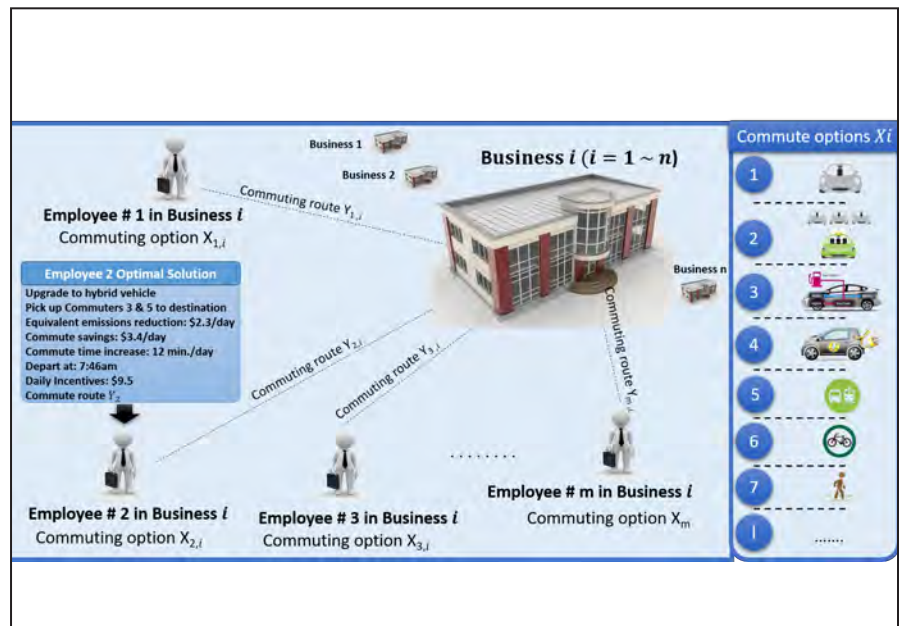


# MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 21-431 (project 553) | April 2021

## Multi-Business Commute Optimization System: System Development and Pilot Case Study



### the ISSUE

The transportation sector in the United States is currently dealing with several challenges, such as greenhouse gas (GHG) and air pollution emission increases, parking facility costs, congestion, and energy consumption. The U.S. transportation sector is reported to be the country's largest and fastest-growing source of GHG emissions at 28%, and is a major source of air pollution, smog, and air toxins, accounting for more than 55% of total U.S. nitrogen oxide emissions. Moreover, the congestion of urban road networks costs the United States about \$85 billion per year, accounting for delays due to extended travel time, reduced mobility, increased vehicle operating costs, and environmental degradation. A significant portion of these challenges comes from the drive-alone commutes mode, which was reported in 2016 as the predominant commute mode at 76.3%. There is a pressing need for transportation planning and programs that could reduce drive-alone commutes to address the aforementioned challenges. Practical solutions are needed to reduce transportation-related emissions while satisfying the commute preferences, convenience, and needs of commuters.

### the RESEARCH

This research focused on developing an innovative system that can identify commute solutions to reduce negative environmental impacts of business commuting. Researchers developed the Multi-Business Commute Optimization System (MBCOS), which consists of three integrated components: a website ([www.commuteopt.com](http://www.commuteopt.com)), a travel attributes model, and a multi-objective optimization model. The website facilitates the collection of travel data and delivery of recommended commute plans. The travel attributes model calculates attributes such as travel time, cost, GHG and air pollution emissions, energy use, and calories for all commuting options. The MBCOS is designed to model commute options, including drive alone, carpool, use of public transit, bike, walk, and combination of these modes. The optimization model is designed to identify optimal commute plans for each employee in a business to minimize GHG and air pollution emissions while complying with commute needs, preferences, and convenience.



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Colorado State University  
North Dakota State University  
South Dakota State University

University of Colorado Denver  
University of Denver  
University of Utah

Utah State University  
University of Wyoming



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### Project Title

Multi-Business Commute  
Optimization System  
(MBCOS): System  
Development and Pilot Case  
Study

### Sponsors | Partners

USDOT, Research and  
Innovative Technology  
Administration

### the FINDINGS

For the analyzed case study in this project, the MBCOS was used to generate business commute plans for 47 employees, resulting in reductions of up to 23.4% of GHG and air pollution emissions for those employees' commutes.

### the IMPACT

The widespread application of the system is expected to reduce GHG and air pollution emissions, VMT, congestion, and commuting time and cost. Based on the conducted analysis in the report, a 9.3% reduction in business related emissions and 4% reduction in VMT are possible in Colorado with the widespread application of the system within three to six years.

For more information on this project, download the entire report at <https://www.ugpti.org/resources/reports/details.php?id=1030>

For more information or additional copies, visit the Web site at [www.mountain-plains.org](http://www.mountain-plains.org), call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.



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