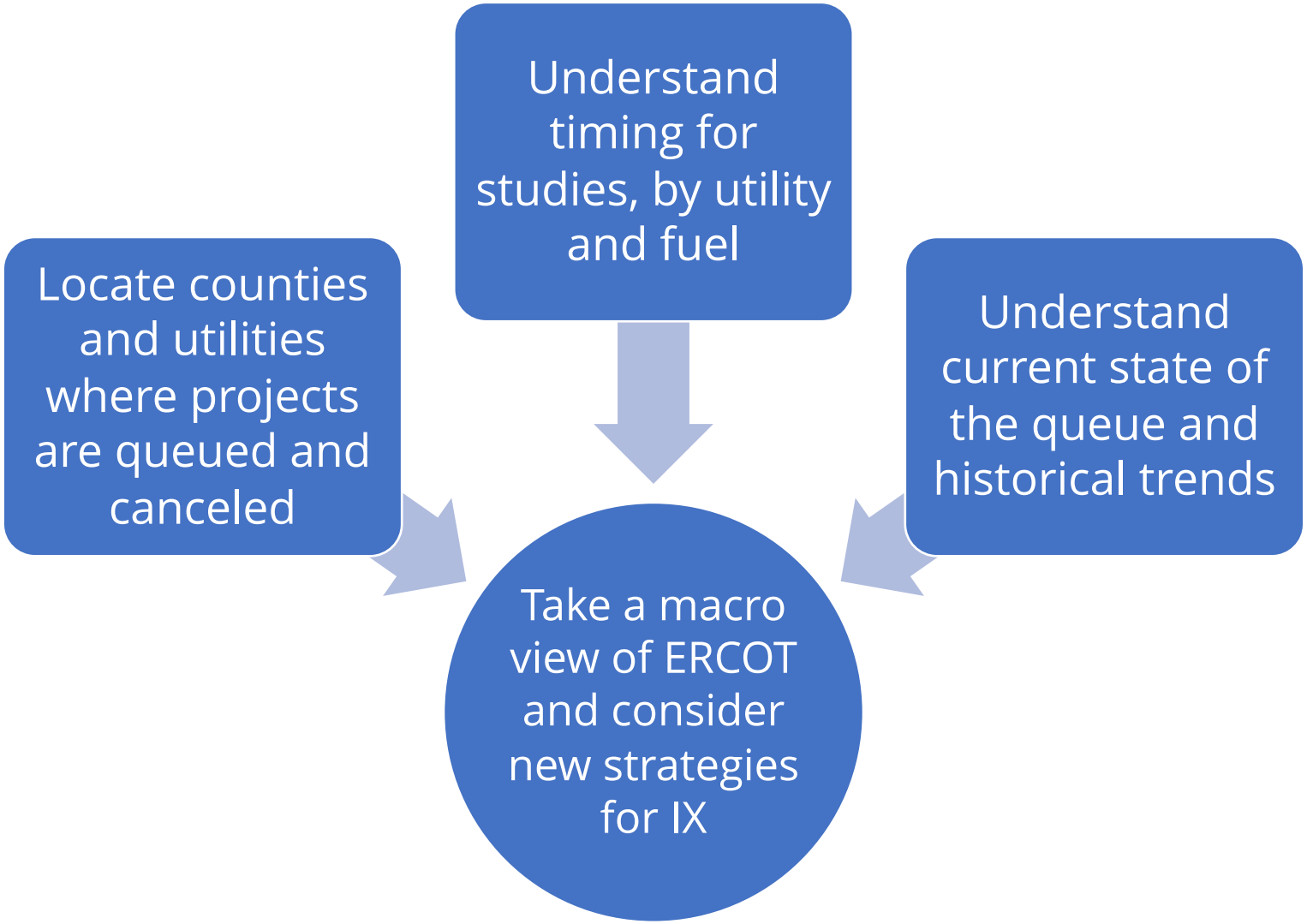
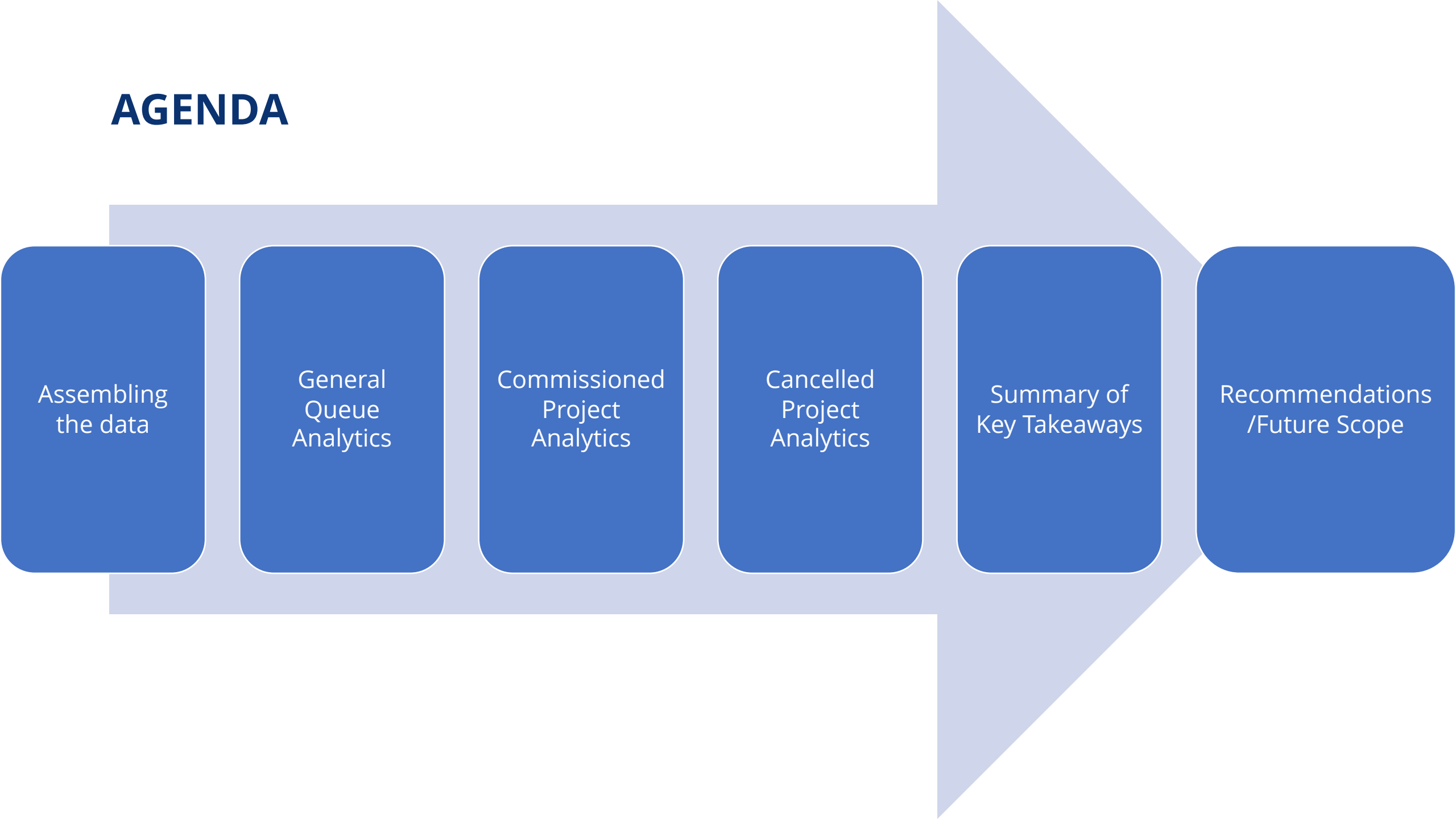
2023 Summer Internship Presentation

ERCOT Interconnection Queue Analytics

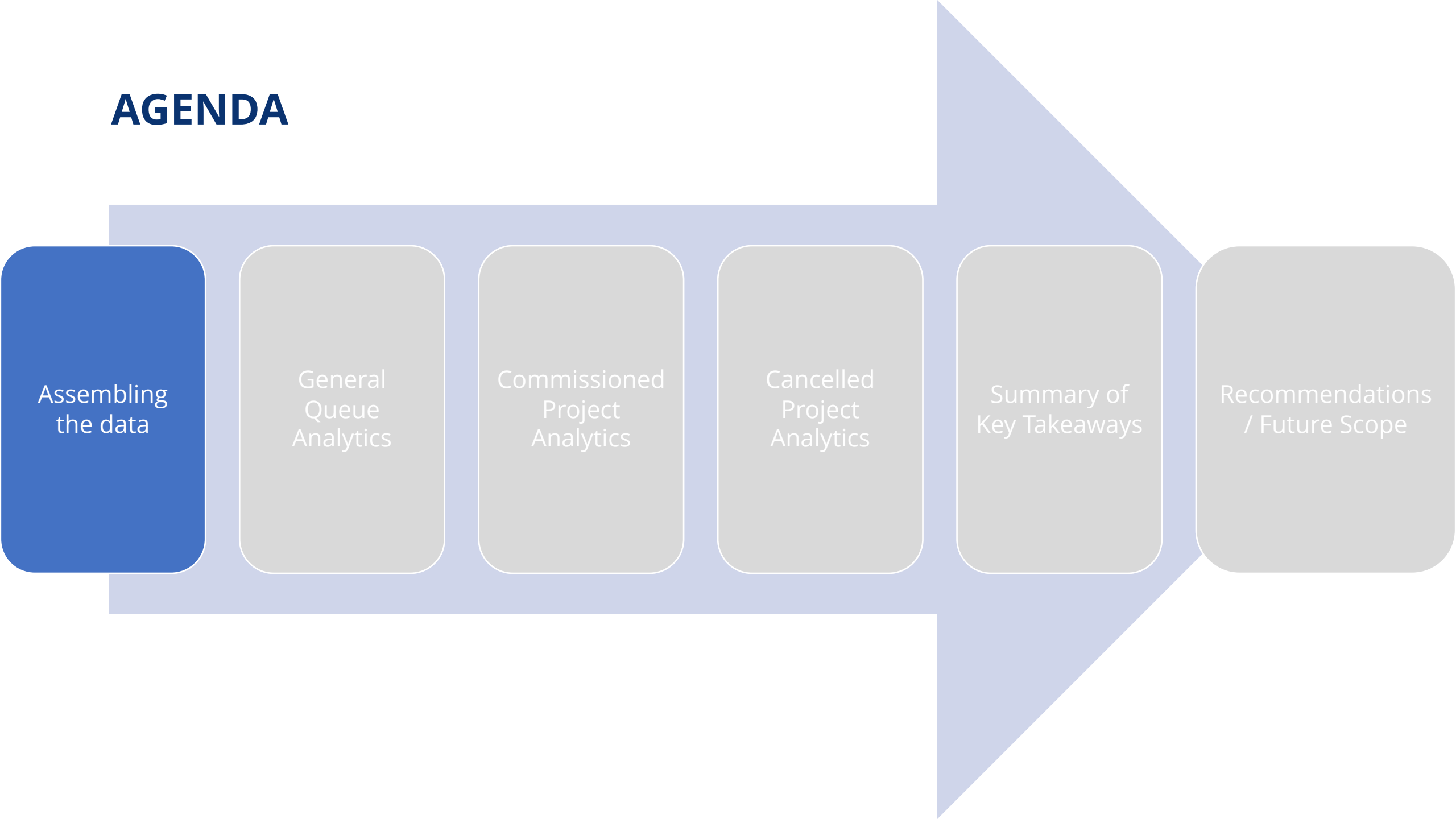
MOTIVATION


Understand timing for studies, by utility and fuel
Locate counties and utilities where projects are queued and canceled
Understand current state of the queue and historical trends
Take a macro view of ERCOT and consider new strategies for IX

AGENDA


Assembling the data
General Queue Analytics
Commissioned Project Analytics
Cancelled Project Analytics
Summary of Key Takeaways
Recommendations /Future Scope

AGENDA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WHERE ARE WE GETTING THE DATA?

ercot

About ERCOT | Services | Committees and Groups | Market Rules | Market Information | Grid Information | Market Participants

Home > Market Participants > EMIL > Data Product Details

GIS Report

Interconnection milestone and trend information for generation resources in the ERCOT region.

+ Show EMIL Information

Friendly Name	Posted		Available Files
Co-located_Battery_Identification_Report_June_2023	7/11/2023	9:19:26 AM	xlsx
GIS_Report_June_2023_Corrected	7/7/2023	4:59:28 PM	xlsx
GIS_Report_June_2023	7/3/2023	2:20:31 PM	xlsx
Co-located_Battery_Identification_Report_May_2023	6/12/2023	3:12:39 PM	xlsx
GIS_Report_May_2023	6/1/2023	4:19:33 PM	xlsx
Co-located_Battery_Identification_Report_April_2023	5/9/2023	8:57:43 AM	xlsx
GIS_Report_April_2023	5/1/2023	3:35:42 PM	xlsx
Co-located_Battery_Identification_Report_March_2023	4/12/2023	10:03:46 AM	xlsx
GIS_Report_March_2023	4/3/2023	4:36:45 PM	xlsx

Shares Same Rule: PG7.1(2)

2006 GINR Screening, Steady-State, Short-Circuit and Facilities Reports

2006 GINR Stability and SSO Reports

2008 GINR Screening, Steady-State, Short-Circuit and Facilities Reports

2008 GINR Stability and SSO Reports

2009 GINR Screening, Steady-State, Short-Circuit and Facilities Reports

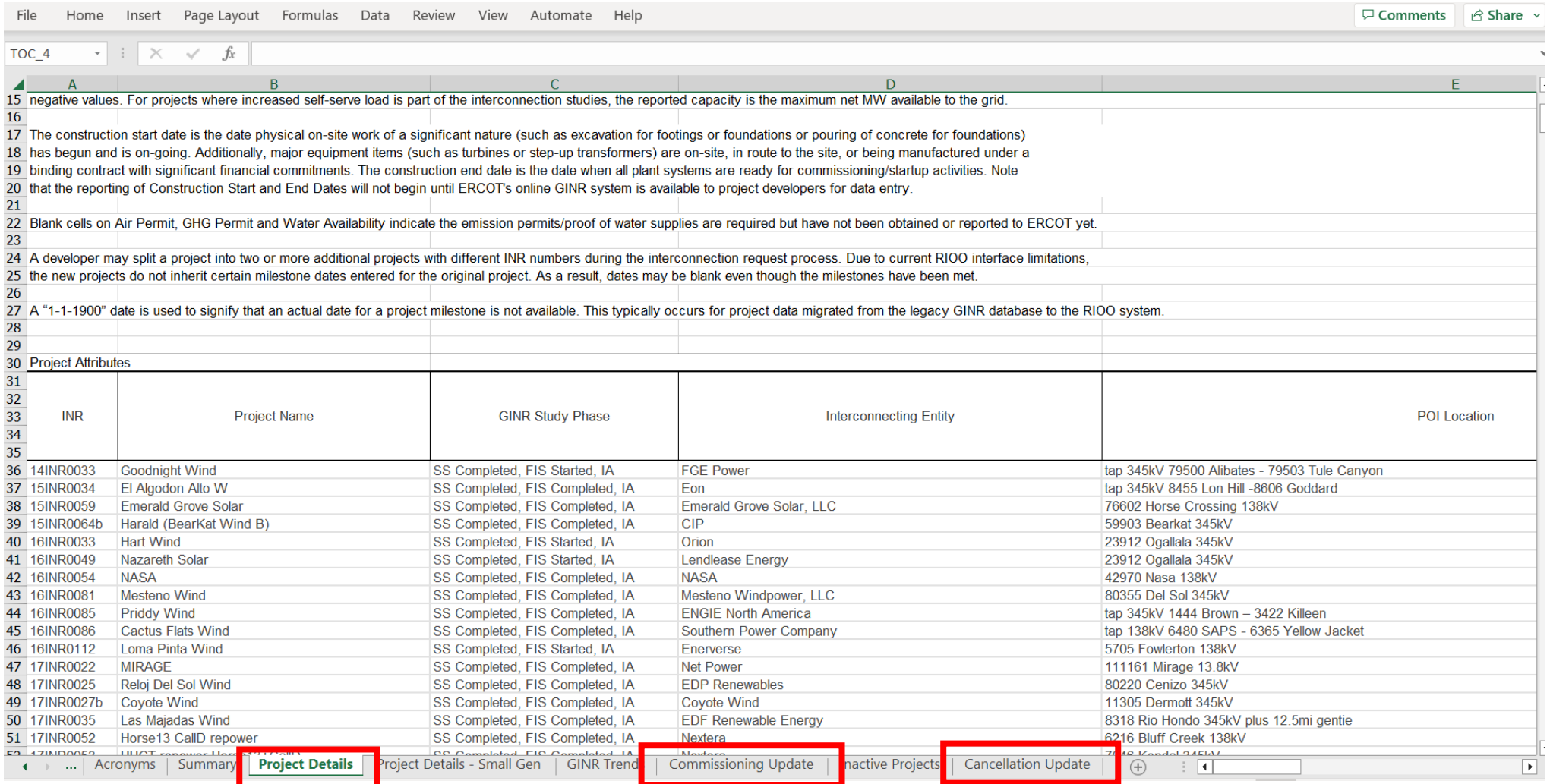
→ Browse 2939 Products for Rule PG7.1(2)

Search Related To

Interconnection Studies

Help

EXCEL DATA!



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TOC_4

negative values. For projects where increased self-serve load is part of the interconnection studies, the reported capacity is the maximum net MW available to the grid.

The construction start date is the date physical on-site work of a significant nature (such as excavation for footings or foundations or pouring of concrete for foundations) has begun and is on-going. Additionally, major equipment items (such as turbines or step-up transformers) are on-site, in route to the site, or being manufactured under a binding contract with significant financial commitments. The construction end date is the date when all plant systems are ready for commissioning/startup activities. Note that the reporting of Construction Start and End Dates will not begin until ERCOT's online GINR system is available to project developers for data entry.

Blank cells on Air Permit, GHG Permit and Water Availability indicate the emission permits/proof of water supplies are required but have not been obtained or reported to ERCOT yet.

A developer may split a project into two or more additional projects with different INR numbers during the interconnection request process. Due to current RIOO interface limitations, the new projects do not inherit certain milestone dates entered for the original project. As a result, dates may be blank even though the milestones have been met.

A "1-1-1900" date is used to signify that an actual date for a project milestone is not available. This typically occurs for project data migrated from the legacy GINR database to the RIOO system.

Project Attributes

INR	Project Name	GINR Study Phase	Interconnecting Entity	POI Location
14INR0033	Goodnight Wind	SS Completed, FIS Started, IA	FGE Power	tap 345kV 79500 Alibates - 79503 Tule Canyon
15INR0034	El Algodon Alto W	SS Completed, FIS Completed, IA	Eon	tap 345kV 8455 Lon Hill -8606 Goddard
15INR0059	Emerald Grove Solar	SS Completed, FIS Completed, IA	Emerald Grove Solar, LLC	76602 Horse Crossing 138kV
15INR0064b	Harald (BearKat Wind B)	SS Completed, FIS Completed, IA	CIP	59903 Bearkat 345kV
16INR0033	Hart Wind	SS Completed, FIS Started, IA	Orion	23912 Ogallala 345kV
16INR0049	Nazareth Solar	SS Completed, FIS Started, IA	Lendlease Energy	23912 Ogallala 345kV
16INR0054	NASA	SS Completed, FIS Completed, IA	NASA	42970 Nasa 138kV
16INR0081	Mesteno Wind	SS Completed, FIS Completed, IA	Mesteno Windpower, LLC	80355 Del Sol 345kV
16INR0085	Priddy Wind	SS Completed, FIS Completed, IA	ENGIE North America	tap 345kV 1444 Brown – 3422 Killeen
16INR0086	Cactus Flats Wind	SS Completed, FIS Completed, IA	Southern Power Company	tap 138kV 6480 SAPS - 6365 Yellow Jacket
16INR0112	Loma Pinta Wind	SS Completed, FIS Started, IA	Enerverse	5705 Fowlerton 138kV
17INR0022	MIRAGE	SS Completed, FIS Completed, IA	Net Power	111161 Mirage 13.8kV
17INR0025	Reloj Del Sol Wind	SS Completed, FIS Completed, IA	EDP Renewables	80220 Cenizo 345kV
17INR0027b	Coyote Wind	SS Completed, FIS Completed, IA	Coyote Wind	11305 Dermott 345kV
17INR0035	Las Majadas Wind	SS Completed, FIS Completed, IA	EDF Renewable Energy	8318 Rio Hondo 345kV plus 12.5mi gentie
17INR0052	Horse13 CallD repower	SS Completed, FIS Completed, IA	Nextera	6216 Bluff Creek 138kV

... | Acronyms | Summary | Project Details | Project Details - Small Gen | GINR Trend | Commissioning Update | Inactive Projects | Cancellation Update

LIST OF COLUMNS IN EXCEL DATA

- INR
- Project Name
- GIM Study Phase
- Interconnecting Entity
- POI Location
- County
- CDR Reporting Zone
- Projected COD
- Fuel
- Technology
- Capacity (MW)
- Change Indicators
- Proof of Site Control
- Screening Study Started
- Screening Study Completed
- FIS Requested
- FIS Approved
- Economic Study Required
- IA Signed
- Financial Security and NTP
- Air Permit
- GHG Permit
- Water Availability
- 6.9(1) Date
- 6.9 Date
- 5.9 Date
- Construction Start
- Construction Finish
- Energization
- Synchronization
- Comment
- TSP/Utility

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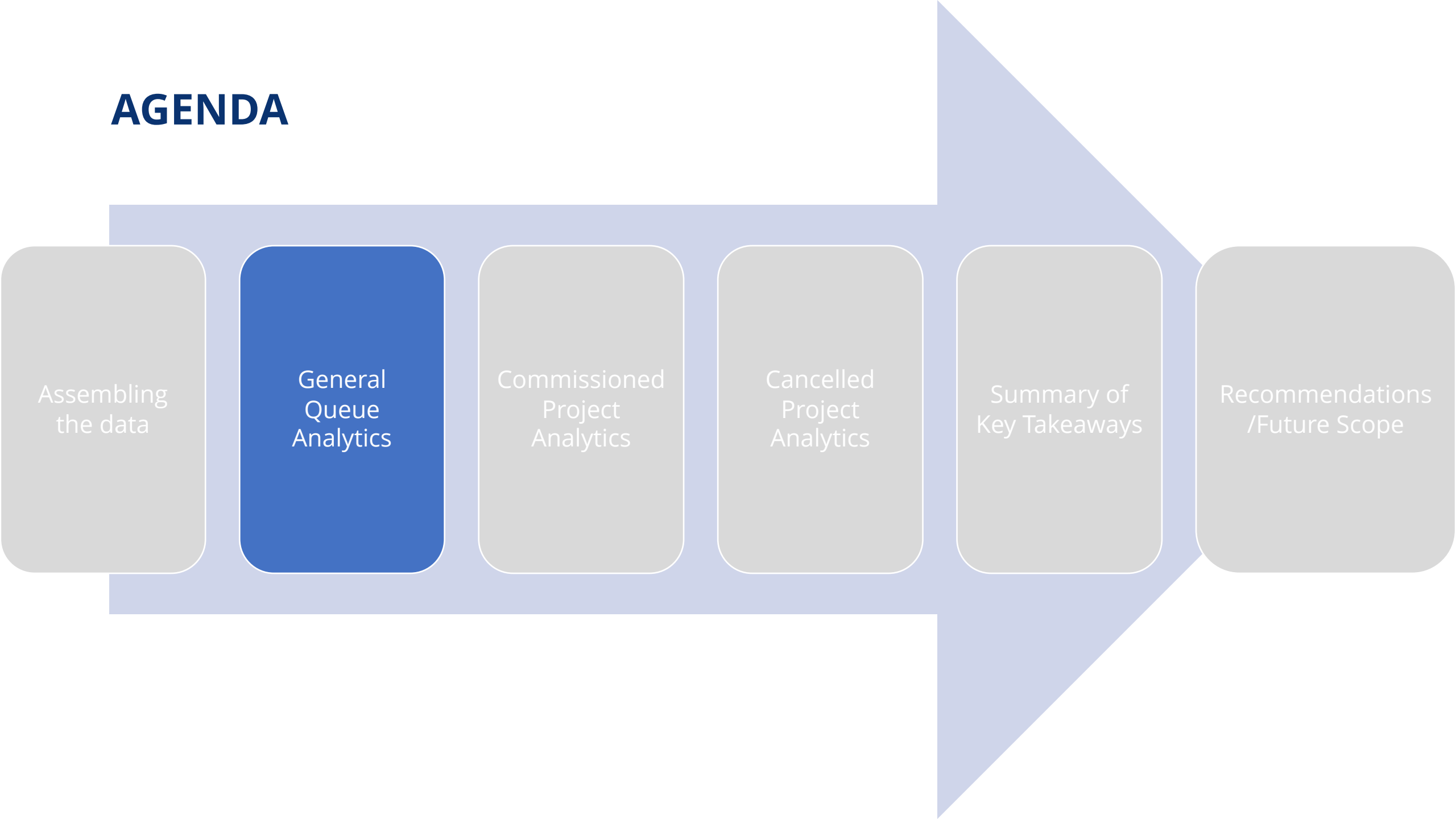
AGENDA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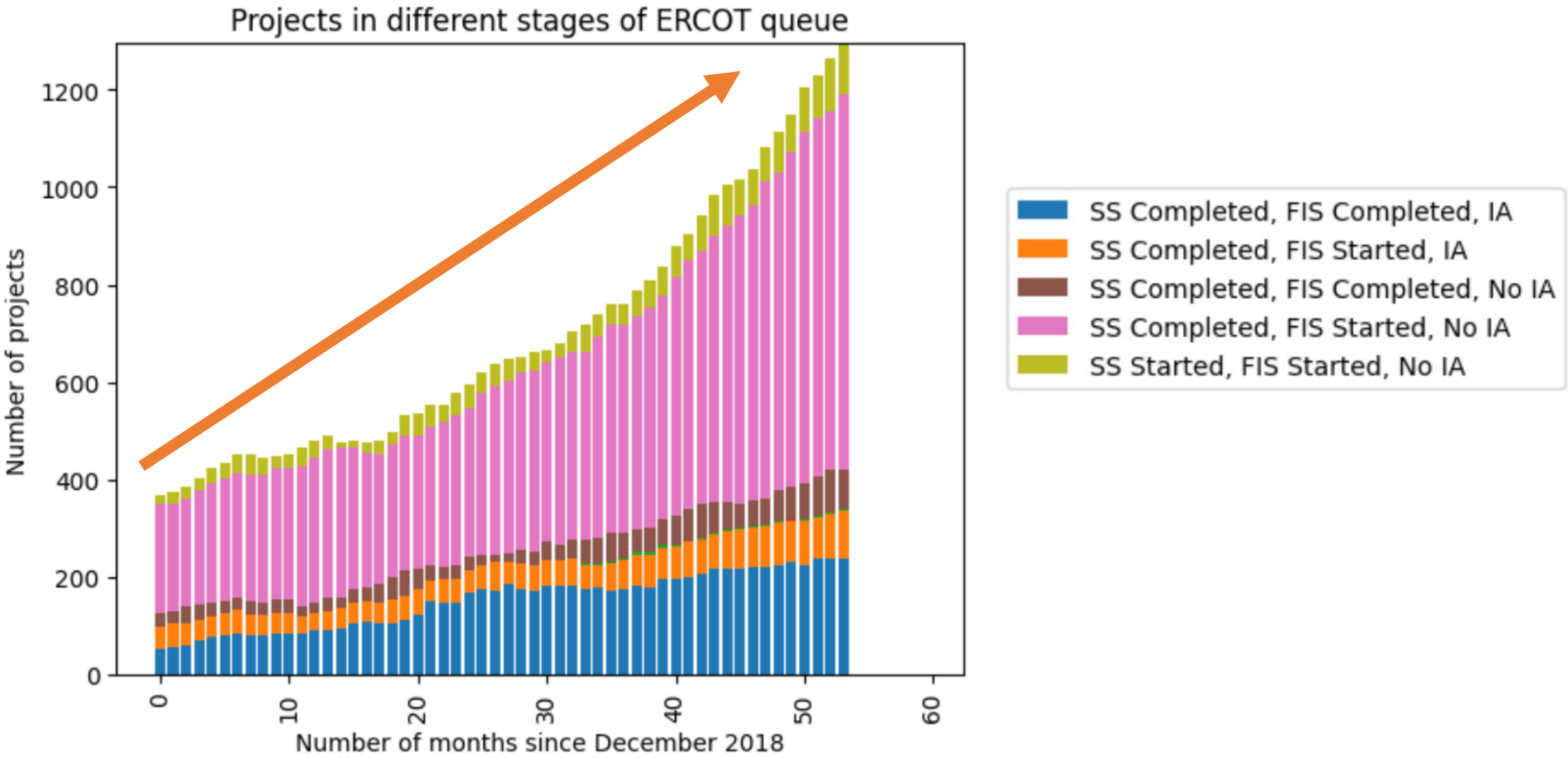
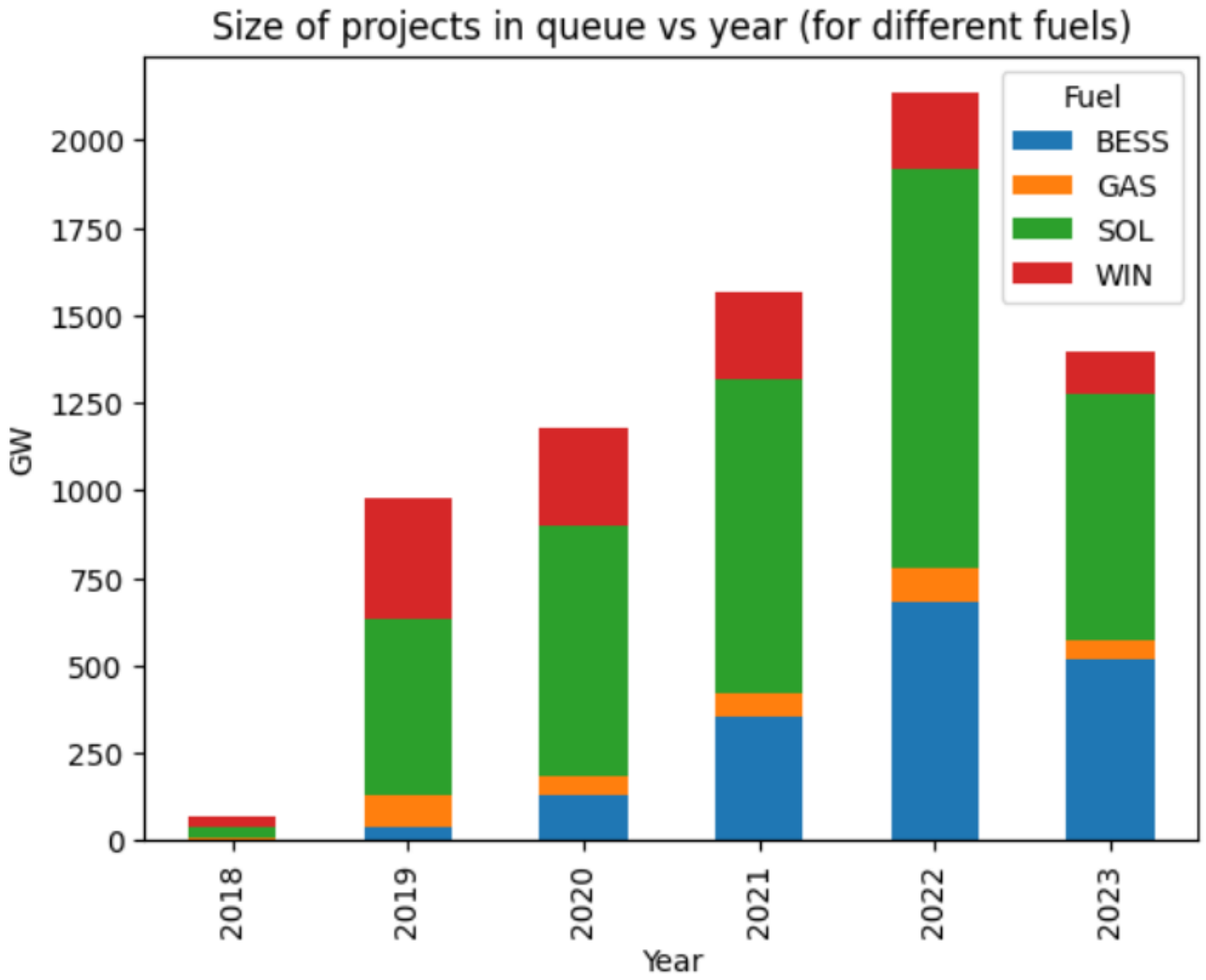
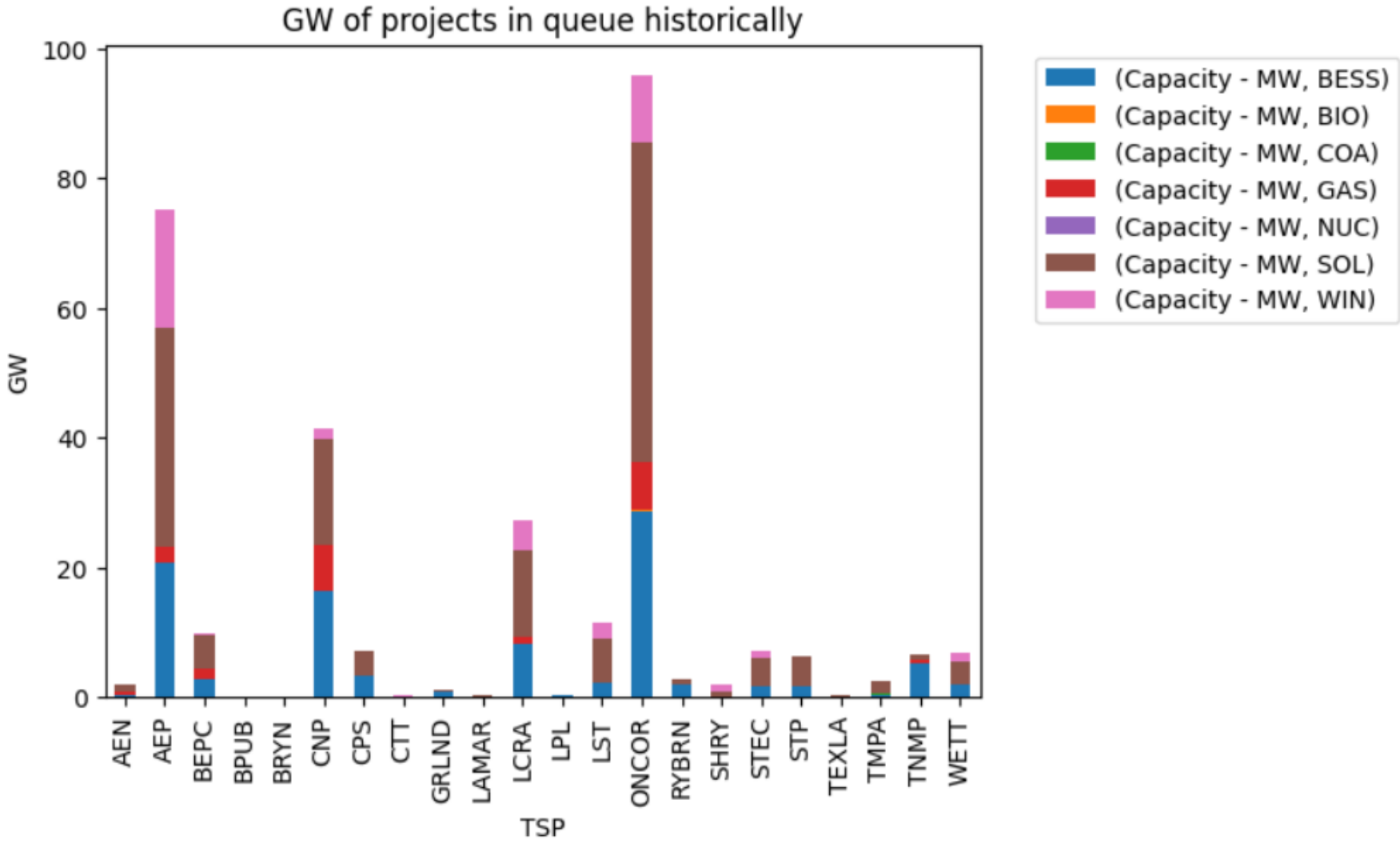
QUEUE IS GROWING EXPONENTIALLY!



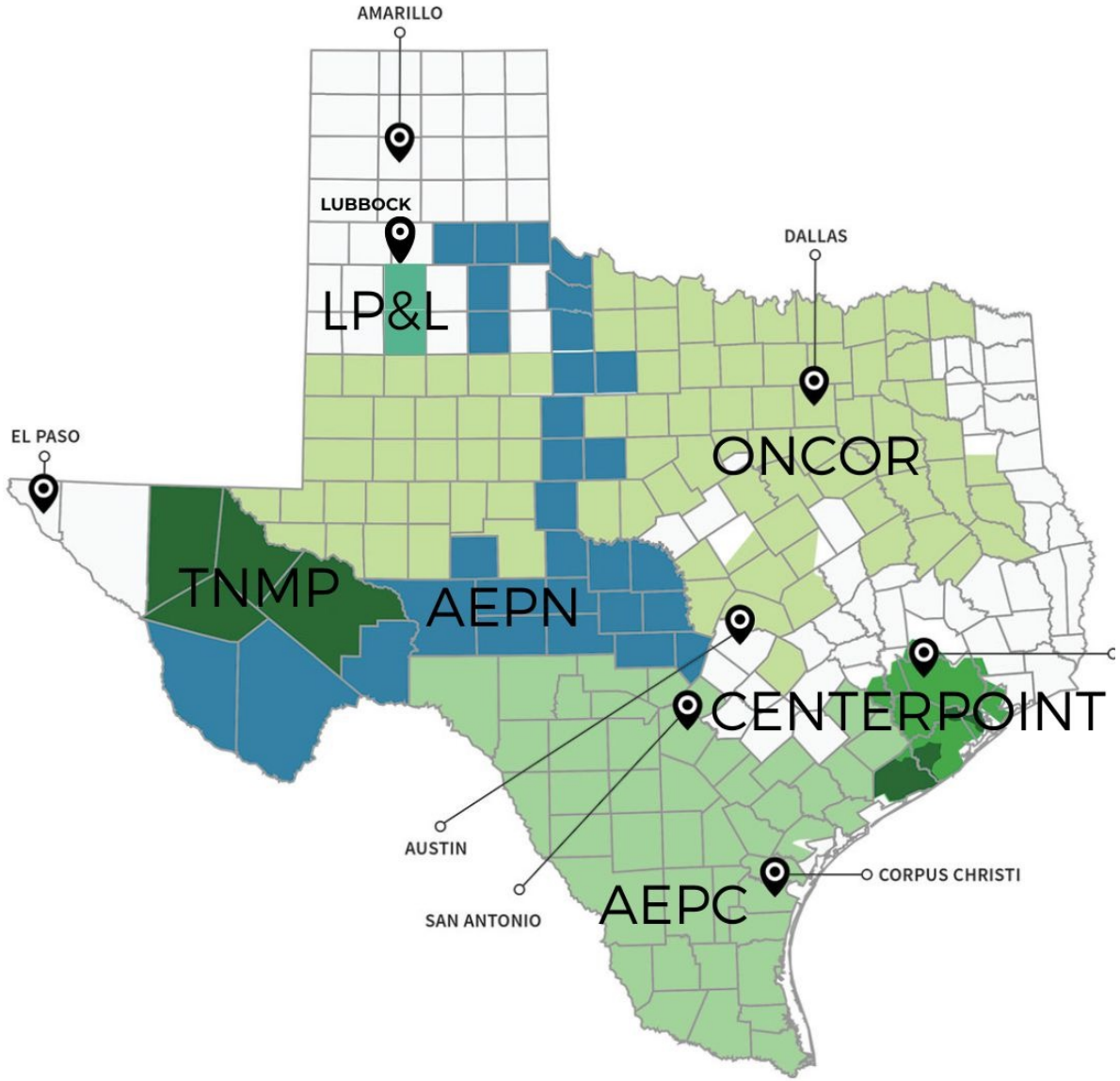
QUEUE IS DOMINATED BY SOLAR AND STORAGE!



ONCOR AND AEP STILL GOING STRONG!



ELECTRIC UTILITIES IN TEXAS

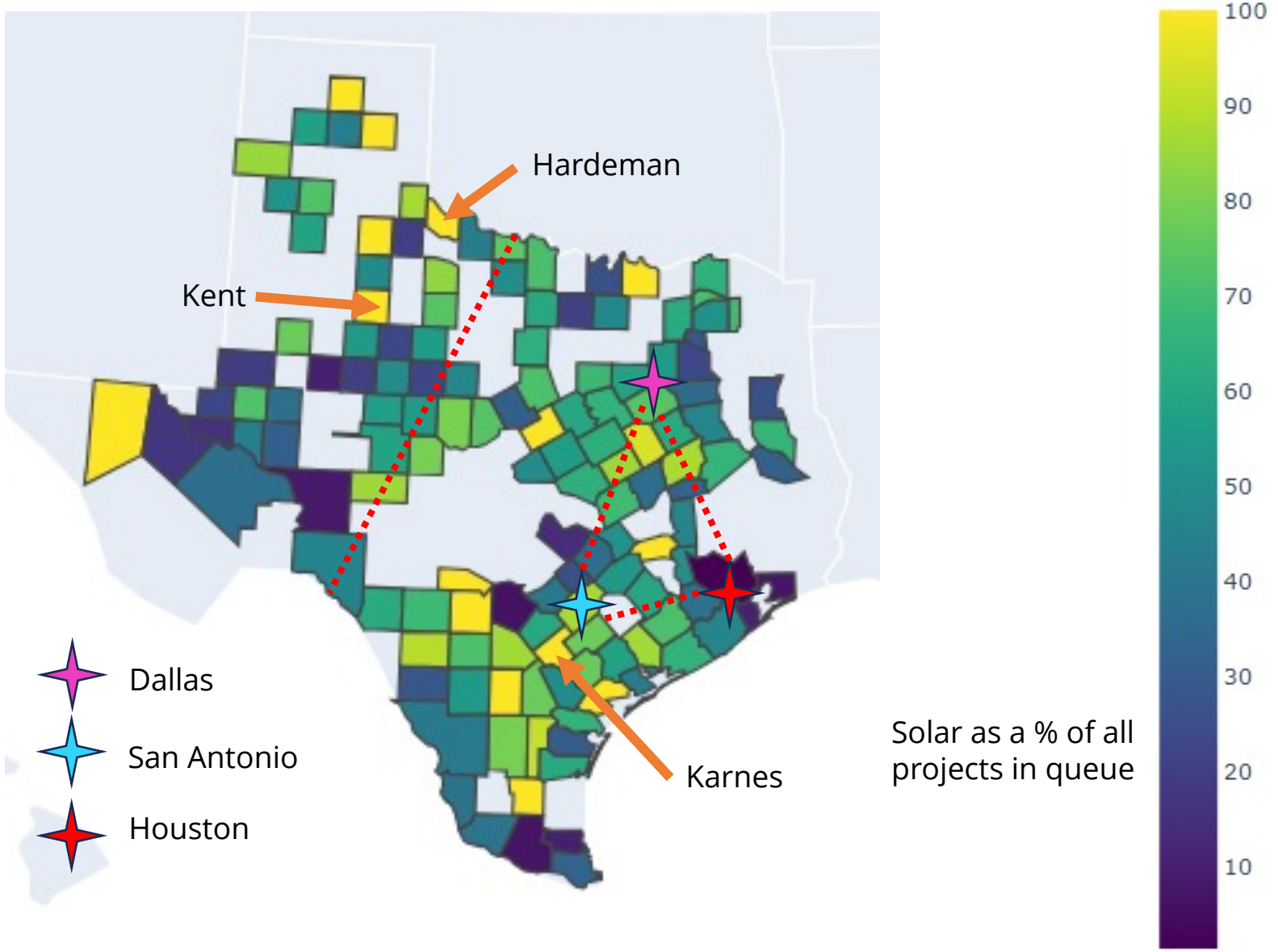


COUNTIES DOMINATED BY SOLAR IN THE QUEUE

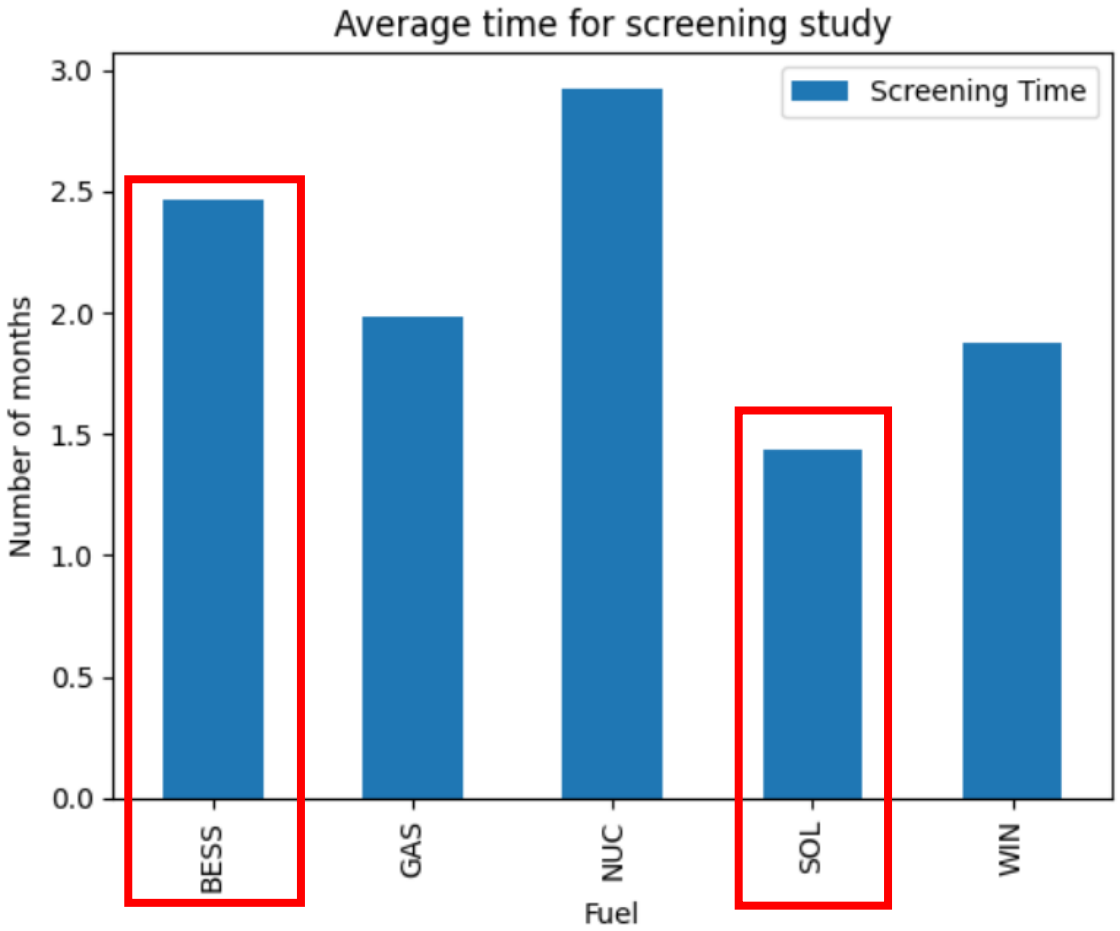
100% Solar

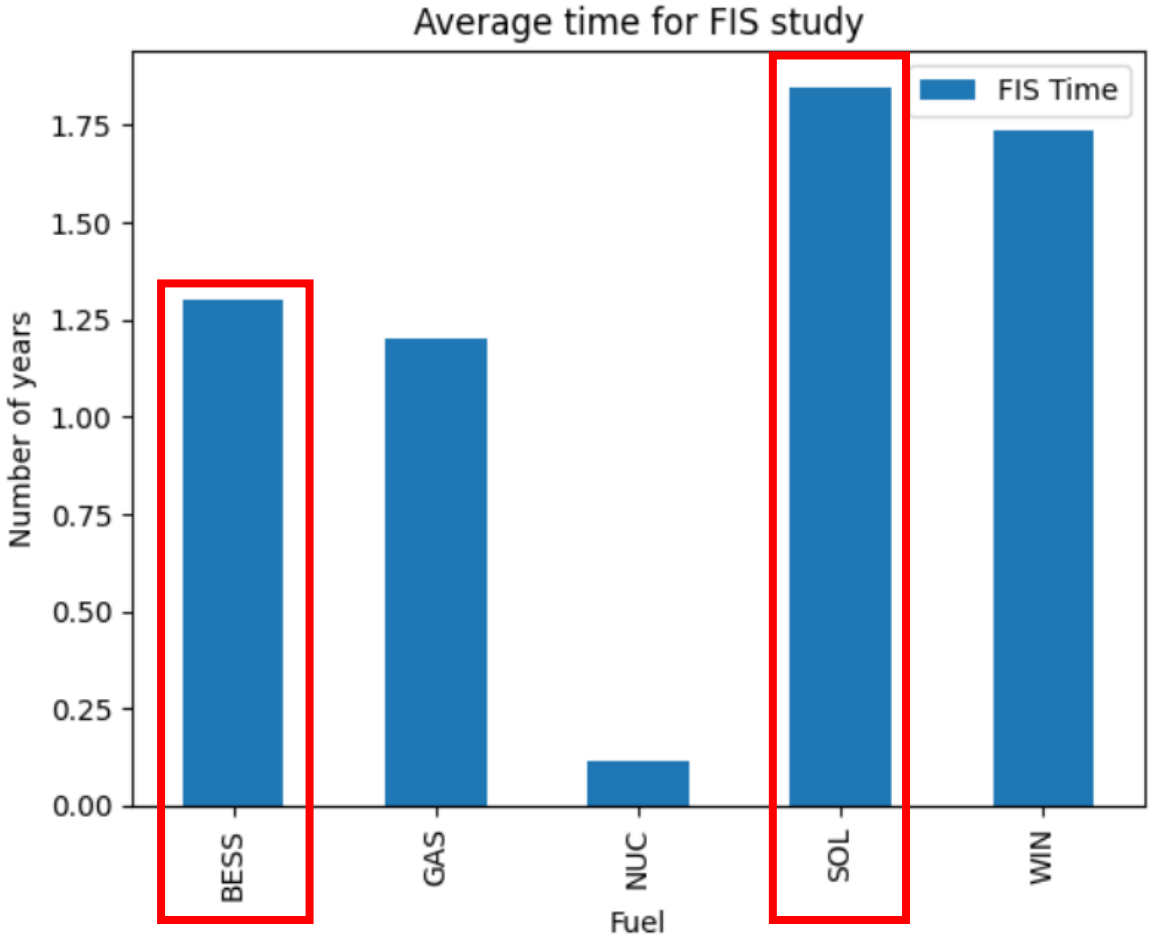
(In MW and number of projects)

- Hardeman – 922 (5)
- Gray – 703 (1)
- Kent – 655 (4)
- Karnes – 609 (7)
- Hutchinson – 570 (2)

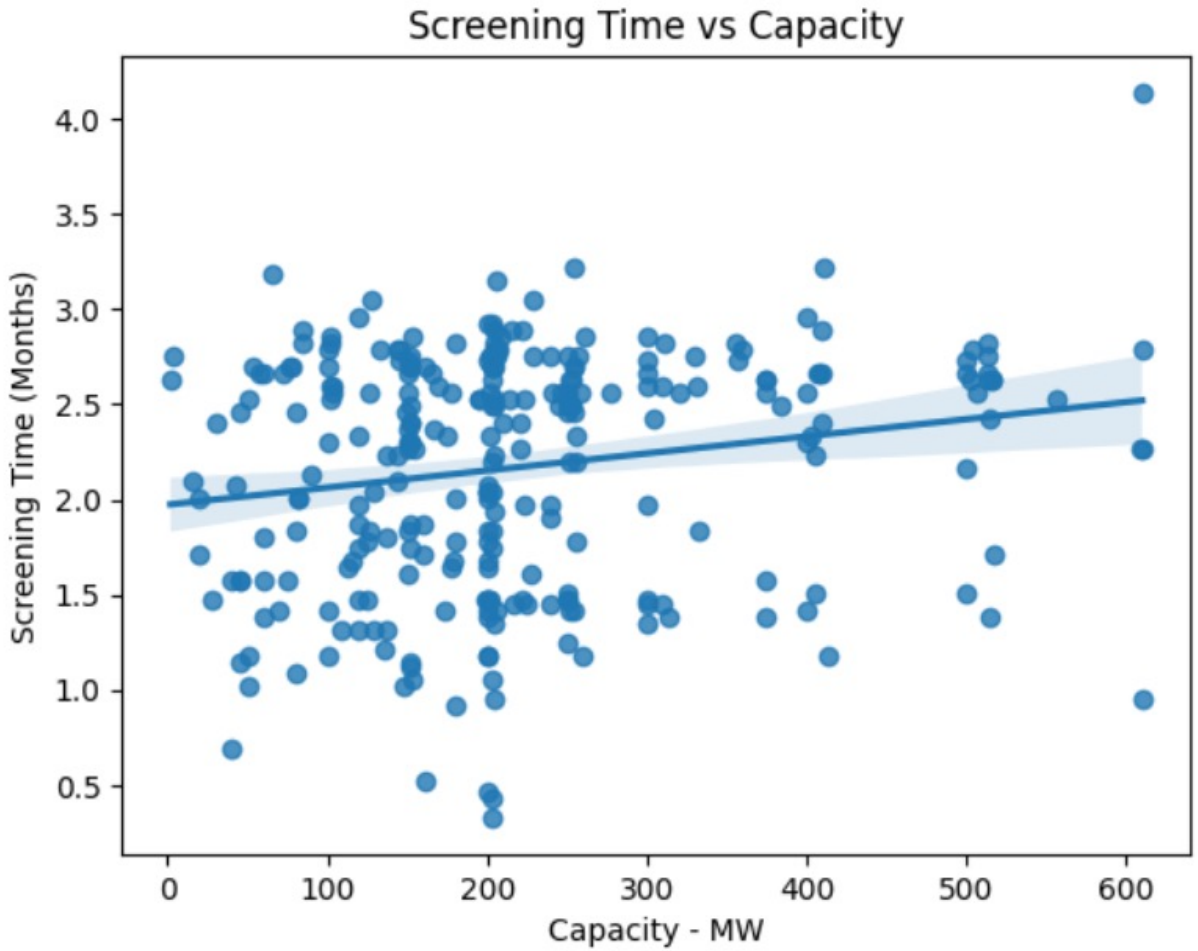


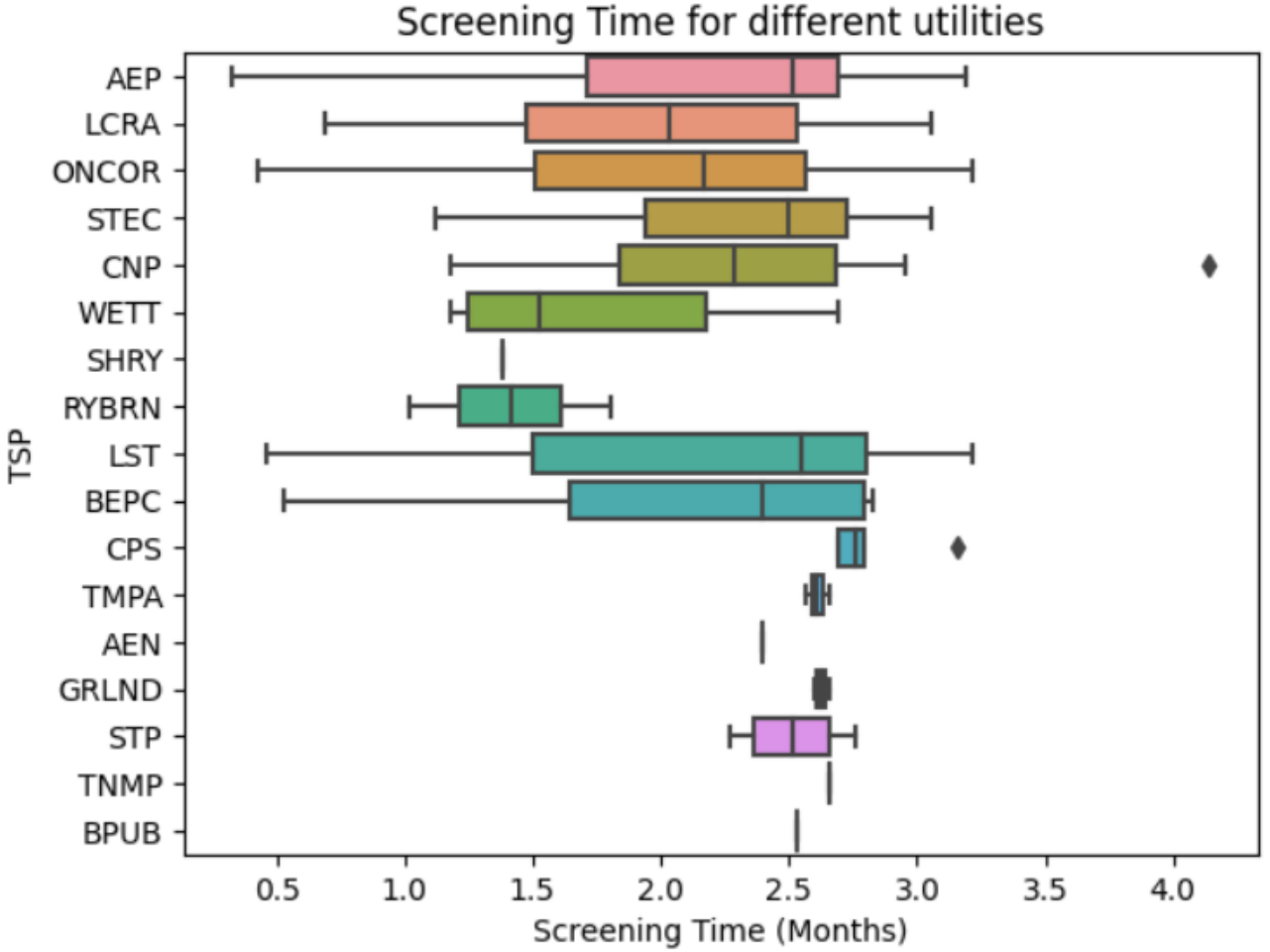
SCREENING QUICK BUT NOT FIS!



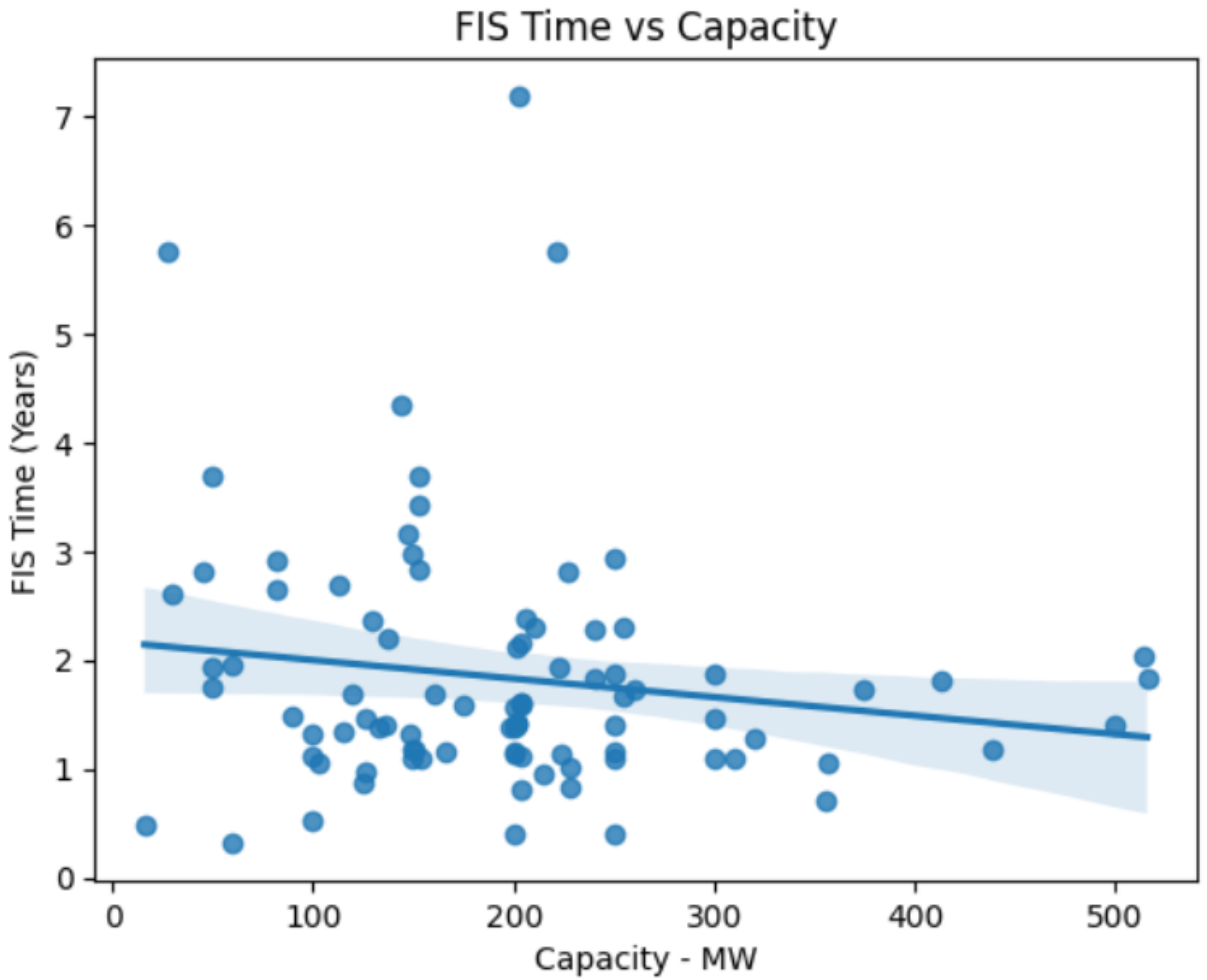


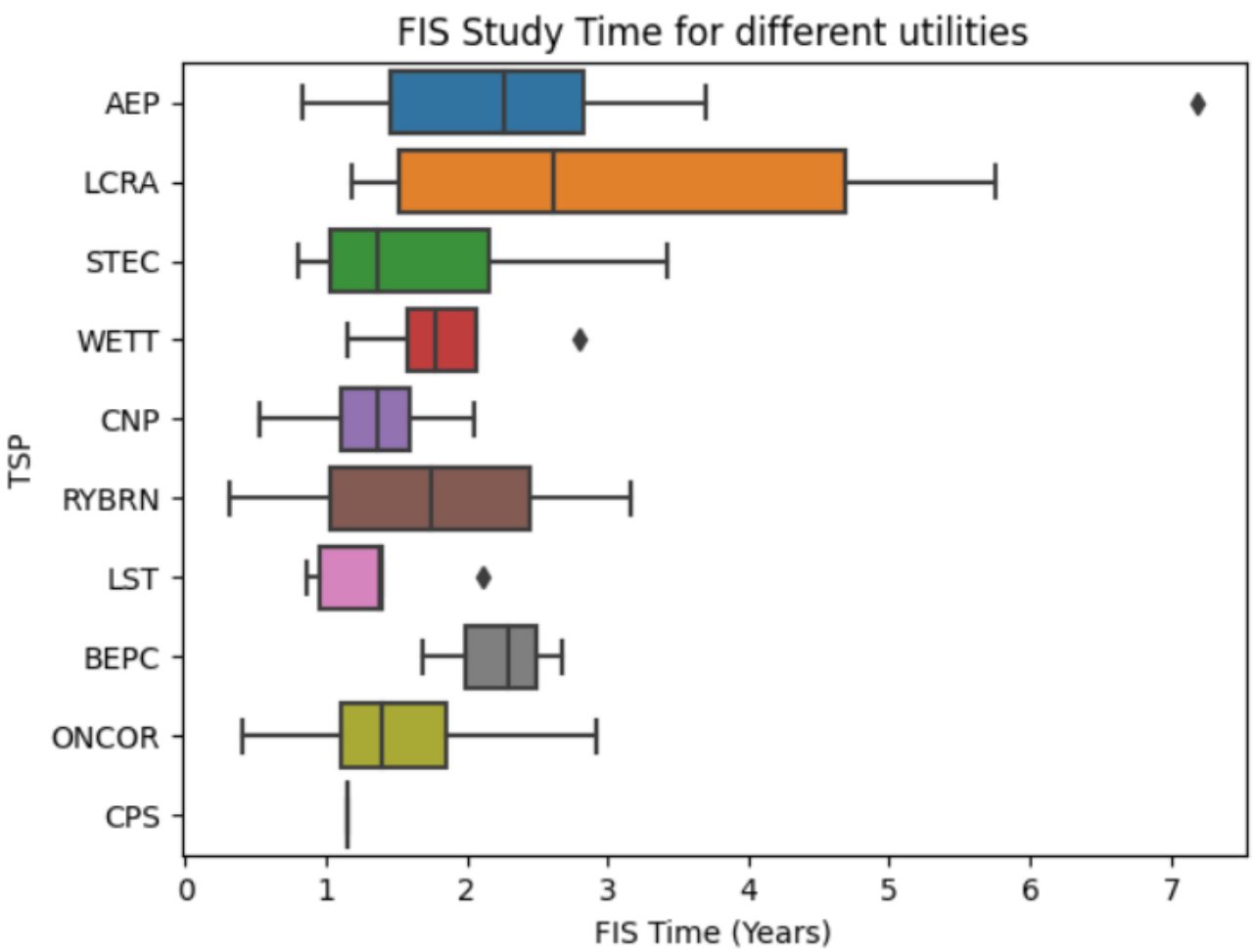
IDENTIFYING TRENDS IN SCREENING TIME FOR SOLAR PROJECTS



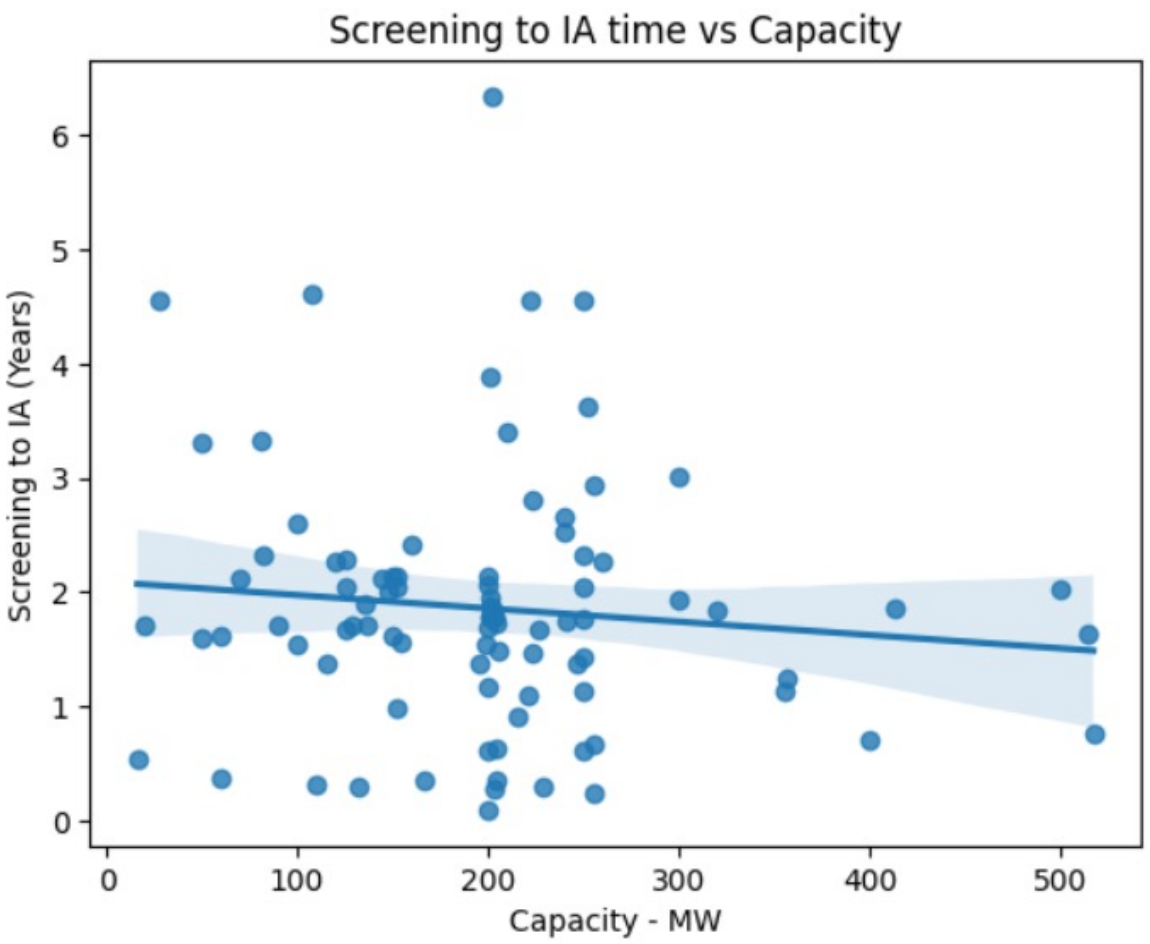


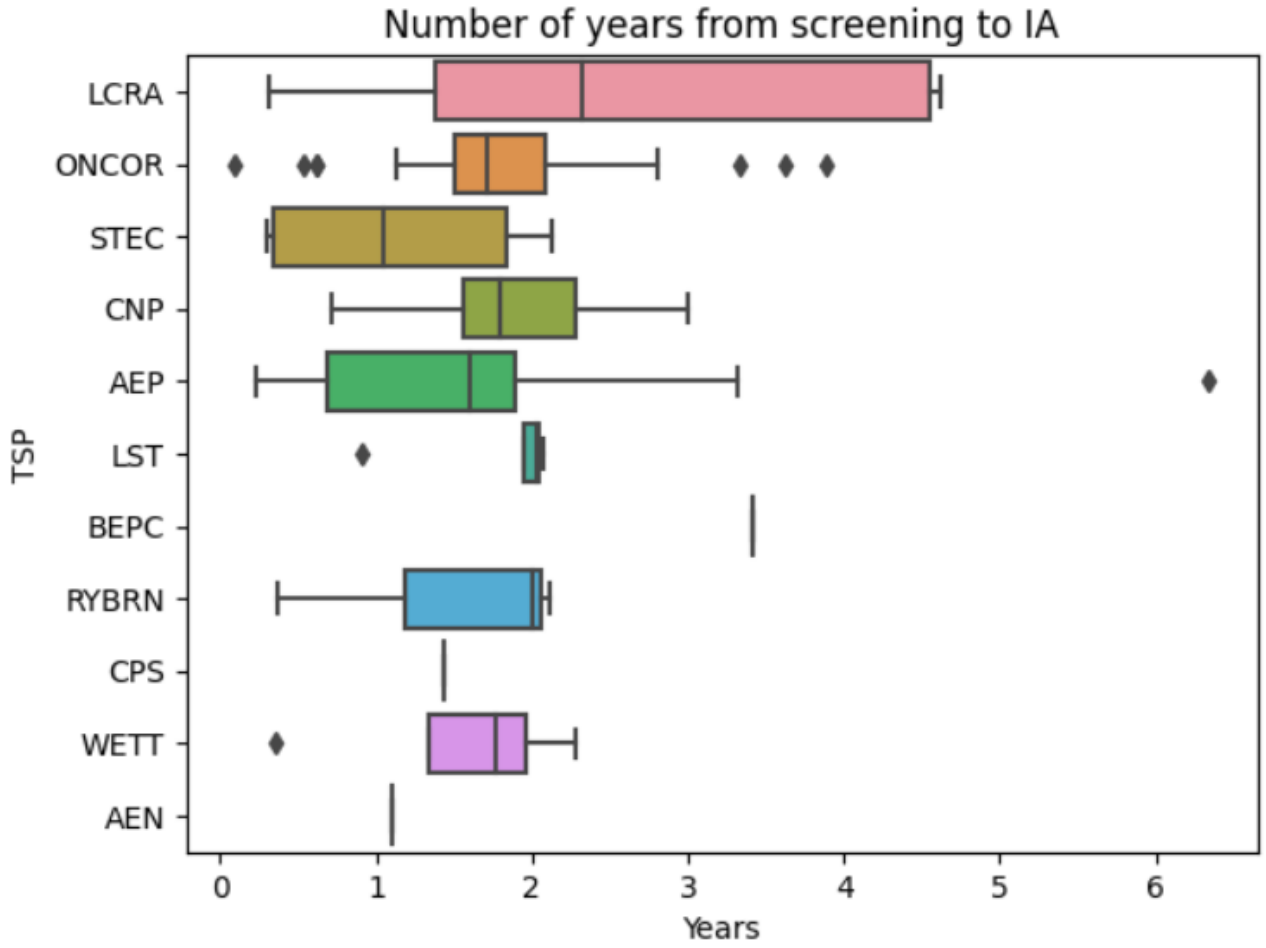
IDENTIFYING TRENDS IN FIS STUDY TIME FOR SOLAR PROJECTS





IDENTIFYING TRENDS IN SCREENING TO IA TIME FOR SOLAR PROJECTS





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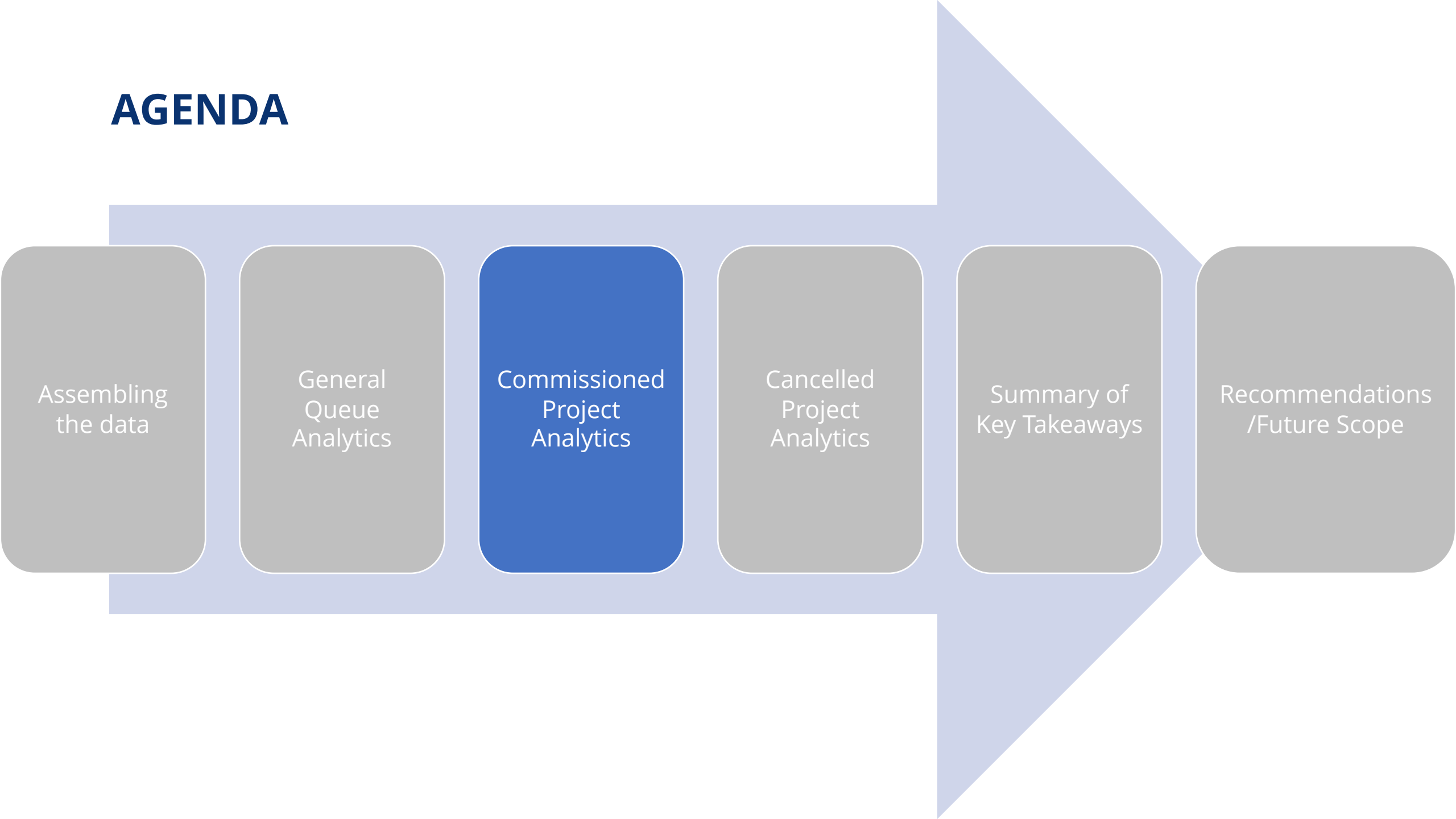
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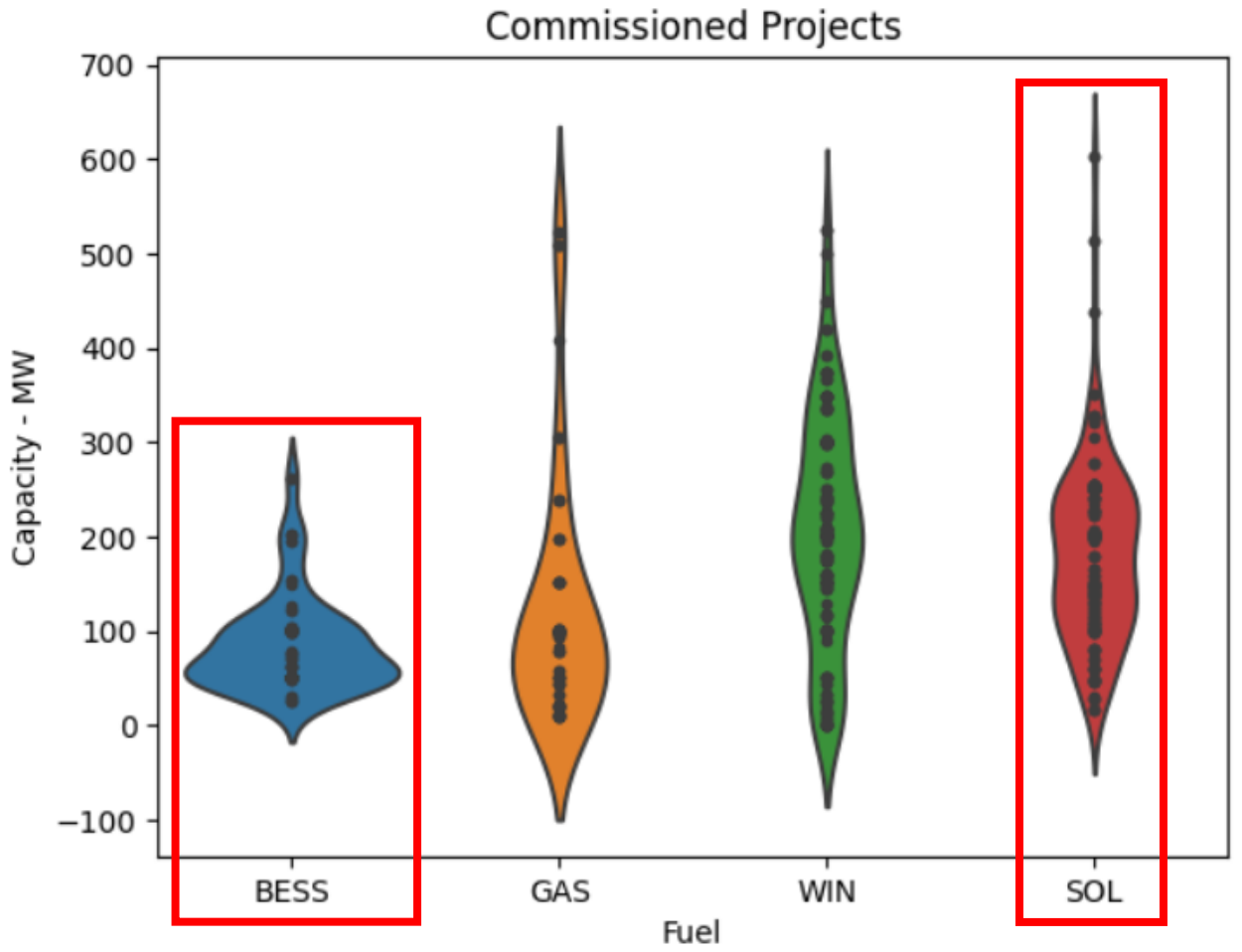
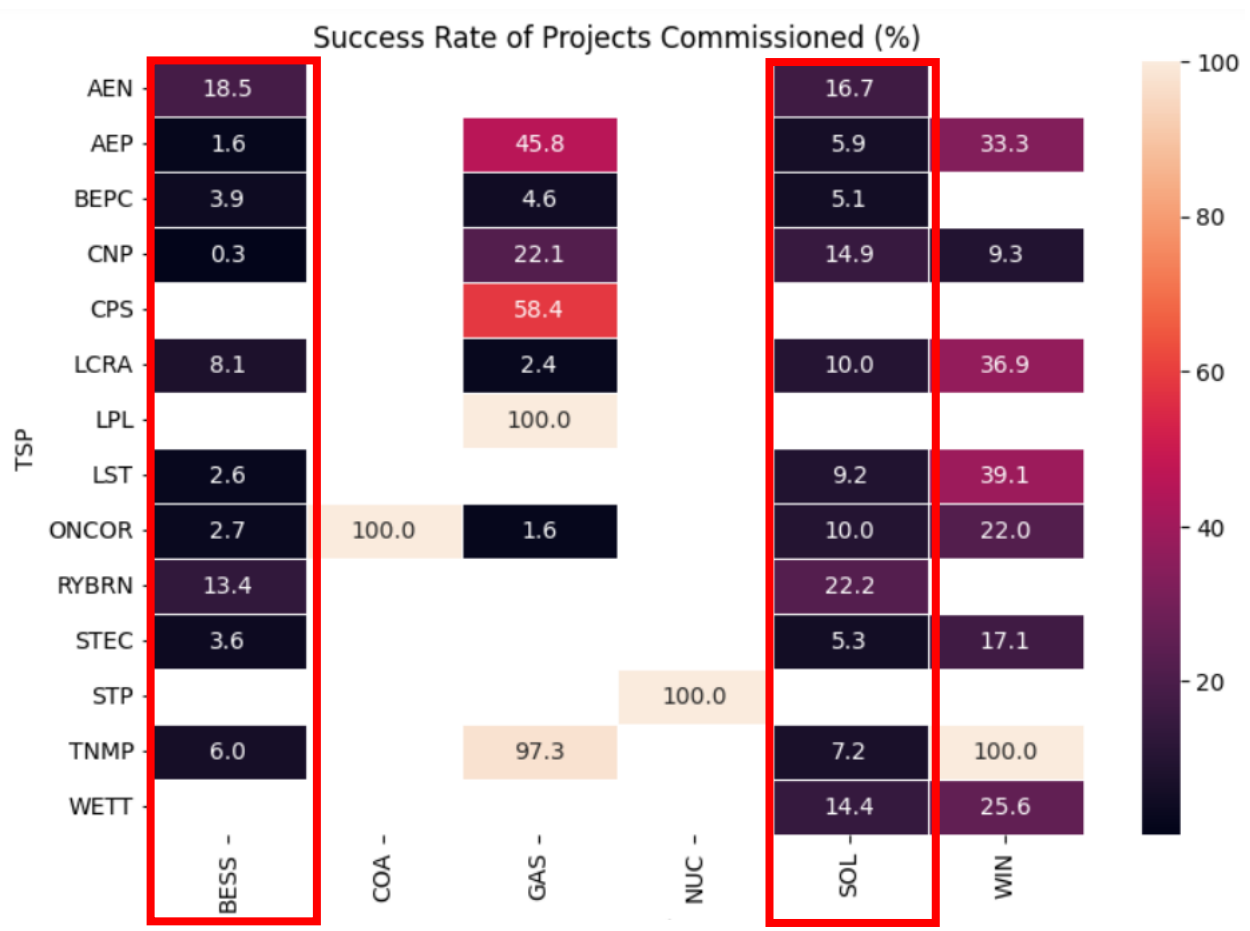
HOW BIG ARE THE COMMISSIONED PROJECTS?

- Solar projects relatively spread out – up to 300 MW
- Storage projects concentrated around 50 MW

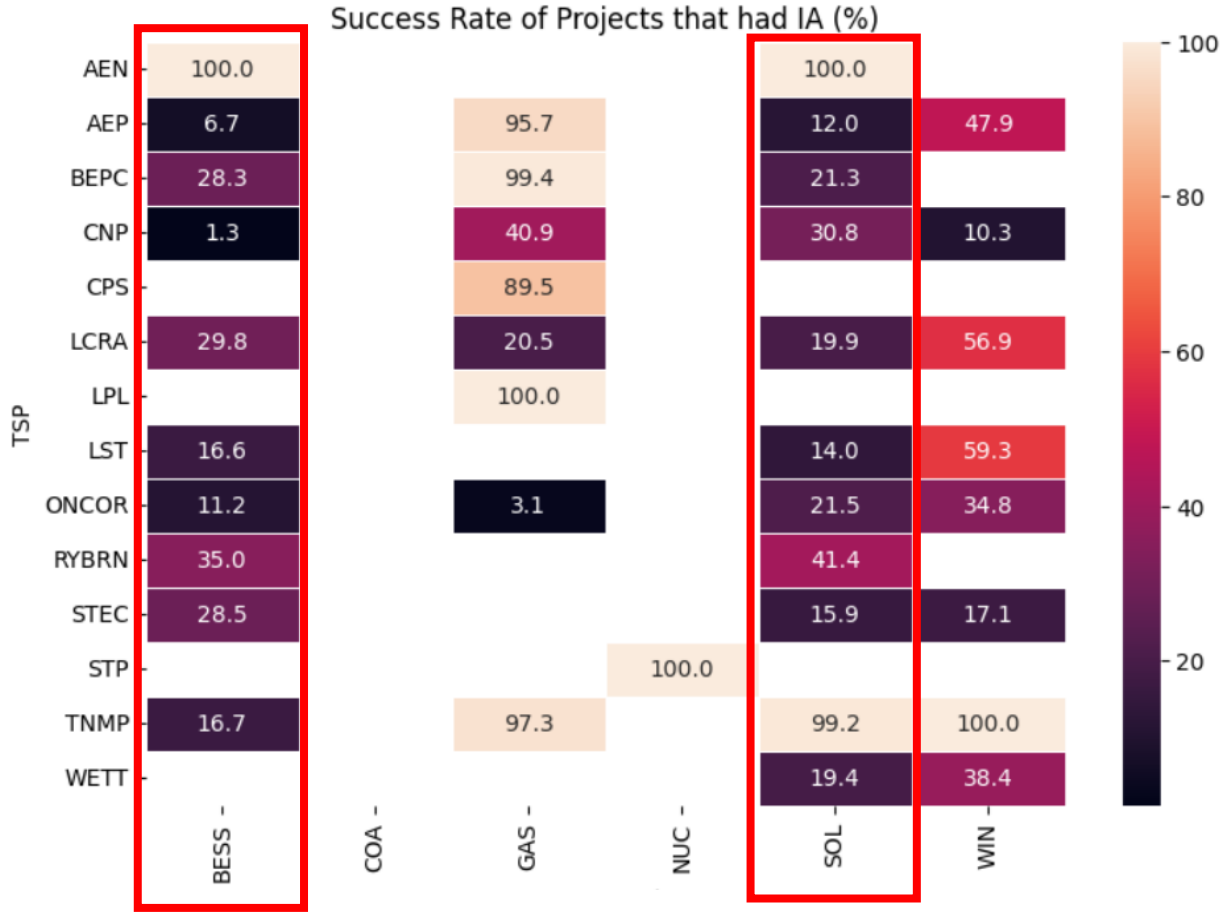


WHICH UTILITIES HAVE A HIGH SUCCESS RATE WITH SOLAR?



*IOUs have an average success rate of 10%

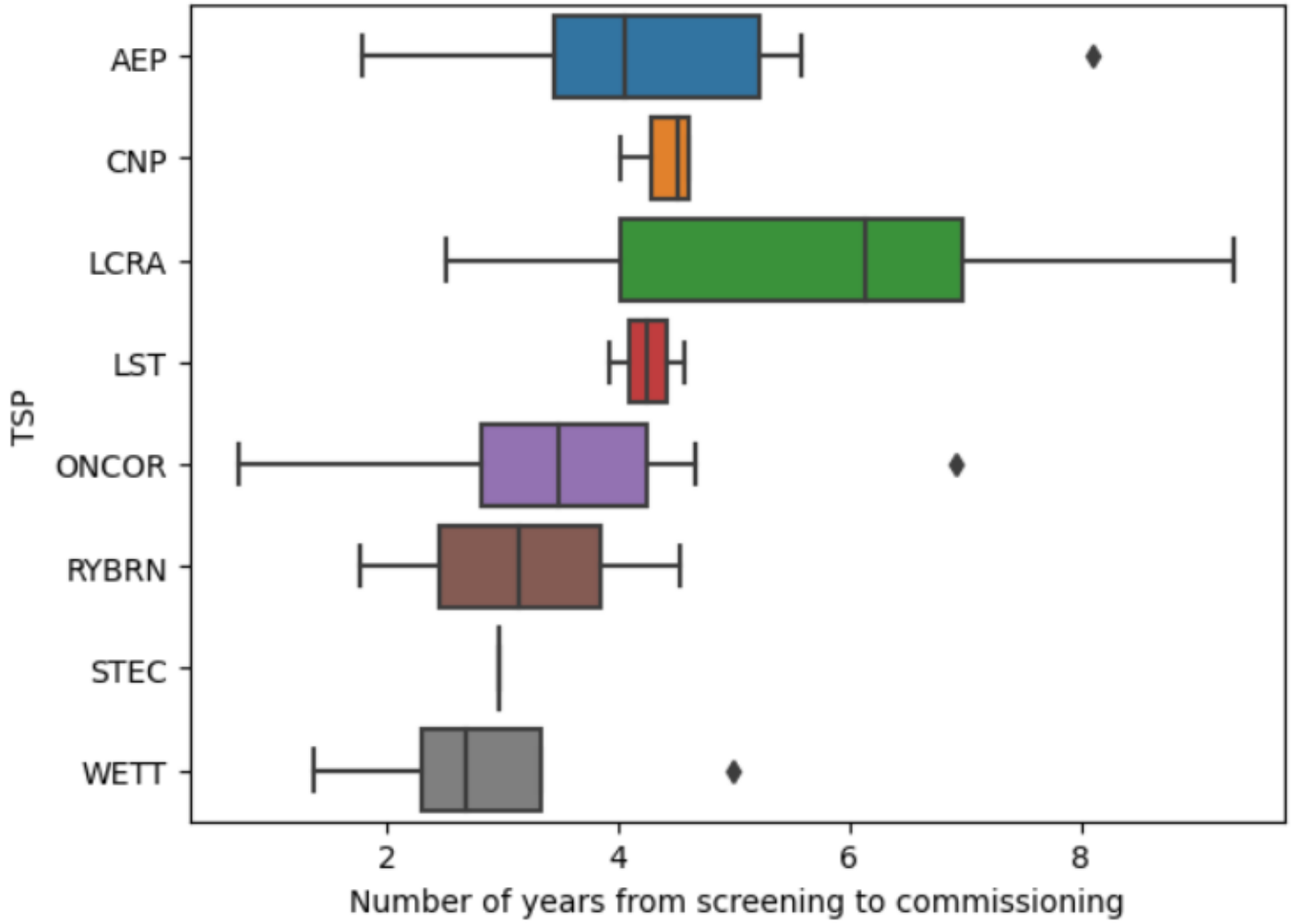
WHICH PERCENTAGE OF PROJECTS WITH IA CONVERT?



*IOUs have an average conversion rate of 20%

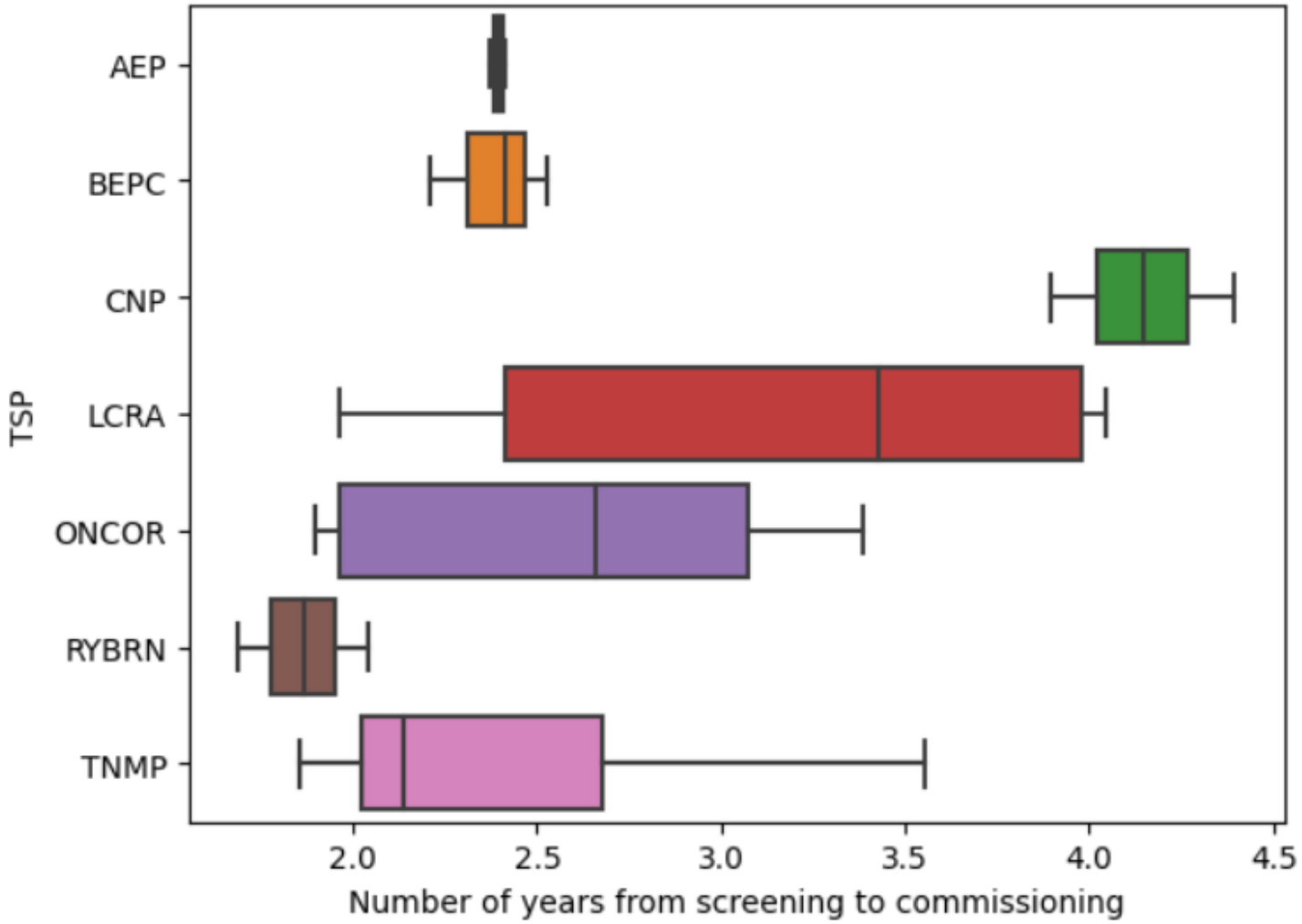
HOW LONG DOES IT TAKE SOLAR PROJECTS END TO END?

- Average of 4.2 years
- Median times for:
  - AEP – 4 years
  - ONCOR – 3 years
  - CNP – 4.5 years
- Mean size of commissioned project ~ 156 MW



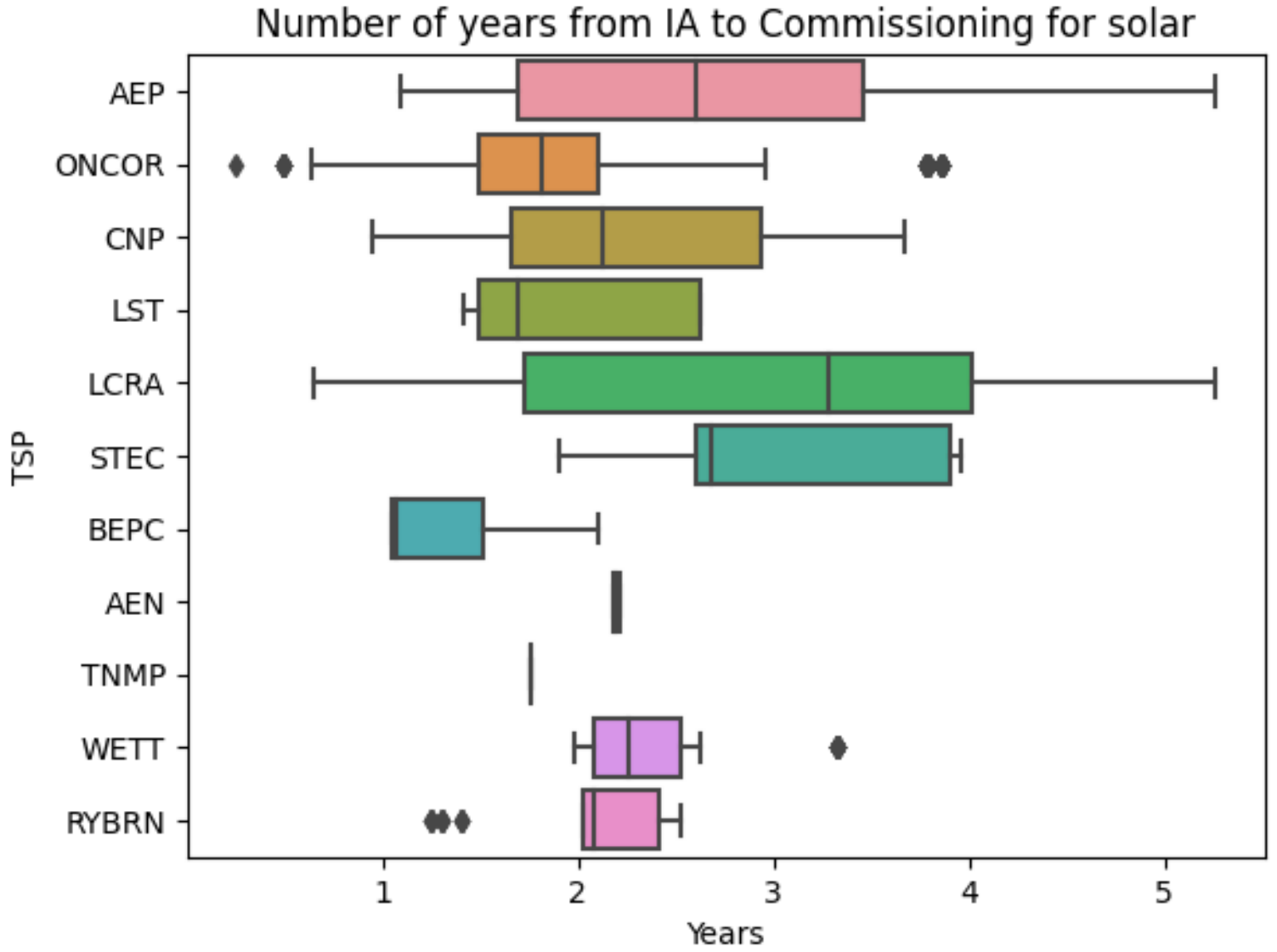
HOW LONG DOES IT TAKE STORAGE PROJECTS END TO END?

- Average of 2.7 years
- Median times for:
  - AEP – 2.4 years
  - ONCOR – 2.7 years
  - CNP – 4.2 years
- Mean size of commissioned project ~ 89 MW



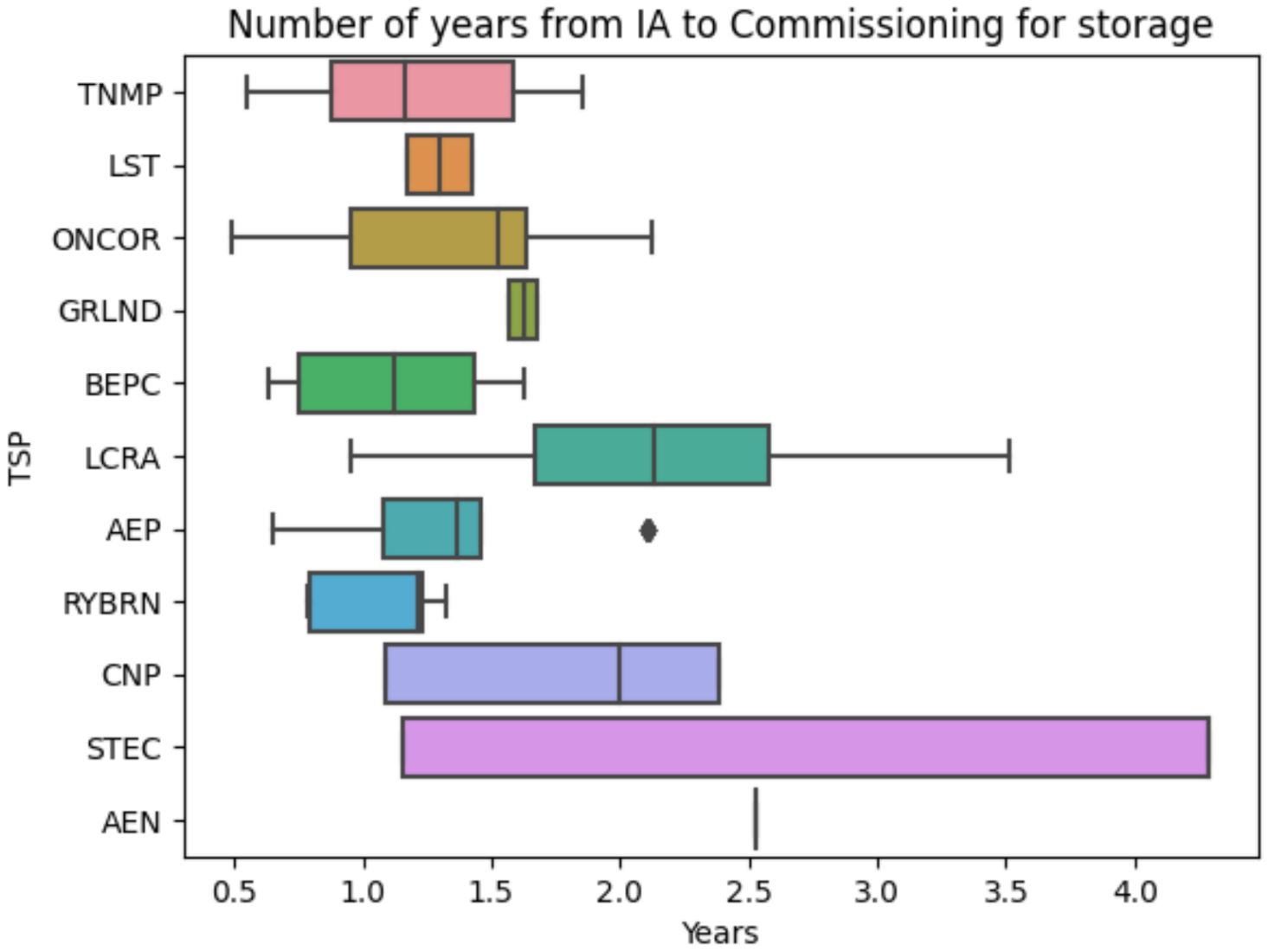
HOW LONG DOES IT TAKE SOLAR PROJECTS FROM IA TO COMMISSIONING?

- Average of 2.2 years
- Median times for:
  - AEP – 2.5 years
  - ONCOR – 1.75 years
  - CNP – 2.25 years



HOW LONG DOES IT TAKE STORAGE PROJECTS FROM IA TO COMMISSIONING?

- Average of 1.5 years
- Median times for:
  - AEP – 1.4 years
  - ONCOR – 1.5 years
  - CNP – 2 years



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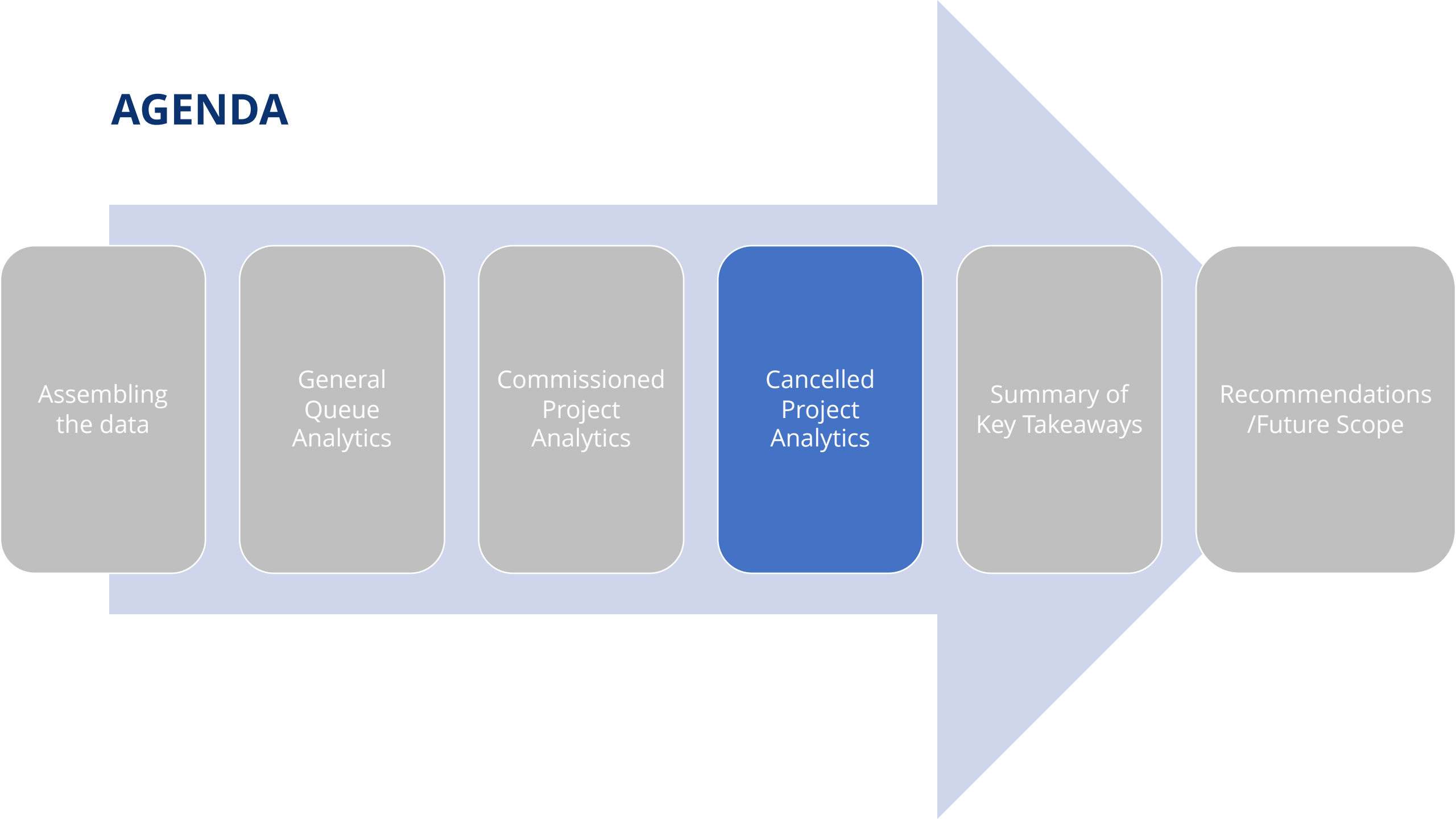
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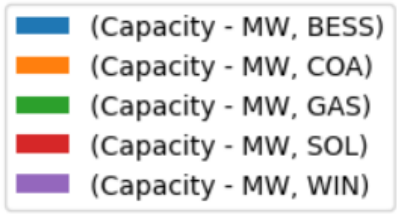
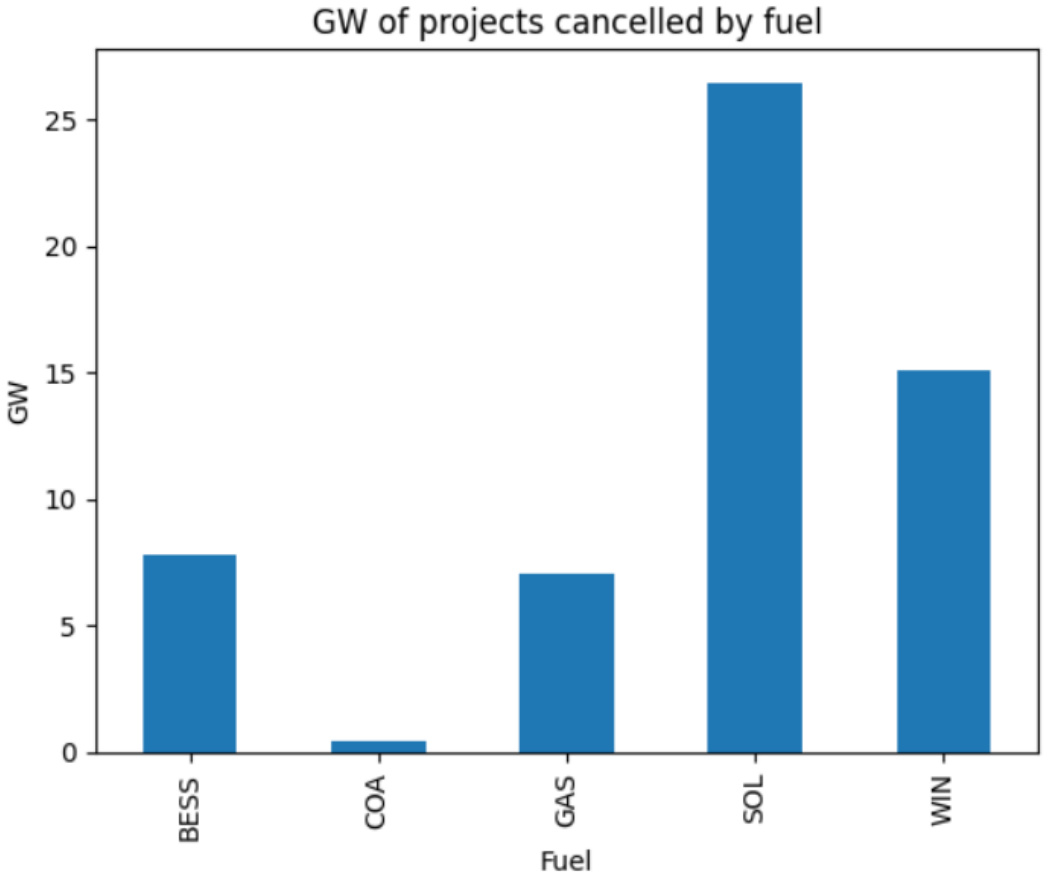
CANCELLED PROJECTS – MAINLY RENEWABLES!





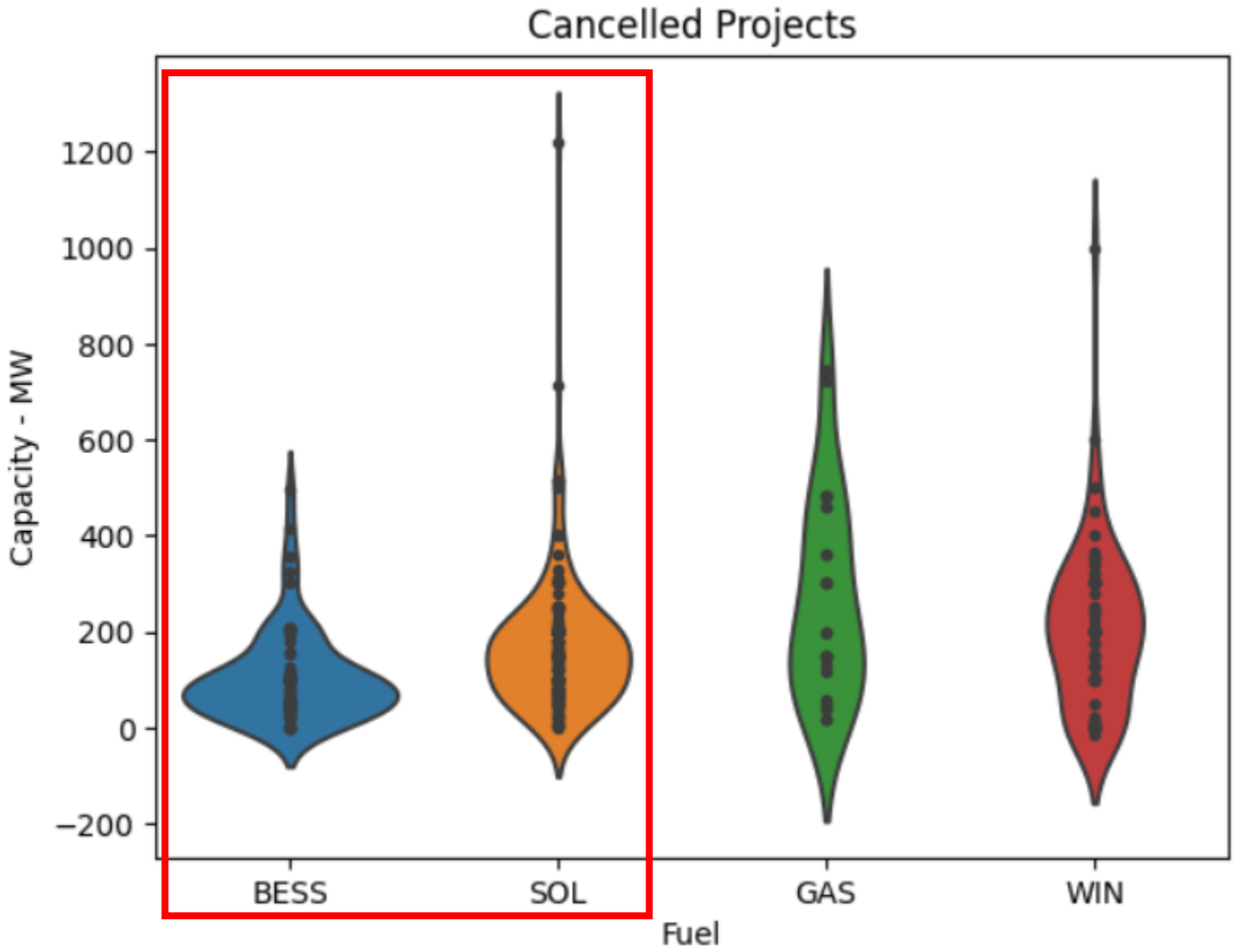
HOW BIG ARE THE SOLAR AND STORAGE PROJECTS CANCELLED?

Solar Projects:

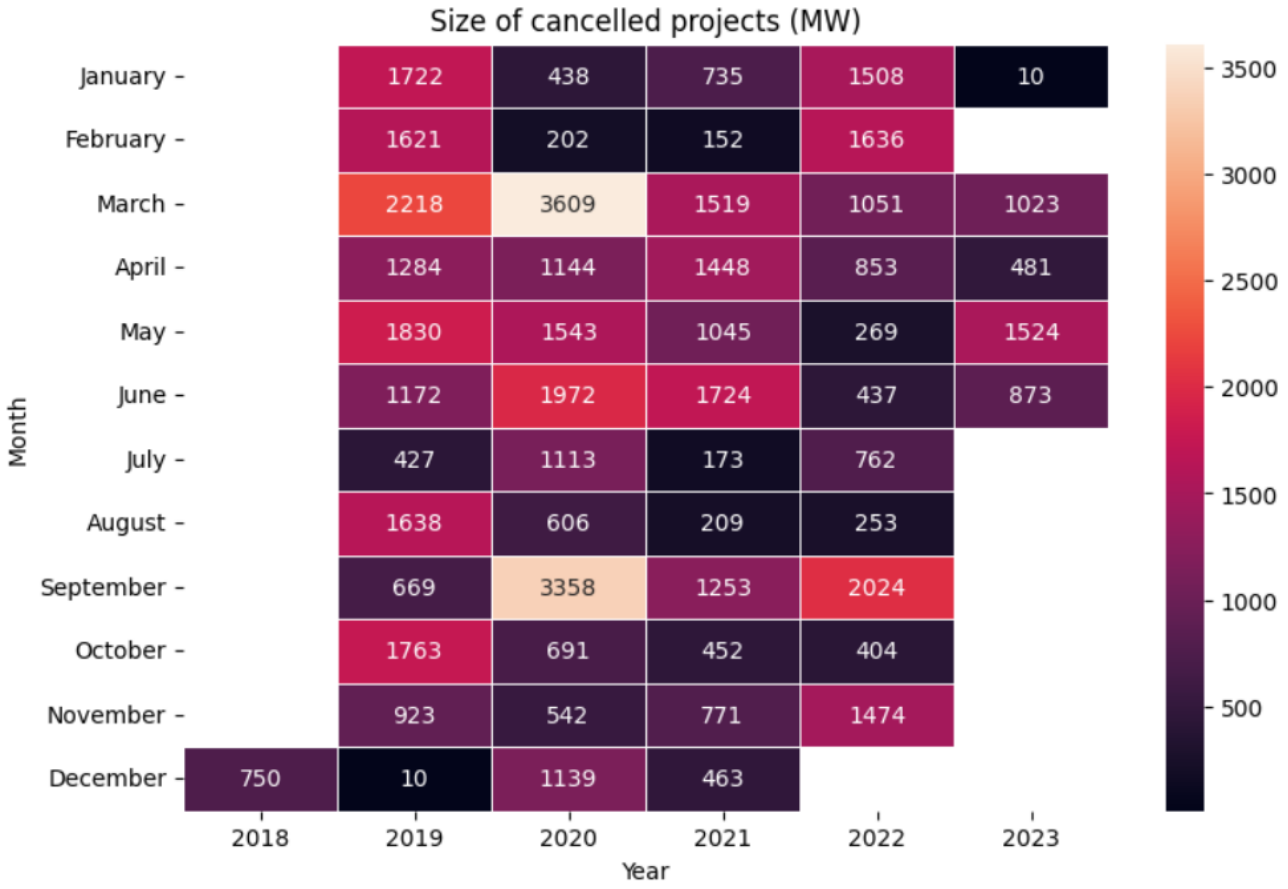
- Median size ~ 175 MW
- Most projects clustered (in size) around 100 – 300 MW range
- Solar projects – more heavily clustered than gas or wind

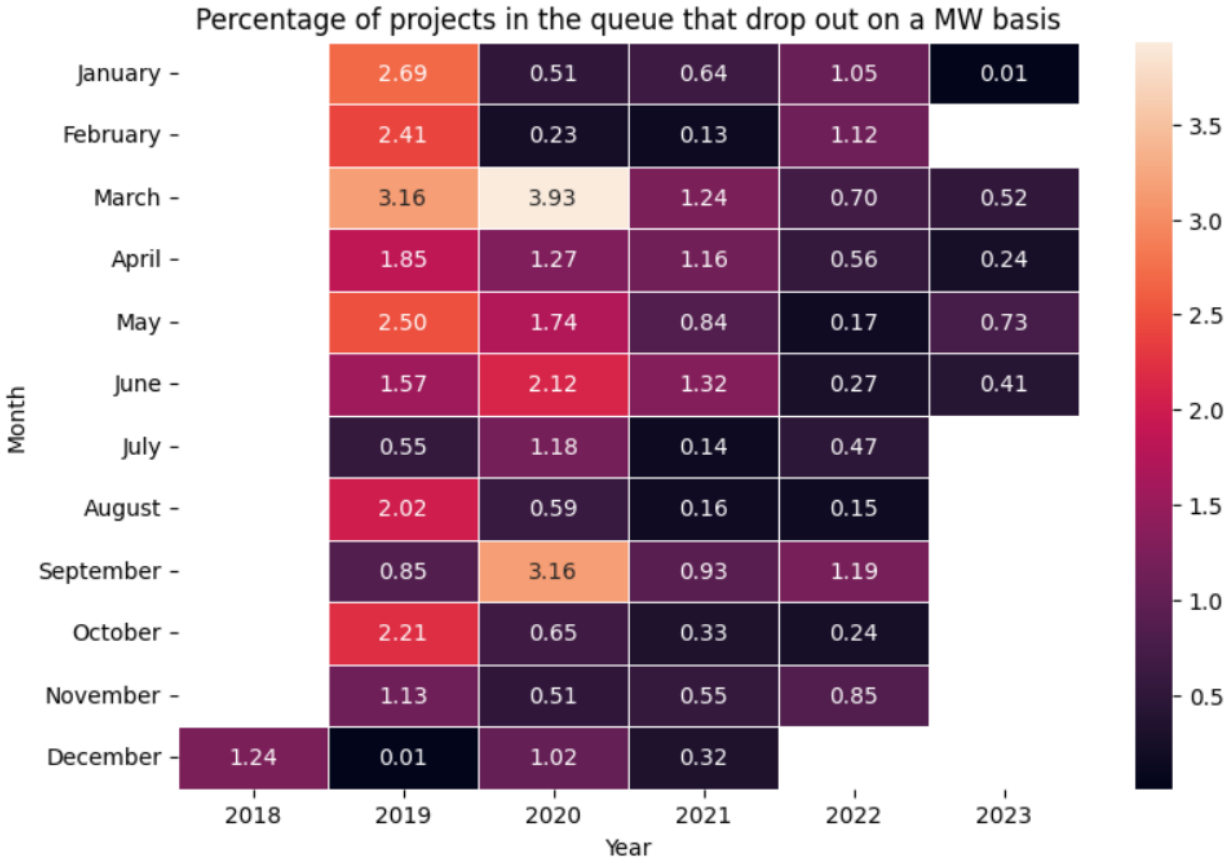
Storage Projects:

- Median size ~ 100 MW
- Most projects clustered around 0 – 200 MW range



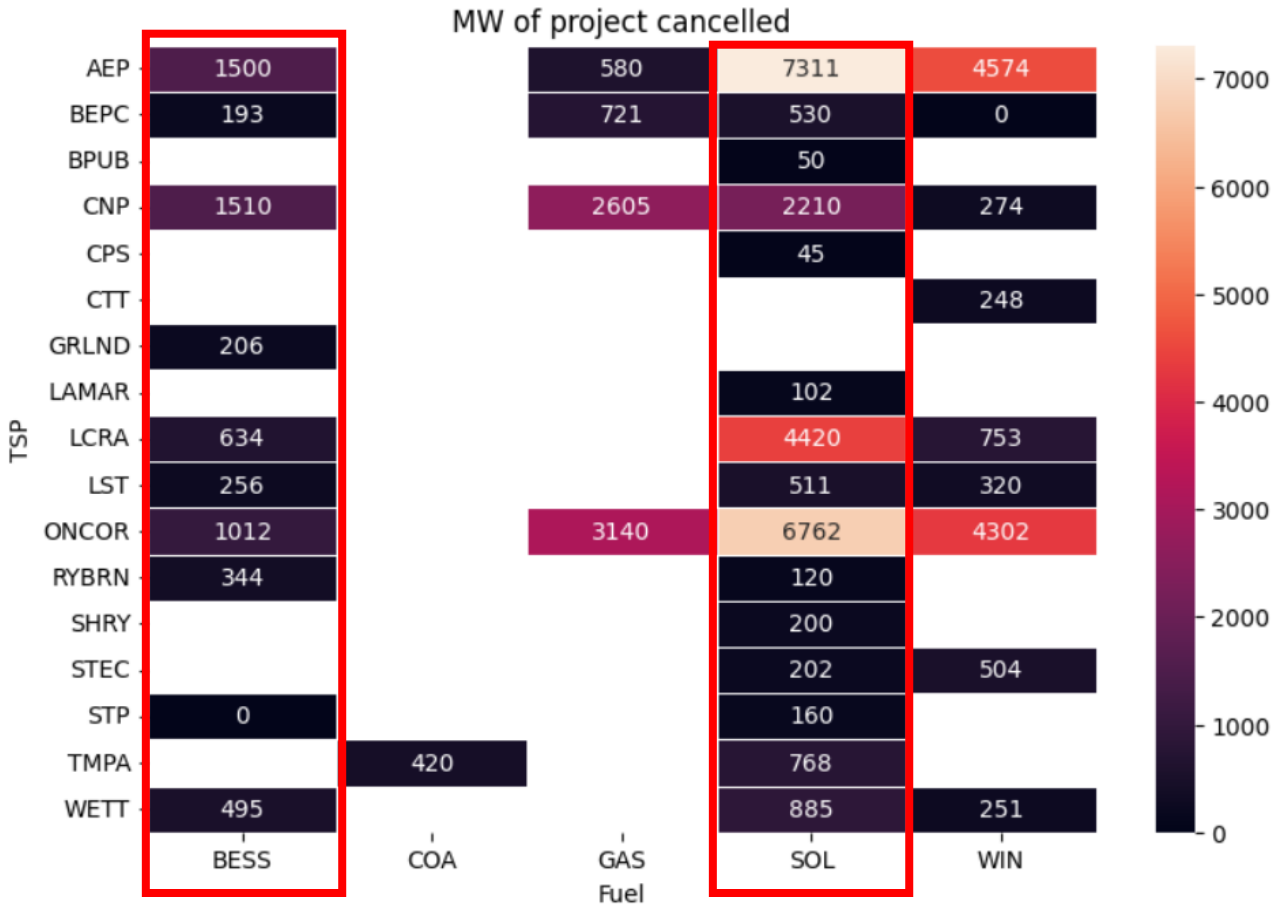
HEATMAP OF CANCELLED PROJECTS BY TIME

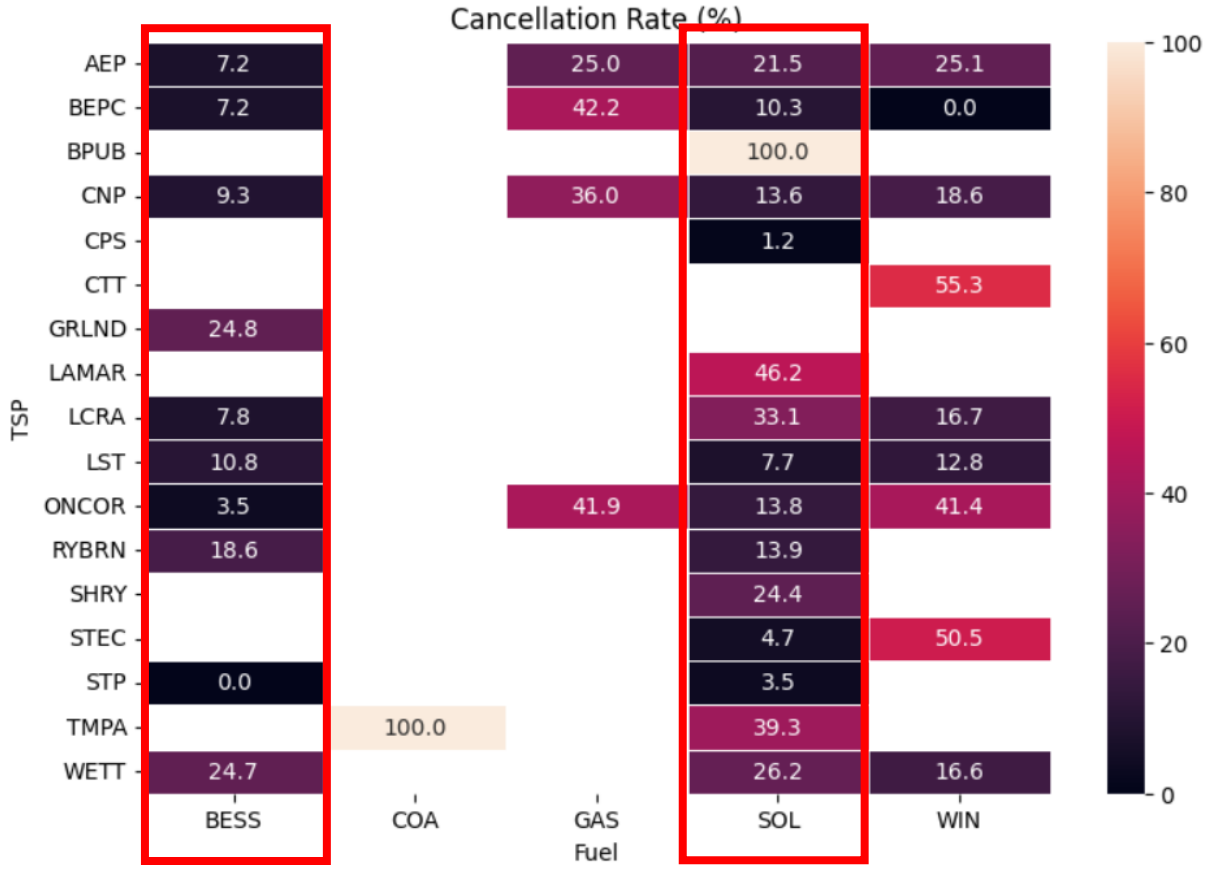




*All fuel types

HEATMAP OF CANCELLED PROJECTS BY UTILITY AND FUEL

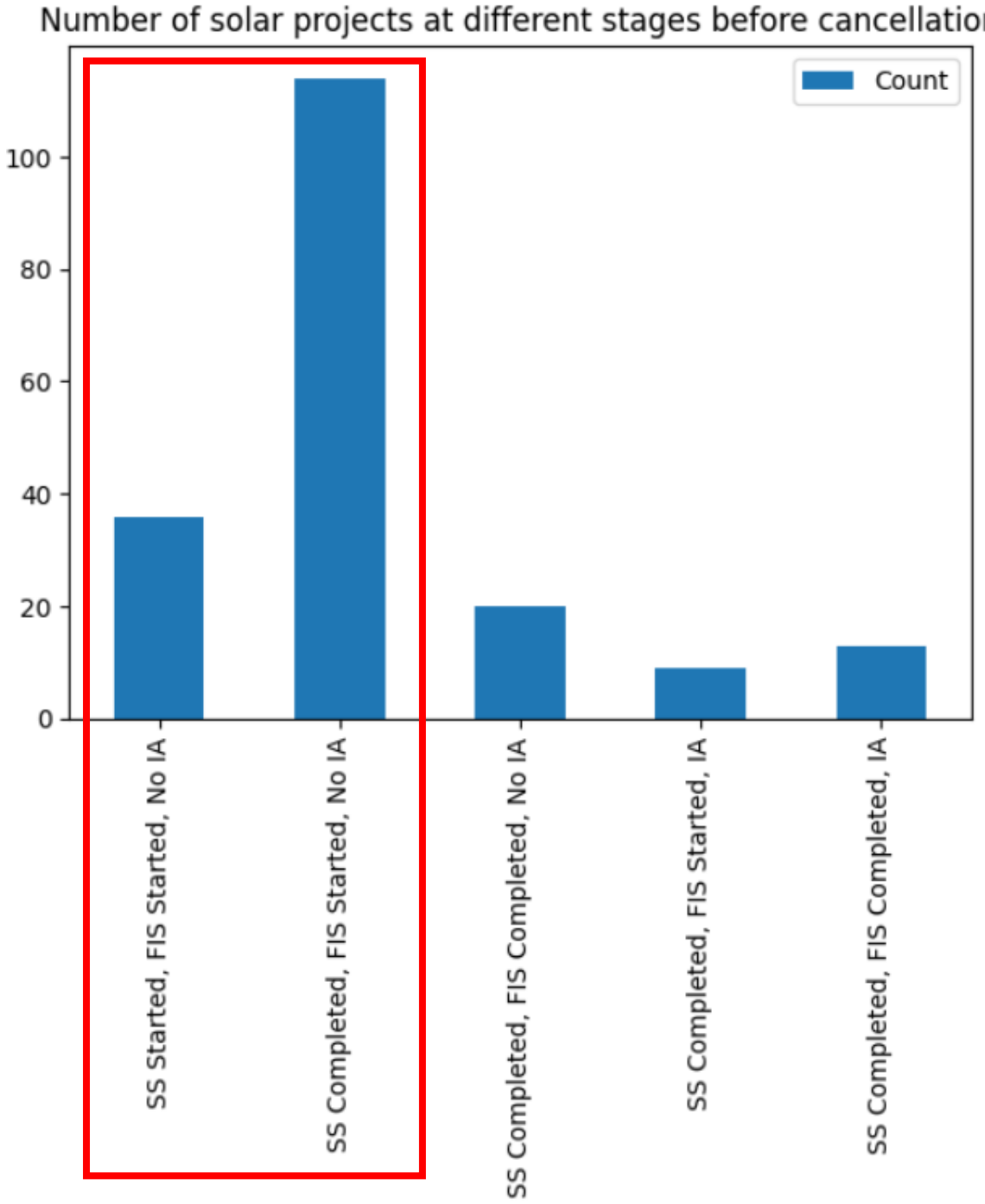




*IOUs have an average cancellation rate of 15%

WHEN ARE SOLAR PROJECTS DROPPING OUT OF THE QUEUE?

- 114 projects cancelled having **completed SS and started FIS**
- 36 projects cancelled having **started SS and started FIS**

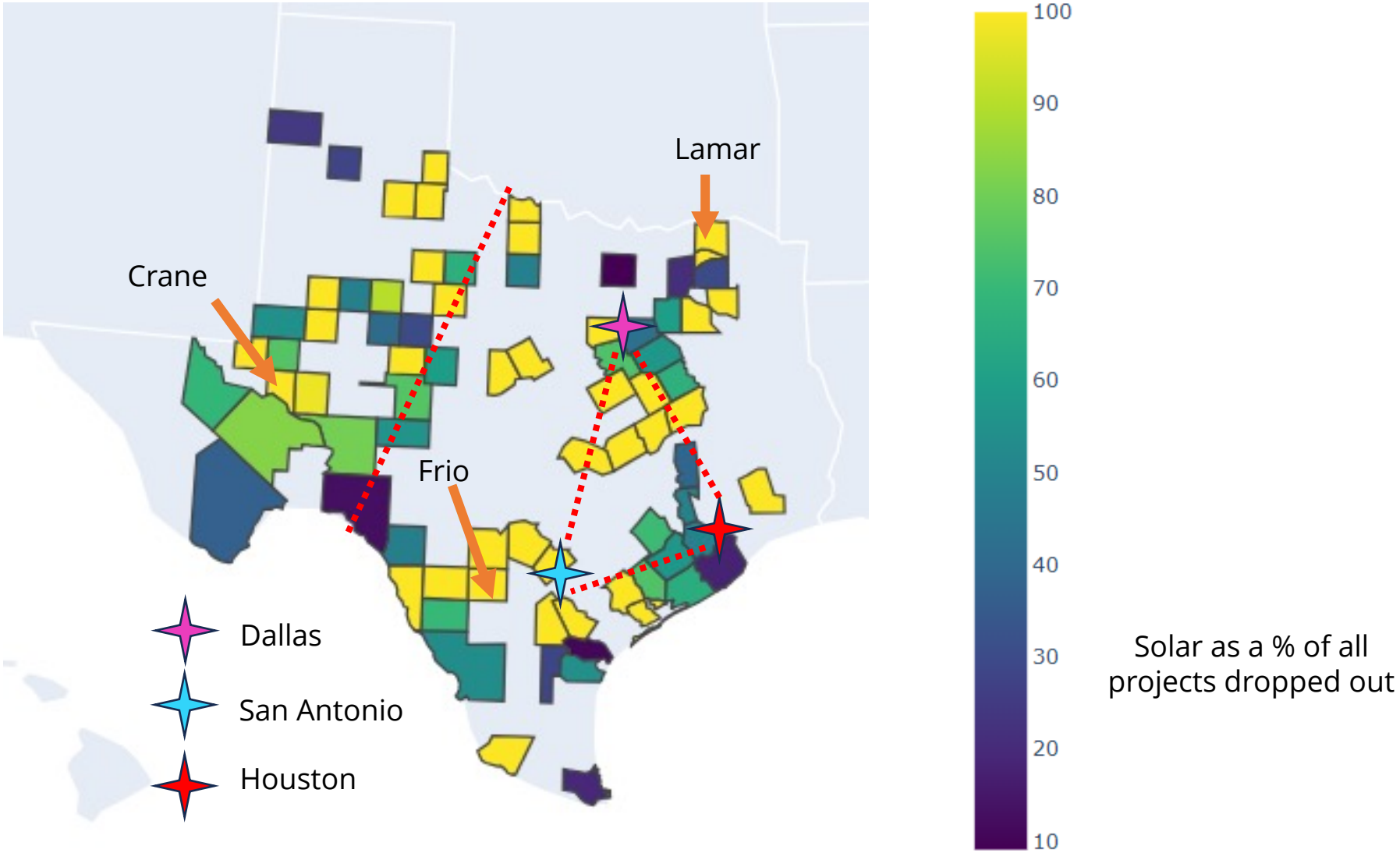


WHICH COUNTIES HAVE A HIGH DROPOUT RATE OF SOLAR?

100% dropout

(MW and number of projects)

- Lamar – 1132 (7)
- Crane – 719 (3)
- Frio – 613 (5)
- Johnson – 502 (1)
- Comanche – 484 (2)



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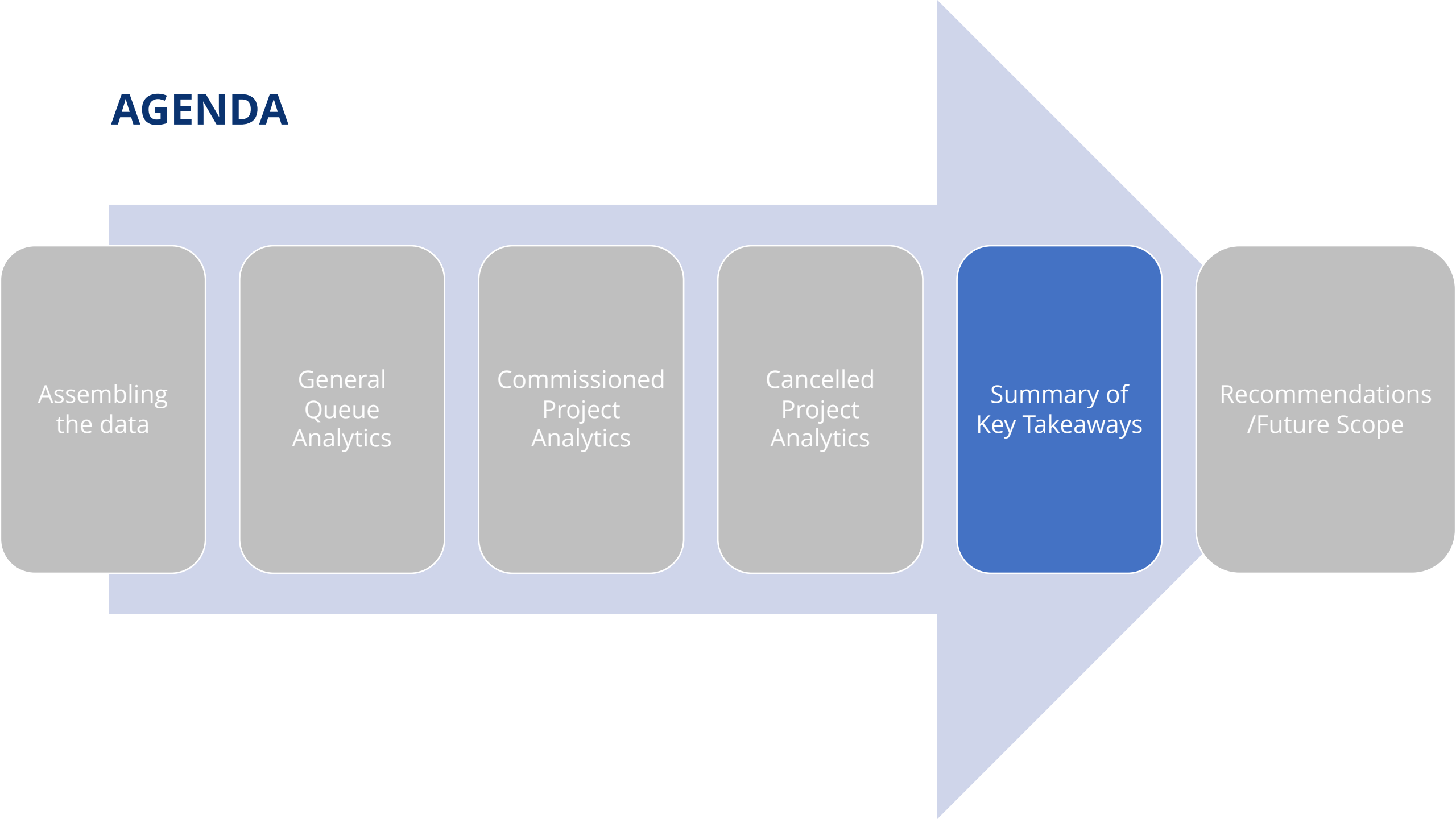
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General Queue

- Growing Exponentially
- Dominated by solar and storage
- ONCOR, AEP and CNP – biggest IOUs

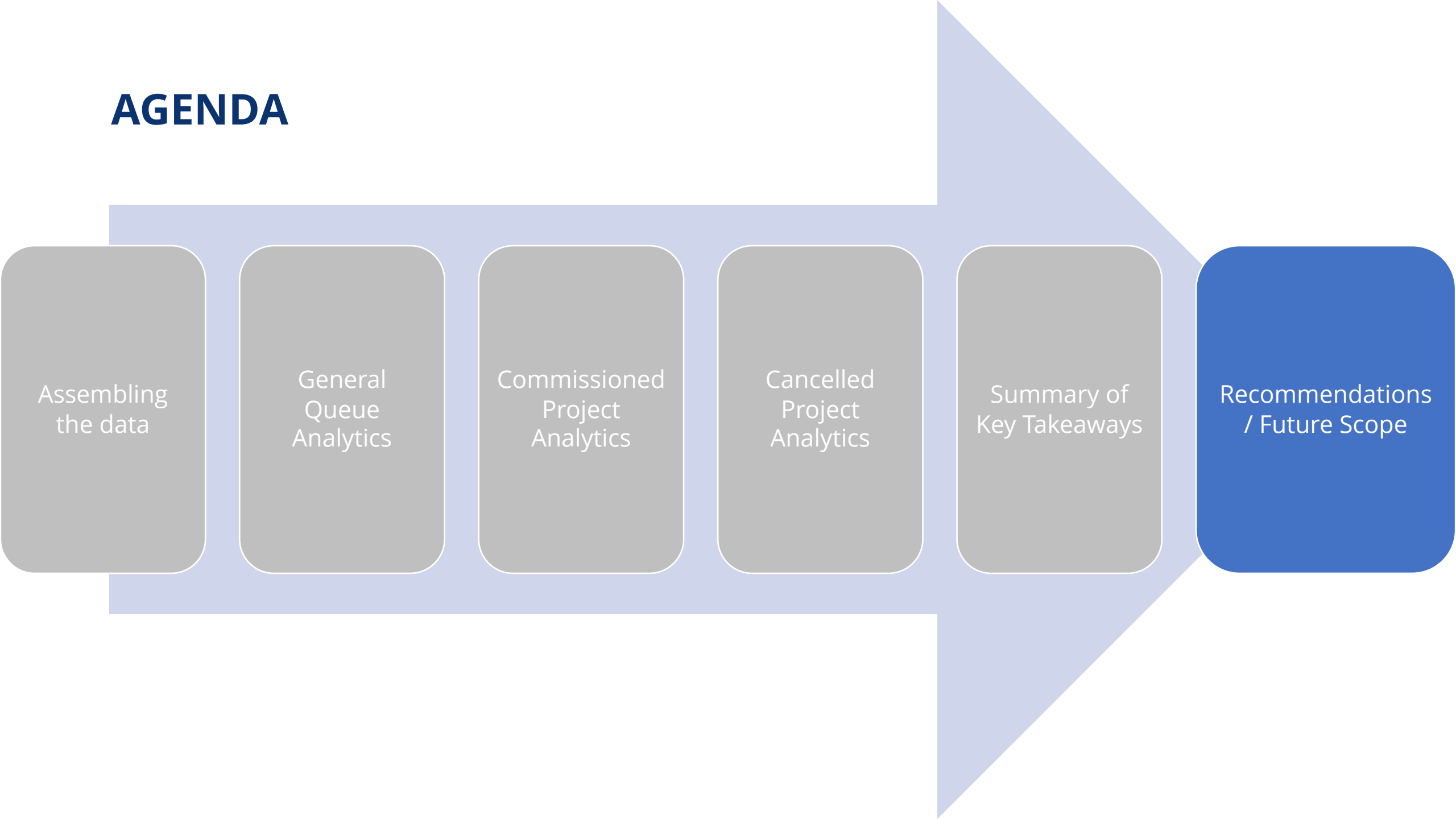
Commissioned Projects

- 11% average success rate for solar, 6% for storage
- Solar: 4.2 years end to end
  Storage: 2.7 years end to end
- Solar: 2.2 years IA to end
  Storage: 1.5 years IA to end

Cancelled Projects

- FIS study phase – most projects cancelled
- Solar dropout rates:
  AEP – 21.5%
  CNP - 13.6%
  ONCOR – 13.8%
- Lamar, Crane, Frio – high dropout rate

AGENDA


Assembling the data
General Queue Analytics
Commissioned Project Analytics
Cancelled Project Analytics
Summary of Key Takeaways
Recommendations / Future Scope

Queue growing rapidly, longer wait times expected, need to factor into financial models (higher dev. costs etc.)

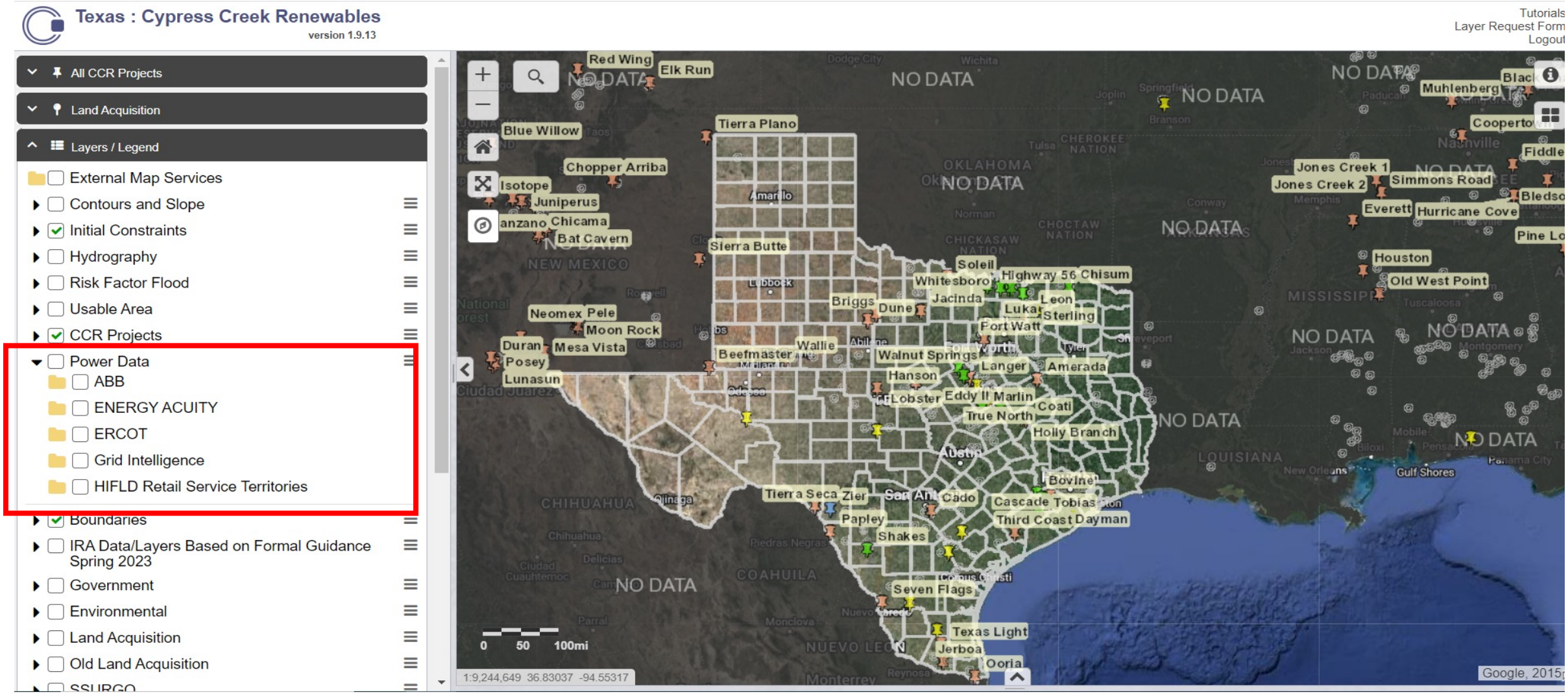
Understand why certain counties and utilities have high dropout rate and circumvent these issues

Recommendations/ Future Scope

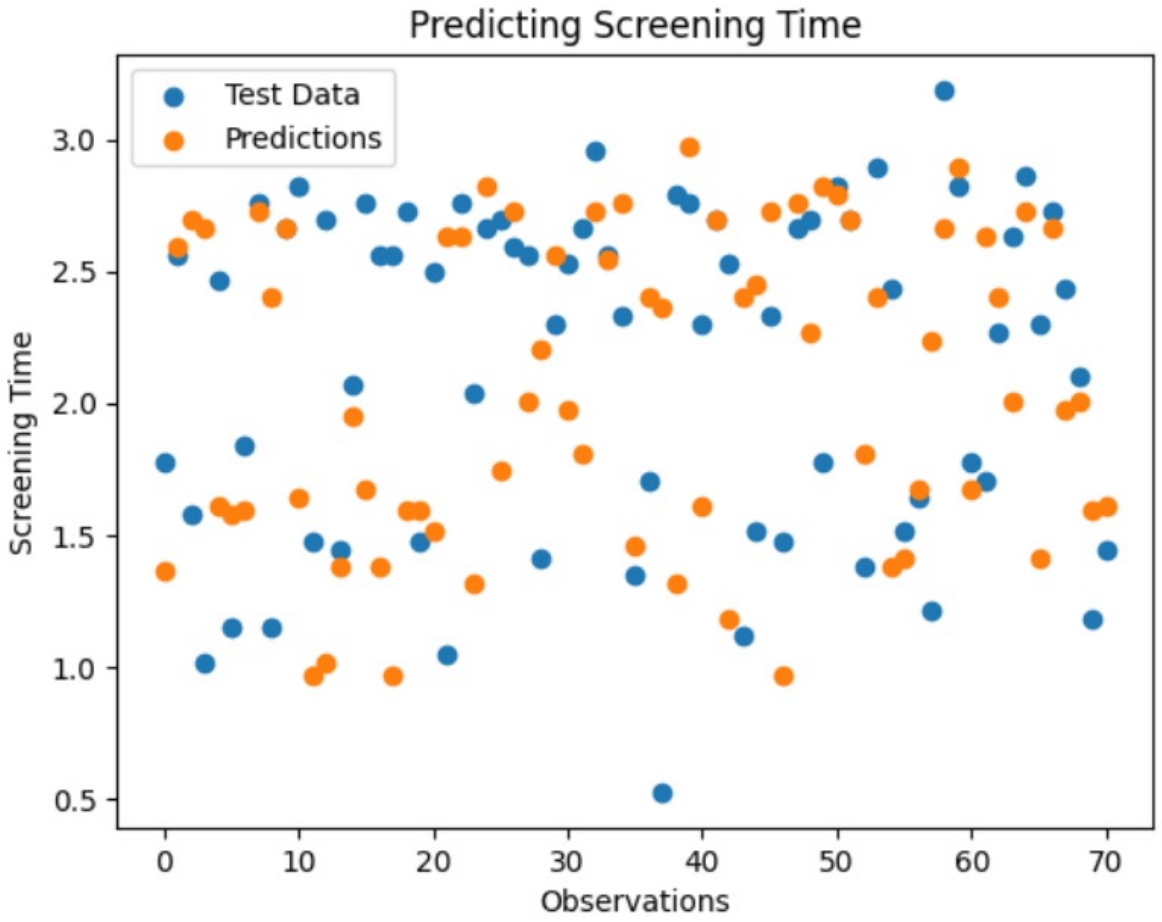
Work with utilities to fast-track FIS

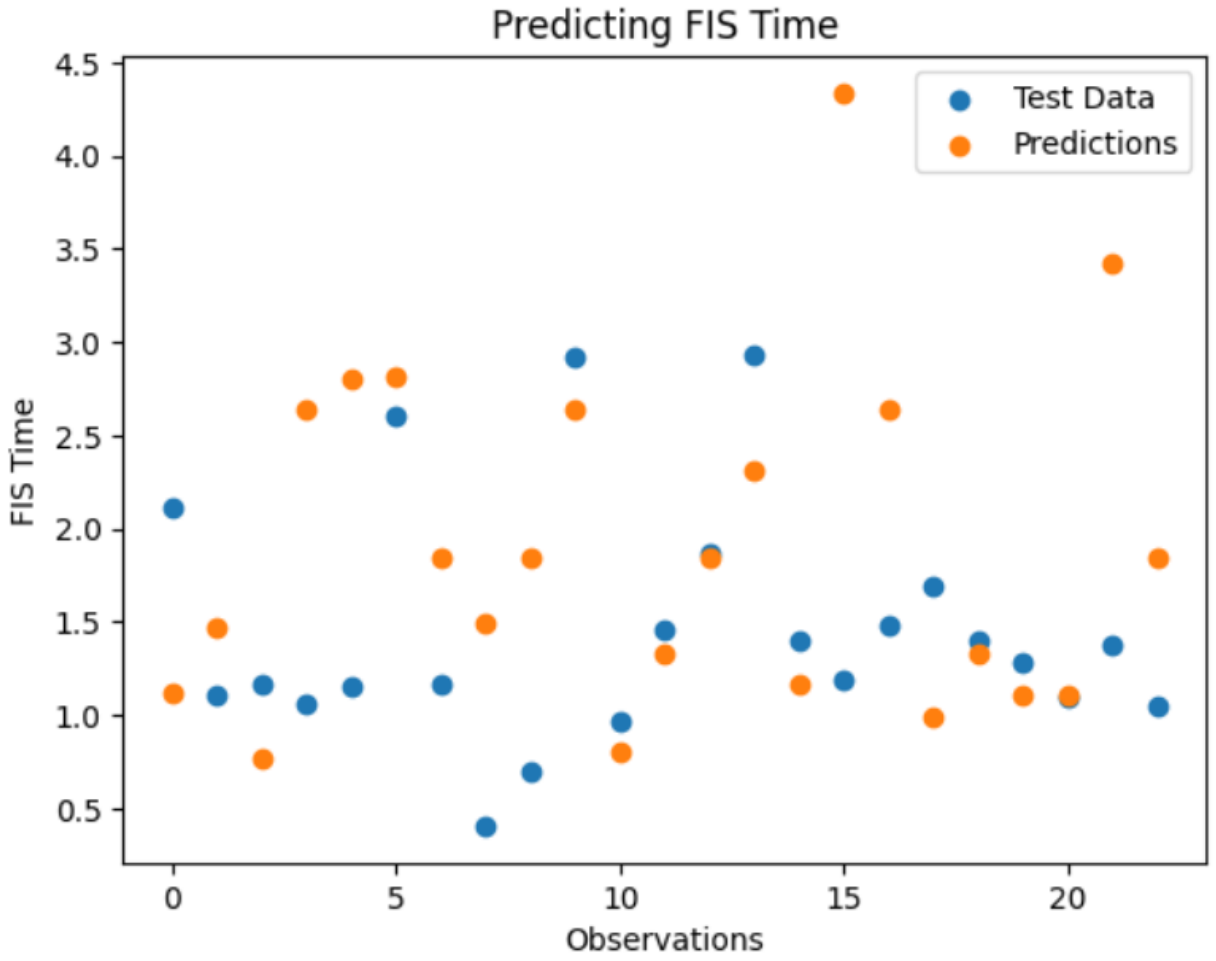
Include data from historical queue analytics into CCR Webmaps to assist in Greenfielding/early-stage development

PROPOSING NEW LAYER FOR IX QUEUE DATA

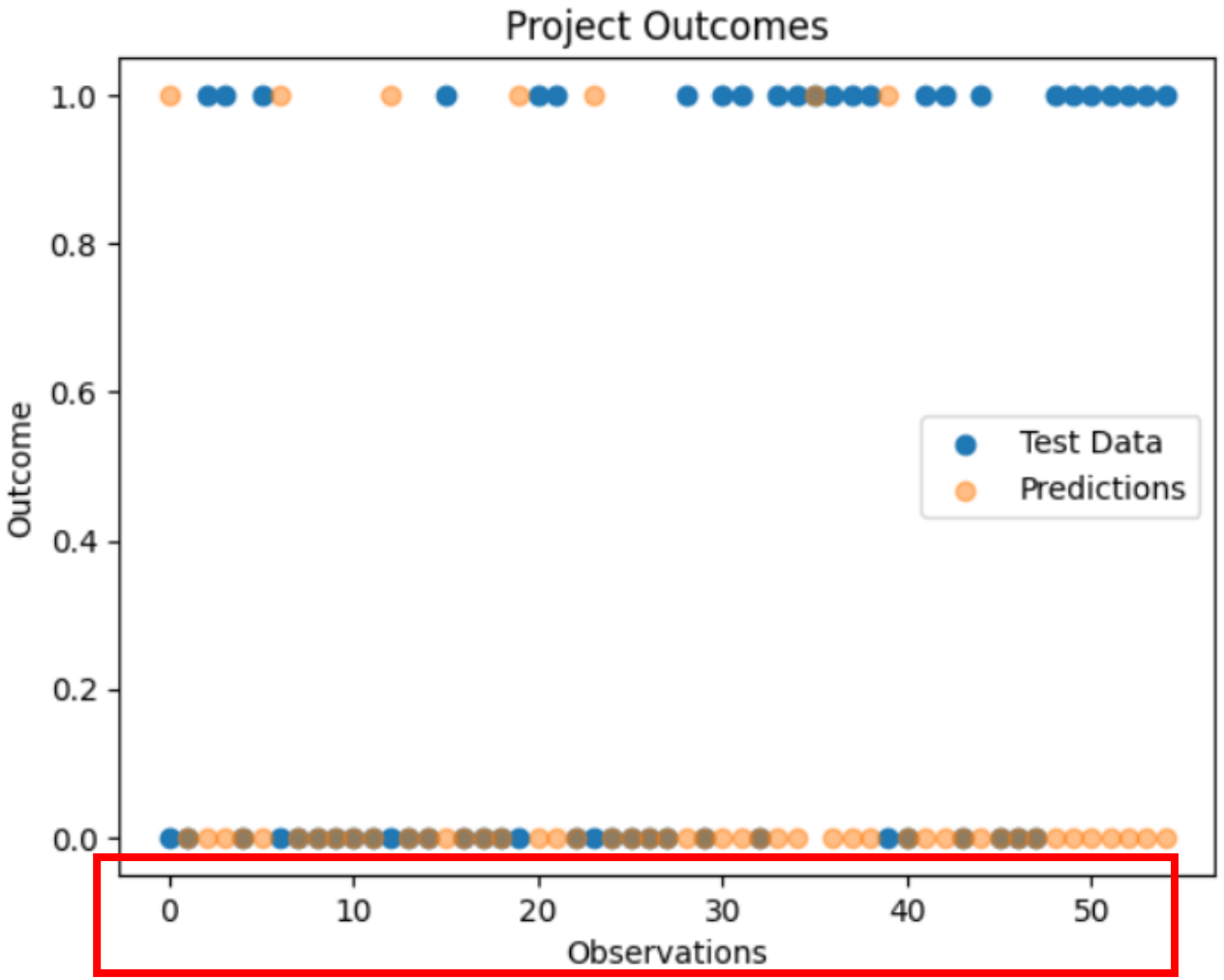


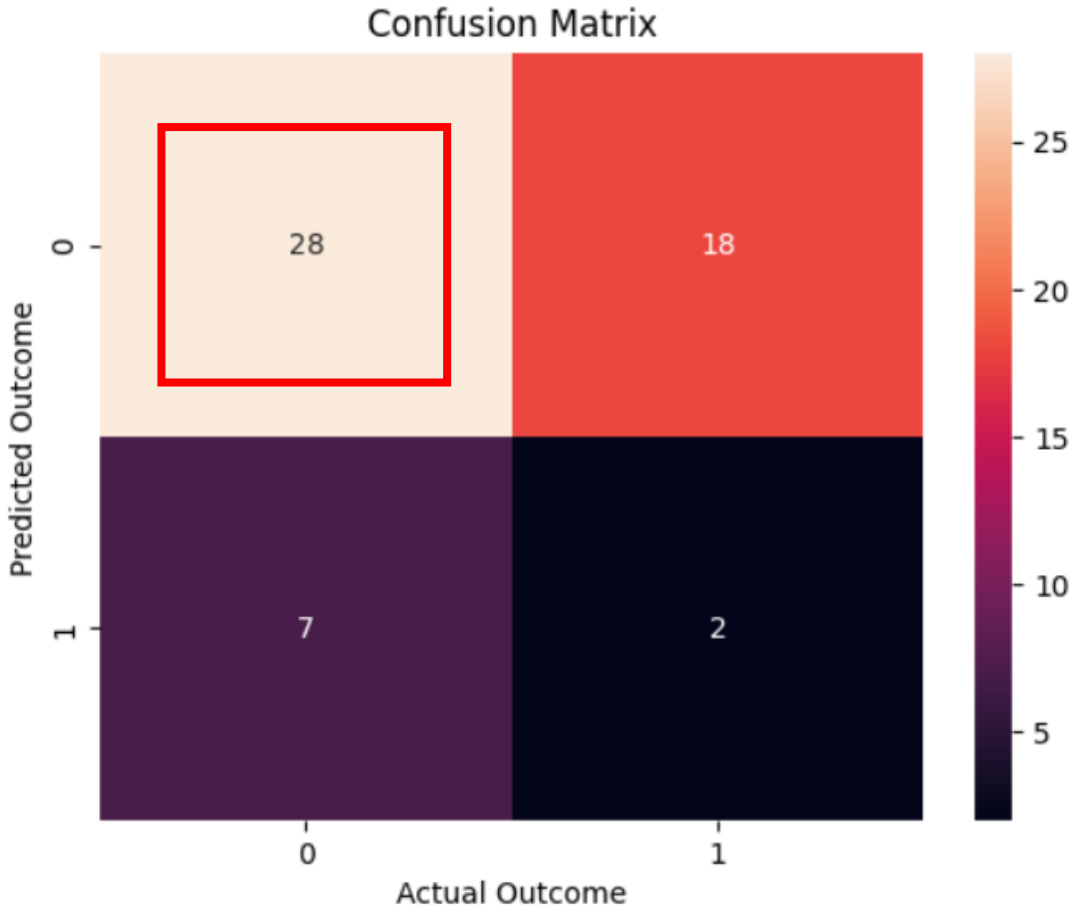
USING CAPACITY AND UTILITY TO PREDICT STUDY TIMES!





USING CAPACITY AND UTILITY TO PREDICT PROJECT OUTCOMES





Thank you!