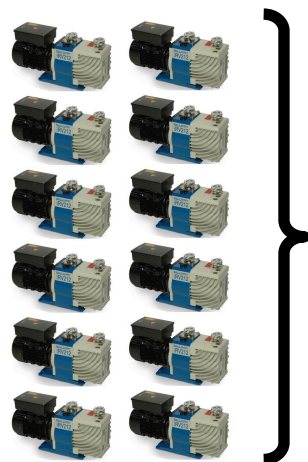


Sustainability: Measuring the Price of Science

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Many research activities across the United States are predicated on the need to better create, manage, utilize, and store energy. The Center for Nanoscale Science is promoting an effort emphasizing the importance of conducting this research with the same sustainability principles in mind.

To do so, we initiate the "Price of Science" concept where we quantify the energy footprint of common experiments and calculations. An important aspect is to develop "units" based on an everyday energy consuming activity (like the energy needed to drive an electric car one kilometer or the energy needed to prepare a slice of toast) so that the energy price becomes easy to conceptualize AND easy to communicate to non-specialists. A cohort of MRSEC students and faculty members are compiling this information with the intent of future publications/ presentations.



Example: A MRSEC thin film lab has 12 PVD systems with pumps running 24/7 to maintain vacuum

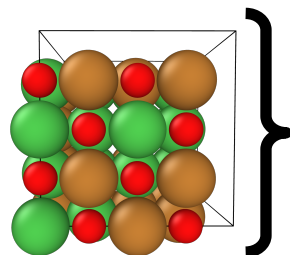
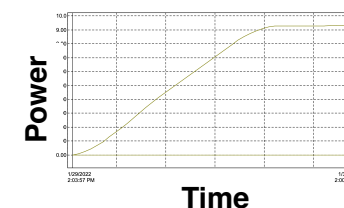
Measure: 4200 W/pump
36,800 kWh = 132 GJ/yr

What is the Price?



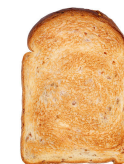
100,000 km !
1 kW·hr ~ 2.7 km

We acquired an energy power meter that connects to our equipment and measure directly the Price of Science...



DFT: 64 atom supercell
Minimize energy
3 nodes for 40 hours
Node = 542.08 W
60 kW·hr / calculation

What is the Price?



600 slices of toast !
1 toast slice: 0.1 kW·hr

