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Analysis of PJM Interconnection Queue Projects with Signed ISAs

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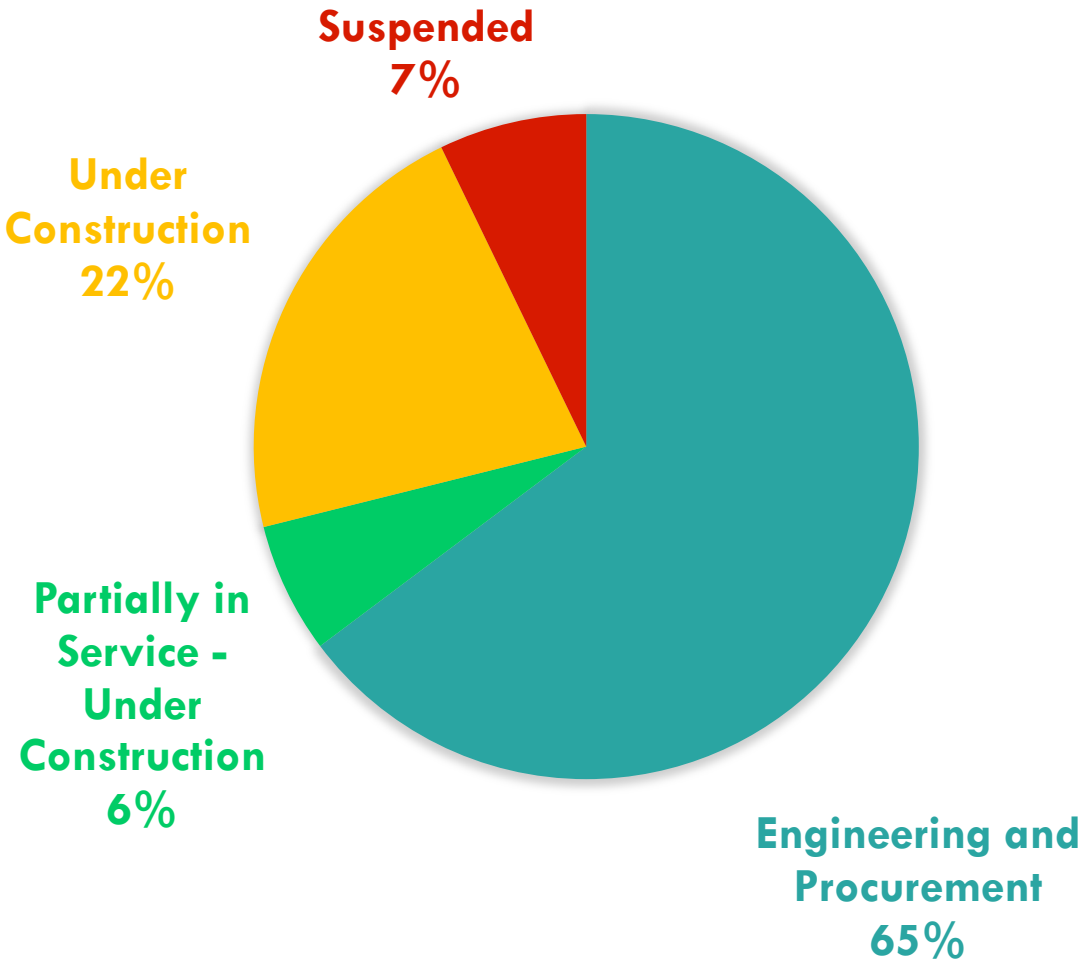
Objectives of this analysis

- Learn more about the characteristics of projects in PJM's queue that have signed ISAs but are not yet built, using PJM's online queue dataset
  - Data downloaded on June 20, 2023
- Highlight any patterns or trends around project type (technology, location, etc.) that might point towards causes of delayed commercial operations date (COD)
- Tee up questions for qualitative analysis (survey of project owners in collaboration with Columbia University) to more fully understand the reasons why these projects might be struggling to come online

Executive Summary – Project Status

RMI analysis of PJM's publicly available queue data found **38 GW*** of projects in PJM's queue with signed ISAs that are not yet in service

- **7%** of these projects are **suspended****
- **93%** remain **in development** (Engineering, Procurement, or Construction)



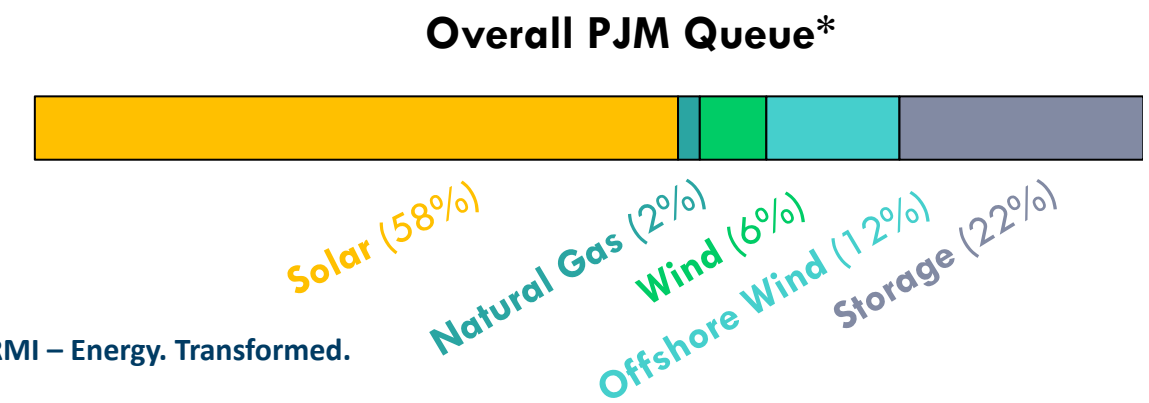
*Note: 38 GW is nameplate capacity.

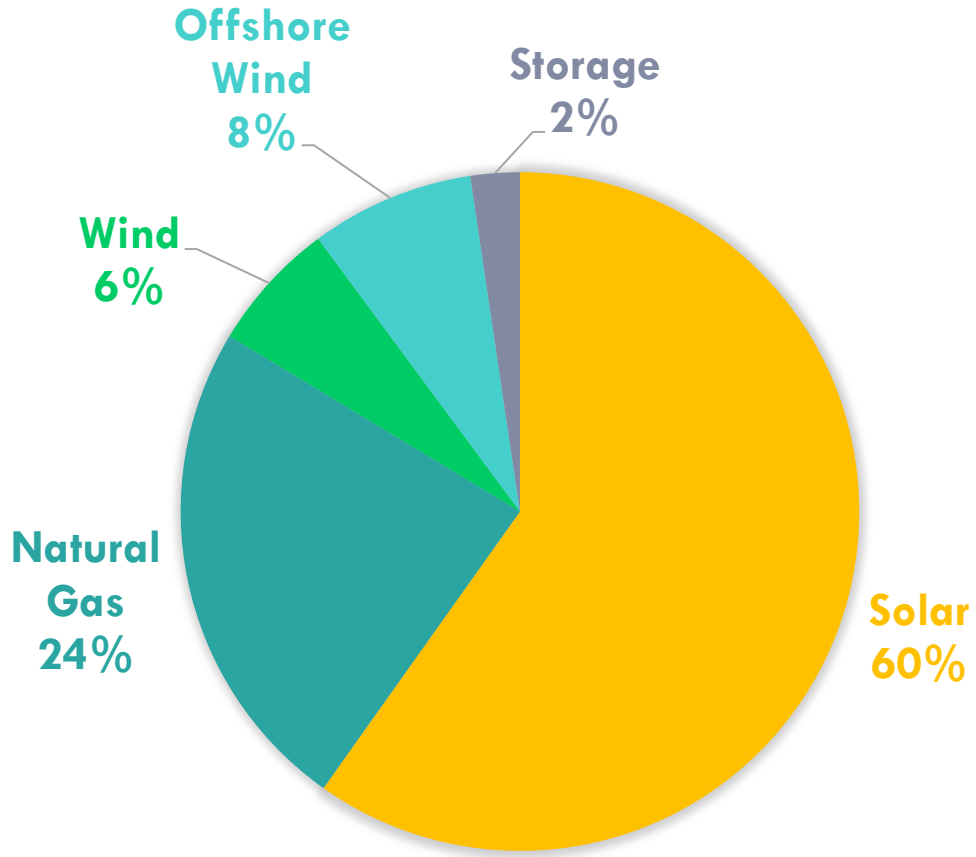
** Suspended projects are those placed on hold but may ultimately still be built. Data in this deck was downloaded on June 20, 2023 from the PJM website

Executive Summary – Project Technologies

Of the **38 GW** of projects in PJM's queue with signed ISAs:

- The most common technologies are **solar** (60%) and **natural gas** (24%)
- Compared to the overall queue, **natural gas** and **solar** are overrepresented while **offshore wind** and **storage** are underrepresented



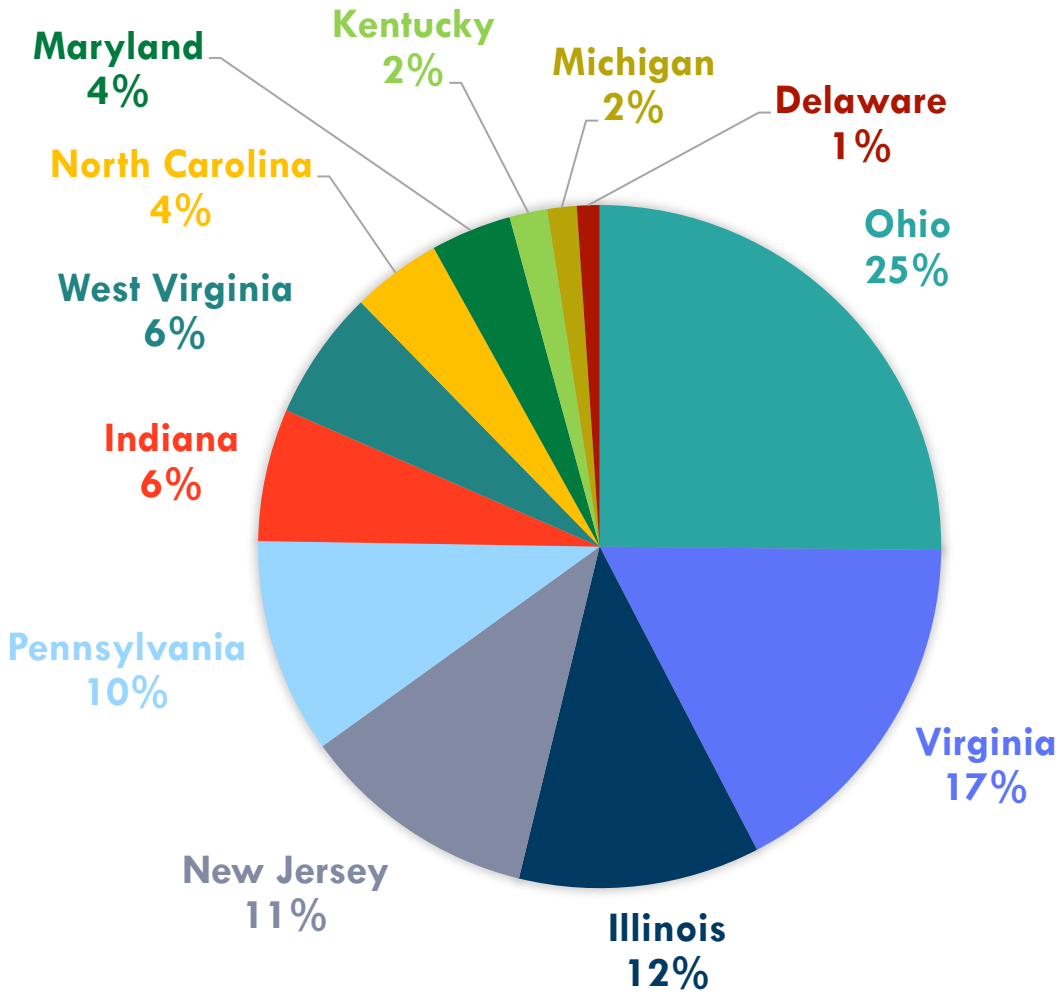


*Includes all active projects in the queue

Executive Summary – Project Locations

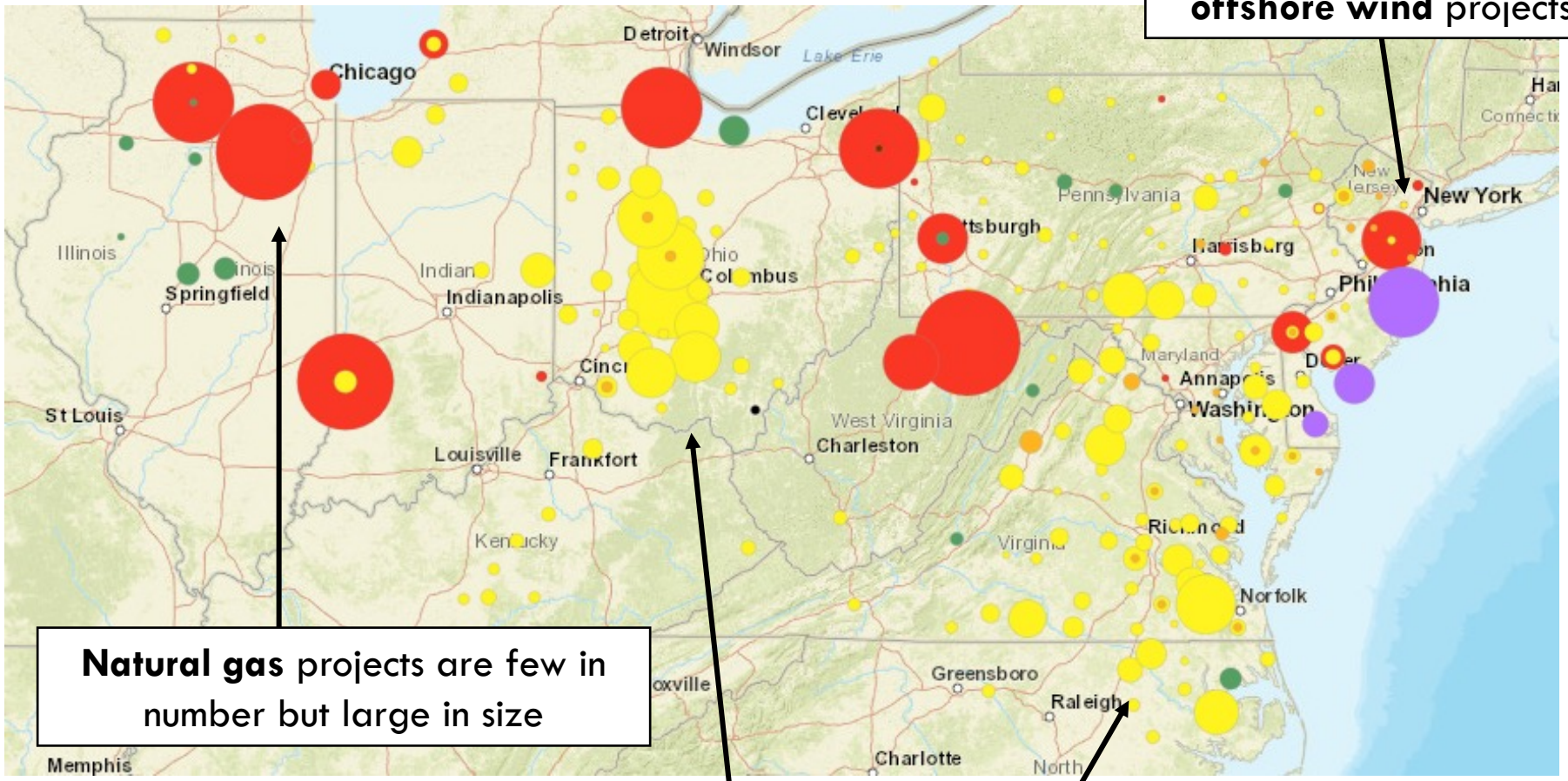
Of the **38 GW** of projects in PJM's queue with signed ISAs:

- The top five states where these projects are located are
  - **Ohio** (25%)
  - **Virginia** (17%)
  - **Illinois** (12%)
  - **New Jersey** (11%)
  - **Pennsylvania** (10%)



Percentages are on a nameplate capacity basis.

Projects are not uniformly distributed across PJM



The coastline hosts several **offshore wind** projects

Natural gas projects are few in number but large in size

Solar projects are clustered mainly in Ohio and Virginia

Legend

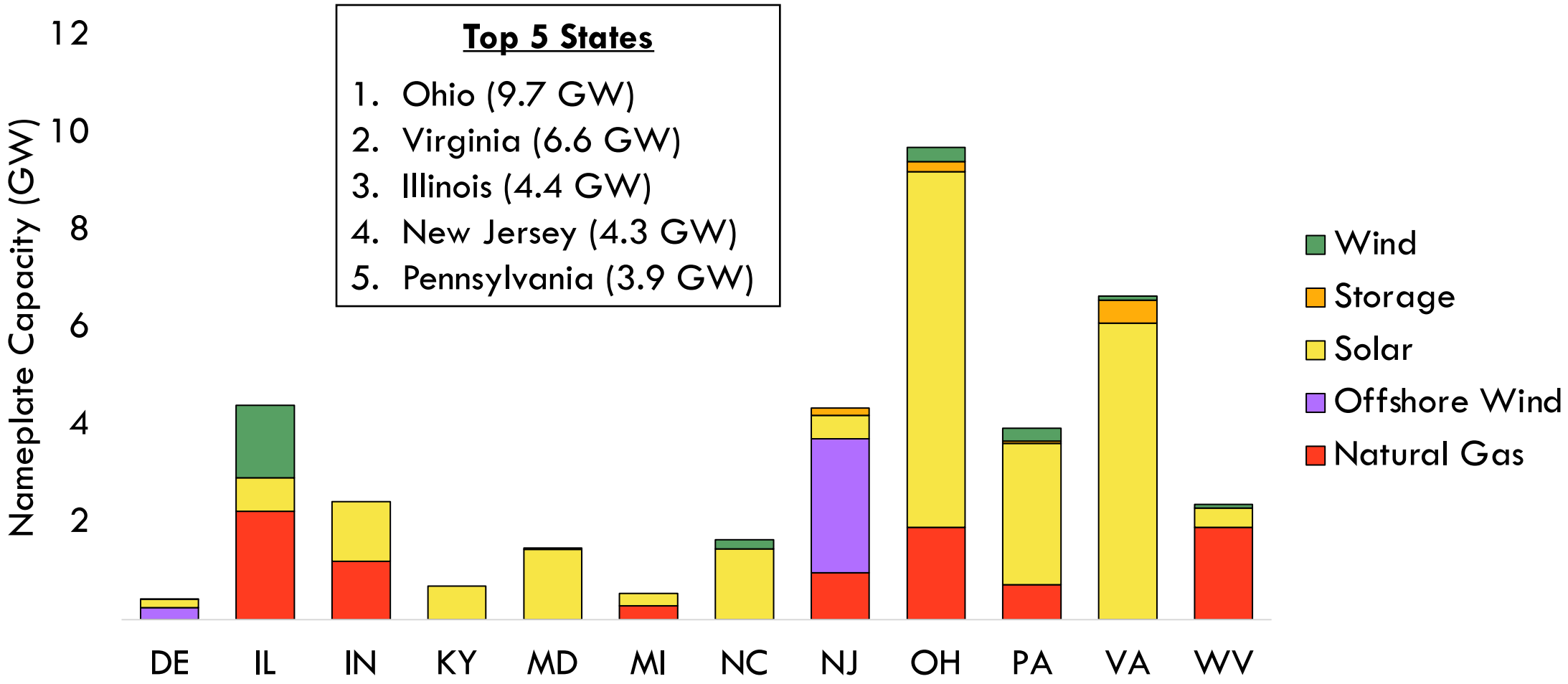
- Solar
- Storage
- Natural Gas
- Wind
- Oil
- Offshore Wind
- Coal
- Hydro
- Nuclear

Nameplate capacity (MW)

> 1,270
1,000
600
300

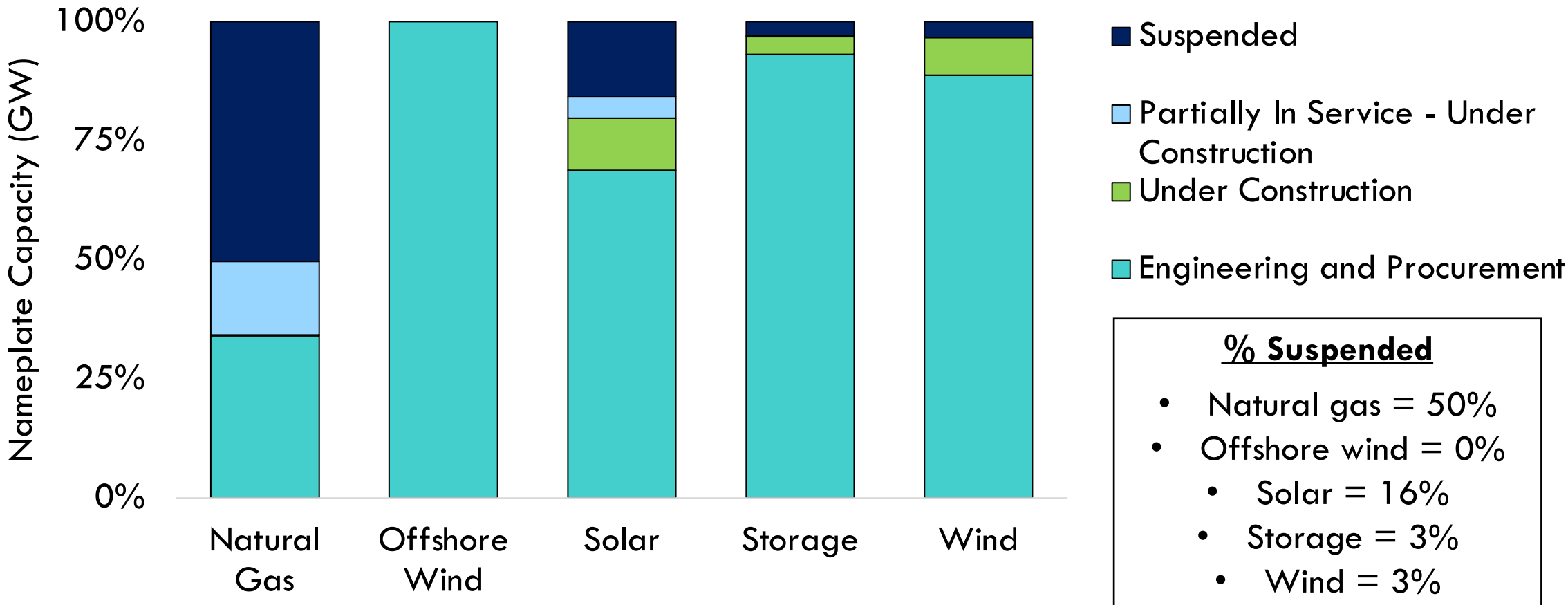
Link to map

Top states by volume of projects with signed ISAs include OH, VA, PA, IL, and NJ



Includes Engineering & Procurement, Under Construction, Partially In Service–Under Construction, and Suspended projects

Among the projects with signed ISAs, suspension rates vary by project technology

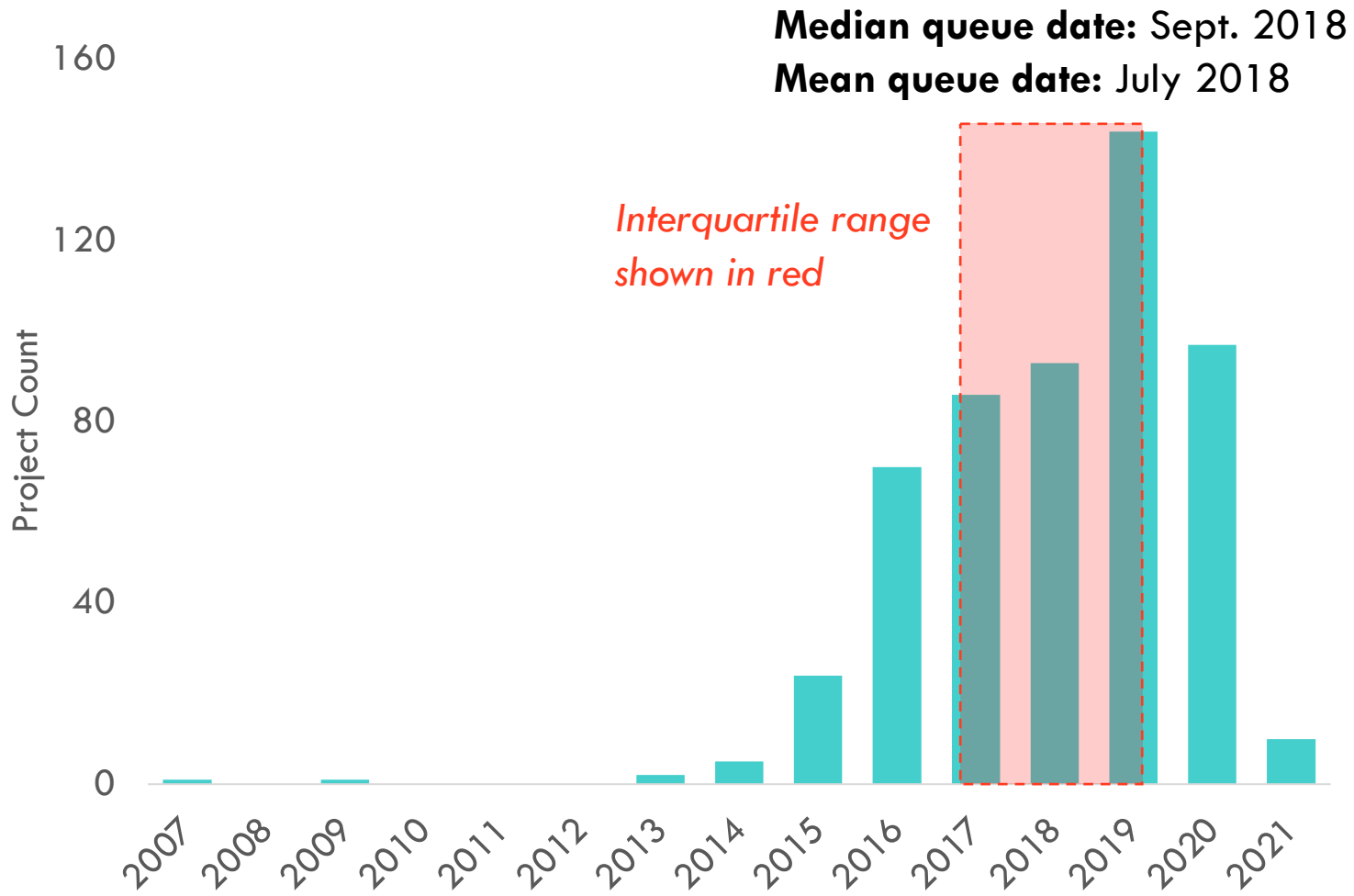


% Suspended

- Natural gas = 50%
- Offshore wind = 0%
- Solar = 16%
- Storage = 3%
- Wind = 3%

Note that projects can experience delays in any status category, not just "Suspended"

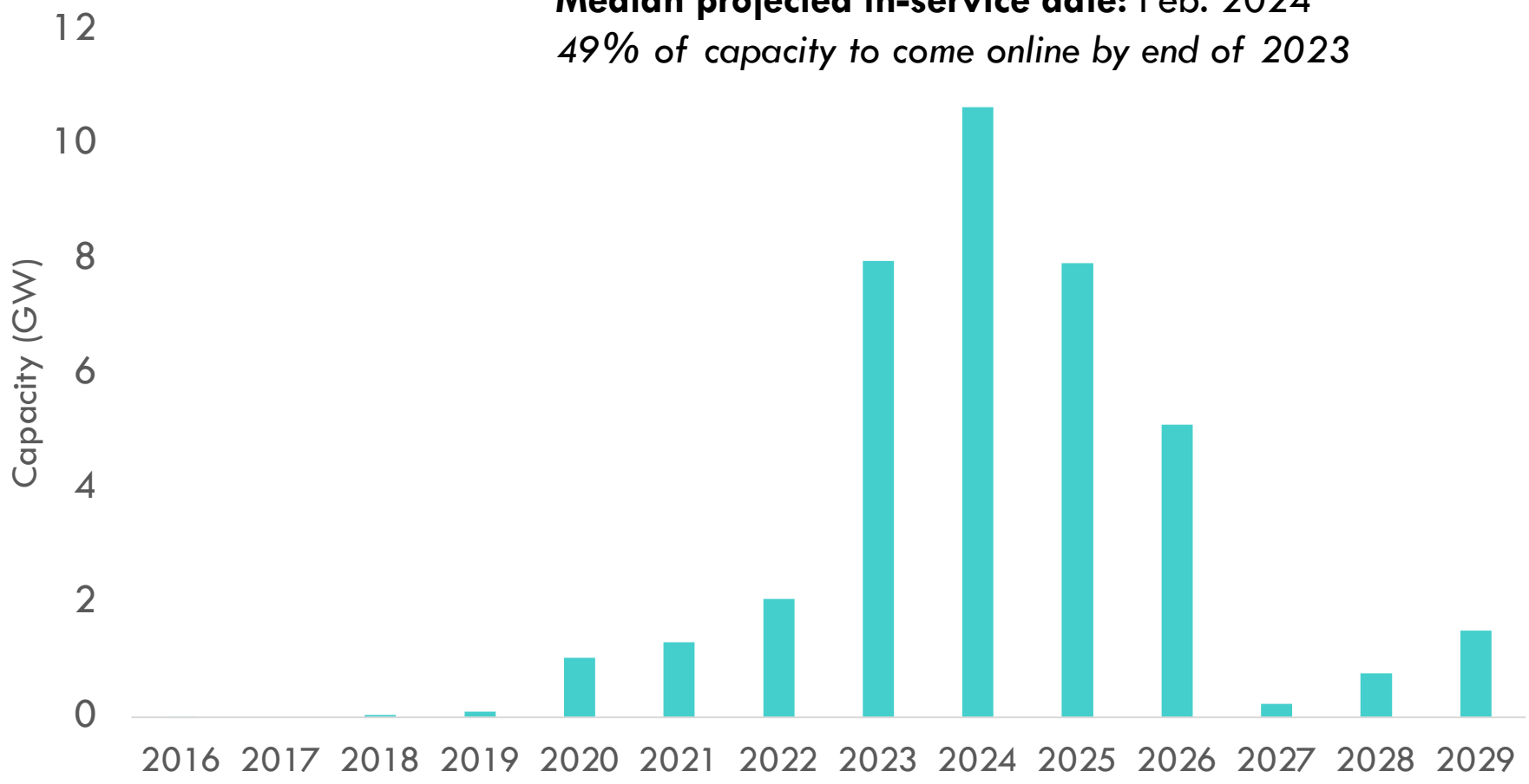
Projects with signed ISAs mainly entered the queue between 2017 and 2019



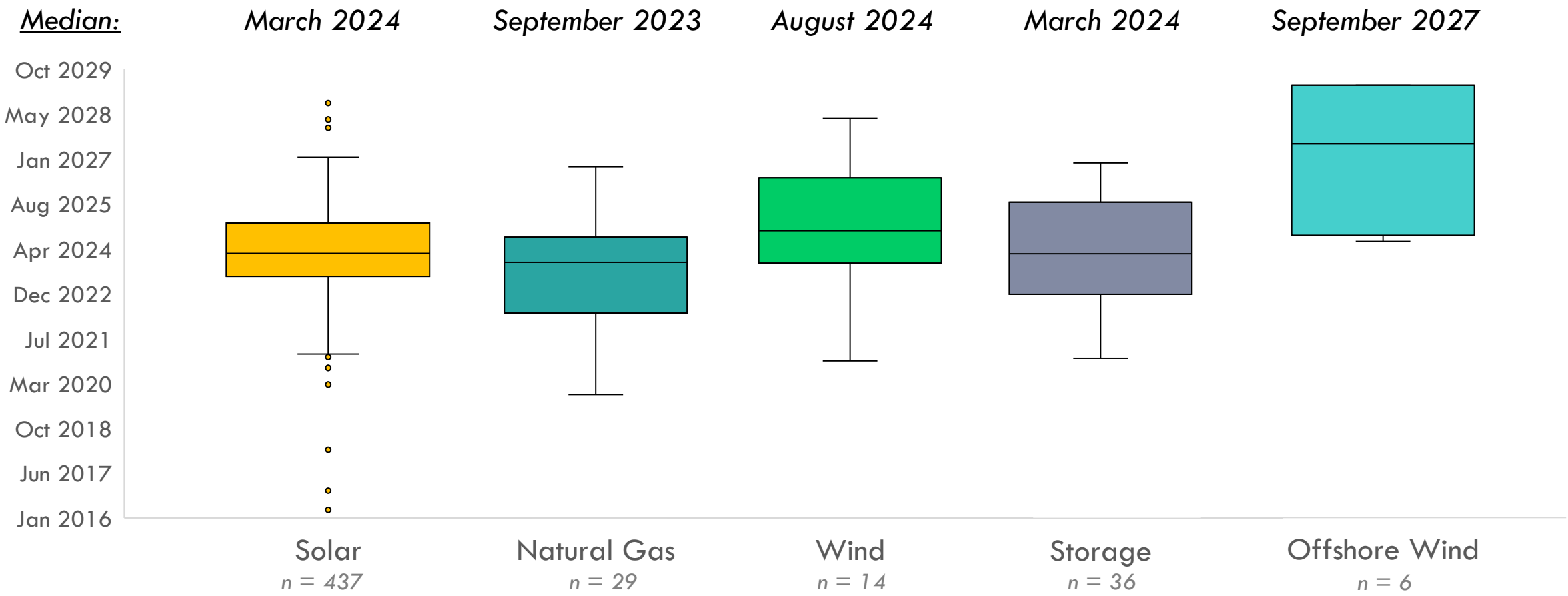
Most of these projects expect to come online between 2023 and 2026

Median projected in-service date: Feb. 2024

49% of capacity to come online by end of 2023

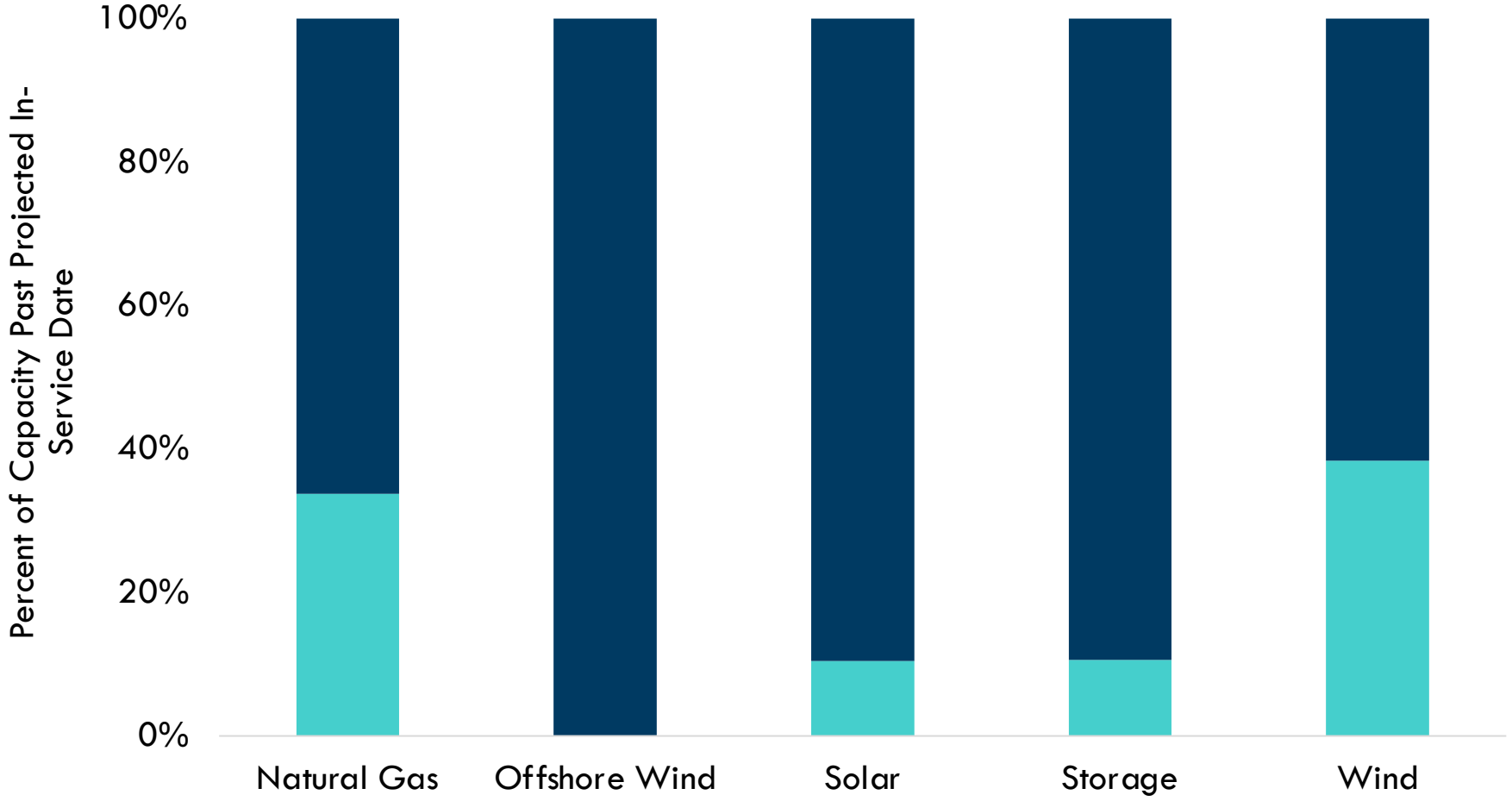


There is significant variation by technology of when projects expect to come online



Date of signed ISA is preliminary from scraping ISA PDFs and was obtained by Devan Samant (Columbia University) only for projects that entered the queue in 2017 or later. Data on this slide was downloaded on May 16, 2023.

Whether projects are on track with their in-service dates varies by project technology, with some more likely to be past due

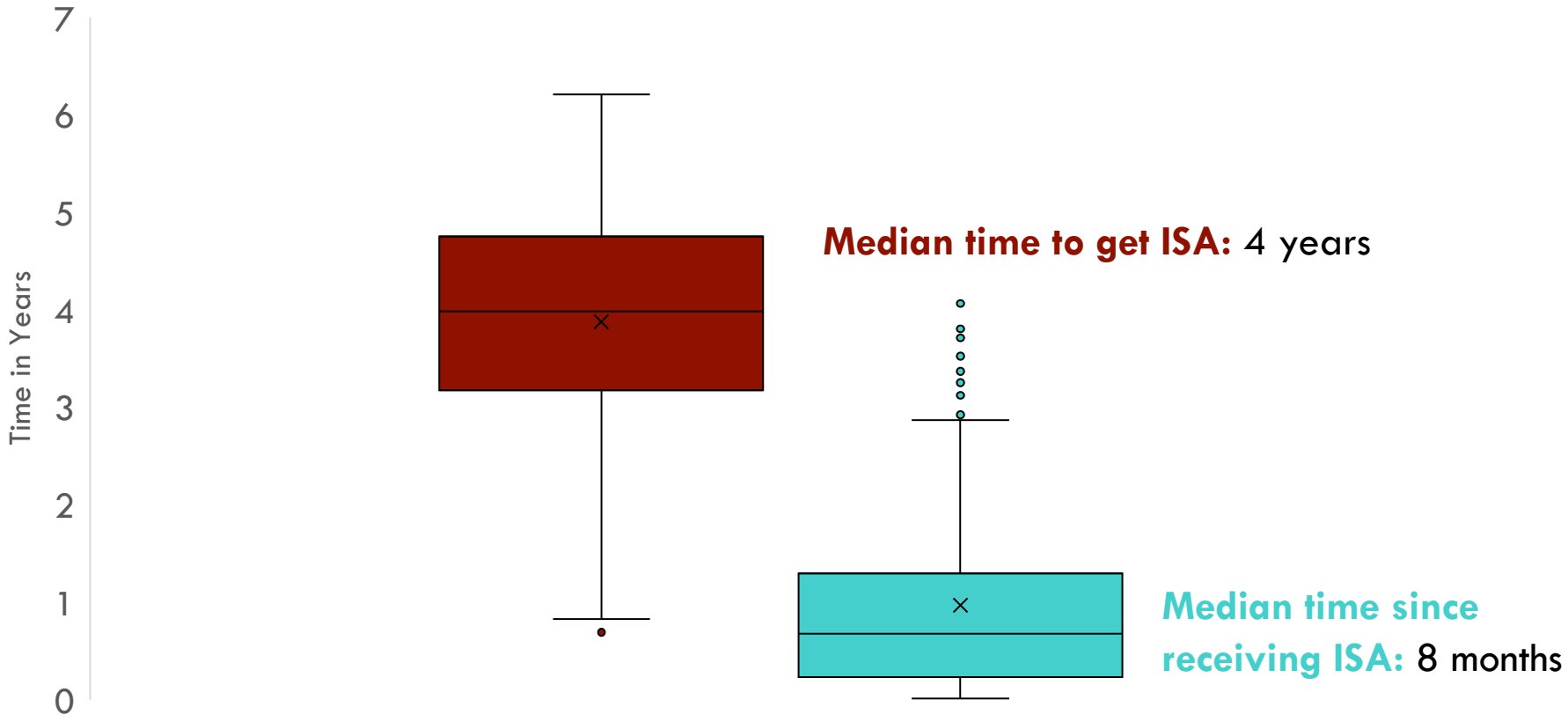


Key Takeaways

- On average, **17%** of project nameplate capacity is **past** its **projected in-service date**
- There is significant variation by fuel type, with **34%** of **natural gas** project capacity past its in-service date compared to **20%** of **clean energy** projects (averaged)

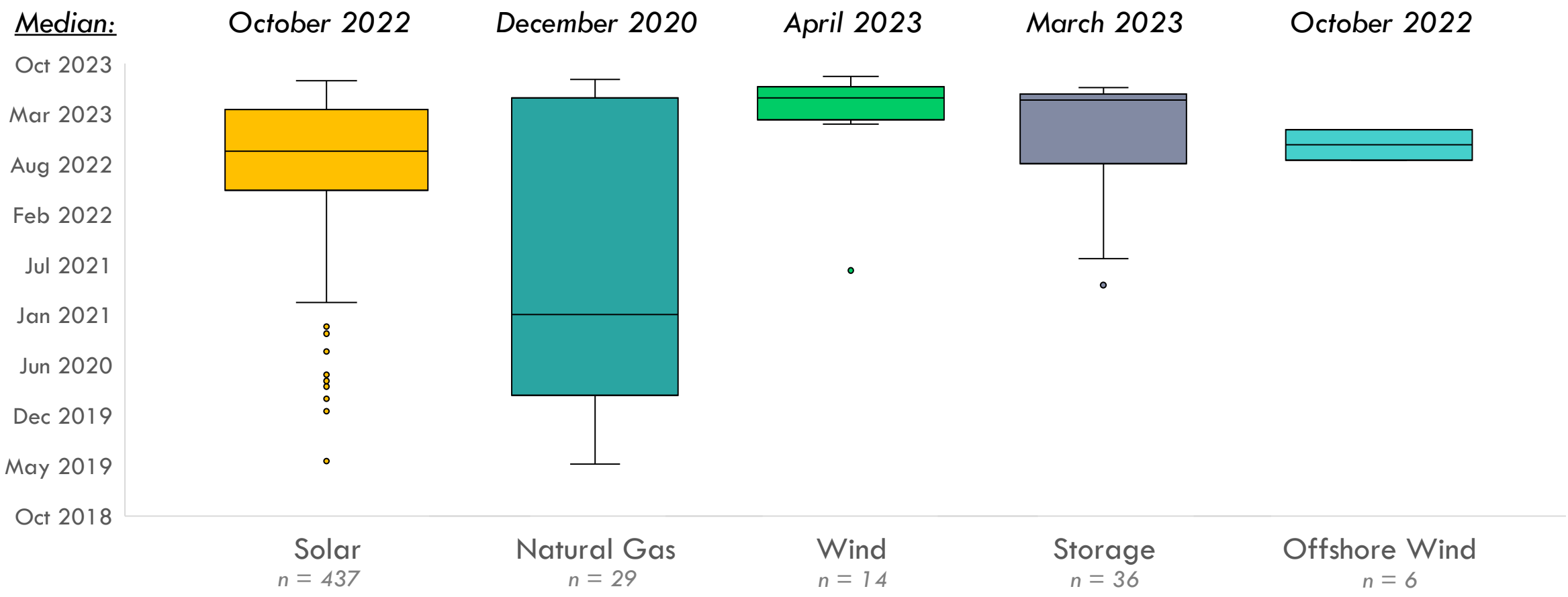
Light blue bar represents the percent of capacity by technology that is past its projected in-service date
***Dark blue** bar represents the percent of capacity that has yet to pass its projected in-service date*

Projects took about 4 years to get their signed ISAs compared to <1 year since receiving ISA



Date of signed ISA is preliminary from scraping ISA PDFs and was obtained by Devan Samant (Columbia University) only for projects that entered the queue in 2017 or later. Data on this slide was downloaded on May 16, 2023.

Natural gas projects received signed ISAs 24-30 months before clean energy projects, on average



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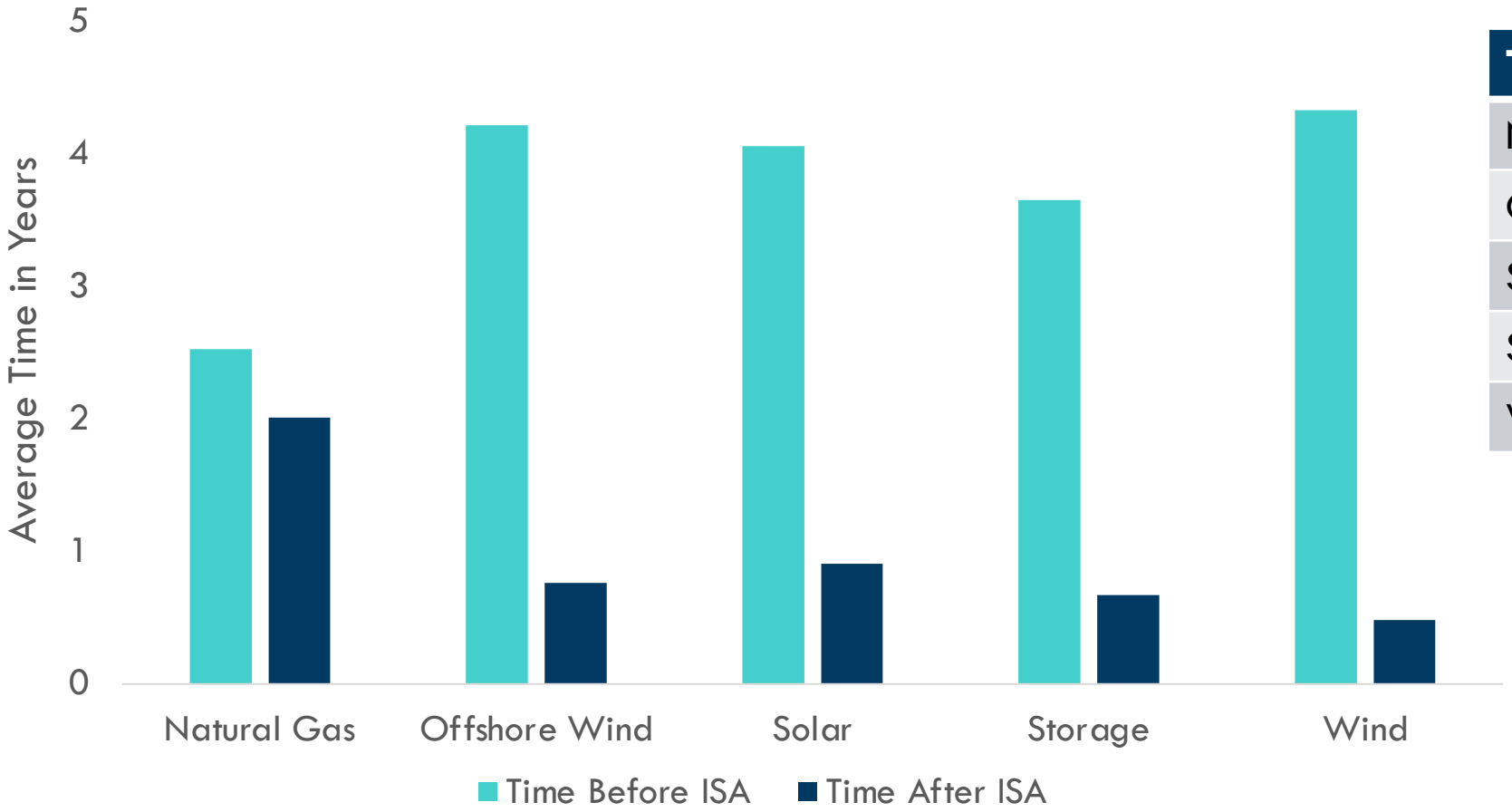
Clean energy experienced 60% higher wait times to receive an ISA

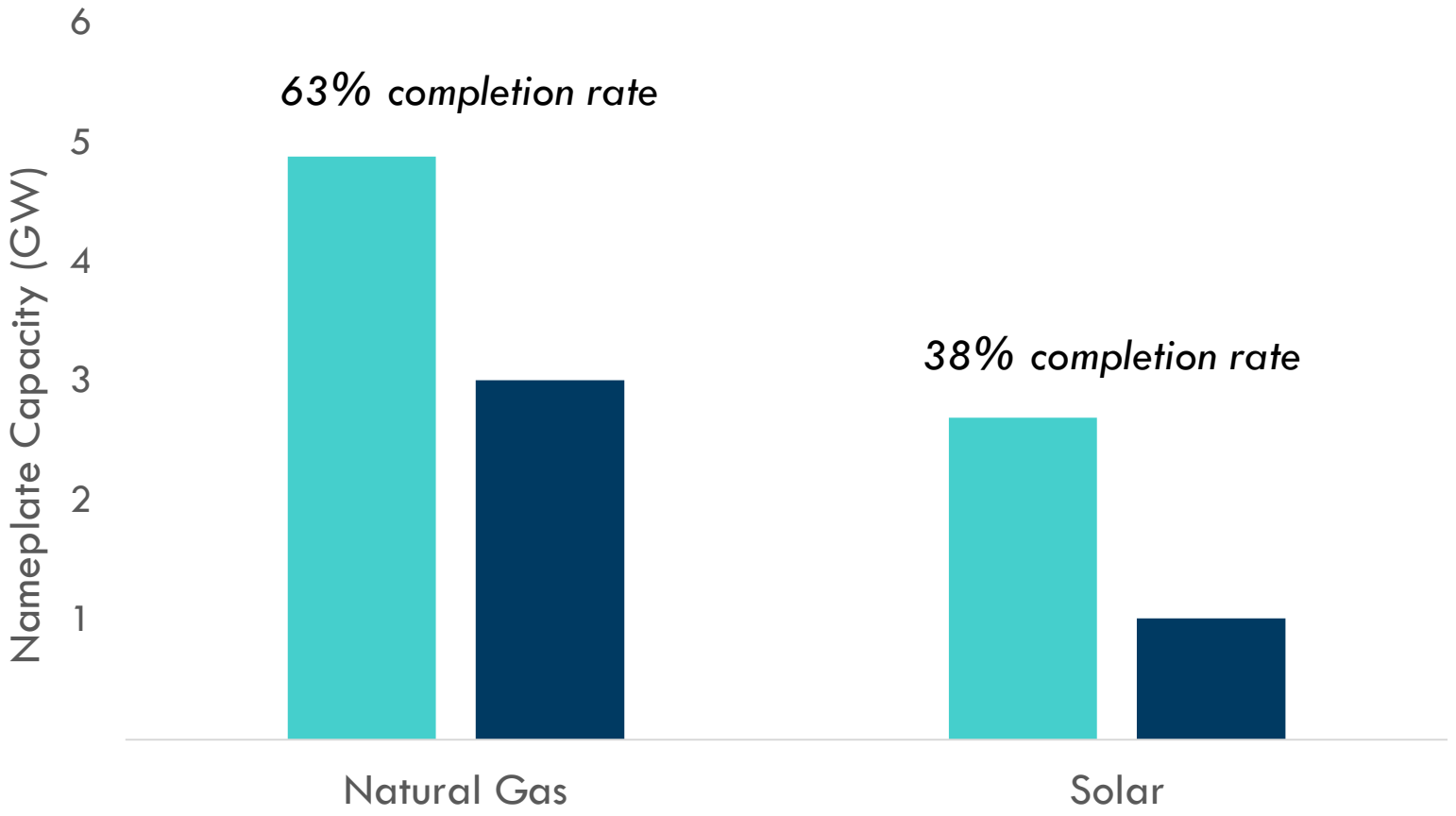


Technology	Median ISA Date
Natural Gas	December 2020
Offshore Wind	October 2022
Solar	October 2022
Storage	March 2023
Wind	April 2023

Note: Almost all natural gas projects analyzed were uprates to existing facilities, which can lead to shorter wait times for ISAs due to the less extensive analysis required for interconnection.

Date of signed ISA is preliminary from scraping ISA PDFs and was obtained by Devan Samant (Columbia University) only for projects that entered the queue in 2017 or later. Data on this slide was downloaded on May 16, 2023.

For projects that came online in 2022, completion rates vary by technology

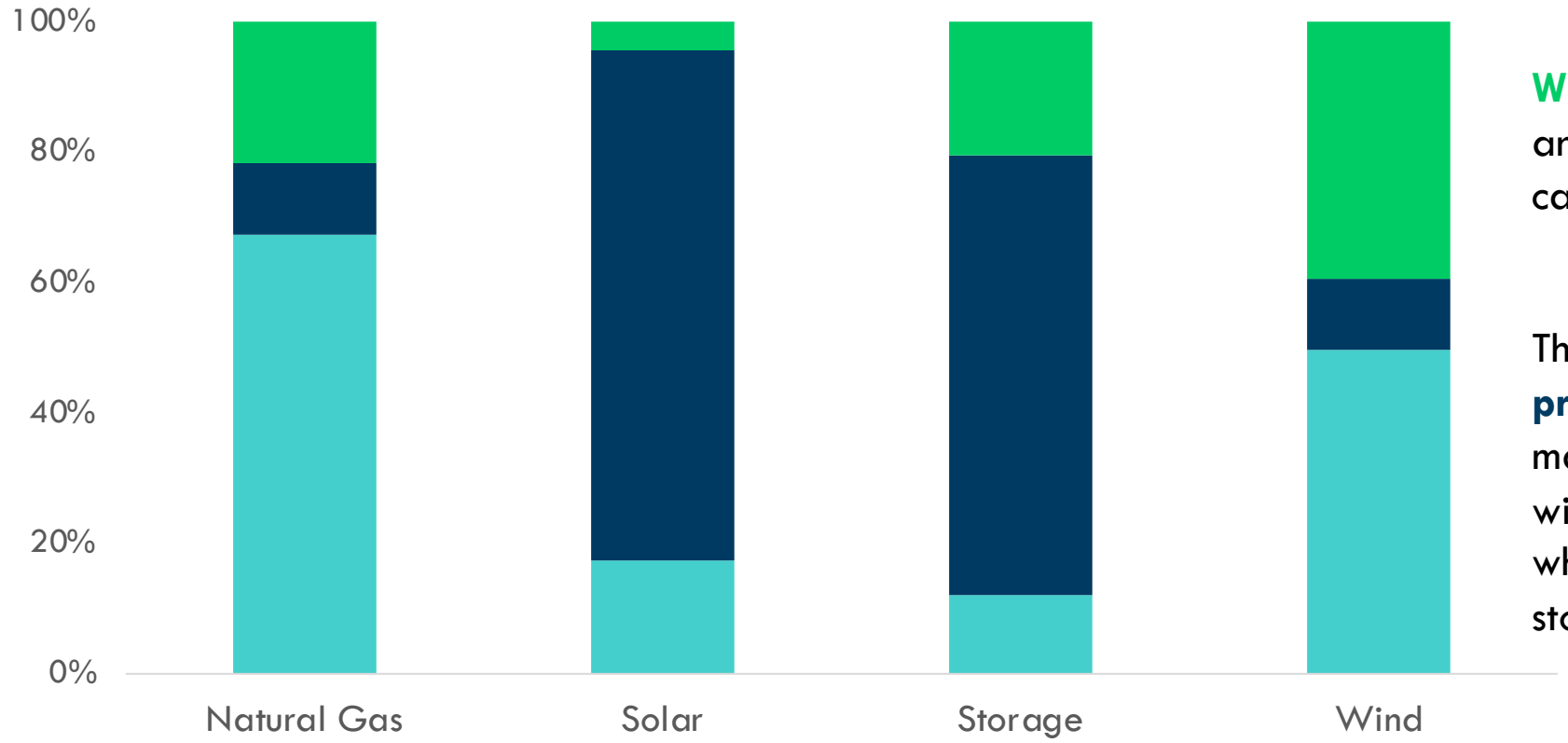


Legend

Projects with signed ISAs projected to be in service in 2022 or earlier

Projects that came into service in 2022

Throughout queue history, projects with signed ISAs have faced withdrawals



Withdrawn projects make up anywhere from 4% to 39% of total capacity with a signed ISA

The ratio of **in service** and **in progress** projects varies. More mature technologies (natural gas, wind) have higher portions in service while more novel ones (solar, storage) are largely still in progress.

In progress includes the following statuses: Engineering & Procurement, Under Construction, Suspended, or Partially In Service – Under Construction.

Percentages are based on nameplate capacity and include all projects with signed ISAs for the entire queue dataset.

Analysis Conclusions

- **93%** of projects with signed ISAs are still in **some phase of development**
- The top technologies represented among these projects with signed ISAs are **solar** (60%) and **natural gas** (24%)
- The top five states are **Ohio, Virginia, Illinois, New Jersey,** and **Pennsylvania**
- **17%** of project nameplate capacity is **past its projected in-service date**
  - 34% of natural gas capacity vs. 20% clean energy capacity
  - **~50%** of capacity expects to be in service by the **end of 2023**
- Projects took, on average, **four years** to get their signed ISAs
  - 2.5 years for natural gas vs. 4 years for clean energy, on average
- **Solar** projects had lower completion rates in 2022 compared to **natural gas**