



U.S. OUTLOOK CONFERENCE

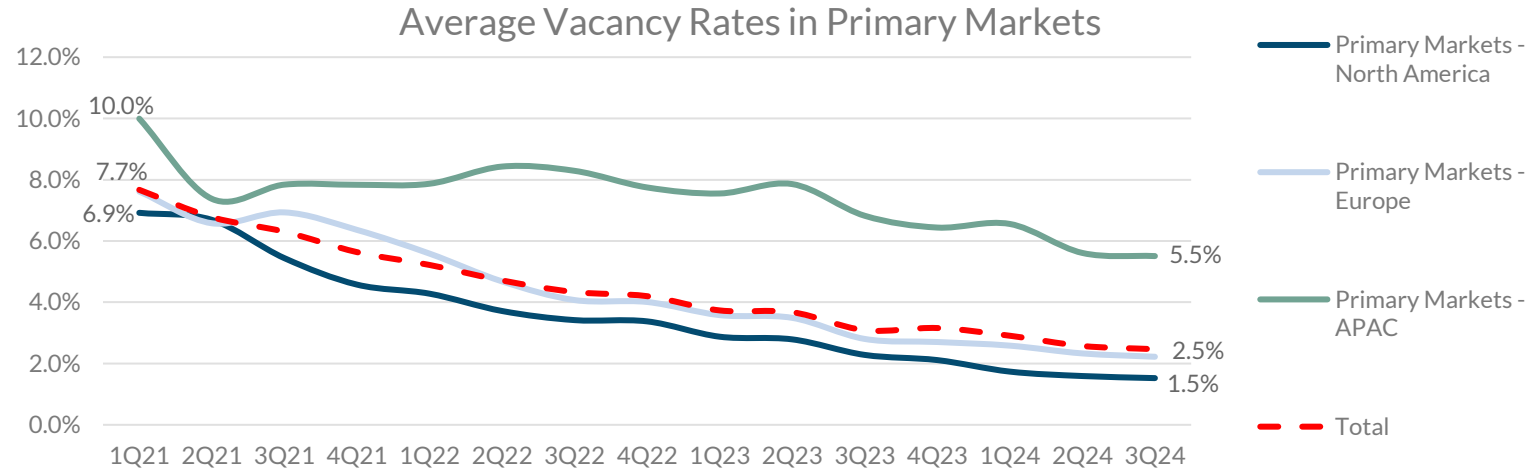
NEW YORK

**AI Revolution: From Power & Energy
to Chips & Big Tech**

December 2024

Vacancy Rates Go Low, Leasing Rates Go High

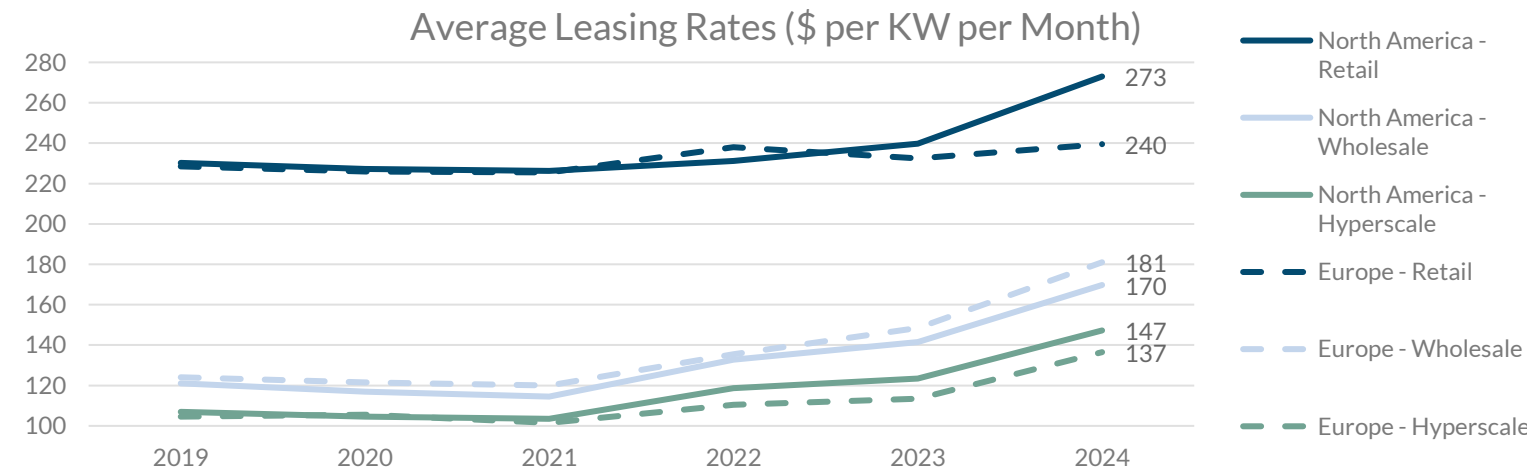
Absorption Exceeds New Supply, Driving Leasing Rates Higher



On average, the vacancy rates across 22 primary markets decreased to 2.5%, a record low

- North America: 1.5%
- Europe: 2.2%
- APAC: 5.5%

Absorption has exceeded new supply in primary markets in 4 of the last 7 quarters



Leasing rates rising across all deployment types

- The imbalance between supply and demand is driving prices higher
- Cost inflation also contributing to higher leasing rates, from \$10 mn to \$12 mn per 1 MW built

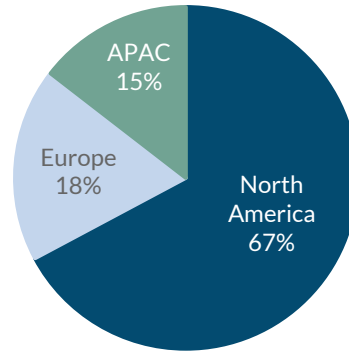
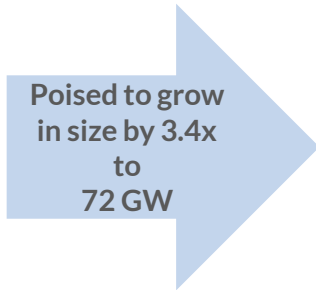
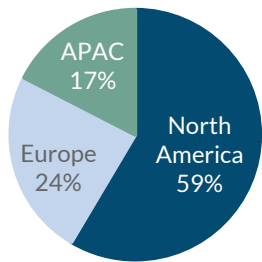
Building Bigger, Colo Growing Capacity 3x

More Developments Moving to Secondary/Emerging Markets

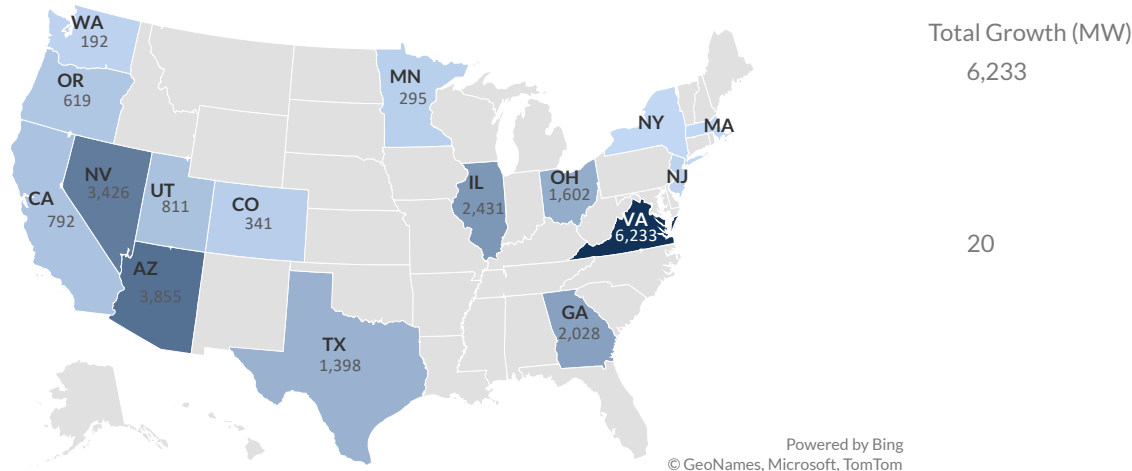
Current Capacity vs. Planned Capacity: Colocation in Tracked Markets

2023 Capacity: 20 GW

Additional Planned Capacity: 50 GW



US Additional Planned Colocation Capacity (MW) Heat Map



Building more capacity through the end of the decade than in the past 3 decades

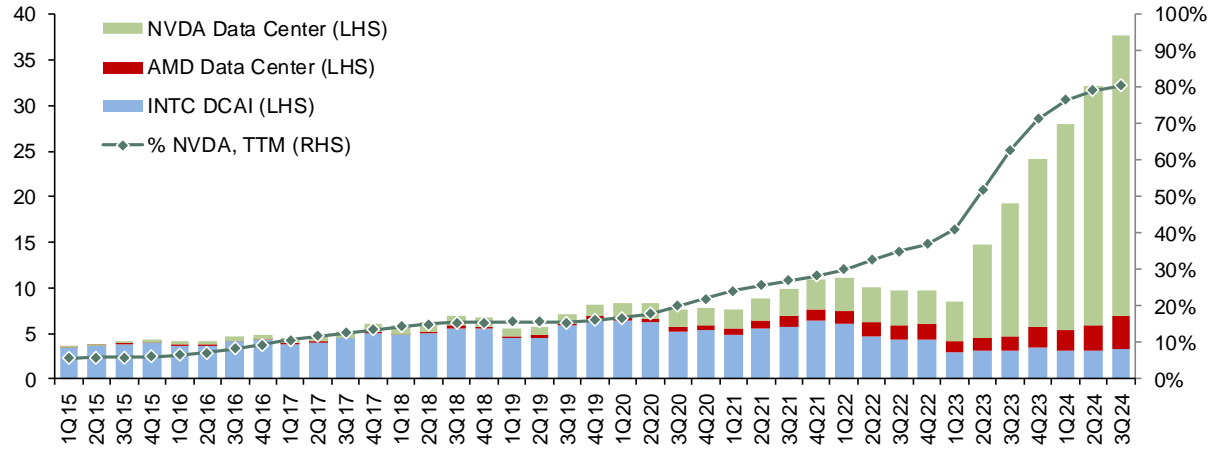
- Colocation data center IT load capacity poised to grow from ~20 GW to ~70 GW
- Supply/demand imbalance necessitates additional capacity
- Enterprises are pressured to invest in AI infrastructure

Strong demand is outstripping supply throughout major markets

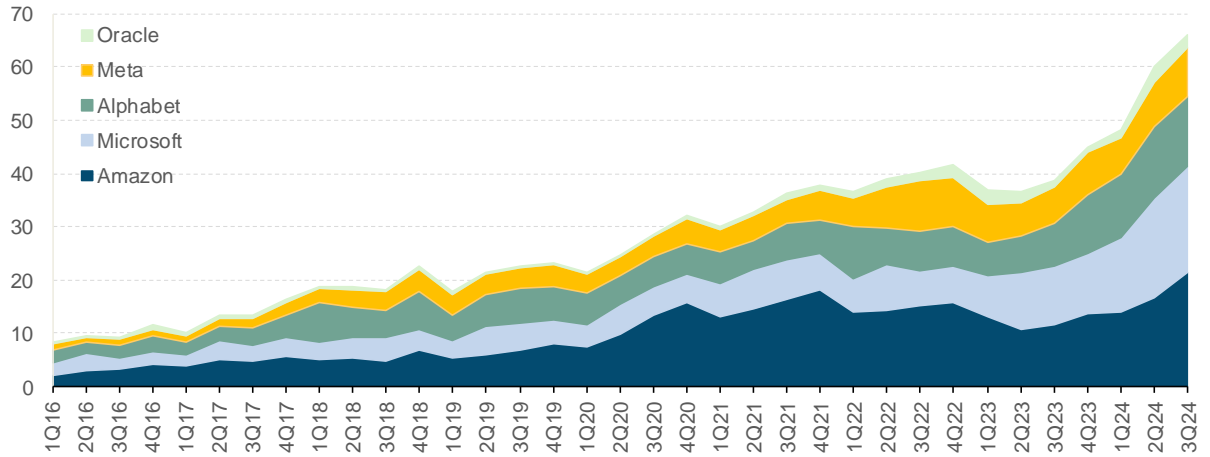
- Primary markets seeing bulk of future investment (~70%), but mix shift toward Secondary/Tertiary (30% planned vs. 18% current)
- Developments follow available land and power, often in secondary/emerging markets
- North America Top 10 Growth Markets: NoVA, Atlanta GA, Phoenix AZ, Dallas TX, Chicago IL, NorCal, Portland OR, Columbus OH, Reno NV, Northern NJ.

AI Infrastructure Boom Continues

Data Center Merchant Silicon Sales - CS Est. (\$ bn)



Hyperscalers: CapEx (\$ bn)



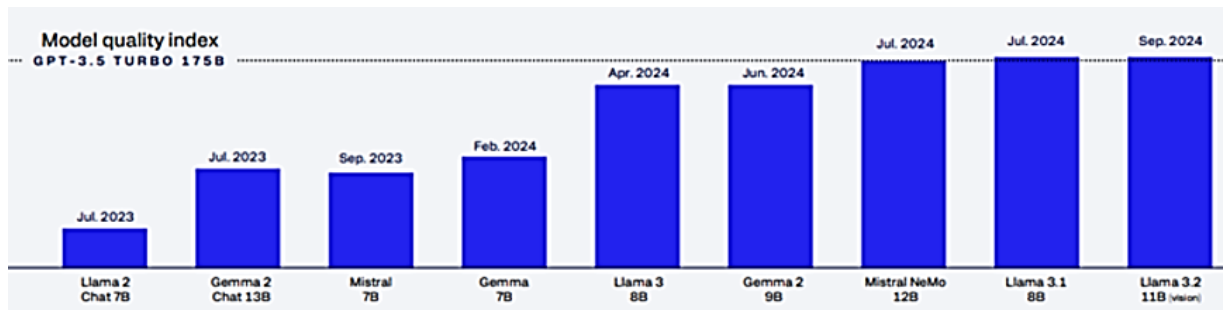
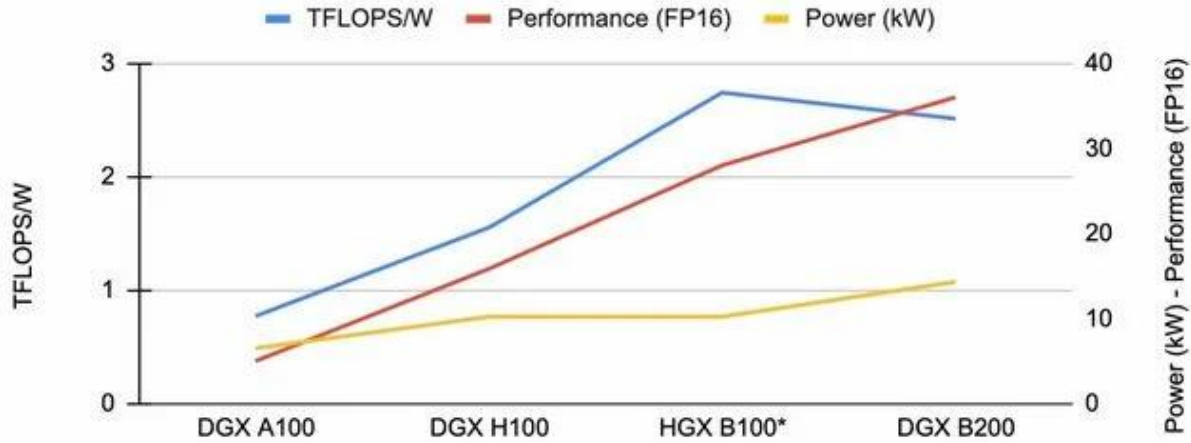
- Unhinged growth in GPU demand for AI
 - Data center merchant compute silicon sales exceeded \$150 bn annual run-rate in MRQ
 - Nvidia GPUs and networking accounted for nearly 80% of shipments since YE'22
 - Street consensus: ~50% growth in Nvidia data center sales in CY2025
- Hyperscaler capital intensity continues to ramp
 - Aggregate trailing 3-yr CAGRs: Revenue ~12%, Capex ~20%
 - Microsoft capex exceeded 30% of sales MRQ
 - Management commentary implies further capex growth in 2025
 - Alphabet CEO in July earnings call:

“The risk of underinvesting is dramatically greater than the risk of overinvesting for us here. Even in scenarios where if it turns out that we are overinvesting, these are infrastructure which are widely useful for us. They have long useful lives, and we can apply it across and we can work through.”

GPU Efficiency Gains Will Lower TCO Over Time

Performance Per Watt (System Level)

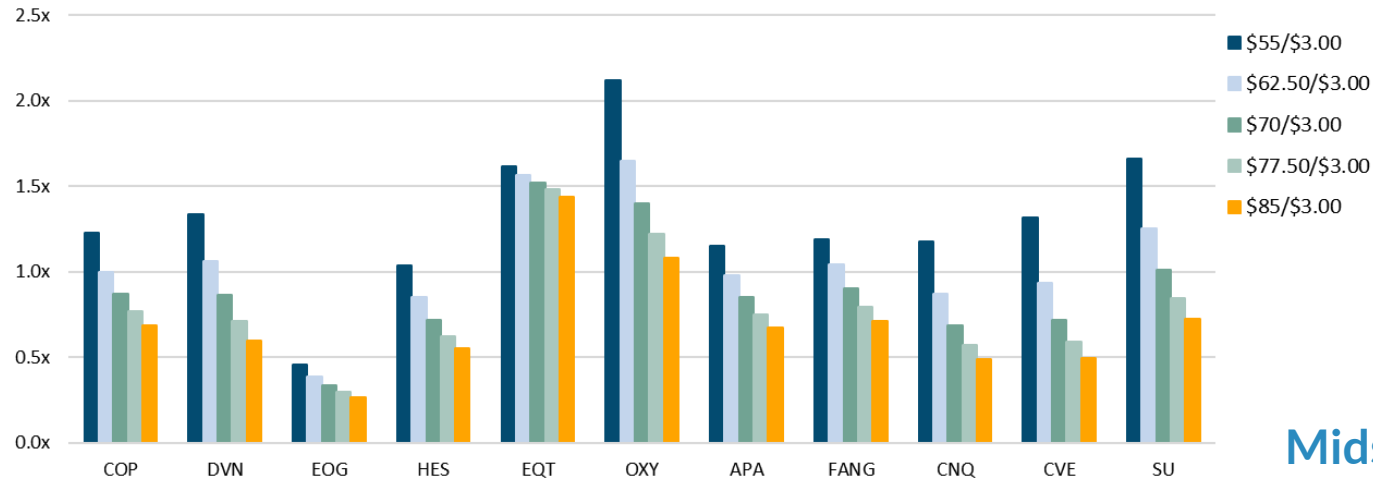
Normalized to FP16



- Technology is disinflationary: do more with less stuff
 - Nvidia GPUs released on an annual cadence, each generation represents 50-70% increased efficiency on a FLOPS/watt basis
 - Configurations may change (i.e., smaller, denser racks), but TCO declines are inevitable
 - 64 Blackwell GPUs are needed to run the GPT-3 benchmark compared to 256 H100s
 - AWS CEO: AI training costs have already decreased by “two or three times over the last 18 months” and expects further declines within the next year or two.
- Inference performance of smaller AI models are also improving rapidly
 - Models released in 2H24 with 8-12 bn parameters (e.g., Llama 3.1/3.2) perform at parity with GPT-3.5 Turbo (175 bn parameters, released March 2023)

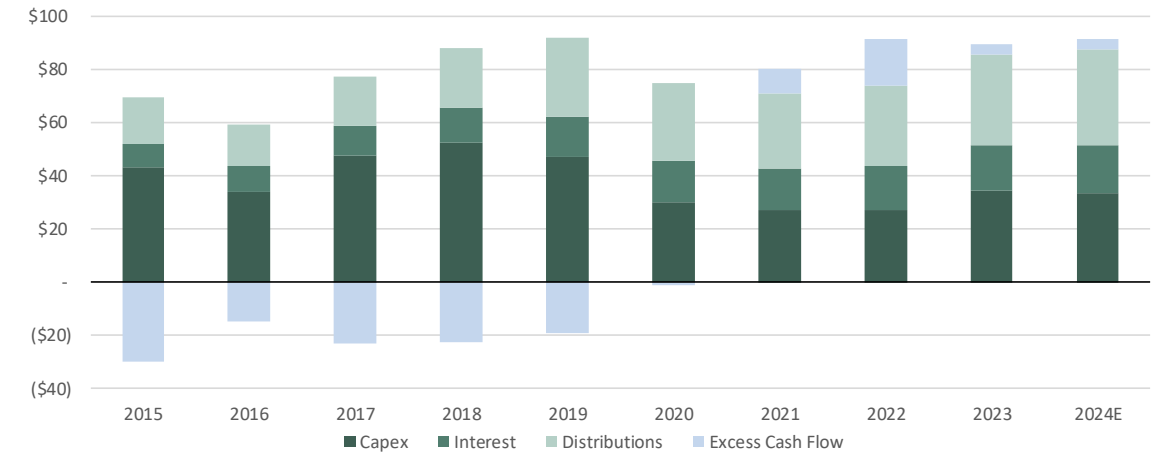
Energy Fundamentals Remain Strong

IG E&P Leverage Scenario Analysis



- Upstream leverage remains below 1.5x in downside scenario
- Midstream capex set to decline as next wave of projects enter service

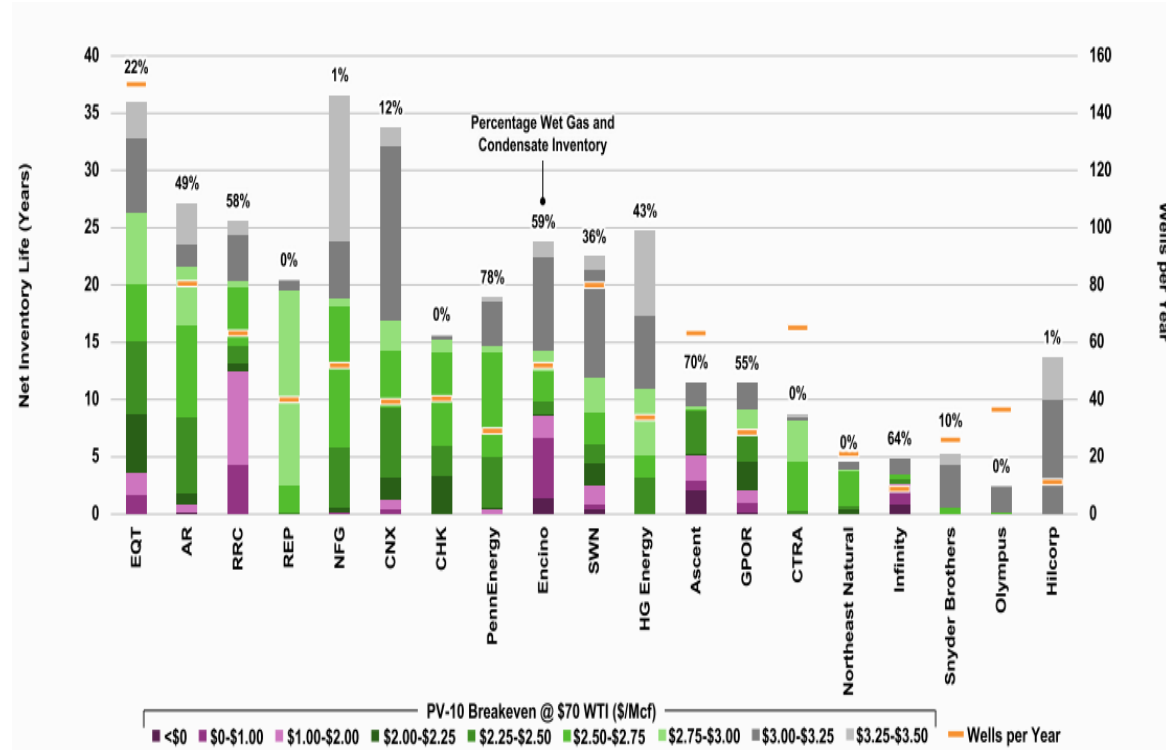
Midstream Continues to Generate Free Cash Flow



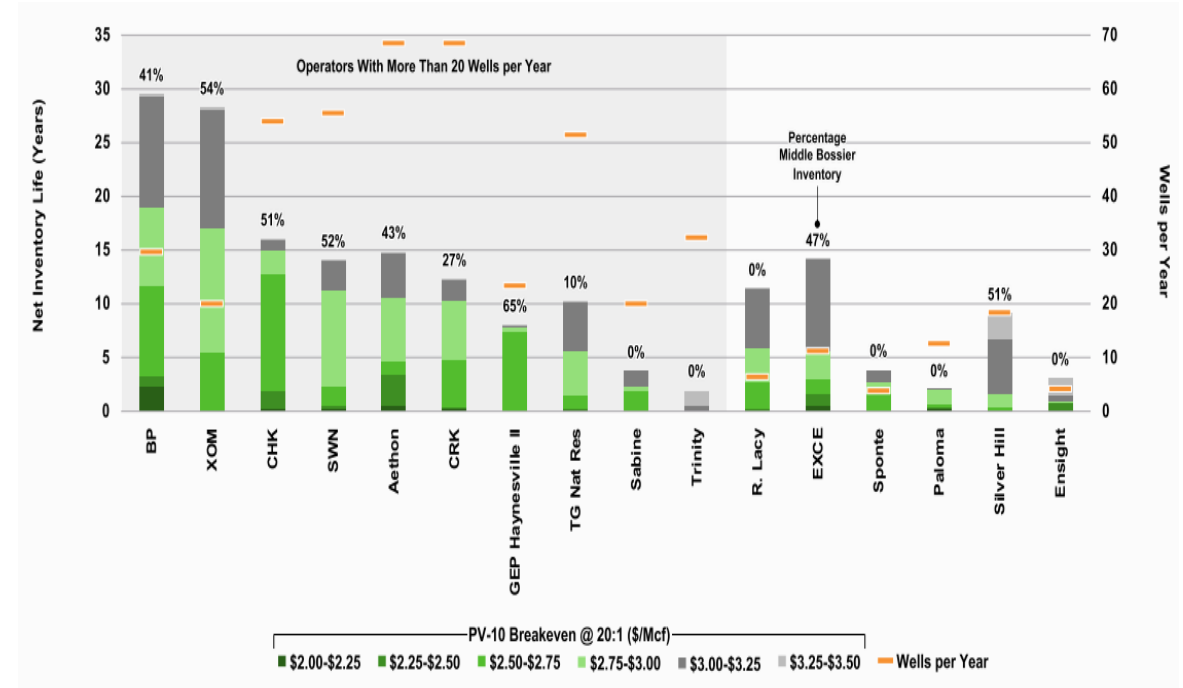
Source: Company Filings, CreditSights

Who is Best Positioned for Rising Gas Demand?

Appalachia Inventory Life by E&P



Haynesville Inventory Life by E&P

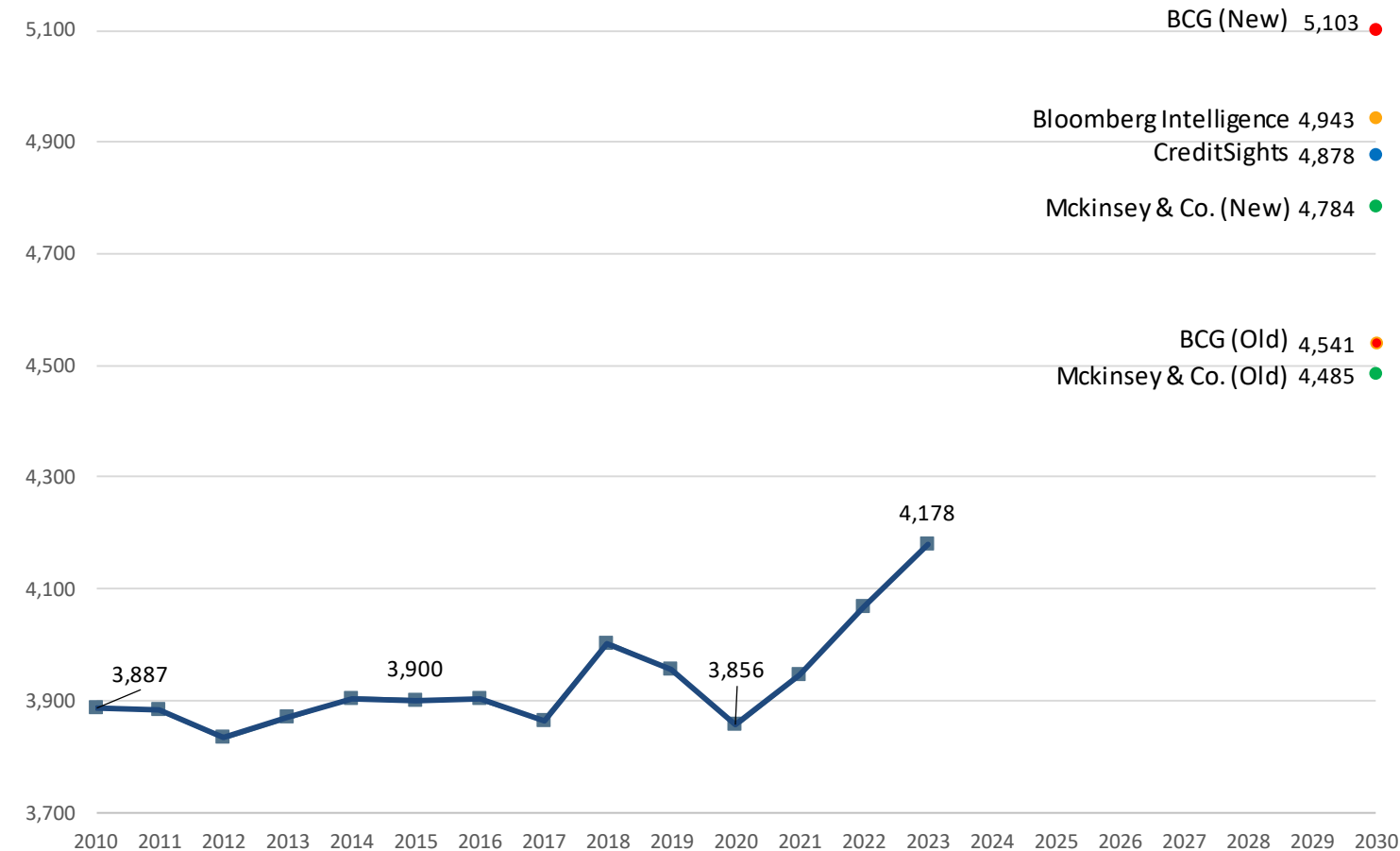


- Appalachia is the lowest cost gas basin, but Haynesville needs to meet growing demand
- Key Midstream names in Appalachia – WMB, MPLX, EQT and DTM
- Key Midstream names in Haynesville – WMB, DTM, KMI and ET

Game Changing New Demand for Electricity

Datacenter Power Consumption Forecasts

TWhs



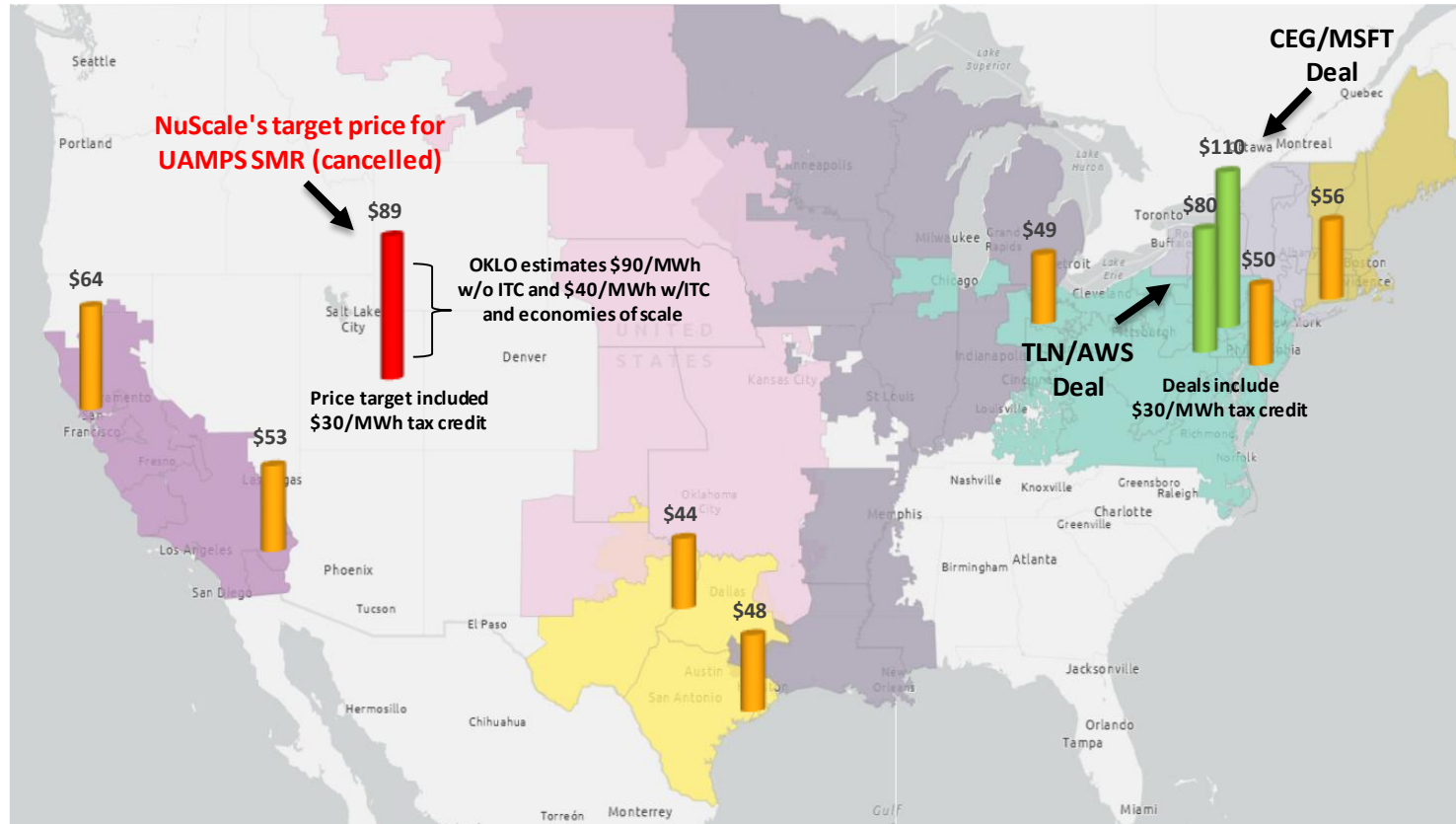
- Electricity demand grows from 0.4% historically to 3-5%; 3% of nation's power in 2023 to ~15% in '30
- All of HY Power benefits from not just higher prices but capacity prices as well (July auction up 10x); Nov. FERC nuke reject just means Big Tech pays T&D fees
- *IG Credit Risk*: Utilities spend \$100 mn per large datacenter (PPL 1Q call), if it stops running in 3-4 years, those costs + utility return fall to residential customers
- *HY Credit Risk*: ST Solar Pain vs LT Datacenter Gain

CreditSights View: The Ohio settlement is blueprint for customer/bondholder protection

Small Modular Reactors: Finally 5-10 Yrs Away (have been for last 20yrs)

Forward Power Prices vs Recent Nuclear Deals and SMR Cost Estimates.

\$/MWh



Amazon / Talen (no tax credits) and Microsoft / Constellation deals both ~\$80/MWh after credits

- Small modular reactor estimate initial costs of \$120 fall to \$90, or \$60 w/ tax credits. \$20/MWh cushion for inevitable overruns
- Nuclear has bipartisan support but significant budget savings potential; PTCs not envisioned for high capacity factor.
- *Why am I paying Big Tech tax credits for power that doesn't hit the grid?*

CreditSights Ways to play it:

- PSEG Power equity: Next to announce collocated nuclear deal
- VST equity: Not pricing in ENGH deals vs CEG pricing in 6-7
- VST unsecured bonds

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