idox

A shifting construction landscape:

adapting to a 'new normal' for energy and utilities capital projects across North America

Idox. Do more.

Contents

Introduction

As the global pandemic recovery continues and the world grapples with challenges like the Ukraine war and energy transition, the construction sector in North America is experiencing a resurgence. However, this arrives at a time when North America sees more project delays and cost overruns than any other region, facing soaring supply chain costs and shortages alongside increasingly complex, large-scale capital projects.

With tough policy-driven timelines for clean energy construction and stricter owner scrutiny of costs and schedules, this report explores the hidden factors behind project delays and cost overruns and the technological solutions that are helping overcome them.

Over the next few pages, we investigate the implications of global growth and recovery in the construction sector, the shift from coal to gas in Asia, and the energy transition towards renewable sources.

This investigation also highlights the challenges posed by accelerated timelines, strict oversight, supply chain costs, and skills shortages, emphasizing the need for connected project data, collaborative models and digital transformation to drive efficiency in capital projects.

By embracing EPC 4.0 technologies and consolidating project documentation, the construction industry can navigate uncertainties, foster collaboration, and achieve transparent and agile projects that adapt to a fluctuating risk landscape.

The boomtimes are back for construction

Amidst global pandemic recovery and challenges like the Ukraine war and energy transition, North America offers significant investment opportunities in the construction sector, driven by Asia's shift from coal to gas and recent US legislation. But these challenges also give rise to opportunity:

- **Construction**
  - Global growth and recovery is sending **output soaring by 42%**.
- **Asia**
  - A **shift from coal to gas** and reduction in piped imports from Russia to Europe is a major market opportunity for North America's LNG industry. **Three LNG projects** are under construction in the US, and North America now leads the world in **pipeline construction.**
- **The energy transition**
  - new oil projects are also underway to plug the gap to the energy transition from Canada's Bay Du Nord to the US Willow Project

The energy transition offers another longer-term opportunity.

Recent US legislation will unlock **over £500 billion** of investment in renewable energy and climate change technology over the next decade and the **American Council on Renewable Energy estimates** that $1 trillion of investment in renewables will be needed by 2030.

Decarbonization goals and policy deadlines pile on the pressure

The accelerated pace of development driven by decarbonization goals poses additional pressure on efficient engineering and construction, amplified by policy-driven deadlines. Take the Biden administration and its target for 30 gigawatts of new offshore wind capacity by 2030, necessitating the rapid rollout of accompanying supply chains and infrastructure. Or **Canada** and the United States' commitment to all or mostly **zero-carbon electricity by 2030** meaning a massive expansion of power grids.

Soaring supply chain costs and **craft skills shortages** compound this further, creating added uncertainty around project targets, driving owners to demand closer scrutiny and stricter control of project deliverables.

The challenges and implications for energy and utilities projects in the Americas

Accelerated timelines, strict oversight, and supply chain challenges in the Americas hinder renewable energy projects and require contractors to do more with less. This arrives against a backdrop of **escalating construction costs and delays** from an ongoing supply chain and skills crunch. The result? Projects in North America are more likely to run **late or over budget** than any other region. Furthermore, US renewable energy capacity growth has actually **slowed** due to rising costs and delays.

It's clear that renewable energy will involve incredibly diverse partnerships. However, a lack of joined-up data is impeding the cross-sector collaboration that is crucial to new energy projects. For example, utility-scale energy storage projects will involve partners from the **solar, wind, battery and power sectors.** The **lack of domestic renewable skills** also means that much of the required expertise must be brought together from around the world.

Transformative strategies

Industry convergence and collaboration requires connected project data

Growing project uncertainty is driving more collaborative shared-risk delivery models while renewable energy will involve the convergence of previously separate industries from oil and gas to offshore wind. This will require connected data and cloud-based document management to create a universally accessible single source of truth among diverse and dispersed project partners.

- Sequential, siloed design-bid-build models are **being replaced** by collaborative design-build or design-assist projects uniting planning, design and development.
- At the other end of the project lifecycle, there is a transition towards progressive handover models where content is handed over continuously, enabling better progress tracking against milestones and a seamless transfer from construction to operations.
- By giving stakeholders greater visibility over other project stages these models create an imperative for connected, consistent project data that is equally and easily accessible to all parties – reducing risk around project delays as a result.

There is also a move towards pooling risks and resources among separate stakeholders.

Joint-venture collaborations increasingly enable partners from diverse energy industries to pool expertise in everything from design to project structuring. Some projects are harnessing **integrated project delivery (IPD)** methods involving a collaborative coalition of partners collectively involved in each project stage with risks, rewards and resources shared among all.

Consolidation, integration, and the cloud

Consolidation in the construction industry through Mergers & Acquisitions (M&A) alongside the increasing need for multidisciplinary collaboration and cross-project integration highlights the growing importance of joined-up project data and cloud-based document management systems in fostering collaborative models and driving new project delivery approaches.

We have seen a spate of **M&A activity** among energy and utilities EPCs from Worley and Jacobs to Amec and Wood. Meanwhile, Front-End Engineering Design (FEED) increasingly involves more multidisciplinary collaboration with the need to share equipment datasheets, lists and calculation sheets across myriad teams. There is also a trend towards more cross-project integration with EPCs often harnessing benchmarks or lessons from previous projects to grow progressively smarter.

Cumulatively, these trends necessitate more joined-up project data to connect diverse stakeholders, specialisms, and even separate projects. Cloud-based collaborative document management systems can help foster more collaborative models.

Idox has worked with companies such as Cleco Power replacing siloed systems with fully integrated, transparent document management systems that helped drive new project delivery models.

Wood Group case study

Wood Group is one of the world's largest consulting and engineering firms with a workforce of 35,000 spanning 60 countries.

The Challenge:

A series of acquisitions left the company with a proliferating array of document management systems ranging from in-house to off-the-shelf platforms. Wood faced the difficulty of maintaining software across a fragmented array of different machines and browsers with widespread variations in age and performance. Siloed systems impeded the multi-office collaboration and integration needed for more collaborative project models. Project setup was slow and laborious due to the difficulty getting infrastructure in place and the inability of clients to install their document management systems.

The Solution:

Wood Group adopted Idox's FusionLive. As a cloud-based system that works across all browsers and needs no installation, the platform could be seamlessly implemented, managed and maintained across the company and swiftly rolled out to clients for new projects. Further updates and enhancements of the platform were automatically implemented from the cloud. As a cloud-based system built around universal accessibility, it drove closer collaboration across diverse departments and project partners.

Suppliers or contractors could upload data instantly to a placeholder on the platform with metadata already prepopulated, transforming the efficiency of document management. Wood Group even cloned previous project templates, dramatically accelerating project setup and reproducing past successes. It has been integrated with Wood's entire project library and helps drive project analytics where lessons from past projects are used to drive progressively smarter projects.

Wood Group also harnessed the platform as an information hub for all internal and external project participants, fostering cross-sector collaboration. And the API library has also streamlined handover to project owners. The platform has since been extended to include the HR department and to play a key role in knowledge management systems.

A conservative industry in need of modernisation

Collaborative delivery models and growing industry consolidation are challenging for a construction industry with a messy patchwork of siloed processes and point solutions. Many established Engineering Procurement Contractors (EPCs) still use primitive paper-based systems or proprietary platforms.

This data disconnect impedes the cross-sector, multidisciplinary collaboration needed to collectively improve project certainty through common oversight of costs and risks.

Outdated and fragmented practices hinder collaboration and fuel uncertainty

Some EPCs use outdated home-grown systems from email, Microsoft Excel spreadsheets and rudimentary file store systems to paper-based document management and record keeping. Other contractors use purpose-built point solutions and proprietary document or asset management tools. This is instead of interoperable systems and best of breed engineering document management solutions integrated into their project ecosystems.

Legacy systems leave documents siloes, fragmented among multiple people from vendors and clients to subcontractors and document controllers, acting as a bureaucratic bottleneck on workflows.

Project progress that's manually recorded using Excel spreadsheets is vulnerable to human error and does not allow all partners to get a real-time overview of risk factors such as poor productivity.

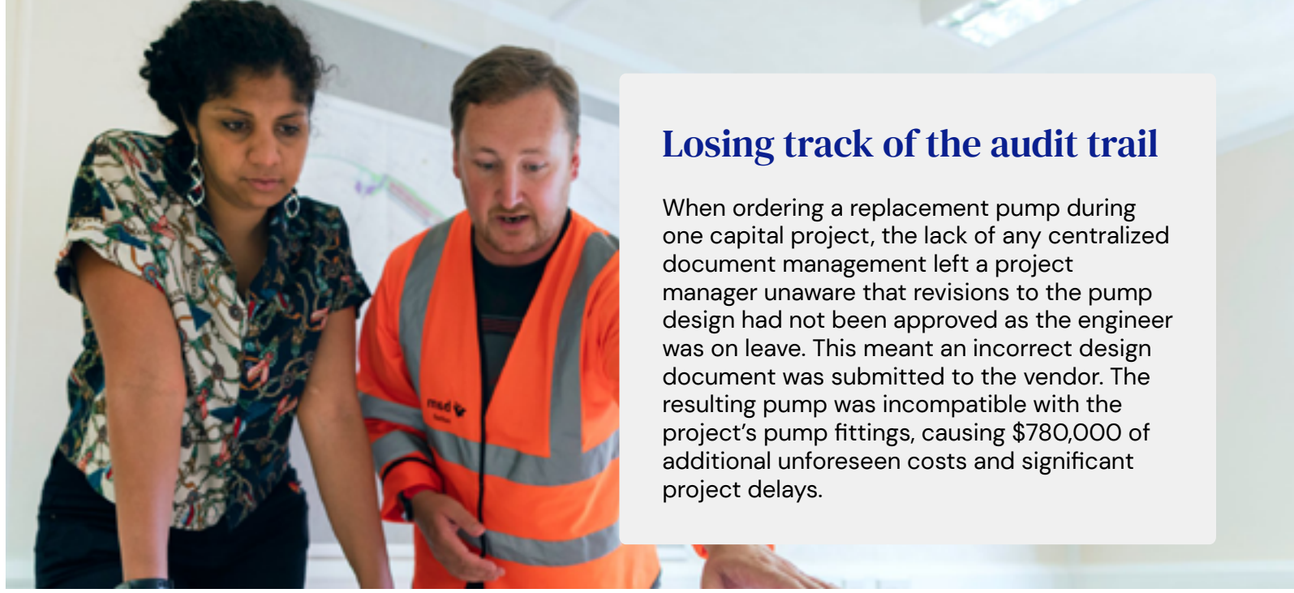
Reporting is often done retrospectively in multiple formats rather than real-time using a singular system which prevents project partners having an integrated and live picture of project progress against targets.

Project uncertainty is exacerbated by the fragmentation of project documents among different stakeholders, hampering collective risk monitoring and management. Organizations in North America are the **most likely in the world** to cite unmanaged or unexpected risks as biggest barriers to project certainty in addition to inadequate oversight of project progress. Capital projects across the Americas are the most likely of any region to identify "data collection, analytics and insights" as an even bigger risk to growth than economic recession and stagnation.

Challenges of incompatible document management systems

The result is disjointed, inefficient projects where important project data cannot be quickly or cost-efficiently communicated among stakeholders. Crucially, it is difficult to scale up to incorporate new partners if different stakeholders are using mutually incompatible tools and data formats. As energy projects become collaborative and complex, this impedes continuous transparency and traceability as documents redundantly change hands among multiple people.

Uncertainty around document status creates a risk of outdated, erroneous or unapproved documents creeping into critical project decisions. Miscommunication between contractors and vendors caused by mutually incompatible document management systems can require significant later rework. Losing track of the audit trail can mean losing track of deliverables too.



Losing track of the audit trail

When ordering a replacement pump during one capital project, the lack of any centralized document management left a project manager unaware that revisions to the pump design had not been approved as the engineer was on leave. This meant an incorrect design document was submitted to the vendor. The resulting pump was incompatible with the project's pump fittings, causing $780,000 of additional unforeseen costs and significant project delays.

Frequent mistakes with documentation circulated and segmented among widely dispersed workers can be a major hidden source of unexpected cost increases and delays across many capital projects. In more collaborative design-build projects, a lack of revision control could lead to builders or suppliers making changes to designs that are not approved and cause undetected design flaws that result in additional costs during construction. Drudge tasks such as manually uploading thousands of documents also divert limited human resources from higher value tasks such as ensuring consistent document quality and timely document turnaround throughout end-to-end project lifecycles.

Towards 'EPC 4.0'

Joining the data dots

There is an urgent need for project data to be digitalized, standardized, and stored in a single shared environment. This would foster collaborative, transparent capital projects that can adapt to a fluctuating risk landscape. There's an equally growing imperative for consolidated, consistent project documentation to create agile, auditable, collaborative projects linked by digital data.

Emerging 'EPC 4.0' technologies are now dissolving data silos to enable more agile, timely and cost-efficient energy and utilities projects. The digitalization, standardization and integration of project data is enabling transparent, collaborative capital projects where all participants have remote real-time oversight and control of risks and costs.

Connected data allows companies to join the data dots and see common opportunities to improve performance and efficiency across project lifecycles.

Cloud-based project enterprise information management technologies allow projects to be seamlessly scaled up or swapped between contractors in sync with economic circumstances.

How EPC 4.0 works in practice

EPC 4.0 objective	Use case and benefits
A single source of truth	• Digital document management with user permissions. • Enhances project collaboration and transparency. • Supports proactive risk management. • Prevents late payments. • Identifies delivery bottlenecks. • Universal access and shared visibility of live project status.
Visibility and traceability	• Live digital dashboards for 24/7 project oversight. • Enables risk monitoring and mitigation. • Facilitates vendor management and overdue item tracking. • Seamlessly supports project scaling and contractor switching. • Provides up-to-date audit trail for transparency.
Intelligent automation	• Automated document management across multiple iterations for accurate, auditable records. • Captures end-to-end processes, revisions, and reviewer comments. • Automates version control. • Uses automated reminders for timely, on-target deliverables.
Automated tag extraction	• Rapid extraction and verification of hundreds of tags from documents. • Enhances data accessibility for engineers. • Enables efficient contractor-to-owner information handover. • Boosts safety, risk, and regulatory compliance. • Accelerates onboarding and use of as-builds across operations. • Maintains up-to-date digital twins with accurately tagged data.
Intuitive features	• User-friendly features like Google-style search and automated data distribution. • Streamlines document retrieval and review processes. • Reduces risk and human error, freeing resources for strategic tasks. • Accelerates digital transformation through swift implementation.
Connected data	• Consolidates data from design to operations for end-to-end transparency and traceability. • Utilizes live operational 3D models and data from multiple locations for 'living' digital twins. • Simultaneous and collaborative approach supports concurrent engineering. • Provides simultaneous updates and visibility across engineering teams and locations.
Historic data for project optimization	• Utilizes past project templates to replicate success. • Applies lessons, best practices, and benchmarks to future projects. • Encourages more timely, cost-efficient construction. • Leverages machine learning to predictively optimize future projects.

Planning for the future

The implications for industry are clear

Energy and utilities developers need to deliver more complex capital projects faster and more efficiently amidst rising supply chain costs and shortages. Increasing cross-sector collaboration and industry convergence means data is being shared more widely than ever before. Yet the preponderance of fragmented systems hampers efforts to maintain a trustworthy, transparent data trail.

There is an urgent imperative for industry to embrace collaborative models where all partners have the collective visibility and responsibility to address shared risks. Synchronizing and automating document management would reduce costly or safety-critical errors by ensuring everything from design to development is informed by comprehensive, current information. This will fast-forward the long-overdue digital digitalization and modernization of engineering, procurement, and construction.

Driving efficiency in capital projects through digital transformation

The digital unification and verification of all documentation would bring unprecedented transparency, traceability, and consistency to increasingly complex capital projects. Cloud-based platforms provide the ideal launchpad for consolidating processes, practices and documents, fostering collaboration across diverse projects. Digital data forms a connecting thread uniting increasingly diverse stakeholders, specialisms, and project stages.

Cloud platforms with automated version control and smart search functions build a trustworthy, transparent bank of project information. Intelligent automation accelerates and streamlines the capture, communication and curation of project data while removing human errors, inconsistencies, and bureaucratic bottlenecks.

Making project documentation universally accessible, amendable, and auditable across all parties and project stages will drive a sea-change in project speed and efficiency. EPC 4.0 will ultimately enable unprecedented multi-party visibility and control of fluctuating costs and risks across construction lifecycles, creating smart, efficient, agile capital projects constantly adapting to predict and prevent costs and delays.

For further information about FusionLive Idox's secure cloud-based Engineering Information Management solution, visit: eim.idoxgroup.com or email marketing@idoxgroup.com.

Idox Software Ltd
Unit 5, Woking 8
Forsyth Road, Woking
Surrey GU21 5SB

T: +44 (0) 333 011 1200
E: **marketing@idoxgroup.com**

www.idoxgroup.com