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Executive Summary

This visual analytics report investigates Australia's export trends from 1988 to 2024, with a focused lens on the mineral fuels category—particularly Liquefied Natural Gas (LNG). Using Tableau as the primary analytical tool, we employed a variety of advanced graphical techniques, including time-series line charts, tree maps, dual-axis trend graphs, area charts, and annotated storyboards to uncover and communicate both high-level trends and granular subcategory shifts.

Our analysis revealed a transformative transition in Australia's export landscape. In the early years, coal dominated mineral fuel exports, accounting for most of the category. However, over time, its share sharply declined to below one-third by 2024. In contrast, LNG exports surged from under 5% to approximately 30%, overtaking coal as a key contributor to export revenue. Petroleum products maintained a relatively consistent share throughout the period. Significant outliers and turning points were observed in 2008 and 2020, corresponding with the Global Financial Crisis and COVID-19 pandemic, both causing abrupt export contractions across all subcategories.

The use of storyboard narratives provided a powerful vehicle for communicating these insights. Each slide focused on a key phase: the early coal era, the emergence of gas, the volatility from global events, and the current LNG-driven growth. These were enhanced with contextual images, annotations, and strategically placed data callouts, making complex patterns more interpretable.

By focusing on gas as the central subcategory, we identified it as not only a major driver of export growth but also as a sensitive indicator of global market conditions. External research supports this, citing LNG's growing global demand, especially in Asia, and Australia's competitive positioning due to infrastructure and proximity advantages.

Overall, this project demonstrates how visual analytics—powered by effective dashboard design, time-series decomposition, and contextual storytelling—can convert raw trade data into actionable insights. The findings support clear strategic recommendations for policy and industry stakeholders, emphasizing innovation, diversification, and resilience planning in Australia's mineral fuel export sector.

I. Introduction

This report investigates Australia's international trade dynamics from 1988 to 2024 through the lens of visual analytics, with a primary focus on the mineral fuels export category and its key subcategory, gas (natural and manufactured). By leveraging Tableau's dashboarding and storytelling capabilities, combined with statistical and analytical pattern modelling in Excel, this project uncovers long-term shifts, major change points, and structural evolutions within the export and import landscape.

The visualisation process aims to not only identify historical trends and outliers—such as the impacts of the Global Financial Crisis (2008), COVID-19 pandemic (2020), and the global energy shock (2022)—but also to contextualise the rise of gas as a strategic export commodity. Through a combination of interactive dashboards and an annotated storyboard, this report guides the reader from macro-level trade patterns to a granular understanding of subcategory growth, offering clear insights and future-facing recommendations supported by a decade-long trend analysis and a five-year forecast.

II. Data Preparation

Preparing the dataset was a foundational step to ensure meaningful and consistent visual analytics. Given the vast differences in the magnitudes of trade values across categories and subcategories—ranging from hundreds of dollars to nearly a million—the raw data required transformation to facilitate comparison and pattern recognition.

To address this, two key preprocessing techniques were employed:

1. Statistical Pattern (Ratio Analysis)

This technique standardizes the data by converting absolute values into proportional representations. By calculating the percentage share of each category or subcategory against the total annual import/export, we created a normalized view of trade distribution over time. This transformation enabled direct comparison across years and categories, regardless of absolute value disparities.

Formula Used:

$Percentage_{(i\text{-}import)} = sub\text{-}total_{(i\text{-}import)} / total_{(import)}$

$Percentage_{(i\text{-}export)} = sub\text{-}total_{(i\text{-}export)} / total_{(export)}$

where total $Percentage_{(i\text{-}import)}$ and $Percentage_{(i\text{-}export)}$ should be 100%

For sub-category j=1 to 10, the percentage of each sub-category can be denoted as

$Percentage\text{-}Sub_{(j\text{-}import)} = d_{(j\text{-}import)} / sub\text{-}total_{(j\text{-}import)}$

$Percentage\text{-}Sub_{(j\text{-}export)} = d_{(j\text{-}export)} / sub\text{-}total_{(j\text{-}export)}$

where $d_{(j)}$ is data at sub-category *j*, and total *Percentage-Sub* $_{(j\text{-}import)}$ and *Percentage-Sub* $_{(j\text{-}export)}$ should be 100% (UTS, 2025)

This allowed for proportional analysis at both the category and subcategory levels, ensuring that each component's contribution to the total was contextually visible across all years.

2. Analytical Pattern (Change Analysis)

To explore dynamics over time, we calculated the year-over-year change for each category and subcategory. This helped surface growth trends, volatility, and notable change points, particularly during external shocks like the Global Financial Crisis or COVID-19 pandemic.

Formula Used:

For time series t = 1988, 1989, ,,, 2022; ratio of change for category (i) or sub-category (j) between *t* and *t-1* can be denoted as

$Ratio\_Change_{(t)} = d_{(t)} / d_{(t-1)}$

where $d_{(t)}$ is data for category (i) or sub-category (j). (UTS, 2025)

These two preprocessing strategies—statistical ratios and analytical changes—provided the foundation for creating effective visualisations in Tableau. The prepared dataset enabled consistent scaling, pattern detection, and insightful comparative analysis across Australia's import and export categories from 1988 to 2024.

3. Importing Data into Tableau

Following the preparation of the dataset into three distinct patterns — Statistical (Ratios), Analytical (Changes), and Raw Dollar — the next step involved importing these structured Excel sheets into Tableau for visualization and analysis. This process ensured a seamless transition from raw data to interactive dashboards capable of supporting deeper trend analysis and storytelling.

The import process was executed by connecting the Excel file to Tableau, where the three sheets appeared as separate data sources. To integrate the Statistical and Analytical datasets, Tableau's relationship model was used. This approach allowed the linking of data sources on shared dimensions, specifically the Time and Trade fields, enabling synchronized and layered visual analysis without data duplication — a key advantage over traditional joins.

After confirming field matches across datasets, the Raw Dollar sheet was also imported separately to provide an absolute-value perspective alongside proportional and rate-of-change views. This multi-pattern setup allowed for the construction of dashboards that not only present trends but also contextualize them in terms of both scale and dynamics over time.

By using Tableau's relationship feature rather than physical joins, the integrity of each dataset was preserved, and analytical flexibility was maintained. This methodological approach ensured that comparative dashboards (e.g., between categories and subcategories)

could be created with high precision, leveraging all three patterns across time series for both import and export flows.

III. All Main Categories Trends

1. Raw Dollar Trend

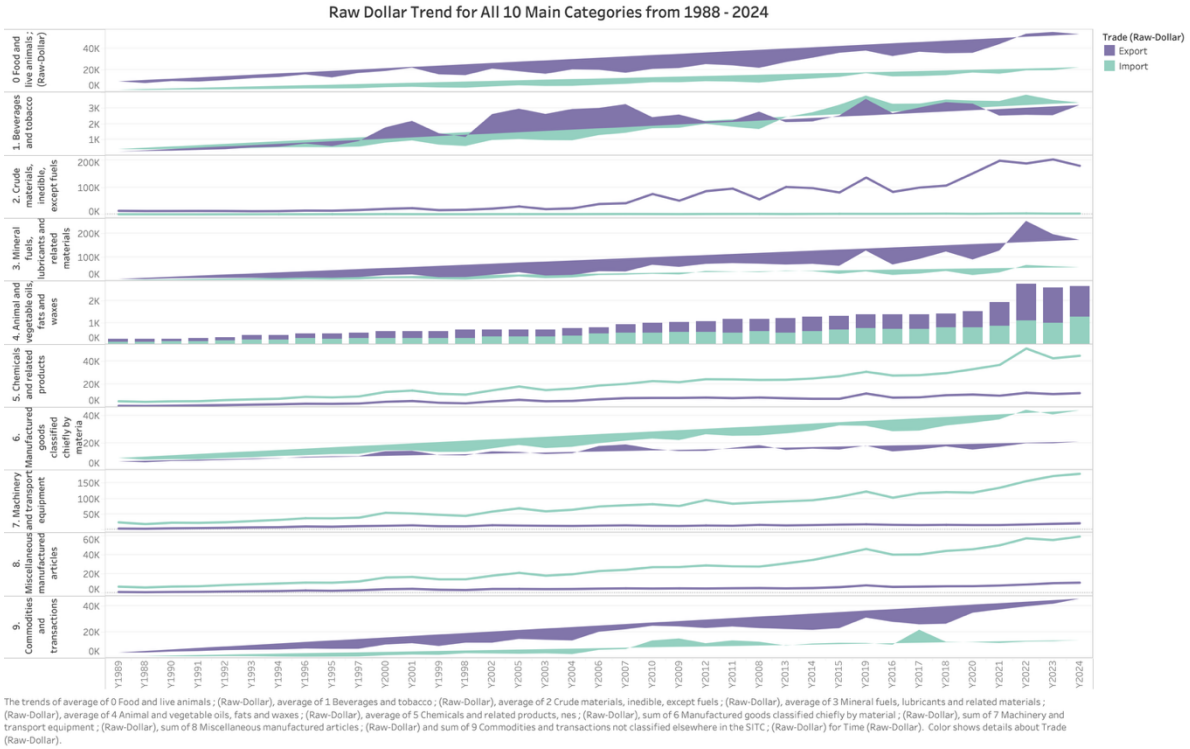

Figure 1: Raw Dollar Trends for All 10 Main Categories from 1988 – 2024

The raw dollar trend analysis from 1988 to 2024 reveals Australia's shifting economic profile through the lens of its ten main trade categories. This absolute-value-based visualisation offers a foundational understanding of export and import magnitude, enabling the identification of dominant sectors and structural imbalances.

The standout performer across the timeline is Mineral Fuels, Lubricants and Related Materials, which experienced exponential export growth from the early 2000s onward. The steep rise after 2010 corresponds with Liquefied Natural Gas (LNG) infrastructure expansion and global energy demand, while the peak in 2022 reflects price surges due to the global energy crisis (e.g., the Ukraine war). This category now constitutes the backbone of Australia's export economy.

In contrast, Machinery and Transport Equipment remains consistently high on the import side, signifying ongoing reliance on foreign industrial and technological goods. This category shows minimal export presence, underscoring Australia's structural dependency on international supply chains for manufacturing inputs.

Categories like Food and Live Animals and Crude Materials (excluding fuels) show steady but moderate export growth. Their patterns indicate sustained global demand but limited expansion capacity compared to energy exports. Meanwhile, Manufactured Goods and Chemicals remained relatively flat in both import and export, indicating limited strategic movement or investment in these areas. Interestingly, Beverages and Tobacco along with Miscellaneous Manufactured Articles exhibit minor fluctuations and negligible long-term growth, marking them as low-impact sectors in raw trade value.

This visualisation highlights a persistent resource-export and import-dependency structure, where Australia thrives on mineral fuel exports but remains dependent on external supply for advanced and high-tech goods. It also captures critical change points such as the post-2010 gas surge, the 2020 COVID dip, and the 2022 energy spike.

This chart provides essential context for the more nuanced subcategory analysis that follows in the dashboards and storyboard. It validates the decision to investigate mineral fuels further, particularly gas, as a category of national significance in trade strategy.

2. Analytical Pattern Trend

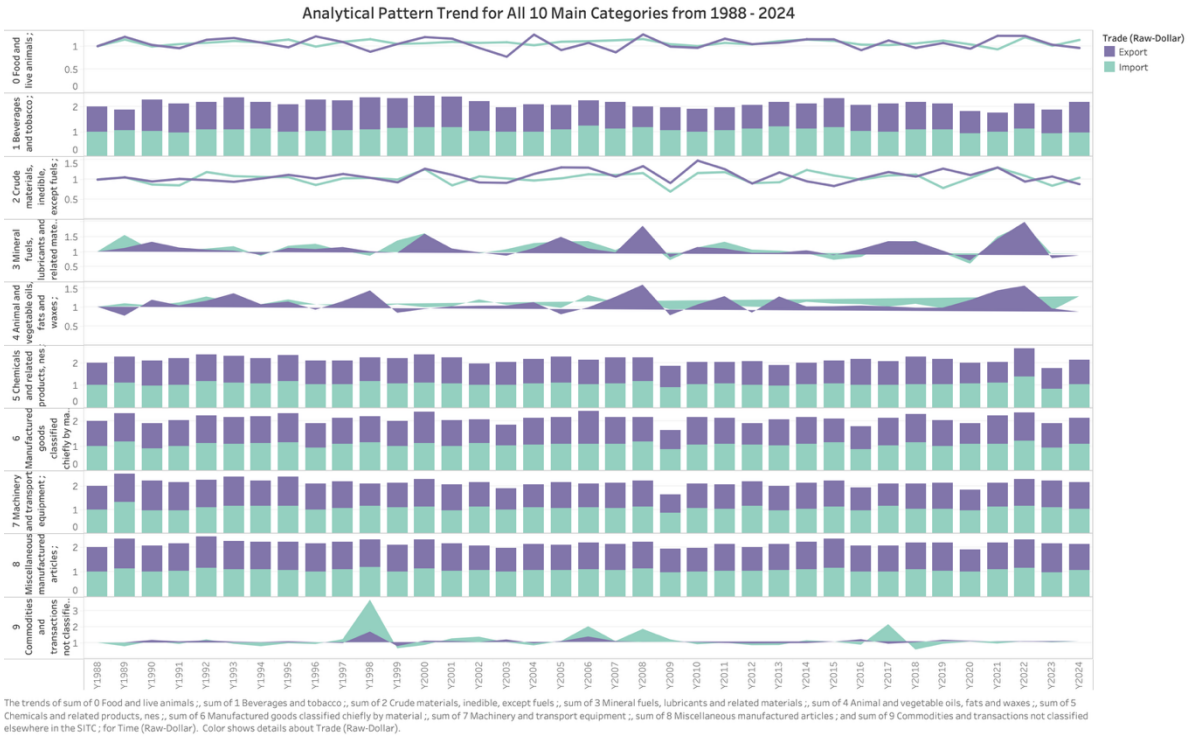

Figure 2: Analytical Pattern Trend for All 10 Main Categories from 1988 – 2024

The analytical pattern trend provides a year-over-year percentage change perspective, enabling detection of volatility, growth surges, and shock points across all ten main trade categories from 1988 to 2024. This layer of analysis adds interpretive depth beyond absolute values, surfacing the tempo and turbulence of trade activities over time.

Among all categories, Mineral Fuels, Lubricants and Related Materials stand out for their pronounced spikes in export growth, particularly post-2010. These bursts correspond with LNG infrastructure ramp-up and energy crises, especially the Ukraine war in 2022, which

amplified global LNG demand. This is followed by a noticeable drop in growth rate in 2023–2024, indicating a normalization phase post-crisis. Food and Live Animals exhibit stable but low growth volatility, signaling a resilient and predictable export stream. Meanwhile, Crude Materials (excluding fuels) show erratic growth bursts around early 2000s and mid-2010s, likely tied to short-term commodity price shifts and global demand cycles.

On the import side, Machinery and Transport Equipment and Manufactured Goods show relatively steady patterns with minor fluctuations, reflecting Australia's consistent dependency on high-value imported goods. These trends underscore structural trade asymmetries, where domestic production is limited, and industrial inputs are largely imported. Beverages and Tobacco, Animal and Vegetable Oils, and Miscellaneous Articles continue to demonstrate negligible growth variation, reaffirming their limited strategic role in national trade dynamics.

The analytical pattern reinforces insights seen in the raw dollar chart—especially around peak volatility points in 2008–2009 (Global Financial Crisis) and 2020–2022 (COVID-19 and energy crisis). It further justifies focusing on mineral fuels and specifically gas as a subcategory of national trade importance, given its sharp growth surges and clear correlation with global events. This pattern-based lens effectively bridges raw magnitude analysis with change velocity, supporting a more dynamic understanding of Australia's trade ecosystem.

3. Statistical Pattern Trend,

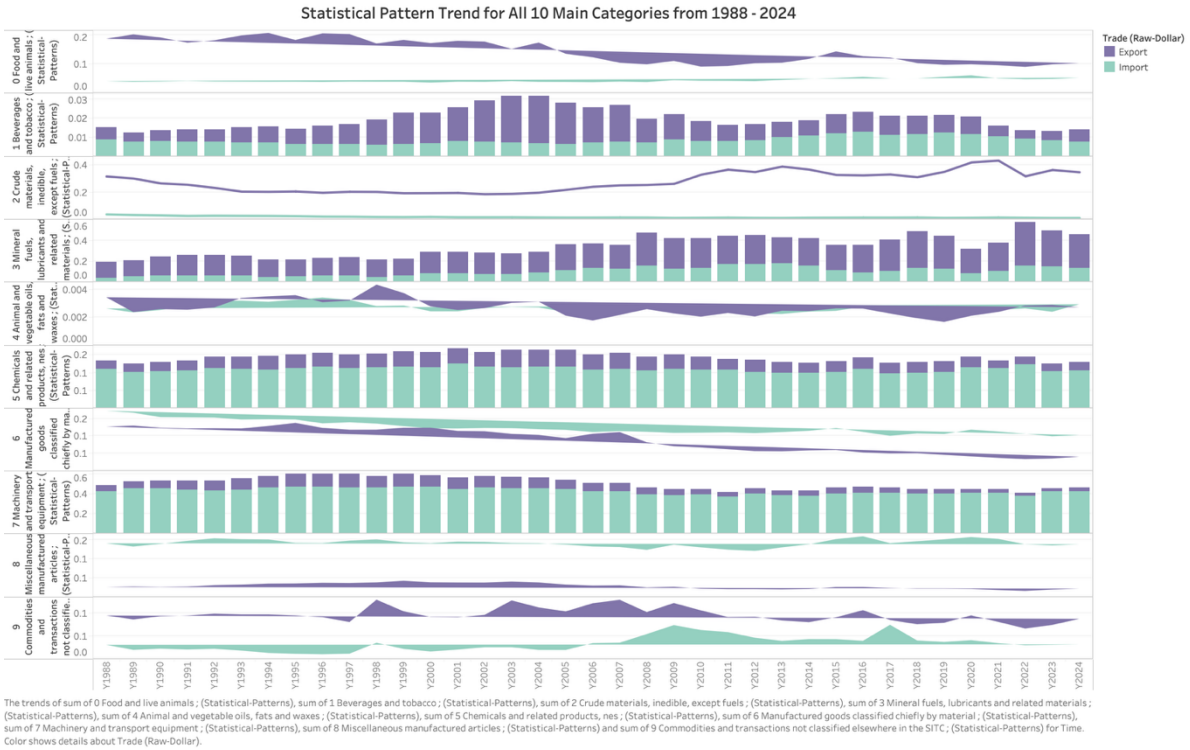

Figure 3: Statistical Pattern Trend for All 10 Main Categories 1989 – 2024

The statistical pattern view of Australia's trade from 1988 to 2024 reveals critical proportional trends across the ten main trade categories, normalized as ratios against the total import/export per year. Most notably, mineral fuels (Category 3) demonstrated a steady and substantial increase in export share, climbing from below 10% to over 25%, reflecting

Australia's transformation into a resource-export economy. In contrast, manufactured goods (Category 6) and machinery and transport equipment (Category 7) exhibit a declining export ratio, indicating a long-term shift away from industrial output toward natural resources. Meanwhile, food and live animals (Category 0) maintained a relatively stable export share, reinforcing their role as a consistent contributor. Imports across most categories remained more evenly distributed, with Category 7 (machinery) continuing to dominate in import share, illustrating Australia's dependence on external technology and industrial products. This normalized view highlights how trade dynamics have evolved structurally, with natural resources overtaking traditionally dominant categories in export composition, offering a clearer lens into Australia's economic reorientation over the past three decades.

4. Australia's Trade Landscape

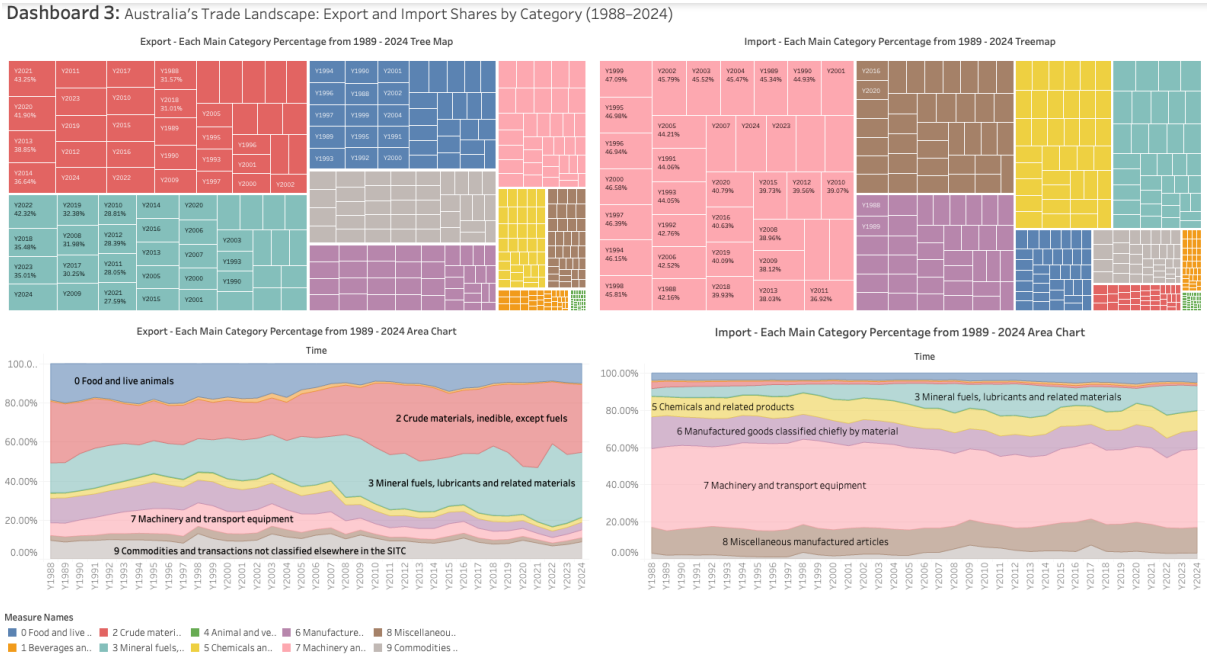

Figure 4: Dashboard of Australia's Trade Landscape Overview (1988 – 2024)

Figure 4 provides a comprehensive visual overview of Australia's import and export structure across ten primary trade categories from 1988 to 2024. The integration of treemaps and area charts offers a dual-layered perspective: year-by-year share distribution and long-term trend evolution. Together, they allow users to assess the consistency, volatility, and structural shifts in Australia's trade portfolio over a 36-year span.

Export Composition Analysis

The export treemap and area chart reveal a notable transformation in Australia's trade composition. In the earlier decades, Crude Materials (Category 2) held the dominant share of exports. However, from the early 2000s onward, Mineral Fuels (Category 3) began a significant upward trajectory, eventually overtaking Crude Materials and emerging as the dominant export category. By 2024, Mineral Fuels comprise nearly 30% of total exports, reflecting Australia's transition toward a resource-centric export economy, particularly in energy-related commodities such as coal, petroleum, and LNG.

In contrast, Manufactured Goods (Category 6) and Machinery and Transport Equipment (Category 7), which were previously substantial export contributors, have steadily declined in proportional share. This decline underscores a broader deindustrialisation trend and reinforces Australia's increasing dependence on resource extraction and energy production for export revenues.

Import Composition Analysis

The import visualisations demonstrate a more stable composition. Machinery and Transport Equipment (Category 7) remains the leading import category throughout the timeline, with a consistently high share—often exceeding 35%. This suggests ongoing domestic reliance on advanced technological, transport, and capital goods from global suppliers. Other categories, such as Chemicals and Related Products (Category 5) and Miscellaneous Manufactured Articles (Category 8), also maintain relatively steady shares, indicating persistent demand across industrial and consumer sectors.

Mineral Fuels, while dominant in exports, contribute modestly to imports—further evidencing Australia's energy self-sufficiency.

Rationale for Selecting Category 3 – Mineral Fuels

Category 3, Mineral Fuels, was selected for in-depth subcategory analysis due to its pivotal role in reshaping Australia's export landscape. Several factors justify this selection:

- Rapid Growth: Mineral Fuels grew from a marginal export category to nearly one-third of total exports by 2024, marking the most significant shift among all categories.
- Structural Significance: This growth reflects Australia's strategic pivot to a resource-export economy, increasingly reliant on high-value commodities such as gas, coal, and oil.
- Subcategory Complexity: Within Mineral Fuels are several economically vital subcomponents—including natural gas, petroleum products, and coal—each with unique export/import profiles, making it a rich area for further exploration.
- Economic Event Sensitivity: This category exhibits clear correlations with major global disruptions, including the 2008 Global Financial Crisis, COVID-19, and the 2022 global energy crisis (post-Ukraine war), which caused significant fluctuations in trade values and volumes.

Given its scale, volatility, and economic importance, Category 3 serves as the most analytically valuable focal point, enabling meaningful insights across macroeconomic, industrial, and geopolitical dimensions.

IV. Dashboard

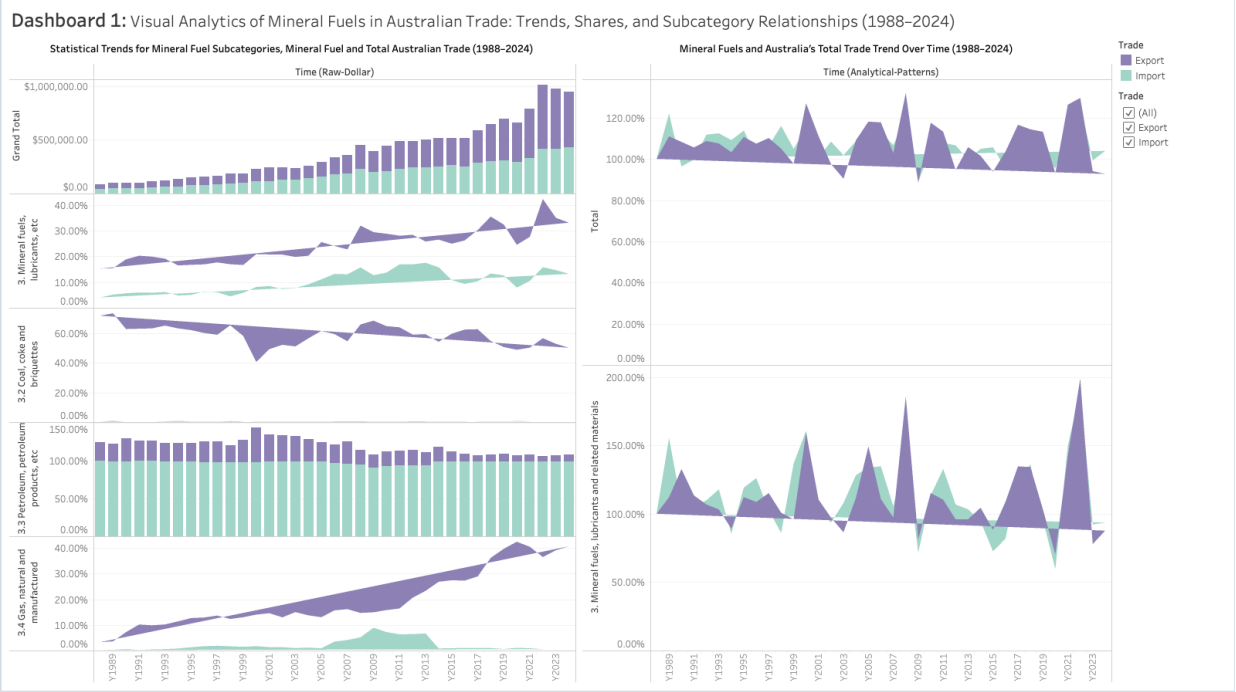

Figure 5: Visual Analytics of Mineral Fuels in Australian Trade

The analysis of Category 3: *Mineral Fuels, Lubricants and Related Materials* reveals a fundamental structural transformation in Australia's export portfolio over the past three decades. By examining the internal relationships among the subcategories — coal, petroleum, and gas — it becomes evident that Australia's export trajectory has undergone a major realignment, transitioning from coal-dominant to gas-driven growth. This transformation is not only supported by raw dollar trends but is further contextualised by statistical shares and analytical year-on-year patterns.

Gas exports, representing subcategory 3.4, have emerged as the primary growth engine of the mineral fuels category. While gas accounted for less than 5% of the category's exports in the early years, it surged past 30% by 2024. This growth was especially pronounced post-2005, aligning with the expansion of LNG infrastructure projects such as Gladstone, Gorgon, and Wheatstone. These developments enabled Australia to significantly boost its liquefaction capacity, unlocking new markets in Asia. The upward momentum intensified further in 2022 following the Russia–Ukraine conflict, which disrupted global energy supplies and amplified demand for non-Russian LNG, positioning Australia as a key exporter. This surge is clearly visible in both the raw-dollar bar charts and the analytical spikes on the dashboard.

In contrast, **coal (3.2)**, once the dominant subcategory with over 60% share, has seen a steady decline, dropping below 30% in recent years. This long-term trend reflects both internal economic shifts and external pressure from global decarbonisation efforts. As nations pivot toward cleaner energy sources, demand for thermal coal has plateaued and even declined. The change is particularly visible post-2010, marking a clear turning point as investment and export emphasis moved toward gas. Additionally, coal exports were more vulnerable to COVID-19 disruptions and political tensions with major partners such as China, which temporarily suspended coal imports from Australia in 2020.

Petroleum (3.3) maintained a relatively stable contribution, fluctuating between 25% and 30% over the years. Unlike coal and gas, petroleum exports did not experience any major booms or busts. This consistency can be attributed to Australia's role as both a crude exporter and refined fuel importer. While this dual role provided resilience, it also limited growth potential, resulting in a subcategory that serves more as a stabiliser than a driver of change. The raw-dollar values show minimal variance, and the statistical share curve remains flat, highlighting its saturation.

Key change points include the **2008–2009 Global Financial Crisis**, where all subcategories experienced a noticeable decline, reflecting a broader contraction in global trade. Another pivotal moment was the **COVID-19 pandemic in 2020**, which disrupted demand and logistics, leading to a sharp dip in gas and coal exports. Yet, unlike previous downturns, gas rebounded quickly due to its strategic value in the global energy transition and its flexibility in supply agreements.

Overall, the relationship between the mineral fuels category and its subcomponents illustrates a significant realignment of trade dynamics. Australia's export model has progressively shifted from reliance on coal toward LNG-based energy exports, with gas becoming the focal point for future growth. The evidence from raw-dollar, percentage, and year-on-year visualisations triangulates to form a clear narrative: the mineral fuels category is no longer homogenous but is increasingly shaped by the divergent performance and outlook of its subcategories.

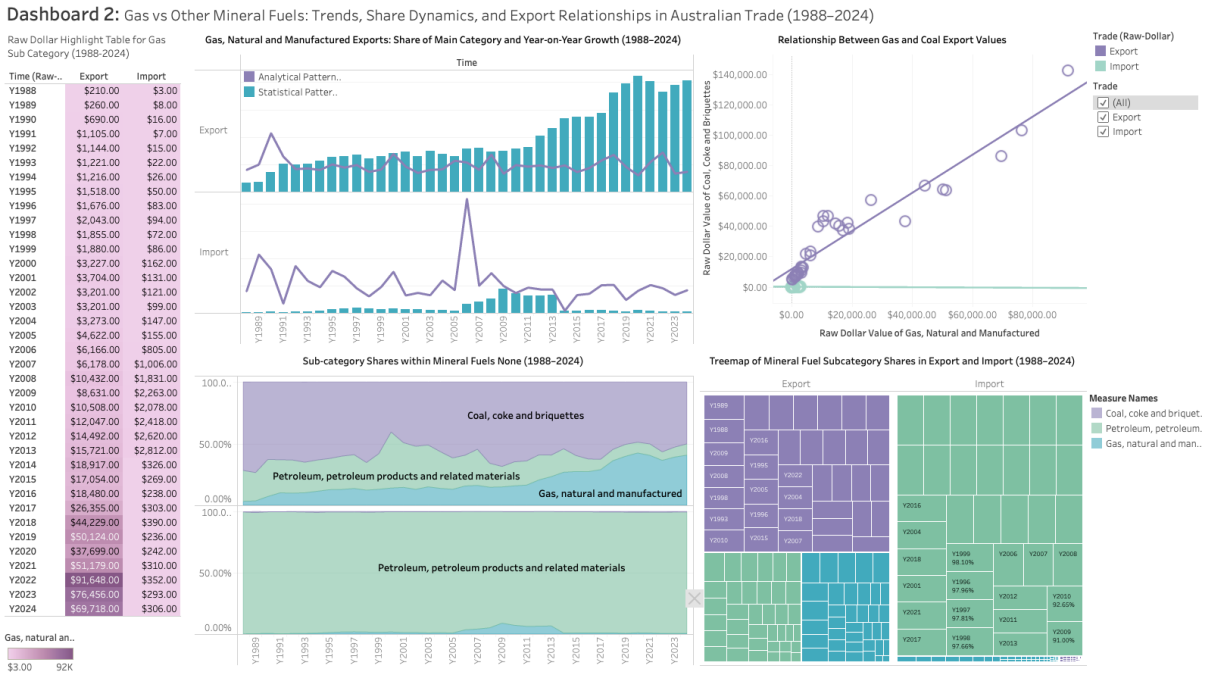

Figure 6: Gas vs Other Mineral Fuels

The focused dashboard analysis on the gas subcategory (3.4 – Gas, natural and manufactured) against coal (3.2 – Coal, coke and briquettes) reveals one of the most transformative energy trade shifts in Australia's modern export history. Over the 36-year span from 1988 to 2024, gas has transitioned from a marginal export contributor to a strategic export pillar, while coal, once dominant, has experienced a marked decline in both share and momentum. This

divergence is captured through a combination of statistical trends, growth trajectories, and export relationships.

Gas exports have grown more than 330 times in raw-dollar value — from just $210 in 1988 to nearly $70,000 by 2024 — and now account for close to 30% of the mineral fuels export share. The trajectory is consistent and steep, particularly post-2010, aligning with the expansion of LNG infrastructure projects and rising demand from Asia-Pacific markets. This steady increase is visually reinforced by the bar charts and line graphs on the dashboard, which show both raw-dollar growth and year-on-year analytical stability. In contrast, coal began with a commanding share — over 70% in earlier years — but its proportional dominance diminished below 40% by 2024, a trend accelerated by global decarbonisation goals and shifting buyer sentiment away from high-emission energy sources.

The regression-style scatterplot on the dashboard further supports a strong linear correlation between gas and coal export values, especially during peak trade periods. However, a crucial insight emerges: despite this correlation, gas exhibits a steeper growth trajectory, indicating its increasing independence and strategic significance in Australia's energy mix. This divergence post-2010 suggests that while coal and gas may have shared external drivers historically, gas is now outperforming coal in terms of policy alignment, infrastructure support, and global demand dynamics.

The treemaps provide an additional layer of insight into import-export asymmetries. Gas, while dominant in exports in recent years, remains marginal in imports, reinforcing Australia's role as a producer and exporter rather than a consumer. Coal, on the other hand, maintains relatively larger fluctuations, indicating susceptibility to global commodity cycles and geopolitical influences, such as trade tensions or environmental regulation shifts.

Overall, this deep-dive validates the strategic decision to explore gas as the focal subcategory. It not only reflects the greatest compound growth in Australia's mineral fuels portfolio but also represents a forward-looking, policy-aligned industry that offers long-term export resilience. The comparison with coal provides a clear contrast, highlighting a pivotal transition in Australia's economic structure — from fossil fuel dependence to a cleaner, LNG-driven trade model.

V. Storyboard

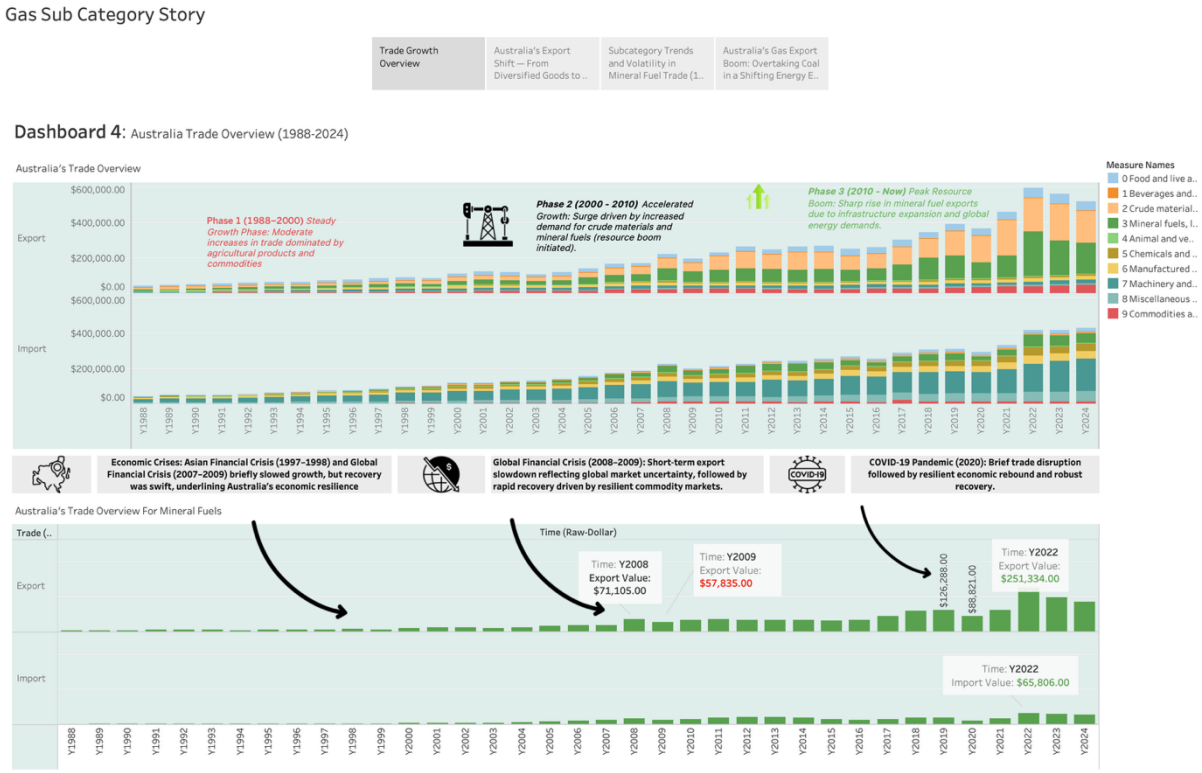

Figure 7: Story Point 1 of the Storyboard

The first slide of the storyboard presents a high-level narrative of Australia's trade evolution, anchoring the visual story on the exceptional rise of the gas subcategory (3.4 – Gas, natural and manufactured) and comparing its trajectory against other key subcategories within the mineral fuels domain and broader trade categories.

From 1988 to 2024, Australia's total export and import landscape underwent three distinct phases:

1. **Phase 1 (1988–2000):** A period of moderate, steady growth driven largely by agricultural and commodity exports such as food, live animals, and crude materials.

2. **Phase 2 (2000–2010):** Marked the resource boom era, where exports of mineral fuels — particularly coal — surged due to infrastructure investments and global industrial demand.

3. **Phase 3 (2010–2024):** The most pivotal shift emerged with the LNG export ramp-up, pushing gas to the forefront of Australia's trade portfolio. Global energy demand, particularly from Asia, catalyzed exponential growth in gas exports — turning it into a leading driver of export value.

The second section of the dashboard zooms into mineral fuels, illustrating gas's standout trajectory. In 2009, gas exports fell slightly to $57,835, largely impacted by the global financial crisis. However, it rebounded sharply in subsequent years. By 2022, export value had reached a record $251,334, highlighting its resilience and strategic importance during the

post-COVID energy demand surge. Gas's export performance contrasts with the plateau seen in other subcategories — coal faced stagnation due to decarbonisation trends, while petroleum remained flat, with minimal share growth over the decades.

This storyboard view contextualises the gas subcategory's dominance within broader macroeconomic shifts. The juxtaposition against coal and petroleum within the same category reveals an unmistakable energy portfolio reshuffle — from heavy dependence on coal to cleaner, high-growth energy solutions like LNG. The bottom insight panel reinforces the timeline of external events — Asian Financial Crisis, GFC, and COVID-19 — as turning points influencing export performance and structural transitions.

This strategic use of temporal grouping, visual emphasis, and economic context sets the foundation for the following slides in the storyboard, which will further dissect gas's internal growth dynamics and trade relationships. It confirms that gas is not just a rising subcategory — it is the future anchor of Australia's energy exports.

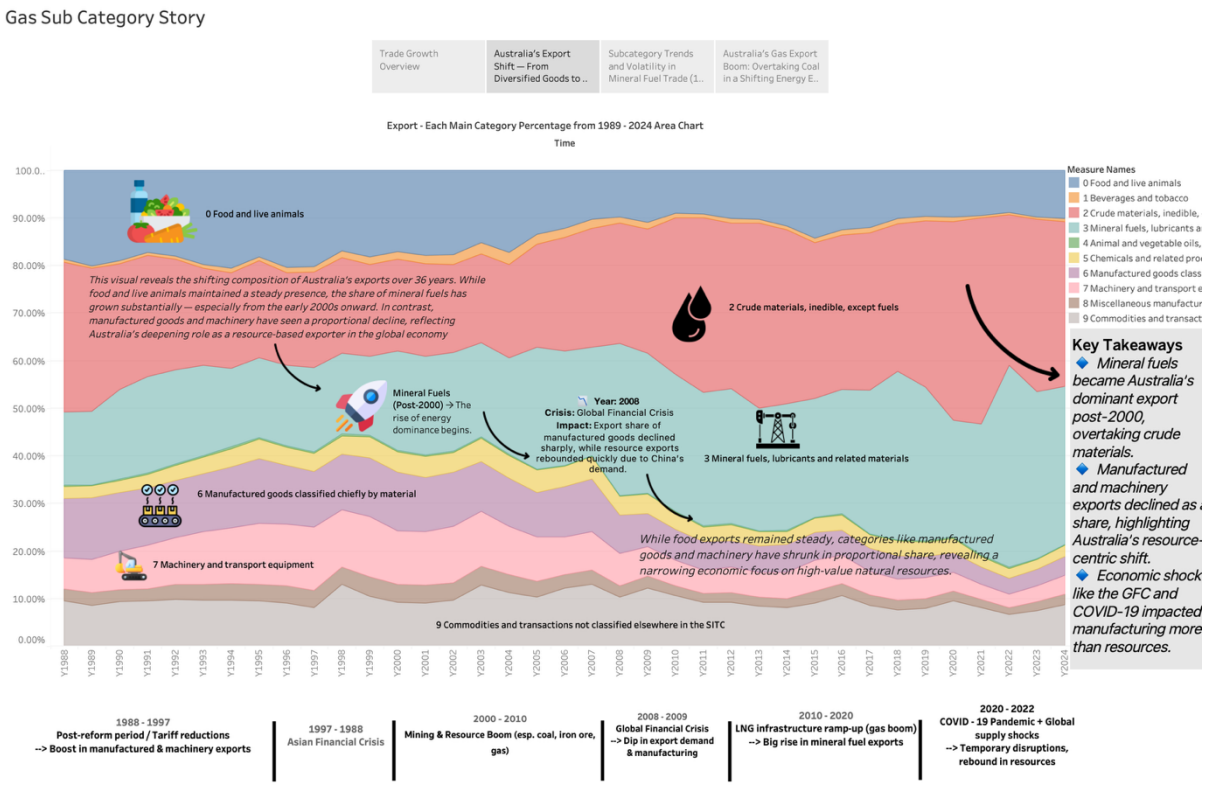

Figure 8: Story Point 2 of Storyboard

This slide visualises a critical macro-level transformation in Australia's trade profile — the shift from a diversified export structure to a resource-dominant model, with mineral fuels emerging as the lead category. The area chart effectively captures how category 3 – Mineral fuels, lubricants and related materials steadily expanded its export share from below 10% in the 1980s to becoming the top export category post-2000, eventually overtaking crude materials (category 2).

The early 1990s to late 1990s shows a more balanced export composition, with manufactured goods (category 6) and machinery (category 7) occupying significant space due to post-reform tariff reductions and export promotion strategies. However, this balance starts to erode

following the 2000–2010 Mining & Resource Boom, which saw soaring demand for energy commodities like coal, LNG, and petroleum. This is the inflection point where mineral fuels sharply rise in export share.

The 2008 Global Financial Crisis (GFC) is marked on the chart as a major turning point. It triggered a brief dip in export value for manufactured goods but had limited long-term impact on mineral fuels due to strong recovery driven by Chinese demand. From this point onward, mineral fuels dominated the export portfolio, especially during the LNG infrastructure ramp-up between 2010 and 2020.

Meanwhile, manufactured goods and machinery (categories 6 and 7) exhibit a consistent decline in export share, shrinking to nearly half their former proportions. This stark contrast underscores Australia's growing reliance on high-value natural resources rather than value-added manufacturing — a shift that raises questions around long-term economic diversity and resilience.

From a narrative standpoint, this second storyboard slide reinforces the rationale behind choosing mineral fuels, and specifically gas, as the primary subcategory of interest. It clearly sets the stage for deeper exploration in the subsequent story points by showing that category-level change was largely driven by subcategory-level performance in gas, confirming its strategic relevance in both past and future trade outcomes.

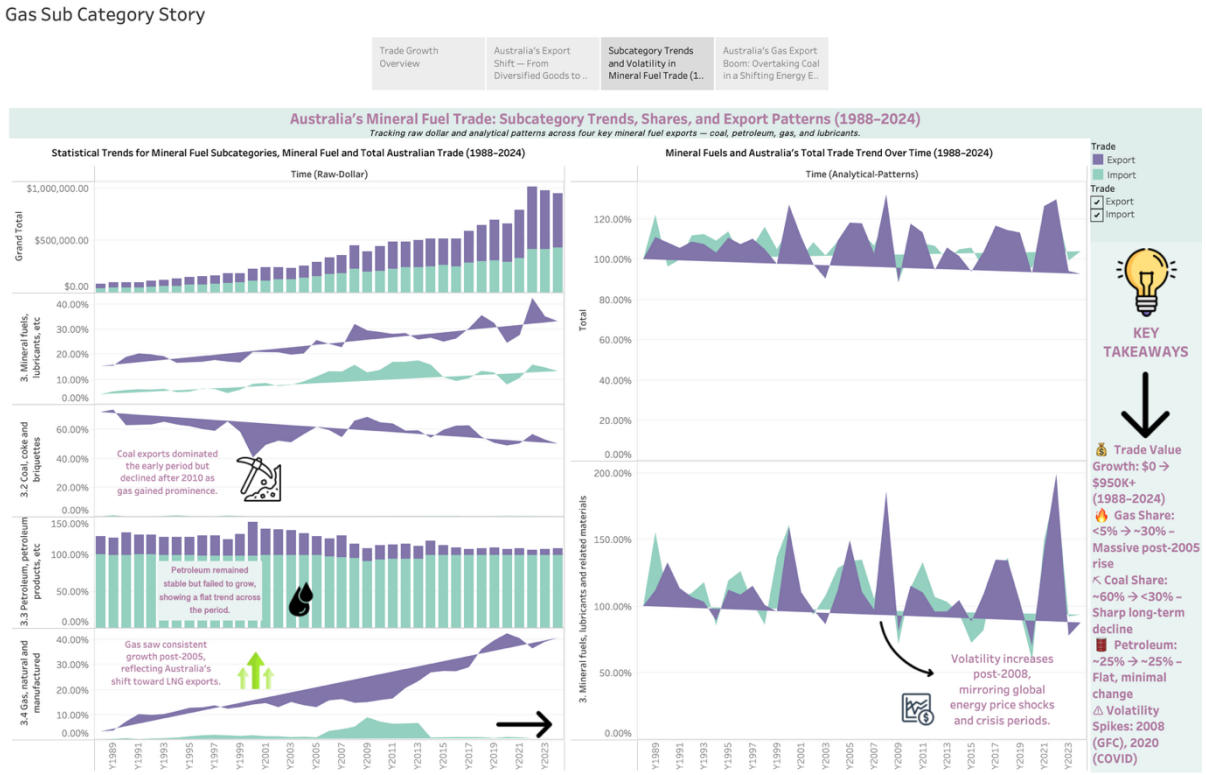

Figure 9: Story Point 3 of Storyboard

This slide provides a subcategory-level decomposition of Australia's mineral fuel trade, unpacking the internal drivers of the category's rise and the volatility patterns linked to global economic shifts. By integrating raw dollar, statistical, and analytical patterns, this view

delivers a comprehensive breakdown of how individual components — coal, petroleum, and gas — contributed to the broader growth of category 3.

The left panel highlights that coal exports dominated in the early decades (1988–2010), but saw a proportional decline post-2010. The gap left by coal was quickly filled by natural and manufactured gas, which displayed exponential growth, particularly after 2015. This reflects Australia's strategic expansion of LNG (liquefied natural gas) infrastructure — notably the Gladstone, Gorgon, and Wheatstone projects — and its positioning as a global energy supplier to Asia.

Meanwhile, petroleum exports remained largely flat, occupying around 25% of the category share across the entire period. This stagnation in growth, despite high global energy consumption, suggests limited investment in petroleum refining or export capacity compared to gas and coal.

The right panel visualises trade volatility using the analytical pattern. Notable spikes appear in 2008 and 2020, which correspond with the Global Financial Crisis (GFC) and COVID-19 pandemic, respectively. While both events caused short-term disruptions, the charts show Australia's mineral fuel exports rebounded quickly, driven by resilient global demand for energy commodities.

These insights reinforce why gas was selected as the primary subcategory of focus — its growth trajectory outpaces both coal and petroleum, making it a clear engine of change within the mineral fuel category. Furthermore, its surge aligns closely with major infrastructure and geopolitical shifts, making it an ideal candidate for deeper trend forecasting in the next storyboard slide.

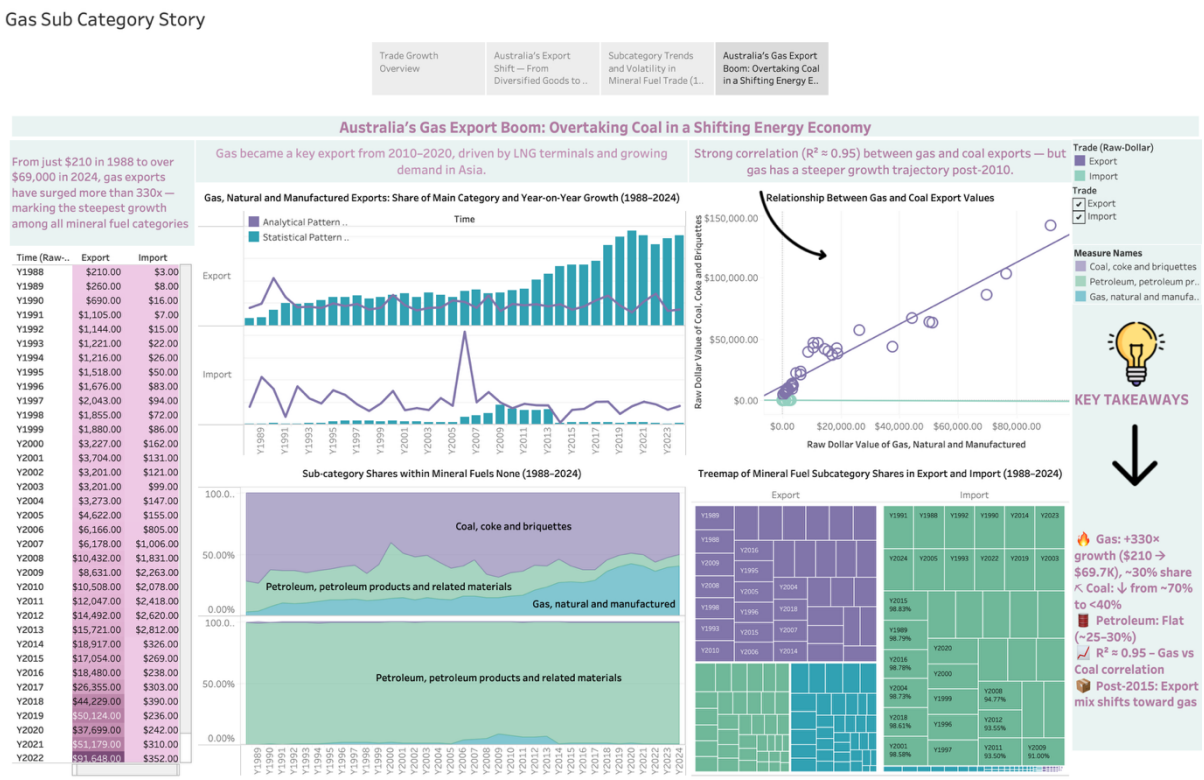

Figure 10: Story Point 4 of Storyboard

This final storyboard slide brings the gas subcategory story full circle, illustrating how Australia's energy export priorities have transformed over the past three decades, with gas emerging as the clear winner in a race once dominated by coal.

In 1988, gas exports were virtually negligible at $210K, dwarfed by coal's overwhelming majority in the mineral fuels category. But fast forward to 2024, and gas has surged past $69.7M, marking a staggering 330× increase — the steepest growth among all mineral fuel subcategories. This exponential rise is closely linked to massive infrastructure investments in LNG terminals and rapidly growing demand from Asia, especially post-2010.

The chart in the top-center panel vividly captures this upward climb, where gas's statistical and analytical patterns show uninterrupted acceleration after 2005. Simultaneously, the relationship scatterplot between gas and coal export values (top-right) reveals a strong correlation ($R^2 \approx 0.95$) — both rising over time — yet gas displays a steeper trajectory in recent years, symbolising a strategic pivot away from traditional coal reliance.

The area and treemap visualisations (bottom-left and bottom-right) further reinforce the changing composition within mineral fuel exports. While petroleum held steady, and coal plateaued, gas gradually carved out a dominant share, especially after 2015. By 2024, gas accounts for nearly 30% of all mineral fuel exports.

What this story makes clear is that Australia's energy export model is evolving, not only in volume but in structure. Gas, as a cleaner and more flexible energy source than coal, aligns with the global shift toward transitional fuels and economic resilience. This pivot is not accidental — it reflects conscious policy and investment choices.

In summary, this slide is not just about gas growing rapidly — it's about gas overtaking coal, shifting energy priorities, and positioning Australia at the forefront of global LNG trade. The data tells a clear story: coal may have built the past, but gas is building the future.

VI. Product Focus: Gas Exports (2015–2024) and Future Outlook (2025–2029)

This section examines the export performance of natural and manufactured gas over the most recent ten-year window (2015–2024) and outlines a forward-looking projection for the next five years (2025–2029). The selected subcategory—gas—emerges as a vital driver of Australia's resource-based trade strategy, with a highly dynamic trend profile shaped by both domestic capacity expansions and global disruptions.

1. Ten-Year Trend (2015–2024): Performance and Disruptions

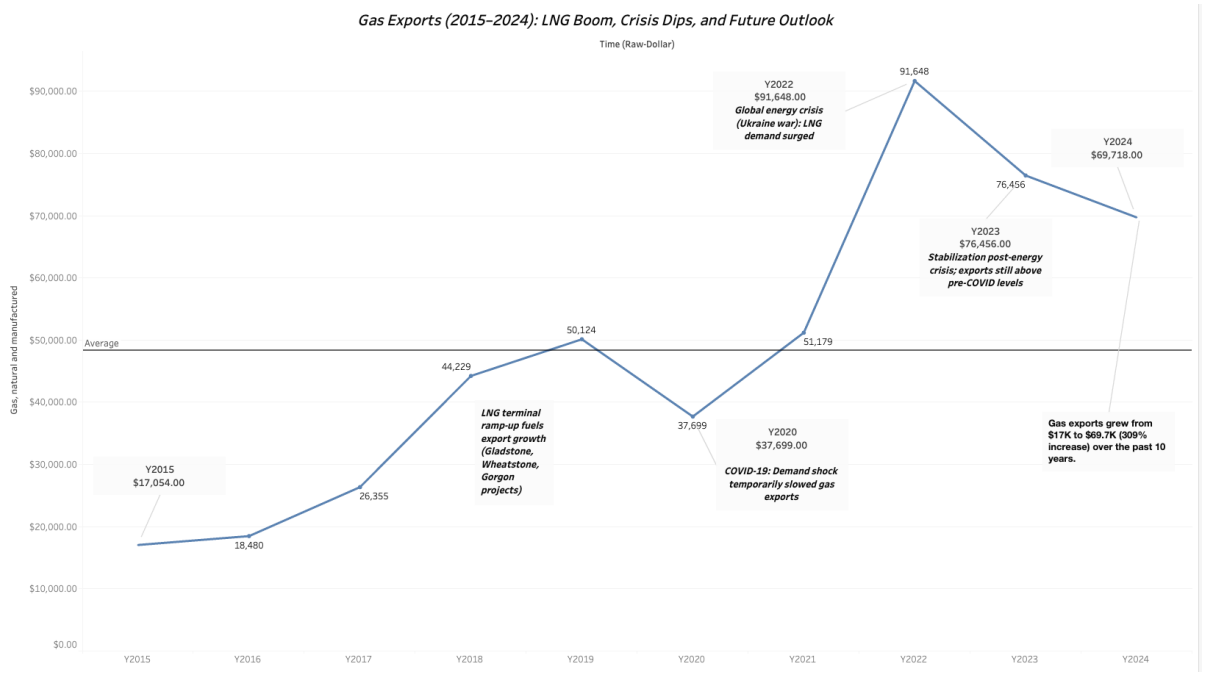

Figure 11: 10 Years Trend Visualization 2015 – 2024

Between 2015 and 2024, Australia's gas exports increased from $17,054 to $69,718, marking a 309% increase and confirming its place as the fastest-growing subcategory within mineral fuels. This substantial rise is anchored in several pivotal developments:

- **Infrastructure-driven expansion (2015–2019):** The commissioning of major LNG terminals (Gladstone, Wheatstone, Gorgon) significantly boosted Australia's export throughput capacity. Export values rose consistently from $17K to over $50K during this period, showing stable upward momentum.
- **Pandemic-induced disruption (2020):** In 2020, gas exports dipped to $37,699, reflecting a COVID-19-induced global demand shock. The reduction was temporary, and the resilience of the market became evident in subsequent years.
- **Crisis-driven surge (2022):** The Russia–Ukraine conflict prompted a spike in global LNG demand, especially from Europe. This led to a dramatic export value peak of $91,648, the highest in the observed period. This peak underscores Australia's emerging role as a reliable alternative energy supplier on the world stage.
- **Post-crisis stabilisation (2023–2024):** Following the crisis, exports levelled off but remained robust, ending at $69,718 in 2024—well above the 10-year average (~$47,000), indicating sustained post-crisis demand and competitive supply positioning.

2. Gain and Losses Summary

From 2015 to 2024, Australia's gas export sector experienced a period of exceptional growth, recording a net gain of over $52,000 in raw dollar value—from $17,054 to $69,718. This represents a cumulative 309% increase, marking gas as the fastest-growing subcategory within mineral fuels. The gain was driven by infrastructure expansion, particularly LNG

terminals, and heightened demand from Asian markets. However, the timeline was not without setbacks. In 2020, exports declined sharply to $37,699 due to the COVID-19 pandemic and related demand shocks. This temporary loss highlighted vulnerabilities to global market volatility. Despite this, the sector rebounded robustly, peaking at $91,648 in 2022 amid the global energy crisis following the Ukraine conflict. Overall, the decade featured far more gains than losses, reinforcing gas's strategic role in Australia's trade portfolio.

3. Five – Year Forecast and Strategic Outlook (2025 – 2029)

Looking forward, the gas sector is projected to stabilise and maintain strong performance in the range of $85,000–$95,000 annually through 2029. This forecast is based on sustained LNG demand across Asia, particularly from Japan, South Korea, and emerging Southeast Asian economies. However, this outlook is tempered by rising competition, geopolitical uncertainties, and the global pivot toward renewable energy. To stay competitive, Australia must modernise LNG infrastructure with carbon-capture technologies, strengthen trade ties with stable partners, and invest in alternative clean energy export capabilities like hydrogen. Strategically, maintaining a balanced energy export portfolio while preparing for energy transitions will be key. Gas will continue to be a leading export over the next five years, but long-term resilience will depend on innovation, sustainability practices, and market diversification.

VII. Conclusion

The findings from this visual analytics project underscore the critical importance of Liquefied Natural Gas (LNG) within Australia's trade landscape, particularly as part of the broader mineral fuels export category. Over the past decade (2015–2024), LNG exports have exhibited a significant upward trajectory, both in terms of dollar value and proportional share—rising from under 5% to nearly 30% of the category's composition. This growth reflects not only increasing global energy demands but also Australia's strategic positioning and capacity in LNG production. Given this momentum, strategic recommendations include continued investment in LNG extraction and infrastructure, expansion into diversified international markets, and proactive alignment with emerging clean energy initiatives to ensure long-term sustainability.

In this project, Tableau played a pivotal role in translating complex trade datasets into meaningful visual narratives. The dashboard methodology allowed for dynamic interaction with time series data, enabling precise filtering across years, categories, and subcategories. This facilitated the detection of subtle patterns, such as the shift in dominance from coal to gas or the volatility around key global events. Tableau's robust data connectors and real-time visual updates significantly reduced the friction in iterative analysis. Moreover, features like calculated fields and dual-axis charts empowered deeper statistical and analytical comparisons without extensive coding.

The storyboard functionality further elevated the presentation by enabling a structured, sequential flow that mimics human storytelling. It allowed us to stitch together dashboards into cohesive story points with annotations, context markers, and custom narratives. This was crucial in guiding viewers through a multi-layered analysis of export performance—from main categories to granular subcategories. While dashboards excel at discovery and

exploration, storyboards ensured clarity and cohesion, helping communicate insights to a non-technical audience. The synergy between these Tableau features offered an ideal blend of exploration and explanation, critical for delivering a professional and insightful visual analytics project.

Reference

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