

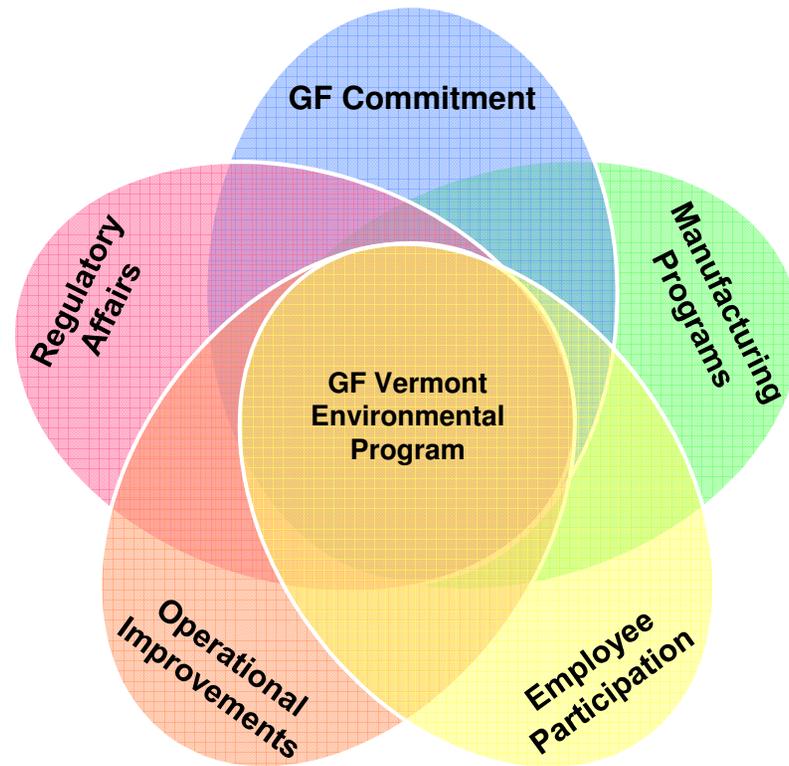
## Globalfoundries SMEEP Status

January 31, 2018

Thom Jagielski – Director: Site Operations



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



## Energy Ideas follow a consistent process based on continuous improvement



Energy  
Management  
Keys



Monitoring &  
Feedback



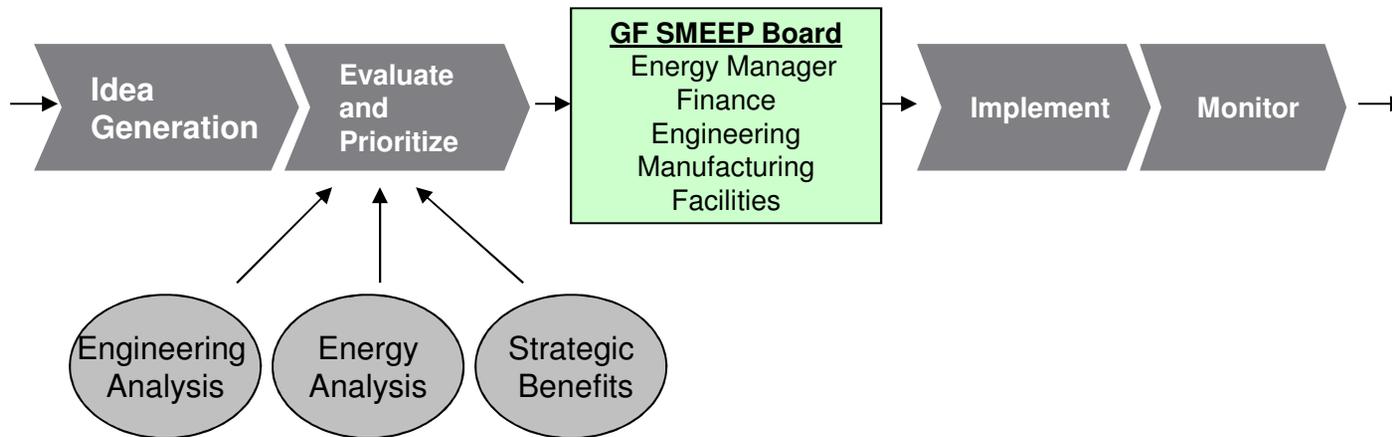
Strategic Focus



Data-Driven Ideas  
& Analysis



# SMEEP Process is imbedded into our Energy Management Process

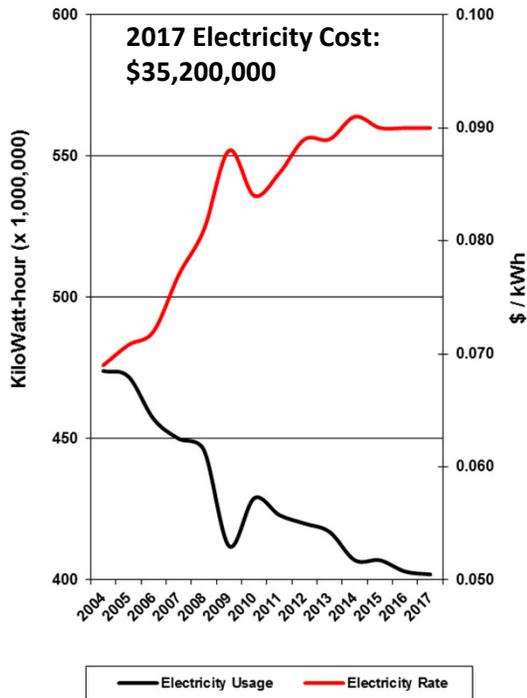


## Globalfoundries (GF) SMEEP Program

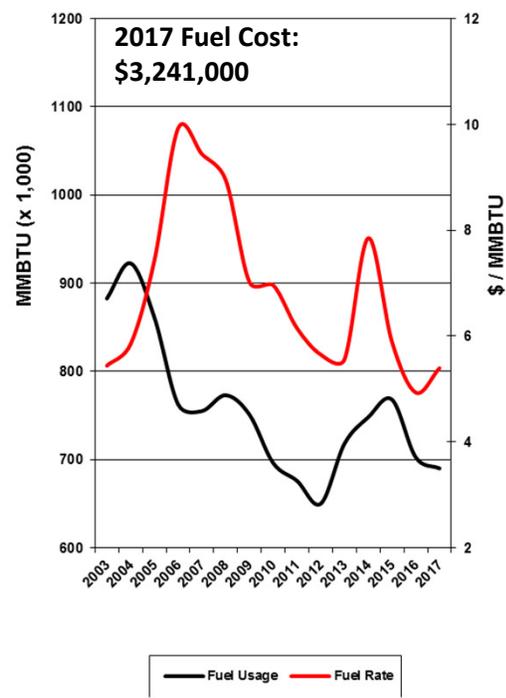
- SMEEP Program Requires that GF Invest \$3M over 3 years in energy efficiency projects
  - Eligible projects includes electricity and fuel efficiency
- IBM/GF has participated in SMEEP program since 2010
  - Invested over \$10M in nearly 60 energy savings projects
    - Resulting in 763,265,000 kWh 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



Electricity Usage vs. Rates



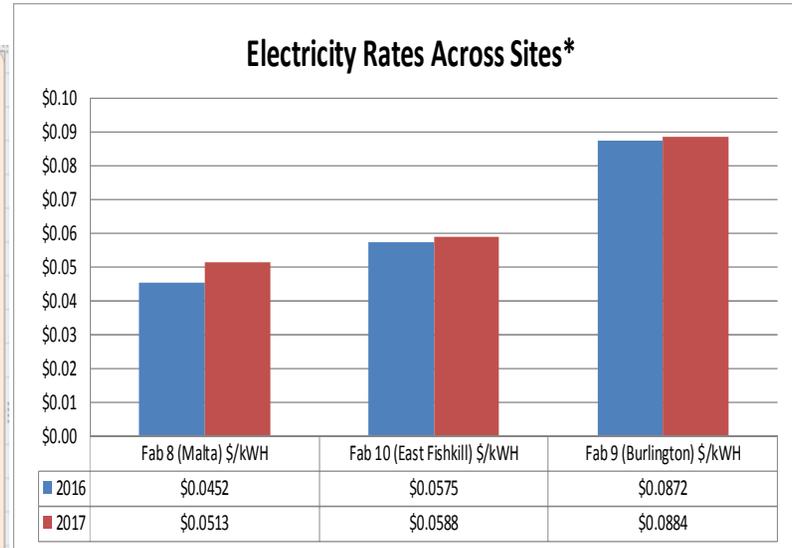
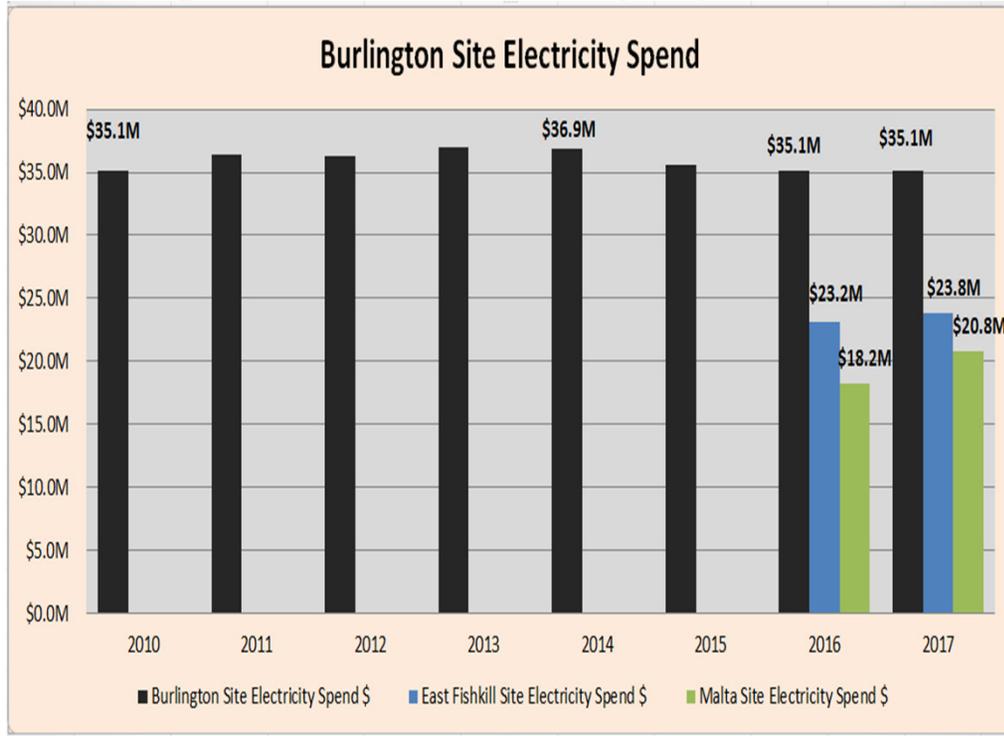
Fuel Usage vs. Rates



**For 2004 to 2017**

- 
**Fuel Usage**  
 Rates: - 8%  
 Usage: - 25%
- 
**Electricity Usage**  
 Rates: + 30%  
 Usage: - 15%
- 
**Plant Capability**  
 Up > 45%

# Burlington Site Electricity Spend



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 \$
2010	16	\$2.047	N/A	10.00	43,952	\$ 308.500	130.368	781,899	\$ 0.0115
2011	12	\$1.348	4.154	5.847	15,704	\$ 128.500	80.939	309,429	\$ 0.0121
2012	7	\$0.483	6.462	20.156	30,092	\$ 626.200	279.226	1,711,442	\$ 0.0058
2013	3	\$1.119	2.453	5.255	10,847	\$ 158.700	105.104	561,600	\$ 0.0080
2014	6	\$1.140	2.295	3.943	6,248	\$ 81.132	78.857	205,920	\$ 0.0118
2015	5	\$0.926	1.21	3.083	8,364	\$ 61.141	61.679	167,280	\$ 0.0123
2016	4	\$0.480	1.129	1.44	No Projects	No Projects	27.092	-0-	\$ 0.0177
2017	5	\$2.000	Not Avail	Not Avail	No Projects	No Projects			
2018 (est)		\$0.60							
<b>Totals</b>	<b>58</b>	<b>\$10.143</b>	<b>17.703</b>	<b>49.72</b>	<b>115,207</b>	<b>\$ 1,364.173</b>	<b>763.265</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**



## 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*



## Advantages of SMEEP to SOV

- Advances SOV energy & environmental goals
- Provides system level benefit to rate payers
- Provided significant Green House Gas reductions
- Provide relief via natural gas line pressure



## Shortcomings of SMEEP

- As GF exhausts the “easy” projects to implement, our cost to implement ideas per kwh saved is increasing
  - GF is looking to broaden the scope of projects that would be eligible to participate in SMEEP
    - Productivity of equipment.....less energy to produce a unit of product
- SMEEP does not allow for third party participation or partnership in projects to allow for additional projects to be implemented

