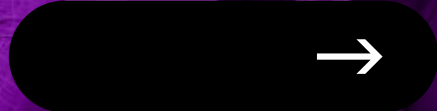


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Welcome to issue 14 of Integrated, our magazine devoted to the specialty insurance lines marketplace. Here we share our knowledge, experience and insights to improve claims and risk management.

Integrated is designed to encourage interaction and discussion, whilst keeping you right up to date with all things Integra. And this issue is no different.

In 2023 Integra celebrates its first quarter-century, and in this edition Founder and Chairman Ewan Creswell looks back over 25 years of milestones and challenges, and predicts what the future holds (page 5).

Integra's growth is highlighted by the recent arrival of new technical experts within our global team. Back in 2016, our CEO Leo Dixon wrote that Integra had grown to "31 adjusters in 13 cities and with our strategic alliance partners' offices that increases to 17 cities globally." Today, these numbers have increased to 54 adjusters, six colleagues in Integra Risk Services and 25 in operations, finance and management, based in 15 cities worldwide. Add our strategic alliance partners' offices across a further 22 countries, and Integra now has a wide geographical reach. Find out more about the latest additions to our team on page 15.

This issue also focuses on the energy sector, with articles on carbon capture and storage (page 11), hydrogen embrittlement (page 9), the effect of ESG strategies on the power generation mix (page 3) and the challenges of permitting programmes in oil, gas and petrochemical installations (page 13).

We want to address the issues that matter to all our stakeholders, from insurers, brokers, consultants and legal experts to the ultimate beneficiaries of the insurance product, be that Risk Managers or senior executives. I hope you enjoy this issue and, as always, welcome your ideas for future contributions, topics and discussions.

Finally, I would like to thank all the contributors to Integrated 14 – Ewan Creswell, Leo Dixon, Phil Poetter, Phil Durrant, Szen Ong, Nick Hide and Derek Gong.

On behalf of the entire Integra team, thank you for your support over the last 25 years. We look forward to continuing our evolution for the benefit of you all.

Enjoy!

Best wishes,

Doug Horne, Global Head of Marketing and Communications

THE POWER GENERATION MIX: KEEPING THE LIGHTS ON IN AN ESG-FOCUSED WORLD



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Global demand for power is expected to double from 20,000 TWh in 2020 to around 45,000 TWh in 2050, due to population growth, economic development and infrastructure requirements, especially in Asia, Africa and the Middle East.

Concurrently, Environmental, Social and Governance (ESG) policies have become prominent in the financing, construction, operation, regulation and insurance of power generation assets. Meeting both power and ESG demands is a complex challenge with wide-ranging impacts on regional economic development and living standards. This article provides a brief overview of this complex relationship.

ASIA AND AFRICA ARE STILL HEAVILY RELIANT ON HIGH CARBON-EMITTING TECHNOLOGY AND ARE SIMULTANEOUSLY EXPERIENCING THE MOST RAPID POPULATION GROWTH.

THE GLOBAL GENERATION MIX & INCREASING DEMAND FOR POWER

The global power generation mix relies on approximately 63% fossil fuels (37% coal, 23% gas, 3% oil) 10% nuclear, 16% hydro and 11% from wind, solar and other renewables. Coal, the highest carbon emitter, is still the largest single source of power generation.

However, the generation mix varies significantly between regions, as shown below:

SOURCE (%):	COAL	GAS	OIL	NUCLEAR	HYDRO	WIND	SOLAR	OTHER RENEWABLES
GLOBAL	37	23	3	10	16	5	3	2.5
UK	2	43	3	16	2	27	5	2
US	19	39	1	18	6	10	5	2
INDIA	74	3	0	3	10	4	5	1
CHINA	61	3	0	5	15	9	5	2
SOUTH AFRICA	85	0	1	5	1	5	3	0

In OECD countries, the environmental impact of power generation is being reduced by moving to lower carbon technologies such as wind, solar and nuclear, with gas seen as a stepping stone to lower carbon (emissions are half that of coal). However, Asia and Africa are still heavily reliant on high carbon-emitting technology and are simultaneously experiencing the most rapid population growth.

Economic development, living standards and health are all dependent on reliable access to affordable power. Countries with low CO₂ emissions are associated with energy (and social) poverty, whilst high GDP countries (> \$25,000 per capita) with advanced living standards also produce unsustainably high CO₂ emissions. Regions with the fastest population growth are set to see the greatest rise in carbon emissions (notably from coal).



RELEVANCE OF ESG FACTORS TO POWER GENERATION

ESG factors are increasingly prominent within government and the corporate sector, where boards, shareholders, clients and staff are all engaged on the topic. Power generation has particular relevance with numerous technologies involved:

- ▶ **Coal:** Although the highest CO₂ emitter with the most damaging effect on the environment, coal provides continuous generation, has a small geographical footprint per MWh and strong financial and social benefits by employing local communities.
- ▶ **Gas:** With 50% of the CO₂ emissions of coal, gas provides continuous generation, has a small footprint and offers strong local employment benefits.
- ▶ **Nuclear:** Whilst benefits include zero CO₂ emissions, continuous generation, a small area footprint and significant local employment, nuclear waste handling is a difficult issue and nuclear's large water requirement has a negative environmental impact.
- ▶ **Hydroelectric:** Although hydro has zero CO₂ emissions, it is limited by geographical location.
- ▶ **Solar/ Wind:** This produces zero CO₂ emissions, but can be limited by weather conditions and geographical factors. Also, its intermittent generation requires battery or thermal storage.

FINANCE AND INSURANCE SECTOR PERSPECTIVE

Investors and insurers have adopted ESG strategies and are moving their financial and underwriting capacity for construction and operational assets to low-carbon emission technology. Many institutions aim to pull out of "dirty" power generation, but recognise their clients are on a journey to transition from oil and gas to renewables (e.g. Statoil to Equinor, DONG to Orsted, GDF to Engie) and continue to underwrite high-carbon emission technology to support their clients and protect their premium income.

Fossil fuel power generation dominates the energy mix in developing economies and there is a danger that, if insurers walk away from these technologies, the rate of capacity installation may be hampered, with obvious knock-on effects to the economic development and living standards in those countries. To help justify continued underwriting of "dirty"

IF AN INSURED PAYS CLOSE ATTENTION TO THE ESG ASPECTS OF ITS BUSINESS, IT IS LESS LIKELY TO EXPERIENCE AN INCIDENT THAT MIGHT LEAD TO A CLAIM.

power generation, insurers are assessing the insureds' ESG policies and implementation. Actuarial studies show that when a company has a comprehensive ESG policy fully implemented, the probability of it experiencing a harmful event (insured or otherwise and regardless of technology) correlates inversely. So, if an insured pays close attention to the ESG aspects of its business, it is less likely to experience an incident that might lead to an insurance claim.

Whilst developing countries rely on fossil fuel for the bulk of their power generation today, many are looking to move to low-carbon emission technology. Their dilemma is whether to invest in cleaner power generation technologies or economic growth, as both cannot be achieved simultaneously.

CHANGE IN THE NATURE OF LOSSES

Transition to low-carbon emission technologies is changing the risk profile of the power generation industry. This is leading to lower value individual losses occurring at higher frequencies (e.g. solar power inverter losses), along with occasional larger losses from typical and atypical weather-related events.

Fossil fuel and large plant losses will continue, but with additional losses associated with carbon abatement equipment. Emission restrictions for high-carbon power generation assets and pollution penalties will likely become common. This may present some interesting business interruption losses when considering whether to run a unit without its flue scrubber.

CONCLUSION

Increased power demands over the next 30 years and meaningful ESG policies present a complex challenge to transitioning towards low-carbon emission technology. Fossil fuels will remain important in the power generation mix for developing countries. A pragmatic ESG strategy is required that incorporates cleanup technology and avoids prolonged energy poverty.

CELEBRATING 25 YEARS OF INTEGRA TECHNICAL SERVICES



Doug Horne

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As Integra reaches its quarter-century milestone, our founder and Chairman Ewan Cresswell looks back at 25 years of exciting growth, testing challenges and profound industry change with Doug Horne, our Global Head of Marketing & Communications.

So, Ewan, how did Integra come about?

Ewan: I started Integra back in 1998. Before then, in my late 30s and early 40s, I'd worked at board level for two of the largest adjusting houses of the time and set up an international adjusting operation for external shareholders. But I'd become jaundiced by the capricious attitudes of senior managers and equity providers. I began looking for a way to stay true to my professional and business principles and take full control of my own destiny, and my family's. Back then I had a young family to think about, so after weighing up the risks, I decided to set up my own business, Integra!

What was your vision for the new Integra back then?

Ewan: I wanted Integra to be a specialist problem-solver, a business that focused on complex losses happening anywhere in the world. To start with, I had no great aspiration for growth. Instead, I focused primarily on my new assignment, which was to be the best I could possibly be at what I did. And, of course, I hoped to persuade more of the Market that specialism was the future! At the time, I was very happy to remain a sole practitioner, but within eight months I found myself with more work than I could handle on my own.

Looking back, what are the biggest changes in the insurance market you've seen over the last 25 years?

Ewan: There have been so many. But one of the biggest would be how markets have become structured to accommodate multiple insurers with claim agreement roles, and no outright leaders. This can become a real challenge. Also, broking houses seem to have reduced investment in their claims teams and consequently have less time and resource to corral insurers to a singular strategy and to settlement. Adjusters have had to step into the void and bring insurers together without any formal training for this new aspect of their role. The other significant change would be the development of regional underwriting markets, especially in Singapore and Dubai, and how London has responded to these challenges.

"I WOULD SAY OUR BREAKTHROUGH MOMENT WAS IN 2005 WITH HURRICANES KATRINA AND RITA."

When, where and why do you think Integra has made its name in the Market?

Ewan: I would say our breakthrough moment was in 2005 with hurricanes Katrina and Rita. For the first time, numerous similar, significant refining and petrochemical claims were being handled simultaneously. That meant the Market was able to judge the capabilities of adjusters in real-time. I remember we closed our doors to new instructions early on, so we could focus on providing the best possible service. We concluded our claims faster than any of our competitors. After that, we were fed problem losses that other adjusters were unable to manage. I think that period cemented our reputation for handling serious losses, not just in the oil, gas and petrochemical arena, but more broadly across all technical lines

What would you say is the company's biggest achievement over the last 25 years?

Ewan: Our transition from the first 10 years as a London-based operation, to international expansion. This growth turned us into a global network and the only privately-owned international loss adjusting business of any significant scale or reach. This evolution has been hugely challenging, but I'm immensely proud of our achievement.



What's your most difficult challenge of the last 25 years, and how was it overcome?

Ewan: Being a privately owned and privately funded business that always needs to make a profit. Profitability is essential to create the investment we need to establish our next base. So, maintaining profitability is vital but not always easy!

Can you pinpoint Integra's three most significant milestones?

Ewan: In 2008, when we handled our first \$1Bn loss. This was effectively an indicator that the Market trusted us with the largest and most complex losses. All this despite our comparatively small size...there were only six of us at the time.

Then there was our first international expansion, into Australia, in 2009. This decision led to us opening a new office overseas every year for the next ten years.

The other big milestone was moving to a dedicated CEO and devolving management to a senior leadership team. We completed that in 2019. Adopting a more formal leadership structure has allowed us to maintain a collegiate approach and build the most appropriate management for each region.

What have been the most important lessons in your 25 years of heading up Integra?

Ewan: In the early days we struggled to break the status quo. When we pitched for business, lots of doors were shut in our face. We were asked things like "How long have you been going?" or "How many adjusters do you have?" We were told we needed more than just a London base. But, encouragingly, no one actually challenged our credentials in handling technical claims. That reinforced our self-belief that we could deliver a superior claim solution and motivated us to keep going and take every opportunity to prove ourselves.

Of course, over the years we've lost some great colleagues, but in the same way that top sports teams plan future iterations of their sides, we continually re-build and re-structure our offering to stay relevant.

Curiously, although we now have 25 years of credibility under our belts, I still think of Integra as a start-up. We have no right to expect business to automatically come to us.

Safe Hands. Agile Minds



25 Years of Technical
Excellence Worldwide

"I'VE ALWAYS WANTED OUR COLLEAGUES TO BELIEVE THAT THEY CAN ATTAIN ANY PROFESSIONAL GOAL AT INTEGRA. WE VALUE PERSONAL DEVELOPMENT VERY HIGHLY."

And, if we want to carry on growing, we'll need to be quicker, more agile and offer claim solutions that are significantly better than our competitors'. I've learned that most other companies are transitory, often with shareholders who don't necessarily understand the business or the industry. Most of the great names who dominated the market 25 years ago have gone. Toplis & Harding, Graham Miller, Thomas Howell, Ellis & Buckle, Robins, GAB, Cunningham ...these were once market-leading players, but no longer exist. I'm proud that Integra has outlasted them, hopefully by staying relevant, changing with the times and keeping our service at the cutting edge.

In our early years we really struggled to secure construction project nominations because we hadn't even existed for as long as the anticipated project duration of a risk. I'm pleased to say that perception has changed today!

Has Integra met your expectations?

Ewan: Yes and no. I've always wanted us to be the world's best service provider, across every line of business in which we claim to have expertise. I'd say in most of these lines we are probably perceived as 'top-three', and in some cases we're possibly thought of as 'number one'. But we must continue to push for consistency across the globe. Perhaps this is an endless road we are on!

What do you think makes Integra what it is today?

Ewan: Without a doubt, our exceptional people. I've always wanted our colleagues to believe that they can attain any professional goal at Integra. We value personal development very highly. We encourage our more senior colleagues to share their years of life experience and knowledge so younger colleagues can benefit. We could certainly do a better job of knowledge transfer, and we continue to work on this, but fundamentally I believe Integra should provide its people with the stage upon which they can express and grow their professional selves.

Looking to the future, what's next for Integra?

Ewan: We'd like to develop new lines of business and geographical regions, so there's still plenty to run at in the short term. Also, for any global business to succeed it needs to achieve consistency of service. This feels like a perpetual challenge given the infinite nuances required to tailor our services to meet regional demands and requirements. That should be enough to keep us occupied for a while!

UNDERSTANDING HYDROGEN EMBRITTLEMENT: HARNESSING HYDROGEN SAFELY



Derek Gong
Managing Director,
Oskefer Consulting Pte Ltd

Hydrogen, often heralded as a 'miracle molecule', holds immense promise as a clean energy carrier. As countries worldwide gear up to transition towards a decarbonised future, hydrogen has attracted growing attention. The rapid rise in renewable energies from wind and solar in recent years makes it increasingly feasible to produce hydrogen from renewable sources through electrolysis, and transport it as a fuel.

The uptick in production, storage, transportation and consumption of hydrogen has made it essential to assess and mitigate the associated risks.

MATERIAL DAMAGE BY HYDROGEN

As the smallest of atoms, hydrogen can (under certain circumstances) easily enter materials and alter their properties. The term "Hydrogen Embrittlement" (HE) refers to the deterioration of material properties, in particular the material toughness and ductility, due to the presence of hydrogen. HE is difficult to identify through normal inspection methods and can cause catastrophic incidents by remaining undetected prior to material failure.

HEE IS MORE TROUBLESOME THAN IHE, AS THE SOURCE OF THE HYDROGEN MAY NOT BE REMOVABLE.

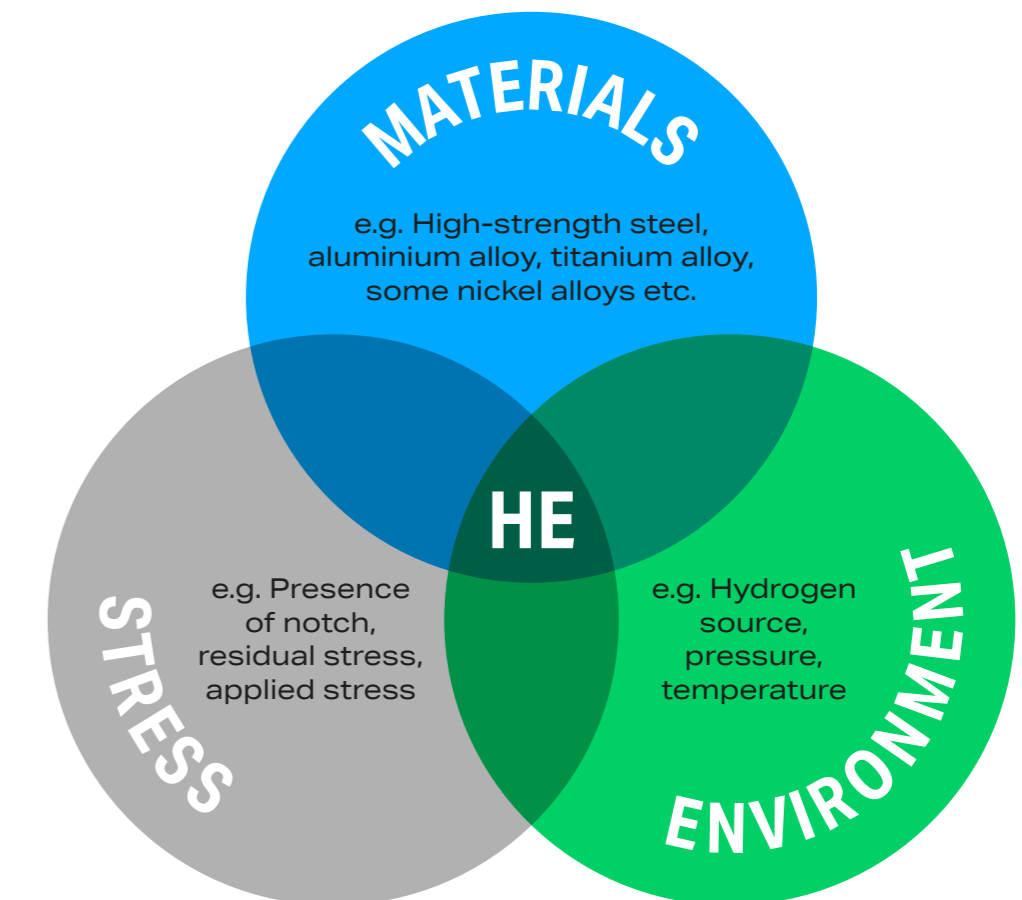


Fig. 1: Factors of Hydrogen Embrittlement

HE is classified into three broad categories:

- Internal hydrogen embrittlement (IHE)
- Hydrogen environment embrittlement (HEE)
- Hydrogen reaction embrittlement (HRE)

IHE is caused by pre-existing hydrogen inside the material, usually from the processing of the material (e.g. welding, cladding or pickling). The internal hydrogen can be removed effectively using heat treatment. The HE generated by exposure to a hydrogen atmosphere is referred to as HEE, the sensitivity of which is highly dependent on hydrogen pressure. HEE is more troublesome than IHE, as the source of the hydrogen may not be removable. It is worth noting that the hydrogen molecule (H_2) cannot directly cause HE without being absorbed and dissolved into the atomic phase. HRE is related to the degradation of certain mechanical properties that occur when hydrogen reacts with the metal matrix itself.

HE is a complex phenomenon influenced by three major factors (see Fig. 1). Crystal structure, microstructure, hydrogen solubility and diffusion coefficient, and internal defects are essential characteristics of materials. HE is especially problematic in high-strength steels with an ultimate tensile strength of $> 1,000$ MPa or hardness $> HRC 32$. From a stress perspective, hydrogen atoms tend to accumulate at areas of concentrated stress, either residual stress as a result of processing or stress applied in service. Environmental factors include hydrogen source, temperature etc.



MITIGATION OF HYDROGEN EMBRITTLEMENT RISKS

The risks of hydrogen embrittlement to hydrogen storage and transportation cannot be overstated, as the infrastructure for these processes often involves materials susceptible to HE. Mitigating HE risks requires a multifaceted approach: material selection, surface modification and design optimisation. Also, appropriate testing should be conducted to evaluate a material's resistance to HE.

MATERIAL SELECTION

Material selection involves choosing alloys resistant to embrittlement. In general, alloys with a face-centred cubic (FCC) crystal structure are more resistant to HE than those with a body-centred cubic (BCC) crystal structure, due to their higher hydrogen solubility and lower hydrogen diffusion coefficient in hydrogen environments. The HE of steels is dependent on their microstructures: the martensitic structure shows the highest HE susceptibility, followed by bainite, pearlite and austenite. Therefore, most hydrogen-resistant alloys are austenitic alloys with an FCC crystal structure, such as austenitic stainless steels or iron-nickel-based alloys.

The advent of composite materials offers promising opportunities. For example, hydrogen storage tanks that employ a plastic liner for gas containment and a carbon fibre composite for strength, have shown good resistance to embrittlement while meeting demanding performance and safety requirements.

SURFACE MODIFICATION

When a metal surface is coated with a protective film, hydrogen entry into the alloy is suppressed and it exhibits high HE resistance. For example, a surface coated with Ni, Cd, Al and Al-Ni complex film can effectively suppress hydrogen infusion and reduce HE susceptibility. Surface nitriding and carbonisation and peening treatments are also promising approaches for enhancing HE resistance.

WHEN A METAL SURFACE IS COATED WITH A PROTECTIVE FILM, HYDROGEN ENTRY INTO THE ALLOY IS SUPPRESSED AND IT EXHIBITS HIGH HE RESISTANCE.



DESIGN OPTIMISATION

In the design phase, reducing stress concentrators and applying low-stress design principles can help to limit the opportunities for crack initiation. However, this can be constrained by the intended design window. For example, the typical pressure of a compressed hydrogen storage tank is 35-70 MPa.

To determine the suitability of a material for hydrogen storage and transportation, its susceptibility to HE can be evaluated by standard tests, such as 'ASTM G142-98(2022) Standard Test Method for Determination of Susceptibility of Metals to Embrittlement in Hydrogen Containing Environments at High Pressure, High Temperature or Both'.

Appropriate Testing		
Material Selection	Surface Modification	Design Optimisation

Fig.2: Mitigating HE Risks

The HE sensitivity of materials can be measured using various parameters. For example, the HE sensitivity of materials can be quantitatively represented by the relative reduction of area (RRA) obtained via slow strain rate tensile tests in the presence of hydrogen (or after hydrogen charging) versus that in the air (or an inert gas). If a material is more susceptible to HE, its reduction of area in the presence of hydrogen will be much smaller than that it is in air (i.e. more brittle).

There are two types of testing method: pre-charging hydrogen experiments (internal hydrogen) and environmental hydrogen experiments (external hydrogen). The latter is more relevant for hydrogen storage and transportation facilities. Those interested in a detailed comparison of HEE among various metals and alloys, should refer to the technical document 'NASA/TM-2016-218602 Hydrogen Embrittlement' prepared by the National Aeronautics and Space Administration (NASA).

Despite the challenges, hydrogen embrittlement should not be seen as an insurmountable barrier to the hydrogen economy. Instead, it is a problem that needs to be managed and mitigated. If we can rise to this challenge, hydrogen's full potential as a clean, abundant and efficient energy carrier can be realised, providing a significant step forward towards a sustainable energy future.



A NEW WORLD OF POLITICAL VIOLENCE



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Russia's invasion of Ukraine in February 2022 started a bloody conflict which continues today and shows no sign of a peaceful resolution. But, whilst the Ukraine war marks a historic milestone as Europe's most serious hostility since WW2, it has also created an unprecedented shockwave across the insurance world.

The conflict presents a new challenge to insurers and insured alike, a highly unusual backdrop for a multiplicity of Political Violence claims, with a perilous, fast-moving and unpredictable situation on the ground. This article examines some of the unique constraints relating to the war and how adjusters are responding.

UKRAINE WAR: A UNIQUE EVENT

Apart from the tragic human cost, Ukraine is paying a heavy price for its decimated infrastructure. A 2023 World Bank report estimates a US\$ 411 billion price tag for rebuilding the war-torn country. Multiple insured assets have been appropriated or suffered war damage as a direct result of a prolonged conflict with no end in sight. Front lines are constantly shifting as Russian and Ukrainian forces advance or retreat, creating uncertainty about the safety and accessibility of damaged sites and the possibility of secondary damage from ongoing fighting. Gathering evidence may be difficult due to local dangers, while restricted supply chain, broken transport infrastructure and sanctioned stakeholders make repairs and business restoration prolonged or impossible while the war continues.

GATHERING EVIDENCE BY SATELLITE

Ground inspection is impossible when damaged assets remain in Russian-occupied territories close to dynamic front lines and within range of artillery attacks. Even remote inspection techniques like Integra's IRIS technology are difficult to deploy without endangering operatives. Enemy drones are known to target mobile phone signals and operatives risk being apprehended and charged with espionage.

With ground operations limited, satellite surveillance has become the adjuster's go-to tool, and free low-resolution satellite imagery is available in most conflict zones. Once an insured asset is identified in low-res, a suitable satellite can be focused on the location in high-resolution and a high-res image purchased at reasonable cost.

However, there are constraints such as the high demand for satellite time from the military and other organisations, and prevailing cloud obscuring target locations. These satellite images prove very useful for scoping war damage and have sometimes demonstrated that insured assets are undamaged but remain inaccessible due to occupation by invading forces.

In more complex cases, military expertise has been engaged to assist in analysing these satellite images to provide more accurate interpretations of the data in relation to the actual ground situation.

Whilst there are different policy wordings in the market, most indemnify the insured for physical war loss, or war damage to their assets and any consequential business interruption. If the insured asset has not suffered war damage, then coverage may not be triggered, despite the asset being unavailable to the insured.

An example is when adjusters were investigating the loss of power at a windfarm in occupied Ukraine. High-resolution images facilitated an accurate inspection of not only the turbines and the distribution station, but also the insured transmission lines between the windfarm and the local grid sub-station. In this example, it was determined that there was no physical war loss¹ or war damage to insured assets. The actual damage was to uninsured third-party property which resulted in the insured being unable to export wind-generated power to the local grid. Unfortunately, the insured was not entitled to an indemnity under the PVI policy.

¹ The invading force did not appropriate insured property; therefore, it was not considered "loss".

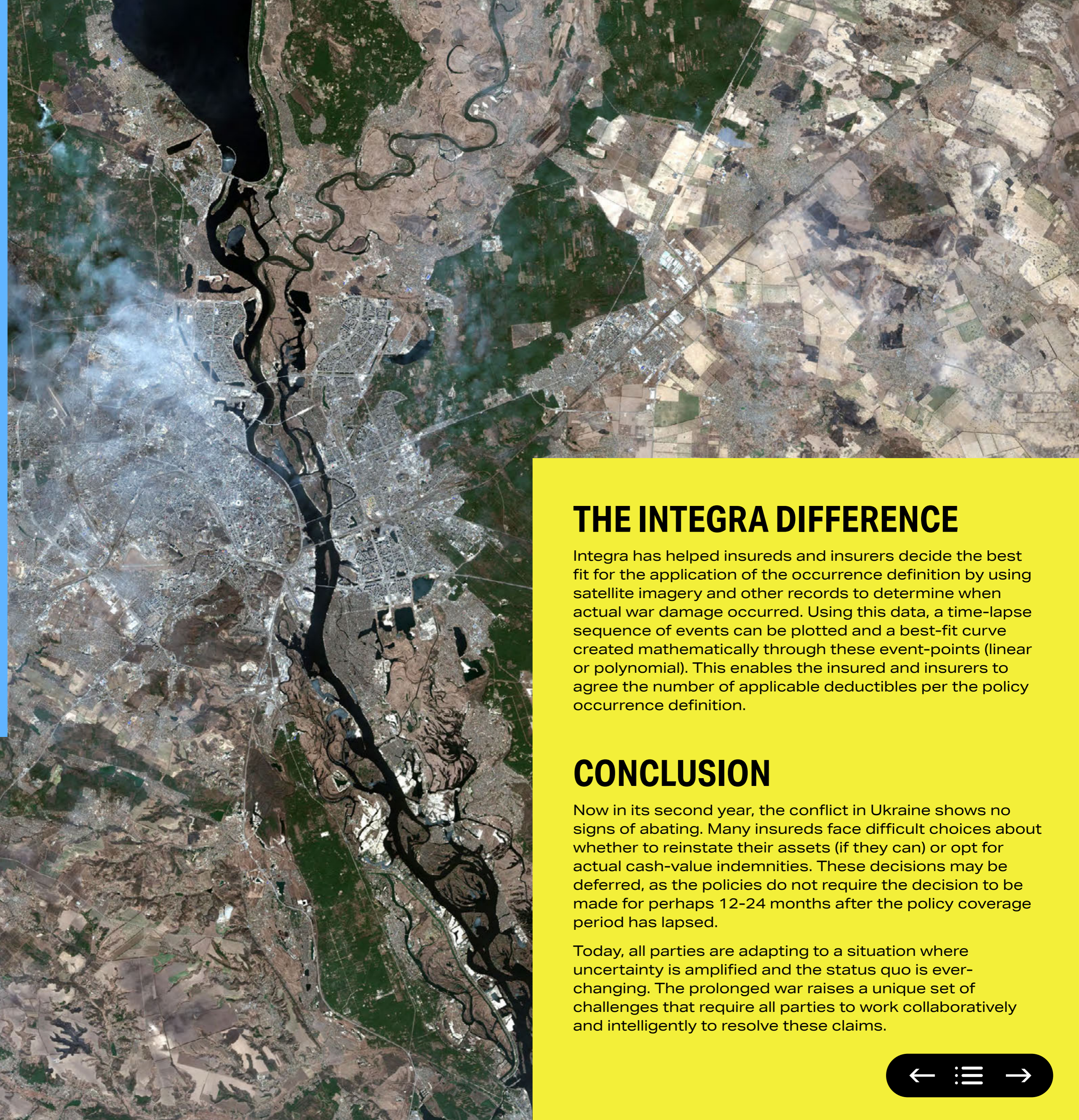


COUNTING MULTIPLE OCCURRENCES

During a state of war, assets typically undergo multiple attacks over a period of time, rather than a single incident of damage. For instance, a site may be struck by a number of missiles or bombardments over weeks or months, and as front-lines move the site may be damaged further through vandalism or looting by occupying forces.

This presents adjusters with a number of challenges: the policy often defines an occurrence as "...the duration and extent of any one occurrence shall be limited to all physical loss or damage sustained during any period not exceeding 30 consecutive days arising out of and directly occasioned by such insured peril(s)...".

- ▶ The insured is contractually entitled to determine the best fit to minimise the number of property damage deductibles to be applied during the policy period.
- ▶ It is necessary to identify damage to critical assets which are the actual drivers of the business interruption claim. It may be that multiple property damage deductibles are applicable, but only one or two business interruption waiting period deductibles are relevant.
- ▶ If the insured is able to undertake some repairs to mitigate the business interruption claim, the driver of the business interruption loss may move to another more recently damaged asset. In that case, the maximum indemnity period may change to run from the new occurrence date and the indemnifiable interruption period may be extended.



THE INTEGRA DIFFERENCE

Integra has helped insureds and insurers decide the best fit for the application of the occurrence definition by using satellite imagery and other records to determine when actual war damage occurred. Using this data, a time-lapse sequence of events can be plotted and a best-fit curve created mathematically through these event-points (linear or polynomial). This enables the insured and insurers to agree the number of applicable deductibles per the policy occurrence definition.

CONCLUSION

Now in its second year, the conflict in Ukraine shows no signs of abating. Many insureds face difficult choices about whether to reinstate their assets (if they can) or opt for actual cash-value indemnities. These decisions may be deferred, as the policies do not require the decision to be made for perhaps 12-24 months after the policy coverage period has lapsed.

Today, all parties are adapting to a situation where uncertainty is amplified and the status quo is ever-changing. The prolonged war raises a unique set of challenges that require all parties to work collaboratively and intelligently to resolve these claims.

CARBON CAPTURE AND STORAGE: WHAT IS HOLDING BACK ADOPTION & GROWTH?



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There is no silver bullet to reverse the growth in carbon emissions. Instead, we rely on a raft of technologies to deliver more sustainable energy sources and suppress the release of greenhouse gases. Only then can we realise the pledges of the Paris Climate Accords and the net-zero commitments of individual organisations.

Other than its limited industrial use in chemicals and fuels, enhanced oil recovery CO₂ is a waste product, hence the global desire to reduce its usage and consequent impact on the environment. One of the technologies currently being invested in to help achieve this goal is Carbon Capture and Storage (CCS), a three-stage process in which CO₂ is captured at a source of industrial emission, transported securely to a place of storage and permanently locked away deep in the earth's substrata.

CARBON CAPTURE

Although direct air capture of CO₂ is technically possible, it is more efficient to capture the gas at high-concentration, single-point locations where higher quantities can be extracted. Typical sources include hydrocarbon-fuel-burning power plants, steel plants and cement factories.

At conventional power plants, a range of extraction processes are available, both pre- and post-hydrocarbon combustion. Although less efficient, the separation of CO₂

from post-combustion flue gas is the current standard and generally preferred when modifying existing process infrastructure. This is due to it being the most developed and standardised technology, its ease of retrofitting into new and existing plants (with no fundamental impact on the power plant) and its ability to stage in carbon capture, thereby minimising potential disruption to the plant and investment risk. However, this still requires the addition of pre-treatment process units, which increases CAPEX and adds significant parasitic load to carbon capture at the plant (i.e. higher OPEX).

CARBON TRANSPORTATION

CO₂ is transported by pipeline or ship because capture and storage locations are typically considerable distances apart. The gas can be corrosive in the presence of moisture, so any containment used for CO₂ delivery must be specially treated to prevent damage to the infrastructure. Another challenge when transported by sea is that the CO₂ must be liquified (cooled and compressed) so it can be shipped more cost-effectively.

CARBON STORAGE

The most suitable places for storing CO₂ are shallow sedimentary settings in offshore regions (such as under the North Sea, Gulf of Mexico or South China Sea). These locations combine optimal storage conditions with proximity to high densities of single-point industrial capture sites. Here, CO₂ can be injected through wells to increase pressure and enable enhanced recovery of oil or gas in producing fields. Alternatively, the CO₂ is pumped underground into depleted hydrocarbon reservoirs, where it replaces the oil and gas previously extracted and is sealed by layers of impermeable strata.

These sites can contain CO₂ securely at limited risk for generations. Currently, several pilot projects are underway, either in the planning phase (e.g. Goldeneye in the UK and Enping 15-1 in China) or close to operation (Northern Lights in Norway).

CCS RISKS AND EXPOSURES

In practice, carbon capture is often closely linked to power and downstream energy facilities, where CCS requires specific absorbing materials and mixing arrangements. Many similar processes can be found across a variety of different industries. Meanwhile, the injection and storage elements of CCS feature strong parallels to the extraction process in the upstream energy industry (but in reverse) and closely resemble enhanced oil recovery projects which have been commonplace for decades.

As a result, most exposures and failure modes, such as corrosion, mechanical breakdown, drilling risks and reservoir or surface leaks, are relatively familiar, and can be easily anticipated and dealt with. Resultant defects and losses are expected to mirror what is currently seen. Others will be novel and linked to the exposure differences: scaling, solvents used for capture, repurposing and upgrading of existing assets or existing well integrity.

Operational risk mitigation measures are reflected in the due diligence taken when repurposing existing downstream assets and upstream infrastructure, such as the use of corrosion-resistant alloys in critical areas of the process and subsurface monitoring.

CCS: THE BUSINESS CASE

Economics will determine the scale and pace of CCS adoption, rather than technological development. Associated risk exposures for more complex upgraded or repurposed assets versus purpose-built facilities are known unknowns. Once adjusted for scale, the existing engineering community can support this step change.

However, widespread adoption of CCS requires a framework that incentivises investment and allows for effective financial risk management and transfer. Unlike commodities extraction, which is an intrinsic value creation process, CCS is a strategic measure to achieve carbon-reduction goals and currently represents a marginal business for operators at best.

Prioritising profit-generating processes such as the carbon-heavy production of 'blue hydrogen' may provide a sustainable financial framework. Here, financial market mechanisms and derivatives are likely to fall into place. For risk-transfer, CCS could become an extension to existing insurance portfolios given the similar risk profile.

However, for CCS to really take off, the assurance of regulators is key. We require clarification on what effective long-term liability management between the private sector and state bodies will look like, and a framework that supports and drives financial predictability.

CHALLENGES FOR INSURERS

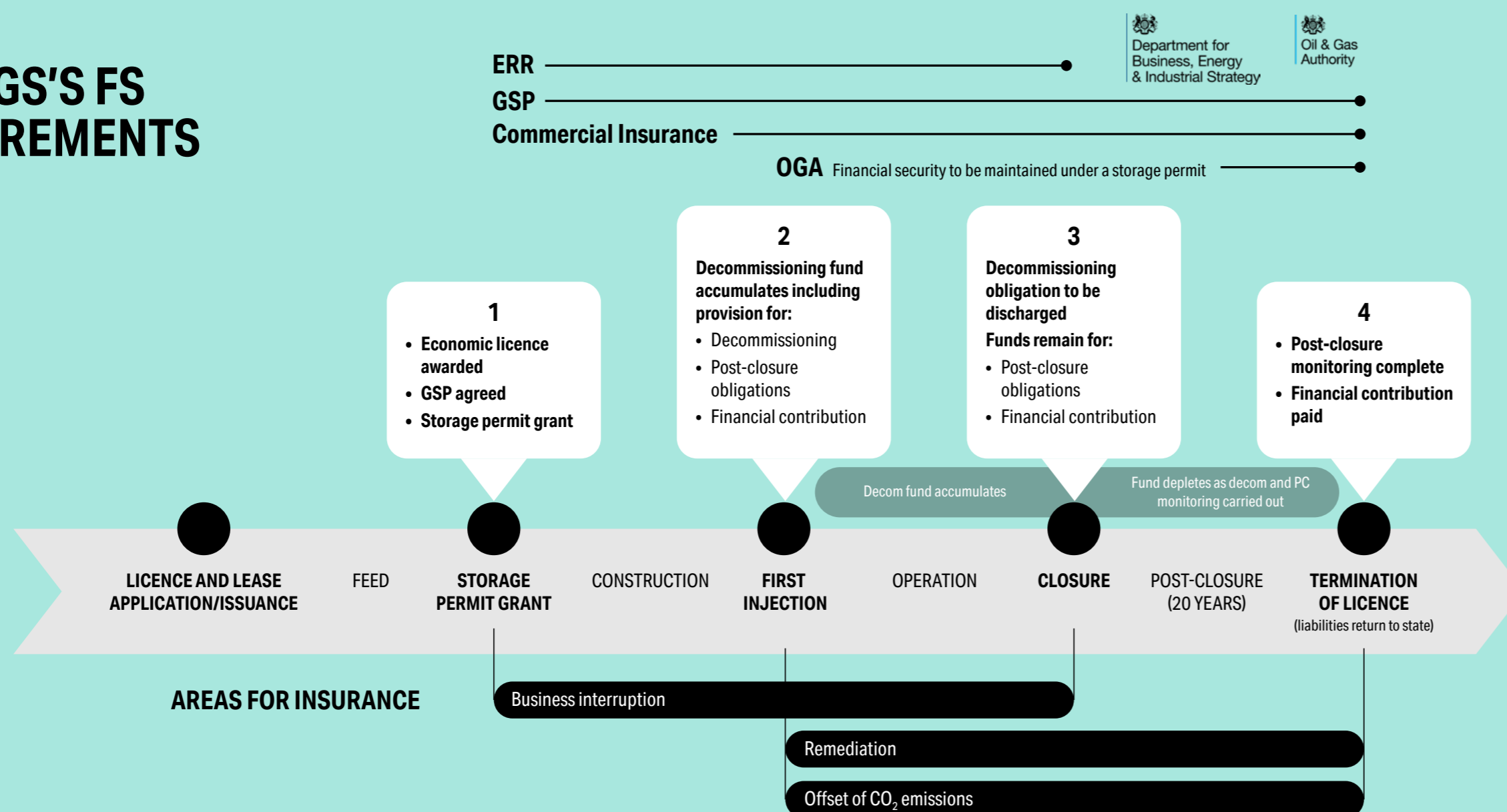
As a CCS project progresses through its lifecycle of FEED, design, construction, operation and post-closure, it is exposed to traditional risks such as third-party liability (TPL), seepage and pollution, subsurface liability, damage to works (CAR), damage to existing property (DTEP), and well control (COW/OEE), all of which are generally accepted by insurers or retained by the owner.

However, regulations that affect financial security and mechanisms such as carbon credits may differ widely across jurisdictions, which in turn have a knock-on effect on the level of business interruption (BI) cover desired from the perspective of the project owner, lender, investor etc. This can be a challenge for owners, given the long life of CCS projects.

While changes in processes and respective exposures are understood and can be accounted for in operational risk management, insurers are concerned about the combination of new technology, project scale, lack of underwriting information (including claims history) and small size of portfolio. This in turn poses the challenge of how to price the risk.

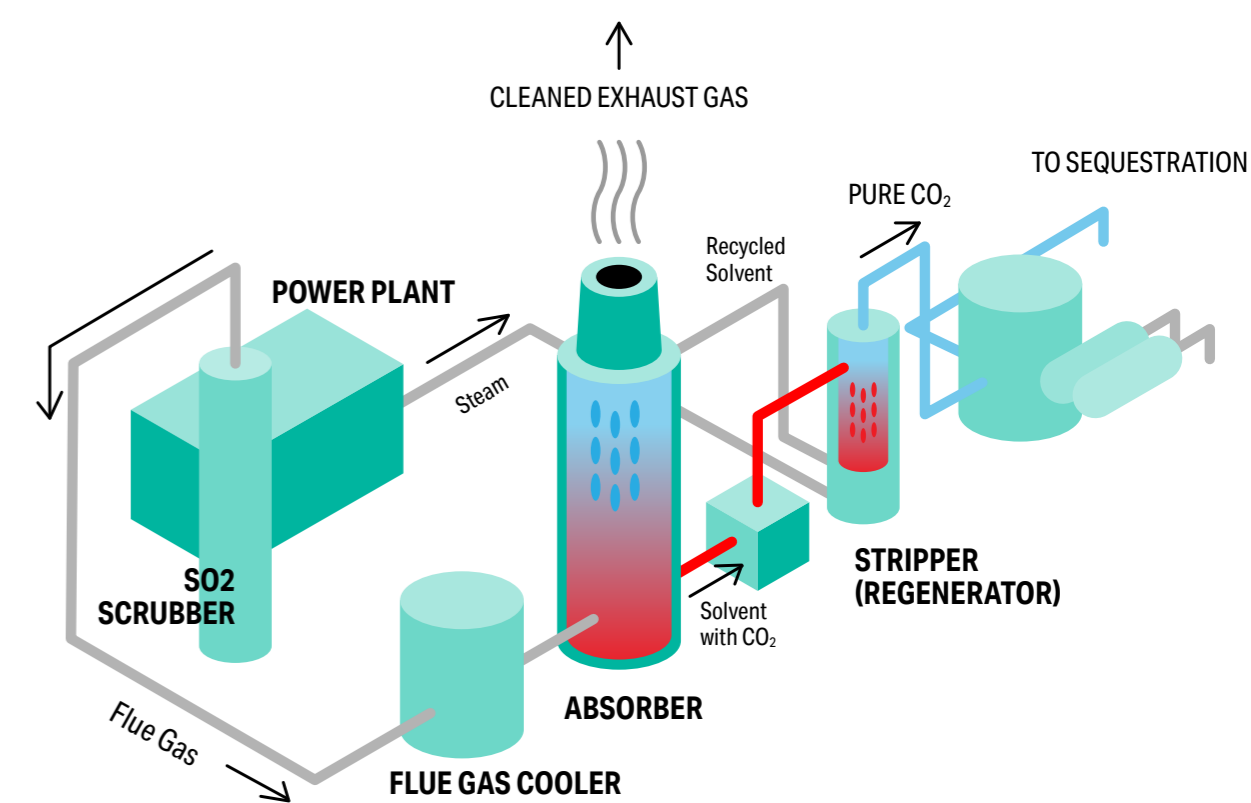
As part of the Lloyd's Market Association, the Joint Natural Resource Committee has set up a dedicated CCS sub-committee to drive awareness in the insurance market.

THE OGS'S FS REQUIREMENTS



POST-COMBUSTION CAPTURE

(source: <https://ukccsrc.ac.uk/ccs-explained/carbon-capture/>)



PERMITTING & CIVIL AUTHORITIES CLAUSES



Ewan Cresswell
Ewan.Cresswell@integratechnical.com

In the USA, the Clean Air Act (CAA) establishes a number of permitting programmes designed to enforce the goals of the act. Some of these programmes are directly implemented by the Environmental Protection Agency through its regional offices, but most are carried out by individual states and local agencies. The CAA requires facilities that are major sources of air pollutants (i.e. oil, gas and petrochemical facilities) to have an air permit in order to be built as well as to operate. As we were to learn, the process of gaining a permit for both new and pre-existing facilities can be extremely time-consuming.

An assignment in which a small refinery in the US Midwest suffered an explosion and fire became our first experience of 'permitting' being a significant factor in the calculation of the period of interruption. As we were to discover, the post-loss requirement for the insured to make the relevant application added another layer of complexity to the adjustment process, and delay to the reinstatement project.

TRIGGERS FOR PERMITTING

In simple terms, every facility is allocated an emissions allowance, but in more complex facilities each subset of equipment can also have an individual rating. This is so that, if the emissions from an individual process unit change, re-permitting may be necessary. In our experience, the need for permitting can be triggered by at least three elements:

- 1 **If a facility is rebuilt following an incident, with a like-kind replacement of equipment damaged due to the incident.**
- 2 **Where a unit's capacity is upgraded and the emissions alter as a result.**
- 3 **Construction works necessary to complete the reinstatement of damage are also subject to permitting.**

ANY SIGNIFICANT REPAIR PROJECT WILL LIKELY TRIGGER THE NEED FOR PSD PERMITTING, WHICH IS COMPLICATED.

Typically, a facility is likely to be classified as a major stationary source for each criteria pollutant according to the geographic area in which the source is located. National ambient air quality standards (NAAQS) determine threshold levels and, if increases in pollutant levels remain below the thresholds, the facility may only be subject to minor modification construction permitting, which is relatively straightforward to achieve.

However, if a facility incurs damage as a result of an incident and most of the following repair or reconstruction activities performed on damaged units meet the criteria for a "replacement unit" versus a new emissions unit, any significant repair project will likely trigger the need for Prevention of Significant Deterioration (PSD) permitting, which is complicated, costly and requires considerably more time than the minor modification alternative.

The most critical part of successfully qualifying as a "replacement unit" is that the rated capacity from an emissions perspective does not increase. It must also be "identical or functionally equivalent" and not change the basic design parameters of the process. Replacing decades-old process equipment with modern technology (as is common in the USA and other parts of the world) can sometimes be a challenge when trying to demonstrate that it is functionally equivalent and does not change design parameters.

A PSD permit application must include an ambient air impact analysis with robust dispersion modelling and details of the Best Available Control Technology (BACT) used. In some cases, a public notice and comments period is necessary, which creates the risk of a 'contested permit application' by third parties.

PERMIT TIMELINES

Understanding the likely permitting response following a loss is important because of the potential impact it will have on both the cost of the reinstatement project and the repair timeline. Each state has its own attitude towards environmental issues. In Texas, the relevant authority is the Texas Commission on Environmental Quality (TCEQ). TCEQ provides guidance as to its application response times, which for a full PSD permit is 365 days.

**AS ADJUSTERS,
WE NEED TO KNOW
WHICH ACTIVITIES
ARE ALLOWED WHILST
THE PERMITTING
PREPARATION AND
APPLICATION REVIEW
PROCESS IS UNDERWAY.**

However, this projected timescale starts from the point of lodging an application for a permit, is non-binding on TCEQ and does not reflect the time necessary for the insured to compile and prepare the application. In Integra's experience, preparing the application cannot commence until the front-end engineering and design (FEED) is largely completed, because the selection and specification of emissions-creating equipment must be known before the necessary calculations can be performed. This in turn cannot be started until the scope of physical damage is determined and decisions made as to the repair or replacement of the original equipment. Consequently, the work necessary to assemble an application is likely to require a further 4-8 months, depending upon the reinstatement approach adopted by the insured.

STREAMLINING THE PROCESS

As adjusters, we need to know which activities are allowed whilst the permitting preparation and application review process is underway. By way of example, demolition and debris removal, asbestos abatement and general site clearance may be permitted and could occur concurrently.

Although construction activities cannot commence on site until the necessary permit is in place or some form of dispensation is granted by the state, there are numerous construction activities which can be performed off-site by way of prefabrication of vessels and procurement of equipment (pumps, heat exchangers, valves etc.). Pipe

spools and related instrumentation and cable runs can be prefabricated remotely and brought to site once permitting is in place. Of course, there is some design risk implicit in this approach. However, with incisive planning and detailed logistics, the duration of the permitting process does not have to result in a commensurate delay to the reinstatement project.

Specialist consultants should be able to advise on what measures can be taken to fast-track an application, and if desirable, work with the insured's advisers to ensure all opportunities to do so are exploited.

Given the plethora of manuscripted wordings in the energy sector, it is difficult to generalise regarding the potential coverage impacts of the need for an insured to secure a PSD permit. However, if a BACT upgrade is required as part of the reinstatement, then Public Authorities and Demolition and Increased Cost of Construction (DICC) clauses are potentially in play.

IMPACT ON BI

From a time element point of view, based on a standard gross earnings wording, the period of liability will run until, "...when with the application of due diligence and dispatch, the building and equipment could be repaired or replaced". So, depending upon any limitation in respect of the period of indemnity (24, 36 months etc.), the permitting process can add very significantly to the business interruption, up to 20 months on the example cited earlier.

We know that some insurers are looking to the wording of By-laws, or Civil and Military Authorities clauses in an attempt to moderate their exposure.

Although this article relates to our experiences in the USA, we anticipate that there will be similar requirements in other jurisdictions and lines of business. It is a small step to imagine authorities imposing constraints on the reinstatement of older coal-fired power plants and certain extraction industry facilities, where there is the prospect of significant physical damage following a loss. Prior to this loss we expect most downstream underwriters had not factored this permitting phenomenon into their PML calculations, but post settlement of the claim we expect those insurers subscribing to the risk, and perhaps those who were not but are reading this article, to be paying much closer attention to this topic when analysing future downstream energy risks in North America.

MEET THE NEW ARRIVALS



Leo Dixon

Leo.Dixon@integratechnical.com

Over the last 12 months, we have recruited both experienced and up-and-coming technical experts, and strengthened our Operations and Finance Team, as we continue to deliver on our promise for the benefit of our clients.



NEW STARTER LOCATIONS



OPERATIONS & FINANCE:



KARIM MANSOOR

Management Accountant
London, UK

Karim joined Integra's Operations and Finance Team in February with over seven years of experience in the Financial Services and Private Equity sectors.

He recently became a father and, aside from his newborn, loves dogs. Being a family man, his perfect day would be a sunny day spent in the park with his wife, daughter and Simba the dog, enjoying a honeycomb ice cream on a cone. A bit of mind, body and soul!



KIRSTEN YOUNG

Business Administrator
Melbourne, Australia

Kirsten joined Integra in April, having worked in business operations, administration and customer service roles for the past 10 years. Kirsten provides support for the team across Australia and New Zealand.

Kirsten is a huge fan of Lord of the Rings, and notes that her favourite holiday destination is New Zealand, as she remembers a past holiday to the North Island and her visit to Hobbiton.

RISK SERVICES:



IAIN CRESSWELL

Associate, Integra Risk Services
London, UK

Iain joined Integra as an Associate within our Risk Services Team in December 2022. He works closely with Paul Latimer and Simon Marshall, supporting them with the continued development and expansion of Integra's Construction and Engineering proposition.

Iain's cuisine of choice is Asian and, although he finds it difficult to pick a favourite region, Japanese, Thai or Vietnamese are his go-to foods. As a Manchester United fan, if he could invite just one famous person to dinner it would be Sir Alex Ferguson (obviously) for his management and leadership insight. He might just bring along a good bottle of red at the same time!



LIAM GILHOOLY

Structural Indemnity Leader,
Integra Risk Services
London, UK

Liam joined Integra in May 2022 and is charged with expanding our Risk Engineering services to inherent/latent defects and home warranty insurers, whilst building upon Integra's existing expert loss adjusting service for this sector.

Liam listens to rock and heavy metal music and his favourite holiday destinations are the Seychelles or Zanzibar, where he can continue his pastime of scuba diving in some of the best waters in the world.



TONI VUKADINOVIC

Director, Integra Risk Services

In January, Toni joined Integra Risk Services, the subsidiary of Integra that designs and delivers the comprehensive management of all risk engineering activities. This followed his 30 years of Construction and Engineering underwriting experience across major European and global markets.

Toni loves hiking and his favourite holiday destination is North-Eastern Italy. Here he enjoys the best of two worlds – Latino charm and German precision. He is also a collector of whiskies and (a little surprisingly) an avid Millwall Football Club supporter!



ADJUSTERS: EMEA



STEPHEN CROMB

Chartered Loss Adjuster
London, UK

With over 13 years of loss adjusting experience, Stephen joined Integra at the beginning of 2023 and handles both property damage and business interruption losses emanating from the Commercial Property and Heavy Industry sectors.

Apart from handling and settling insurance claims, his perfect day would involve sunshine, a gentle breeze, a cold drink of some sort and either live sport or music.



JASMINE WATTS

Loss Adjuster
London, UK

Jasmine joined Integra's UK Loss Adjusting Team in February 2023 to continue to learn and grow her career. She works on UK and international Construction claims, while supporting her colleagues on claims from other lines of business. She is currently undertaking her DIP CILA loss adjusting qualifications.

One thing you may not know about Jasmine is that she used to compete at a high level in show jumping across the UK with her glorious horse Henry. More recently, she has taken up running and completed her first half-marathon in April, with the next scheduled for September this year.



EDDIE WALSH

Senior Adjuster
Abu Dhabi, UAE

Eddie is a Chartered Loss Adjuster and qualified Engineer, with over 17 years of adjusting experience. He has worked extensively on major losses in the Property, Power, Energy, Construction and Cyber sectors across the Middle East, Africa and New Zealand.

If Eddie had the chance, he would include Dave Grohl as a guest at a dinner party. Eddie considers him to be a legend and a brilliant human being. He describes his perfect day as a round of golf (breaking 100), a beach and barbecue with his family, and watching Ireland win the Rugby World Cup!!



NICK HIDE

Global Head of Power Generation
Dubai, UAE

Nick is responsible for the strategic growth and evolution of Integra's Power Generation proposition throughout the world. He is a Chartered Engineer with specialist knowledge of dealing with Conventional and Renewable Power Generation, including coal, CCGT, nuclear, hydroelectric, wind and solar on both construction and operational policies.

Nick is a fan of 70s and 80s music, especially rock. If he could invite anyone, past or present, to a dinner party, it would be H.G. Wells – an incredible author whose ideas were ahead of his time. Nick would be interested to hear his thoughts on today's world and what he would imagine for the future.



ADJUSTERS: AMERICAS & ASIAPAC



GARETH COTTAM

Senior Adjuster
Singapore

Gareth has over 10 years of loss adjusting and forensic accounting experience and joined the team in November last year. He handles claims across sectors such as Property, Energy, Cyber and Mining, especially iron ore and coal mining claims.

Gareth finds it hard to choose his favourite cuisine as there are so many to choose from, especially living in Singapore. However, if he had to settle on just one, it would be Japanese as he lived in Japan for many years – he finds the food there is fresh, energising and tastes amazing. He also has a soft spot for 80s rock. His hobbies include swimming, Tai Chi and ballroom dancing, especially salsa.



DANIEL COLE

Executive Adjuster
Sydney, Australia

Daniel is a qualified Mechanical Engineer who, after around 10 years in the industry, moved into insurance as a Risk Engineer for a global insurer. Later he transitioned into underwriting Power, Energy and Mining risks in Australia and New Zealand. For the last six years, he has adjusted and settled claims emanating from the Construction, Engineering, and Power and Energy sectors.

Daniel's favourite cuisine is Malaysian and, while on a family holiday to Kuala Lumpur, enjoyed trying different dishes from hawker stands. In his spare time, Daniel likes to make and fix things, and has a long-term project to restore a 1962 Karmann Ghia car.



ALBERT STASSEN

Senior Chartered Adjuster
Auckland, New Zealand

Albert is a Chartered Loss Adjuster with over a decade of experience, having worked at local and international loss adjusting firms, and an insurance company. Over this time, Albert handled major and complex losses across lines of business such as Commercial Property, Construction, Fidelity, Cyber and Public & Product Liability.

As a true South African, he loves a traditional braai on a fire (coal not gas) with boerewors (spiced farmer's sausage), medium-rare scotch fillet steaks and all the trimmings. I guess this is why he is also such a fitness fanatic – running, mountain biking and visits to the gym!!



TONY MAXWELL

Chartered Adjuster
Houston, USA & Mexico

Tony is an experienced loss adjuster with 38 years of service involved in adjusting and settling major and complex losses related to Upstream Energy, Petrochemicals, Construction, Power Generation, Marine and Renewables claims. He joined the team in May and is based at Integra's Houston office. Tony is also the main point of contact for our Mexico operation.

During his adjusting career, he spent some time in Kuwait and was actually taken hostage by Iraqi forces, becoming one of Saddam Hussain's "human shield" defence in 1990. Tony loves South Africa as it is a 'world-in-one country', with its amazing climate, wine, cuisine, scenery and the wildlife of its many game parks.



TROY RONDENO

Loss Adjuster
Houston, USA

Troy joined the US team in May 2023, following 23 years in the insurance industry managing and handling claims involving property damage, liability and litigation. He joined Integra to develop his career further and support the existing Integra team.

Troy was raised in Louisiana USA, and loves all types of seafood. He could easily eat it every day, with seafood tacos being his favourite. He grew up playing basketball, and notes that he would love to meet Michael Jordan to hear all his basketball war stories on and off the field – the ones we never hear about!

LESSONS LEARNED FROM COMPLEX & MAJOR LOSSES



Leo Dixon
Leo.Dixon@integratechnical.com

Integra's loss adjusters are the custodians of significant amounts of data relating to an insured's assets, their main contracts, their insurance policies and the claims that emanate from their assets.

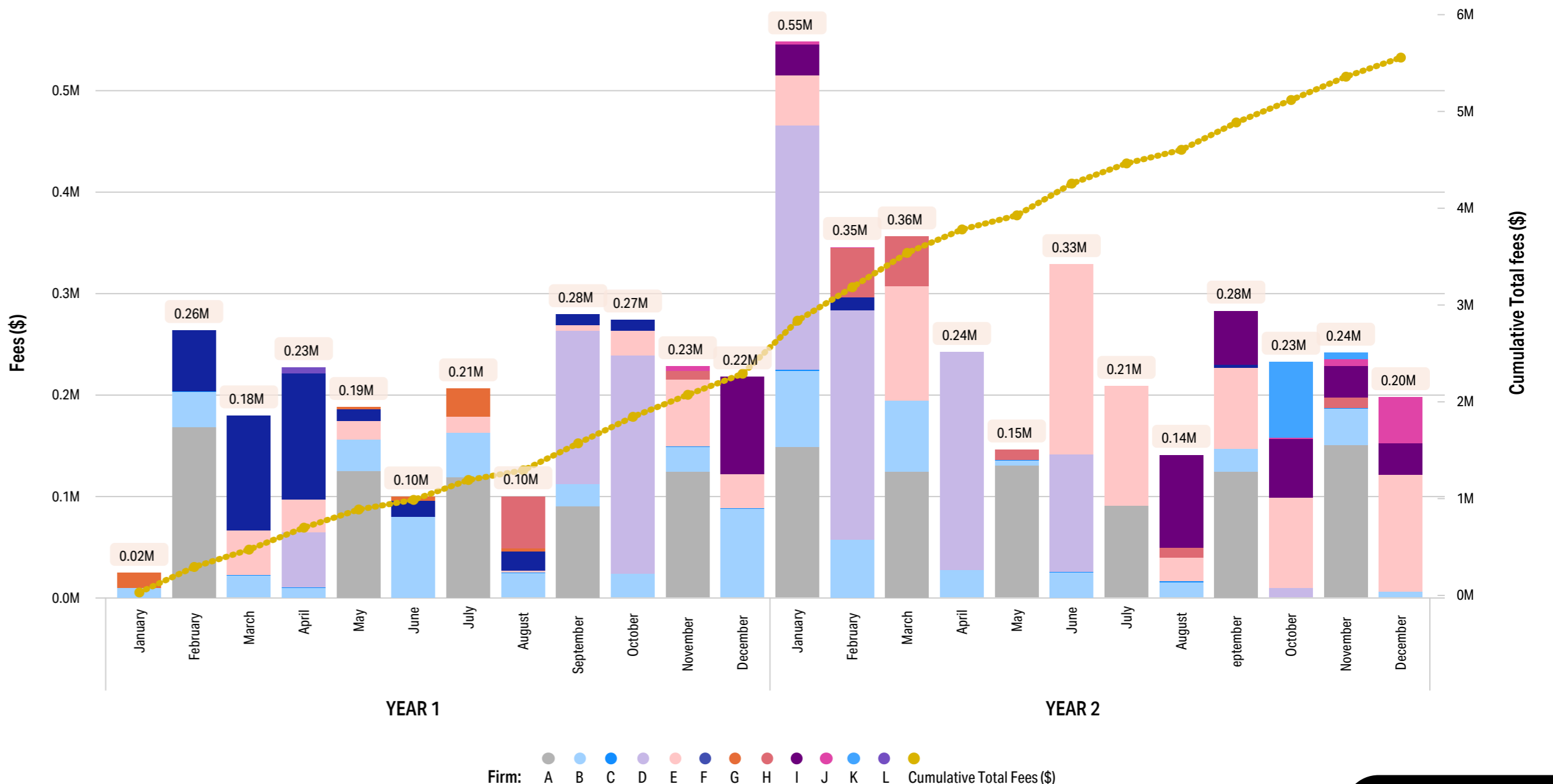
The topic of 'lessons learned from complex and major losses that impact the insurance industry' has been given plenty of 'airtime' over the years. But, other than anecdotal stories delivered to interested parties in discrete meetings, there has been little or no formal knowledge transfer about the key learnings from these types of losses. Instead, insurers subscribing to the risk are required to learn from their own experience of participating in claims, and their review of reports from loss adjusters, forensic accountants, scope-of-damage experts and other sources.

Following a number of complex losses to hit the downstream energy insurance market over the last few years and at the request of leading European insurers, Integra is about to deliver its first formal 'lessons learned' review on a particular loss.

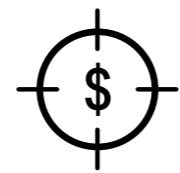
The purpose of this initiative is to create value for each of the stakeholders involved in the claim. Our hope is that this review may lead to developments in the policy wording (sums insured, deductibles, sub-limits, extensions, etc) and in the claims handling process, so that learnings can be applied to the placement of risks and handling of losses occurring in the same sector in the future.

EXPERT FEES OVERVIEW

An example of data output in the insights report, showing the breakdown of experts' fees throughout the lifecycle of the claim.

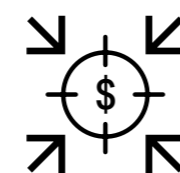


IN THIS INITIAL REVIEW WE ARE SHARING OUR OBSERVATIONS ON THE FOLLOWING TOPICS:



1. FINANCIAL EXPOSURE

- ▶ **The insured's claims submission and its evolution over the life of the claim** – this illustrates the stability of the insured's claim submission and shows how their submission evolves over time.
- ▶ **Loss adjusters' reserve recommendations and its evolution over the life of the claim** – this demonstrates how stable the reserving has been and at what point the reserve sits within a 10% tolerance of the final settlement.
- ▶ **Timing and level of Payments on Account** – this analysis demonstrates how quickly insurers make their first POA post-loss, and how frequently and for what value they make further POAs. This should help to understand the demands insurers have for cash on similar claims in the future.
- ▶ **Experts' fee spend broken down by expert and illustrated over the life of the claim** – this shows the monthly burn on experts' fees, which experts have the largest role in the claim based on total fee-spend and highlights the months that involved the highest levels of activity from the experts.



2. KEY DRIVERS OF FINANCIAL EXPOSURE

- ▶ **Physical Damage**
- ▶ **Business Interruption**

For PD and BI, we will look at the aspects of both covers that were of the highest value.



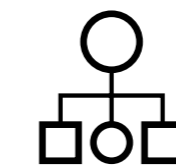
3. POLICY

- ▶ **Clauses that caused polarisation between the insured and insurers**

Here we draw attention to the clauses that caused the insured and their insurers to have contrasting views on how they should apply to the loss.

- ▶ **Any clauses that limited or increased the cover provided by the policy**

Here we draw reference to the clauses that either put a limit or sub-limit on a particular head of claim, or alternatively increase the cover available.



4. LOSS EXPOSURE MODEL

- ▶ **Insured's best case**
- ▶ **Insurer's best case**
- ▶ **Basis of the settlement achieved**

This section illustrates the different approaches put forward by the insured and insurers as to how the policy should respond to the loss in question. The final view illustrates how the claim was settled.

SHARING KNOWLEDGE

We hope that by transferring the knowledge gained in these areas we will enable the lessons learned to be shared with insurers across their claims, underwriting and risk engineering departments. Importantly, the lessons learned can then be retained and shared corporately, as opposed to resting solely with the individuals involved in the handling of the loss.

Allied with the capturing of loss insights (which we do on every claim we settle), this initiative demonstrates our desire to 'close the loop' once the final settlement has been paid, and to collaborate with claims stakeholders who want to reflect on what went well and what could be improved upon from a policy wording and claims handling perspective.

For more detail or a discussion, please contact me.

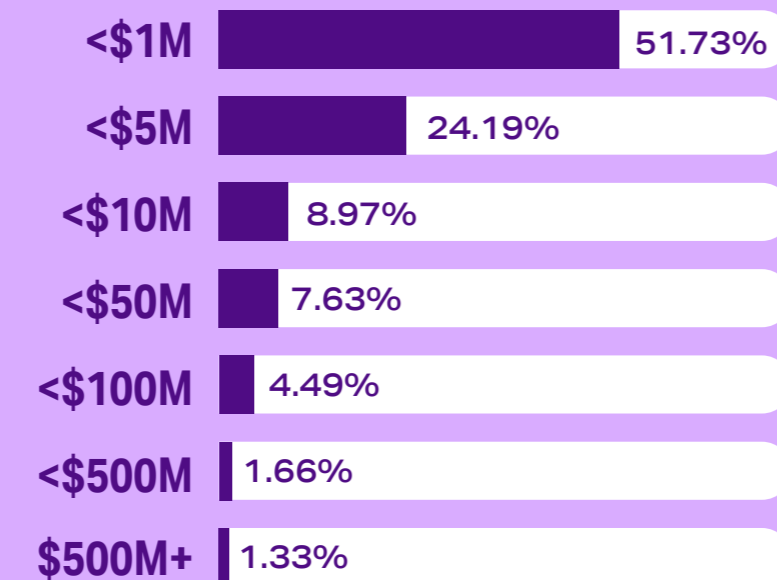
GROWTH FOR INTEGRA

H1 2023 has seen yet more growth for Integra. Take a look at our stats* or visit integratechnical.com

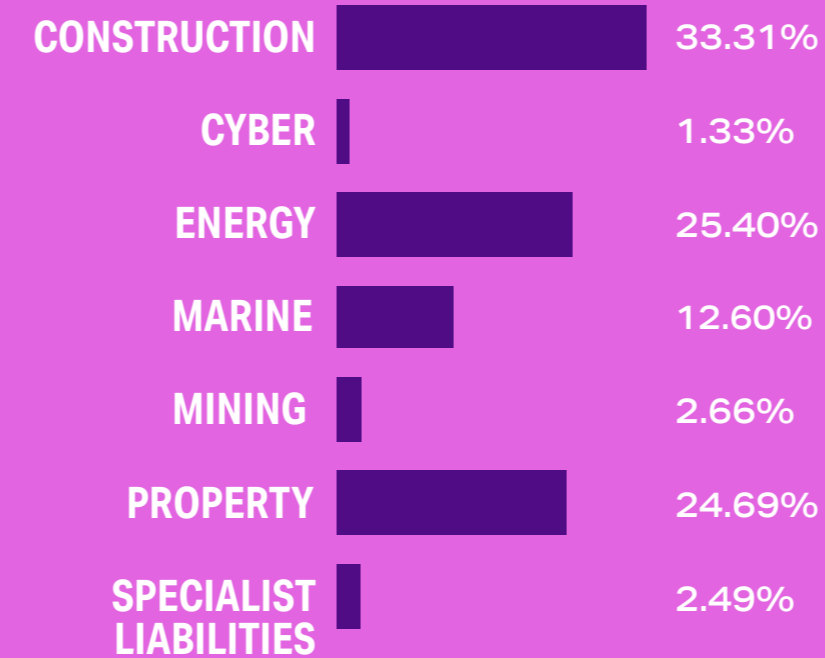
*Stats from 01.01.23 to 30.06.23

603 NEW CLAIMS RECEIVED IN H1 2023

CLAIM VALUES:



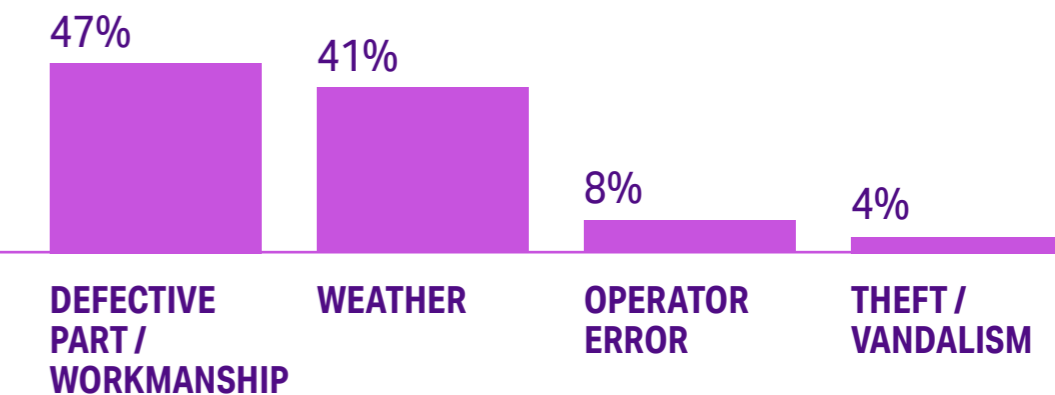
NEW CLAIMS BY SECTOR IN H1 2023



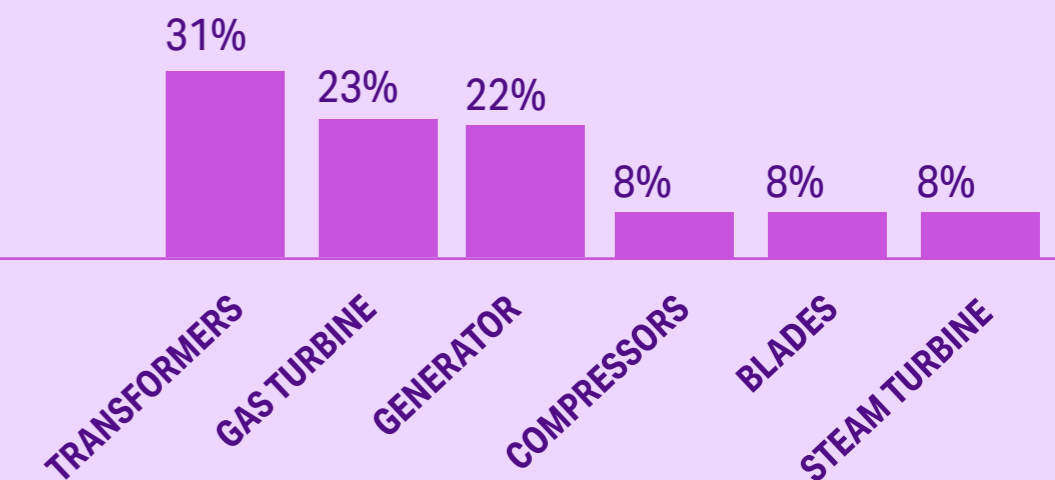
POWER GENERATION

A sample of loss insights gathered from Power Generation losses (including Renewable Energy) we have been instructed on since 1st January 2020.

CAUSE OF LOSS



CRITICAL ASSET



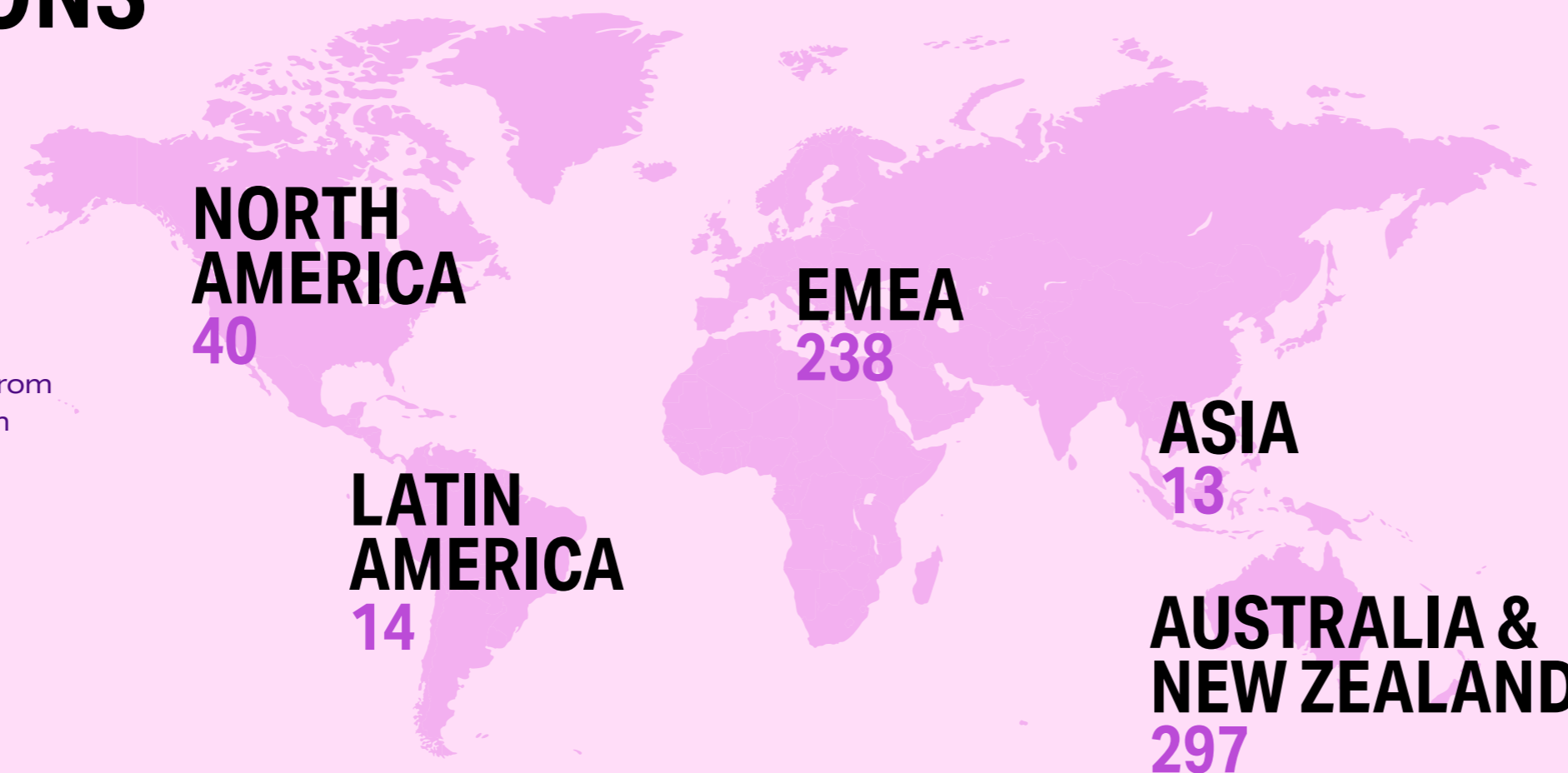
GROSS CLAIM VALUE



INSTRUCTIONS BY REGION

TOTAL: 602

An increase in new instructions from H2 2022 of 19.64% - growth from Asia Pacific and EMEA regions





integrated

ISSUE 14

This publication is for the benefit of insureds, insurance brokers, insurers and other stakeholders involved in the services that are provided by Integra Technical Services Ltd. It is not legal advice and is intended only to highlight general issues relating to its subject matter but does not necessarily deal with every aspect of the topic. Produced by Integra Technical Services, 6th Floor, 117 Houndsditch, London EC3A 7BT.



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