

## Globalfoundries Testimony H739

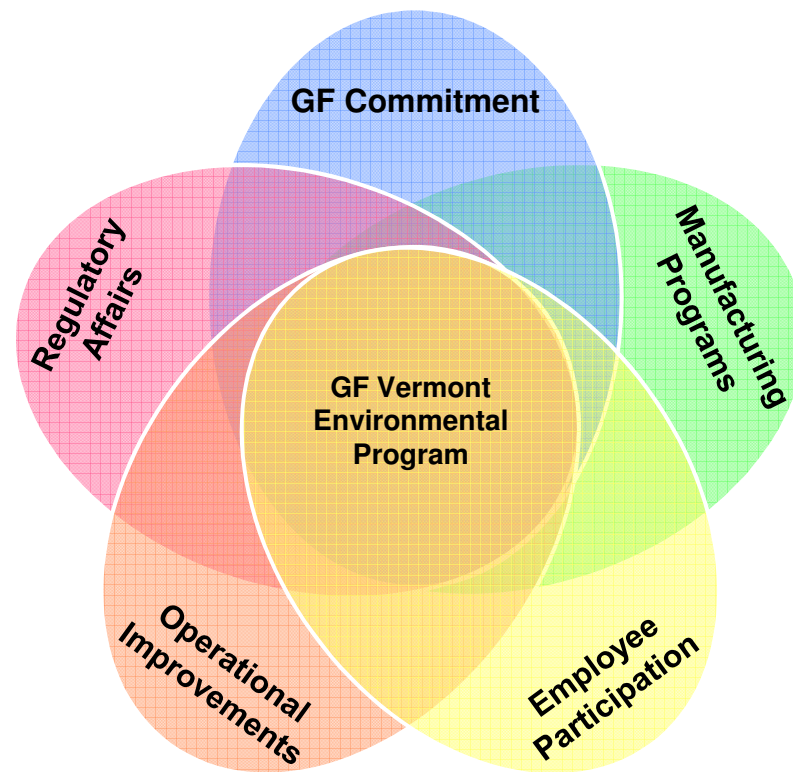
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GLOBALFOUNDRIES®

# GF Energy Management Program is based on 5 key principals for success



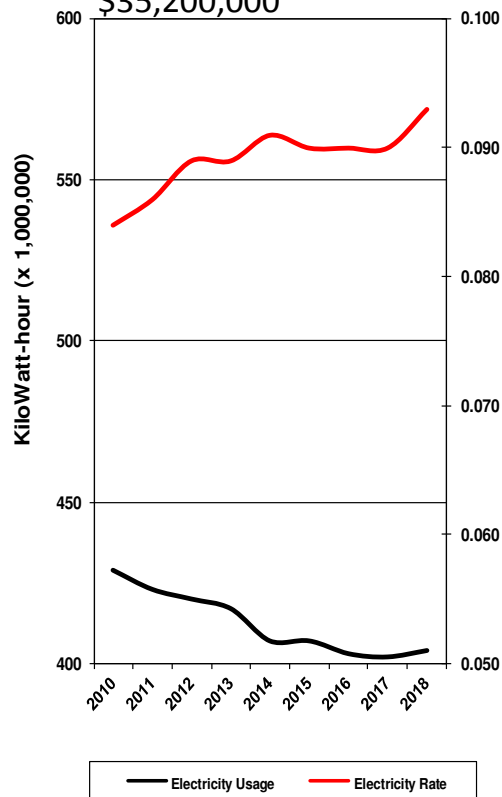
## Globalfoundries (GF) SMEEP Program

- SMEEP Program Requires that GF Invest \$3M over 3 years in energy efficiency projects
  - Eligible projects includes electricity and fuel efficiency
- IBM/GF has participated in SMEEP program since 2010
  - Invested over \$10M in nearly 55 energy savings projects
    - Resulting in 826,605,000 kWh savings &
    - 3,737,570 MMBTU in fuel savings
    - Reduced Peak Power requirements from 62 MW to 55 MW
    - Projects range from changing light fixtures to replacing components of semiconductor equipment, replacing chillers, replacing air handlers, improved building controls, installation of variable frequency drives, utilization of outside air to reduce chiller load



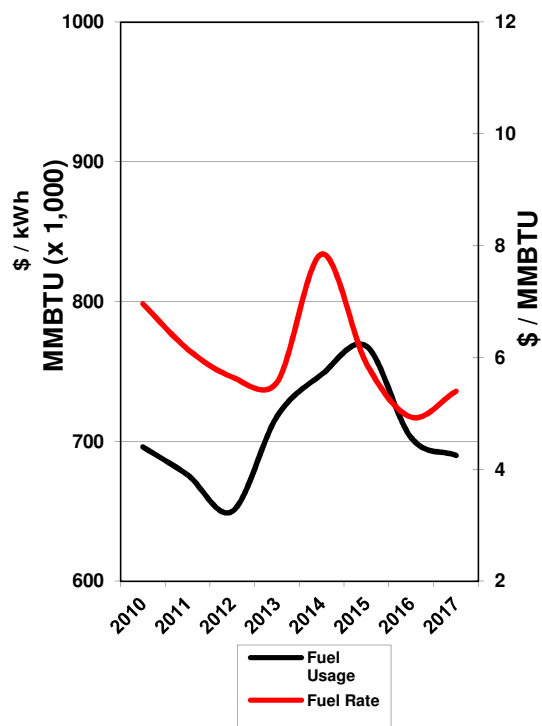
## Electricity Usage vs. Rates

2017 Electricity Cost:  
\$35,200,000



## Fuel Usage vs. Rates

2017 Fuel Cost:  
\$3,241,000



For 2004 to 2017

### Fuel Usage



Rates: - 8%  
Usage: - 25%

### Electricity Usage



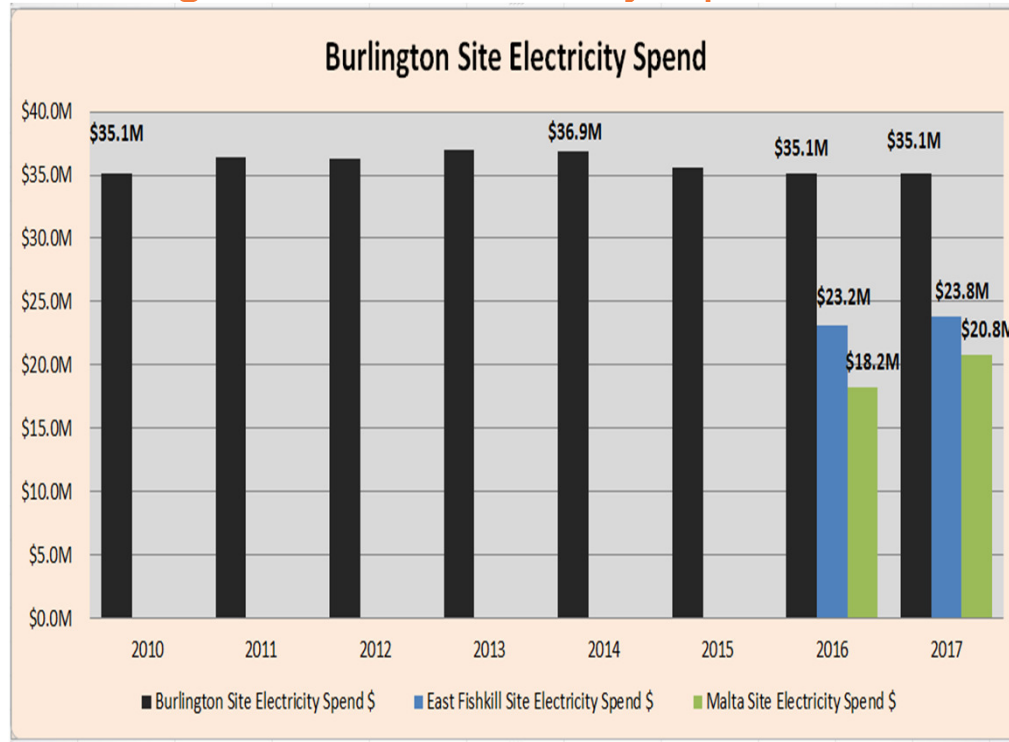
Rates: + 30%  
Usage: - 15%

### Plant Capability

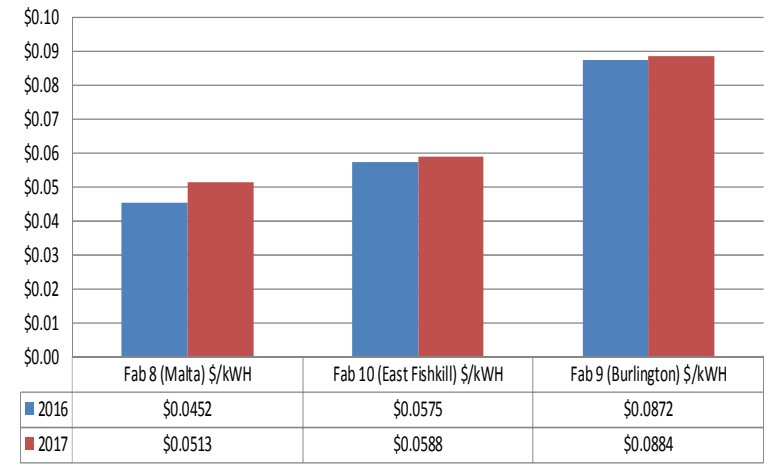


Up > 45%

## Burlington Site Electricity Spend



### Electricity Rates Across Sites\*



### Burlington Electricity Trends

Year	Consumption (kWh)	Spend	Rate (\$/kWh)
2010	429,964,887	\$35,103,880	\$0.0816
2011	424,631,528	\$36,370,192	\$0.0857
2012	420,796,091	\$36,333,913	\$0.0863
2013	415,199,516	\$36,961,845	\$0.0890
2014	405,906,598	\$36,855,369	\$0.0908
2015	408,970,105	\$35,624,110	\$0.0871
2016	402,934,475	\$35,146,666	\$0.0872

Electricity Spend has hovered around \$35M to \$36M since 2010. Rates in Burlington are not nearly as competitive as those of other Site's.

## Detail of SMEEP Performance Since 2010

Year	# of Projects	Amount Invoiced \$M	Electricity Saved [MWh] in Year Implemented	Electricity Saved [MWh/yr]	Fuel Saved [MMBtu/yr]	Fuel Saved [\$K/yr]	Total MWh saved over lifetime	Total MMBtu saved over lifetime	Cost/kWh \$	Avg ROI (yrs)
2010	16	\$2.05	N/A	10	43,952	\$308.50	130.368	781,899	\$0.0115	2.23
2011	12	\$1.35	4.154	5.847	15,704	\$128.50	80.939	309,429	\$0.0121	2.08
2012	7	\$0.48	6.462	20.156	30,092	\$626.20	279.226	1,711,442	\$0.0058	1.24
2013	3	\$1.12	2.453	5.255	10,847	\$158.70	105.104	561,600	\$0.0080	1.69
2014	6	\$1.14	2.295	3.943	6,248	\$81.13	78.857	205,920	\$0.0118	2.14
2015	5	\$0.93	1.21	3.083	8,364	\$61.14	61.679	167,280	\$0.0123	2.88
2016	4	\$0.48	1.129	1.44	No Projects	No Projects	27.092	0	\$0.0177	3.95
2017	2	\$2.17	0.75	3.167	No Projects	No Projects	63.34	0	\$0.1316	3.05/18.0
2018 (est)		\$0.60								
<b>Totals</b>	<b>55</b>	<b>\$10.31</b>	<b>17.703</b>	<b>49.72</b>	<b>115,207</b>	<b>\$1,364.17</b>	<b>826.605</b>	<b>3,737,570</b>		

## SMEEP Example: Semiconductor Ion Implanter chamber cooling

### **Ion Implanters**

- Deposit atoms on silicon wafers using electromagnetic acceleration
- Atoms are located to meet the design requirements of the chip

### **Upgrade Cooling Chamber**

- Dissipates heat generated in the implanter during wafer processing.
- Original units supplied by Semiconductor Equipment manufacturer
- Worked with supplier to find more efficient system

**8 Ion Implanters Upgraded  
1,625,000 KW-Hr / yr saved**



## H739

### ●Language that is important to GF

- “As used in this subsection(i), productivity programs and measures means investments that reduce the amount of energy required to produce a unit of product”
  - GlobalFoundries investments in productivity can also reduce energy consumption while also boosting production.
  - Enabling productivity investments under SMEEP also will help reduce the impact of increasing electricity costs.
  - Controlling the growth in energy costs is critical to justifying continued investment in new product lines.
- Examples of projects that GF would explore as contributing:
  - Investments to allow reduction of maintenance to improve on-line performance
    - Specific Example: \$328K Invested
    - Results:
      - 24% Increase in Production (units/tool), 20% Reduction in Energy (energy used/unit)
  - Investments in modifications to equipment that increases production
    - Example: Chemical Mechanical Polishing Tooling
      - Chemical Process Change required new support equipment but increased productivity of the tool by 15%.





## Advantages of SMEEP to GF

- “Proactive” approach to efficiency
- GF commitment to spend on efficiency in-lieu of fees and corresponding rebates
- GF can use ALL the money directly on efficiency
  - Efficient & timely use of capital on projects
- *“GF agrees to do the projects and if we don’t do them, we pay an extra fee”*
- Delivered impressive electric & thermal efficiency results*

