

## RESOURCE PLANNING FOR ELECTRIC POWER SYSTEMS



## KEY INSIGHTS

- Models assume deployment starts in a given year, but real-world delivery requires sequential steps for design, permitting, procurement, and other tasks that span years. Planning that reflects these realities is what ultimately enables infrastructure to be built.
- Project timelines, which can range from 2-3 years (e.g., battery energy storage) to over 10 years (e.g., large light water reactor), are dynamic, shaped by permitting, supply chains, technology novelty, and evolving market conditions.
- Emerging technologies may need new infrastructure, like transmission, CO<sub>2</sub> pipelines, or hydrogen networks, adding regulatory and technical challenges that complicate planning.

## **Delivering the Energy Transition: Project Timelines & Considerations**

by Todd Gorgian



## Research Overview

Most large-scale, new generation projects emerge from long-range resource planning, where electric companies and stakeholders define needs and select technologies. Beyond commercial viability, companies must also navigate regulatory frameworks, supply chains, site development, and other challenges that shape how projects advance from concept to operation.

Recent EPRI research synthesizes literaturebased estimates and expert judgment to develop notional lead times and delivery pathways for more than 20 technologies in power generation, energy storage, grid support, and enabling infrastructure. It primarily reflects U.S. experience and a range of project scopes. The timelines are instructive, not prescriptive, with cross-cutting factors, such as regulatory complexity, supply chain maturity, and site readiness, highlighted to frame common risks and challenges.

These insights serve as a reference to support planning in an increasingly complex landscape, essential for ensuring reliability and affordability while advancing corporate objectives and broader goals.

Figures 1 and 2 present sample results: Figure 1 shows a generalized project delivery process, while Figure 2 illustrates technologyspecific timelines and other key considerations for solar PV.

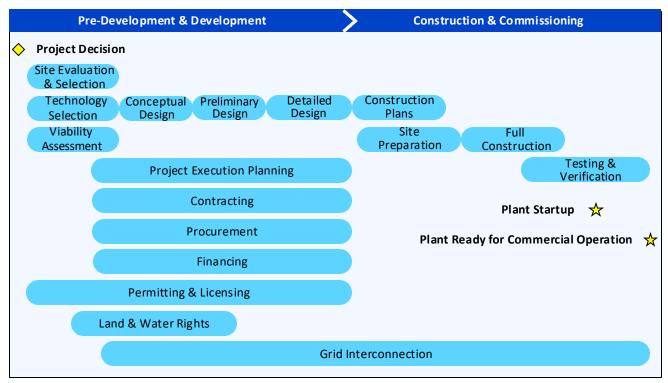


Figure 1: Generalized Project Delivery Process

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		Solar PV				
Project Delivery Timeline			Project Operating Lifetime			
Pre-Development & Development (Years)		Construction & Commissioning (Years)		<b>Design Life</b> (Years)		
1 – 2		2 – 4		30 –	30 – 35	
Total Project Delivery Duration: 3 – 6 Years						
2025 2028 2029 ♠			2029	/	2059	
l — — Solar PV technologies are commercially available.						
Project Delivery Critical Paths			Technology-Specific Caveats			
Projects face long interconnection times, partially due to increasingly lengthy queues, preventing some projects from entering service on schedule.				<ul> <li>Mounting systems and power electronics can affect delivery timelines.</li> <li>Brownfield sites may require</li> </ul>		
Permitting & Licensing			extra permitting.			
Projects can face challenges obtaining community approval – halting projects – as demonstrated by recent examples of opposition toward projects in rural communities.				<ul> <li>PV + energy storage projects may have different timelines and lifespans.</li> </ul>		
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Figure 2: Example: Solar PV Overview

This brief is based on EPRI Report "Charting the Course: Practical Considerations and Project Delivery Timelines for Energy Technologies"

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