

A low-angle, upward-looking photograph of a modern building's facade. The building features a series of curved, cantilevered balconies with light-colored wooden slat railings and dark green metal balustrades. The balconies are set against a background of a clear blue sky. The building's structure is a mix of dark brown vertical columns and glass panels.

Portugal Autumn Market View

The shadow of stagflation

Introduction

The outlook for construction has changed dramatically in 2022 as markets for materials continue to be severely disrupted by high energy prices and disrupted supply chains. There are early warnings that the ongoing energy crisis could curtail global growth and a number of sources are predicting recessions in many countries.



Portugal's rebound from Covid-19 has been impacted in 2022, as shockwaves from the Ukraine War, the constant lockdowns in China and the wider cost of living crisis combined to threaten the return of inflation. The potential implications for construction clients are significant, as construction is a growth-driven sector, that is sensitive to inflation in domestic manufacturing. How clients and contractors should work together in a cooling market is the key theme of this Market View.

Whilst the industry currently looks in a healthy state, the foundations for future prosperity are still uncertain. In the short-term, we are seeing that some stabilisation in material prices is enabling the agreement of existing fixed price contracts and because of this the level of workload is stable if not increasing. However, we are also seeing several projects delayed due to the increased costs, extended negotiations, and long lead ins for key materials. In the future it is possible that order books could shrink because costs are too high, and clients and their contractors cannot agree terms. Input costs are unlikely to fall significantly in the immediate future, so future workload levels depend increasingly on clients and their project teams finding commercial solutions, with contractors less willing to take on more risk.

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 first half of 2022 has been significant, and there are many threats to the forward pipeline.

Collaboration between all stakeholders in the shadow of stagflation will be the key to delivering essential projects in difficult market conditions

Economic growth

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

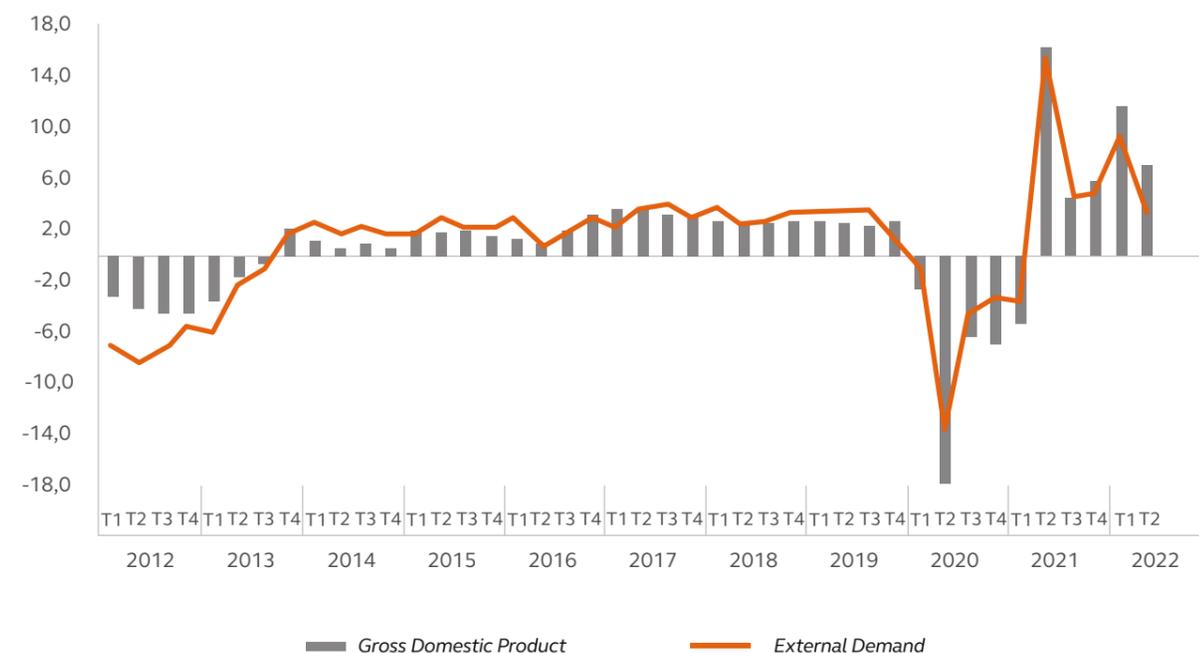
According to information released by INE (National Statistics Institute), in the 1st semester of 2022, GDP grew by 9.4% compared to the same period of 2021, an evolution that partly reflects a base effect, given that last year several measures were in place to combat the pandemic, which conditioned economic activity.

Compared with the first quarter of the year, the GDP presented a null variation, which translates into a positive revision vis-à-vis the -0.2% previously indicated in INE's flash estimate.

As regards the evolution of Construction Investment and GVA in the Construction sector, in this semester, there were increases of 1.7% and 1.3%, respectively, variations that denote a slowdown in the growth rate of the Sector (+4.0% and +3.8% in 2021, in 2021, respectively), in a period in which, in the public works market, there is a strong reduction year-on-year reduction in the volume of contracts signed, bearing in mind the fact that the State Budget for 2022.

Figure 1. – Internal and External contributions to GDP – Year on Year growth

Source – Instituto Nacional de Estadística



In effect, there is a reduction in the volume of public works tenders the first seven months of 2022 of 14.7%, in accumulated homologous terms, and a year-on-year change comparable over time of -43% in the amount of public works contracts concluded and registered in the Base Portal.

In the real estate market, the number of new residential buildings licensed by the City Halls in the first six months of 2022, amounted to 15,558, which corresponds to an increase of 4.4% compared to the 14,897 housing units licensed in the same period of the previous year. In terms of the licensed area, in this period there are increases of 1.6% and 2.2%, in homologous terms, in housing and non-residential buildings, respectively. In the month of June 2022, the construction costs index for new housing increased by 12.9% year-on-year, as a result of 17.2% growth in the materials component and 6.9% growth in the labour costs component.

In the first half of 2022, the granting of new housing credit by financial institutions rose 16.9% compared to the 1st half of the previous year to 8,397 million euros. With regard to the bank valuation in housing, in July there was a 16.1% year-on-year increase, in view of increases of 16.7% in flats and 13.1% in houses, reaching new highs in this statistical series which began in 2011.

However, despite this deficit start in terms of public works contracts, an acceleration in activity is expected for the coming months, considering the volume of public investment planned in the PRR and Portugal 2020 Program.

Figure 2. – Economic indicators of the construction and public works sector

Source – AICCOPN

Economic indicators of the construction and public works sector

Indicator	2021		2022						
	Annual Value	Annual growth rate (%)	Jan	Feb	Mar	April	May	Jun	Jul
Macroeconomic Indicators and Funding									
	Thousand	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
GDP	211,30	4,9%	-	-	11,9%	-	-	9,4%	-
GFCF - Total	41,90	6,6%	-	-	-	-	-	3,7%	-
GFCF - Construction	23,00	4,0%	-	-	-	-	-	1,7%	-
GVA - Construction	9,10	3,8%	-	-	-	-	-	1,3%	-
Accumulated credit to Construction companies	6,60	-10,4%	-5,9%	-5,6%	-4,0%	-3,1%	-2,4%	-2,6%	-3,3%
New credit operations for housing purchases	15,30	34,1%	22,8%	25,3%	-	19,8%	18,5%	16,6%	-
Employment and Unemployment in Construction									
	Thousand	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
No. of Employee Construction	305,40	2,8%	-	-	-	-	-	1,8%	-
No. of Unemployed Construction	20,50	-15,4%	-0,174	-19,9%	-23,0%	-23,1%	-22,3%	-21,9%	-21,7%
Construction Sector Production Indicators									
	Thousand	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
No. of new dwellings licensed	28,30	12,9%	0,133%	19,8%	-	2,7%	5,4%	4,4%	-
No. of new dwellings concluded	18,90	12,9%	-	-	-	-	-	-	-
	Thousand m ²	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Licensed residential area	6,310,20	14,4%	0,111	14,4%	-	0,0%	3,1%	1,6%	-
Non-residential area	2,531,70	-5,3%	-0,042	27,5%	-	6,5%	13,6%	2,2%	-
	M. (€)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Value of Public Works Developed	3,782,90	-8,2%	0,047	-0,1%	-7,9%	-14,8%	-21,5%	-26,5%	-14,7%
Value of Public Works Contracts	3,483,30	-21,7%	-0,611	-42,7%	-42,7%	-52,3%	-51,0%	-4,4%	-43,0%
	Thousand Ton	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Consumption of Cement	3,782,90	5,8%	0,139	18,3%	10,7%	3,8%	4,3%	4,3%	2,5%
Production Values of the Construction Sector									
	M. (€)	(%)	2022 Forecast (Annual Variation (%))						
Global Production	15,958,60	4,3%	[4,0% ; 7,0%]						
Residential Buildings	4,610,90	4,5%	[4,0% ; 7,0%]						
Non Residential Buildings	3,806,70	0,9%	[0,2% ; 3,2%]						
Civil Engineering	7,541,00	6,0%	[6,0% ; 9,0%]						

The projections for 2022 to 2024 reflect the continued recovery of the Portuguese economy after the pandemic shock, in an external environment aggravated by the Russian invasion of Ukraine. In 2022, the economy grows by 6.3%, reflecting a strong drag effect associated with growth throughout 2021, the dynamics of the first quarter of the year, but also a sharp deceleration in the rest of the year. Thus, in 2023 and 2024, activity growth is forecast to be 2.6% and 2% respectively.

Inflation

The Consumer Price Index year on year rate was recorded at 9,4% by Banco de Portugal in July 2022 which is the first time since 1992 that levels have exceeded 9%. However, the government has been putting plans in place to subsidise fuel costs to control this spike.

Experts are largely placing this larger than expected spike down to the contribution of higher-than-expected income and demand from tourism.

The Banco de Portugal is forecasting an average year on year rate of 5,9% general inflation across 2022 but some in a more adverse scenario for the Portuguese economy associated with the impact of war in Ukraine experts are now suggesting that this should be closer to 7%.

Eurozone Inflation reached a year-on-year rate increase of 8.6% in June 2022, which exceeded their prediction of 8.4%. In May the rate had been 8.4%, which shows costs are currently continuing to escalate. The European Central Bank is reviewing interest rates increases to reduce this inflation which could reduce the economic recovery and create a contraction in European GDP overall.

Looking outside of Portugal, indicators similarly point in different directions. The IMF downgraded its short-term and long-term growth forecasts in response to the Ukraine crisis and spiralling inflation. Global growth is forecast at 3.6% for 2022 and 2023, down by 1% over the period. 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.

In the officially published economic reports from the Banco de Portugal in collaboration with the Instituto Nacional de Estatística we can see experts are expecting inflation rates to reduce largely due to a more stabilised energy market. These reductions that are forecasted in 2023 and 2024 are shown in Fig.3 and Fig.4 and are expected to bring the industry back to more typically experienced inflationary increases.

Figure 3. – Forecast split of Year on Year Inflation (not accumulated)

Source – Banco de Portugal

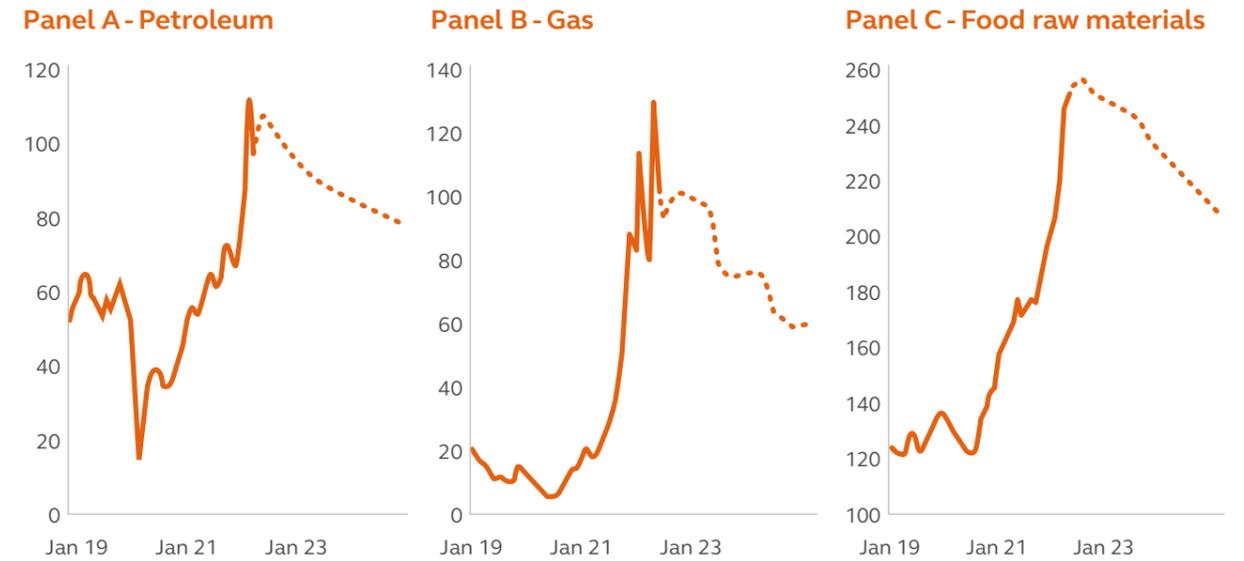
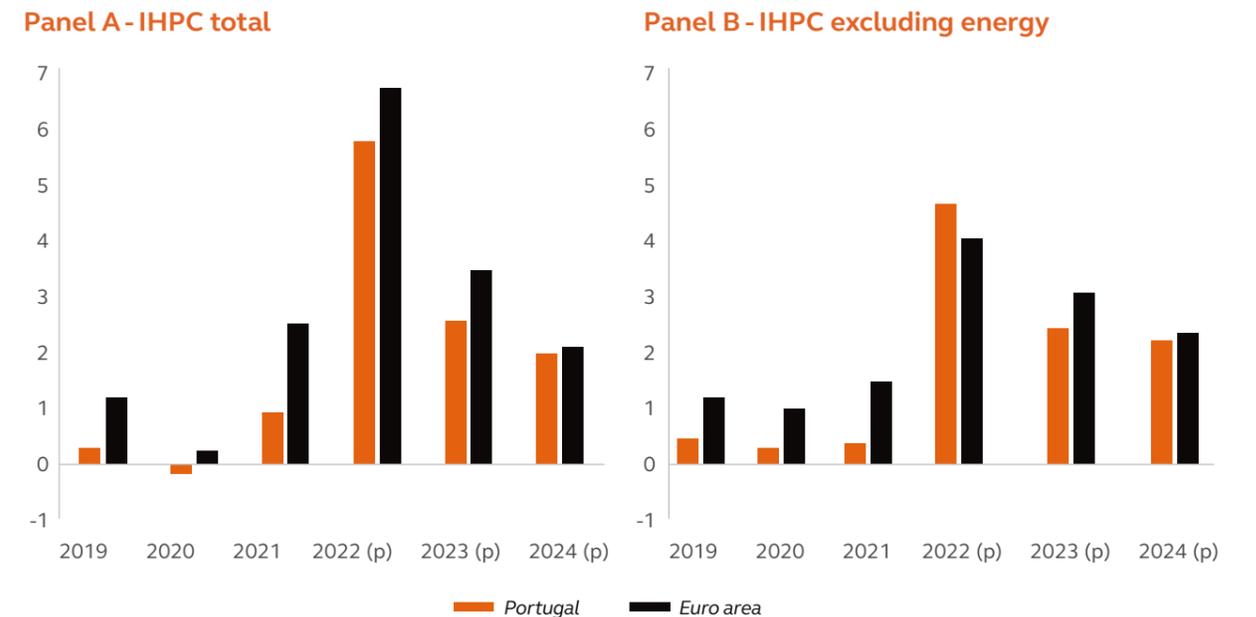


Figure 4. – Forecast split of Year on Year Inflation (not accumulated) by Source

Source – Banco de Portugal



When focusing on construction we can see that the industry has been one of the hardest hit sectors due to the manufacturing reliance on energy. Year on year increases in the general construction index show at 12,9% increase between June 2021 and June 2022. Fig. 5 shows this increase across the building indices with the data shown in Fig. 6.

Figure 5. – New Construction Costs Index for New Housing

Source – Instituto Nacional de Estatística

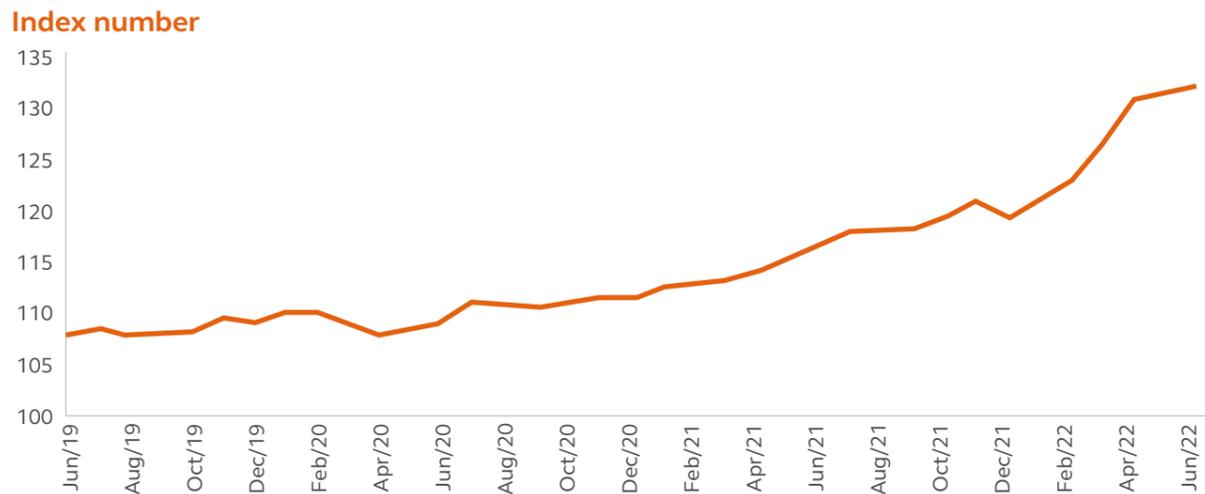


Figure 6. – Construction Cost Indices

Source – Instituto Nacional de Estatística

	Total	Materials	Labor
June 2022 (*)	12,9%	17,2%	6,9%
May 2022 (*)	13,5%	18,8%	6,2%
April 2022 (*)	14,5%	20,4%	6,2%
June 2021	6,7%	6,8%	6,6%

Activity index: could inflation be the cure for high prices?

There is little doubt that the disruption caused by the Ukraine War has created ripples in the Portuguese construction market. We are seeing several projects being pushed back due to higher prices, extended negotiations, and long lead ins for key materials. This means that the market is likely to become more competitive, but it does not mean that prices will fall, due to continuing high energy prices. However, we anticipate that mechanisms to regulate pricing will be put in place to mitigate risk, such as contractual price fluctuation clauses and advance procurement of materials. We are already starting to see more openness on the part of our customers to include these provisions.

Labour

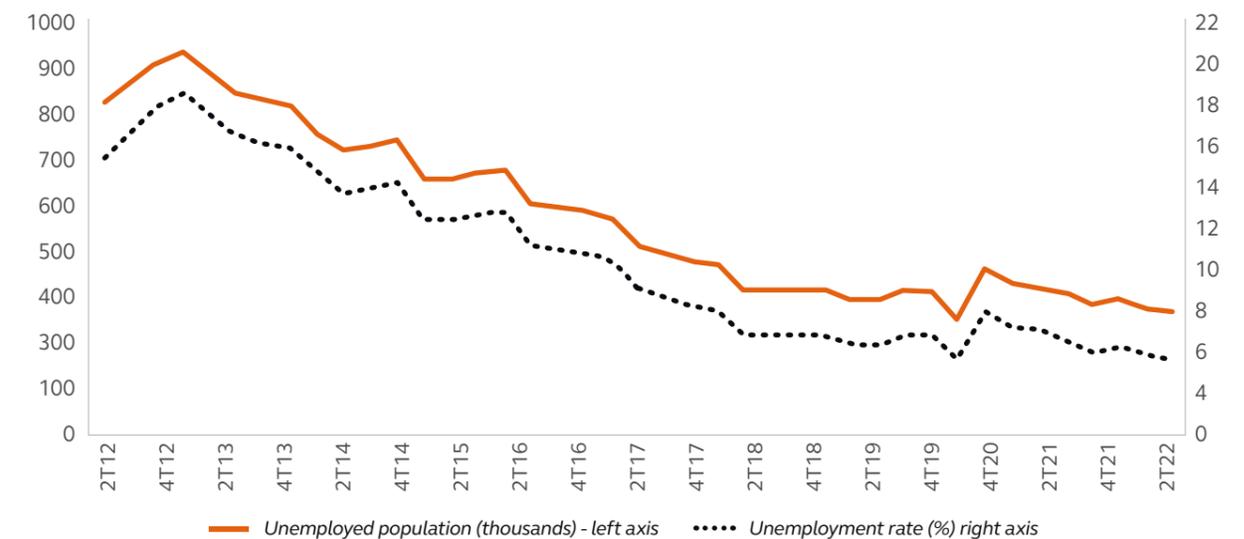
Employment has been steadily increasing since the COVID pandemic and especially with full time contracts. The total number of people out of work and registered with job seekers support is 298,800. In this quarter unemployment in construction has accounted for 27,325.

Although material prices have been moving the markets in 1-2Q 2022, labour sourcing will remain construction’s long-term headache as shown by the inflationary increases post-pandemic.

Despite those levels of unemployment, these unemployed people are not expected to be available to enter the construction industry due to them being subsidised or seasonal workers. Contractors in Portugal rely on freelance labour and crews, and we are seeing a slight shortage in these resources which is causing cost volatility due to their preference for higher earnings in place of long-term security. There are few signs that the industry’s labour crisis is being addressed and there are few short-term solutions to the workforce challenge.

Figure 7. – Unemployed population and unemployment rate

Source – Instituto Nacional de Estatística





Materials

Material price inflation has been a huge challenge for all 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 materials categories.

Data has yet to be published for specific material indices beyond June 2022, but we can see that there have already been significant rises being experienced due to the Ukraine war and due to the increase in demand following the pandemic contraction. Over 2Q2022 we have started to see decreases in the costs of some materials. Nevertheless, at the end of the second quarter of 2022 and already in the third quarter, a new increase has been observed.

Figure 8. – Employment and Compensation Indices in Construction

Source – Instituto Nacional de Estatística

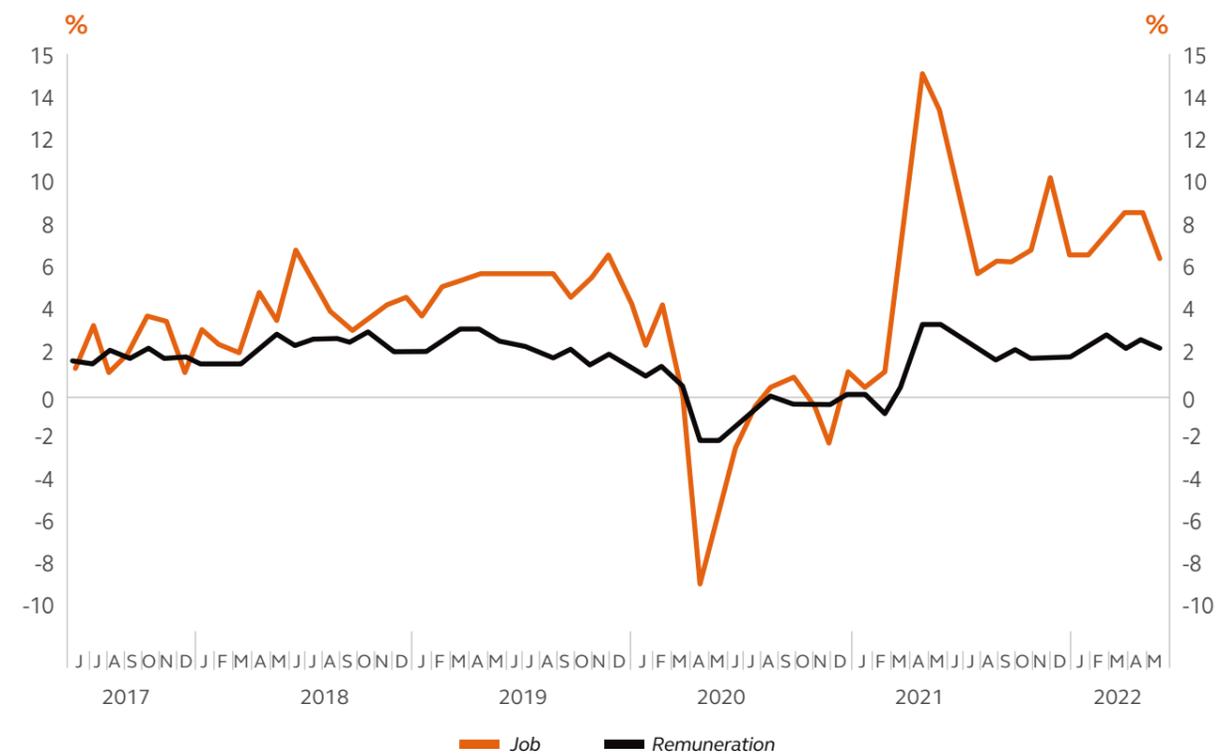
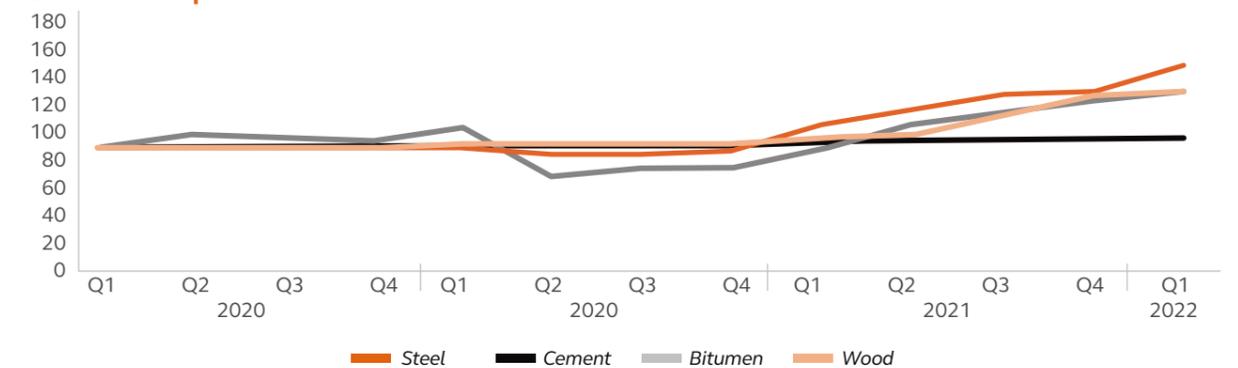


Figure 9. – Evolution of prices of construction materials

Source – FIEC – Federação Europeia da Indústria da Construção

Construction Materials	2019				2020				2021				2022
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Steel	100	99,8	99,7	2,6	100	95,4	94,4	99,7	119,0	131,6	144,7	145,8	167,1
Cement	100	99,4	99,9	2,5	103,7	103,5	103,6	103,6	106,1	106,6	106,6	107,8	108,8
Bitumen	100	112,7	107,7	105,6	116,1	77,6	84,0	84,0	99,9	119,8	127,4	138,7	145,5
Wood	100	100,0	100,0	100,9	103,4	104,6	104,6	104,6	108,6	111,2	129,9	143,2	145,6

Evolution of price for construction materials



Material	Year on Year - June 2021 to June 2022 % Movement	2Q 2022 % Movement
Glass - Hollow	23.5%	10.3%
Steel	45.1%	9.5%
Cement	16.6%	8.8%
Lime	43.4%	8.2%
Plaster	43.4%	8.2%
Concrete	16.0%	7.3%
Prefabricated	16.8%	6.6%
Fibre cement pipes	16.8%	6.6%
Radiators and Boilers	24.6%	6.6%
Paints, Varnishes and Putties	17.8%	5.9%
Carpentry - Metal	17.5%	5.7%
Synthetics	19.3%	5.5%
Plastic pipes	19.3%	5.5%
Aggregates	11.4%	4.8%
Asphalts	15.0%	4.7%
Fibre Glass	15.0%	4.7%
Mortar	14.6%	4.4%
Valves and Taps	9.1%	3.9%
Rubber	9.6%	3.8%
Plaster Derivatives	16.9%	3.2%
Explosives	13.2%	3.1%
Ceramics	16.8%	2.9%
Ceramic tiles	16.8%	2.9%
Wood	19.1%	2.8%
Carpentry Wood	19.1%	2.8%
Kitchen and Bathroom Furniture	8.6%	2.3%
Lighting Appliances	4.3%	2.3%
Electric Switchgear	5.2%	2.1%
Alarms and Detectors	32.6%	1.8%
Ornamental Stone	4.4%	1.6%
Non Electrical Appliances	6.5%	1.5%
Lifts	6.7%	1.4%
Electrical Cables	7.4%	1.4%
Fibre Optic	7.4%	1.4%
Fire Extinguishers Hoses	7.4%	1.0%
Electronics	2.1%	0.8%
Air Conditioning and Ventilation	5.3%	0.6%
Electric Appliances	7.9%	0.6%
Antennas, Public Address System	1.4%	0.0%
Ceramic Toilets	0.0%	0.0%
Hardware	14.2%	-0.5%
Glass - Flat	17.1%	-5.4%
Copper pipes	9.8%	-5.6%

Figure 10 - % Changes in materials in the last year June 2021 to June 2022 and in the 2Q2022

Whilst the data does show a continuing trend of increases, more recently we have seen on some projects that aluminum and steel prices have fallen, however this anecdotal evidence will need to be reviewed along with the total data in the next market review.

At the end of 2021, according to data from the Ministry of Industry, Commerce and Tourism, Spain had imported 28.5 tons of aluminum from Russia, for 57.4 million euros. 85% of imported clays come from Ukraine, and clay imports from Ukraine in January 2022 compared to the same month in 2021 have increased by 74% in the main port of the sector (Castellón). The most aluminum profiles assembled in Portugal come from Spain. About 90% of the neon, which is used for chip lithography, comes from Russia, and Ukraine is also one of the biggest countries of neon's production. For buildings in particular, MEP installations and fit out elements are exposed to this supply chain issue. The limited availability and long lead-in times for key elements such as boilers, white goods, lighting system, fire detection, alarms, smart sensors and controls, are also at risk potentially delaying projects. The rise in the price of energy will especially affect the production of cement and ceramics.

The impact of the war has added 3 to 5% to the cost of typical projects. High energy costs disproportionately affect the construction materials supply chain, so prices are expected to remain high until the Portugal and European energy markets are retooled to be less dependent on Russian gas and oil.

Figure 11. - Portuguese imports of liquefied natural gas

Source - Instituto Nacional de Estatística

	1T-2021	1T-2022	Peso 2021 (%)	Peso 2022 (%)
United States	30,106,854	333,029,794	13,1%	51,4%
Nigeria	98,190,910	186,645,013	42,9%	28,8%
Trinidad e tobago	16,380,430	65,591,139	7,2%	10,6%
Russia	81,800,611	39,431,379	0,9%	3,1%
Qatar	2,040,534	19,842,221	0,9%	3,1%
Spain	495,128	350,380	0,2%	0,1%
	229,004,467	647,889,926	100%	100%

Further to the individual material inflationary data we see when reviewing energy costs that there has been a significant spike in energy costs following the war but the Bank of Portugal forecasts that there will be no price rises in the second half of 2022. In 2021 Portugal bought 35,7% of its gas from Russia but in 2022 that percentage decreased to 6,1%. Despite these seemingly small numbers, the overall disruption to the global energy market has increased costs across the board. Further to the figures for materials inflation we have seen further increases that have coincided with the risk in energy because of the materials manufacturing reliance on energy and also increases in transport costs. Pre-pandemic, energy costs typically accounted for 20-30% of the total manufacturing costs of products including cement, bricks and glass. As new deals are struck, 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. This means that construction material prices are likely to remain at or near record levels for some time to come.

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

Spotlight on: Navigating turbulent markets

The Arcadis Autumn Market View focuses on the consequences of the extreme market gyrations that have followed the Ukraine invasion.

Although our focus is mostly on the direct and hopefully short-term disruptions to the materials supply chain, the impacts of recent events are likely to be felt for much longer. Whilst prices remain at current high levels, and whilst contractors struggle to obtain price and delivery guarantees from their supply chain, contracted projects will be challenging to deliver.

Clients and their project teams will face similar barriers to reaching commercial close in connection with new schemes. Stagflation is not only likely to be felt across the Portuguese economy, but also in construction where order books are likely to contract as schemes are delayed pending improvements in market conditions.

Whilst clients and their teams want to be able to take forward new projects, they also need to be mindful of the unique circumstances that currently apply to construction markets. As part of the Arcadis International Construction Cost Report, we developed a five-step management plan to encourage clients to think about managing these unfamiliar new circumstances in a consistent way. In doing so, the five-point plan builds on existing best practice and gives teams the discretion to choose the measures that work for them rather than introducing completely new ways of working.

This 5-point plan does not offer a magic bullet to solve the problems faced by clients and their teams. The plan needs to be adapted to project circumstance and opportunities. Nevertheless, great quality information will support better decisions, doing more with less will save money, and leveraging the problem-solving talent of teams will prepare projects for the challenges ahead, focusing effort on problems over which the project team has some control. These are all well-established approaches that can be glued together by great relationships and great leadership.

It will be a long time before European energy markets, steel manufacturing capacity or other critical supply chains return to their pre-war state. This means that the current 'unprecedented' unstable market conditions will become very familiar indeed. To make projects work under these new circumstances, we need to review how we collaborate and share risk from a new perspective. The five-point plan is the first step towards managing that volatility in a positive way.

The key parts of the plan are:

→ Step 1 - Supply chain resilience.

In addition to urgent concerns around financial health and exposure to financial risk beyond the scope of a specific contract, supply chain resilience will increasingly involve navigating the impacts of sanctions, product sourcing and supply-chain disruption. Some risks associated with price escalation are likely to be affecting suppliers across multiple projects, so due diligence during the procurement process will be even more important than usual.

→ Step 2 - Project resilience.

Project resilience is about the identification and mitigation of showstopper risks, which are multiplying as the impacts of the Ukraine crisis grow. Single points of failure are probably the greatest concern given the extent to which disruption to a complex system like a bathroom pod could trigger wider knock-on impacts. Projects can be made more resilient through the design of additional risk-sharing provisions including price adjustment clauses.

→ Step 3 - Project optimisation.

Project optimisation should use the energy generated by the crisis to focus even more on opportunities to rationalise design, minimise waste and assure design completeness and quality. These opportunities are examined in more detail in the Zoom into: Resourceful use of materials. Teams should always focus on optimisation, but the benefit of doing so in the current market is significant.

→ Step 4 - Team culture.

High performing teams can make a difference in the current crisis by collaborating to solve problems. Flexibility and willingness to navigate the project in a collaborative manner, remaining open to different approaches to adapt to the new industry challenges. Self-interest will potentially get in the way, and a project culture needs to be built to counter this. Getting the basics right around people care and commercial arrangements is the first step in setting the conditions for success, including the consideration of sub-contractor and supplier management as well as the client and tier 1.

→ Step 5 - Project leadership.

Leadership matters. The Ukraine war provides ample demonstration of not only how important leadership is but also how important it is to focus on the right issues. Looking forward to 2023, the key challenge will be to start projects onsite in anticipation of future demand. Leaders will need to take risk and share risk and will need to delegate authority so that teams can respond rapidly to issues as they emerge. Leaders may have less cover from their contracts than usual and will need to adapt to further, unpredictable events.

Zoom into: Resourceful use of materials

High energy costs in Europe 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 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 in 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. 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 long time before a project hits the construction site. The earlier that resource intensity is considered, the greater will be 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.

In the case of new build, the degree of freedom in applying creative solutions seems to be higher than in refurbishment. Increasingly the “go to” solution across Europe is to use cross laminated timber, which is a welcome step towards the reduction of embodied carbon but could be prone to raw material scarcity and ignores the potential of other alternative solutions.

..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 the 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 efficient 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 improved 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 can 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. Whilst they may not be applicable for structural elements in high or mid-rise, they have potential applications in housing or warehousing. Hempcrete has been used in the UK by Adnams Brewery and by Marks & Spencer for their Cheshire Oaks retail store. In France, Paris Habitat is developing social housing

using hemp as insulation. As innovation progresses, new bio-based materials will come into play too. 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 resource use is a huge challenge, yet many of the opportunities on offer to utilise resources more responsibly are very small scale. 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 more 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 is 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.



About 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 Paulo 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.

Contact us



Marco Santos

Head of Region – Portugal

E marco.santos@arcadis.com



Emilio Garcia

Head of Cost Management Spain and Portugal

E emilio.garcia@arcadis.com



Ana André

Senior Cost Manager

E ana.andre@arcadis.com

Disclaimer

This report is based on market perceptions and research carried out by Arcadis, as a design and consultancy firm for natural and built assets. It is for information and illustrative purposes only and nothing in this report should be relied upon or construed as investment or financial advice (whether regulated by the Financial Conduct Authority or otherwise) or information upon which key commercial or corporate decisions should be taken. While every effort has been made to ensure the accuracy of the material in this document, Arcadis will not be liable for any loss or damages incurred through the use of this report.

©2022 Arcadis

Arcadis. Improving quality of life.

Connect with us



@ArcadisGlobal



Arcadis



@ArcadisGlobal



@ArcadisGlobal