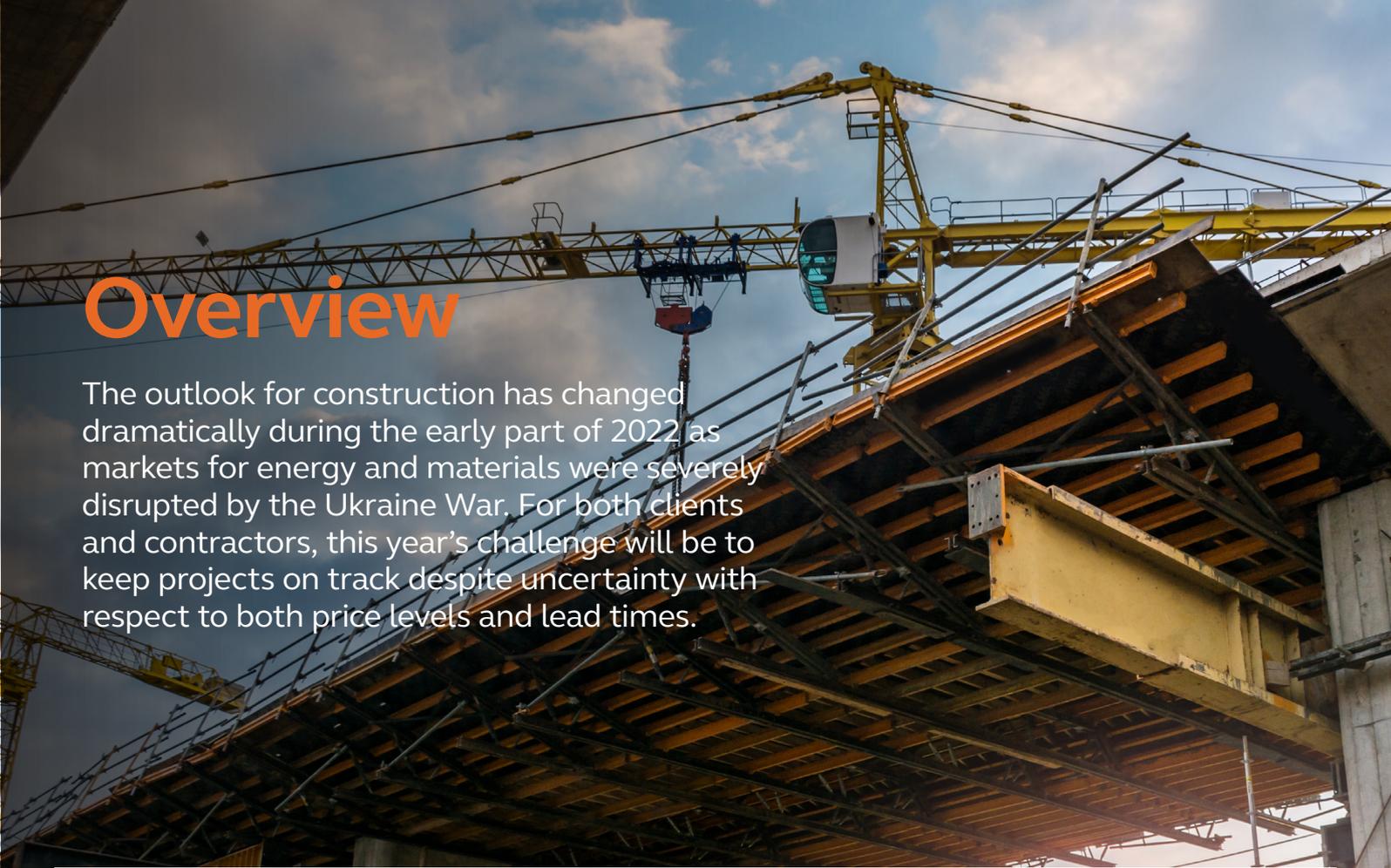


# The Shadow Of Stagflation

Half-Year Australian  
Construction Market View

October 2022



# Overview

The outlook for construction has changed dramatically during the early part of 2022 as markets for energy and materials were severely disrupted by the Ukraine War. For both clients and contractors, this year's challenge will be to keep projects on track despite uncertainty with respect to both price levels and lead times.

Australia's rebound from Covid-19 in Q1-2022 has certainly stuttered as shockwaves from the Ukraine War and the global cost of living crisis combine to threaten the return of stagflation, the potent combination of low growth and high inflation last seen in the 1970s. The potential implications for construction clients are significant, as construction is a growth-driven sector that is sensitive to inflation in manufacturing. How clients and contractors should work together in a potentially cooling market is the key theme of this Market View.

Currently available data isn't quite pointing to a slowdown in Australia's growth just yet, but this is accompanied by plunging consumer confidence and rapidly rising prices. Australia GDP grew by a total of 0.8% in Q1-2022 and increased by 3.3% for the year in seasonally adjusted terms. The consensus growth forecast for 2022 sits at 4.2%, even as the drivers behind this growth lose momentum. Inflation measured by CPI rose 1.8% in the June 2022 quarter. However, the Treasury is forecasting that headline inflation will rise to 7.75% by the end of the year, before falling to a more modest 3.5% by the end of 2023.

By contrast, other aspects of the Australian economy point to considerable strengths that will help the economy weather the coming storm. There are signs that there is growing investment in manufacturing, technology, and automation, in part to reduce reliance on scarce labour and offset issues regarding overseas supply chain volatility. Employment participation rate, currently standing at 66.8% of the working age population is at its highest level since 2011, and there were almost as many vacancies as there were people seeking work. This means that the Australian labour market is likely to be highly resilient in the face of the predicted slowdown. Similarly, CoreLogic has indicated that house price inflation has increased across Australia by an average 8% to the end of July 2022, despite recent declines in some States. This points to a deep pool of demand for housing that will sustain residential markets during the short and shallow slowdown currently envisaged by the Reserve Bank.

Looking outside of Australia, indicators point in different directions. The IMF downgraded its short-term and long-term growth forecasts in response to the Ukraine crisis and spiralling inflation. The baseline forecast is for global growth to slow from 6.1% last year to 3.2% in 2022, 0.4% lower than in the April 2022 World Economic Outlook. However, commodity prices for metals that are sensitive to levels of demand including iron ore and copper remain at or near record levels, spreading the stagflation pressure.

Forward looking indicators are less encouraging and point to a bumpy market. Of greatest concern, the Westpac Consumer Sentiment Index fell a further 3% in July. It indicates that confidence is now down 19.7% since December 2021, falling every month since the start of 2022. It is important to note that both the level and pace of deterioration are comparable to previous major shocks. Other sentiment measures such as the S&P Purchasing Managers Index was recorded at 51.1 in July, down 1.1 in the previous month. The Index hit a 12-month high in February at just over 56, but has continued to steadily decline since April, highlighting just how quickly the mood in the market is changing.

The Ukraine crisis has undoubtedly hit economic prospects across the world. However, the construction sector has quite a lot of momentum behind it, and 2022 will continue to be a busy year. Latest output data from Q1-2022 shows that the industry continued largely in line with the previous three quarters, with total output equating

to \$53.7B. The good news here is that construction output is now on par with pre-Covid levels. However, new orders declined for a second consecutive month in July, following four months of relatively positive conditions, with the growing interest rate environment now beginning to impact the sector. The latest Australian Industry Group Performance of Construction Index for new orders fell by 2.7 points in July to 43.1. Readings below 50 indicate a relative contraction, and the July reading is well below the 12-month average of 51.7.

The sectors most exposed to slowing growth are expected to be industrial and private housing repair and maintenance, both of which are exposed to the cost-of-living crisis, and private housing, where developers are facing many headwinds related to affordability and rising material costs. Overall, current signs indicate that the industry is on the edge of a precipice. In the short-term, with suppliers struggling to provide cost and program certainty to their contractor clients,

order books could shrink because costs are too high, and also because clients and their contractors cannot agree terms. Input costs are unlikely to fall in the immediate future, so future workload levels depend increasingly on clients and their project teams finding commercial solutions to make their projects deliverable.

Collaboration in the shadow of stagflation will be the key to delivering essential projects in difficult market conditions, as was the case during the early stages of the pandemic.





# In Focus: Around the States

While there are many factors impacting the construction industry in Australia, each State continues to face local challenges as well as opportunities.

## Queensland

- Over the past 18 months, Queensland has suffered from significant price increases across the board. This has been driven by a combination of factors including rising material and shipping costs, a constrained supply chain, labour shortages, and reducing market competition. According to the ABS, non-residential construction costs have increased by a staggering 12.3% annually through to June, beaten only by Western Australia (14.4%).
- The collapse earlier this year of several reasonable-sized contractors, such as ProBuild and Condev Construction, has done little to restore confidence in the sector. This has undoubtedly created a level of apprehension across the market, with many contractors now being far more selective in their projects. Procurement methodology, level of market engagement, contract and risk allocation, and extent of relationship are now all key aspects that are being explored by contractors prior to committing. Projects that offer opportunities for early collaboration, direct negotiation, and perhaps longer-term partnerships are certainly seen as being far more attractive to contractors in the current market.
- We have been reporting for quite some time that Queensland, generally, has borne higher-than-anticipated construction costs and increased levels of tender escalation – even before the current dynamics came into play. This has largely been due to a shallow pool of contractors within the market and particularly at the Tier 1 level, which has only been exacerbated by recent collapses. This has further reduced competitive tension leading to increasing costs. As workload has increased during the State's economic recovery, and with many contractors now under significant strain, construction costs have only had one way to go – up.
- There have been signs that there could be a slowdown on the horizon – at least in the short term. Due to the ongoing issues regarding rising energy, material, and transportation costs, project feasibilities are under increasing pressure. Several projects across the State have now been put on hold in a bid to 'wait out' current cost increases. There is hope that construction pricing will shortly return to pre-pandemic levels once some of the current inflationary factors reduce – however, this is likely to be an optimistic viewpoint.
- Waterfront Place, a significant \$1B development in the heart of Brisbane, is due to commence construction later this year. This will align with the commencement of the next phase of the Queen's Wharf integrated resource development, which will only add further pressure on trade availability across South East Queensland.

## New South Wales

- Like Queensland and Victoria, material availability, shortages, and rising costs are all impacting construction projects – regardless of sector. Labour shortages are continuing to grow and, as a result, the employment market is becoming increasingly competitive. Project managers, site managers, estimators, quantity surveyors, and commercial managers are all in high demand. This growing demand is increasing wages costs significantly and this is now impacting contractor's preliminaries and overheads.
- According to the ABS, non-residential construction prices increased by 9.7% annually through to the June quarter, which is a significant climb from last year. This is indicative that contractors are no longer absorbing labour and material cost increases and are passing these costs on to clients.
- Despite these challenges, the New South Wales construction market continues to be relatively positive with a strong pipeline of work across both the private and public sectors. However, the broader supply chain is under increasing pressure. Delays in supply and rising material costs are impacting many projects and a rising number of trade contractors are now flatly declining opportunities to tender.
- There are substantial cost increases across several key trades and lead-times for specialist components have also grown significantly – impacting project programs and completion dates. A combination of early market engagement and the advance procurement and off-site storage of materials are serving to mitigate the risks of rising costs.
- The next State election is scheduled for March 2023. While this is still some way off, it is anticipated that the current government will move into a “caretaker” period, maybe before the end of the year, as they transition into election mode. During this period, there will likely be a period of constrained growth as major decisions and policy updates are delayed.



## Victoria

- The recent 2022/2023 State Budget put Health spending at its heart, with more than \$12B committed to increase the number of health workers, critical infrastructure, and services to meet the anticipated demand for hospital beds.
- Like New South Wales, there is a looming State election in November 2022. Again, like New South Wales, this will likely cause delays in decision making during the “caretaker” period that will result, as well as any potential changes in the governing party. This will translate to a period of slower growth and activity and may even delay projects that may have been previously announced.
- The ABS have reported that non-residential construction costs have increased by 4.7% during the last year through to June – which is one of the lowest recorded of all states, with ACT the lowest at 2.3% over the same period.
- As per the other States, the availability and supply and cost of commodities and materials, rising energy and transportation prices are a significant feature across the construction market. The cost of selected key materials are now substantially higher than historic benchmarks and trends.
- In addition, the recent collapse of several domestic house builders as well as larger head contractors, such as ProBuild and Grocon, provide a sufficient level of warning to clients that they must increase their due diligence activities prior to committing.
- Overall, construction market activity remains high. However, current dynamics such as rising material and labour costs are beginning to negatively impact projects that are currently underway. If these trends continue, and our current analysis indicates that they will, then the viability of future projects will be brought into question.
- Despite these headwinds, current levels of market activity are expected to remain through to the early part of 2023. It also remains to be seen how the recent change of federal government will impact infrastructure investment, as many projects are now being reviewed. The upcoming state election will also provide a level of uncertainty in this regard, but it is anticipated that government infrastructure investment will continue.



## Western Australia

- The Western Australia economy is heavily reliant on the export of commodities, such as iron ore, petroleum, gold, and other base metals. The global demand for commodities and supply shortages have therefore kept the local economy especially buoyant.
- Like other States, unemployment is low and labour shortages are now becoming a growing issue, particularly due to the demand that is being driven by a booming resources sector. This is now impacting the local construction sector that is now suffering from a significant skills and labour shortage, as well as increasing material costs and supply constraints. This has been exacerbated by a reduction in interstate migration due to recent border closures and a slowdown in international migration over the last two years because of the global pandemic. Now that restrictions have been lifted, the influx of skilled labour and professionals has been slow to materialise.
- The rapid economic recovery, built on substantial government stimulus initiatives, has supported a boom in construction activity that is being felt just as keenly in Western Australia as it is across most other States. However, with a growing skills crisis, labour and material shortages, and rising costs across the board, many projects are now under pressure and are feeling the pinch.
- Tender prices are therefore increasing, and many contractors are now turning down opportunities to bid for projects. This is through a combination of contractors being more selective in their tendering behaviours, risk aversion, resource availability, and in some cases not being able to secure their supply chain.
- Like we have witnessed on the East Coast, Western Australia has also experienced the liquidation of several contractors, with many more reporting financial difficulties. This only serves to add more pressure on to an already constrained market. Across the industry, cash flow is king and rising costs further underline the need for prompt payments to ensure that the market can continue to operate.
- We anticipate that it will be some time before the construction market starts to stabilise and, therefore, escalation is anticipated to run at increased levels for quite some time. Concerns over market crowding and delivery capacity are now impacting decision making, with the commencement of several projects now being delayed.





# The Arcadis Forecast

The Ukraine war has overturned many of the assumptions in our previous forecast. The combination of steep price hikes and disrupted supply chains has resulted in delayed and cancelled projects, even though demand remains relatively strong. In our update, we look beyond the current crisis to the state of markets in 2023 and beyond.

**The construction sector is not known for being nimble, but sometimes it can turn on a sixpence – quite often in response to bad news. The level of disruption seen in the earlier part of the year has been significant, and even as short-term data shows that the industry is in strong health, there are many threats to the forward pipeline.**

All short-term activity indicators are presently flashing green. Output and orders are healthy, and the forward-looking pipeline is also indicating continuing growth, albeit at a slowing rate. The main sectors of housing, transport infrastructure, and social infrastructure, particularly health, are all supported by positive growth dynamics.

Headwinds associated with labour and product availability continue to challenge the industry, although there are some positive developments, including a 7.3% increase in the size of the workforce in the five years through to November 2021, and the easing of supply shortages associated with timber and some other construction products.

Similarly, the lifting of COVID-19 related workplace restrictions has given contractors greater flexibility with respect to their deployment of labour on site.

All these developments have been overshadowed by the effects of the Ukraine crisis, even though Australia barely sources any construction materials from Ukraine and Russia. However, we anticipate that the impact of the war has added between 2% and 4% to the cost of typical projects in Australia, largely due to the resulting impact on energy costs and commodities. High energy costs disproportionately affect the construction materials supply chain,

so prices are expected to remain high until some of our import markets, like the UK and Europe, are retooled to be less dependent on Russian gas and oil. However, China does not appear to have the same concerns as the West and has ramped up imports of Russian oil from 5.4 million tonnes in February to 6.5 million tonnes in April 2022.

Volatile energy and raw material markets, compounded by the Ukraine crisis, continue to add to levels of risk on construction contracts. High prices and difficulties in reaching terms that are acceptable to clients, contractors, and funders are now beginning to delay projects across several sectors. In time this will result in lower levels of demand that, all things being equal, will create a more competitive market. How contractors respond to a slowing market is the critical aspect of this forecast.



## Material prices – is the worst over?

Material price inflation has been a huge challenge for all the industry over the past 18 months. Across all industries, input costs have increased on average by nearly 30%. The Ukraine war has come as a significant additional shock, as the prices of many material categories including steel and timber were falling from their 2021 peaks during early 2022. Our latest Market Sentiment Survey, in collaboration with the Australian Constructors Association, tracks inflation for a basket of materials and indicates that prices are up by an average of 22% in the last year, the highest level of inflation seen so far in this cycle. However, a closer analysis of the survey data shows that there is potential for further upward price pressure for energy intensive products including cement and concrete products, plastic pipes, and insulating products.

Although a big jump in steel prices grabbed the headlines in March, the broader impact of the crisis will be felt through sky-high energy costs. Pre-pandemic, energy costs typically accounted for 20% to 30% of the total manufacturing costs of products including cement, brick, and glass. As new deals are struck by product manufacturers, both in Australia and overseas, further price rises are likely to be passed on. Europe has few short-term options to increase the supply of gas and petroleum products from sources other than Russia. Closer to home, China appears to be putting all their eggs in the Russian energy basket. This means that the cost of construction materials is likely to remain at, or near, record levels for some time to come.

## The labour market – are higher wages attracting more workers?

Although rising material prices have been largely impacting the market since before Q1-2022, labour sourcing will remain construction's long-term headache. Latest data shows that the construction workforce expanded by 1.1% to 1.18 million workers between Q1 and Q2-2022, and that the construction sector accounts for more than 8% of Australia's total workforce. Total employment is now at its highest level ever. In seasonally adjusted terms, there are now 556,100 (4.3%) more people employed than there were in March 2020. With unemployment at its lowest level (3.4%), it is increasingly clear that the labour market has the potential to be a major problem.

Average wage inflation is currently sitting at its highest level in the private sector (3.8%) since June 2012. Demand for skilled jobs over the last 12 months has continued to build wage pressure across a broad range of industries and jobs, reflected in the increasing size of pay rises. However, it is not anywhere near the pace of CPI, which is currently at 6.1% as of June 2022. This discrepancy will continue to add pressure on the industry to increase wages further in what is already a highly competitive market. Undoubtedly, this will also provide labour unions with the ammunition needed to insist upon further award increases and bonuses as existing agreements come to an end.

There are now early signs that the industry's growing labour crisis will start to be addressed following the Jobs and Skills Summit that was held at the beginning of September.



Some of the pledges take on board long-term strategies that have been proposed by organisations such as the Australian Constructors Association, Infrastructure Australia, and the Master Builders Association. Between February 2021 and May 2022, job vacancies in the construction industry have increased by 13.2%. Even as the number of starting apprentices recover to pre-pandemic levels, there are few short-term solutions to the workforce challenge given the cost and complexity of Australia's points-based migration system, even with the increase in the permanent ceiling to 195,000 skilled workers.

Looking towards the start of 2023, with the potential for a slowdown in project starts, wage pressure could temporarily fall. However, over the extended forecast period we retain our view that labour costs will be the primary driver of above trend inflation.

## Workload – could high prices be the cure to high prices?

There is little doubt that the disruption caused by the Ukraine war has created some ripples in the Australian construction market. While some sectors like the private housing market can rely on a deep pool of demand, other sectors where viability is more of a challenge are now seeing delays and cancellations. The NAB Business Confidence Index bounced back 5 points from June to 7 in July, which points to a marked rally amid growing headwinds from inflation and rising interest rates, as well as a deteriorating global economic outlook. Sentiment rose significantly in construction as well as in retail, wholesale, manufacturing, and mining. Even the home renovation market still appears in robust health despite soaring materials prices, with builders' merchants still reporting growth in both retail and wholesale markets.

We are beginning to see early signs of there being fewer opportunities for contractors. Furthermore, these are proving harder to convert into live projects due to issues of pricing and risk profile. There are hints of a deterioration in the market, with a potential but significant decline in the number of project starts, even as both the planning pipeline and value of main contract awards continue to increase, albeit at a slowing pace.

With signs that both main contractors and early trades have gaps in their order books for 2023, the market is likely to become a little more competitive. This does not mean that prices will fall. Continuing high energy prices and a tight labour market will see to that. However, we do anticipate that there will be some scope for more competitive pricing of on-costs and risk allowances, particularly if clients are more flexible in their approach to risk transfer through well-established means such as price fluctuations and early materials procurement.



# The Arcadis Forecast



The Ukraine war has added a further 2 to 4% to the costs of most construction projects. For projects with a greater exposure to the steel market including the logistics and infrastructure sectors the extra inflation will be even higher, ranging from 5 to 8%. This means that construction inflation is likely to reach double figures on some construction projects this year.

There are other elements of risk in the forecast that could crystallise in the very near future. Further disruption in the Chinese economy could result in a shortage of components later in the year, with the engineering services and fit-out sectors particularly exposed. The semi-conductor shortage is also showing no signs of improvement.

For 2023, it is early days to make a firm forecast. However, with growing evidence of a slowdown in the market, even if caused only by the difficulty of getting into contract in uncertain markets, we do not believe that high levels of inflation will be sustained beyond next year. For the building sector, we have adjusted our forecast, allowing for some pass through of labour and materials cost inflation, even as on-costs and risk allowances are

reviewed in a more competitive market. Infrastructure projects are likely to see higher inflation due to their exposure to energy intensive materials and issues of resource scarcity triggered by mega-projects.

Looking beyond 2023, forecasts are subject to higher levels of uncertainty because of the potential negative impact of stagflation. Weak economic growth is likely to weigh on demand for construction, but continuing scarcity of labour will drive wage inflation which in turn will maintain pressure on tender prices. From 2024 onwards, we retain our view that construction prices will increase faster than background inflation, and as CPI returns to around 2%, construction prices will rise much faster.

## Inflationary Factors

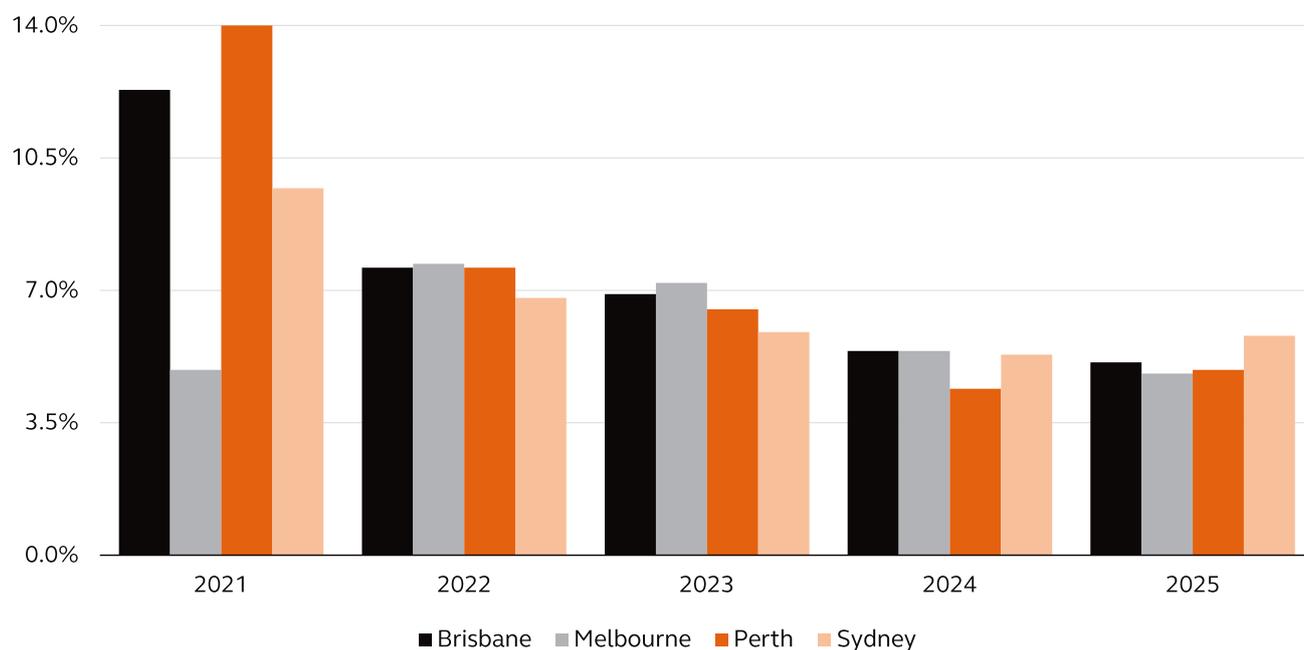
- High level of output and healthy short-term order books
- Energy and material price inflation
- Potential of further EBA negotiations
- Labour shortages
- High cost of risk transfer

## Deflationary Factors

- Increasing competitive pressure aligned to future project opportunities
- Potential for reduced on-costs and risk allowances in response to competition

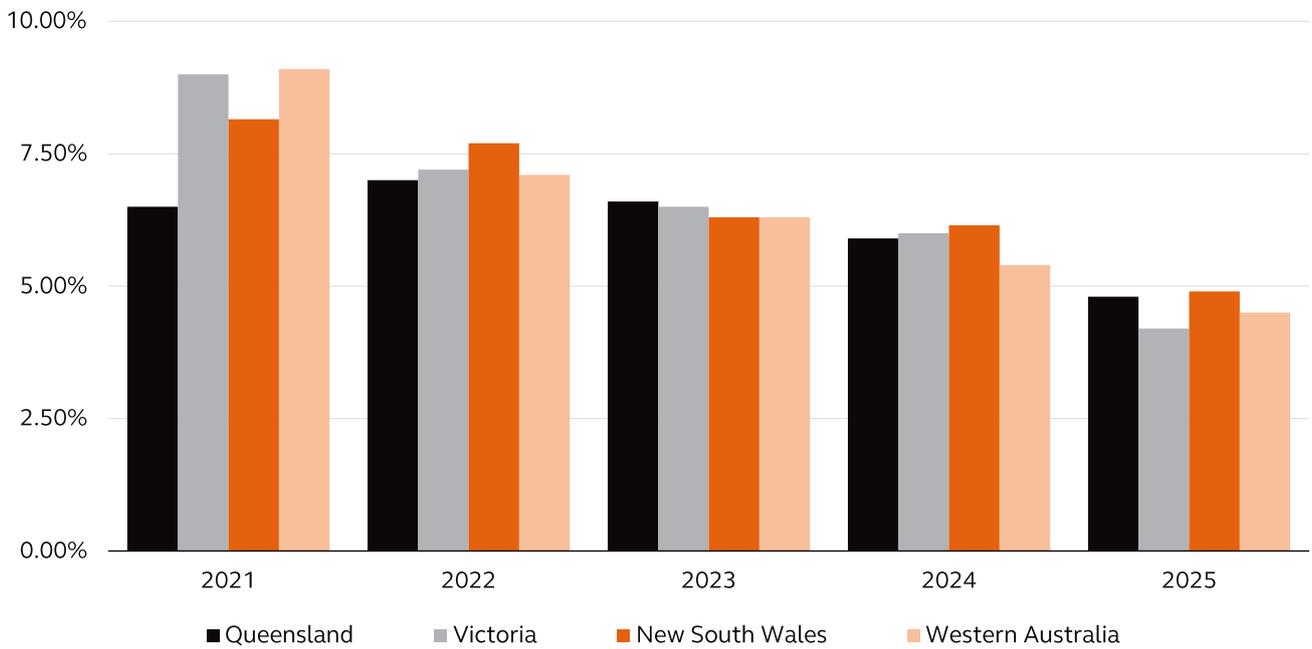
## Arcadis Buildings Tender Price Forecast

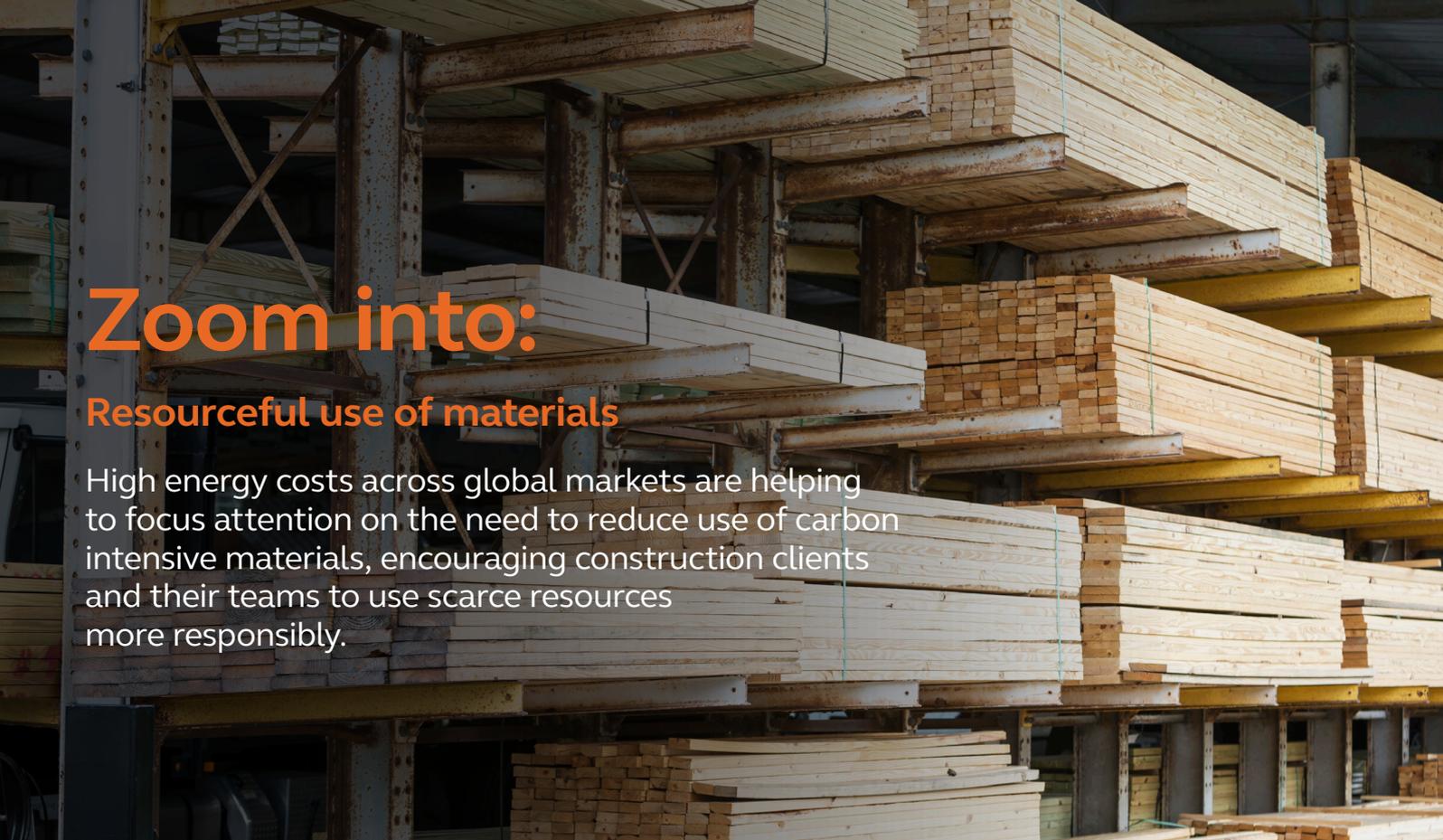
	Brisbane	Melbourne	Perth	Sydney
2021	12.3%	4.9%	14.4%	9.7%
2022	7.6%	7.7%	7.6%	6.8%
2023	6.9%	7.2%	6.5%	5.9%
2024	5.4%	5.4%	4.4%	5.3%
2025	5.1%	4.8%	4.9%	5.8%
<b>Total</b>	<b>37.3%</b>	<b>30.1%</b>	<b>37.9%</b>	<b>33.5%</b>



## Arcadis Infrastructure Tender Price Forecast

	Queensland	Victoria	New South Wales	Western Australia
2021	6.50%	9.00%	8.15%	9.10%
2022	7.00%	7.20%	7.70%	7.10%
2023	6.60%	6.50%	6.30%	6.30%
2024	5.90%	6.00%	6.15%	5.40%
2025	4.80%	4.20%	4.90%	4.50%
<b>Total</b>	<b>30.80%</b>	<b>32.90%</b>	<b>33.20%</b>	<b>32.40%</b>





# Zoom into:

## Resourceful use of materials

High energy costs across global markets are helping to focus attention on the need to reduce use of carbon intensive materials, encouraging construction clients and their teams to use scarce resources more responsibly.

### Why focus on resources?

One of the unexpected impacts of the Ukraine War has been an interruption to industrial production in the UK and Europe. This is not simply because of a lack of raw materials and components, but also because when the cost of energy is too high, it is not profitable to manufacture. This is an early illustration of potential impact of resource scarcity.

Looking further ahead, the smart use of resources must become a critical viability driver. From an economic point of view, increasing carbon and energy costs will become an even greater barrier to the use of carbon intense materials. The global energy transition will increase demand for materials such as copper and nickel by two-times and six-times respectively. With nickel already trading at \$33,000/tonne, two times higher than seen in 2021, scarcity is becoming a real problem. Simple economics is not the only concern. Resource depletion is an equally serious issue as highlighted in the 2021 Dasgupta Review in the UK. Wider considerations of resource use, including impacts on air quality and water supply, will also weigh down on efforts to

increase materials production. Clearly more efficient use of existing and new materials will be necessary to ensure that projects are affordable and have a manageable environmental footprint.

### Where to begin?

The level of resource intensity and waste associated with development will be determined a long time before a project hits the construction site. The earlier that resource intensity is considered, the greater the opportunities to mitigate impacts. In many ways, the most important issue to be considered is “to build or not to build?”, as this will have the greatest impact on resource use and waste.

The Green Building Council points out that 80% of assets that will exist in 2050 have already been built – hinting at the growing importance of refurbishment as a lower-impact option. However, upgrading existing assets has its limitations and will not always lead to a better outcome, so we need to be able to evidence the impacts and compare the options, accounting for carbon footprint, and other factors like biodiversity impacts.

In the case of new build, the degree of freedom in applying creative solutions seems to be higher than in refurbishment. For decades, concrete has been the “go to” solution across Australia. But the uptake of mass timber solutions, such as cross-laminated timber, has rapidly grown over the last few years and is expected to grow further at an annual rate of 13.6% between 2021 and 2028, according to a report published by Research and Markets in December last year. A wonderful example is Jackson Clements Burrows Architects’ student accommodation building at La Trobe University, which provides 600-plus beds for on-site students. This demonstrates that using mass timber construction can be a viable commercial alternative to more traditional methods such as steel and concrete. However, will the forestry industry be able to keep up with this growing demand? Timber prices in Australia have already increased by more than 40% because of logistical delays, a direct result of the pandemic, and rising global demand for residential property.

## ...there's so much more than timber...

Material selection is not only about the types of materials that are selected, but also how we use and reuse them. Increasingly, resource-conscious design needs to consider not only the life, but also the afterlife of the asset. So, what are the options at our disposal? Below, we provide some examples.

- **Designing out waste** – this is a first step that should be standard on all projects. Waste management processes are well developed but more can be done to minimise volumes through waste profiling and segregation, as well as standardisation of components and the use of pre-fabrication.
- **Designing out carbon intense elements** – the concept of replacing steel, concrete and even aluminium with wood is gaining more and more attention, but in many cases will be limited by fire safety regulations. Another alternative is to increase efficiency of materials use. This can be achieved in some circumstances by maximising the structural efficiency through techniques including biomimicry. The lightweight steel canopy structure of Stuttgart's Airport Terminal 3 for example is inspired by the fractal geometry of trees.

- **Optimisation of materials use** – Digital tools have a key role in controlling material efficiency. The time saving potential of BIM in the design phase can also support component manufacturers, particularly in the pre-fabrication space. For example, Carbon Dynamic, a Scottish producer of modular off-site timber buildings, achieves a 15% materials savings and improves its production times by integrating BIM into its internal systems.
- **Adopting circular economy principles** – The circular economy not only promotes the recovery and reuse of existing construction materials but also the creation of new products from waste streams. For example, research at the University of Bath has shown that waste plastic can partially replace sand in structural concrete. Large scale examples such as the Resource Rows development in Copenhagen's Ørestad reuses masonry panels from abandoned industrial buildings as part of a housing scheme, reducing embodied carbon emissions by 70%. The development of materials passports by architect ORMS is a further step that will increase the potential for materials reuse.
- **Use of natural or bio-based materials** – There is a wider range of bio-based materials beyond the default option of timber, including hemp and straw. While they may not be applicable for structural elements in high or mid-rise, they have potential applications in housing or warehousing. Hempcrete was used in Hemp House, a multi-family home, completed in 2012 and designed by Steffen Welsch Architects. In the UK, Marks & Spencer incorporated Hempcrete into their Cheshire Oaks retail store and, in France, Paris Habitat is developing social housing using hemp as insulation. As innovation progresses, new bio-based materials will come into play. In the Netherlands, in early 2020 a record-breaking 66m long pedestrian/cyclist bridge was completed, consisting of 80% bio-based materials. In accordance with the project's circular economy plan, in 100 years, the bridge will be repurposed as fertiliser.



## Many challenges but is there an alternative?

Construction's current resource use is a huge challenge, yet many of the opportunities on offer to utilise resources more responsibly are very small scale – a single warehouse, or a pedestrian bridge. This is due to a combination of challenges – including safety considerations, small production capacity, and even regulatory obstacles affecting industrial hemp cultivation. In time, very low-carbon steel, aluminium and concrete will make a big contribution to reducing embodied carbon emissions, but the industry needs a wider range of options such as these featured in this Zoom Into.

Not every innovation will make it to the broader market, some may find a niche application and others may be shelved. What is needed is opportunity to enable more innovation. The support of clients, designers, contractors, regulators, and funders will be essential to create markets and enable the scaling up of these innovations. The Ukraine War, as well as Australia's more recent issues with China, are acting as a timely reminder that construction and other industries cannot rely for ever on existing resources to deliver base workload, let alone support the demands of the energy transition. Being more resourceful in our thinking about the use of materials will equip the industry better for a resource-constrained future.





# Spotlight on:

## Planning for long-term carbon reduction

The construction industry is making great strides in measuring and driving the reduction of embodied carbon. But what is really being reported? Is our thinking too short term? Are we driving change or virtue signalling?

### Sustainability is now topping the agenda

The construction industry has taken notice and is starting to report embodied carbon on several major projects. Legislation, procurement policy, contract stipulations, and social drivers are now impacting the industry, and this has led to sustainability moving from a 'nice to have' to now topping the construction agenda. While some of this is out of necessity, a growing number of organisations are choosing to report on embodied carbon in their construction projects as part of their commitment to achieving Net Zero.

Infrastructure Partnerships Australia, an industry think tank providing research focused on excellence in social and economic infrastructure, have recently launched their latest report on decarbonising construction. It posits that an embodied carbon 'base case' should be included in all business cases for infrastructure projects and programs over \$100M in capital cost. Such an approach would establish a framework to move the transport infrastructure sector to a Time, Quality

and Cost + Carbon setting. This may not sound particularly ground-breaking, but it would set a baseline that could be continually measured and, if utilised correctly, would enable the design to be influenced accordingly.

### Creative carbon accounting is getting in the way

Too often though we're comparing apples with the total lifespan of an orange tree. If what gets measured gets done, then what gets measured consistently gets done right. The approach to measurement and reporting on embodied carbon differs significantly between projects and consultants, and the rise of carbon accounting has seen an even greater rise in creative carbon accounting. How we report on carbon and its impact is critical to the future resilience of the industry. Understanding what has been included and, more importantly, understanding how to use the information appropriately is still not fully appreciated across the industry – and it is gradually becoming more complex.

While any level of reporting is better than nothing, not all carbon reporting is created equal. It is generally accepted that projects need to consider the full asset lifecycle during the early decision-making stages – the consideration of demolition, re-use, new construction, and future operation. Embodied carbon must also be included within the decision-making process, regardless of whether it is a building or infrastructure project.

However, having a singular and pure focus on reporting, and therefore reducing, embodied carbon can overshadow the necessity of meeting passive standards – for example, the construction of a low energy structure without compromising comfort. By focusing on the reduction of carbon upfront, the industry often overlooks the opportunity to create a passive orientated structure. Some will be quick to point out that levels of embodied carbon in low energy buildings is often significantly higher. However, sustainability is all about balance – and this is integral to the future of sustainable construction.

## Moving in the right direction... but still a way to go...

The level of understanding regarding the underlying requirements and sensitivities of carbon measurement, its implementation, and the longer-term benefits are still relatively immature across the industry. Calculations are typically undertaken at the end of design stages as part of milestone reporting, and they are not often utilised early enough to materially influence the developing design – other than perhaps through the guise of early design optioneering.

Embedding sustainable decision-making during the design process will be key as the industry builds maturity in this space. Projects must take on a full life cycle approach with regards to the holistic performance of projects that consider whole-of-life environmental, social, and economic factors. This means that different designs can be compared across various criteria, helping clients and asset owners make informed clean carbon decisions early in the project life cycle. Sustainability will become visible and accessible to project decision makers, as well as project stakeholders, who are then able to visualise the lifecycle carbon footprint of the design before committing to a decision.

## Focusing on the end state

From an operational cost perspective, the biggest misconception is to believe that most costs associated with the creation of an asset are incurred during the construction phase. Asset life spans can vary greatly and, with the added pressure to recycle rather than replace, it is now not uncommon for assets to have lifespans ranging between 50 and 75 years. The ongoing operational costs over this period will typically equate to between 4 and 7 times the initial costs incurred during construction.

By acknowledging the ongoing operational cost burden, asset owners can start to understand and appreciate how incorporating whole of life forecasts into the early design phases can offset future expenditure and generate longer-term savings over the life of the asset. A critical component of this approach will be to also include the assessment of embodied carbon from both an operational and future replacement perspective. This will drive a far more mature ‘value for money’ outcome, that also supports wider societal expectations, and that can be measured over the life of the asset, rather than just the relatively short-term construction phase.

Integrating the design and carbon calculation process more closely, so that they are dependent on each other, is the evolution that is required. A unifying standard and approach would lower the barrier to entry and raise confidence in making decisions. Far too often we see people wanting to make a difference and have tangible impacts but find it too hard to implement, don't know where to start, or how to utilise the information that they are given. Better connected, more informed and diverse teams will deliver far better economic, social, and environmental outcomes.





## Arcadis

Our world is under threat - from climate change and rising sea levels to rapid urbanisation and pressure on natural resource. We're here to answer these challenges at Arcadis, whether it's clean water in Sao Paolo or flood defences in New York; rail systems in Doha or community homes in Nepal. We're a team of 27,000 and each of us is playing a part.

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