

REMARKS PREPARED FOR DELIVERY BY
STEVEN A. BARSONY
DIRECTOR, OFFICE OF
ENGINEERING EVALUATIONS
URBAN MASS TRANSPORTATION ADMINISTRATION

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FEDERAL DEVELOPMENT OF TRANSIT AND NEW TECHNOLOGIES

THANK YOU FOR YOUR KIND INTRODUCTION. I WOULD ALSO LIKE TO THANK THE ELECTRIC POWER RESEARCH INSTITUTE FOR PROVIDING UMTA THIS OPPORTUNITY TO ADDRESS YOU CONCERNING OUR PROGRAM RELATIVE TO TRANSIT DEVELOPMENT AND NEW TECHNOLOGIES AS IT PERTAINS TO ELECTRIC POWER.

I BRING WARM GREETINGS FROM OUR ADMINISTRATOR BRIAN CLYMER. WITH OUR HEIGHTENED CONCERN OVER ENERGY SECURITY AND AIR QUALITY, HE APPLAUDS YOUR EFFORTS TOWARD DEVELOPING ELECTRIC VEHICLES.

TRANSIT TECHNOLOGY CHOICE IS FREQUENTLY MISUNDERSTOOD, AND DESERVES SOME ATTENTION. IF A CITY WANTS TO MAKE A MAJOR TRANSIT IMPROVEMENT, A SERIES OF PLANNING AND ENVIRONMENTAL STUDIES MUST BE COMPLETED TO QUALIFY FOR FEDERAL FUNDING. THESE STUDIES ARE CALLED AN ALTERNATIVES ANALYSIS. ESSENTIALLY, THE PROCESS OF AN ALTERNATIVES ANALYSIS DEVELOPS CAPITAL AND OPERATING COST INFORMATION FOR VARIOUS TYPES OF FIXED GUIDEWAY AND VARIOUS TYPES OF BUS SYSTEMS SO THAT THE SYSTEM SELECTED IS OPTIMUM TO MEET LOCAL SITE SPECIFIC CONDITIONS. COST EFFECTIVENESS IS, OF COURSE, A PRIMARY CONSIDERATION. THEREFORE, TRANSIT TECHNOLOGY CHOICE IS BASED ON NUMEROUS FACTORS WHICH TAKE INTO ACCOUNT SERVICE AREA, MAJOR TRAFFIC GENERATORS, PROJECTED RIDERSHIP, VEHICLE HEADWAYS, OPERATING COSTS, ETC.

THERE ARE FOUR TYPES OF FIXED GUIDED TRANSIT SYSTEMS NORMALLY CONSIDERED IN THE PLANNING PROCESS WHICH I JUST DESCRIBED: RAPID RAIL, LIGHT RAIL, COMMUTER RAIL, AND AUTOMATED GUIDEWAY TRANSIT, OR AGT. ALL FOUR FIXED GUIDEWAY SYSTEMS ARE ELECTRICALLY POWERED, ALTHOUGH SOME COMMUTER RAIL SYSTEMS USE DIESEL LOCOMOTIVES. I WILL BRIEFLY EXPLAIN THE DIFFERENCES BETWEEN THE SYSTEMS.

RAPID RAIL IS SOMETIMES CALLED HEAVY RAIL, ALTHOUGH WEIGHT OF THE RAIL HAS NOTHING TO DO WITH THE SERVICE. RAPID RAIL IS HIGH CAPACITY RAIL OPERATED IN SUBWAY, ON THE SURFACE IN HIGHWAY MEDIANS, OR ON ELEVATED STRUCTURES. TRAINS CONSIST OF UP TO 8 CARS. THE BART SYSTEM IS A TYPICAL EXAMPLE. LIGHT RAIL IS A MODERN NAME FOR WHAT WE USED TO CALL STREETCAR SERVICE. HOWEVER, LIGHT RAIL SYSTEMS USUALLY OPERATE ON SURFACE STREETS, BUT ARE SEPARATED TO THE MAXIMUM EXTENT FEASIBLE FROM AUTOMOBILE TRAFFIC THROUGH GRADE SEPARATIONS IN CALIFORNIA, LIGHT RAIL SYSTEMS ARE FOUND IN SAN DIEGO, LOS ANGELES, SAN FRANCISCO, SACRAMENTO, AND SAN JOSE. COMMUTER RAIL SERVICE IS OPERATED ON RAILROAD RIGHTS-OF-WAY USING RAILROAD TYPE EQUIPMENT. COMMUTER TRAINS ARE EITHER ELECTRICAL OR DIESEL LOCOMOTIVE POWERED.

THERE IS INCREASED ATTENTION BEING FOCUSED ON BOTH LIGHT RAIL AND COMMUTER RAIL SYSTEMS AS SOLUTIONS TO TRAFFIC CONGESTION, PARKING, AND AIR POLLUTION PROBLEMS FOR VARIOUS REASONS. CONVENTIONAL RAPID RAIL SYSTEMS ARE EXTREMELY COSTLY TO BUILD BECAUSE THEY MUST BE COMPLETELY GRADE SEPERATED DUE TO A 3RD RAIL POWER SOURCE. THEREFORE, THESE SYSTEMS ARE BUILT UNDERGROUND OR ON ELEVATED STRUCTURES WITH LARGE STATION COMPLEXES ALL OF WHICH IS EXTREMELY EXPENSIVE, PERHAPS \$50-75 MILLION PER MILE FOR SUBWAYS. IN CONTRAST, LIGHT RAIL SYSTEMS WHICH GENERALLY OPERATE ON SURFACE RIGHTS-OF-WAY, REQUIRE MINIMUM INFRASTRUCTURE. SIMPLE BUS SHELTERS SUFFICE FOR STATIONS. THE SAN DIEGO LIGHT RAIL SYSTEM IS A GOOD EXAMPLE - IT RUNS ON STREETS AND RAILROAD RIGHTS- OF-WAY.

WITH DRAMATICALLY INCREASED TRAFFIC CONGESTION AND AIR POLLUTION IN MANY URBAN AREAS, UNDERUTILIZED RAILROAD LINES ARE BEING EXAMINED FOR POTENTIAL COMMUTER RAIL TRANSIT SERVICE. A COMPLETELY NEW COMMUTER SERVICE WAS STARTED IN 1989 BETWEEN PALM BEACH AND MIAMI. ANOTHER NEW SERVICE BETWEEN FREDERICKSBURG AND MANASSAS, VIRGINIA AND DOWNTOWN WASHINGTON, D.C. IS SCHEDULED TO START LATE THIS YEAR.

AUTOMATED GUIDEWAY TRANSIT (AGT), OR WHAT IS SOMETIMES CALLED PERSONAL RAPID TRANSIT OR PRT, HAS BEEN OF ENORMOUS FASCINATION TO SUNDAY NEWSPAPER SUPPLEMENT WRITERS, INVENTORS, AND TRANSPORTATION PLANNERS FOR DECADES, BUT IMPLEMENTATION HAS OCCURRED ONLY UNDER SPECIALIZED CONDITIONS. THESE COMPLETELY AUTOMATED SYSTEMS, WHICH USE SMALL SIZED VEHICLES ON COMPLETELY GRADE SEPARATED GUIDEWAYS, ARE USED IN AIRPORTS, AMUSEMENT PARKS, AND IN THREE LOCATIONS AS MASS TRANSIT - MORGANTOWN, WEST VIRGINIA, DETROIT AND MIAMI. THE LATTER SYSTEM IS INTEGRATED WITH A CONVENTIONAL RAPID RAIL SYSTEM. THE ATTRACTION OF AGT SYSTEMS IS THAT FREQUENT, SHORT HEADWAY SERVICE CAN BE OPERATED WITH NO INCREASE IN LABOR SINCE THE VEHICLES ARE UNMANNED. TRAIN CONSISTS CAN BE CHANGED QUICKLY TO MEET TRAFFIC DEMAND. ALTHOUGH THERE IS WIDE AND CONTINUING INTEREST IN THESE SYSTEMS, THEY CREATE ENVIRONMENTAL CONCERNS BECAUSE OF USE OF ELEVATED STRUCTURES. THERE ARE ALSO SECURITY CONCERNS WHERE THESE SYSTEMS HAVE BEEN PROPOSED FOR LONG LINE HAUL APPLICATIONS, ALTHOUGH SUCH A SYSTEM IS IN SUCCESSFUL SERVICE IN FRANCE.

ELECTRIC POWER IS VITAL TO THE OPERATION OF TODAY'S RAIL AND OTHER FIXED GUIDEWAY SYSTEMS. SOME OF YOU MAY NOT BE AWARE OF THE FACT THAT AT THE TURN OF THE CENTURY, POWER COMPANIES WERE INSTRUMENTAL IN THE FORMATION, OWNERSHIP, AND OPERATION OF STREET RAILWAY AND INTERURBAN LINES BECAUSE THEY WERE LOOKING FOR NEW MARKETS. POWER COMPANY INVOLVEMENT IN TRANSIT ENDED FOR THE MOST PART IN THE 1930S, BUT THERE ARE STILL SEVERAL BUS SYSTEMS OPERATED BY COMPANIES. ALTHOUGH TRANSIT SYSTEMS ARE NOW COMPLETELY IN THE PUBLIC SECTOR, TRANSIT AGENCIES MUST WORK CLOSELY WITH ELECTRIC UTILITIES TO INSURE STEADY AND RELIABLE TRACTION POWER.

TRACTION POWER IS A SIGNIFICANT OPERATING COST TO RAIL TRANSIT SYSTEMS. JUST TO GIVE YOU AN IDEA OF THE MAGNITUDE, THE TWO LARGEST RAIL RAPID TRANSIT SYSTEMS, NEW YORK AND CHICAGO, SPENT \$113 MILLION AND \$30 MILLION RESPECTIVELY FOR POWER ANNUALLY IN FY 1989. POWER COSTS ARE A SIGNIFICANT PART OF A RAIL SYSTEM'S ANNUAL OPERATING COST. ALTHOUGH MOST RAIL TRANSIT SYSTEMS HAVE STRONG PEAK USAGE DURING MORNING AND EVENING RUSH HOURS, POWER COMPANIES DO NOT HAVE ANY DIFFICULTIES ACCOMMODATING THEIR TRANSIT CUSTOMERS. THIS IS IN LARGE PART DUE TO THE EXCELLENT WORKING RELATIONS BETWEEN THE TWO INDUSTRIES, AND CAREFUL PLANNING TO INSURE THAT REDUNDANCIES PREVENT MAJOR SYSTEM FAILURES.

THE USE OF RAPID TRANSIT HAS POSITIVE ENERGY AND AIR QUALITY BENEFITS. A FULL RAIL CAR DURING RUSH HOUR REMOVES 75 TO 125 CARS FROM THE TRAFFIC STREAM. THIS NOT ONLY TRANSLATES INTO AIR QUALITY BENEFITS--ONE AUTO COMMUTER USING PUBLIC TRANSIT INSTEAD OF DRIVING TO WORK WOULD REMOVE ON AN ANNUAL BASIS NINE POUNDS OF HYDROCARBONS, 63 POUNDS OF CARBON MONOXIDE, FIVE POUNDS OF NITROUS OXIDES, AND ONE POUND OF PARTICULATES--BUT ALSO INTO ENERGY SECURITY BENEFITS. I AM SURE THAT SIMILAR STATISTICS ARE AVAILABLE THAT SHOW THE AMOUNT OF PETROLEUM THAT WOULD NOT HAVE TO BE IMPORTED IF ONE AUTO COMMUTER TOOK PUBLIC TRANSIT TO WORK INSTEAD OF DRIVING. THERE'S NO DOUBT IN MY MIND THAT THE ENERGY SAVINGS STATISTICS WOULD BE EQUALLY AS IMPRESSIVE.

FIXED GUIDEWAY SYSTEMS ARE LIMITED BY THEIR CAPITAL INTENSIVE REQUIREMENTS AND THE NEED FOR SUFFICIENT DEVELOPMENT DENSITY TO SUSTAIN THEIR EFFECTIVE USE. THE WORK HORSE AND BACKBONE OF THE TRANSIT INDUSTRY REMAINS THE BUS.

UMTA'S CLEAN AIR PROGRAM WAS CREATED TO SUPPORT THE NATIONAL GOALS OF REDUCING BOTH BUS VEHICLE EXHAUST EMISSIONS AND OIL IMPORTS. IT CONSISTS OF A NUMBER OF RELATED UMTA ACTIVITIES INCLUDING THE ALTERNATIVE FUELS INITIATIVE PROGRAM, THE METHANOL BUS DEMONSTRATION PROGRAM, THE FUEL CELL/BATTERY BUS PROGRAM AND THE ALTERNATIVE FUEL BUS PROGRAM FROM THE ALTERNATIVE MOTOR FUELS ACT OF 1988. WE CONSOLIDATED THESE RELATED PROGRAMS INTO THE CLEAN AIR PROGRAM IN APRIL, 1990 IN RESPONSE TO THE TRANSIT INDUSTRY'S GROWING INVOLVEMENT IN EXPLORING THE NEW TECHNOLOGIES FOR REDUCING BUS VEHICLE EMISSIONS.

ALTHOUGH ELECTRIC VEHICLES ARE ELIGIBLE UNDER THE ALTERNATIVE FUELS INITIATIVE PROGRAM, THE GRANT APPLICATIONS TO DATE HAVE BEEN FOR OTHER ALTERNATIVE FUELS. THE PROGRAM THAT I WOULD LIKE TO DISCUSS WITH YOU TODAY IS THE CONGRESSIONALLY MANDATED FUEL CELL/BATTERY BUS PROGRAM.

FIRST A LITTLE HISTORY OF THE PROGRAM. IT BEGAN WITH A FEASIBILITY STUDY CONDUCTED BY THE LOS ALAMOS NATIONAL LABORATORIES IN 1986. THE MAJOR CONCLUSIONS OF THE STUDY WERE THAT A FUEL CELL/BATTERY POWERED BUS COULD BE BUILT WITH CURRENTLY AVAILABLE TECHNOLOGY, THAT ANTICIPATED TECHNOLOGICAL ADVANCEMENTS WOULD SIGNIFICANTLY IMPROVE ITS PERFORMANCE, AND THAT THEIR COSTS MAY BE COMPETITIVE WITH CONVENTIONALLY FUELED BUSES.

SINCE THAT STUDY, UMTA HAS BEEN INVOLVED WITH THE DEPARTMENT OF ENERGY IN A FOUR PHASE PROGRAM TO DEVELOP A FUNCTIONING FUEL CELL/BATTERY PROPULSION SYSTEM. THE FIRST PHASE, PROOF-OF-FEASIBILITY, WAS COMPLETED IN 1990. IT INVOLVED TWO CONTRACTING TEAMS DEMONSTRATING THE FEASIBILITY BY CONSTRUCTING AND EVALUATING A HALF SCALE FUEL CELL/BATTERY POWER SOURCE SYSTEM. ITS PERFORMANCE WAS MODELED OVER THE DUTY CYCLE OF TRANSIT COACHES AS WELL AS THE GEORGETOWN UNIVERSITY TRANSPORTATION ROUTES. THE TECHNICAL FEASIBILITY OF A PHOSPHORIC ACID FUEL CELL/LEAD ACID BATTERY PROPULSION SYSTEM WAS CONFIRMED. ITS ECONOMIC FEASIBILITY, HOWEVER, IS DIFFICULT TO PRECISELY DETERMINE AT THIS POINT. IT APPEARS TO BE WITHIN THE RANGE OF ECONOMIC FEASIBILITY.

WE HAVE MOVED INTO PHASE II OF THE PROGRAM. PROOF-OF-CONCEPT. THIS PHASE WILL ACTUALLY LEAD TO THE DEVELOPMENT OF TWO TEST BED FUEL CELL/BATTERY SMALL SIZED BUSES. A SYSTEMS DESIGN WILL ALSO BE CONDUCTED FOR A STANDARD 40 FOOT FUEL CELL/BATTERY BUS.

IN CONJUNCTION WITH THIS PROJECT, WE ARE EXPLORING IN COOPERATION WITH DOE AND THE SANTA BARBARA METROPOLITAN TRANSIT DISTRICT THE DEPLOYMENT AND DEMONSTRATION OF A SODIUM SULFUR BATTERY POWERED SMALL SIZED BUS. THIS WOULD COMPLEMENT SANTA BARBARA'S EXISTING LEAD ACID BATTERY POWERED BUS AS WELL AS PROVIDE AN OPPORTUNITY TO EVALUATE THE APPLICABILITY OF THE SODIUM SULFUR BATTERY FOR THE FUEL CELL/BATTERY BUS PROGRAM.

IN CONCLUDING, LET ME SAY THAT WE AT UMTA ARE LOOKING FORWARD TO WORKING COOPERATIVELY WITH DOE IN BRINGING THESE ADVANCED TECHNOLOGIES TO PRACTICAL TRANSIT APPLICATIONS. WE AT UMTA CERTAINLY LOOK FOR EPRI'S CONTINUED SUPPORT.

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