

# Considerations Relating to the Allocation of Electric Utility Production Plant and Resources

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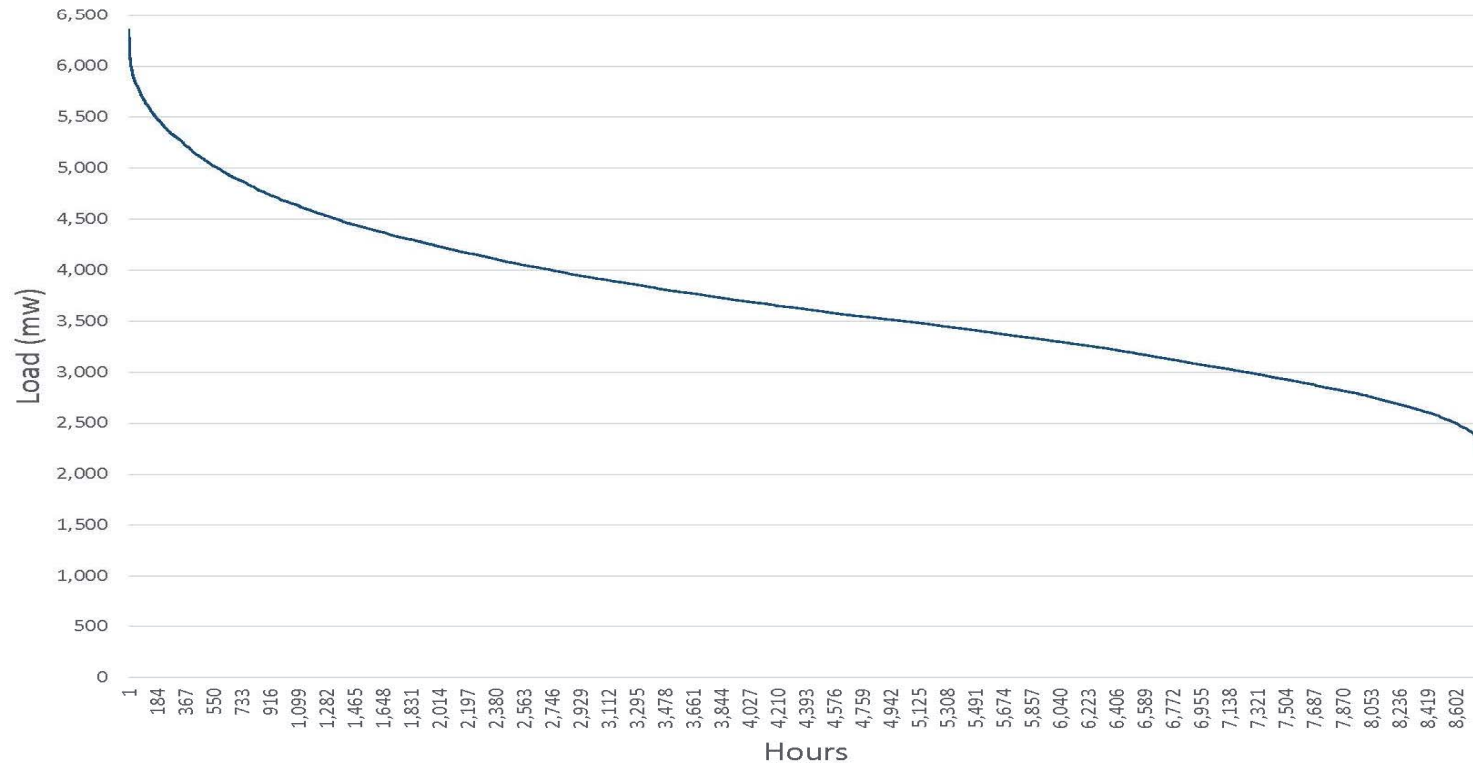
# Utilities Plan Their Production Resources to Minimize Total Cost of Service

- Utilities must have enough capacity (owned or purchased) to meet peak load requirements.
- Historically, utilities were primarily concerned with meeting native load and energy requirements.
  - System planning and operation of production resources has become more complicated (and sophisticated) over the last two decades.
  - Evolution of RTOs and development of competitive wholesale markets.
  - Environmental and political policies to: reduce green house gas emissions; and, promote renewable energy.
  - With the development of competitive wholesale markets, some utilities are finding that it is less expensive to leave legacy baseload and/or intermediate generation resources idle and instead purchase energy in the wholesale market during low cost periods.
- In a traditional sense, utilities will invest in a portfolio of generation assets considering:
  - system load profile;
  - cost of capacity (per KW) of particular types of generation; and
  - variable running costs (primarily fuel) of different types of generation.

## Embedded Cost Allocations Should Consider and Reflect the Characteristics and Constraints Outlined Previously

- Consider the generation characteristics of a traditionally vertically-integrated electric utility:
  - Kentucky Utilities/Louisville Gas & Electric
    - These companies are subsidiaries of a parent.
    - Generation resources are jointly-dispatched to meet both companies' requirements.
    - For generation purposes (demand and energy-related), these companies can be thought of as a single utility.
- Consider KU/LG&E's annual load profile (load duration curve) shown on the next slide.

KU/LG&E  
System Load Curve



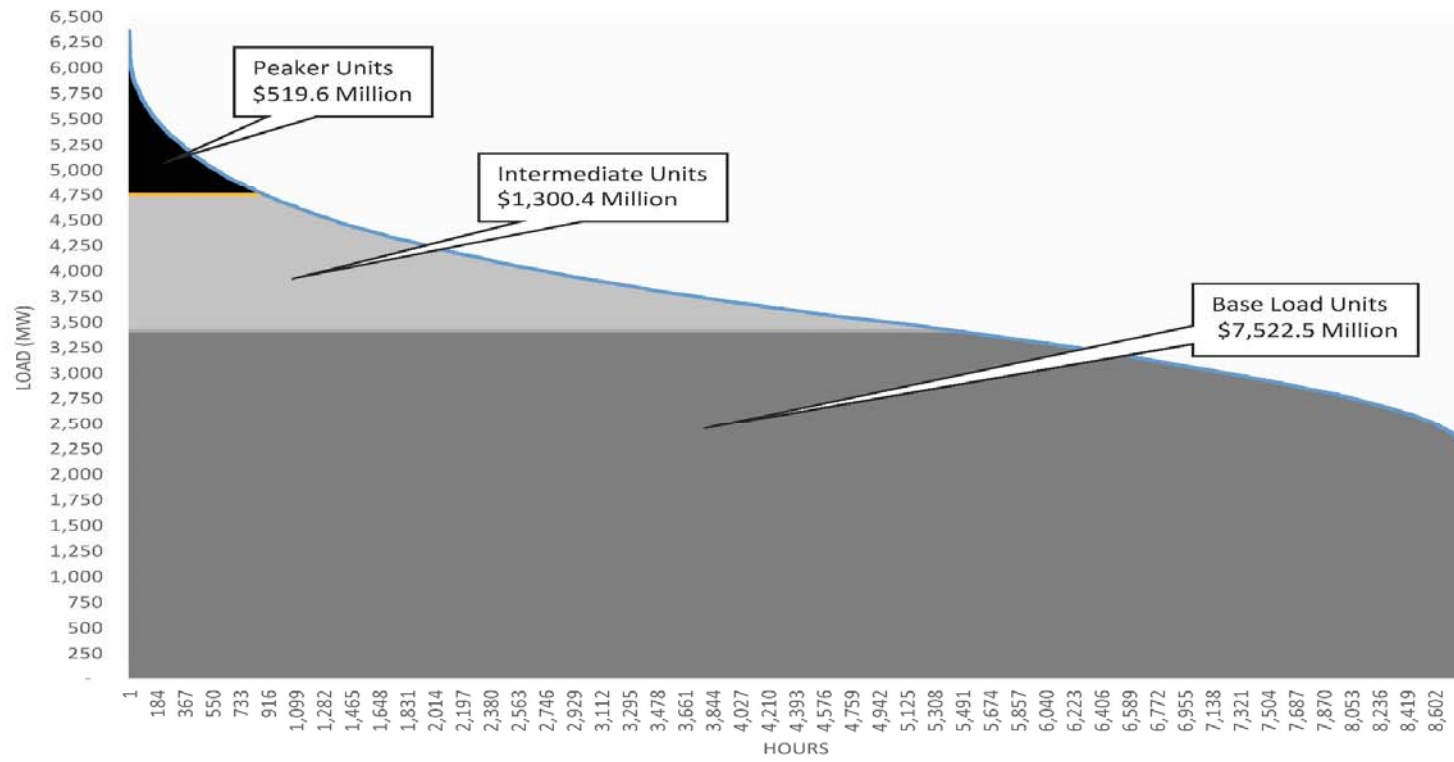
Next, Consider KU/LG&E's  
Portfolio of Generation Assets

### KU and LG&E Generating Unit Characteristics

Generating Unit (a)	Designation	Order of Dispatch 1/	Forecasted Fuel		KU/LG&E Capacity 3/	Capacity Factor	Gross Investment 10/31/18 (\$000) 4/	Fuels 3/	Net Generation in Forecasted Test Year 3/
			Cost/MWH 2/						
Trimble County 2	Base	3	\$ 19.50		629	46.80%	\$ 1,128,924.8	Coal	3,445,250,000
Cane Run 7	Base	4	\$ 19.90		808	66.79%	\$ 550,214.7	Gas	4,740,180,000
Ghent 2	Base	5	\$ 20.20		556	58.65%	\$ 434,348.3	Coal	2,866,140,000
Trimble County 1	Base	7	\$ 20.90		425	46.62%	\$ 648,331.0	Coal	2,318,340,000
Mill Creek 4	Base	6	\$ 21.50		544	63.25%	\$ 865,072.4	Coal	3,020,190,000
Ghent 1	Base	12	\$ 21.70		557	54.41%	\$ 702,479.6	Coal	2,661,540,000
Ghent 4	Base	13	\$ 21.70		556	49.77%	\$ 1,238,207.2	Coal	2,431,550,000
Mill Creek 1	Base	8	\$ 22.00		356	58.11%	\$ 320,319.5	Coal	1,814,490,000
Mill Creek 2	Base	9	\$ 22.10		356	52.92%	\$ 388,271.4	Coal	1,652,540,000
Mill Creek 3	Base	10	\$ 22.30		463	49.78%	\$ 547,177.4	Coal	2,022,930,000
Ghent 3	Base	15	\$ 22.60		557	46.14%	\$ 699,121.0	Coal	2,255,570,000
<b>Total Base</b>					<b>5,807</b>		<b>\$ 7,522,467.3</b>		
Brown 6	Intermediate	26	\$ 29.60		177	10.26%	\$ 66,454.8	Gas, Oil	159,530,000
Brown 7	Intermediate	27	\$ 29.80		177	4.39%	\$ 62,219.0	Gas, Oil	68,220,000
Brown 5	Intermediate	28	\$ 37.30		123	14.97%	\$ 55,080.1	Gas	161,770,000
Trimble County 5	Intermediate	18	\$ 38.00		199	22.84%	\$ 73,841.6	Gas	399,070,000
Brown 3	Intermediate	16	\$ 40.00		464	16.44%	\$ 976,435.3	Coal	669,990,000
Trimble County 6	Intermediate	19	\$ 40.70		199	17.53%	\$ 66,354.4	Gas	306,320,000
<b>Total Intermediate</b>					<b>1,339</b>		<b>\$ 1,300,385.2</b>		
Brown 8	Peak	31	\$ 42.20		126	2.04%	\$ 37,790.5	Gas, Oil	22,600,000
Brown 9	Peak	29	\$ 42.30		126	2.29%	\$ 56,667.4	Gas, Oil	25,370,000
Brown 11	Peak	32	\$ 43.00		126	1.52%	\$ 46,676.1	Gas, Oil	16,820,000
Brown 10	Peak	30	\$ 43.70		126	3.24%	\$ 36,732.0	Gas, Oil	35,890,000
Trimble County 7	Peak	20	\$ 45.40		199	12.53%	\$ 57,011.8	Gas	218,900,000
Paddys Run 13	Peak	24	\$ 45.70		178	9.55%	\$ 84,764.4	Gas	149,490,000
Zorn 1	Peak	36	\$ 61.10		18	0.34%	\$ 1,974.7	Gas	540,000
Trimble County 8	Peak	21	\$ 64.70		199	5.68%	\$ 56,457.7	Gas	99,300,000
Trimble County 9	Peak	22	\$ 86.90		199	3.49%	\$ 56,793.9	Gas	61,010,000
Haefling 1	Peak	37	\$ 138.60		21	0.39%	\$ 4,374.1	Gas, Oil	710,000
Haefling 2	Peak	37	\$ 138.60		21	0.00%		Gas, Oil	
Trimble County 10	Peak	23	\$ 152.40		199	1.64%	\$ 70,160.8	Gas	28,660,000
Cane Run 11	Peak	33	\$ 465.20		16	0.51%	\$ 3,726.4	Gas, Oil	730,000
Paddy's Run 11	Peak	34	\$ 1,026.30		16	0.22%	\$ 2,151.1	Gas	310,000
Paddy's Run 12	Peak	35	\$ 1,151.80		33	0.22%	\$ 4,339.2	Gas	620,000
<b>Total Peak</b>					<b>1,603</b>		<b>\$ 519,620.1</b>		
Brown Solar	Solar & Hydro	1			10		\$ 25,492.4	Solar	18,400,000
Dix Dam 1 (1)	Solar & Hydro	2			11		\$ 43,422.8	Hydro	
Dix Dam 2	Solar & Hydro	2			11			Hydro	81,780,000 Total all Units
Dix Dam 3	Solar & Hydro	2			11			Hydro	
Ohio Falls 1 (1)	Solar & Hydro	2			13		\$ 143,394.8	Hydro	
Ohio Falls 2	Solar & Hydro	2			13			Hydro	
Ohio Falls 3	Solar & Hydro	2			13			Hydro	
Ohio Falls 4	Solar & Hydro	2			13			Hydro	300,360,000 Total all Units
Ohio Falls 5	Solar & Hydro	2			13			Hydro	
Ohio Falls 6	Solar & Hydro	2			13			Hydro	
Ohio Falls 7	Solar & Hydro	2			13			Hydro	
Ohio Falls 8	Solar & Hydro	2			13			Hydro	
<b>Total Solar &amp; Hydro</b>					<b>146</b>		<b>\$ 212,310.0</b>		
Business Solar							85	Solar	

Superimpose KU/LG&E's Generation  
Assets onto its Load Duration Curve

### KU/LG&E System Load Curve & Gross Generation Plant Investment





# Conclusions

## (Relating to KU/LG&E Generation)

- The majority of generation investment (rate base) is attributable to baseload generation plant with low operating costs per unit (KWH) of output.
  - These baseload units serve load and energy requirements during most hours of the year.
- Peaker units represent a small percentage of generation investment (rate base) with high operating costs per unit (KWH) of output.
- Intermediate units fall in between baseload and peaker units in terms of both capacity costs and variable running costs.
- Hydro, wind, and solar need to be considered on a case-by-case basis reflecting operational constraints.

## The Allocation of Embedded Generation Plant (Rate Base) Costs Should Consider the Planning and Operational Characteristics of a Utility's Portfolio of Generation Assets

- Examples of generation allocation methods:
  - 1-CP and 4-CP
  - Seasonal CP methods for utilities that may peak in Winter and Summer
  - 12-CP
  - Average & Excess (aka Base and Extra Capacity)
  - Peak & Average
  - Base-Intermediate-Peak
  - Probability of Dispatch
  - Loss of Load Probability
  - Equivalent Peaker (Peak Credit)