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Expediting Power to Data Centers:

What, Who, and How to Navigate Energy Solutions

Behind the Meter

HONOLULU, HI

David Bell,

Vice President of Data Center and MicroGrid Development

VoltaGrid

3:00 PM-3:45 PM

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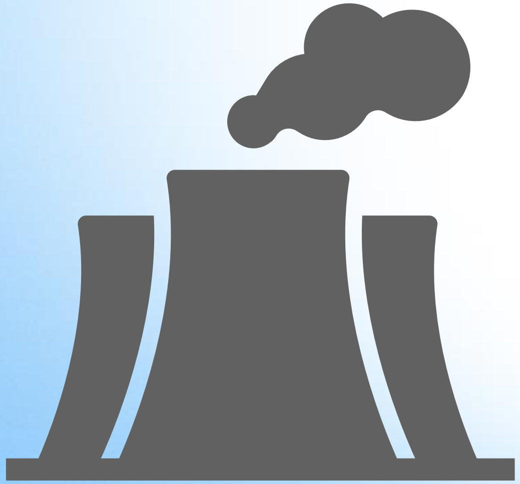
Behind the Meter is Inevitable



325 to 580 TWH by 2028
38 to 66 GW of New Power Generation

Ireland uses 4.5 GW per Hour on Average

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Source U.S. Department of ENERGY

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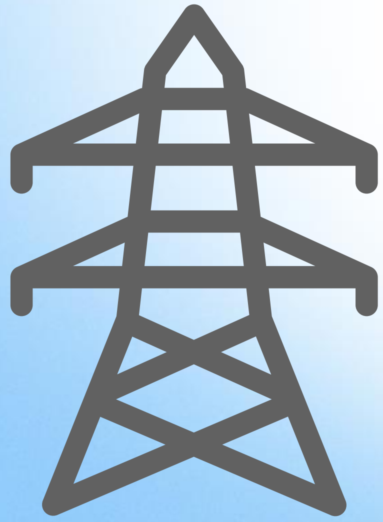

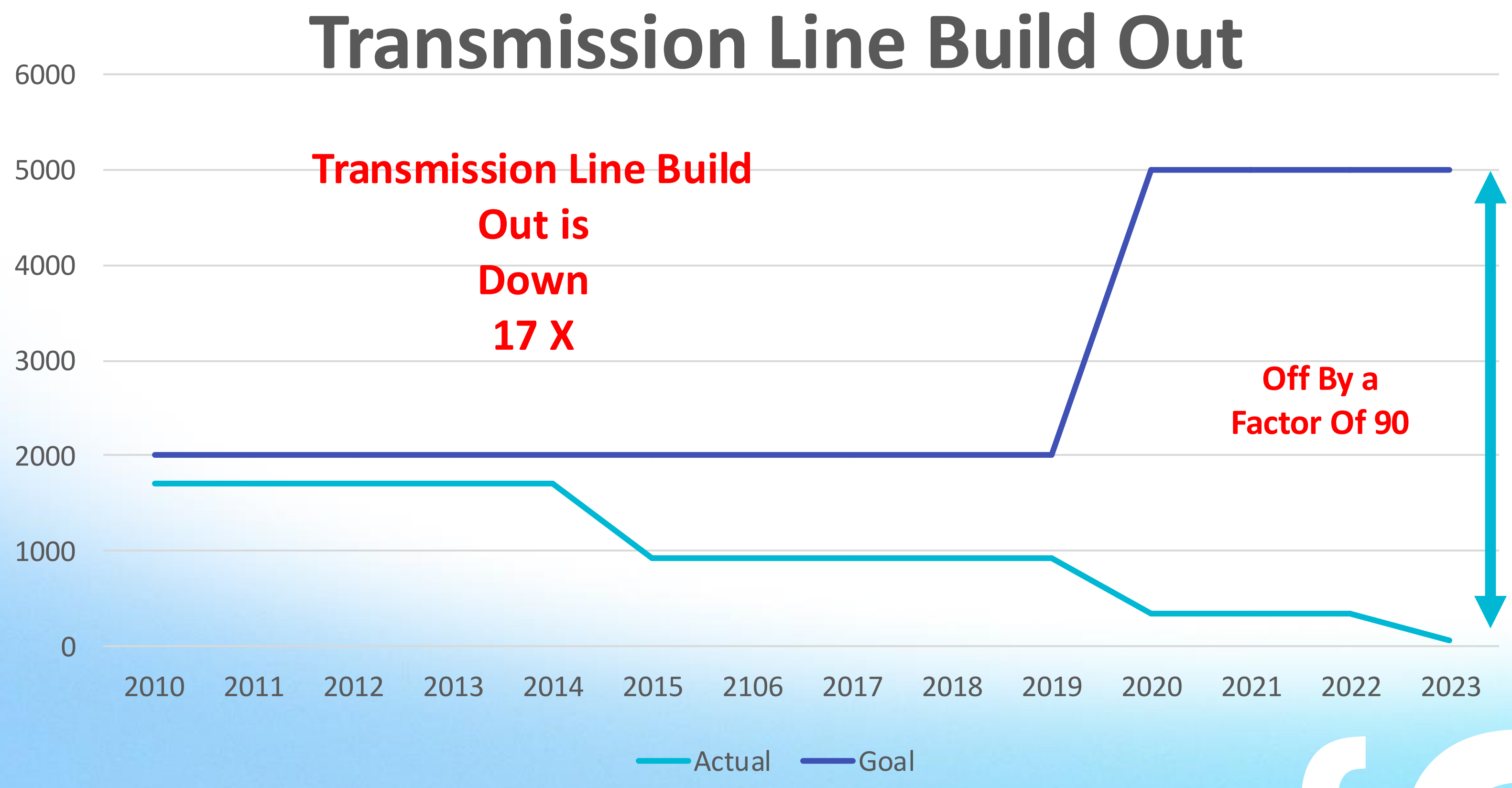

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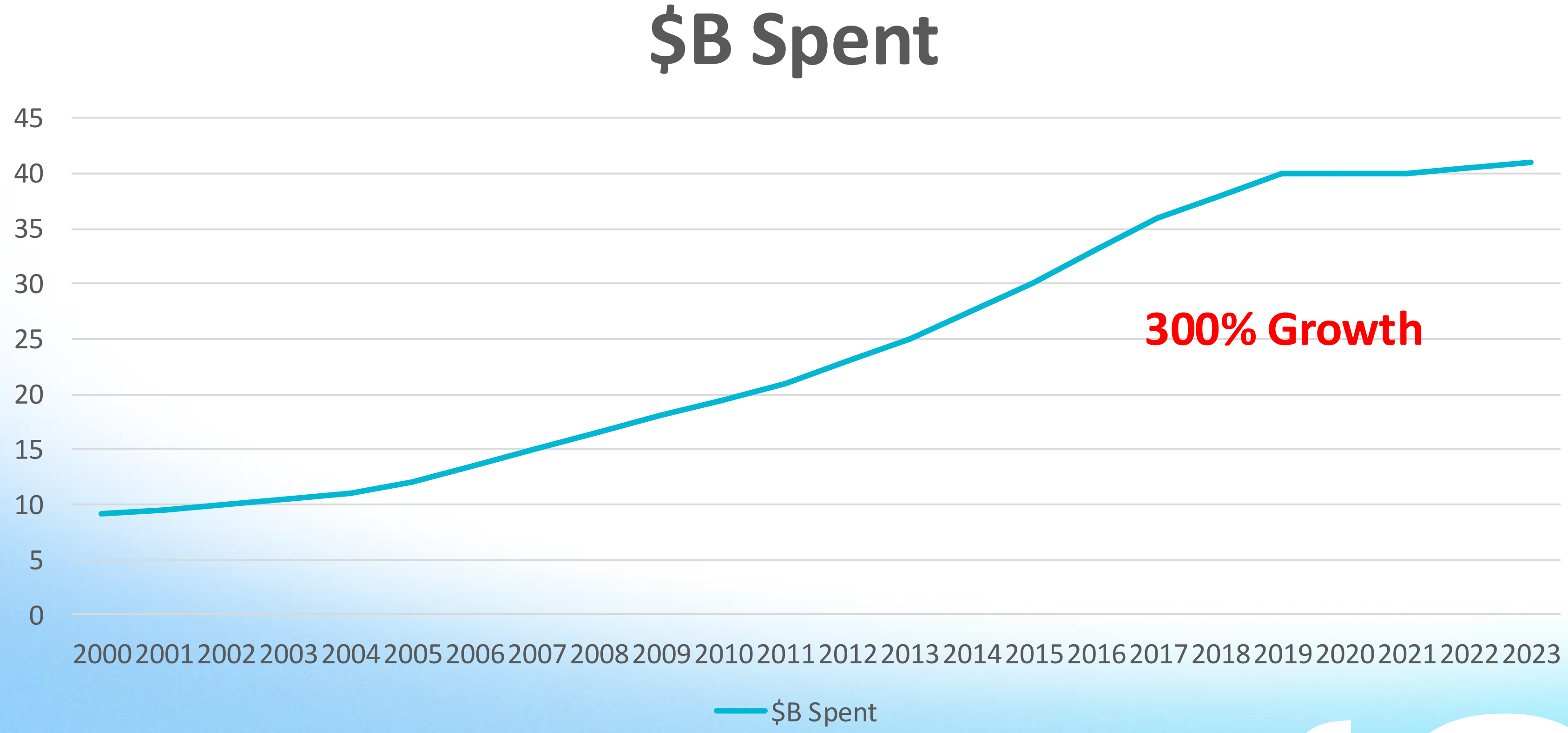

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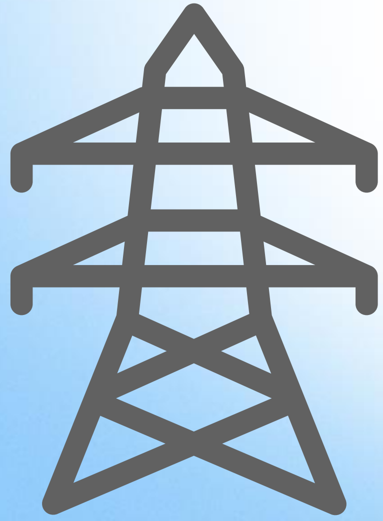

In The US from 2000 to 2023
The Total Capital Spent in Transmission for Every New Mile Went From

$6M per mile to $745M per Mile

WHY?

Utilities can capitalize on reconstruction.
System needs upgrades
New Construction is Difficult
Upgrading the system is low-hanging fruit

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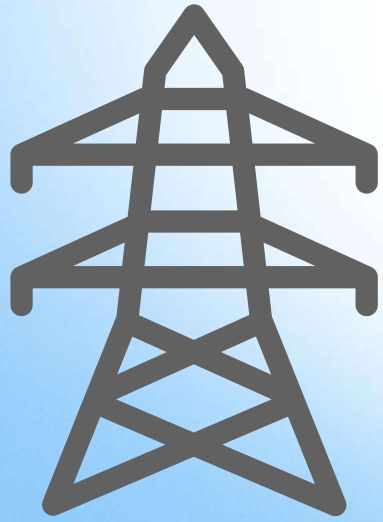

Utility Grid cannot keep pace

Price will be subject to change

There is public awareness, and change is in the air.

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How To Navigate BTM

Main Objectives We Hear

- Speed to Market
- Power Reliability & Quality
- Energy Efficiency
- Total Cost of Energy

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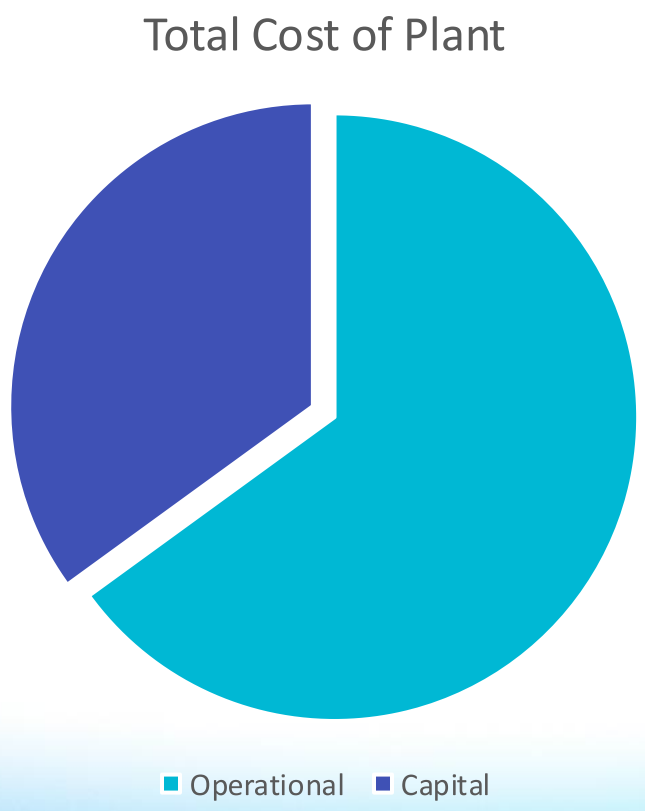
Total Cost of Capacity

- Just like the utility
  - Operational Cost 65%
  - Capital 35%



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Total Cost of Energy

Different from Utility

- Operational Cost 45%
- Capital 30%
- Energy (Fuel) 25%

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Test Cases

Concerned by Physical Footprint Customer Thought Bigger Would be Better

- **Scenario One – Moderate Temperatures, Extreme Elevation**
- **Scenario Two – Extreme Temperature, Moderate Elevation**
- **Scenario Three – Variable Temperature, Low Elevation**

Assumption

- All plants were 100 MW
- All fuel costs were $3/MMBTU
- All jobs were 99.999% reliable
- Need 1st phase completed in 1 yr

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Immediate Findings

Heat Rate

Elevation alone would de-rate their desired equipment by 15%

Elevation would increase fuel consumption by 16%

On the hottest days it would increase fuel consumption by 20%

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Heat Rate would change from 9.5 MMBTU to up to 12.1 MMBTU

This would drive cost of fuel up by 25% of what the customer was expecting.

Fuel Findings

Our original proposal vs Customer Request

			$/MMBTU
MW Job	100	Fuel Cost	$3.00
Mth hours	730		

LHV	MMBTU/MW	MWHR/Mth	MMBTU	$ /Mth	%	$/MWHr
Option 1	**7.86**	**73,000**	**573,780**	**$ 1,721,340**		**$ 23.58**
	8.1	73,000	591,300	$ 1,773,900	3%	$ 24.30
	8.5	73,000	620,500	$ 1,861,500	8%	$ 25.50
	8.6	73,000	630,501	$ 1,891,503	10%	**$ 25.91**
	9.1	73,000	664,300	$ 1,992,900	16%	$ 27.30
	9.5	73,000	693,500	$ 2,080,500	21%	$ 28.50
	10.1	73,000	737,300	$ 2,211,900	28%	$ 30.30
	10.5	73,000	766,500	$ 2,299,500	34%	$ 31.50
	11.1	73,000	810,300	$ 2,430,900	41%	**$ 33.30**
Option 2	12.1	73,000	883,300	$ 2,649,900	54%	$ 36.30

Immediate Findings

Spinning Reserve

To have the spinning reserve to meet quality and reliability you would have to spin more than double the MW's to have the same reliability and power quality.

You would burn for spinning reserve only an extra 70,080 MWh to meet the same reliability.

That = $1.6 M extra in fuel.

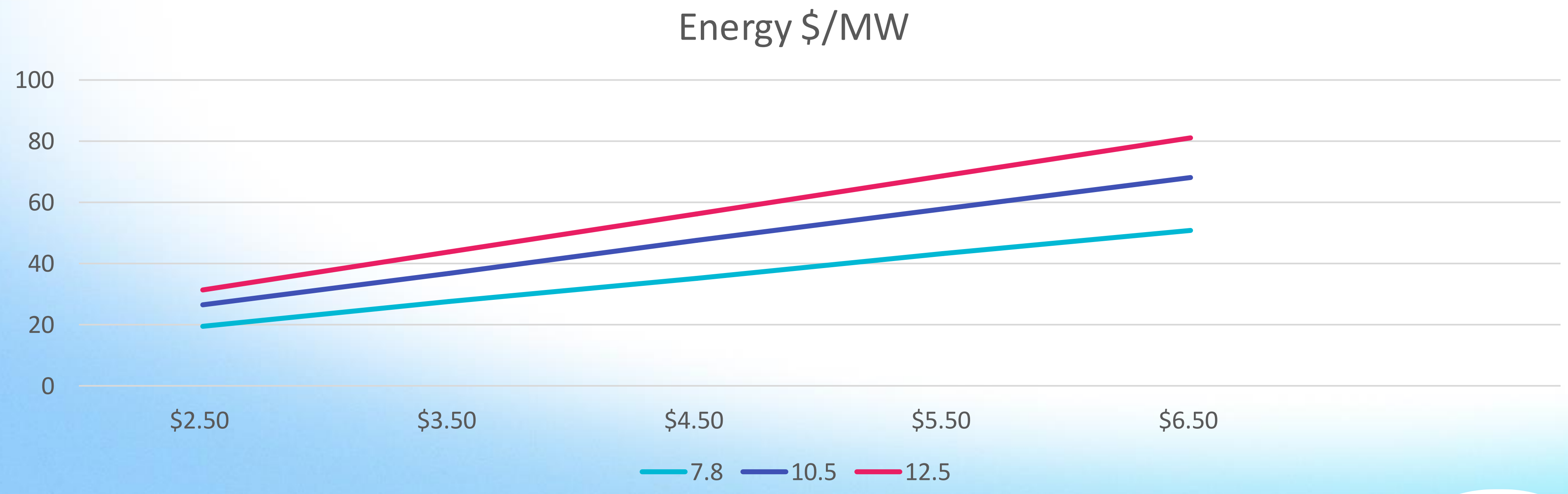
Fuel Findings

Ancillary Finding

- At one location this would limit the size and scope through permits
  More fuel = more unburned hydrocarbons
- Larger pipe more cost on pipeline construction

Cost of Fuel Matters

From $2.50 Gas to $6.50 Gas



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Heat Rate Summation

Selecting the correct technology in the beginning can reduce your behind-the-meter total cost of energy.

~ $0.10 to $0.18 per kWh

Speed to Market

Longest Lead Times

- Permitting (Jurisdictional)
- Fuel Supply
- Supply Chain

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Conclusion

Energy Solutions Behind the Meter is Inevitable

Utility Grid cannot Keep Pace

Speed to Market

Power Reliability & Quality

Energy Efficiency

Total Cost of Energy

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Q&A

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