

Carbon Neutrality Initiative Fellow Application

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UCSF Carbon Neutrality Initiative: Improving energy efficiency in the operating rooms

Introduction: Man-made climate change remains one of the biggest threats facing society today, potentially affecting billions worldwide. There is overwhelming scientific consensus that aggressive action is required immediately to limit global warming, and that current efforts are falling short in meeting those goals.¹ Healthcare represents nearly a tenth of the United States' carbon footprint, with hospitals making up nearly forty percent of those emissions. Hospitals in the United States utilize twice as much energy when compared to European hospitals.²

Improving energy efficiency in the hospital setting represents a key strategy to meeting the University of California (UC) president's goal of making campuses carbon neutral within the next decade. Other hospital systems have also started developing strategies to reduce their carbon footprint and save money through improvements in energy utilization. Kaiser Permanente (KP) has estimated nearly \$30 million/year in potential savings across their facilities statewide through over-ventilation of hospital spaces alone. They have multiple pilot studies, including "heat, ventilation, and air conditioning (HVAC) setback" in operating rooms, underway.³

Background: Last year, Dr. Jason Lang undertook a project through funding from UC's Carbon Neutrality Initiative (CNI) to study energy utilization in the Moffitt-Long (ML) operating rooms at the University of California San Francisco (UCSF). He installed data loggers in five ORs to assess energy utilization. Preliminary temperature data showed that unused rooms were kept an average 5.1° Fahrenheit cooler than standards require overnight (ranging from 63.5-67.5F). With only an average 10% of ML ORs being used at any point from 10pm-6am during the week and similar usage numbers over the weekend, optimization of HVAC settings during off-time hours has the potential for both large savings and a meaningful reduction in greenhouse gas emissions.

Project Overview: I am taking over from Dr. Jason Lang to continue this project. Our focus is the reduction of energy utilization in operating rooms across the UCSF hospital system through more efficient temperature control and lighting without sacrificing patient care within the existing regulatory framework.

1. **Continue to gather data and expand to additional sites.** We plan to continue tracking energy utilization in ML ORs by looking at temperature, air flow and light usage in the ORs. We will expand data gathering from the current five ML ORs to additional ORs both at ML and at other UCSF hospitals like Mission Bay (MB) or Mount Zion (MZ). We also plan to observe perioperative work-flow to establish patterns of inefficient energy use (e.g. machines left on, lights kept on). This would also include identifying roadblocks (e.g. unanticipated reasons for overnight light use in the OR).
2. **Work with key stakeholders to implement change.** We are currently working with clinical engineering and facilities management to gather HVAC data. We will continue to collaborate with them both at ML and other sites to begin developing a cohesive strategy for reducing energy utilization. This would include establishing work-flow for existing OR personnel and bringing in leadership from relevant hospital divisions to help create the culture change necessary for improving energy efficiency. Additionally, at newer facilities like MB we plan to work with clinical engineering to identify potential sources of automation that can be improved upon to reduce energy waste. We will pilot these changes first in 10 selected ORs before expanding hospital-wide.
3. **Analyze data to assess cost and energy savings.** As we move from baseline data collection to implementing changes in the OR, we will track kilowatt-hours (kWh) usage to assess both the environmental and economic impact of the project.

Future Directions: Expansion of the project to other UCSF hospital sites like Mission Bay and Mount Zion. Identify cost-effective areas for investment to improve energy utilization.

¹ Peters GP, et al. "Key indicators to track current progress and future ambition of the Paris Agreement." *Nature Climate Change*. 2017; 7: 118-22.

² Chung JW, Meltzer DO. "Estimate of the Carbon Footprint of the US Health Care Sector." *JAMA*. 2009; 302(18): 1970-72.

³ Hemstreet HR. "Kaiser Permanente at a Glance." Slideshow presentation at Global Climate Leadership Council Meeting (GCLC). Nov 2016.

I whole heartedly support the application of Dr Clifford Bielinski, MD for the CNI fellowship. A native of Texas, and a current anesthesia resident, he has been involved in quality improvement (QI) and implementation in hospital setting during his pediatric residency related to autism screening and flu vaccination rates in clinics run by Northwestern. Both projects resulted in meaningful and sustained change in practice at the clinic sites.

Clifford is an avid outdoors person and loves hike and bike all over the country. His love of the outdoors has given him a deep appreciation for the environment. The threat of global warming has weighed heavily on him, especially in recent years where the political will seems lacking in his view. As such, this project and the CNI represent a great opportunity to act locally and to potentially make a meaningful impact on greenhouse emissions and Clifford will be an invaluable asset toward it.

Please contact me for any further questions.

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