

Green Vivarium Expansion: Mouse Care's President and Chief Scientific Officer, Dr. Germain Rivard, has partnered with a major US university to upgrade and expand their animal facilities in an effort to make their operations more efficient and sustainable.

Dr. Rivard, acting for a major University, submits to the Recovery Act Limited Competition (C06) a grant proposal titled: *Green Vivarium Expansion*. This institution is committed to becoming one of the nation's leading interdisciplinary and sustainable biomedical research institutions. The university is undertaking this endeavor despite the current economic climate and a regional unemployment rate of 13%. To this end, a strategic faculty hiring initiative in life sciences and engineering of 100 new faculty members over a 10-year period is underway. A key step toward attracting and retaining top candidates is the improvement of the animal facility infrastructure. This project proposes to improve the existing conventional rodent facility into a multi-species green barrier facility. Once completed, it will serve the needs of existing and new faculty members including Dr. Rivard who will study cost-effective, sustainable caging system and barrier housing/production of rodents. Due to energy and process savings as well as an increase in *perDiem* revenues, the animal facility anticipates cost recovery in a short period. The 'green' vivarium will be a model for the nation.

Green opportunities amount to carefully and actively managing the flow of air, water, and waste. These 3 components will be addressed in detail as part of this project:

- Air Reduction:** This project proposes the installation of an exhaust ventilation system (EVS) to safely reduce the air flow related to room, caging, and processing ventilation system and eliminate the plug-ins used in animal care and use. Improvements will include:
 - Open space holding areas that will improve management, productivity, maintenance, and sanitation; allow the installation of low-pressure drop air supply system; simplify the manifolding of volumetric exhaust ducting system; and decrease the noise as well as the size and fans' horsepower of the HVAC system hence reducing energy consumption.
 - Exclusive use of local exhaust devices (LED), i.e. exhaust ventilated cageracks (EVC) and backdraft workstations that function without blowers or fans but by HVAC-assist with a low static pressure. By integrating the multi-point LEDs with the building's exhaust system, the EVS eliminates heat loads, odors, and airborne contaminants at their source of generation before they disperse in the environment. This reduces by nearly 70% the recommended-HVAC requirements which are the air changes per hour calculated from the ASHRAE's total-cooling-load method. Also, it will create a near-perfect air mixing factor to allowing high population density and flexibility as well as providing air quality, occupants comfort, contamination-free environment, and occupational health and safety.
 - Use of carousel cageracks that could double the number of cages in the same space to reducing the space to air condition and cutting on first and operating costs by 16% and 23% respectively.
 - Utility Chase proximity that will make possible the addition of a sustainable stack-driven ventilation system to decreasing HVAC equipment size and redundancy needs.
 - Make use of a heat recovery system that will capture the animal heat loads from the EVS to PreHeating/Cooling the fresh air supply hence reducing energy consumption by 65%.
 - When compared to a traditional installation that uses room's dilution-removal ventilation and forced-air, individually ventilated caging system, our proposed usage of 3,000 EVC cages will house 42% more animals in the same space and yet save 87,000 kW per year. Overall, we expect to save 70% in energy consumption and 30% in ownership cost annually.
- Water Reduction:** We plan on using recirculating automated watering of cages and an energy-efficient cage/rack washer. This proposition for 3,000 cages would save 88,000 gallons of water per year.
- Waste Reduction:** We are extending bedding change, using a vacuum system, and operating a waste disposal unit. For 3,000 cages, we would avoid the handling of 27 tons of waste per year.

The planned improvements will enable the University to continue its rapid growth in biomedical research. The green technologies will be disseminated widely and have the potential for implementation elsewhere. If successful, this project will stimulate the economy and create/retain about 45 American jobs.