



UNLEASHED



bgeSM

AN EXELON COMPANY

Optimal Substation Asset Planning

2024

Path to Clean



2045

Net Zero

84

2024



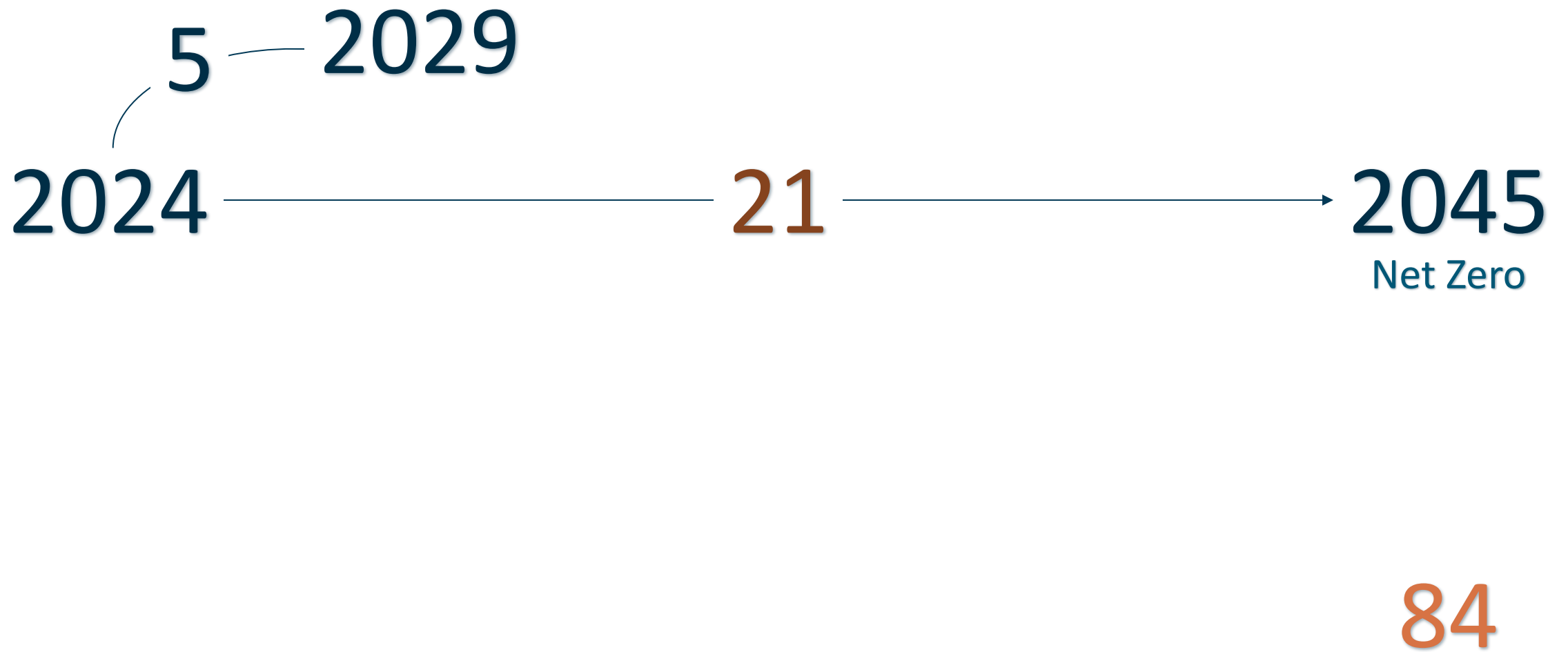
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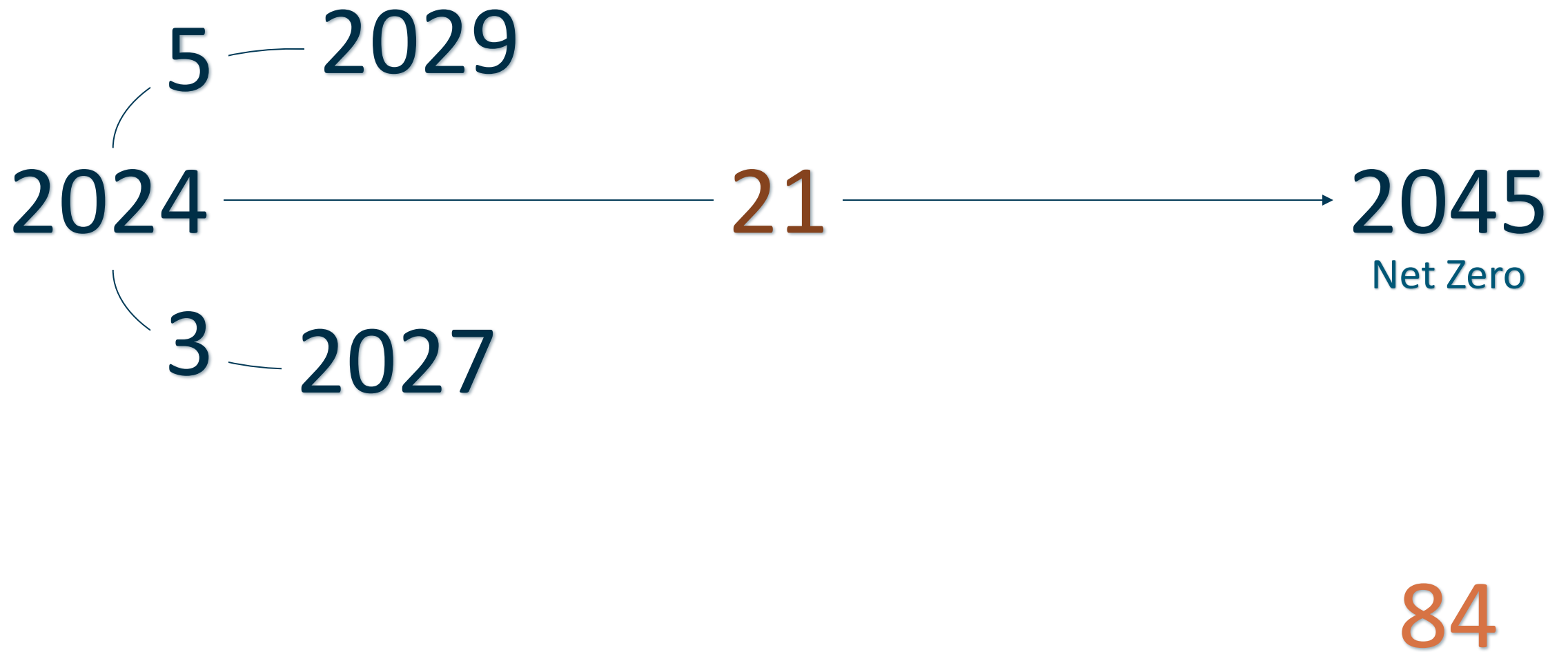


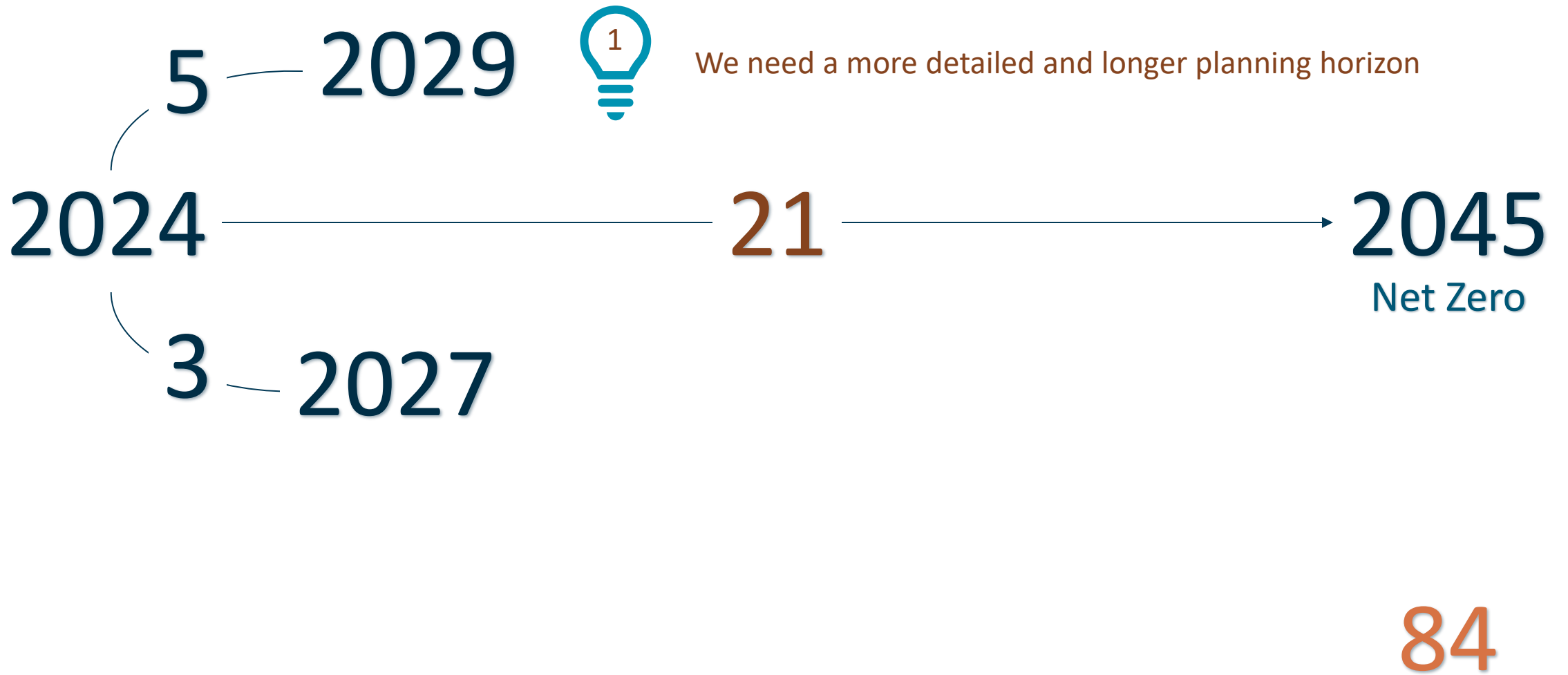
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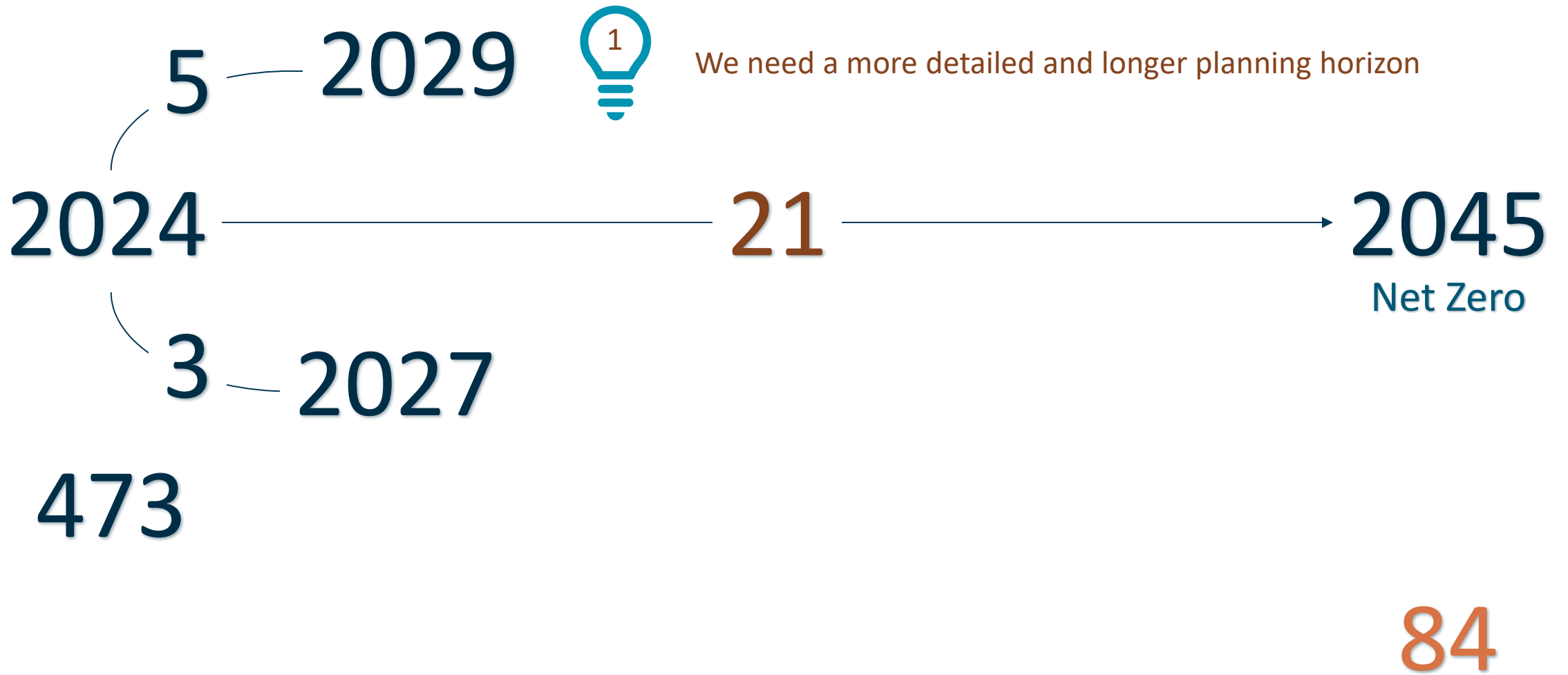
Net Zero

84

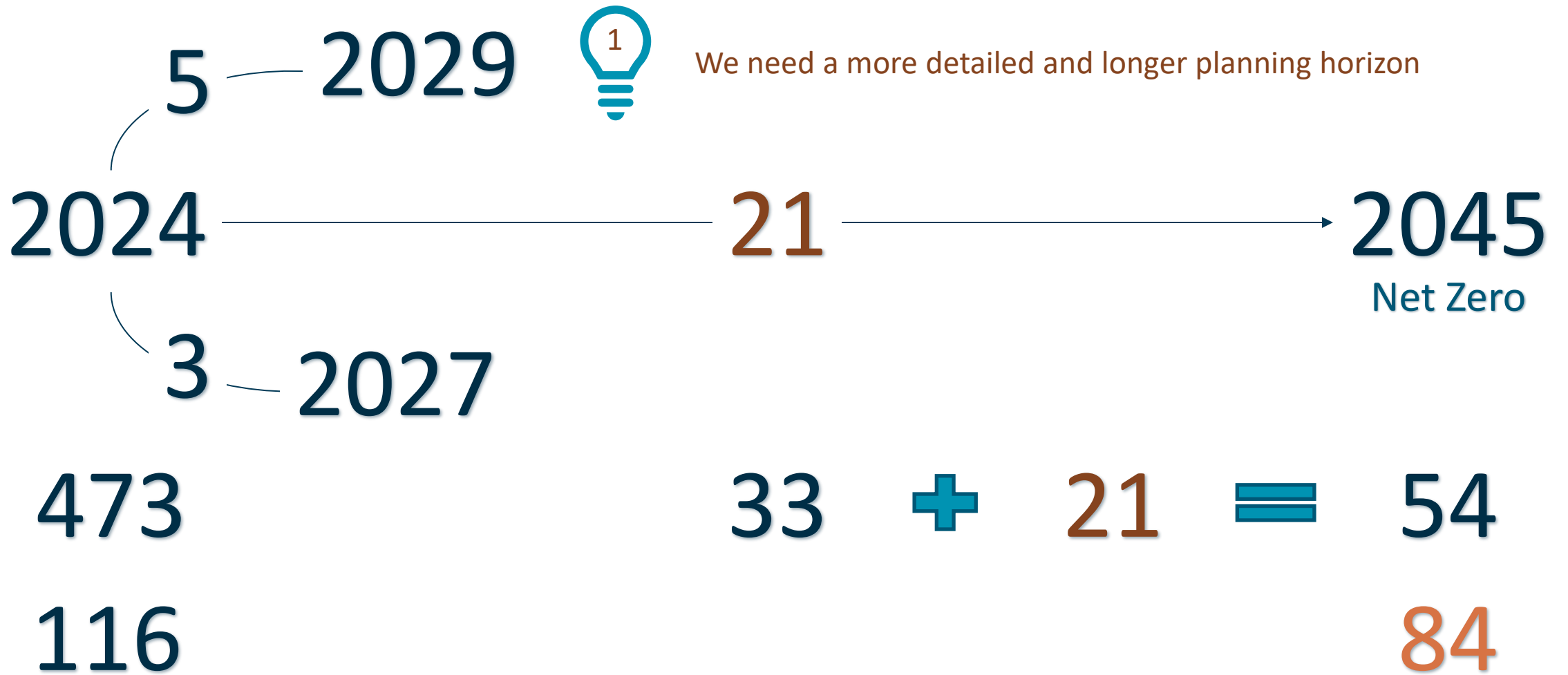


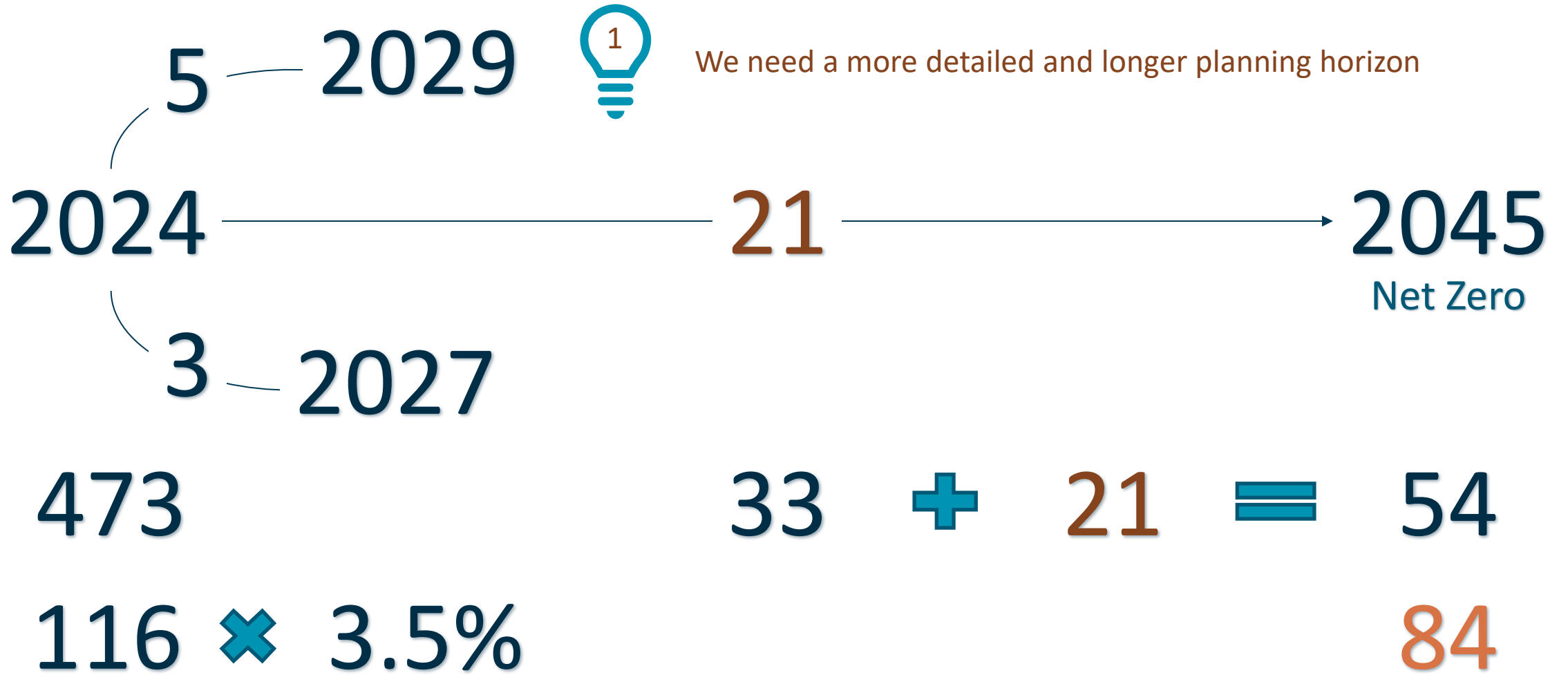















$$473 \quad 33 \quad + \quad 21 \quad = \quad 54$$

$$116 \times 3.5\% = 4 \quad \times \quad 21 = 84$$





 We need to pick the right assets to replace in the right order.

$$473 \quad 33 \quad + \quad 21 \quad = \quad 54$$

$$116 \times 3.5\% = 4 \quad \times \quad 21 = 84$$

250



$$473 \quad 33 \quad + \quad 21 \quad = \quad 54$$

$$116 \times 3.5\% = 4 \quad \times \quad 21 = 84$$

$$250 \times 40\% = 100$$



We need a more detailed and longer planning horizon



We need to pick the right assets to replace in the right order.

$$473 \quad 33 \quad + \quad 21 \quad = \quad 54$$

$$116 \times 3.5\% = 4 \quad \times \quad 21 = 84$$

$$250 \times 40\% = 100$$



We need aging infrastructure solutions that future proof the electric grid.



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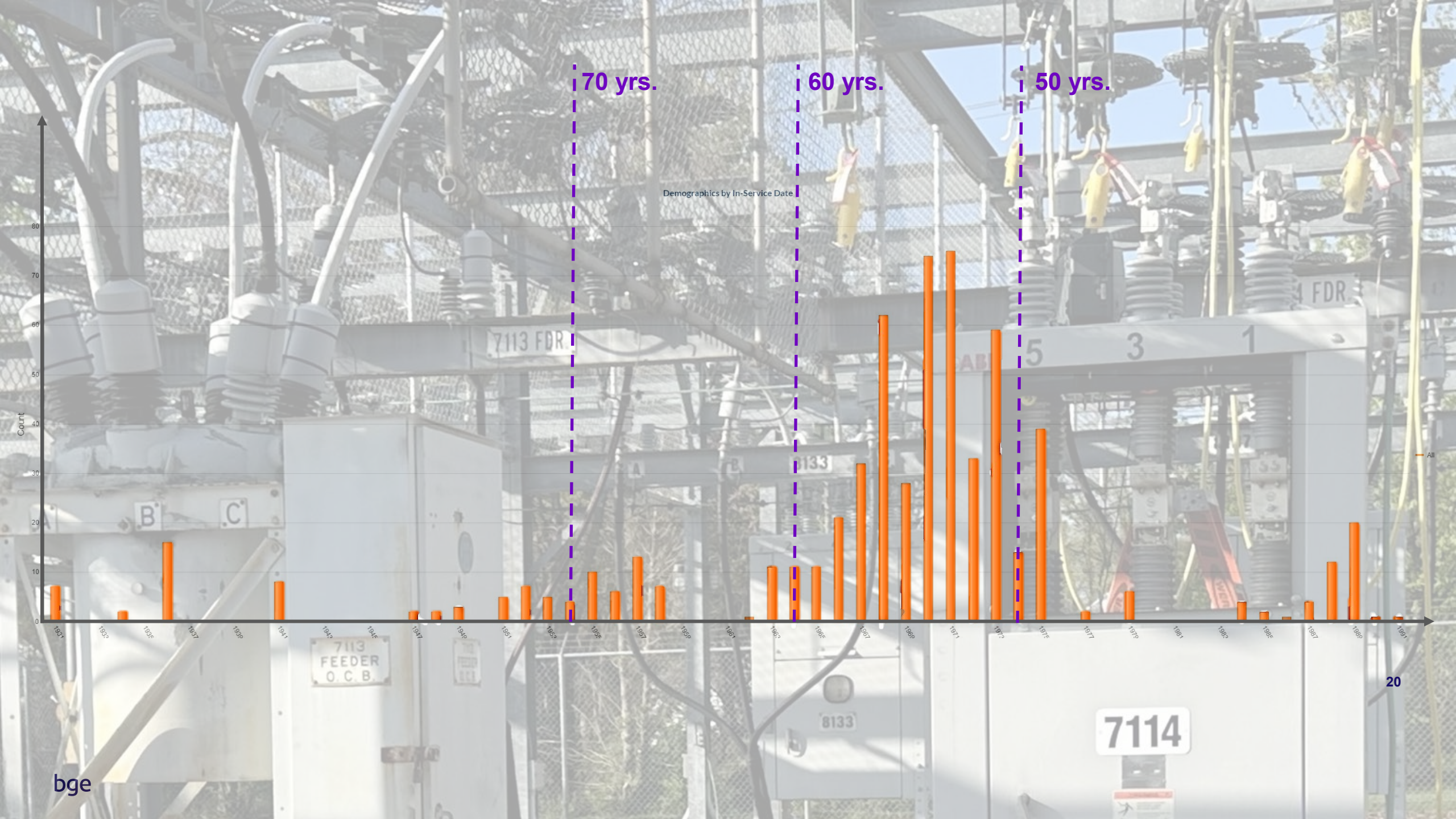
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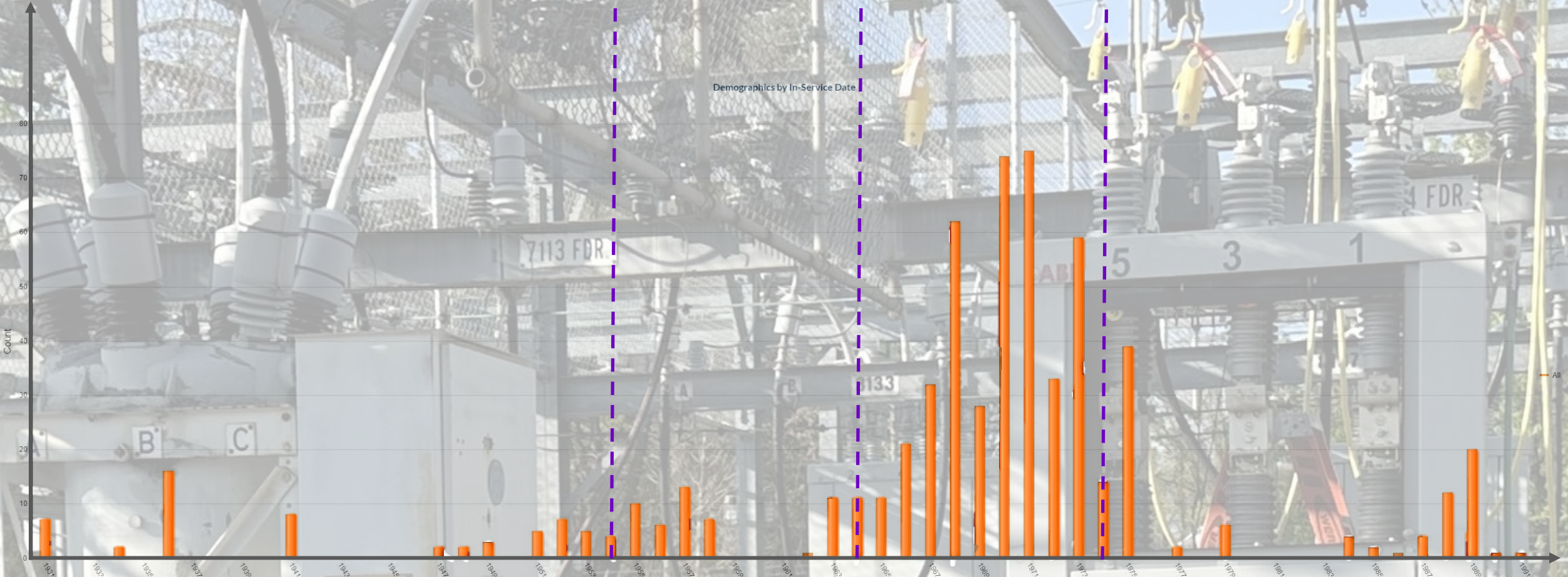
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FDR



Demographics by In-Service Date



70 yrs.

60 yrs.

50 yrs.

Baltimore Gas and Electric

Enhancing the Effectiveness of System Performance Work Planning

Where we were...

Responsible engineers (12) across four (4) departments identified assets for replacement in silos by asset specific programs.



Where we are headed.

One engineer within the Asset Management & Reliability unit able to identify and optimize a multi-year asset investment plan.

Subset of T&S assets are reviewed twice a year for replacement consideration.



All T&S assets (62,216) are evaluated, and optimal replacement dates are determined twice a year.

Analysis was performed bi-annually and was not constrained by funding designated in Long Range Plan (LRP).



Funding constraints are implemented to align the multi-year asset investment plan with the financial long-range plan (LRP) and beyond.

Variety of factors varying by asset type are used to justify investment decisions with age being the primary driver.



Multi-dimensional Value framework used to justify all investment decision included in asset investment plan.

Optimizing Substation Asset Management

Moving beyond a 5-year planning horizon.

- BGE has moved to multi-year planning (MYP) versus traditional rate case model.
- Equipment lead times have extended and likely to remain extended.
- Need to optimize investments for electrification and aging infrastructure management.

Integrated Investment Planning Across Executive Categories

- Identify assets scheduled for replacement that will be or could be impacted by Capacity Expansion projects.
- Remove those assets from system performance projects and develop a spare parts strategy to deal with near term failures.

Evolving Beyond Asset Replacement Programs

- Develop discrete substation replacement projects sized to the Long-Range Planning (LRP).
- Evaluate cost benefit of full, hybrid and asset specific replacement projects.



Why is BGE interested in multilevel risk analysis



System Level Risk

- Method for optimizing system performance dollars for the greatest impacted.



Substation Level Risk

- Method for ensuring equitable investment of system performance dollars.
- Customer experiencing four or more interruptions over the past 3 years. (CEMI 43P)



Asset Level Risk

- Method for analyzing major driver for risk within an asset family.
- Ability to compare the level of risk between asset families to see if funding constraints to a given asset family need to be readjusted.

Asset Replacement Strategies



Asset Specific Replacements



Hybrid Substation Replacement



Full Substation Replacement

Lesson Learned



Missing and or incomplete data can be overcome



Understanding the link between assumptions and results



Dispelling the Black Box Myth

What's next for BGE

- Continual refinement of assumptions used in the development of value framework.
- Active initiatives to develop standardized asset health scores across all T&S assets for all Exelon Utility operating companies.
- Incorporate asset health scores into Copperleaf for additional assets.
- Use of Copperleaf Asset to support the development of T&S asset investment plan for next regulatory filing.
- Leverage Copperleaf reporting to provide quantifiable data for future technical and financial project approval process.





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Thank you