

Keeping Up With the Changing Times in Capital Projects

Andras Marton

Independent Project Analysis



IPA's Mission

Conduct research into the functioning of capital projects and project systems

Apply the results of that research to help our customers create and use capital assets more efficiently

How We Achieve Our Mission

Empirical research based on over 23,000 projects

Quantitative benchmarking

Quantitative project risk assessment

The Capital is There, But Spending it is a Challenge

- Capital investment is back up to pre-COVID levels
- Project results and delivery practices are not improving, and are being challenged by capability gaps driven by staffing shortages and inexperience
- However, these challenges pale in comparison to those caused by the complexities of the sustainability transition
 - Unclear direction from governments
 - Uncertain long term business prospects
 - Unfamiliar shaping and technology challenges
 - New business cases and venture formation
 - Challenging to set up long-term strategies
 - Spillover effects to most major industrial sectors and project supply chain players

The Current State of Capital Projects



We Are Back to Pre-COVID Levels of Investment

Project Evaluation System (PES®) Database has been growing steadily and contains approximately **23,000 capital projects**

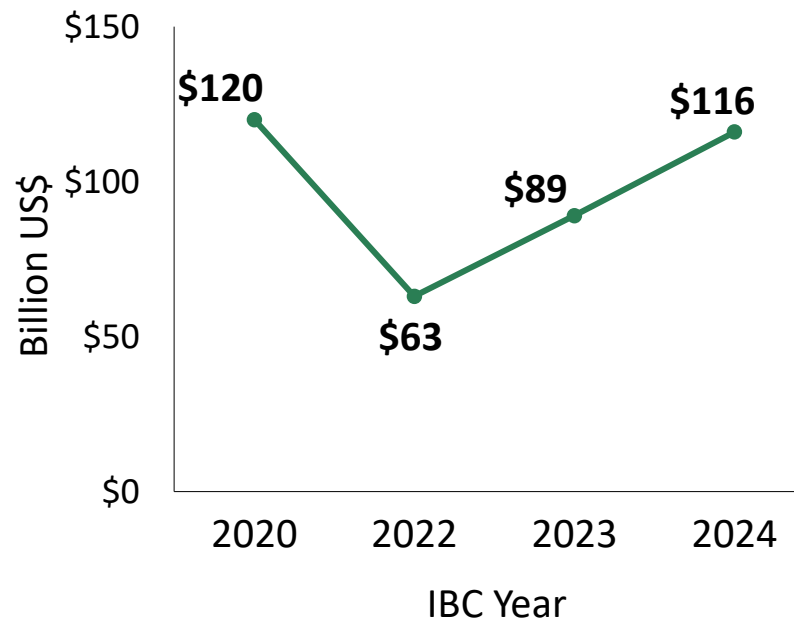
493 Projects added in 2023

132 large completed projects
8 projects above \$1 billion

182 large projects at authorization
21 projects above \$1 billion

179 Site & Sustaining Capital projects
(<\$10 million)

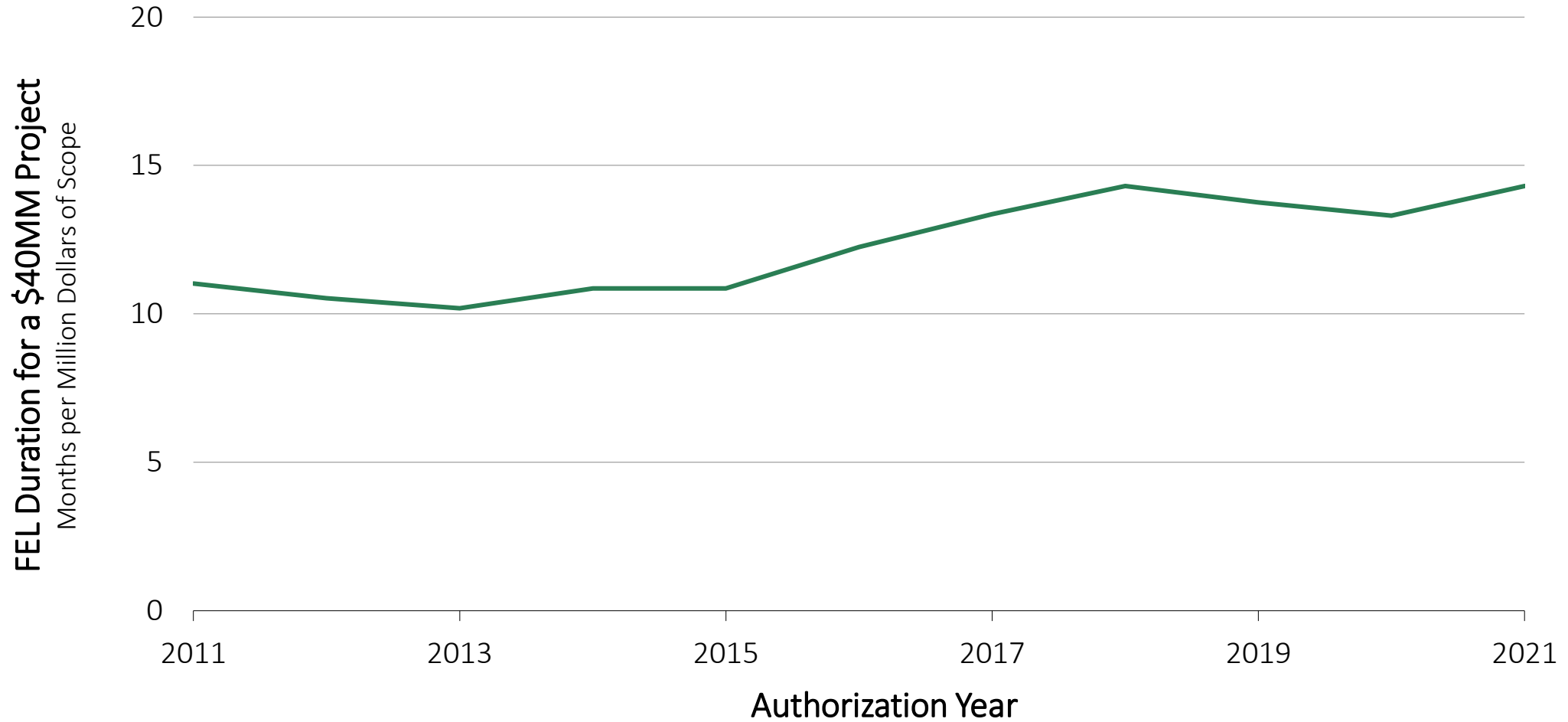
\$116 Billion Capital Investment



70 Owner Companies

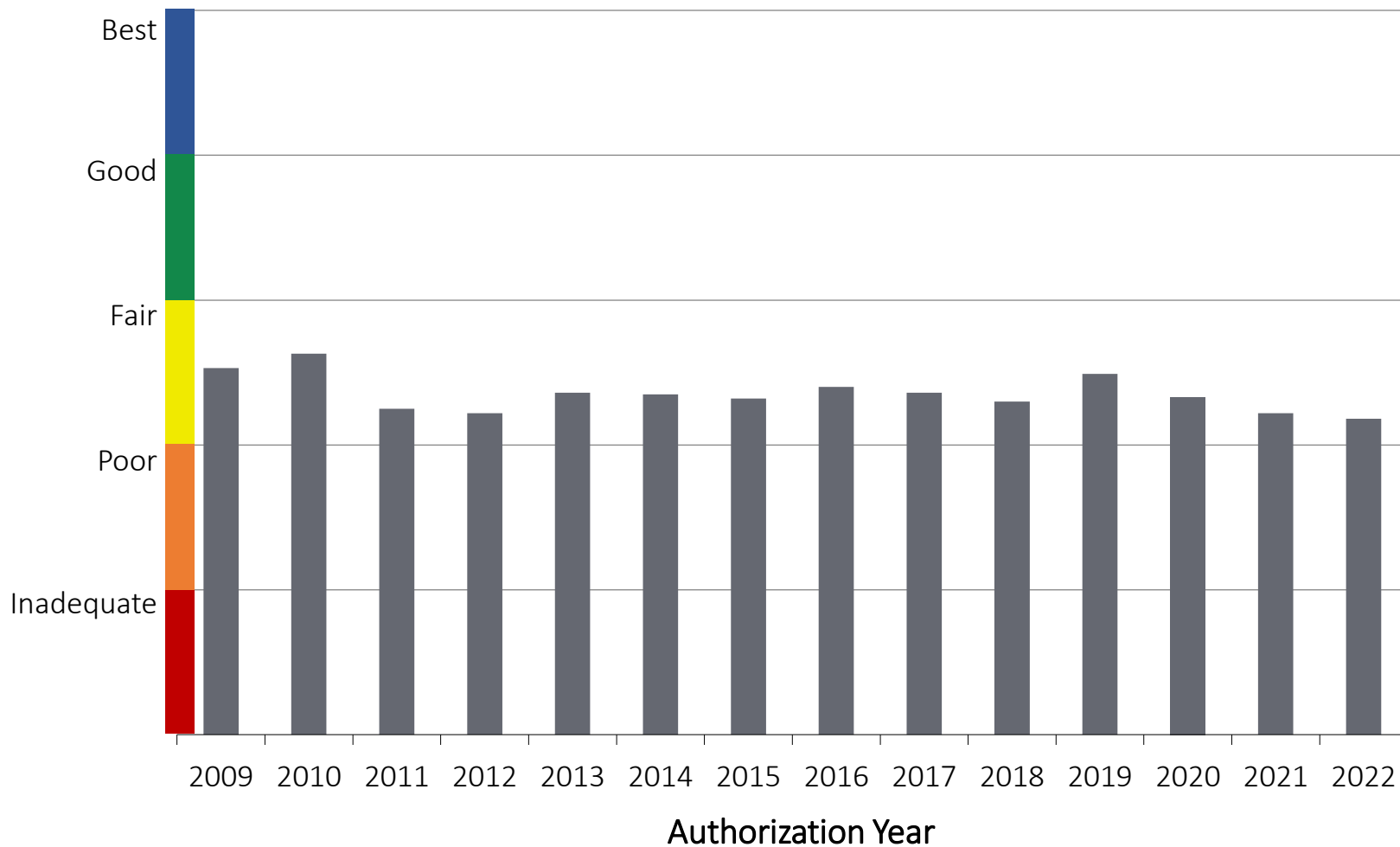
Total number of owner companies includes IBC and non-IBC members

Getting Our Front-End Work Done in a Timely Manner Is Really Difficult These Days



Front-End Loading (FEL) Is Declining

FEL Index at Authorization



FEL is the process by which an **organization translates its opportunities into capital projects**. The objective is to develop a detailed understanding of the **project scope that meets business objectives**.

The **FEL Index** reflects the status of three equally weighted factors: site-specific items, project engineering, and project execution planning.

Most Recent Projects:

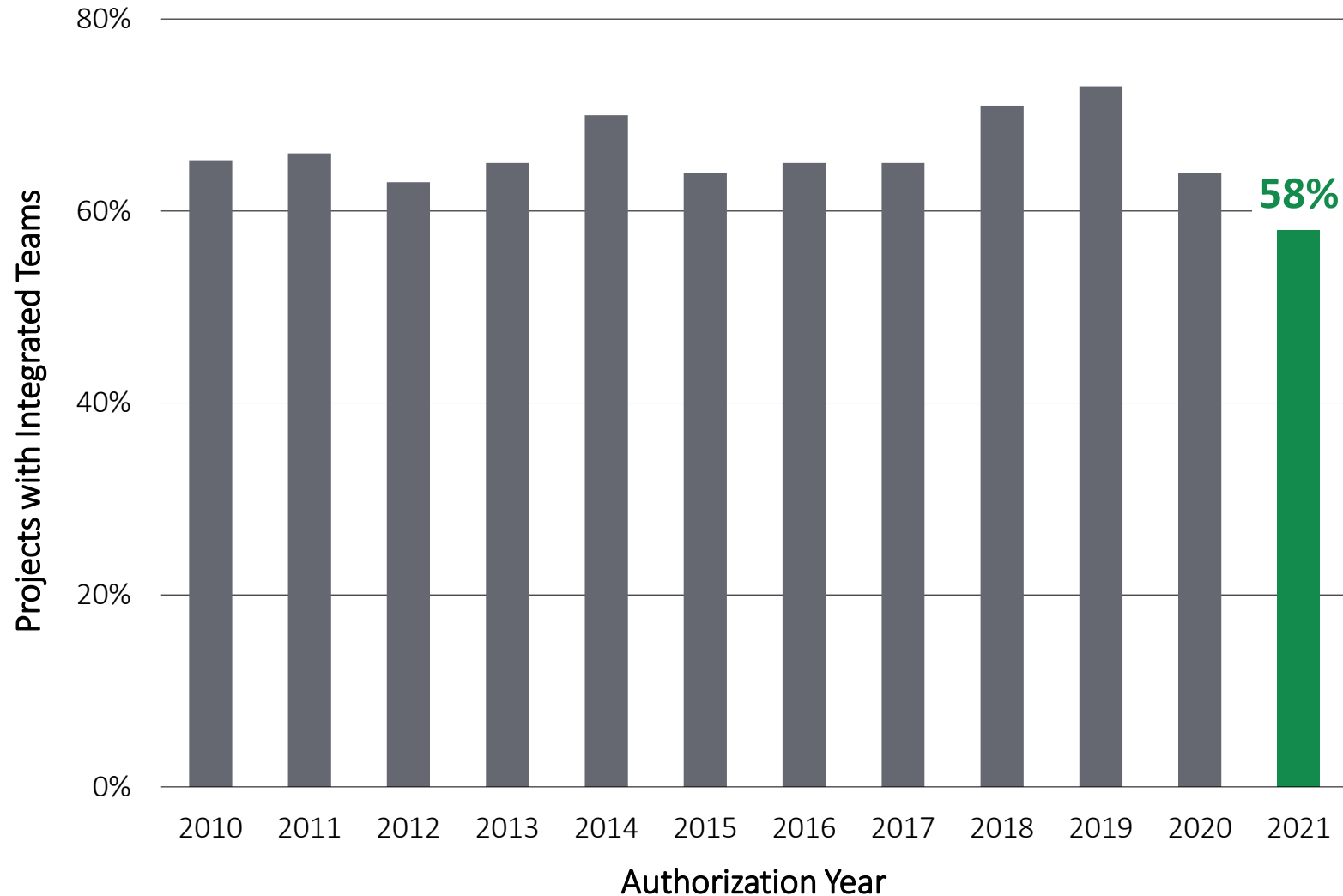
Teams know when FEL is insufficient and include more contingency. Logical!

18% had *Best Practical* FEL Index

Project governance does not seem to work!

Owner Team Integration

Recent Projects Have Less Team Integration



Team integration measures whether **all functions** that can influence the project **are represented** on the project team.

Function representatives must be **active** participants on the team, have the **authority to make decisions** for the function they represent, and **provide function input** to the project team.

Most Recent Projects with Integrated Teams:

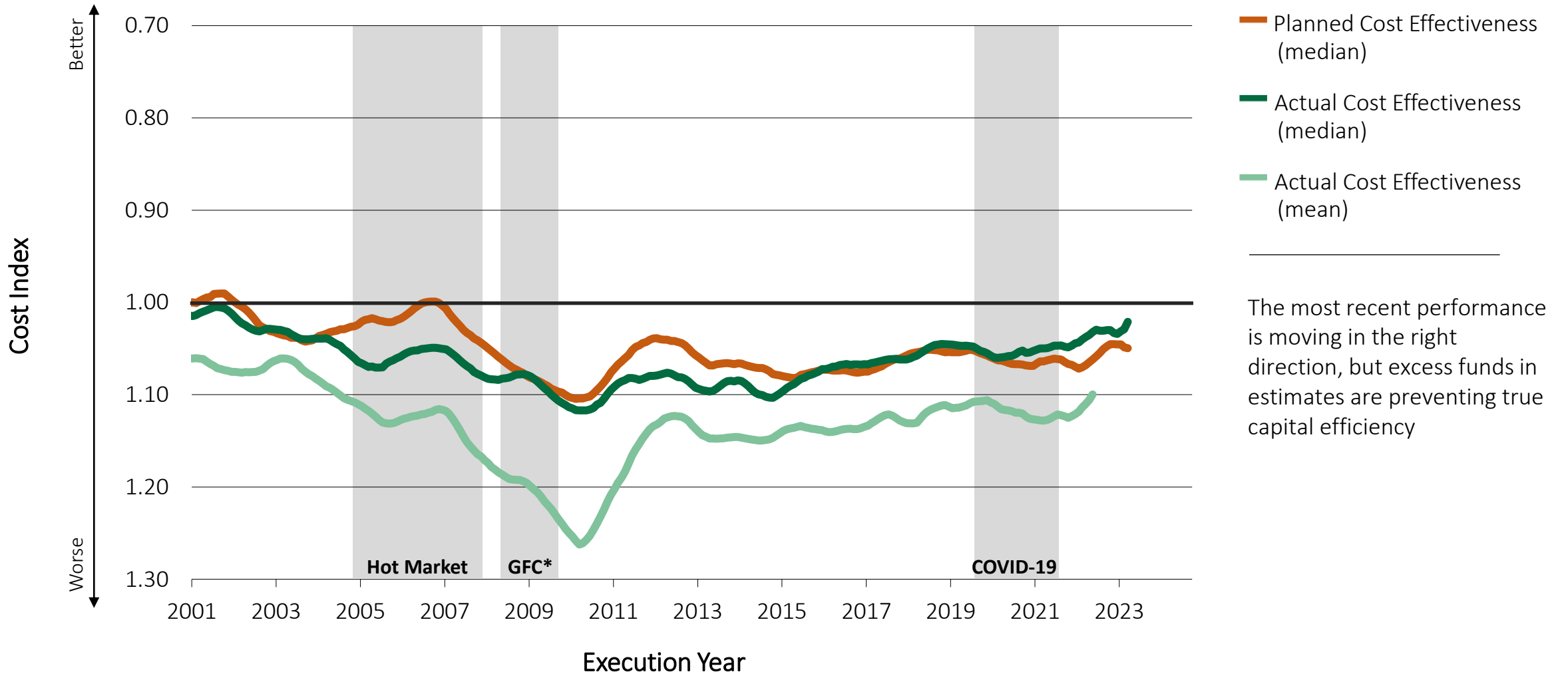
Consistently had **better FEL**

12% Faster execution schedules

8% Lower cost

Cost Performance Is Still Behind the Historic Average

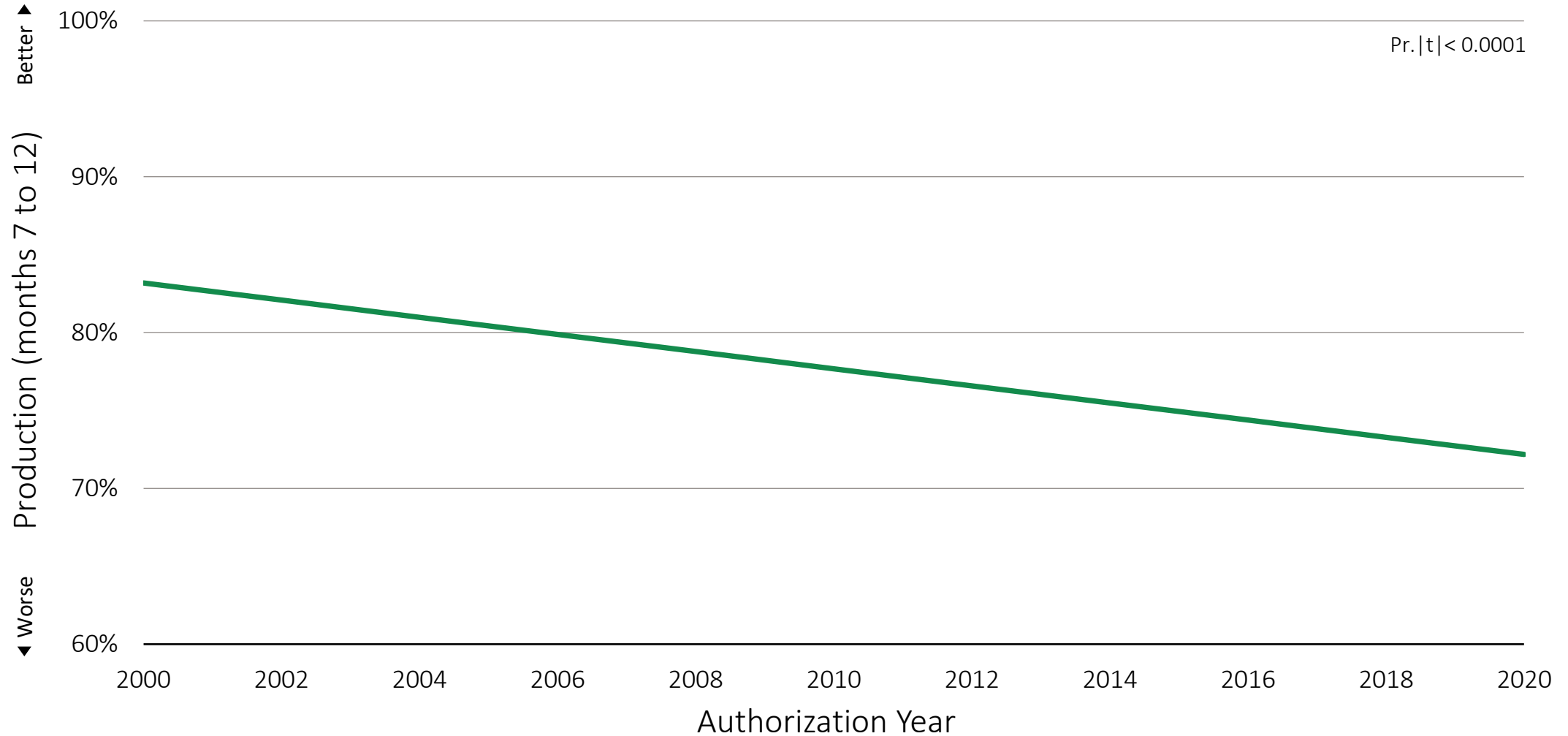
Cost Targets Continue to Be Conservative



* Global Financial Crisis

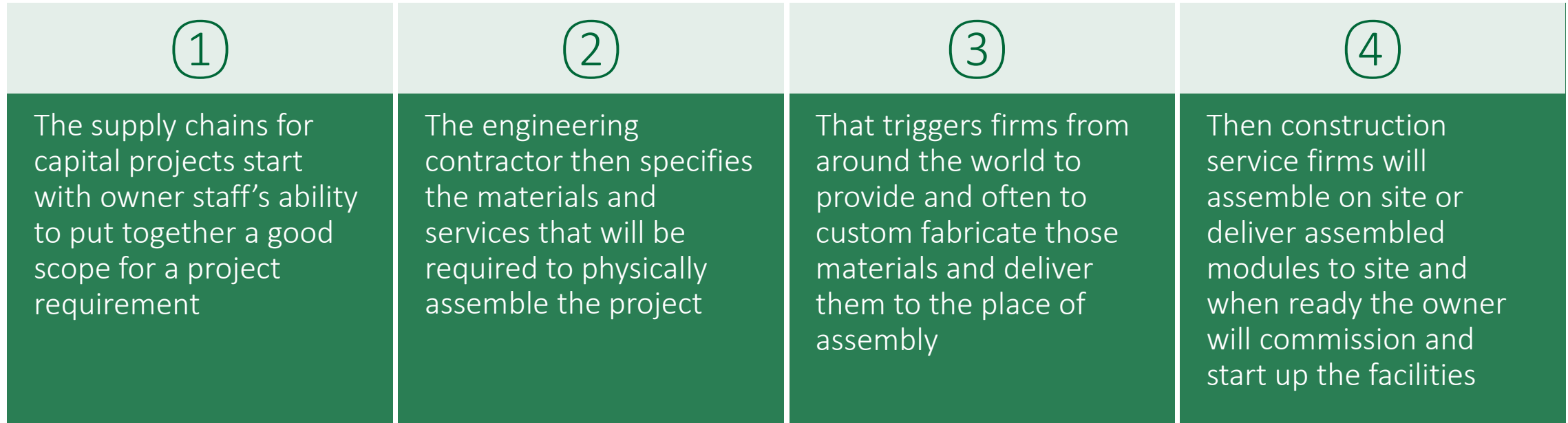
Plant Operability Has Been Declining Over Time


We Can Not Take Operational Performance for Granted Anymore





Results are controlled for number of new technology process steps, the percentage of heat and mass balance equations based on prior commercial production facilities, engineering and construction overlap, and process complexity, all of which depress production


The Performance Gaps Are a Result of the Project Supply Chains Vulnerabilities



 **Owners are struggling to staff** scoping teams and have more project types to cover

 **Engineering contractors are struggling to staff** with experienced and skilled personnel

 Equipment and materials supply chains are stabilizing post-COVID but **new problems continue to arise**

 **Construction markets are highly stressed** in some geographies: Middle East, US, Europe

The Sustainability Transition

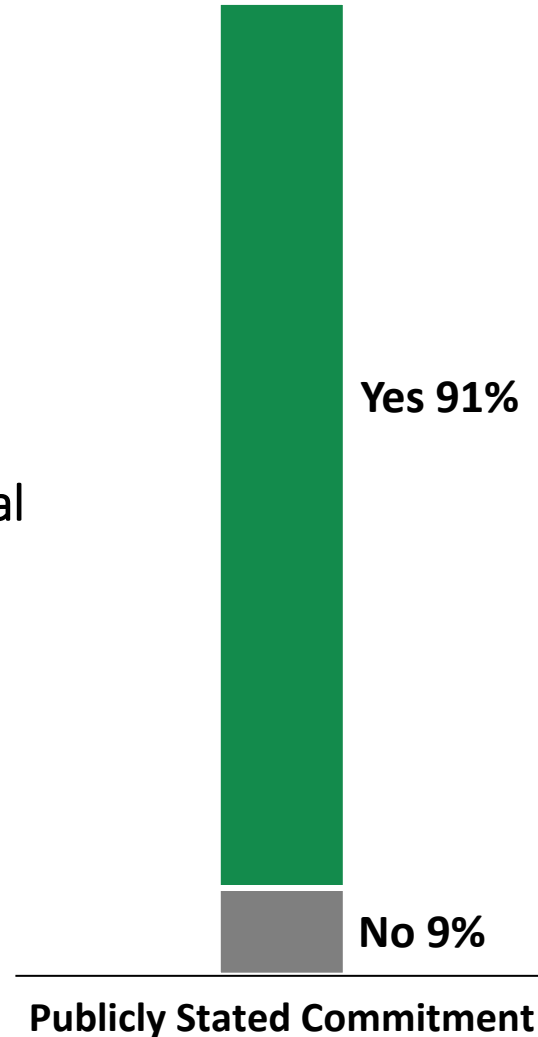


Sustainability Is the Issue of Our Era

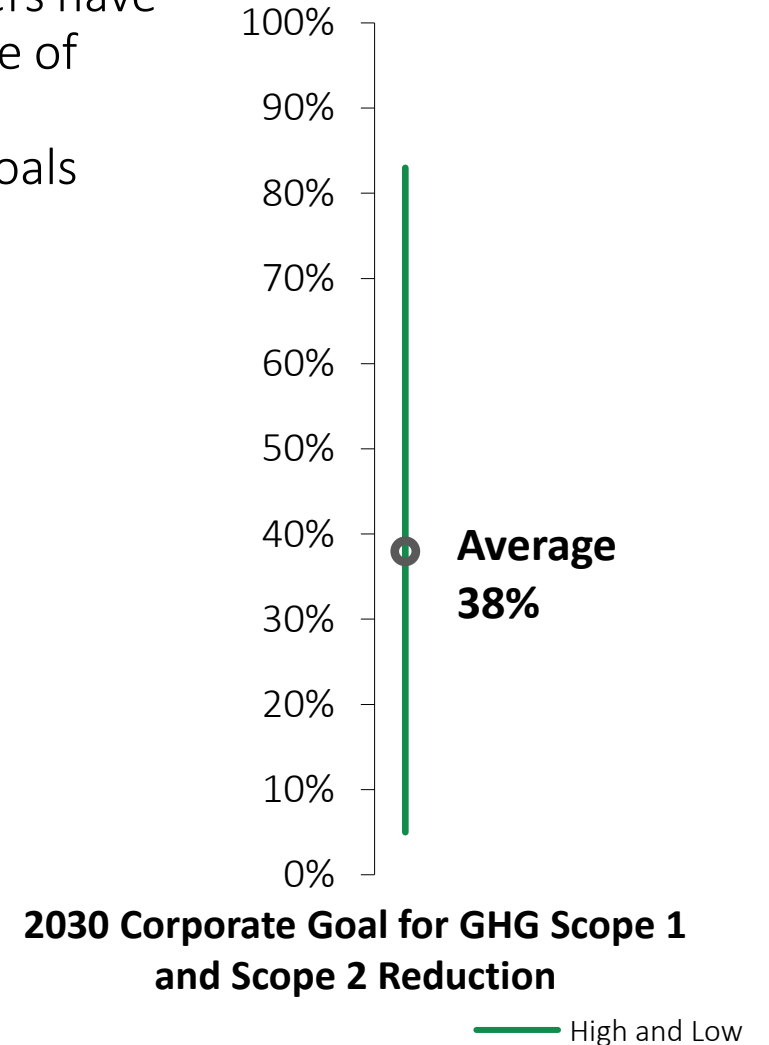
Recent IPA Survey Shows Commitment to GHG Goals

Most core IPA clients have a publicly stated commitment to emissions reductions (2030 or equivalent)

The large percentage of commitment has a major influence on the entire capital project ecosystem



These owners have a wide range of 2030 GHG reduction goals



Where Is the Energy Transition Going?

- Global events and trends over the past 4 years have been very hard on efforts to progress GHG reduction goals
 - The pandemic appeared to accelerate the process, but the aftermath of the pandemic sent things into reverse
 - The war in Ukraine set back and even arrested progress in the region that was clearly the leader in terms of commitments and actions—Western Europe
- There is general recognition that time is growing short; permanent temperature rise of 1.5° C may occur within the next decade
- When it is deemed “too late,” it is reasonable to worry that all momentum will be lost
- So, will it be action or inaction?

Action or Inaction?

On the **ACTION** side:

- A major climate change support bill was passed in the US in 2022 and projects are being prepared for funding
- The EU is “seriously considering” a significant CO2 price (\$200/metric ton minimum is needed), but the currently high fossil energy prices make that quite unlikely
- The only major step forward in 2023 was a dramatic change in power tariffs in the UK to support offshore wind and the authorization of another major nuclear power station (although the costs of the station under construction are out of control)

On the **INACTION** side:

- Governments have made little or no progress in clearing out the regulatory underbrush that slows even fully cost-effective renewables such as solar and onshore wind
- Governments in most places have not made any real moves to improve the grids required for EVs and renewables

Challenges Abound

Commercial



- Marginal project economics
- Market and customer development needs
- Commercial agreements and pricing
- Early commitment scenarios

Stakeholders



- More and possibly different
- Uncertain regulatory environments
- Local content requirements
- Social acceptance

Partnerships



- New partnerships with very different types of companies, and even within our own company
- Misaligned or difficult to align JVs
- Unprepared and inexperienced EPC market
- New owners to work with

Faster Pace



- Rapid change
- Dynamic market
- Decision making
- Nimble and agile people
- Undermined governance

We Have Struggled With This Complexity

And Consistently Carry Business Case Risk Past FEL 2

Robustness of the Business Case

- The business case of the company CCS project is *Not Robust* due to key issues.
- The **JV has not been established**.
- Consequently **unable to formalize an overarching team** heading into FEL 3.
- Although this may be outside of the team control, it poses significant risk to the business case.
- **Commercial** agreements linked to tariff charges of emitters, and government subsidies, **are not final**.
- The project's economic viability in terms of tariffs from emitters is not final as negotiations with emitters are ongoing. This puts **positive NPV at risk**.
- These gaps, with lack of quantifiable targets beyond schedule as well as **aggressive FEL 3**, render the business case as *Not Robust* at the end of FEL 2.



Risks to Achieving the Business Case

- The project is at a HIGH risk of not achieving the business objectives. The **full business model is not in place and cannot be fixed until after key government decisions** later this year.
- The project team is aware of these external risks and as far as possible has planned for them. They are nevertheless still fundamental.



Key Message for the Gatekeeper

- The project is in mid-FEL 3, with its business case at high risk and significant gaps in project definition
- Key project shaping components are pending: the **business case is not final, stakeholders are not completely aligned, and governance is unclear**



Assigning a Present Value to Sustainability Is Hard

Investment Rules for Sustainability Will Continue to Evolve

- Many companies are still working on how to evaluate the cost benefit of sustainability investment—**the problem is that there is no product price**
- Some methods companies are using for investment decisions include:
 - Including carbon shadow prices in project economics
 - Lowering hurdle rates on projects with major sustainability investments
 - Estimating negative cash flows for the do-nothing case
 - Considering some abatement projects as no-return projects and using strategic capital to fund them

“ My job would be so much easier if there was a carbon tax

— Quote from an interviewed Sustainability Representative ”

- The value uncertainty creates uncertain and often bloated project portfolios—which not only ties up critical owner resources but also creates a very uncertain environment for contractors
- Companies most advanced in sustainability give decision makers more guidance on the financial and non-financial factors to consider when evaluating sustainability investment

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Technology

- New technology development
- Need to be scaled significantly
- New to company technology
- General inexperience with commercialization



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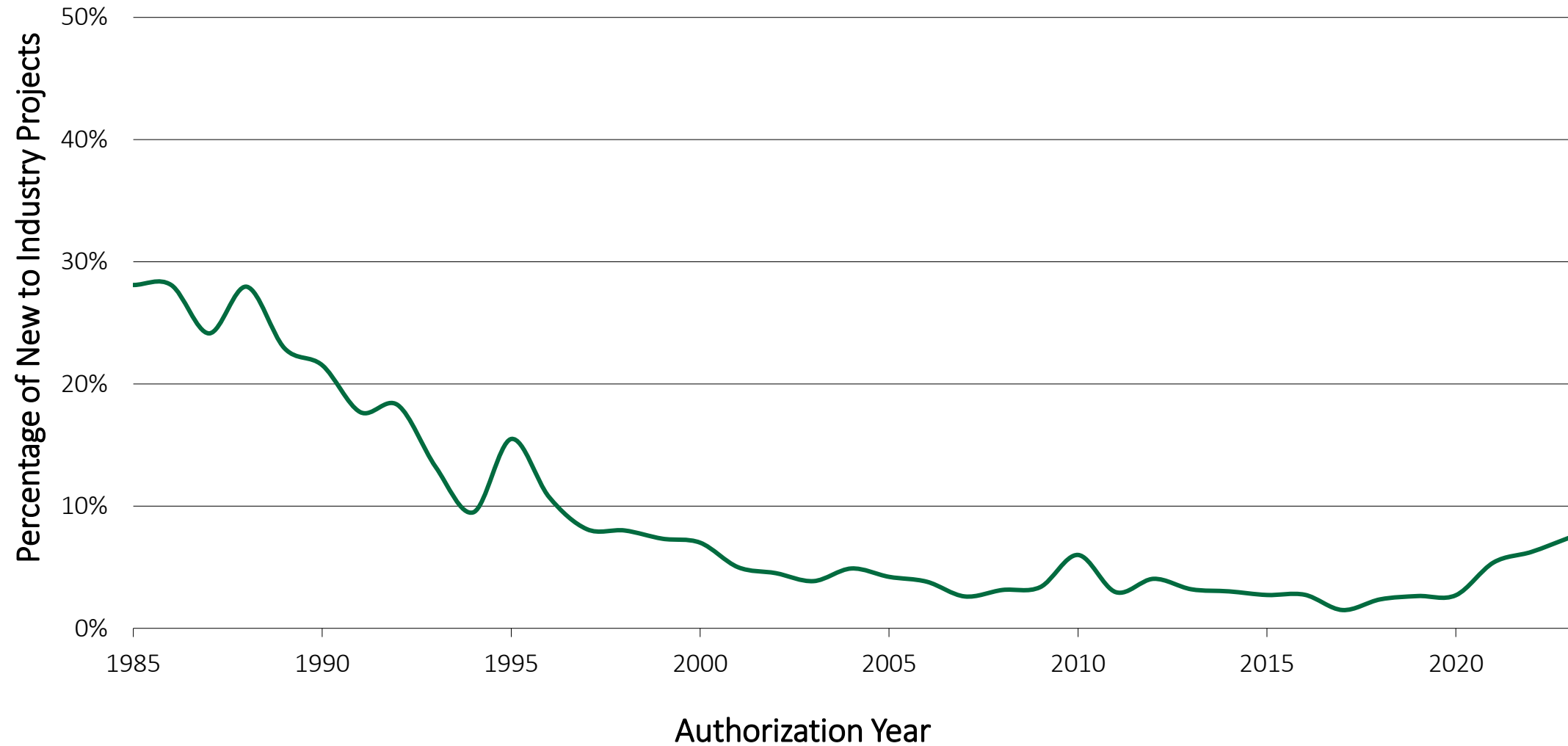
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Supply Chain

- Establishing new supply chains
- Escalation of new inputs
- Supplier relationships
- Standardization

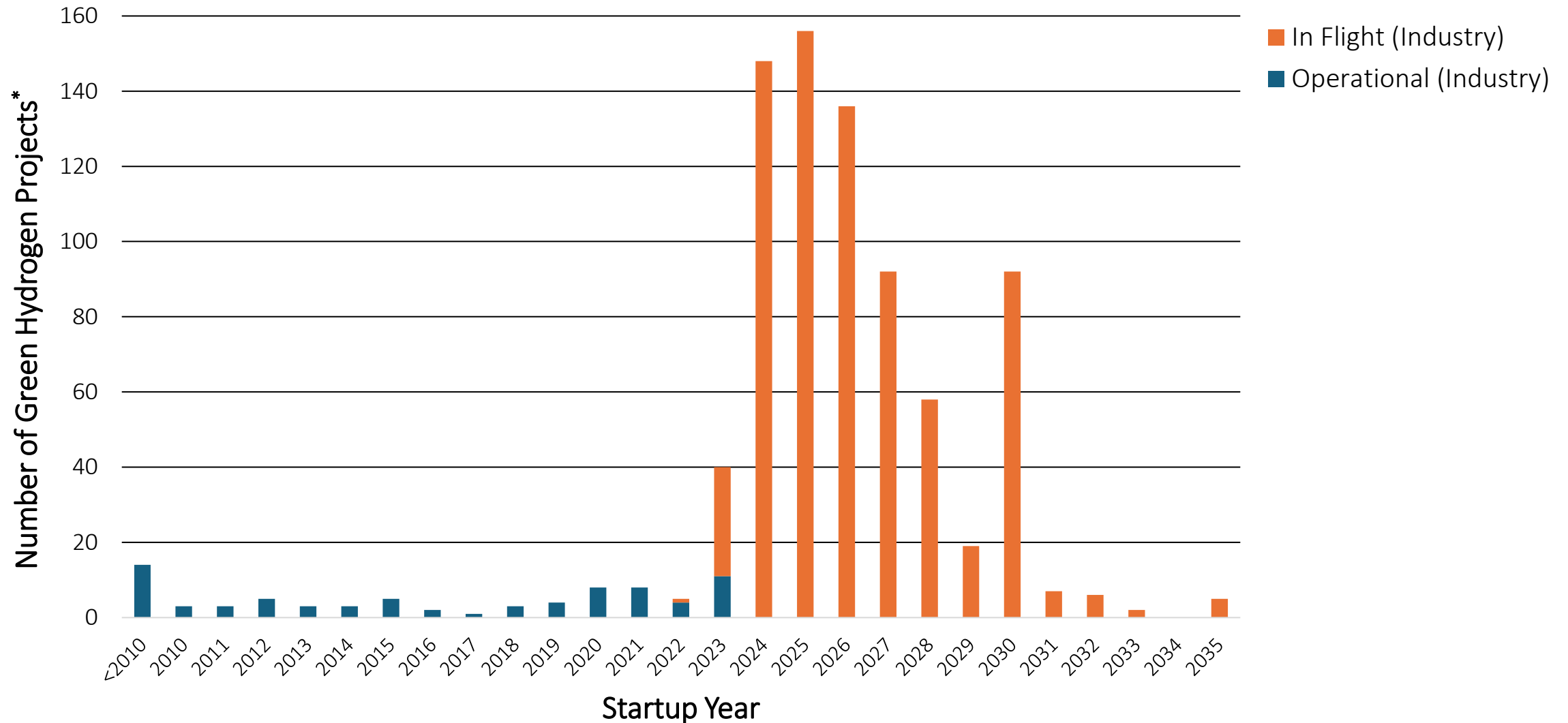


Commercialization Capability Is Long Lost



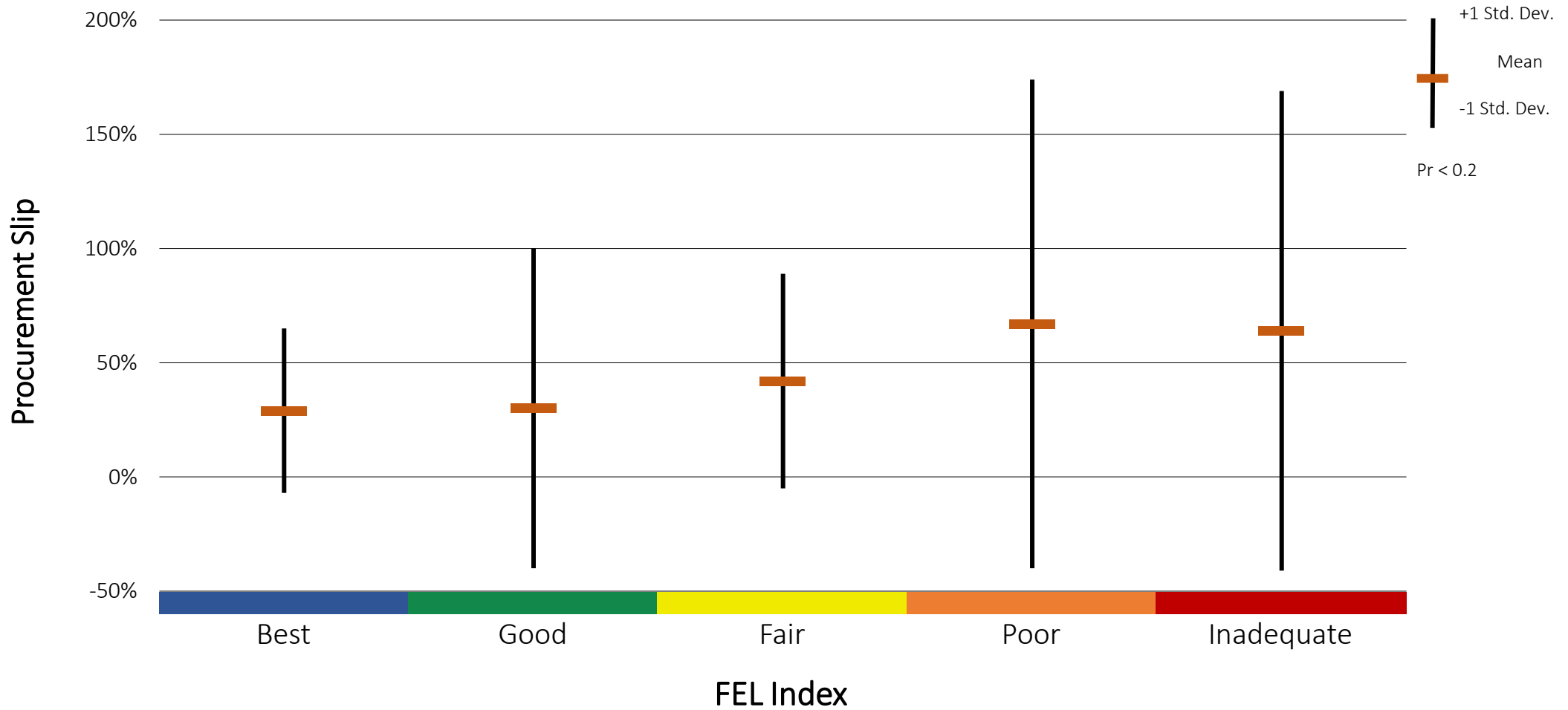
Number of Planned Green Hydrogen Production Projects Is Growing Rapidly

However, There Is Very Little Experience in the Industry



*Source: IEA Database from October 2023; IPA Research

Adequate Planning Does Wonders to Procurement Challenges



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**Governance is
unprepared**



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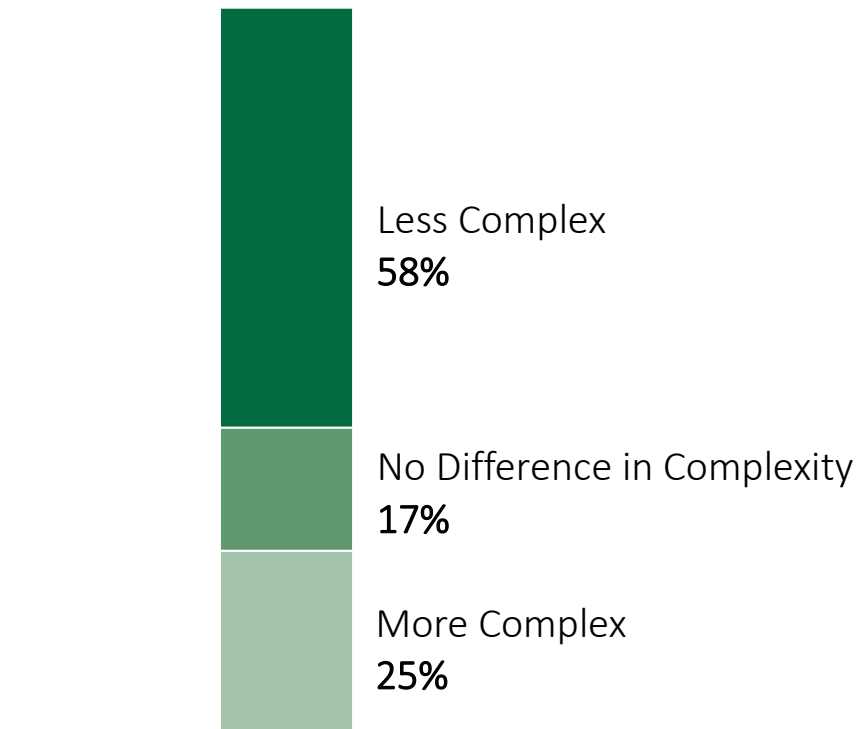
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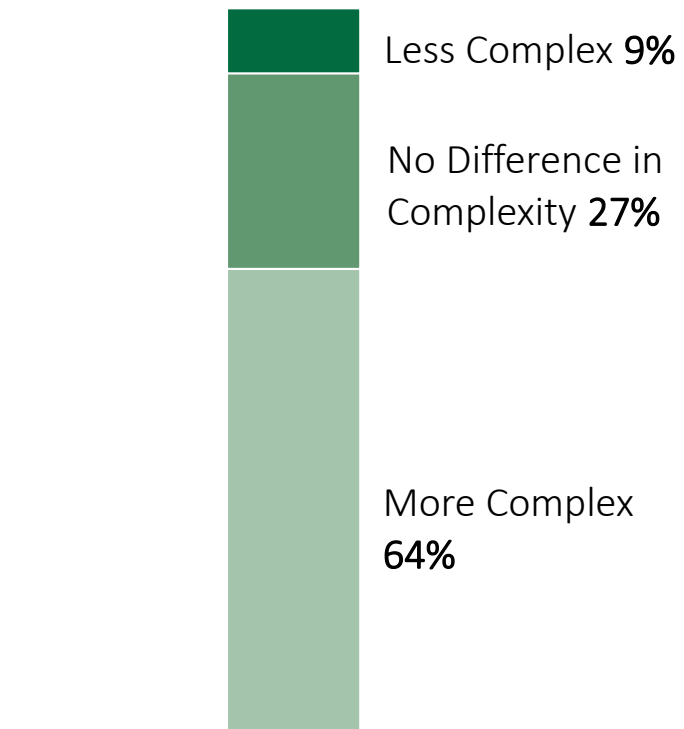
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General Opinion Is That New Energy Projects Are Less Complex— Except When It Comes to the Front-End



Energy projects compare to conventional oil & gas projects:
General project complexity



Energy projects compare to conventional oil & gas projects:
Front-end project complexity

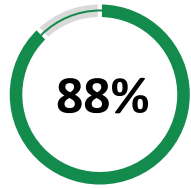
“ a megaproject is still a megaproject

developing a new business area

must integrate into existing assets economically ”

Project Governance Needs to Be Stronger and Able to Cope With New Challenges

Recent IPA Survey:



said the work process was clear and understood by most project teams

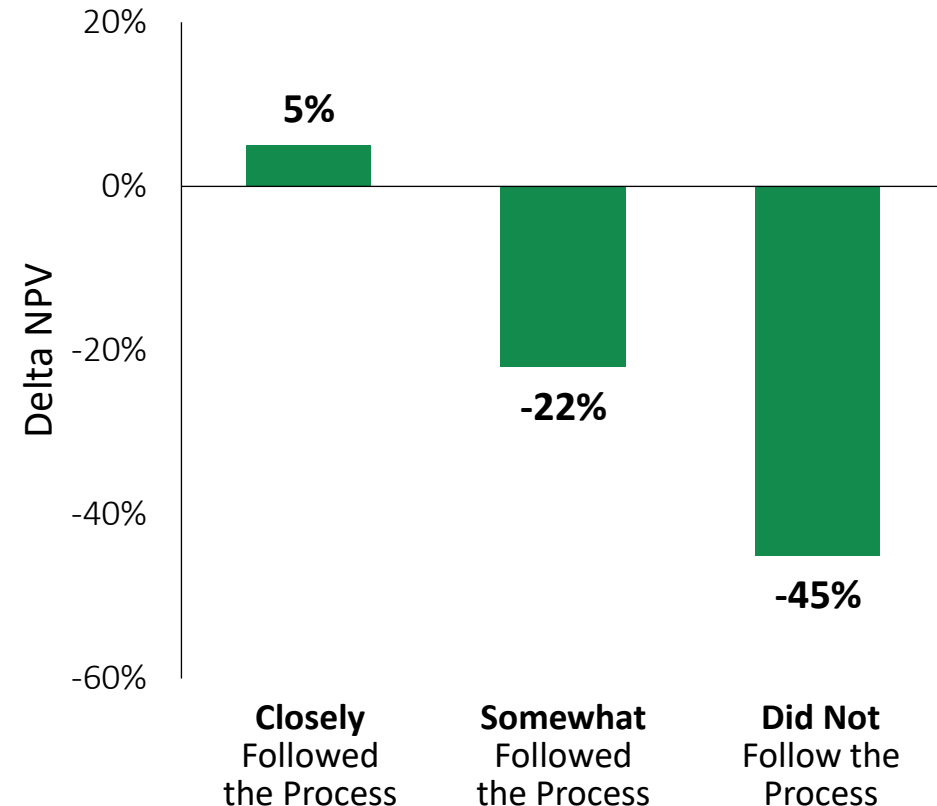


said the work process was adhered to on every project

↑ IPA's FEL Index proves otherwise

- However, only 18% of projects reach a Front-End Loading in line with *Best Practical*, which is what most processes call for
- Work process works for sustainability transition projects, but most systems have limited experience with governing under the complexities and uncertainties of the new environment

Effect of Following the Process on Delta NPV



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Staffing is lean and new to these complexities



Talent Challenges: Everybody Is Struggling

- Demographic cliff, portfolio volatility, and competition with other industries have led to worldwide talent supply issues
- Lately, clients frequently describe staffing challenges in our conversations

“

We only delivered half of our portfolio because we **didn't have enough people** to staff projects

Projects are not progressing at the rate they should. **Short staffing** is a contributing factor, but also the **quality of skills** and how projects are set up are affecting our ability to develop and execute projects

”

Staffing Gaps Are Widening

Most Organizations Are Increasing Their Portfolios but Not Necessarily Their Staff

Recent IPA Survey:



Owner Responses to Staffing Problems May Make It Worse

- Some owners are responding to their staff shortages by degrading their systems to weak matrix arrangements in which more and more people are part-time on major projects
- Functional leads are allowed to undermine the project managers by changing people out to assist the function in coping with shortages
- This is occurring in some of the companies that had made the best strides in improvement over the last 6-8 years by strengthening their project teams

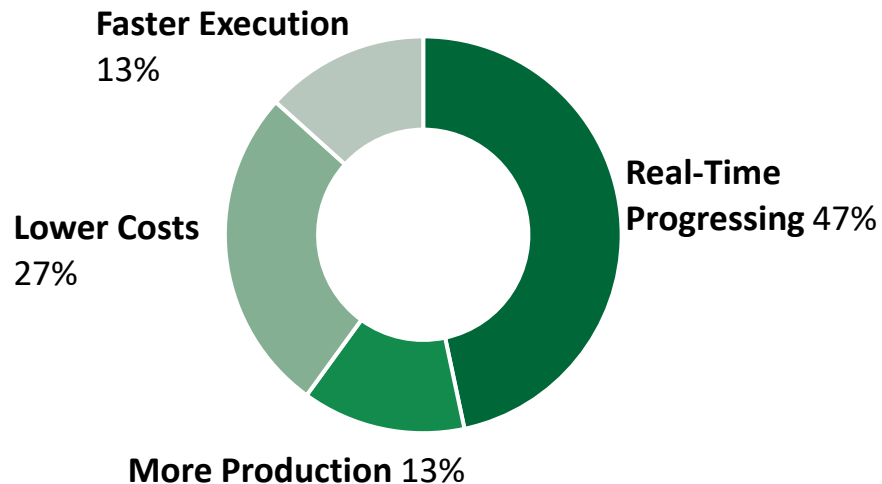
Can Digitalization, and in Particular AI, Help With the Staffing Problem?

In the capital projects world, digital technologies are applied to change and improve the way we deliver projects—to **increase the volume, accuracy, and speed of information needed** for key decision-making

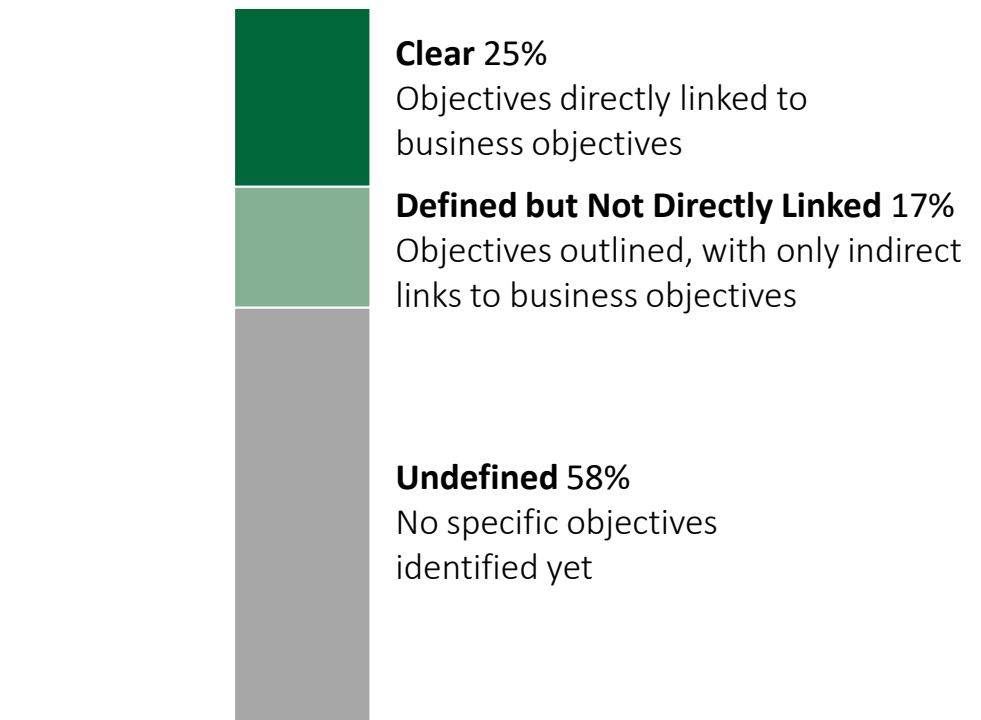
Digitalization Project Underway?



What Problem Are We Trying to Solve?



Are Digitalization Objectives Defined and Clearly Linked to Business Objectives?



What Is the Value of Artificial Intelligence and Machine Learning for Projects?

Current uses:

- Assistance in note taking and summarization
- Co-pilot with domain specific training to augment less experienced staff
- Knowledge management/lessons learned

Challenges:

- Security concerns
- Training data limitations will lead to bias—propagate “our way” approaches
- Project professionals and AI developers speak a different language and no cross-domain knowledge
- Identifying the use (and business) case is not always trivial when we don’t know full capability due to rapidly changing field

It Will be Challenging, But it Will Make us Better

Nobody knows where to invest for the long-term:

- Companies that had coherent strategies are being forced to rethink
- Company executives are struggling to plot a long-term strategy
- Oil companies have limited their exploration budgets and consequently have few projects to work on
- Chemical and minerals companies don't know whether they need to invest in the chemicals and metals to support the energy transition or not—and these are big, lumpy, and irreversible decisions
- Vendors and suppliers don't know whether to invest in the new capacity that is apparently needed

However, the change will bring many

opportunities: new ventures, attract new talent, personnel growth, leadership development, and a lot of learnings...

If anyone, it's you in this room that can overcome the challenges

- Maintain and leverage your project supply chain relationships to identify and shape the right opportunities
- Focus on technology strategy and how it aligns with your business strategy
- Maintain project discipline and strengthen your governance process to optimize your portfolio
- Strengthen your staff: retain and develop competency

THANK YOU

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