



Mid-America Regional Council: Bi-State Planning for Operations Improves Traffic Flow and Air Quality

Quick Information

Organization(s): Mid-America Regional Council (MARC), Kansas Department of Transportation (KDOT), Missouri Department of Transportation (MoDOT)

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Website: <http://www.marc.org/Transportation/Commuting/Operation-Green-Light/About-OGL>

Cooperation Topic(s): Air Quality and Environmental Planning; Congestion Management

Cooperation Practice(s): Project Partnerships

Cost Information: MoDOT unused CMAQ funds to implement the project; MARC used CMAQ and STP funds and collects annual dues from partners for ongoing operation. Federal funding initially covered 80 percent of the cost for new cities to enter the system.

Kansas and Missouri have found that traffic congestion and problematic air quality defy State boundaries. Mid-America Regional Council (MARC), the metropolitan planning organization (MPO) for the bi-state Kansas City region, addresses this reality by administering Operation Green Light (OGL), a traffic signal management system that uses wireless technology to coordinate traffic signals on major routes in the Kansas City area. Kansas Department of Transportation (KDOT), Missouri Department of Transportation (MoDOT), 26 cities, and 9 counties on both sides of the State border participate in the system. OGL has enabled real-time responses to traffic changes in the region and reduced delays up to 80 percent.



Figure 19 Operation Green Light technician adjusts signal timing at traffic signal cabinet. Source: MARC

Motivation for Establishing the Collaboration

In the late 1990s, three events occurred that led to Operation Green Light. First, KDOT and MoDOT completed planning for the Kansas City (KC) Scout freeway management system, which caused concern for the surrounding cities about potential impacts on the signalized street system. Second, both MoDOT and the City of Kansas City, Missouri began developing a common hardware standard for traffic signal controllers at intersections between their highway and street systems. Third, the region was categorized as a non-attainment area under the Environmental Protection Agency's one-hour ozone standard. These events sparked interest in retiming traffic signals as a way to mitigate both traffic and air quality. After the leaders of all three initiatives learned of each other's work, they met, identified common interests, and designated MARC to coordinate planning for OGL.

OGL provides needed traffic signal connections along key corridors in the region using radio and fiber-optic communication networks. These networks provide real-time operations data from each intersection and enable MARC to remotely retune signals. Local cities paid to join the network because 80 percent of the cost was provided by Federal funds, which were mostly awarded to larger cities. This program provided smaller cities connections to the new OGL communications network and access to MARC's regional software license. Recently, two additional communities were added along the K-7 line through KDOT, which is a quickly growing suburban corridor.

Federal Funding

Prior to the Transportation Equity Act for the 21st Century (TEA-21), Kansas would not have been eligible for MoDOT to spend unused Congestion Mitigation Air Quality Improvement (CMAQ) Program funds, because St. Louis was also a non-attainment area. The TEA-21 legislation changed this provision, which allowed MoDOT to designate CMAQ funds to the project, providing the resources for MARC to plan OGL and implement it in 2000.³ Kansas created a committee structure that programmed the non-attainment areas that fell under the OGL service area together. Under that programming cycle, MARC applied to receive CMAQ and Surface Transportation Program (STP) funds to build and operate the system. MARC was cognizant of dedicating CMAQ funds to shorter term uses, such as construction, and STP for longer term uses, such as maintenance. Both CMAQ and STP funds were used for OGL expansion over the years, although the use of STP funding may change in light of new restrictions.

Collaboration Structure

MARC operates OGL with oversight from a steering committee and ad hoc task forces. The original OGL steering committee consisted of higher level management from KDOT, MoDOT, and MARC representatives as well as Public Works Directors and City Managers from OGL-involved cities, who were high-level program visionaries. Before OGL was implemented, the steering committee dedicated a generous portion of its time to developing a procedure for resolving internal disagreements, convening focus groups, and conducting strategic planning exercises prior to securing new procurements. Over time, the steering committee has evolved, and now, most committee members are traffic engineers who oversee operation and maintenance of the

Takeaways

- MARC, the MPO for the bi-state Kansas City region, addresses traffic congestion and air quality issues by administering OGL, a traffic signal management system that uses wireless technology to coordinate traffic signals on major routes in the Kansas City area.
- The OGL traffic signal networks provide real-time operations data from each intersection and enable MARC to remotely retune signals.
- Local cities paid to join the OGL network because 80 percent of the cost was provided by Federal funds.
- MARC operates OGL with oversight from a steering committee and ad hoc task forces.
- MARC was able to use CMAQ and STP funds to cover the project.
- OGL has reduced delay on the system's corridors by up to 80 percent, and the Kansas City region has shown a decreasing trend of air pollutant concentrations.

³ [U.S.C. Title 23 §110\(c\)](#)

OGL system. The group met monthly while developing and establishing the initiative, but now meets quarterly.

Ad hoc task forces have also evolved since the inception of OGL. Initially, ad hoc task forces were established with contracted engineering firms for design plans, hardware, software and traffic signal timing or for procurement. Since then, task forces have become less formalized and task force groups are created for specific projects and dissolved when the task is complete and recommendations have been made to the steering committee.

To support the five-person work unit which operates the entire OGL system, MARC receives annual funds from each partner rather than relying on individual cities to help with operations. Cost is allocated using a formula that was developed based on the amount of signals an agency owns within the system. The agreement documents are connected through MARC on an individual basis, rather than a group memorandum of understanding (MOU), which would require city attorneys to negotiate. This agreement system outlines how much each partner contributes, the process for retiming signals on a corridor, and what to do if two partners disagree on signal timing changes.

MARC uses traffic flow, air quality, and operational metrics to measure the performance of OGL. Because of the project's goal to improve air quality, MARC focuses on reducing idling time, which in turn reduces fuel consumption and volatile organic compounds and nitrogen oxide emissions. Before and after retiming each corridor, MARC conducts and publishes travel time studies to document the project's impact on traffic flow and air quality. Internally, MARC also tracks operational metrics for its member agencies. These metrics include how often MARC responds to maintenance issues, the number of intersections on which MARC collects data, and the uptime of various links in the communications network.

Collaboration Accomplishments

The improvement of regional traffic flow and air quality are two significant accomplishments of OGL. MARC's studies show that OGL has reduced delay on the system's corridors up to 80 percent. These analyses also showed a benefit-to-cost ratio of at least 7 to 1 and as high as 60 to 1, depending on the corridor.⁴ MARC also documents air quality and has produced public ozone summaries annually since 2011. The ozone summaries show that the Kansas City region has a decreasing trend of air pollutant concentrations between 1999 and 2015. Demonstrating the system's tangible benefits, these reports encourage agencies to continue participating in the group and enabled OGL to retain full membership even during the 2008 financial crisis.

OGL has also strengthened MARC's relationships with many different stakeholder groups. MARC has worked with law enforcement agencies to use the traffic signal communications network as a tool to improve safety and emergency response time. In addition, MARC has built stronger ties to

⁴ [OGL Traffic Signal Coordination studies](#)

outlying suburban communities. For example, suburban communities along the K-7 corridor approached MARC for involvement in OGL. Though this initially presented a challenge because of the limitations of the OGL radio system, MARC was able to use fiber-optic cables to connect these communities to the system. The cities involved in this process have strong relationships with MARC, because their funding agreements are tied through the MPO, rather than a multi-party MOU. These funding agreements require strong communication and trust between MARC and the communities and demand the jurisdictions to be knowledgeable of the newer traffic signal technology. Finally, MARC has created direct relationships with KC Scout and local government traffic operators, which has led to emergency response improvements and fiber optic developments.

Challenges and Lessons Learned

In spite of the strong relationships between the OGL partners, staff turnover has posed challenges in retaining institutional knowledge and maintaining interest in the initiative. As top officials leave, MARC must re-convince their replacements that OGL is worth the investment. When MARC negotiates new funding agreements for OGL, agencies must decide whether to continue committing funds to the initiative. A program champion is a necessary element to the OGL program to maintain program momentum and stakeholder interest. To address this challenge, MARC is updating its strategic plan to include methods to educate high-level decisionmakers and the public in each of its members' jurisdictions about the traffic flow and air quality benefits stemming from OGL.



Figure 20. Roadway congestion motivates stakeholders to collaborate on OGL. Source: Volpe Center

Value changes in the community have also challenged the perception and relevancy of OGL. In the late 1990s, when planning for OGL began, the goal of reducing air pollution by reducing unnecessary traffic signal delay was self-evident to regional stakeholders. With improved vehicle fuel-efficiency and changing land uses along many OGL corridors, the project partners have had to adapt their approach to managing the system to focus more on impacts to pedestrian accessibility, bus-transit operations, and other multi-modal needs in addition to their original traffic flow performance measures.

MARC uses funding incentives as one strategy to encourage member agencies' participation. When cities participate in OGL and/or apply for funding for projects related to OGL, they receive points in the application review process and are more likely to receive KDOT, MoDOT, and MARC funding. These incentives help to ensure that existing partners remain committed to funding OGL.

In the future, MARC may see the need for OGL to evolve with new vehicle technologies, such as autonomous motor vehicles. In addition, MARC

foresees a demand to exchange data using the OGL communications infrastructure. This communications infrastructure may be strained under high usage, which could indicate an avenue for opportunity.

Through OGL, MARC has significantly improved traffic flow and air quality in its members' jurisdictions. Sharing funds, data, and equipment has enabled the 26 cities and two State DOTs to coordinate traffic signal timing across city and State borders in response to changing traffic patterns, thereby providing time savings and improved quality of life to residents throughout the Kansas City region.

Additional Resources

- [U.S.C. Title 23 §110\(c\)](#)
- [OGL Traffic Signal Coordination studies](#)
- [OGL Concept of Operations: Roles and Responsibilities](#)
- OGL Traffic Signal Coordination Measures of Effectiveness Methodology (see RMOB Handbook Appendix p. 28)
- [OGL Brochure](#)