Pacific

Density (directed in our case) of the ECA network in the Asia-Pacific by year is a helpful descriptive statistic. The density statistic captures the proportion of actual ties (i.e the presence of an ECA energy deal in our data) to possible ties within the ECA network. Figure 1a demonstrates that the majority of ties within the ECA network are linked to fossil fuels. Post-2009, the density of fossil fuel connections increased markedly while clean ties started to increase substantially in 2014, albeit not at the same rate as fossil fuel connections. Examining the average weighted degree – the average number of connections in the network weighted by the value of those connections – reveals a similar, although not surprising, dominance of fossil fuel lending relative to clean energy (Figure 1b).

One of the most striking differences between the clean energy and fossil network relates to the average value of a connection (i.e. the average value of an energy deal). The average value of a fossil fuel deal in 2020 was USD 5.3 billion compared to USD 204 million for clean energy. Another difference between Figure 1a and 1b relates to the average weighted degree for clean energy relative to its density – while connections in the clean energy network grew, the value of those connections did not display the same level of growth. The average value of a connection in the clean energy network in 2015 and 2020 was USD 59.8 million and USD 204 million – an increase of nearly 250%. By contrast, density in the clean energy network increased by 348% over the same period. This suggests that while there was an expansion in the clean energy network in terms of the number of countries involved, that expansion did not increase linearly with the value of energy financing. In other words, while more ECAs lent to more countries, this network growth did not imply an overall growth in total dollars lent, suggesting smaller deals but across a broader range of countries.

Clean refers to clean energy investments while Fossil Fuel refers to investments in fossil fuel. Weighted degree is the average value of all ties for a given country.

Figure 1: Network Density and average weighted degree

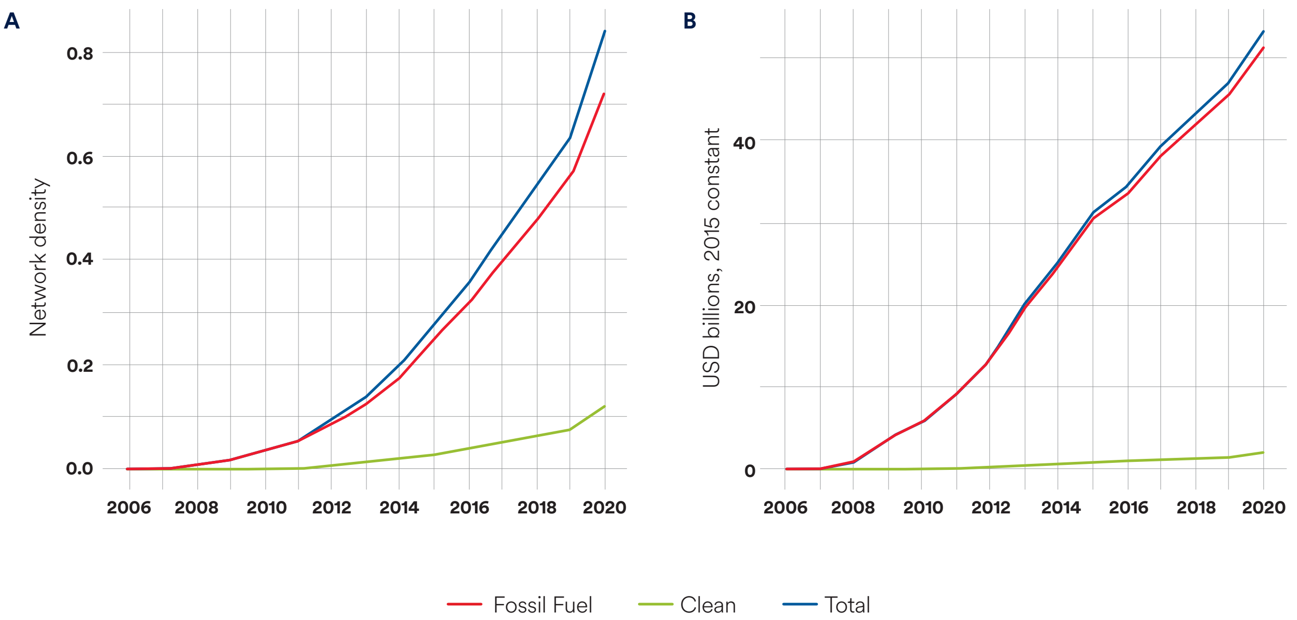


Figure 2 shows that the fossil fuel and clean energy networks appear to approach a power law distribution where a limited number of cases cluster towards the bottom of the distribution and account for the bulk of investment. Power law distributions are a common feature of many complex social networks including the preferential trade agreement network (Pauwelyn and Alscher 2015; Frank 2021). There are two key implications associated with this structure.

First, both networks are well-equipped to handle the withdrawal of a random country. For example, if Sri-Lanka no longer participated in ECA lending, both fossil fuel and clean energy lending would continue uninterrupted. However, if one of the key nodes in the network (such as Japan, Canada, or China) withdrew, energy lending patterns would be substantially impacted. This would likely be most acute in the clean energy network where Japan alone accounted for 47.4% of total lending in the region.

Second, preferential attachment, or the tendency of actors to form ties with popular actors (as measured by the number of their connections), is another common network property (Hafner-Burton, Kahler, and Montgomery 2009). Many real-world networks, both social and biological, with complex topology, are characterised by a tendency for ties to accumulate on nodes that already occupy central positions (Fruchterman and Reingold 1991). In the context of ECA lending, it is possible that two causal mechanisms may underpin preferential attachment – the conveyance of information about trustworthiness and preferences. Possessing a large number of connections may indicate that a country is more trustworthy (and investment less risky) while more information about the trustworthiness of a country is revealed in each subsequent deal. Taken together, this suggests that those countries that are already part of the ECA energy network are more likely to receive additional flows relative to newcomers.

Figure 2: Distribution of ties

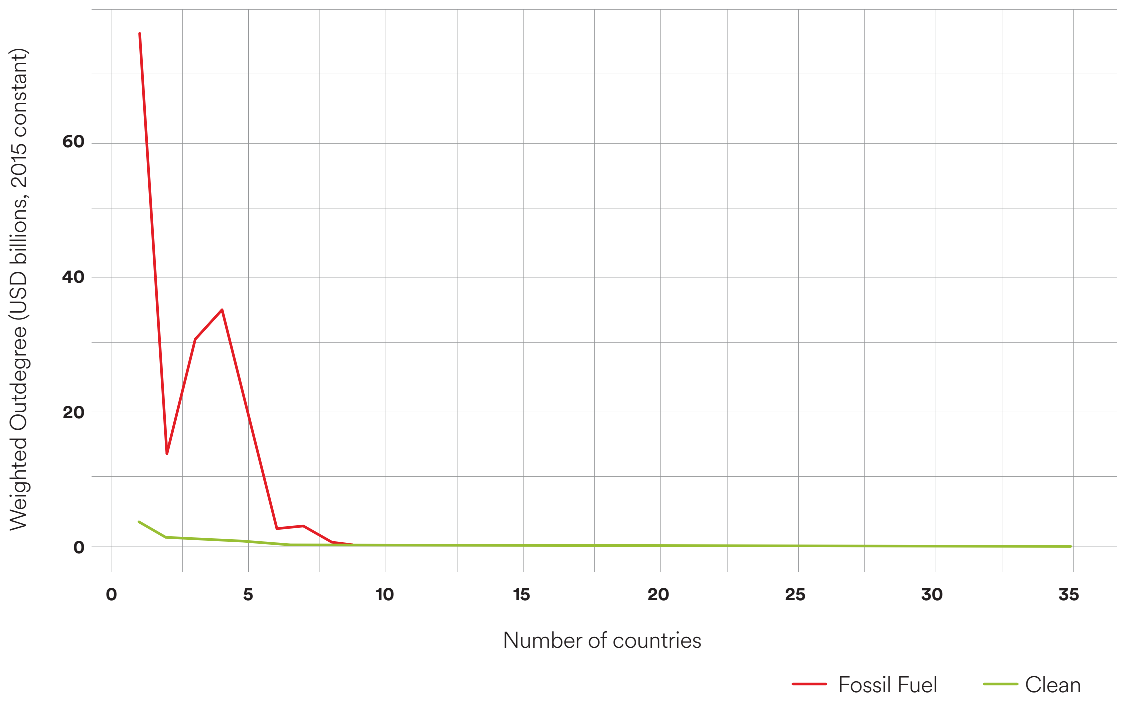


Figure 3: Evolution of the fossil fuel network

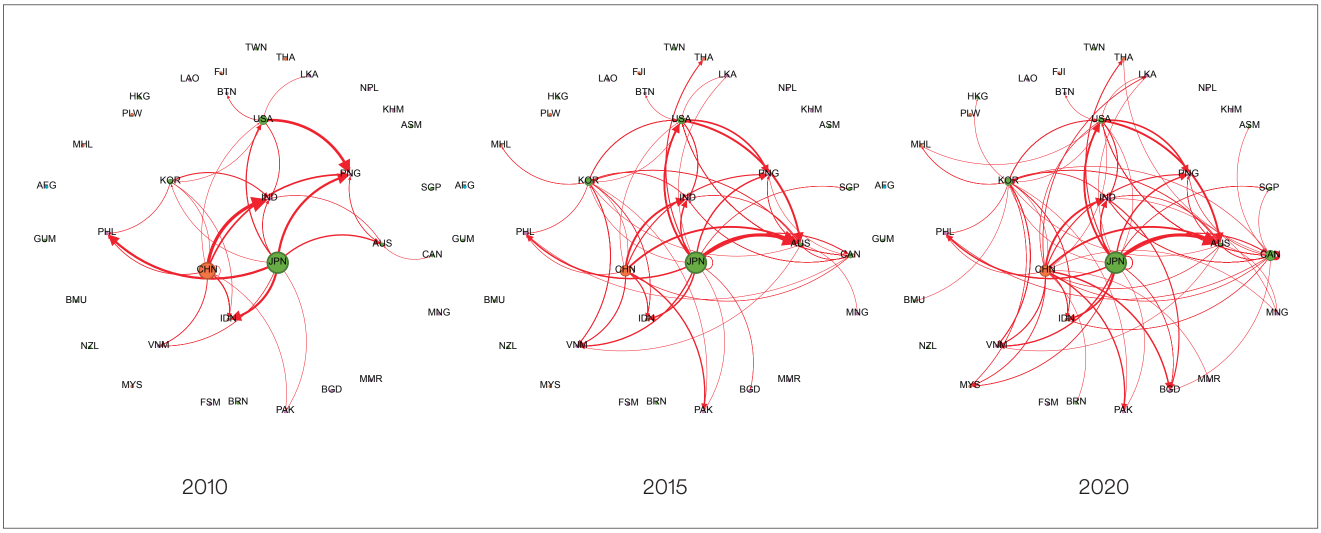
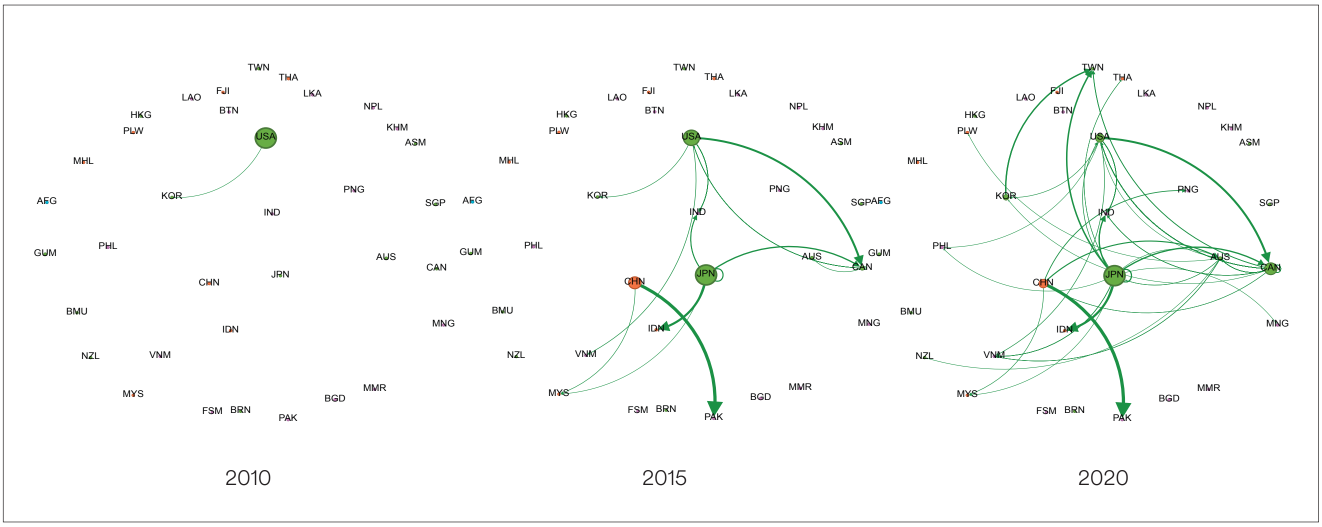


Figure 4: Evolution of the clean energy network



Figures 3 and 4 show the evolution of the fossil fuel and clean energy networks using a force-directed algorithm to aid in visualization. We colour-coded countries based on their level of development according to the World Bank Development Indicators (green for high-income, orange of upper middle-income, purple for lower-middle income, and blue for low income). We also scaled the size of each country based on the average weighted outdegree (the larger the node, the more high value connections a country has). Finally, we added in directional arrows to indicate creditor-debtor relationships and scaled connections to correspond to the value of investment flows.

Figure 3 helps to reveal a number of interesting dynamics associated with ECA fossil fuel energy lending in the Asia-Pacific.

- **Fossil fuel lending has evolved into a tightly integrated architecture.** The structural distance – i.e the number of connections that would be required to connect any two nodes– between countries in the network has decreased over time as the number of countries engaged in ECA lending has increased. There is also evidence of substantial reciprocal investments by creditor countries. For example, China has invested in Australia and the US while the US and Australia have invested in China as well as one another.
- **Fossil fuel lending is dominated by high and upper middle income countries.** In aggregate terms, Japan, followed by China, Canada, South Korea and the US are the most important creditors in the network. Australia, India, and Indonesia are minor creditors.
- **As the fossil fuel network expanded, so too have investments in less developed economies.** In 2020, 25 out of the 35 countries in the region were engaged in ECA lending as either debtor or creditors. Australia emerged as the largest recipient of lending flows followed by Indonesia, the US, Cananda, Vietnam, India, Papua New Guinea, India, and Bangladesh. This reflects the heterogenous nature of both fossil fuel deposits as well as energy demand.
- **ECA financing is used by a handful of high-income countries (particularly Japan and Canada) to directly drive the development of their domestic fossil fuel sectors.** Rather than utilize ECA lending to support purchases of domestically produced goods and services by foreign buyers, these countries provide credit directly to firms operating in their domestic markets. For example, Canada provided substantial financing to firms engaged in upgrading the Trans Mountain Pipeline, fossil exploration, and processing.

Figure 4 highlights several forces driving the development of the clean energy network in the region.

- **The clean energy network is less integrated relative to the fossil fuel network.** While the structural distance (between actors in the network has decreased over time, it still remains less dense and interconnected compared to the fossil fuel network. 18 out of the 35 countries in the region do not participate in any form of ECA lending.
- **A 'China versus the rest' dynamic appears to characterise clean energy lending.** Outside of joint lending in Malaysia, Chinese investment does not appear to take place in conjunction with the US or US-allied countries. Similarly, Canada was the only western-aligned country to invest in clean energy in China. This differs dramatically from the fossil fuel network where conjoint investment by China and western-aligned states is common – China and the US engaged in reciprocal fossil fuel investments. By contrast, there is substantial reciprocal and non-reciprocal clean energy investment in the western-aligned cluster. For example, Australia has invested in Japan, the US and New Zealand while South Korea has invested in Taiwan. This cluster also includes Vietnam, which, while studiously non-aligned, has cautiously rejected many of China's proposed infrastructure investments (Liao and Dang 2020).
- **Lower-middle and low-income countries are largely excluded from the clean energy network.** While India (the largest recipient of clean energy finance), Pakistan, Vietnam, Papua New Guinea, the Philippines, and Mongolia receive clean energy financing, nine other lower or low-income countries do not. Furthermore, the value of clean energy investment in high-income countries is substantially higher than in lower-middle and low-income countries. For example, of the 20 largest individual investments made from 2006-2020, 18 occurred in high-income and upper-middle-income countries.
- **The use of ECA financing to directly drive the development of domestic clean energy sectors is comparatively rare.** In contrast to the use of ECA financing to directly support domestic fossil fuel sectors, lenders tend not employ these practices in the clean energy space. Where they do, the value of the individual deals is unremarkable. For example, Australia provided almost twelve times the amount of clean energy finance to Vietnamese firms (USD 46 billion) relative to investment in domestic Australian firms (USD 3.9 million). By contrast, Australia provided USD 0.5 million in fossil fuel export finance to Vietnamese firms compared to USD 1.8 billion in direct support to Australian firms.

5. Policy options

ECAs and the governments that regulate them have several policy options to support the energy transition and increase financing in EMDEs. Of course, their ability to implement these policies will depend on ECAs' statutory autonomy and/or the political will of governments. We focus on policies that remain consistent with ECAs' commercial orientation, international agreement commitments to reduce carbon emissions, and their mandate to grow national exports.

5.1 End fossil fuel-related financing

As of this writing, many ECAs continue to provide financing for fossil fuel infrastructure, including countries which agreed to the Glasgow Statement at COP 26 to end all new public financing for foreign fossil fuel projects by the end of 2022 (IISD 2022). For example, the Export-Import Bank of the United States approved a USD 500 million oil and gas project in Bahrain in March of 2024 (Friedman and Tabuchi 2024). In September 2023, Italy's SACE signed a five-year deal to guarantee a USD 550 million contract with Vitol, a global energy trading group, to increase natural gas/LNG supplies to Italy (SACE 2023). While not a signatory to the Glasgow Statement, in May of 2024 the Japan Bank for International Cooperation (JBIC) provided USD 1 billion in financing for an LNG project in Australia (Reuters 2024), and in 2019 purchased a major equity stake in Atlantic, Gulf and Pacific (AG&P) energy company, which the firm is leveraging to construct LNG import infrastructure around the Indo-Pacific on an ongoing basis (AG&P 2019; Reuters 2022; PR Newswire 2024).

While the Glasgow Statement has already been breached, there is a patchwork of other regulatory forces that shape ECAs' lending in the energy sector. The primary international governance institution setting guidelines for export-credit agencies' energy lending is the OECD, which sets and updates climate policies through the Climate Change Sector Understanding (CCSU) of the OECD Arrangement on Officially Supported Export Credits. The CCSU has mandated that member states cease support for new unabated coal-fired power plants. However, as of the most recent update to the CCSU, OECD ECAs may still finance abated coal-fired generation projects and does not restrict lending for gas-fired power plants or gas transportation infrastructure (OECD 2023).

ECAs are also subject to national policies, many of which continue to permit financing for oil and gas projects under certain conditions. EU ECAs such as Euler Hermes and Italy's SACE continue to provide financing for natural gas projects under qualifying energy security, strategic, and development exceptions, and natural gas infrastructure (such as LNG import facilities) is justified within the EU taxonomy of sustainable activities for its potential contributions to hydrogen generation (Choksey and Gebel 2023; Schmidt et al. 2024). However, such justifications are subject to considerable doubts from energy transition experts; so-called "blue hydrogen" has not yet proven scalable, nor is it a carbon-free or renewable energy source (Schlissel and Juhn 2023). Expert assessments cast doubt on the ability of "green hydrogen" technologies to scale at a sufficient pace to meet the demands of transition pathways, and caution that the risks of carbon lock-in from further investment in gas infrastructure outweigh the potential benefits of converting this infrastructure for hydrogen production (Odenweller et al 2022). In the meantime, ECA investment for fossil fuel consumption infrastructure, specifically LNG transportation facilities, accelerate demand in the rapidly globalizing international gas market (Sakmar and Kendall 2009).

By following through on the commitments made at COP 26, ECAs could substantially reduce global financing for fossil fuels, and the attendant risks of further carbon lock-in. While countries must carefully balance climate commitments with energy security concerns, long-term oil and gas supply deals, such as those recently inked by Euler Hermes, SACE, and JBIC, suggest a move toward, rather than away from, a carbon-intensive future.

5.2 Reduce domestic content requirements

Domestic content requirements limit the extent to which ECA financing can be used by borrowers to purchase goods and services not produced in the ECA's host country. For example, a grain elevator construction firm seeks ECA financing to support a foreign buyer's purchase of the firm's services, but the low-skill labor for the project will come from local contractors in the foreign country. The foreign labor accounts for 25% of the total contract value, while the technical advisors and components exported from the ECA's country account for 75% of the total contract value. A strict, 0% foreign content policy means that it can lend the borrower up to 75% of the total contract (equivalent to the value of the ECA-country produced "content" of the project).

OECD members have varying domestic content requirements. The U.S. ExIm has the highest requirement (ExIm will lend the full contract value only if 85% of all goods/services in the contract are produced in the USA, allowing for a maximum of 15% foreign content financing), and Germany has the second highest (51% must be produced for full contract financing, allowing nearly half of the content financed to be foreign in origin). Generally, OECD ECAs have steadily reduced their content requirements over the last two decades as the global official export credit market has become more competitive (U.S. Export-Import Bank, 2023). But reducing content requirements for renewable energy deals is of special importance.

The viability of a given renewable energy project will frequently turn on the ability of the borrower to secure adequate financing. If ECAs cannot finance, for example, foreign labor costs, the borrower may have to consider abandoning the renewable project for a more carbon-intensive option that is cheaper or easier to secure commercial financing for. By increasing flexibility in domestic content requirements for clean energy infrastructure, ECAs can expand the universe of potential deals for green exporters, an outcome which would serve both export promotion and climate goals. While ECAs are likely to maintain (or even raise) restrictions on financing for deals with foreign content from adversaries, allowing greater levels of foreign content from allies and partners would still strengthen the global financing environment for renewable energy projects.

5.3 Expand domestic lending, working capital, and equity financing for clean energy

As our data demonstrate, despite their export-orientation, high-income ECAs do engage in domestic lending to finance firms in strategically important export sectors, even where such financing is not directly related to the insurance of an export contract. For example, ExIm's "Make More in America" program makes financial products normally reserved to cover export activities available to domestic manufacturing operations in export-oriented industries (U.S. Export-Import Bank 2022). Canada's EDC has invested billions to cover the costs of the TransMountain pipeline expansion, which doubles the capacity to transport bitumen from Canadian oil sands to its Pacific port in Vancouver (Reuters 2023). These are examples of the emergence of more expansive industrial policies that serve to elevate future exporting capacity rather than just cover against potential losses for foreign export deals.

As ECAs apply their instruments to support industrial policies through domestic financing programs, it will be important to ensure that such policies aim to expand the exporting capacity of clean energy fuels and technologies, which are already at a disadvantage in exporting capacity relative to incumbent fossil energy firms. This means providing equity and working capital to scale up green firms operating in industries for which there is foreign market potential.

5.4 Expand export credit agencies' role through blended finance frameworks

A likely explanation for the relatively limited green investment in middle and lower-income countries suggested by the data is the inconsistency between ECAs' commercial orientation and sustainable development. While ECAs are not development agencies, their role as bearers of sub-commercial debt makes them critical players in enabling private sector involvement in developing countries, and they have been far more willing to accept such risks for fossil fuel investments than for clean energy projects.

One way of accelerating ECAs role in financing clean energy in the developing world is to increase their participation in blended finance transactions (BNP Paribas 2021). Blended finance brings state finance together with private capital to offer concessional lending rates for sustainable development. Export-credit agencies can work more closely with development banks to facilitate national exports in industries that are key for sustainable growth; together, development banks and export credit agencies can occupy sub-commercial credit tranches to derisk projects that would otherwise be commercially unviable. Foreign aid grants can be earmarked to pay down buyer credits offered by ECAs. This builds mutually beneficially relationships between donor countries and recipients, as it ties part of foreign aid to manufacturing and job growth in the lender country.

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