

## Abridgment

# Ridesharing at Construction Sites: TVA Experience

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This paper provides a case study of Tennessee Valley Authority's (TVA) rideshare experience at the Hartsville nuclear power plant, which is under construction in middle Tennessee. As part of a formal mitigation program, TVA has developed an extensive rideshare program that involves 132 vans and 17 buses that transport 56 percent of the day-shift employees. The costs and benefits derived from this rideshare program are described as is the administrative structure of the program. The TVA experience has shown that an employer-based program can benefit employees and employer as well as the community. The Hartsville rideshare program results in an estimated annual reduction of 19.7 million annual vehicle miles of travel. Ridesharing has meant a net annual savings to TVA employees of \$1.2 million in commuting cost and the conservation of 800 000 gal of gasoline. TVA has benefited by avoiding the need to construct additional lanes along TN-25, which has little or any developmental potential for the area. Also, through improved commuter transportation, the construction labor pool can be geographically expanded so that relocations can be held to a minimum. At the Hartsville site, 40 percent of the work force resides outside the immediate five-county impact area. Transportation is the linkage to relieve pressure on local housing, schools, utilities, public services, and road networks.

Concern about energy costs and availability has stimulated interest in construction of large-scale energy projects, such as nuclear, coal, and synfuel plants. Because of non-transportation-oriented site-location factors, these projects are often located in rural areas. These areas do not have an infrastructure that can adapt easily to the massive influx of people and machines. A large, temporary influx of construction workers can cause a multitude of socioeconomic impacts in these rural areas. Ridesharing (the use of carpools, vanpools, and buspools) is one alternative to mitigating these impacts.

Workers either have to be attracted from neighboring metropolitan areas, from which commuting distances will be lengthy, or reliance must be placed on attracting migrant workers who, when in residence in the local area, place pressure on local

housing and public services. In many situations the local roadway systems are unable to accommodate the influx of construction-oriented commuter traffic without undue hazards or congestion. Serious questions must be addressed concerning the investment of scarce resources in the construction of roadway facilities that will result in underused roadway capacities after completion of construction. Roadway construction can also involve serious environmental consequences, which may delay the implementation of the construction project.

The question then is, In what alternative ways can a commuter transportation system be arranged to minimize the undesirable impacts of transporting temporary workers to large-scale construction projects?

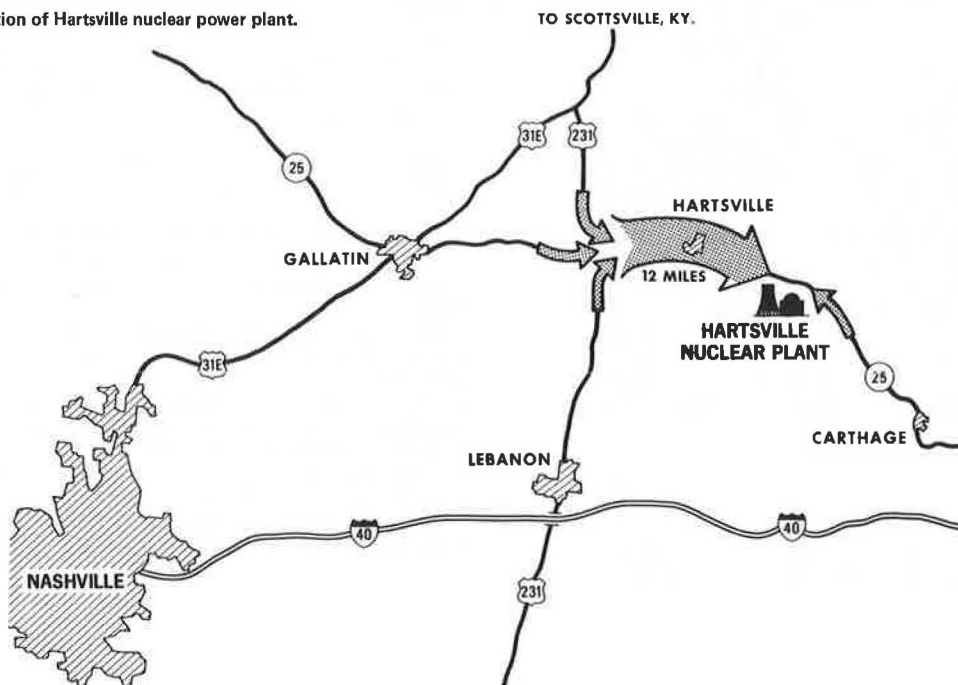
## BACKGROUND OF HARTSVILLE PLANT

The Hartsville nuclear plant construction site lies in Trousdale and Smith Counties, about 50 miles northeast of Nashville, Tennessee. The combined population of both counties is less than 20 000. The only towns within a radius of 10 miles are Hartsville (population 2243) and Carthage (population 2491) (see Figure 1).

The critical transportation problem created by the Hartsville construction project is the peak-hour traffic generated by the construction work force. Maximum traffic will occur during the middle 3 years of a 10-year construction period, when more than 6000 employees will be at the site. Approximately 80 percent of the work force will approach the project from the west, which will compound the traffic problem.

During the initial planning to minimize the socioeconomic impacts of the proposed nuclear plant

Figure 1. Location of Hartsville nuclear power plant.



construction project, it became obvious to planners that either an employee commuter transportation program or a road-widening project would be necessary to accommodate construction worker traffic. Initial analysis indicated that 10 miles of two-lane highway approaching the site would need to be widened to four lanes, at an estimated cost of approximately \$7 million. This stretch of highway had no developmental potential for the region. In addition, a road-widening project would delay construction for at least one year.

The approach selected by the Tennessee Valley Authority (TVA) was to establish an employee commuter transportation system. TVA's traffic mitigation strategy is to reduce the number of employee cars that approach the site by attracting workers into high-occupancy vehicles (buses and vans). Fortunately, TVA already had experience with ride-sharing at its headquarters in Knoxville, Tennessee. However, no bus companies were readily available to provide service in Hartsville. TVA would have to develop and operate its own commuter transportation system.

An agreement was reached with the Tennessee Department of Transportation that the impact of construction worker traffic would be mitigated by the use of a TVA-sponsored commuter transportation system. The state would monitor the traffic and reserve the right to require TVA to take appropriate measures if acceptable traffic volumes were exceeded. In order to maintain an acceptable traffic flow, about half of the day-shift work force at peak employment (6000 employees) would need to be in high-occupancy vehicles, which would take approximately 1300 of the workers' cars off the road.

A voluntary carpool program would not do the job. Such a dramatic shift in commuting behavior requires persuasion by management as well as economic incentives, such as reduced commuting costs. This effort required that the current 1.7 average vehicle occupancy rate experienced at other TVA construction sites be raised to about 5 persons/vehicle--a shift of more than 2000 workers from cars to high-occupancy vehicles. This shift would require the extensive use of buspools and vanpools. As of January 1980, 133 vans and 17 buses were in operation and more than 4000 workers were at the project.

#### RIDESHARE ORGANIZATION AND ADMINISTRATION

In April 1976, TVA issued the first van at Hartsville. The employee commuter transportation program was established as a cooperative effort between TVA and its employee credit unions. Legal restraints prevent TVA from directly purchasing commuter equipment. Federal law [U.S. Code Section 68(a)(c)(2)] specifically forbids the use of government-owned vehicles for the transporting of government employees between their homes and places of employment. Consequently, the TVA employees credit unions finance and hold title to the vans and buses. They also serve as a depository for fares and provide for insurance coverage.

Administration, operation, and monitoring of the program are handled by TVA's employee transportation branch. The collection of funds, payment of expenses, and other accounting functions are administered by TVA's division of finance. TVA maintains a rideshare office at Hartsville to administer the program, which requires monitoring of ridership, selection of drivers, maintenance of equipment, and collection of fares. The office is staffed by a rideshare coordinator and secretary.

Vanpools and buspools, like any public means of transportation, are subject to state regulation.

The TVA vanpool program encountered some initial confusion as to operating, licensing, and authority. These problems were resolved in March 1976 when the Tennessee General Assembly passed a bill (House Bill No. 2184) that exempts vanpools from the regulatory powers of the Tennessee Public Service Commission. Under this bill, it is legal to operate vanpools in Tennessee as long as they meet established criteria.

Bus and van drivers are selected from the applications submitted to the rideshare coordinator according to considerations such as regularity of work hours, driving record, age (over 25), and location in relation to potential riders. The staff introduces drivers to program procedures and helps them form pools. After the pool is established, the driver selects at least one alternate driver.

An underlying policy of the TVA vanpool program is that the driver should take primary responsibility for his or her van and its pool. This not only cuts down on staff demands but also allows the driver to become a significant part of the program and draws on his or her knowledge of the area and fellow workers. The driver arranges the route, pick-up points, and schedule. The informal rules that govern operation of the van are usually set by the driver in conjunction with the riders.

The driver is furnished with a van and a gasoline credit card. Maintenance work is performed at local garages and is charged to the vanpool program. Backup vans are kept at some of these garages for temporary use during the maintenance period. If no backup is available or a van fails to operate, prearranged carpools take the riders to work and their drivers are reimbursed. The driver is responsible for cleaning the van in return for 50 miles of free personal use per week. Drivers are charged 20 cents for each additional mile of personal use above 50.

Buspools operate in a similar manner with drivers and backup drivers drawn primarily from teamsters employed at the site. Drivers are paid \$10/day plus 5 percent of fares (fares range from \$1.25-\$3.50/ rider per day for short and long hauls, respectively). Backup drivers receive pay only when they drive. They receive a free ride for collecting fares. If drivers elect, they can receive \$20 compensation/week for washing and cleaning the bus. Each vanpool rider is charged a set fare based on the van's daily round trip mileage. The van riders pay fares weekly and bus riders pay daily (see Figure 2).

The vans are 15-passenger maxivans. The buses are 40-passenger Blue Bird All Americans. All vehicles and drivers are covered by Travelers Insurance Company.

Bus and van insurance coverage includes the following:

| <u>Coverage</u>                      | <u>Limit of Liability (\$)</u> |
|--------------------------------------|--------------------------------|
| Liability                            | 1 000 000                      |
| Comprehensive-collision<br>for buses | 1000 deductible                |
| Comprehensive-collision<br>for vans  | Self-insured                   |
| Medical payments                     | 10 000                         |
| Uninsured motorist                   | 250 000                        |
| Umbrella                             | 5 000 000                      |

#### RIDESHARE STATUS

As of January 1980, TVA's commuter pooling program at Hartsville consisted of 132 vans and 17 buses that transport approximately 56 percent of the day shift employees. The average bus ridership is 35 and van ridership is 10.

Figure 2. Employees boarding bus used for ridesharing program.



Figure 3. Quitting time at Hartsville construction site.



Table 1. Benefits of TVA ridesharing program in Hartsville.

| Item   | Van        | Bus       |
|--|------------|-----------|
| No. of vehicles  | 132        | 17        |
| Avg. occupancy   | 10         | 35        |
| No. of persons participating                                     | 1320       | 590       |
| Private vehicles not driven to construction site <sup>a</sup>    | 780        | 350       |
| Reduction in private automobile annual VMT                       | 13 918 200 | 8 505 000 |
| Remaining private automobile annual VMT to access rideshare mode | 1 687 000  | 1 026 900 |
| Net difference in private automobile annual VMT                  | 12 231 200 | 7 476 100 |
| Vehicle miles for rideshare vehicle                              | 2 366 100  | 413 100   |

Note: All data are as of January 1980.

<sup>a</sup>Based on a 1.7 occupancy rate for construction workers at other construction sites.

The employee commuter system is only provided for the west corridor to the construction site, where mitigation actions were deemed necessary. No commuter service is provided by TVA on the second shift or to the east. Some limited buspools and vanpools provided by private operators help fill this gap.

Rideshare vehicles carry TVA annual (nonmanual) and hourly (manual) employees from a number of cities and towns in middle Tennessee to the construction site. The 78 vans operated by hourly construction workers have an average one-way trip length of 40.7 miles, and the 35 vans operated by annual employees have an average trip length of 28 miles. The buses primarily haul hourly construction workers and have an average one-way trip length of 48.6 miles (see Figure 3).

#### Benefits

Although TVA's employee transportation effort at Hartsville is to keep vehicular traffic on TN-25 below its rated capacity, an effective employee transportation system also has provided several spinoff benefits to TVA, the community, and the

employees themselves. Perhaps the most significant benefits of the ridesharing program are the reduction of traffic on TN-25 and the conservation of fuel. More than 1100 private vehicles are not being driven each day to the construction site. The rideshare effort then translates into a reduction of 19.7 million annual vehicle miles of travel (VMT), even after consideration that 70 percent of the ridesharers will use their automobile each day to drive to a park-and-ride lot (see Table 1).

One of the direct consequences of a reduction in VMT is the savings in vehicle operating cost. Recent statistics indicate that the average cost of operating a vehicle is 12.4 cents/mile for a standard-size automobile and 6.23 cents/mile for a subcompact. The following analysis, based on a 50-50 mix of standard and subcompact, results in a cost of 10.3 cents/mile. If the vehicles eliminated by commuting are sold, all of the savings in operating cost are passed on to TVA employees, thereby increasing their disposable income. If a TVA employee does not sell his or her second car because of ridesharing but only uses it less, his or her savings would be about those quoted. The figures generated for Hartsville assumed that the present commuting vehicle will not be sold. This is a conservative estimate since a recent survey of 455 vanpoolers indicates that 6 percent of them sold an automobile and 18 percent postponed a decision to buy a new car because of the vanpool system. Savings in vehicle operating costs, however, are offset to some extent by the cost of ridesharing. User cost savings in comparison with private automobile driving are given below:

| Item   | Savings    |
|--|------------|
| Annual reduction in automobile VMT                                 | 19 709 300 |
| Cost reduction for less automobile driving at 10.3 cents/mile (\$) | 2 030 058  |
| Bus fares paid at \$2.38/day avg (\$)                              | 333 795    |
| Van fares paid at \$1.75/day avg (\$)                              | 519 750    |
| Annual TVA employee savings (\$)                                   | 1 176 513  |

It is estimated that 806 800 gal of fuel are saved annually at the present level of ridesharing as opposed to reliance on the private automobile. A breakdown of changes in fuel consumption by mode is given below.

#### Changes in Annual VMT

Automobile = Reduction of 19 709 300,  
Van = Increase of 2 366 100, and  
Bus = Increase of 413 100.

#### Changes in Annual Fuel Consumption

Automobile (at 18 miles/gal) = Reduction of 1 095 000 gal,  
Van (at 10 miles/gal) = Increase of 236 600 gal, and  
Bus (at 8 miles/gal) = Increase of 51 600 gal.

#### Net Change in Annual Fuel Consumption

All modes = Reduction of 806 800 gal (ignoring that buses use diesel fuel, but automobiles and vans use gasoline).

#### Increase in Convenience

Opinion surveys of TVA vanpoolers indicated additional desirable aspects of the program. As summarized in the table below, vanpoolers are particu-

larly conscious of the reduced costs of commuting and reduced energy consumption. Also significant, but more difficult to quantify, is the perceived relief from the tensions of driving each day. Another important factor noted was the ability to make the vehicle formerly used for commuting available for other family members during the day. Note that 70 percent of the vanpoolers own two or more cars, thus they are riders by choice. Only 1 percent of the riders were without an automobile.

| <u>Perceived Benefit</u>         | <u>Frequency of Response from 1977 Survey (%)</u> |
|----------------------------------|---|
| Conserve gasoline                | 57  |
| Less-expensive means of travel   | 30  |
| Safer in case of accident        | 3   |
| Less damaging to the environment | 1   |
| Freedom from tension of driving  | 7   |
| More comfortable                 | 1   |
| Develop new friends              | 1   |

Another benefit of the rideshare effort is the employment opportunities provided to minority employees. This is illustrated in the table below, which gives participation in employee transportation by race in July 1978. More than half of the Hartsville minority employees participate in the TVA employee transportation program, and 97 percent use some form of ridesharing.

| <u>Mode of Travel</u>           | <u>Minority Employees (%)</u> | <u>White Employees (%)</u> |
|---------------------------------|-------------------------------|----------------------------|
| TVA bus or vanpool              | 53                            | 36                         |
| Private van                     | 9                             | 5                          |
| Carpool                         | 35                            | 42                         |
| Drive alone                     | 3                             | 17                         |
| Percentage of total ridesharing | 97                            | 83                         |

Ridesharing at Hartsville has proved to be more economical than building additional highway capacity and constructing and maintaining 1000 additional on-site parking spaces. In addition, valuable space not needed for parking is used for laydown areas (e.g., storage of pipes) needed during construction. The cost savings of deleting temporary gravel

parking lots is at least \$500 000.

Besides the obvious benefit of reducing traffic congestion on TN-25, a system of ridesharing has also encouraged workers to commute from outside the impact area. This has reduced the overall impact of the project on nearby school systems and local government services. The ratio of commuters to movers is greater than anticipated. Therefore, the cost to the community and to TVA to mitigate the effects of the project on education (i.e., payments to school systems) and other public services has been kept to a minimum.

As a result of the employee transportation program, the Hartsville project can draw its work force from a wide geographic area. TVA's ability to attract large numbers of skilled construction workers has been substantially increased. As a corollary to this, the project should be better able to meet construction schedules.

CONCLUSION

An employer-based transportation program can be shown to benefit the employees and the employer, as well as the community. Rather than the construction project having an adverse impact on a local area through the influx of a large temporary work force, an entire region absorbs the work force. At the TVA Hartsville site, 40 percent of the work force resides outside the immediate five-county area. Transportation is the linkage to relieve pressure on local housing, schools, highway system, and public services.

Employer-based vanpool and buspool programs cannot totally eliminate the impact of heavy traffic loads and inconvenience to the local community, but ridesharing is an alternative to building additional highway capacity and public services that cannot be fully used after construction. Ridesharing will not eliminate all costs but will be more cost effective than wasteful construction of unneeded facilities.

The TVA experiment at Hartsville has been so effective that a similar program has been developed at Yellow Creek, Mississippi. It now has 13 buses and 27 vans that carry more than 29 percent of the day shift. Overall, TVA has developed a transportation system that involves 625 vans and 93 buses at 25 different TVA installations.

*Abridgment*

# Role of the Transportation Broker at Children's Hospital of San Francisco: A Case Study

CLIFF CHAMBERS

Children's Hospital of San Francisco has implemented various ridesharing programs to provide employees with alternatives to the single-occupant vehicle, reduce neighborhood parking congestion, and thereby garner neighborhood support for a major remodeling project. Wilbur Smith and Associates prepared a transportation plan in May 1978. Recommended program elements included ridesharing, transit information, transit improvements, parking management strategies, and the hiring of a transportation broker for implementation purposes. Rotating shifts, a large proportion of part-time employees, a 30 percent annual turnover rate, and shift changes required nontraditional approaches to ridesharing efforts. A carpool and vanpool program offers personalized matching service, the incentive of free parking, and active cooperation with neighbor-

ing institutions. Among the 1400 employees, 56 active carpool groups and 5 joint institutional vanpools have been organized. Faced with poor cross-town transit service and poor Bay Area Rapid Transit connections to the south, Children's and two neighboring hospitals are cosponsoring an employee shuttle service. Wilbur Smith and Associates conducted a two-year program evaluation in April 1980. The number of drive-alone employees was reduced from 752 to 574. Key factors included the increase of the ridesharing modal split from 15 to 23 percent and transit from 16 to 20 percent. Three strong influences have aided alternatives programs for commuters. A neighborhood preferential parking program, begun in August 1979, has restricted employee parking in a 24-block area that surrounds the hospital. The two Bay Area ridesharing