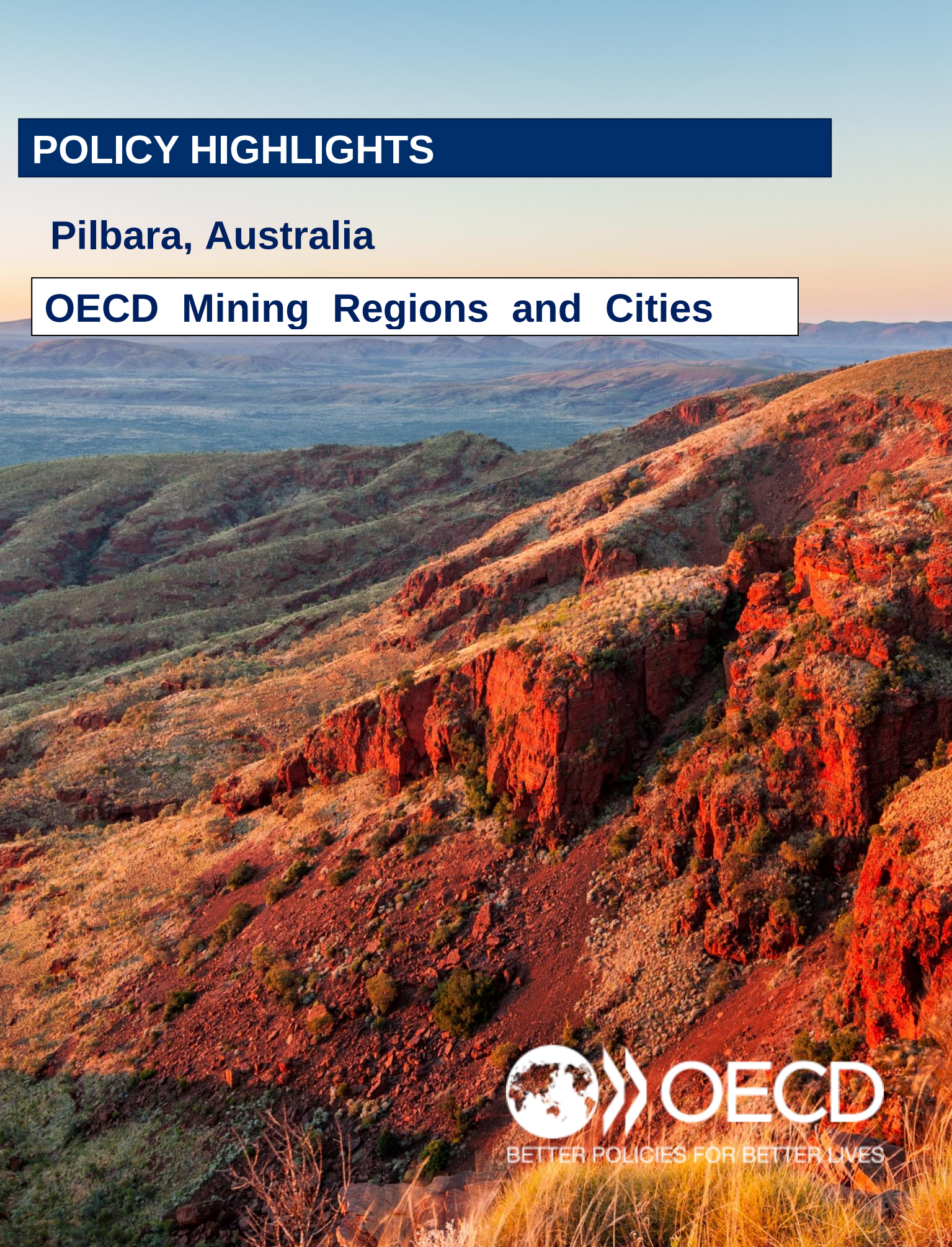
POLICY HIGHLIGHTS

Pilbara, Australia

OECD Mining Regions and Cities



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About OECD Mining Regions and Cities initiative

The OECD Mining Regions and Cities initiative was created in 2018 to develop recommendations to help improve regional development outcomes for regions and cities specialised in mining. The project is framed around three core components that deliver on that objective: 1) Analysis and evidence on well-being in mining regions, including a data and a policy toolbox; 2) Case studies to identify place-based recommendations for specific mining regions; 3) Dissemination of best practices through seminars and events to promote knowledge-sharing and dialogue between public/private sectors and local communities.

About the Centre for Entrepreneurship, SMEs, Regions and Cities

This initiative is co-ordinated within the OECD Centre for Entrepreneurship, SMEs, Regions and Cities. The Centre helps local, regional, and national governments unleash the potential of entrepreneurs and small and medium-sized enterprises, promote inclusive and sustainable regions and cities, boost local job creation and implement sound tourism policies.

About these policy highlights

These highlights provide a summary of the findings and recommendations of the OECD Mining Regions and Cities Case of Pilbara, Australia. This is the fourth case study carried out under the initiative following on from the case studies of Andalusia, Spain, Upper Norrland, Sweden, Outokumpu, North Karelia, Finland and Antofagasta, Chile. These policy highlights benefited from the feedback of various stakeholders during the 4th OECD International meeting of mining regions and cities in Karratha, Australia on 20-23 June 2023. The official launch of the case study was at the Pilbara Summit in Karratha, Australia on 10-11 October 2023. The full report is available at https://www.oecd.org/publications/mining-regions-and-cities-case-of-the-pilbara-australia-a1d2d486-en.htm.

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Introduction

The Pilbara is one of nine regions located in the state of Western Australia, and is known for its thriving mining and resource extraction industries. While Pilbara's industrialisation dates back to the 1960s, when towns were established to accommodate the mining workforce, First Nations people have inhabited the region for approximately 50 000 years (Webb, 2003[1]). The Pilbara has the same geographical size of Spain, but is 780 times less populated, placing it amongst the 5% least densely-populated regions in the OECD (0.17 persons per square km) (United Nations, 2021[2]) (OECD, 2021[3]).

The mining sector in the Pilbara is a global powerhouse in supplying quality iron ore that has fuelled the economic growth of the state and the country and has considerable deposits of three of the eight key minerals required for battery manufacturing – lithium, manganese, and vanadium. The mining sector contributes to the bulk of Pilbara's regional output (86.9%) (REMPLAN, 2023[4]). When compared to 50 OECD mining regions, it ranks fifth highest in GDP per capita and seventh lowest in unemployment rate. This sector has also supported community infrastructure and attracted a wide range of investments (e.g. Australia's largest port by tonnage) and international companies specialised in mining-related technology and services to the region. In fact, the pipeline of expected investments registered in 2022 was equivalent to double 2021's regional GDP. Beyond mining, the region benefits from a strategic geographic location to Asian markets and its value chains, a rich cultural heritage that is home to about 30 First Nations language groups, and the presence of a unique landscape and natural amenities.

Despite these assets, Pilbara's remoteness and harsh climate conditions, remoteness from metropolitan areas, low population density, and a development model that is heavily reliant on the mining sector (especially iron ore) present a number of well-being challenges to the region. These include i) high economic volatility, ii) high share of fly-in fly-out workers (FIFO) with high cost of living (the largest in the state) (iii) shortage of affordable housing iv) difficulties to recruit labour for quality service provision (e.g. childcare) v) low level of entrepreneurship and vi) high levels of inequality, particularly with respect to First Nations people.

Against this backdrop, the green transition presents the Pilbara with an opportunity to diversify its economy and improve the well-being conditions of its communities, particularly for First Nations people, while becoming a strategic player in the global shift towards more sustainable mining. To achieve this, the region needs to adopt an inclusive and long-term development strategy that ensures the participation of First Nations people and local governments in regional policy making, with better co-ordination amongst different levels of government, local initiatives and private companies' social and environmental programmes to address the main priorities of its communities and First Nations people.

This study identifies 16 recommendations across the following 4 pillars:

I. Enhancing well-being and development opportunities of First Nations people, through First Nations co-designed reforms.

II. Improving access and provision of housing and services in the Pilbara.

III. Diversifying the economy inside and outside the mining sector with a greater focus on green-related activities.

IV. Establishing a coherent place-based strategy with a long-term vision for development.

The Pilbara is an economic powerhouse state-wise and country-wide

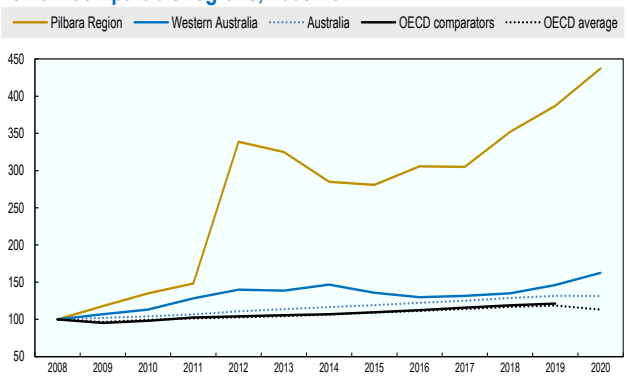
The Pilbara is a leading mining producer in the world, accounting for a major share of the global mining value production of iron ore and home to important endowments of offshore petroleum (primarily natural gas), lithium, gold, copper, and nickel. These mineral assets have fuelled economic growth in the region (86.9% of total output in 2020 and 53% of the employed workforce) (REMPLAN, 2023[4]). Pilbara's mining resources are nationally and globally relevant (Box 1).

Box 1. Pilbara: A key player for national and global mining

- **Iron ore**: Represents approximately 93% of Australia's iron ore and 28% of global production in 2018.
- **Lithium**: Fourth biggest lithium mine in the world, and the second and third largest lithium-producing mines in Australia.
- **Gold**: One of Australia's largest gold mines

Mining activities have not only driven the bulk of growth in the region but have also made significant contributions to the development of both the state and the country. Pilbara accounts for 19.2% of Western Australia's GDP and 3.4% for the whole country - approximately 15 times higher than its share of national population (0.2%) (REMPLAN, 2023[4]). During 2012-20, Pilbara's economic growth rate (4%) was almost double that of the national average (2.2%) and was significantly higher than the TL2 OECD Mining benchmark (3.0%) (Figure 1)[1]. Mining activities have also created around 30 000 direct jobs (52% of the total in the region) over the same period.

Figure 1. GDP growth in the Pilbara, Western Australia, and OECD comparable regions, 2008-20



Note: 2008=100. Australian Bureau of Statistics via REMPLAN, OECD (2021), Gross domestic product (GDP) (indicator). doi: 10.1787/dc2f7aec-en

Key economic figures in the Pilbara:

- Major exporter in the state accounting for 31.5% of total exports in Western Australia and 11.5% in the country in 2022.
- Significant contributor to both state and national GDP driving 19.2% of Western Australia's and 3.4% of Australia's GDP in 2022 (REMPLAN, 2023[4]).
- One of the lowest unemployment rates in the country and in OECD mining regions, at 1.8% (December 2022), one-third the average of OECD regions (4.9%) (OECD, 2022[5]).
- Major provider of fiscal revenue for the state generating 91% of royalties received by Western Australia (2021-22), and around one quarter of the state's total fiscal revenue (WA, 2022[6]).

The region has the potential to become a global leader in the green transition.

Mining has spurred investments in infrastructure and attracted innovative and internationally competitive services and equipment providers to the Pilbara. The region, however, has other assets including its strategic location to Asian markets, cultural and natural amenities, tourism, and renewable energy potential, including solar, wind and hydrogen energy production (Table 1).

[1] The OECD regional classification identifies Australian regions based on density, population thresholds and their level of accessibility to cities (understood as Functional Urban Areas-FUAs). Thus, Australia's OECD regional classification consists of states and territories (TL2) as first-level sub-national government units (like Western Australia), and a second tier of (TL3) regions – groups of local government areas, such as Pilbara.

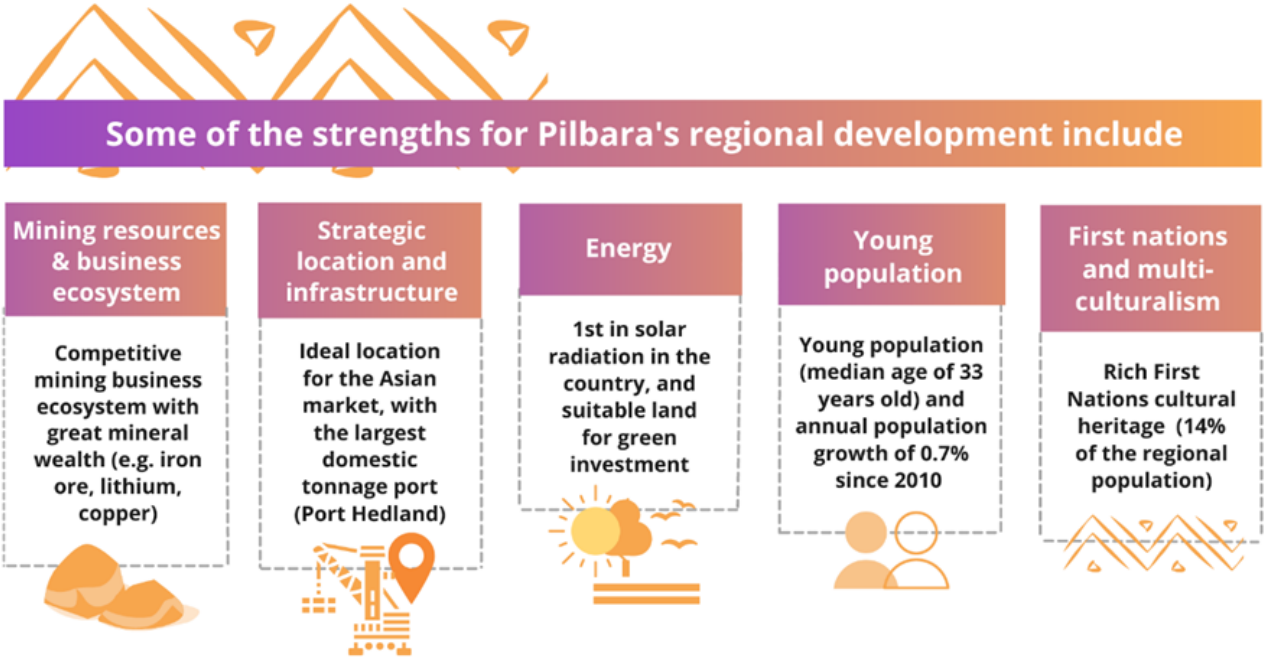


Table 1. Main assets for development in the Pilbara

	Assets	Description
Economy	Internationally competitive mining business ecosystem	▪ 94% of Australia's iron ore exports and around 60% of natural gas production.
	Attractive geology with critical minerals	▪ 90% of Australia's total iron ore production. ▪ Deposits of lithium, gold, copper, nickel and offshore petroleum.
	Strategic location to Asia with an export-oriented infrastructure	▪ Pilbara's proximity to Asia and is Australia's largest port by tonnage (Port Hedland).
	Renewable energy potential	▪ Vast open landscapes and consistent sunlight for large-scale solar power generation and strong winds for wind power generation.[2]
Social	Multi-culturalism with a diversity of First Nations people	▪ First Nations people represent 12.9% of total population.[3]
	Young population	▪ With a median age of 33 years (40 years for the OECD average). ▪ Population growth (0.7% annually during 2010-20), higher than OECD mining regions.
	Safety and recreational infrastructure	▪ A rich natural environment fosters an outdoor lifestyle and access to extensive recreational infrastructure with high safety standards.
Environment	Natural parks and environmental amenities.	▪ A rich and unique landscape, characterised by deep gorges, high canyons, waterfalls, and serene waterholes. ▪ Four National Parks, including the Karijini National Park, a top tourism spot in the state.

[2] Receives more sunshine than anywhere else in Australia (over 10 hours a day).

[3] The share of First Nations people within the total population has been calculated by combining 2021 Census data from East and West Pilbara.

In order to succeed, the Pilbara will also need to ensure better social outcomes, in addition to better environmental results, as these factors are increasingly important to both society and investors. To achieve this, greater participation of First Nations people in mining and energy initiatives, stronger commitments to preserve the environment and cultural heritage and to support thriving local communities must be at the core of policies. At the same time, the Pilbara should also look to diversify its economy by fostering entrepreneurship both within and outside of mining value chains, including tourism and leveraging First Nations know-how.

Pilbara's low population density, harsh climate and high dependence on fly-in fly-out workers presents challenges for sustainable development.

To mobilise its potential, the region will need to improve well-being standards and attractiveness. Harsh climate conditions, remoteness from metropolitan areas and urban amenities and low population density act as disincentives for businesses and people to establish or remain in the region. These are further complicated by the high dependency on extractive activities, and reliance on fly-in fly-out workers, which increases the vulnerability to economic volatility. In addition, Pilbara faces pressing well-being challenges including high costs of living, shortage of affordable housing, difficulties in attracting and retaining workers, high levels of inequality with First Nations people, low accessibility to services and high greenhouse gas emissions (Western Australia Government, Perth, 2022[7]) (Table 2).

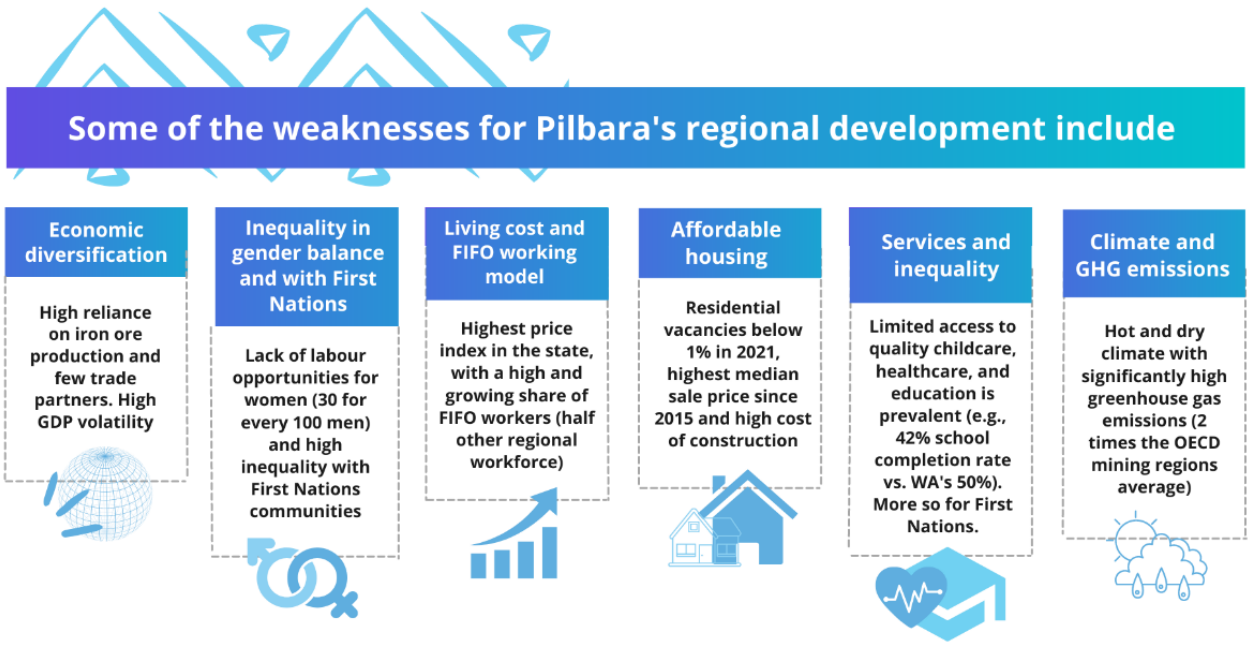


Table 2. Main development challenges in the Pilbara

	Challenge	Description
Economy	The least diversified region across the sample of the 50 OECD regions specialised in mining[4], which reduces economic resilience	▪ High reliance on a single product (iron ore), with few trade partners, and three times fewer registered firms (34 per 1 000 population) than the comparable benchmark of OECD regions (82). ▪ Four times higher economic volatility (deviation coefficient of GDP growth of 40%) than the national average (10%).
	Lower share of women in the workforce	▪ The lowest share of women in the workforce (30 women for 100 men) amongst OECD mining regions (96 women for 100 men).
	Highest living costs in the State and Australia	▪ The regional index price in Pilbara is 15% higher than Perth.
Social	Fly-in fly-out working model linked to an industry strategy to access a large workforce.	▪ Approximately half of the people working in the region can be identified as FIFO.[5] ▪ Growth of FIFO workforce (20.17% annual average increase since 2020).
	Shortage of affordable housing	▪ Residential vacancies in 2021 were below 1%.
	Lack of quality childcare, specialised health, and education, mainly due to workforce availability	▪ Share of adults needing medical treatment for injuries and preventable hospitalisations (24%) exceeds the state average. ▪ Despite an increase, school completion rates in Pilbara (42% in 2016) remain below the Western Australian average (over 50%). ▪ One of the highest deficits of childcare spots in Australia. In East Pilbara there is only one childcare spot for every nine children – a deficit almost three times higher than the Australian average.
	High inequality levels between First Nations and non-First Nations people	▪ Among First Nations people, a significant proportion (60%) face long-term health problems, compared to only 26% among non-First Nations people (at the state level). Despite high incomes from the mining industry in both Western Australia and the Pilbara, these health disparities are only slightly below the Australian state average (65%) and remain above 3 states, including the Northern Territory (52%) ▪ Unemployment rates have soared to as high as 60% in recent decades among First Nations workers in Pilbara. Moreover, those who were employed typically held positions in lower occupational classes and earned an average of AUD 250 less per week than their non-First Nations counterparts.
Environment	Harsh climate	▪ Hot and dry climate, with tropical cyclones. In summer, average daily temperatures exceed 30 degrees Celsius (°C) with average daily maximum exceeding 35°C.
	Higher Green House Gas emissions than the average of the OECD mining benchmark	▪ GHG emissions in Western Australia's Outback, including Pilbara, are around 2 and 10 times higher than the OECD mining regions and OECD regional average respectively.

Note: * Data using the international comparable region of Western Australian Outback

[4] Diversification is measured with the Herfindahl-Hirschman index. For the Pilbara, it corresponds to 2 042, which places it as the lowest diversified region across the 50 OECD mining regions.

[5] In the 2021 Australian population census, there were a total of approximately 30 000 people in the Pilbara whose current location was outside their normal area of residence. While this figure would include tourists and intra-regional travel, it is reasonable to assume that a significant portion of that number are FIFO employees and contractors, which is about half of the working population in Pilbara. FIFO employees and contractors come mainly from Perth and operate on shift cycles that are variable, with two weeks on and one week off being a common shift rotation (Government of Western Australia, 2012[21]),

Beyond curbing its attractiveness and living conditions, these challenges also stifle current and future growth opportunities in the Pilbara and represent a bottleneck for the region to become a global leader in the green energy transition. The way mining is done and its effects in the environment and people's live is increasingly at the centre of social movements and international investment strategies. Thus, addressing these challenges will contribute to well-being in the region but also will help attract investment into the region.

To mobilise Pilbara's assets and address its challenges, this study identifies four priority pillars:

- Enhancing development opportunities of First Nations people, through First Nations co-designed reforms
- Improving access and provision of housing and services in the Pilbara
- Diversifying the economy inside and outside the mining sector with a greater focus on green-related activities
- Establishing a coherent placed-based strategy with a long-term vision for development

Pillar I – Enhancing development opportunities of First Nations people, through First Nations co-designed reforms

First Nations residents represent a stable component of the population in the region, recording the highest population growth. However, they face the highest unemployment rate, lowest median income and greatest deficits in access to basic services. Improving well-being standards of First Nations communities in the Pilbara will strengthen the labour market and create new business opportunities beyond mining. To this end, the Pilbara requires a comprehensive approach that improves and clarifies land tenure, enhances tailored education opportunities, and empowers First Nations people.

Evaluating alternative systems for native title royalties to improve First Nations people's self-determination. Some First Nations groups and mining companies share land-use agreements that enable mining companies to access native title lands to operate mines in exchange for royalty payments that are made into trusts for which Native Title holders are beneficiaries. This substantial and growing resource has the potential to be mobilised towards economic empowerment of First Nations communities.

However, the constrained nature of the current trust system disempowers communities as opportunities for engagement with the economy and the right to self-manage funds is removed (Lombarndi, 2015[8]). Thus, an alternative system for native title royalties that grants autonomy to First Nations peoples would aid in unlocking communities' development potential.

Leveraging education to improve integration of First Nations people in regional development. Existing education models are failing to deliver adequate outcomes for a large portion of First Nations children. New education models need to incorporate and align with traditional knowledge systems and ways of transferring knowledge. This will ensure that students are empowered to learn, equipping them with the necessary literacy and numeracy skills to reach their full potential whilst maintaining cultural connections.

Increasing capacity and training to support entrepreneurship within First Nations communities. Taking stock of successful First Nations initiatives in the Pilbara as well as from other OECD regions can spread valuable lessons and incentivise entrepreneurship – e.g. by promoting examples of successful First Nations companies operating in the mining industry (e.g. Yurra, a First Nations owned contractor and services company) and in other sectors (e.g. tourism and arts). Other OECD mining regions have supported First Nations entrepreneurship with First Nations-led associations or First Nations -owned local financial institutions (e.g. Canadian Council for Aboriginal Business).

The actions to improve First Nations people's well-being need to be led, co-developed with, and overseen by First Nations communities.

Pillar II – Improving access and provision of housing and services in the Pilbara

Improving liveability in the region for current residents and attract new ones requires:

Enhancing access to services

The main barrier for quality service provision in the Pilbara is labour force availability, which is a common challenge Australia-wide, but exacerbated in the Pilbara by climate, the cost of living, and remoteness from metropolitan areas and urban amenities. Some Pilbara towns have relied on FIFO workers to cover some specialised services, as immediate and short-term solutions (e.g. health care specialists). However, this solution hampers the ability for the Pilbara to engage in long-term local development.

Reducing the cost of living, in particular for non-resource workers in the region, would help attain a twofold goal: i) improving service provision and ii) increasing regional attractiveness. For example, Yukon, Canada established a tax credit to incentivise permanent leaving of non-resources workers in the region. Furthermore, the Pilbara could further utilise the Designated Area Migration Agreements (DAMAs) to allow for a co-ordinated and targeted attraction of oversees workers.[6]

Improving access to housing and accommodation

Pilbara faces a shortage of affordable housing. Prices have risen by 25% over 2015-21, with residential vacancies below 1% (Pilbara Development Commission, 2022[10]). Critical to both mining companies and communities, this has been a long-standing barrier to improving liveability and economic opportunities locally, contributing to inequality in the region and reducing incentives for people and businesses to move into the area. Although the causes are multifaceted, they are rooted in Pilbara's high volatility, high construction costs, and a complex system of land tenure (Table 3). These challenges are exacerbated by a reactive and siloed policy approach to deal with housing issues.

[6] DAMAs are a formal agreement between the Australian Government and what is termed a Designated Area Regional Representative (DAR) which can be a State Government or regional body such as a local government.

Table 3. Main challenges in the housing market of the Pilbara

Challenges	Description
The volatility of the economy	The demand for housing has followed the boom and busts periods, with high correlation of residential population and expansion phases in the Pilbara. This creates uncertainty for developers, financial institutions and individuals, and thus volatility in the housing market.
Complex land tenure and reactive policy approach	Most land in the Pilbara that is zoned or suitable for zoning for residential development is held by the Western Australian Government through Development WA (Western Australia Government, Perth, 2022[7]). The economic volatility of the region has led the state to adopt a conservative approach to residential land release and development, which combines with time consuming and siloed approval processes.
High cost of construction	From a construction perspective, Western Australia is one of the most expensive states in Australia (Townsend & Turner, 2022[11]). In the case of the Pilbara Region, this is further exacerbated by the fact that most residential developments are greenfield developments requiring the additional cost of significant headworks, which is challenging due to remoteness and limited local building services.
High property price and finance valuation	During periods of high housing demand there is typically a significant differential between the market price of a residential property and the valuation that a bank will place on the property for the purposes of mortgage calculations. Insurance cost is also high due to cyclone rating.

The nature of these challenges – managing a housing market in the midst of booms and busts – are also present in other remote OECD regions specialised in mining. Some of these OECD mining regions have created dedicated public funds to level market failure. For example, the local government of Thompson in Northern Manitoba (Canada) introduced a 5% municipal hotel fee in 2009 to create a reserve fund to support affordable housing during bust periods (Canadian Centre for Policy Alternatives, 2009[12]).

Other regions have created special taskforces where different stakeholders join forces to understand the causes of the challenges, develop strategic action plans and raise funds and awareness. This was the case of Labrador West that created the Labrador West Housing and Homeless Coalition to address an acute housing shortage in their mining boom of 2010s (Box 4). Mining regions such as Dalarna County and Norrbotten in Sweden have partly addressed housing shortages through densification initiatives to increase the occupancy rate in dwellings such as construction of apartment buildings and other high density residential options.

Box 4. Strategies in Labrador West to address housing shortages

Characterised by its cold winters and a high economic specialisation in mining, Labrador City (Canada) has experienced several economic booms and busts. A major boom in 2010 led the demand for housing to significantly exceed supply. At that time, some of the actions taken to address the issue of housing included:

- Creation of the Labrador West Regional Task Force to address the local housing shortage, which established a dialogue between the provincial and local government representatives to find solutions.
- The Labrador West Housing and Homeless Coalition was made up of a diverse range of stakeholders. In its first year It helped to secure funding (from private and provincial sources) to build around 10 social housing units.
- Creation of a provincial non-profit organisation, the Newfoundland and Labrador Housing and Homelessness Network (NLHHN) to share information, provide training/seminars and conduct the Provincial Conference on Remote and Rural Homelessness.

Better integrate the Pilbara FIFO workforce

The FIFO working model has played an essential role in attracting and retaining a skilled and professional workforce from a larger pool of options into remote areas, and has provided a buffer for governments to develop local community infrastructure during expansions or construction periods (Haslam McKenzie, F., 2020[13]). Despite these benefits, relying on high flows of FIFO workers also has major drawbacks including pressures on the local cost of living, increased local inequalities, and issues with social cohesion and mental health of FIFO workers.

The use of FIFO should not discourage permanent living in the region and needs to be planned and coordinated across levels of governments to avoid pressures on the housing market. Further, some initiatives to help mitigate the negative impacts of a FIFO workforce include standardising models on how

an effective FIFO camp is designed and operates and encourage better integration of FIFO accommodation within Pilbara towns to help attain economies of scale for local businesses. These decisions need to involve communities early in the stage to attain common agreements with local governments and industry. For instance, the Yukon Hire Initiative introduced by the Yukon Government in Canada provides incentives to increase the number of local workers in the mining sector such as a 12% tax credit for eligible Yukon resident employees and training programs to companies that meet local hiring targets.

Pillar III - Diversifying the economy inside and outside the mining sector with a greater focus on green-related activities.

Economic diversification is essential to attain sustained and resilient growth in the Pilbara and reduce, economic volatility. A strategy to advance economic diversification should be anchored on regional strengths, including its resource sector.

Diversifying inside the mining and energy sector

Expanding the supply of critical minerals. The region can further diversify its current mineral production by exploring ventures in critical minerals. The Pilbara's geological framework contains world-class mineral deposits with competitive deposits of at least four critical minerals (lithium, nickel, manganese, and copper).[7] Some progress is already underway with the discovery of lithium resources – 10 million tonnes, east of Pilgangoora and promising results in the Tambourah Lithium Project, southeast of Port Hedland (The West Australian, 2022[14])- which complements world-class mine sites at Pilgangoora and Wodgina.

Renewable energy can accelerate the decarbonisation of the mining process and incentivise downstream activities. The Pilbara has large solar and wind resources, extensive areas of undeveloped land and well-established global energy companies with an export-oriented infrastructure (trains and ports). Increasing clean energy solutions offers the opportunity to decarbonise the mining production process and diversify the country's energy mix, while providing new income sources and affordable energy supply for regional industry and local communities, particularly First Nations people.

Reducing the use of fossil fuels to extract and process minerals is increasingly key to reaching new markets and customers that prioritise traceability and environmentally-sustainable mineral productions. In this perspective, most of the main mining companies in the region have already set investment plans to increase renewable energy sources in production, which can be leveraged to decarbonise the energy matrix of the region and create new employments.

Box. 2. Ongoing key renewable energy projects by mining firms in the Pilbara

- Rio Tinto's 34MW solar plant at the Gudai-Darri mine, which will provide one-third of the mine's electricity
- Fortescue's plans for a 5.4-gigawatt solar, wind and battery plant to power its projects in the region
- BHP's Shay Gap Wind Farm, which is currently planned to provide 45MW, with a potential first-generation date of 2027

The deployment of renewable energies needs to have a strong community-focus. These projects typically offer some short to medium term business opportunities in the construction phase, with fewer long-term opportunities during the operational phase.

[7] Many OECD governments, including and Australian have created strategies on critical minerals, identifying a number of strategic minerals to meet the global technology needs of transition out of fossil fuels.

The Pilbara has already started to advance in this regard with the creation of the Hydrogen Hub to fast-track renewable (green) hydrogen production and exports, with funding from both the state and the Commonwealth governments.[8] This complements advanced projects aiming at developing and exporting both green hydrogen and emissions free materials – e.g. the Yuri green hydrogen project one of the largest of its kind in Australia and capable to source green hydrogen into the Yara ammonia production plant, enabling the export of green ammonia and production of green hydrogen at scale.

Promoting circular mining practices. Circular economy practices in mining can create new business opportunities locally, attract new investments and reduce negative environmental effects from mining.[9] Reusing mining waste, for example, is of growing importance across several countries (Canada, Finland, Portugal, Spain), given the opportunity to recover valuable minerals or reuse reagents contained in mineral waste streams such as tailings. Mining waste in some operations can often reach well over double the amount of extracted ore, e.g. for each ton of iron ore extracted, between 2 to 12 tons of overburden material might be removed (Kinnunen and Kaksonen, 2019[15]; Mohanty et al., 2010[16]).

However, creating a system that harnesses the benefits of the circular economy in mining requires addressing barriers, including technological development, environmental and administrative regulation and market and value chain bottlenecks. Furthermore, promoting partnerships with SMEs or other companies can help mobilise opportunities in the circular economy, as waste valorisation is not yet a core business in many big mining companies.

Some OECD mining regions have promoted circular mining activities by facilitating partnership opportunities with SMEs and research centres to put in place an appropriate value chain using the circular model, for example water reuse in. Västerbotten and Norrbotten in Sweden (OECD, 2021[17]), while others have adopted regulations or policy incentives, for example to induce greater recycling of equipment and inputs, including machinery and tyres (Box 3).

Box. 3. Regulation in Chile to advance circular economy in mining

Chile recently introduced a law which specifies that starting in 2023, 25% of mining tires must be recycled, which should increase to 75% as of 2027, and to 100% as of 2030.

This could be an example for Australia, as 93% of the metric tons (mt) of used tires in the Australian mining industry were disposed onsite, piled up or buried, while just 1% were recycled (Tyre Stewardship Australia, 2020)

Beyond mining, the Pilbara also has a growing opportunity to reuse decommissioned infrastructure from offshore oil and gas operations.

Diversifying outside the mining and energy sector

In addition to the advantages provided by its rich geology, proximity to Asia, and export-oriented infrastructure, the Pilbara has a diverse combination of cultures and environmental amenities that can be mobilised to diversify the economy by promoting its tourism and agriculture potential. The region also has a relatively high share of young people, therefore promoting entrepreneurship could generate opportunities for new business and ideas.

Notwithstanding this fact, Pilbara records lower levels of entrepreneurship than nationally, mainly explained by the small domestic economy outside of mining as well as the high reliance on a single sector. For instance, the region has a much lower number of registered firms per capita (34 per 1 000 population)

[8] . The Pilbara Hydrogen Hub includes various project such as a hydrogen and/or ammonia pipeline between Maitland and Burrup Strategic Industrial areas, a Clean Energy Training and Research Institute to develop the required skills for the emerging industry and port upgrades to enable the import of oversized renewable energy equipment (e.g. turbine blades).

[9] In mining, circularity can translate into a more efficient use of natural resources needed for mineral extraction process (e.g. reuse of water) and reusing of mining waste (e.g. rock, slag), non-mining waste (e.g. oil, office waste, old technology,) and mining infrastructure (e.g. mine sites' structures or transport infrastructure).

than across the OECD (69), or even across Australia (90), and is significantly below the lowest in the benchmark of comparable regions– Northern Hungary (44). Actions to improve entrepreneurship could focus on the following areas:

- ***Promoting entrepreneurship in people already working in mining companies*** can be of strategic importance as the majority of the workforce in the region is already employed in that sector. This includes intrapreneurial programmes associated with the in-company incubation of employee-driven initiatives that eventually spin-off from the company. It would also benefit companies as they can stand out globally with such environmental, social, and corporate governance (ESG) practice and promote vertical integrated value chains (companies such as Deutsche Telekom or French Telecom have implemented such initiatives).
- ***Targeting entrepreneurship support programmes for women and First Nations people***. Given the relatively low participation of women in the workforce, entrepreneurship strategies that promote role models, create women's networks and family care services for self-employed women can be effective measures to raise female entrepreneurship.
- ***Reinforcing networking opportunities to promote entrepreneurship and scale-up SMEs*** with frequent, formal networking opportunities that create synergies among business and targeted support to different parts of the population, including supporting entrepreneurship, social economy and tourism and First Nations enterprises.

Improving infrastructure outside mining, particularly for tourism (e.g. hotels, broadband), as well as supporting joint tourism strategies in the region as a whole-of-government approach can help boost tourism activities. There are already several strategies underway that can be further integrated among them, such as East Pilbara and Port Hedland's Tourism strategies. Measures include the development of an iconic port-focused visitor attraction, the creation of commissionable First Nations cultural tourism products/experiences, and the expansion of existing and new local events that celebrate local culture and community (Shire of East Pilbara, 2021[18]) and (Town of Port Hedland, 2021[19])

Pillar IV – Establishing a coherent place-based strategy with a long-term vision for development

The development of the Pilbara is mainly guided by Western Australia state policies and strategies, with the Pilbara Development Commission (PDC) as the institution in charge of co-ordinating and promoting development in the region. Local governments deliver a relatively narrow range of services, with responsibilities defined by the state. Most development plans for the Pilbara recognise the need to further diversify the economy (e.g. PDC's 2019-21 Strategic Plan).

However, the Pilbara does not have a masterplan with a mechanism to help co-ordinate actions across different state ministries for long-term and forward-looking strategies that address coherently the pressing local priorities (e.g housing affordability). Development plans tend to be managed and delivered independently by each ministry, each following their respective sectorial scope. Furthermore, there is little collaboration among strategic projects of local governments and lack of a systematic approach to identify priorities of citizens (First Nations and non- First Nations people).

The development of the Pilbara requires a coherent, long-term vision that prioritises actions with sustained funding to improve well-being standards in economic, social, and environmental dimensions and plans for mining legacy in the region. A place-based policy can materialise this vision, with a clearer mechanism to coordinate different levels of government and regional stakeholders to address local needs, beyond political cycles. It also needs better coordination of mining companies' initiatives and strengthening government accountability.

A place-based approach can shift the perception of structural challenges in the Pilbara, such as remoteness and harsh weather, into opportunities. For example, what were previously perceived as challenges in Lapland, Finland (i.e. remoteness, freezing temperatures (-30°C) and darkness (50 days of 24-hour sunless night), are now promoted as some of the region's main assets, attracting tourists and investors to experience the advantages offered by this particular setting (e.g. environmental beauty or First Nations culture).

Likewise, Fort McMurray, Alberta, Canada is a remote and substantial oil-producing town, which has experienced one of the largest population growth rates in Canada (3% annual average since 2012) despite its low temperatures and long distance to big cities (Government of Alberta., 2022[26]).

For rural and low-density regions, policies that adopt a consistent approach to enable communities to translate their needs into concrete strategic plans benefit from a greater local buy-in that ensures sustainability in their implementation, better monitoring and mobilisation of endogenous assets (OECD, 2020[20]).

Recommendations: A framework for action for rural development in the Pilbara

This review identifies a framework for action across 4 pillars providing 16 recommendations around three pillars to help the Pilbara take advantage of its mining strengths, while promoting inclusive and sustainable growth with better living conditions for its communities.

Pillar 1: Enhancing development opportunities of First Nations people, through First Nations co-designed reforms

1. Support the organisation of a Pilbara First Nations Self-determination Summit
2. Tailor education services to First Nations' needs
3. Standardise First Nations procurement across industries and government
4. Establish a Pilbara First Nations Chamber of Commerce with a programme to facilitate access to capital

Pillar 2: Improving access and provision of housing and services in the Pilbara

5. Attract and retain professionals to improve local service provision.
6. Improve the housing market with collaboration among various stakeholders
7. Set a task force to strengthen access to quality education and training
8. Better integrate FIFO workers to increase social cohesion and strengthen local communities

Pillar 3: Diversifying the economy inside and outside the mining sector with a greater focus on green-related activities

9. Facilitate projects on critical minerals co-developed with First Nations people and the industry
10. Promote renewable energy projects with the participation of First Nations communities and local businesses
11. Accelerate circular economy practices in the mining value chain
12. Promote a more sustainable mining sector including monitoring of environmental impacts and ecological stewardship by First Nations people.
13. Increase the support to local entrepreneurs, SMEs and social enterprises (in the energy and tourism sectors).

Pillar 4: Establishing a coherent place-based strategy with a long-term vision for development

14. Create a coherent long-term vision for the Pilbara's development
15. Adopt a place-based development strategy with improved participation of local governments and First Nations people
16. Establish a formal co-ordination mechanism to implement and monitor development policies

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