Castrol

Forging the way to net zero

The opportunities, challenges, and future of sustainable steel

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Foreword

The next economy hinges on steel. Demand for machinery, infrastructure, transportation, and technology is ramping up exponentially, with a pressing need for materials. Steel – unmatched in its strength, versatility, and affordability – could answer this call.

Sectors that we rely on for economic growth – such as construction, manufacturing, aerospace and renewable energy infrastructure – depend on a backbone of steel. With the Economic Recovery Act promising to spend $1.2 trillion[1] on, among other things, the renewal of road and energy networks – steel requirements are set to surge. At the same time, the entire industrial manufacturing sector is under scrutiny to reach net zero carbon emissions as quickly as possible – with steel currently responsible for an estimated 8% of total global CO2 emissions[2].

This Castrol®-commissioned report, *Forging the Way to Net Zero,* investigates how steel industry leaders perceive the path ahead, and their perspective on whether a net zero transition is within reach. It finds that significant obstacles – access to finance, talent, strategy alignment – as cited by industry leaders as areas of concern – are not necessarily as insurmountable as they might at first seem.

And the findings suggest that leaders in the US steel industry believe that financial and environmental sustainability are interlinked, rather than at odds with one another. If steel production can bring its emissions down, the industry could not only protect its future and its growth, but also play a key role in helping the world meet its carbon reduction goals, galvanizing the transition, and forging the way to net zero.

– Rafael Vecchio, VP Castrol Industrial Lubricants

The use of steel, in and of itself, is not damaging to the environment.

From an environmental perspective, steel's durability typically extends the lifespan of the structures it helps to build, and its recyclability means that, even at the end of a lifecycle, steel is typically reclaimed and reused, rather than sent to landfill[3] [4].

However, the emissions from steel production currently have a negative impact on the environment, and investment in infrastructure is needed to contribute to a reduction of those emissions.

1 https://www.whitehouse.gov/bipartisan-infrastructure-law/
2 https://www.mckinsey.com/industries/metals-and-mining/our-insights/decarbonization-challenge-for-steel
3 https://www.aisc.org/why-steel/sustainability/#:~:text=Steel%3A%20The%20Most%20Sustainable%20Choice,become%20steel%20again%20and%20again
4 https://www.steel.org/wp-content/uploads/2020/09/Steel-Sustains-in-Recyclability-Fact-Sheet.pdf

Executive summary

***Forging The Way to Net Zero* explores the current state of the US steel industry and the role it could play in moving the US economy toward a net zero state. This study, commissioned by Castrol, is based on opinion research and a supplementary layer of economic forecasting (using the opinion data) to extract key findings and insights from steel leaders and investors on the current state of the steel industry.**

This study aims to identify the challenges the steel industry is facing in relation to decarbonization and investigate the barriers and accelerators to change. See the full research methodology for more information (page 21). Informed by economic extrapolation and the perspectives of steel industry leaders – at HQ and at steel mills – as well as investors in the steel industry across the US, this research finds that prioritizing decarbonization efforts could unlock a $74.3 billion opportunity for US steel, as well as potentially provide organizations with a competitive advantage and access to the next generation of workers.

Approaching the sustainability challenge

How are business leaders expected to tackle the monumental challenges of delivering economic sustainability while pursuing environmental sustainability strategies?

Section 1:
Strike while the iron is hot

Based on the views of industry leaders, the economic model used in our study projects that the US steel industry could benefit from enhanced **net profitability of up to $74.3 billion** between now and 2035 as a result of organizations **investing 3.1% of their revenue** in transitioning to net zero.

On top of this financial incentive, there is a competitive advantage to transitioning; **88% of investors** in the study say they would be more likely to invest in producers of steel that are **actively adopting sustainable practices**.

Progress towards a more sustainable steel industry may help to attract the next generation of workers, who are increasingly environmentally conscious. Forty-one percent of US steel industry leaders believe that an organization's **sustainability strategy is important for attracting new talent** into the steel industry and could help the steel industry keep pace with the growing demand of the next economy.

Section 2:
The wrench in the works

The steel industry could be on the brink of **a lost decade of sustainability progress:** Despite 56% of steel industry leaders identifying 'investing in the transition to net zero' as a core strategic objective for their organization, leaders within the mills reportedly don't expect investment in more sustainable practices to be on the agenda for at least ten years.

Even where sustainability initiatives are in place, this study finds they are **not always being clearly communicated** throughout an organization. Just 35% of steel industry leaders believe that their organization has articulated a clear transition narrative to its investors, customers, and suppliers.

In addition to this, the majority (95%) of industry leaders are **concerned about talent retention and acquisition** – a growing issue as the Infrastructure Investment and Jobs Act[5] is expected to increase the workload for the engineering and construction industry.

Section 3:
Rethinking steel

With steel playing an important role in the entire value chain of alternative energy, it's promising that **industry leaders seem to be focused on forging the way to net zero**, with the implementation of improved material processes, smart energy infrastructure and *green steel* already underway – and that steel industry investors seem to recognize this.

However, 43% of steel industry leaders would like to learn more about how their organization can be more sustainable[6], and a third (33%) currently believe that their organization focuses too heavily on profit at the expense of long-term sustainability goals[7] – suggesting a potential opportunity to **close the gap between intention and action**.

Currently, only 32% of organizations have set public targets on reducing emissions aligned with the Paris Agreement. It may be that taking the initiative to make transition commitments ahead of legislation – and sharing them publicly – could be the **catalyst to progress**.

5 https://www.pwc.com/us/en/services/consulting/cybersecurity-risk-regulatory/library/infrastructure-investment-jobs-act/modernizing/industrial-products.html#:~:text=The%20Infrastructure%20Investment%20and%20Jobs,transition%20to%20a%20clean%20economy

6 22% of leaders would not like to learn more about how their organization can be more sustainable, 35% did not feel strongly either way.

7 Thirty percent do not think their organization focuses too heavily on the bottom line at the expense of long-term sustainability goals, 39% neither agree nor disagree.

Section 1:

Strike while the iron is hot

The opportunities emerging through the transition to net zero

A critical moment for the steel industry

The economy is going to rely on steel to meet its surging demand for buildings, highways, renewable energy infrastructure, construction machinery and transportation – planes, ships, trains and cars. Even if business leaders step up to the plate in terms of steel production, it will be important for net zero transition that they can do so in an emissions-conscious way.

A current lack of regulations[8] means that, for the steel industry, immediate progression to net zero is going to be driven by individual organizations investing in their own sustainability initiatives. It will be a challenge; but progress towards a net zero future offers invaluable benefits for the industry's long-term survival.

Fueling the financial opportunity

Based on the views of steel industry leaders and publicly available data, the economic model used in our study projects that, between now and 2035, failure to invest in the transition to net zero could reduce the steel industry's cumulative profit from $167.4 billion to $93.1 billion – **a drop of $74.3 billion**.

To prevent this shortfall, the model calculates that organizations **need to invest just 3.1%** of their annual revenue each year in sustainable practices – such as employing smarter supply chain management, working with cities to meet green building standards, and using hydrogen, rather than coal, in order to produce 'green steel'.

Currently, almost a third (30%) of the organizations in this study report investing 2% or less of their annual revenue in financing their transition to net zero.

The economic model used in our study estimates that, over time, the cumulative impact of failing to invest in the transition to net zero could lead to an increasing loss of profits, putting the industry under more pressure to reduce quality and potentially lose out to international competitors.

If steel producers continue to fall short of this 3.1% target transition investment but hope to maintain long-term profitability averages, this revenue would have to increase by up to 80% – or a cumulative total of $2.1 trillion over the next 14 years.

This rate of increase may seem like a daunting prospect, particularly when considering that overproduction – and the consequential depression of prices – is already a cause for concern across the industry. It's unclear how manufacturers could reliably achieve this percentage increase in revenue. Investment towards a net zero future will likely be a crucial option for financial security.

3.1%

targeted annual revenue investment in transition to net zero

30%

organizations invest 2% or less of their annual revenue in financing their transition to net zero

43%

leaders believe they *should* be spending 4% of their annual revenue on sustainable practices

8 https://www.epi.org/publication/why-global-steel-surpluses-warrant-u-s-section-232-import-measures/

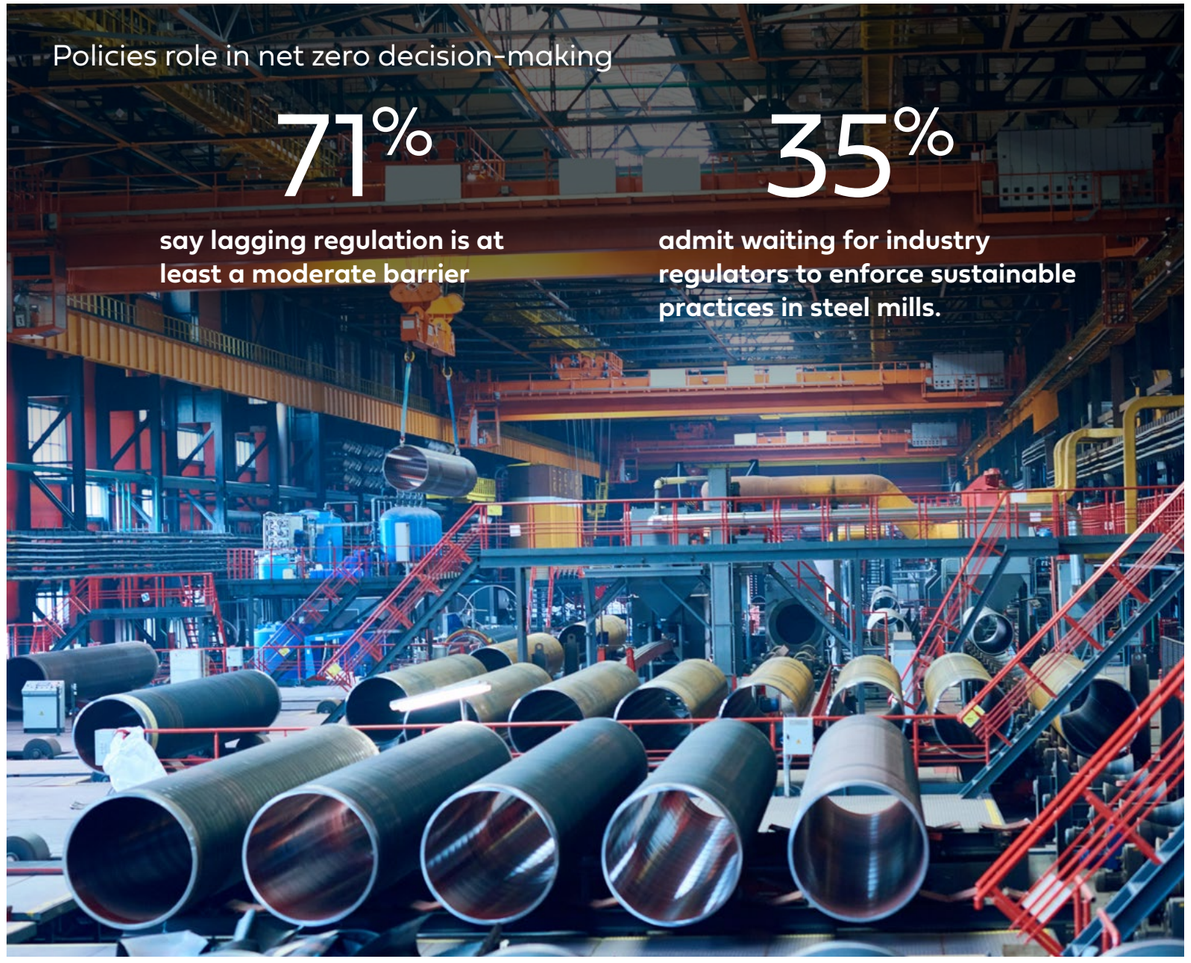
Honing a competitive edge

To transition to net zero and secure its future, the steel industry needs income and funding. Business leaders are recognizing that clients, consumers and investors are looking to work with **organizations they can trust**, and transparency around ESG practices is increasingly a part of this.

Over a third (36%) of leaders are concerned about their organization losing clients or customers in the future, as a result of its lack of progress towards net zero.

However, at the moment, there's a stalemate. Steel industry leaders are waiting for legislation to guide their decision-making.

But with legislation looming in other sectors – for example, the Inflation Reduction Act[9], in relation to oil and gas – it's reasonable to expect that industrial manufacturing may soon be facing its own legal requirements. So, if business leaders can establish environmental practices **before being legally required to**, it could not only help with their long-term transition journey and financial stability, but also potentially lend them a short-term competitive advantage by attracting the workers, buyers and investors needed to support the future of steel.

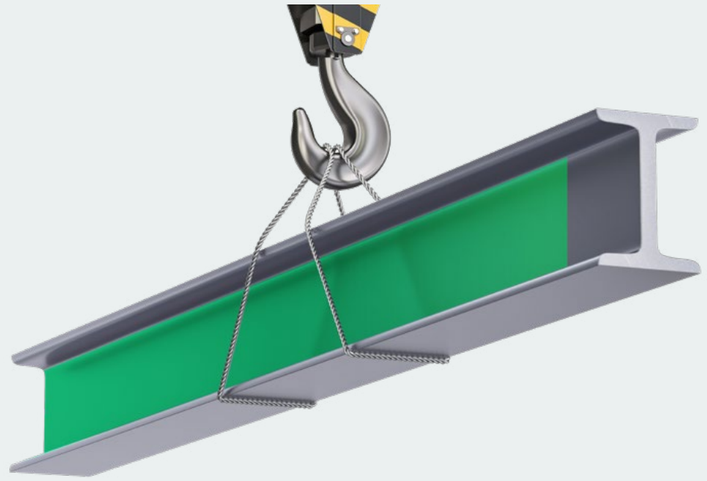


Ethos-focused investors

ESG is a growing concern for financial institutions, with many lenders declining to invest in businesses that do not have defined ESG goals.

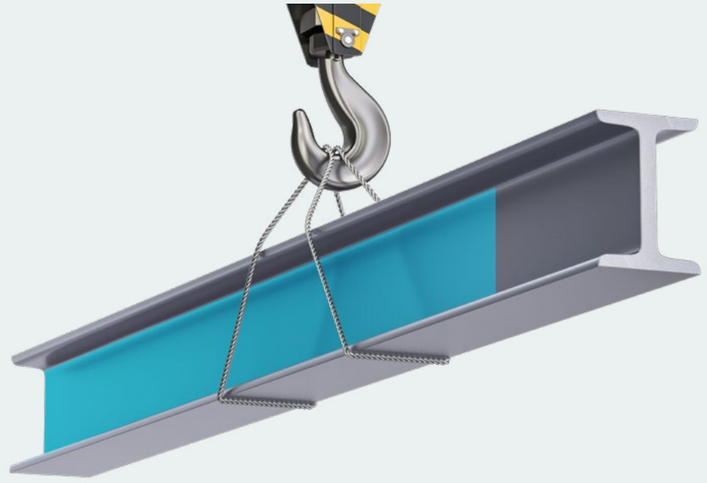
Based on the insights from the investors that took part in this research, organizations that can make – and action – commitments towards both net zero and diversity and inclusion may be more likely to receive investor support.

Investors more likely to invest in producers of steel that are:



Actively adopting sustainable practices

88%



Actively adopting diversity and inclusion practices

76%

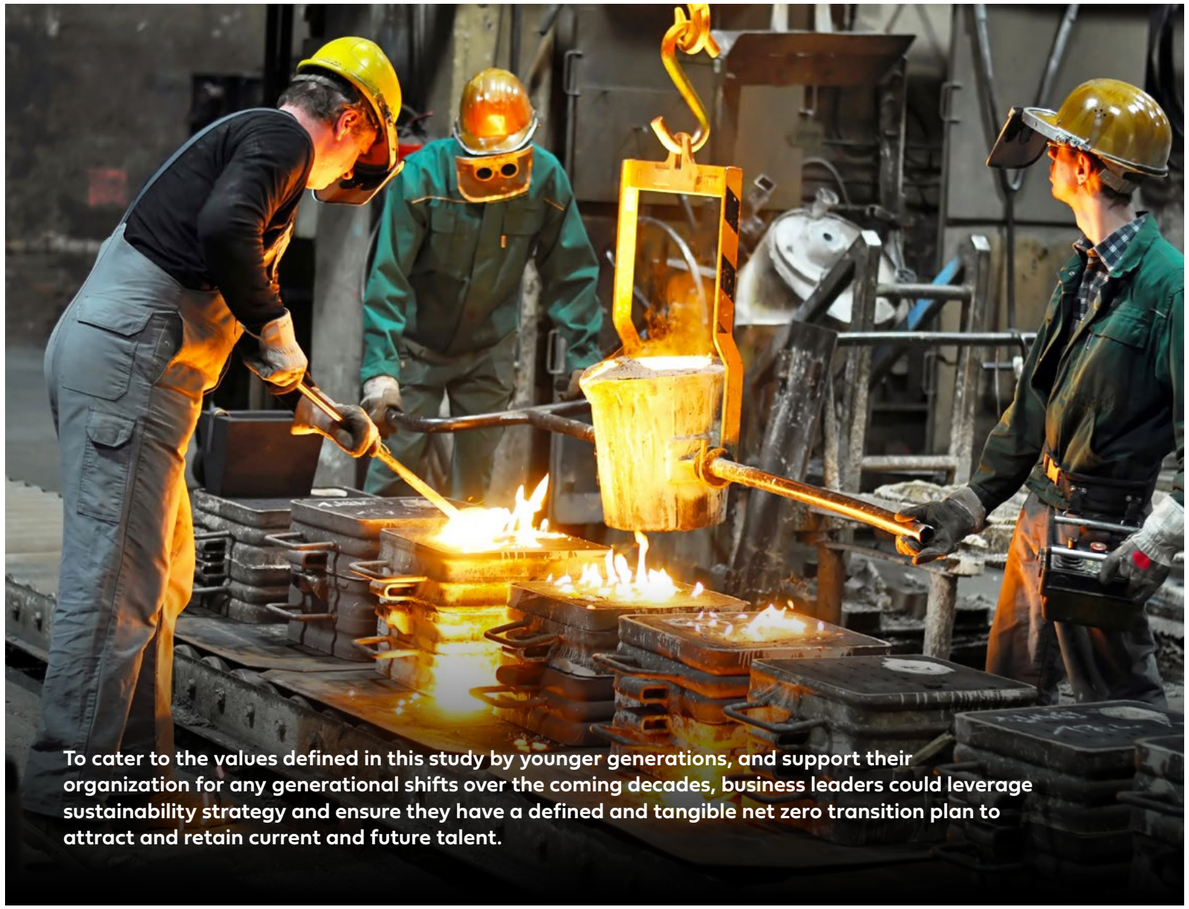
9 https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-inflation-reduction-act-heres-whats-in-it

Solving the talent-crunch conundrum

Workers are a particularly vital part of the equation. Over half (55%) of steel industry leaders predict that the US infrastructure bill will create an increase in workload for staff in US steel mills, upping the need for recruitment and retention.

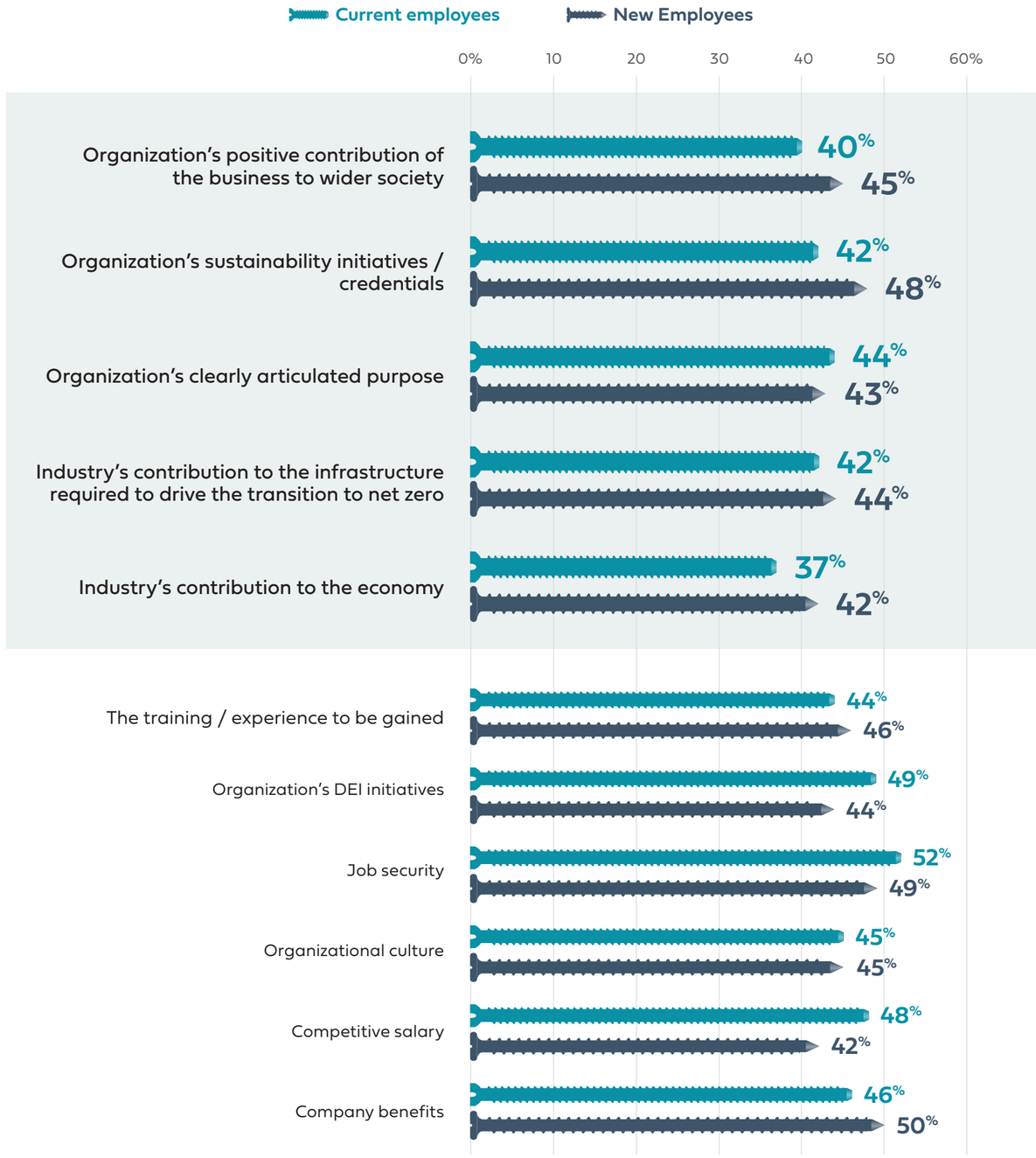
At the same time, typical employee turnover rates are being intensified across the US, driven by seismic shifts in the economic climate, and pandemic-driven revolutions in employment culture[10]. This study shows the steel industry is not immune to this, with 95% of business leaders being concerned to some extent about talent retention and acquisition. This research indicates that defining an ESG strategy could relieve some of this pressure; two in five (41%) US steel industry leaders believe that **an organization's sustainability strategy is important for attracting new talent** into the steel industry.

Separate studies have shown that younger generations of workers are increasingly motivated by company ethos and ESG action – 64% of Gen Z say it's important that employers act on environmental issues[11] and, in the same study, three in five (59%) claim they would stay longer with a company that has ESG commitments. A different study found that 40% of millennials have committed more time and effort to a company because they were happy with its sustainability agenda[12].



To cater to the values defined in this study by younger generations, and support their organization for any generational shifts over the coming decades, business leaders could leverage sustainability strategy and ensure they have a defined and tangible net zero transition plan to attract and retain current and future talent.

Comparison: Job aspects in the steel industry that motivate current employees vs. aspects reportedly most important to future employees.



10 https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/gone-for-now-or-gone-for-good-how-to-play-the-new-talent-game-and-win-back-workers
11 https://www.thehrdirector.com/business-news/employee-experience/gen-z-seek-ethical-workplaces-as-environ-mental-health-burden-bites/
12 https://medium.com/swytch/new-study-shows-employees-seek-and-stay-loyal-to-greener-companies-f485889f9a7f

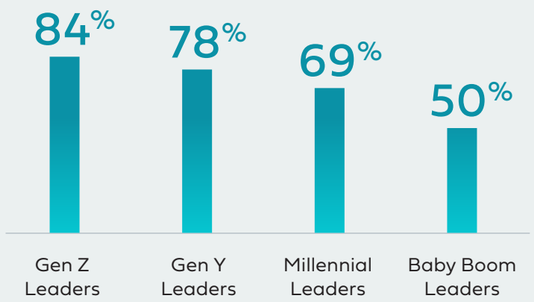
Generational sustainability splits

This study finds concerns about the net zero agenda are growing with each generation. From a recruitment perspective, developing and implementing a clear transition plan could become an increasingly valuable differentiator.

The drive to decarbonize

Eight in ten (84%) Gen Z leaders are at least moderately concerned about decarbonization/working towards net zero commitments. This drops slightly to 69% of Millennials and 78% of Gen X, and falls to just half – 50% – of Baby Boomer leaders.

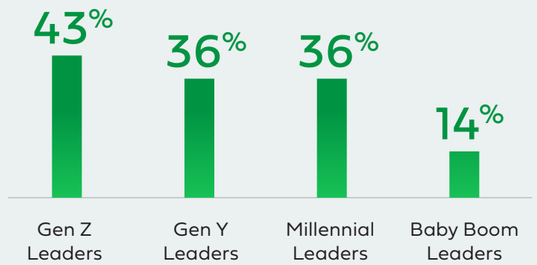
Percent Concerned with decarbonizations and working toward net zero commitments



An appetite to learn

Similarly, only 14% of Baby Boomer leaders believe their organization could invest more in educating their people on sustainability and the impact of our organization, compared with 36% of those from Gen X and Gen Z, and 43% of Millennial leaders.

Percent who believe that their organizations could invest more in educating their people on sustainability and the impact of the organization



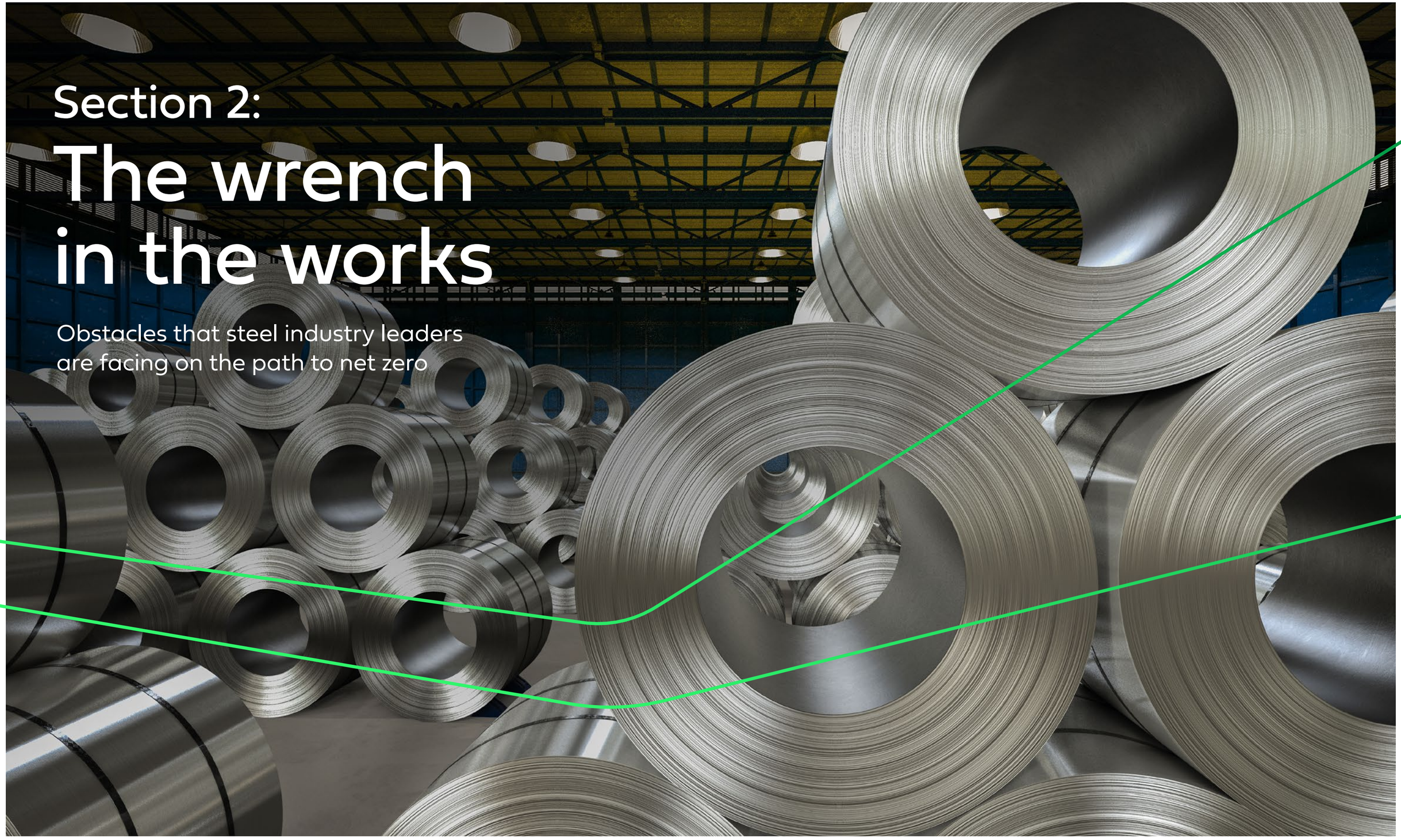
With younger generations coming into the workplace there is increasing demand for organizations to prioritize sustainable action. This is the perfect time to operate change. This study shows that by increasing internal education and communication, the industry could transform the decarbonization goals of the C-suite into tangible actions in the mills themselves.

- David Gannon, Marketing Director, Castrol Industrial Lubricants

Section 2:

The wrench in the works

Obstacles that steel industry leaders are facing on the path to net zero

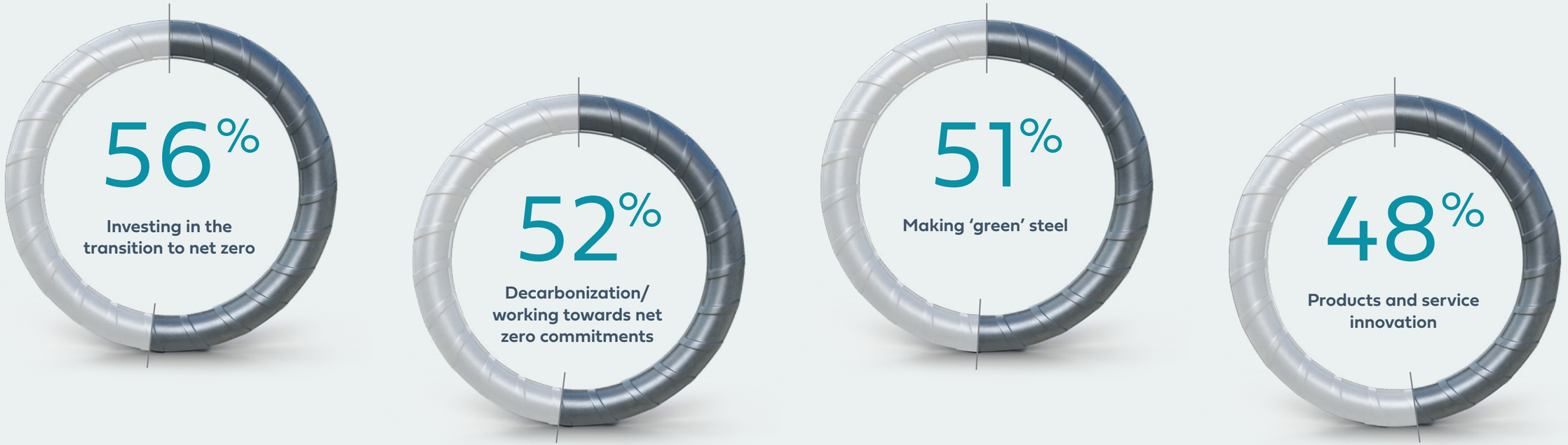


Gauging the challenge ahead

Although there seems to be reluctance to move in advance of legislation, our research finds that US steel industry leaders do understand the role steel can play in the global transition, particularly in creating smart energy infrastructure and the manufacture of electric vehicles.

They also recognize that net zero should be front-of-mind with more than half (56%) identifying 'investing in the transition to net zero' as a core strategic objective for their organization.

The top four core strategic objectives for leaders in the next 12 months



However, the reality is that leaders are contending with three key challenges that seem to be preventing sustainability from coming to the forefront:

1. An industry in financial flux

2. A weakened chain of communication

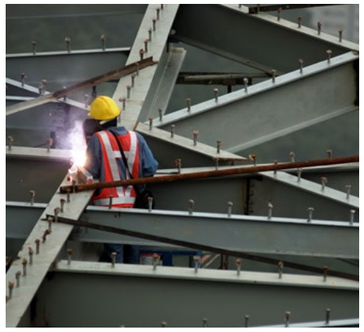
3. An immediate shortfall of talent

1. An industry in financial flux

Despite promised federal investment into US infrastructure[13], **access to finance** is hindering the transition for two in five (42%) industry leaders, who identify a number of concerns when it comes to funding sustainability commitments.

Industry concerns impacting sustainability funding

Huge upfront investment/associated costs	**43%**
Risk of downtime impacting revenue growth	**41%**
Low customer demand for sustainable or 'green' steel	**40%**
Lack of leadership buy-in/resistance	**38%**



In the face of these challenges, the steel mill leaders that took part in this study don't expect investment in more sustainable practices to be on the radar for at least another ten years: **a lost decade of progress**.

In fact, less than half (45%) of leaders at both mills and headquarters claim they will start to invest in decarbonization (energy-efficient production and efficient use of materials) before 2050. Two in five (40%) say investment will start **after 2050** or that they **won't be investing at all**.

The fact that 40% of leaders are not planning to invest in decarbonization for at least 27 years – if ever – suggests a disconnect between aspirational strategic objectives and the current perception of what the future may actually hold for the steel industry. However, there's an opportunity to turn industry insight on net zero into tangible action and progress as long as mindsets can begin to shift.

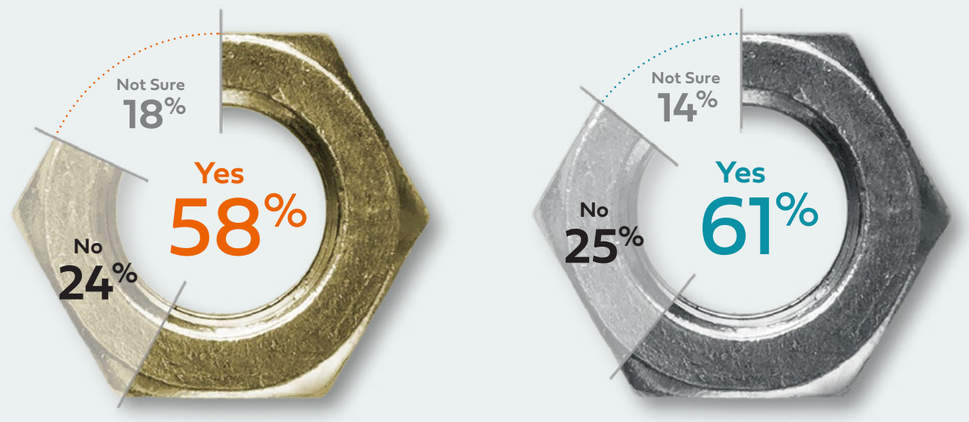
The lack of optimism found in this research may be linked with financial concerns and a fixation on short-term profits: two in seven leaders (27%) believe that decarbonization efforts are negatively impacting their organization's revenue and bottom-line results[14]. While profits remain high and business is booming, this study shows many business leaders are hesitant to commit to significant upfront investments that are unlikely to deliver immediate return.

What's perhaps more shocking is the apparent mindset behind this decision, with **three in five leaders** stating they are comfortable that this pace of investment is fast enough – suggesting a lack of urgency behind transition action.

To marry advancing decarbonization in the US steel industry with tangible progress, leaders should shift this mindset and adopt a clear sustainability strategy within their organization. This research suggests focusing on the long-term financial value that investing in decarbonization could deliver may enable leaders to shift towards a sustainability-focused business model – such as offering education for their workforce and investing in new research and infrastructure to build mills with sustainable production at their core.

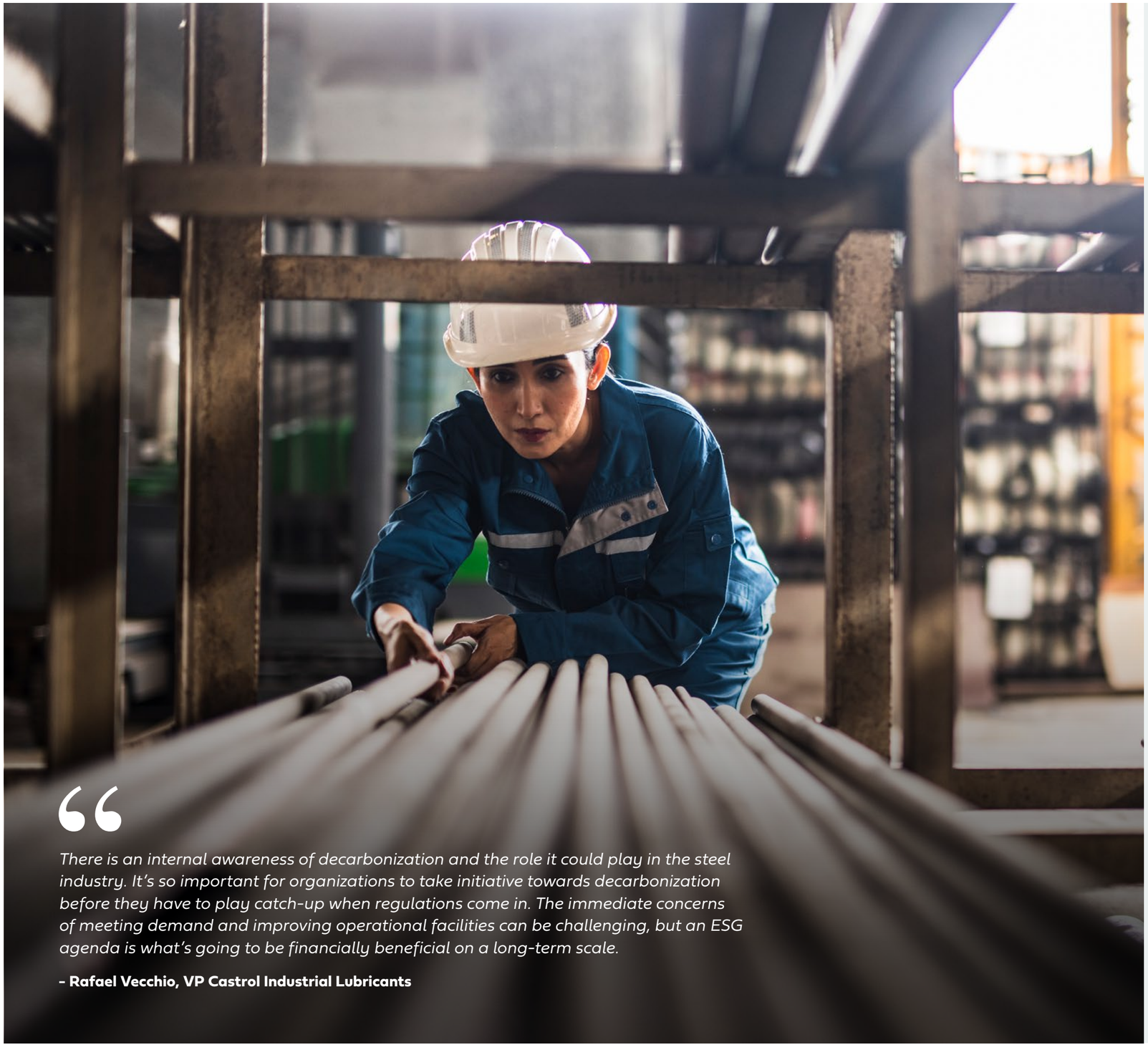
When will your organization start to invest in decarbonization?

Do you think this is quick enough?



13 https://www.pwc.com/us/en/services/consulting/cybersecurity-risk-regulatory/library/infrastructure-investment-jobs-act/modernizing/industrial-products.html#:~:text=The%20Infrastructure%20Investment%20and%20Jobs,transition%20to%20a%20clean%20economy

14 Forty-one percent of leaders do not believe that decarbonization efforts are negatively impacting their organization's revenue and bottom-line results, and 32% neither agree nor disagree.



There is an internal awareness of decarbonization and the role it could play in the steel industry. It's so important for organizations to take initiative towards decarbonization before they have to play catch-up when regulations come in. The immediate concerns of meeting demand and improving operational facilities can be challenging, but an ESG agenda is what's going to be financially beneficial on a long-term scale.

- Rafael Vecchio, VP Castrol Industrial Lubricants

Leading by example

Through their ability to scale operational change, large organizations – identified in our study as those with an annual turnover of over $500m – have the greatest potential to positively influence the net zero transition for the steel industry.

The business leaders within these organizations are largely attuned to the importance of transitioning to net zero; two-thirds (68%) identified decarbonization as a top strategic priority. Furthermore, 64% believed that investing in the net zero transition and making 'green' steel are top strategic priorities.

The majority have made net zero commitments, and many are already investing in decarbonization, in part due to less financial sensitivity than smaller organizations.

If these larger organizations can successfully achieve their net zero targets, they may, in turn, be able to inspire and support smaller organizations on their own transition journeys.

Three in five (61%) leaders at large organizations claim their organization has made net zero target commitments, and 57% say their organization has made public commitments to transition to net zero by a defined date. Two in five (39%) are already investing in decarbonization and three quarters have committed to achieving net zero by 2050.

40%

believe their organization's profitability could be negatively impacted by lack of net zero progress

2. A weakened chain of communication

Where sustainability strategy and ESG commitments are on the agenda, they are potentially **not being circulated** throughout the whole organization.

This research found a small – but consistent – difference between the levels of engagement at HQ and mills when it comes to certain aspects of sustainability action.

For example, almost half (48%) of HQ leaders **want to learn more** about how their organization could be more sustainable – compared to just 38% of leaders at mills – and two in five (38%) **recognize climate change as a key risk** for the business, versus only 28% of mill leaders.

Corporate communications – brand websites and internal messaging – may be clear about an organization's net zero transition efforts but, at operational level, this study shows the importance of those efforts is **diminished in comparison with the need to maintain production**. So, employees, customers, investors and other third parties are not fully aware of organizations' drive to reach net zero, potentially hampering sustainability action.

STEEL LEADERS

35%

are confident that their organization has articulated a clear transition narrative to **employees**.

35%

are confident that their organization has articulated a clear transition narrative to **investors, customers, and suppliers**.

Perhaps as a result of this, 47% of steel industry leaders perceive a lack of employee buy-in or employee resistance to be a barrier to their organization's transition to net zero.

HQ LEADERS

39%

claim their organization **has a clear transition strategy** in place with agreed targets towards net zero.

MILLENNIAL LEADERS

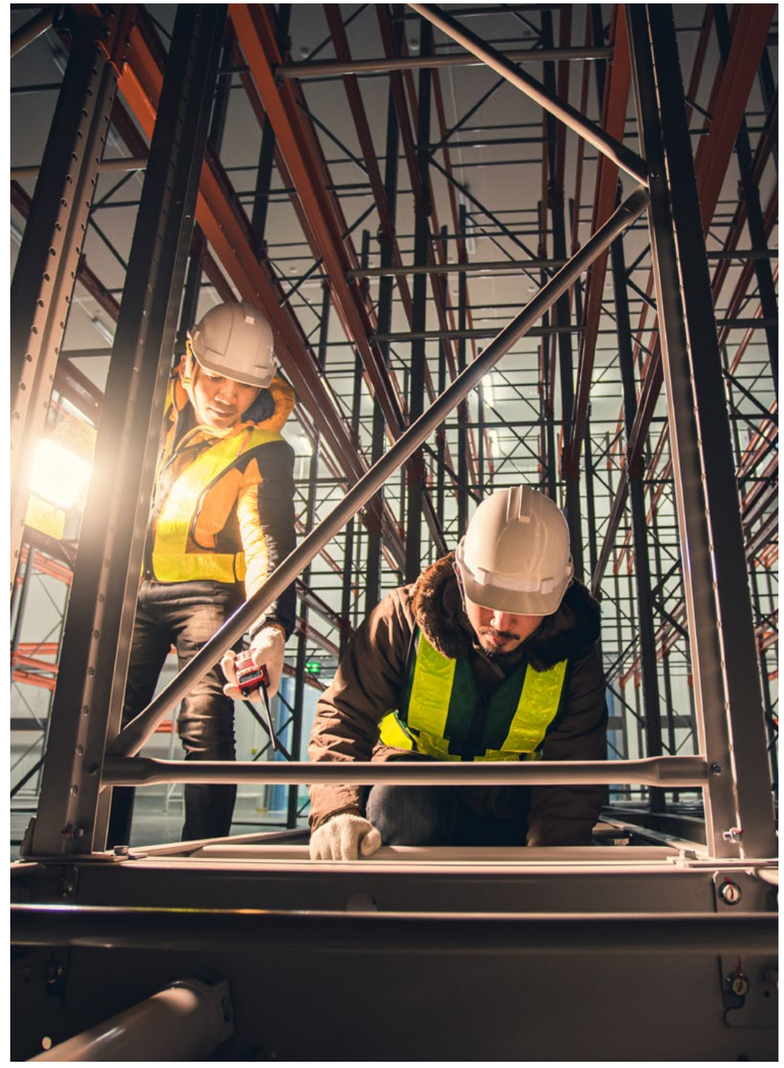
22%

only 22% of millennial leaders think that **this is true**.

3. An impending shortfall of skilled workers

Steel is faced with an aging workforce. Not only are younger generations gravitating towards industries that are perceived to be more 'forward-focused' (e.g., tech), but former worker 'hubs' have dispersed as populations have taken on remote work and moved to more desirable areas following the pandemic[15] .

This leaves 95% of steel industry leaders concerned to some extent about **talent retention and acquisition**. Two in five (38%) predict there will be a shortfall of workers to fulfill the demand for steel and, of these leaders, over half (52%) **expect the shortfall to become critical between 2035-2040** (a view shared by 66% of investors).



15 https://www.nwitimes.com/business/local/steel-workforce-aging-getting-more-educated/article_334f0dcc-0aab-5aae-a989-b607d2f4749b.html#:~:text=The%20U.S.%20Department%20of%20Labor,are%20already%20eligible%20for%20retirement

Section 3:

Rethinking steel

How the steel industry could reach a sustainable future

Stoking the furnace to fuel transition

The US steel industry is facing challenges, but sustainability action is happening. For example, two in five business leaders are driving their transition to net zero through more efficient use of materials, and a similar number (38%) are focused on reducing their overall energy usage.

But can this action be transformed into meaningful change? The business leaders that took part in this research identified key areas that could make the difference.

Scope 1, 2 and 3 is a way of categorizing the different kinds of carbon emissions a company creates in its own operations, and in its wider value chain.

Scope 1
DIRECT
Emissions from sources (on site)

Scope 2
INDIRECT
Emissions from energy / utilities

Scope 3
INDIRECT
Emissions of the supply chain

Scope 1 emissions are the easiest to measure, report and control. But, for the US steel industry to transition to net zero, there is huge untapped opportunity in understanding an organization's **Scope 2 and 3** emissions, and how it can influence its value chain in reducing those emissions.

1. Strengthen the understanding of the role of steel in the net zero transition

When asked about how their organization is making a **positive contribution to driving net zero transition**, leaders' top initiatives fell within Scope 1: efficiencies with materials and energy, or supplier management. Although they are aware that the wider US steel industry contributes to society through the manufacture of electric vehicles, wind turbines, solar panels and public transport, they reportedly **do not necessarily identify their own organization as part of the picture**.

Only a quarter of leaders in this research believe that the steel industry is integral to the net zero transition and are aware of the ways in which it is driving this change.

It seems that business leaders are prepared to acknowledge they need **more support and education** on how to approach their wider sustainability agenda: Forty-three percent of leaders say they would like to learn more about how their organization can be more sustainable – rising to 56% for Gen Z – and 22% admit that, although they think the steel industry plays a role in supporting net zero transition, they are not sure how, and would like to know more.

Over a third (36%) of leaders acknowledge that their organization could invest more in educating their people on sustainability and the impact of their organization. **Fostering conversations about purpose**, and how it links individuals, organizations, and the wider environmental landscape could be a valuable step in **galvanizing the transition within the steel industry**.

"Saving waste manifests in many ways across manufacturing – from using materials more efficiently to minimizing energy loss. It's one of the three focus areas of Castrol's PATH360 framework, which sets out the company's overarching sustainability strategy.

As part of this strategy, between now and 2030, Castrol will continue to help our commercial customers save energy, waste and water as well as aim to reduce our plastic footprint by half.[16]

- David Gannon, Marketing Director, Castrol Industrial Lubricants

In which of the following areas are you aware that your organization makes a positive contribution when it comes to driving net zero transition?

	Mills	HQ
Efficient use of materials (improving material properties or recycling)	40%	39%
Reduction of overall energy usage / energy conservation	38%	40%
Smart supply chain management (cutting ties with suppliers that fall short of net zero goals)	36%	29%
Being at the heart of green technologies: e.g., smart/electric vehicles, public transport, advanced manufacturing, smart buildings	32%	29%
Moving to Electric Arc Furnaces	30%	31%

16 To promote the responsible design and management of plastic packaging along its life-cycle. Castrol defines its plastic footprint as the amount of virgin plastic included in our packaging per litre that isn't recycled vs. our 2019 baseline. For more information visit www.Castrol.com/PATH360/Definitions

2. Shifting priorities from short term to long term

Sustainability is taking over agendas. Over half of steel industry leaders (56%) indicate that investing in the transition to net zero is among their strategic objectives in the next 12 months – and 52% say the same about decarbonization/working towards net zero commitments. However, a third believe that their organization focuses too heavily on the bottom line/profit at the expense of long-term sustainability goals[17].

Looking back at the economic forecast at the beginning of the report, the benefit of switching this focus is clear. Based on economic projections from the views of industry leaders in this research, **prioritizing sustainability should lead to financial stability and profitability for the US steel industry** – with findings showing the route to net zero ultimately helping businesses to mitigate the anticipated decline in profits over the next 14 years.

If business leaders can **overcome the apprehension of losing short-term profits and customers**, the research suggests their organizations will be in a stronger position to attract the investment, forward-looking clients and a new generation of workers that is currently falling short – particularly if they can **set themselves apart from competitors** by doing so ahead of industry-wide policy decisions.

3. Taking the initiative to make public commitments

Even in organizations that have transition strategies and commitments in place, the findings of this research suggest there's room for those plans to be communicated more clearly throughout the organization – and beyond.

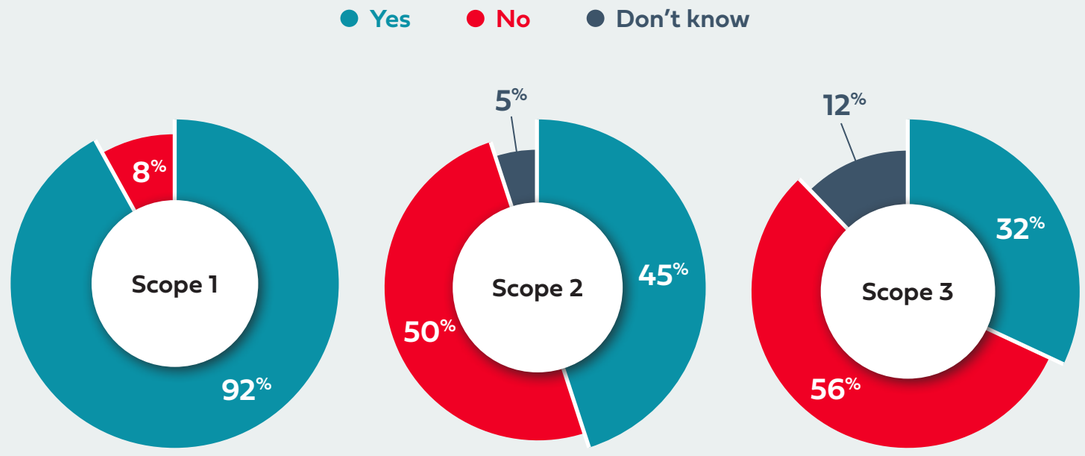
Currently, just a minority of steel industry leaders are confidently – and, more importantly, publicly – moving towards net zero. Only two in five (39%) say their organization has made a public commitment to transition to net zero by a defined date, and less than a third (32%) have set public targets on reducing its emissions aligned with the Paris Agreement.

Part of the hesitation could be the fear of getting it 'wrong'; a fifth (22%) of leaders have not made a public commitment to net zero commitments due to fears of greenwashing. **This may relate to a lack of confidence around Scope 2 and 3 emissions:** without specific targets and actions, it can be difficult to provide clear reports on measurable results. However, as this research confirms, workers and investors are actively seeking to engage with businesses that are prioritizing ESG – but they cannot do this if net zero transition plans aren't being broadcast. **Developing meaningful emissions targets (across Scope 1, 2 and 3)** and taking proactive steps to reach them could be a strategic solution for steel industry leaders seeking to drive their organization closer to net zero and, at the same time, reach investors and new talent.

The Scope 1 bias

Although most business leaders claim to have either a sustainability strategy in place or to have made public commitments to achieve net zero by a defined date, organizations are heavily focused on their Scope 1 emissions.

Does your organization have a defined and agreed plan to tackle emissions?

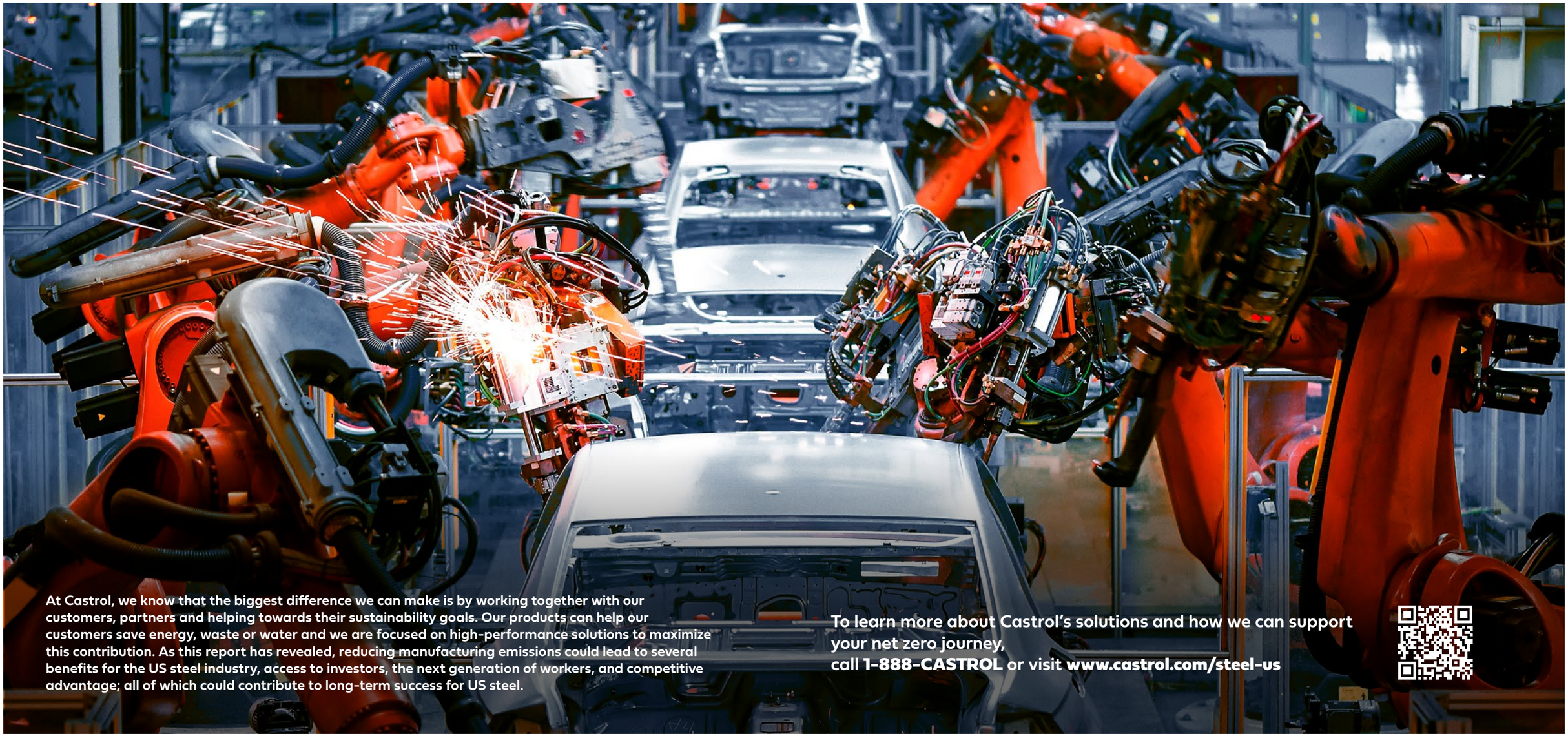


Conclusion

Steel is at the core of the next economy, playing a critical role in the construction of durable machinery, transport networks, buildings and vehicles. Because of this, the steel industry's transition to net zero is a valuable component of the global transition.

The insights presented in *Forging the Way to Net Zero* reveal three actionable learnings that could help steel industry leaders across the US enable not only their own organization's transition, but also that of the wider industry:

- **strengthening the understanding of the role of steel in the net zero transition**
- **shifting priorities from short-term to long term**
- **taking the initiative to make public commitments**



About PATH360

PATH360 is Castrol's overarching sustainability strategy. It focuses on reducing carbon, saving waste, and working to improve people's lives around the world as well as contributing to our overall aim of becoming a net zero brand by 2050 or sooner. It also shows how our efforts can help our customers achieve their sustainable objectives.

#PATH360

About Castrol

Castrol provides the oils, fluids and lubricants the world needs, for every driver, every rider and every industry.

The world of transport is going electric, and e-fluids have a vital role to play. EVs play a key part in the mobility revolution and the pathway to decarbonizing transport. Castrol's e-Fluid expertise extends across land, sea and even space.

IN SPACE

Castrol e-Greases help keep NASA's $820 million Insights Mars Lander working in the unforgiving conditions on the Red Planet.

AT SEA

Castrol e-Fluids support equipment used in the transfer of power from an engine or electric motor to a propeller or thruster.

ON LAND

Castrol has developed a range of e-fluids to meet the needs of vehicle manufacturers. From transmission e-fluids, which are inside many EVs already on the road, to e-Greases and e-Coolants, these fluids enable electric vehicles to run smoothly, efficiently and stay cool.

Developments include Castrol's lowest viscosity e-transmission oil, designed for efficiency, durability and reliability. Castrol is partnering with major manufacturers to ensure its lubricants deliver what drivers want: to go further on a single charge, enable longer life of transmission and component parts, and ensure long-lasting battery health.

As EVs continue to evolve, Castrol's best brains are not only defining the fluids, but the way the fluids are defined: pioneering unique testing and monitoring methods, driving efficiency and economy going beyond the standard requirements of the fluids, taking consumer insights and engineering technical solutions; advancing technologies that will lead to breakthroughs for the transport of tomorrow.

To find out more about Castrol please visit **www.castrol.com/steel-us**

Methodology

***Forging The Way to Net Zero* is an opinion research study among 109 HQ and 116 mill leaders as well as 25 investors in the US steel industry. The study explores the challenges US steel industry leaders face in decarbonizing the steel industry. It investigates the barriers as well as the accelerators to change and the role that regulation, finance, talent and customer demand play in this narrative. Ultimately it aims to define what "good" looks like.**

Opinion research

The opinion research used operated under CAWI (computer-assisted web interviewing) and was conducted between July and August 2022 in association with Coleman Parkes Research Limited and Man Bites Dog Limited, Thought Leadership Consultancy, looking at respondents from the US market only. The research was carried out under the ethical research guidelines set by both the MRS (Market Research Society) and ESOMAR (European Society for Opinion and Market Research). When this report refers to mill and HQ leaders and investors throughout, it is solely referring to the individuals that took part in this opinion research.

Audience

• Overall,	250
• HQ leaders,	109
• Mill leader,	116
• Investors,	25

Generations:

• Gen Z (18-25),	25
• Millennials/Gen Y (26-41),	61
• Gen X (42-57),	150
• Baby Boomers (over 58+),	14

Annual turnover:

• 0-USD50m,	77
• Between USD50m – USD250m,	82
• Between USD250m – USD500m,	38
• More than USD500m,	28

Economic modeling

Forging The Way to Net Zero also incorporates a supplementary layer of economic forecasting using the opinion research data to reveal the positive impact of greening steel through the use of big numbers. This additional layer of supplementary forecasting was conducted in association with Oxford Analytica, Economists and Consulting firm, and Man Bites Dog Limited, Thought Leadership Consultancy.

Oxford Analytica is a global analysis and advisory firm which draws on a worldwide network of experts to advise its clients on their strategy and performance. Our insights and judgements on global issues enable our clients to succeed in complex markets where the nexus of politics and economics, state and business is critical.

Methodology

The economic model is designed to estimate, based on survey data, the financial cost of not transitioning to net zero. The research centers off three key datapoints:

1. Negative impact on net profitability due to lack of progress to net zero: **Average -2.8 percentage point impact on net profit margin**[18].
2. Value of US steel industry in 2021: **110 billion dollars**[19].
3. Most US steel industry professionals, according to MBD's study, believe the industry will have transitioned to **net zero by 2035**.

18 Based on MBD's recasting steel survey. Sample size of 91 professionals based in the US steel industry.
19 https://www.thomasnet.com/insights/why-is-steel-so-important-to-u-s-manufacturing/#:~:text=The%20U.S.%20steel%20industry%20boasted,a%2021%25%20rise%20from%202020

To estimate the difference in cumulative net profit of the industry transitioning to net zero by 2035 compared to insufficient transition, we conducted an analysis of net profit margins and revenue growth among 28 publicly listed steel companies in the US over a period of 20 years. This analysis found that, on average, the industry has annual **net profit margins of 6.3% and revenue growth of 7.0%**.

This suggests that insufficient progress towards net zero would, on average, reduce net profit margins from 6.3% to 3.5% (6.3% - 2.8%). Similarly, over a period of 14 years between 2022 and 2035 we would expect the industry to grow from 110 billion dollars in 2021 (synonymous with total industry revenue) to 285 billion dollars by 2035, holding all else equal. This increase in revenue equates to 7% annual growth.

To estimate the cost of not transitioning to net zero, the model applies net profit margins of 6.3% and 3.5% to the total industry revenue (see below) and subtracts the difference to estimate the reduction in net profit due to lack of progress on the transition to net zero. Over a period of 14 years, in current dollar terms, the total reduction in net profit is estimated to be 74.3 billion dollars. This is the difference between cumulative net profit over the same period at 6.3% (167.4 billion dollars) and 3.5% (93.1 billion dollars).

	2022	2023	2024	2025
Total industry revenue (projection based on cumulative annual growth rate over the last 20 years)	**117.7**	**126.0**	**134.9**	**144.4**
Net profit (expected - progress to net zero)	**7.4**	**7.9**	**8.5**	**9.1**
Net profit due to lack of progress on the transition to net zero	**4.1**	**4.4**	**4.7**	**5.4**
Reduction in not profit due to lack or progress on the transition so nor zero	**3.3**	**3.5**	**3.8**	**4.0**

Furthermore, to underscore the benefit of transitioning to net zero, given the impact on net profit margin, the model also reveals the extent to which revenue would need to increase to maintain net profit constant – i.e., absolute profits at the higher net profit margin of 6.3%. It finds that keeping net profit constant at the lower profit margin of 3.5% would require top-line revenue growth of 79.8% (see below).

Assuming lack of progress to net zero, the required revenue to support the same absolute level of profitability under the 'progress scenario', the required industry revenue would be the following Son	**211.7**	**226.5**	**242.5**	**259.6**
Same level of absolute profitability would require higher revenues	**7.4**	**7.9**	**8.5**	**9.1**
Indicated increase in required revenue to maintain same **absolute profitability**, $bn Required percentage increase	**93.9**	**100.5**	**107.6**	**115.2**
	79.8%	**79.8**%	**79.8**%	**79.8**%

The model adopts the same approach at the company level to estimate the reduction in net profit due to lack of progress on the transition to net zero among survey companies with revenue of 5, 30, 75, 175, 375 and 625 million dollars in annual revenue. For simplicity, the model assumes the same net profit margins and revenue growth for all companies.

Legal disclaimer

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