UAB Grand Challenge Concept Paper

Name of the UAB Grand Challenge: "City of the Future – Healthy & Sustainable"

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Description of the Problem to be Addressed, including its importance to the State of Alabama and how it is generalizable to other states, the U.S., and the world:

This program seeks to make Birmingham the leading green healthy city in the southeastern U.S., and to make the State of Alabama the most green/sustainable state in the nation. Forbes Magazine currently ranks Alabama at the 48th greenest state in the nation; only Indiana and West Virginia are less green than Alabama. The top 10 greenest states include: Vermont, Oregon, Washington, Hawaii, Maryland, Connecticut, New Jersey, Rhode Island, New York, and Arizona. The states were ranked in six equal categories: carbon footprint, air quality, water quality, hazardous waste management, policy initiatives, and energy consumption. This Grand Challenge project serves to leapfrog Birmingham and Alabama as leaders in sustainable healthy cities in the U.S. and will serve as model for sister cities in the Southeast, such as Memphis, TN, and Atlanta, GA.

Similarly, in conjunction with the U.S. Department of Energy (DOE), WalletHub analysts measured the efficiency of auto- and home-energy consumption in 48 U.S. states (due to data limitations, Alaska and Hawaii were excluded from their analysis). According to the U.S. DOE, the average U.S. family spends ~$2,000/year on utilities, with heating and cooling alone accounting for more than half the bill. In 2016, the average consumer spent another $1,900 on motor fuel and oil. According to WalletHub analysts, Alabama ranked 46th best in energy efficiency, showing Alabama has a great opportunity to improve in terms of statewide energy efficiency. Similar to the Food-Water-Energy Nexus, health case and sustainability (including energy and water conservation) are similarly linked.

College campuses are also aiming to improve their eco-friendliness; Forbes Magazine reviewed college self-reported sustainability-related policies, practices, and programs, as well as student ratings of how sustainability influenced life on campus, administration, and student support for environmental awareness and conservation efforts, and the visibility and impact of student environmental groups. According to their evaluation, the top 10 eco-friendly colleges are: College of the Atlantic, State University of New York College of Environmental Science and Forestry, Colby College, University of Vermont, Dickinson College, St. Mary's College of Maryland, Cornell University, Colorado State University, Stanford University, and the University of California at Riverside. It should be noted that none of these ecofriendly institutions of higher learning reside in the Southeastern U.S. That is not to say that UAB has not been actively involved in sustainability and energy conservation activities. Examples of these energy conservation activities include: temperature setbacks in campus buildings during weekends, evening, and holidays; use of occupancy sensors; upgrade of lighting with LED lights; employing LED exit signs; upgrading LED exterior lighting; replacing air-cooled vacuum pumps with water-cooled vacuum pumps; employing variable frequency drive pumps; installation of solar panels in the Rec Center; and employing condensate recovery in the air handling system.

"In 2015, Hawaii became the first state in the country to make an unprecedented commitment to achieve 100 percent renewable energy by 2045. Concurrently, the University of Hawaii and the Hawaii Legislature established a collective goal for the university system to be 'net-zero' by January 1, 2035, meaning the system would produce as much renewable energy as it consumes across its campuses." The University of Hawaii Maui College, one of the University of Hawaii's ten campuses, "is on target to be the first to supply 100 percent of its energy needs through renewable energy." UAB should also take the lead in coupling health case and sustainability in urban environments.

The goal of this research project is to instill a proactive sustainable health care focus at UAB, in the metropolitan Birmingham area, in the State of Alabama, in the Southeastern U.S., and across the nation with measurable outcomes. Examples of sustainability initiatives to be undertaken as part of this grand challenge relate to energy conservation, use of vertical gardens to provide health and nutritious foods at very reasonable costs, health of infrastructures, air quality, water quality, storm waters management, energy generation from renewable energy systems. We will also explore the potential of green streets, active transportation, and human-centered urban design for meeting sustainability and livability objectives. These activities should be of benefit to human health, improve air quality, reduce energy consumption, lessen traffic congestion, lower utility bills, improve food quality and access, stimulate economic growth and enhance quality of life for all.

To achieve these goals, UAB will team with faculty partners on campus in a multidisciplinary mode, involving the School of Engineering, the School of Public Health, the Department of Biology, the Department of Chemistry, the Department of Psychology, the Department of Education, the Facilities Management Department, and the School of Medicine. We will also partner with outside organizations such as the Mayor's Office in the City of Birmingham, Jefferson County Department of Health, McWane Science Center, the local metropolitan public school systems, Alabama Power/Southern Company, Southern Research Institute (SRI), the Birmingham Regional Planning Commission, Vulcan Industries, the DOE National Laboratories, the U.S. Environmental Protection Agency, and state agencies such as the Alabama Department of Environmental Management (ADEM) and the Alabama Department of Economic and Community Affairs (ADECA). We will submit research proposals to these agencies and National Science Foundation NSF to leverage funding for sustainable smart cities research while addressing quality of life issues in the region and beyond. During the next five years, we will actively seek partners to invest in these sustainable health care operations in urban environments.

Desired Outcomes and the Conceptualization of the Plan of Work to Achieve Them:

Benefits commonly associated with embracing environmental sustainability concepts and initiatives include: Financial benefits (A CDF report identified that businesses that account for climate change see 18% higher return on investment (ROI) than companies that don't, and a 67% higher ROI than those who fail to disclose their emissions entirely), significant growth, becoming sustainable means a reduction in energy usage, more efficiency often means less waste generated resulting in less pollution, sustainable practices usually mean an overall reduction of operating costs, can get into better relationships with your suppliers, can build a relationship with government agencies, can position yourself as an industry and/or market leader by embracing sustainability, and position yourself for the advances of tomorrow with sustainability.

Exhibit A

List of Potential Team Members (individuals and organizations) from inside and outside UAB:

Key Researchers/Individuals:

UAB School of Engineering:
Dr. Fouad H. Fouad, Director, UAB Sustainable Smart Cities Research Center, and Chair of the Department of Civil, Construction and Environmental Engineering
Dr. Jason T. Kirby; Director, Sustainable Smart Cities ME Program
Dr. Chris Waldron; Director, Structural Engineering ME Program
Dr. Robert W. Peters; Department of Civil, Construction and Environmental Engineering
Dr. Virginia Sisiopiku; Department of Civil, Construction and Environmental Engineering
Dr, Nasim Uddin; Department of Civil, Construction and Environmental Engineering
Dr. Hessam Taherian, Department of Mechanical Engineering
Dr. Mohammad Haider; Department of Electrical and Computer Engineering

UAB Department of Biology:
Dr. Karolina Mukhtar; Department of Biology
Dr. Stephen A. Watts; Department of Biology

UAB Department of Education:
Dr. Tonya Perry; Director, Center for Urban Education

UAB Department of Psychology:
Dr. Despina Stavrinos; UAB Psychology Department

UAB Collat School of Business:
Dr. Molly Wasko; UAB Collat School of Business

UAB School of Public Health:
Dr. Michelle Fanucchi; Environmental Health Sciences, School of Public Health
Dr. Claudiu Lungu; Environmental Health Sciences, School of Public Health

Facilities Management:
Dr. Julie Price; Director, UAB Office of Sustainability
Mr. Matthew Winslett, Director of Utilities Management at UAB

UAB Occupational Safety and Health (OHS):
Dr. David Hagan; Occupational Health and Safety

Parking and Transportation:
Mr. Brian D. Atkinson, TDM Program Manager, UAB Parking and Transportation

UAB Medical School:
Dr. Mona Fouad; Senior Associate Dean, Preventive Medicine

External Organizations:
Office of the Mayor of Birmingham – Kevin Moore / Joanice Thompson
Jefferson County Department of Health
Alabama Power/Southern Company – John Smola
Southern Research Institute (SRI) – Dr. William Grieco
Regional Planning Commission of Greater Birmingham – Scott Tillman
McWane Science Center
Brasfield & Gorrie – George Talley
Birmingham Business Alliance BBA – Nan Baldwin
REV Birmingham – David Fleming
DOE National Laboratories
Professional Societies (ASCE, AIChE, NSPE, ITE, etc.)