

Remarks prepared for a conference on
“Sprawl and Congestion – Is Light Rail and
Transit-Oriented Development the Answer?”

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Personal Introduction

To make clear my values and orientation, I have been an avid environmentalist for thirty years, and annually contribute to a score of environmental organizations. Since reading landscape architect Ian McHarg’s epic study, *Design With Nature*, in 1970, I have fervently believed in good urban design principles, with scrupulous protection for environmentally sensitive areas, including riparian zones, wetlands, flood plains, steep slopes, and prime soils. In addition to protecting the ecological services that nature provides, good planning should restrain sprawl, thereby promoting the efficient use of land and reducing public infrastructure costs. Influenced first by Roger Hagan’s splendid film, *Downtowns for People* (circa 1968), I have favored pedestrian-oriented, people-friendly urban centers. Mightily affected by Seattle’s 1965 Transportation Plan, which proposed to knit the city with a dense grid of freeways – to the degree that Seattle would effectively destroy its quality of life in order, theoretically, to assure everyone easy mobility – I strongly favored the anti-freeway movement. In defeating a major north/south expressway, Citizens Against the R.H. Thomson became the pioneers of a successful anti-freeway constituency in Seattle that largely dismantled the 1965 Transportation Plan – so far.

In 1973, during the Arab Oil Boycott, I started commuting by bicycle, and continue to do so 26 years later, impressed with its health benefits and cost savings. I last owned an automobile in 1982. I grew up in Seattle, always elected to live in the city, raised a family there, reside in a historic structure in a long-established neighborhood, and am a member of Historic Seattle.

I believe in choices, and in markets. But markets work effectively only when there’s a reasonable relationship between cost and price. Unfortunately, the cost of automobiles to society largely is borne by taxpayers and residents, rather than by automobile owners and drivers. Automobile owners don’t even pay fully for the direct costs they impose on society. Gasoline taxes do not fully cover the costs of highway, road, and bridge construction. The balance is made up by

taxpayers, who also pay for road and highway maintenance. The largest burden on local police forces is enforcing traffic laws and responding to auto accidents, but, again, the cost is borne by taxpayers. Drivers do not fully cover the costs of accidents, nor the resultant suffering and loss of life and productivity. Auto drivers are provided subsidized parking by employers, and the tax code favors such subsidies. As for indirect costs, the automobile is the leading cause of air and water pollution, but owners/drivers evade those costs too. The fact that roughly 40% of an urban area is paved for automobile use is the primary cause of storm water sewers but, again, it is taxpayers and ratepayers who pay. Auto driving is a leading cause of global warming, but this prodigious consequence is not reflected in the cost of operating a car. These lavish subsidies distort the market and induce considerably more driving than would occur if the price of automobile use fully covered its cost. Further, it's inequitable.

What is true for automobile drivers is in considerable degree true for transit patrons. In Seattle bus riders pay only 25% (\$1.25) of the cost of a one-way trip, while the remainder (\$3.75) is borne by taxpayers. The buses get considerably worse per-passenger miles per gallon of fuel than autos do, with prodigious externalized costs. And the experience with urban rail projects, as will be discussed further, is inordinately higher capital costs, inordinately higher operating subsidies by taxpayers, and a lack of environmental benefits. There are superior alternatives, both economically and environmentally, but these are choices that are not offered or are severely beggared.

The premises and conclusions of this paper are consistent with those of the definitive study, *Avoiding the Collision of Cities and Cars: Urban Transportation Policy for the Twentieth Century*, sponsored by the American Academy of Arts and Sciences and the Aspen Institute (1993), and directed by Elmer W. Johnson. It is the most objective review of urban transportation in America, scrupulously independent and dispassionate. It was guided by a broad-based panel of 26 experts spanning pertinent disciplines including engineering, transportation planning, urban planning, economics, architecture, climate and energy, capital formation and economic development, and environmental studies. The goals of the report were *to minimize the auto-related social costs...; to facilitate convenient, efficient, personal access to people, goods and services in the urban environment; and to enable people to fashion more livable cities.*¹

The allure of the automobile is compelling, and crafting a sensible transportation policy requires an acknowledgement of the wonderful attributes of the car:

¹ The American Academy of Arts and Sciences and the Aspen Institute, *Avoiding the Collision of Cities and Cars: Urban Transportation Policy for the Twentieth Century* (1993), page 10.

The motor vehicle has enriched our lives in countless ways. It has provided the easy connectivity that enables modern, highly interdependent, urban societies to thrive. It has eliminated rural isolation. It has enabled workers to choose employers rather than accept whatever employment opportunities are within walking or transit distance of their homes. The personal truck allowed craftspeople and artisans to carry their tools with them and enter the middle class by becoming independent contractors. The motor vehicle has enabled people to live outside urban centers and still participate in mainstream society....

The car is an amazing piece of technology that has greatly extended our range of choice as to where to live, work, shop, and play. No other form of transport can compete with the automobile in terms of door-to-door mobility, freedom to time one's arrivals and exits, protection from inclement weather, and comfort, security, and privacy while in transit.²

In short, even if markets worked well, it would be a challenge to find alternative transportation modes and technologies that could compete effectively with the automobile. Even so, that is an achievable goal – but it can't be achieved with our current emphasis on monopoly public transit systems wedded to buses and trains. While rail is the darling of the “transit-oriented development” set, its utility is cogently and swiftly dispatched by the distinguished group that prepared *Avoiding the Collision of Cities and Cars* :

Given the overall record of investment in rail transit over the last twenty years, the participants do not generally favor additional such investment in the present price environment.³

Personal rapid transit is one technology that holds great promise for urban transit systems, and the report urges that its development be monitored so that it can be applied, if and when it becomes cost-effective.

In the interim, the study calls for the crafting of policies that cause the various, alternative modes of travel to reflect their true social costs: *As people began to pay the full social costs of driving, they would take greater care in deciding when and how to move from place to place. Solo travel would decrease substantially in favor of car pooling and other kinds of shared mobility....*⁴ And in response to the presumption that political leaders can be counted on to stick with the present mix of distorted, subsidized policies and practices, rather than come to grips with real problems, the report ends with this more hopeful possibility:

² *Ibid.*, page 1.

³ *Ibid.*, page 34.

⁴ *Ibid.*, page 43.

[A] more enduring concept [of leadership] holds that those in positions to influence public policy, by virtue of their special knowledge or positions in society, are obliged to develop a visionary and hopeful program that spells out the seriousness of the nation's social ills and the kinds of tough but equitable solutions that will be required to address those ills.⁵

That is precisely what is desperately needed, and sorely lacking.

Transit-Oriented Development (TOD)

The Conference Question: *To what extent will a regional TOD strategy (investment in new rail capacity and actions to encourage development around transit stations) produce benefits in the form of reduced auto trips, reduced congestion, and improved air quality? Will it produce other important benefits that should be accounted for?*

The Answer: **A regional TOD strategy, particularly one involving contemporary rail technology in the circumstances of contemporary urban America, will not produce benefits that remotely justify its costs. And far from producing other benefits, by its stupendous “opportunity costs” – that is, money siphoned away from myriad, more beneficial uses – it will undercut the prospects for desirable outcomes, including the provision of workable and attractive alternatives to the single-occupant automobile trip.**

The veracity of the answer can be demonstrated historically, economically, environmentally, and through consideration of superior alternatives. But first one must deal with the duplicitous wedding of good community design to wasteful transportation modes, like rail. TOD proponents paint a very attractive picture of compact communities, pedestrian and bicycle-friendly, with a handy mix of retail establishments and work sites, convenient schools and recreational facilities, green spaces, and protected wetlands and riparian zones, resulting in efficient use of land and urban infrastructure. These attractive amenities and important values then are disingenuously highjacked into the service of an outdated, inflexible, noisy, capital-intensive, ruinously expensive-to-operate rail system – with the unstated premise that good urban design can only exist by imposing immense and needless costs on taxpayers, and foreclosing superior transportation alternatives, including the development of more appealing and cost-effective transit technologies. It is akin to the advertising stratagems of clever financial institutions, automakers, and cigarette companies that hype

⁵ *Ibid.*, page 44.

themselves by associating their names with gorgeous scenery, macho guys, or beautiful women.

We should develop well-planned, attractive, efficient, pedestrian-friendly, environmentally-sensitive communities. That goal will be served by using scarce public transportation resources in an efficient, responsible manner, which precludes lavishing money on contemporary rail technology. Rail should be applied when – but only when – it is economically and environmentally competitive with its alternatives. Today's rail systems can carry long-haul freight at an advantageous cost. In some instances they serve as an attractive, competitive inter-city travel option, as in the Boston-to-Washington corridor. That may be possible in the Vancouver-Seattle-Portland-Eugene corridor. Further, there are some metropolitan areas, such as Chicago, that have obtained surplus rail corridors through relatively dense settlements at an attractive price, and instituted suburban rail service that does not require ruinous levels of subsidy. Chicago METRA's rail lines, in fact, are less heavily subsidized than Seattle METRO's buses.

The Problem With Urban Rail: Historical

After the Puget Sound Regional Transit Authority (RTA) lost its \$7 billion rail proposal, in 1994, the author of this paper interviewed some thoughtful people who supported the proposal. It was unquestionable, from the cost and ridership data provided, that the RTA represented a very poor investment. So why had sensible people promoted it? The answer was an introduction to the concept of transit-oriented development. Bill Kendall, a talented policy professional on the staff of the Seattle-King County Economic Development Council, explained he supported the RTA, in spite of its bleak economics, because he had been advised that rail investments will "drive" land use – that is, the investment of billions of dollars in urban fixed rail infrastructure will instigate more efficient, livable, compact communities. The retort to this reasoning has been historically demonstrated in many, many communities, including Seattle:

Once upon a time we had good rail infrastructure in this region – an extensive network of inter-city trains, interurban rail, trolleys, and cable cars. By your thesis we never would have lost them, as the infrastructure was in place, and operating. But the automobile provided other options, and in time its appeal and use undercut the rail-oriented, fixed system. A Hope that the introduction of a far more costly, far less extensive rail system, into settlement patters that are far more dispersed, will cause us to revert to 19th century settlement patterns, is an

*amazing leap of faith and a slender reed on which to bet billions of dollars and the region's transportation future.*⁶

Once fixed rail systems were the dominant form of land transportation in North America. Great cities emerged where the railhead hit the harbor. The rail systems then radiated outward to facilitate the founding and development of smaller, outlying centers of economic and residential activity along the rail corridors. Being a port city, Seattle also had its “mosquito fleet” that served nearby islands, and ferries that linked the city to the west side of Puget Sound and the east side of Lake Washington. These amenities in turn were linked to cable cars and steel rail trolleys in Seattle, creating a regional transit network. The coming of the automobile eroded and eventually destroyed that system. The last urban trolley rails were dug out of the streets of Seattle in the early 1940s, after the demise of the interurban rail lines, to be replaced by more comfortable, rubber-tired electric trolleys and more flexible buses. This story was repeated all over America.⁷

The same sequence is in process in Europe. In the European Union the share of passenger miles traveled by automobile in 1970 already was 50% higher than the combination of rail, buses, and coaches. By 1996, auto miles had gone up 250% on a steeply inclined curve, while rail, buses, and coaches remained static – and had declined to a marketshare only one-fourth that of the automobile, and falling. This rapid loss of marketshare by trains and buses occurred despite gasoline prices four-times those in the US, much stricter land use controls in cities and in the countryside, much more compact communities, and superior transit infrastructure.⁸

The historical evolution is easy to describe: Rail, or rail-and-ship were the dominant transportation technologies, and settlement patterns conformed accordingly. Interurban rail lines then facilitated suburbanization, with outlying communities connected to the urban core in some variation of spokes on a hub. The automobile changed all that. People could live virtually anywhere, in every direction. Permissive land use policies placed few constraints. The built

⁶ Personal correspondence, Emory Bundy/Bruce Kendall (April 6, 1995).

⁷ One enduring myth is that urban rail systems would have continued save for a conspiracy by automobile and oil companies. There may be a shred of truth to that myth, somewhere, but there's no general evidence of such machinations. But some TOD advocates are relentless conspiracy theorists. At a Seattle appearance, a prominent proponent of the New Urbanism announced that it was the subsidies provided to the national freeway system, during the Eisenhower Administration, that doomed urban rail in Seattle – overlooking the inconvenient fact that the Seattle-area rail system had terminated decades earlier.

⁸ “Modes of passenger transport,” *The Economist* (September 5th 1998), page 4.

environment does not change very fast, so the changes took place over decades. By 1950 the Seattle metropolitan population was vastly more dispersed, and density had declined to roughly 5,000 people per square mile. By 1990 it was less than 3,000, and continuing to fall. It is sheer fantasy to spend billions of dollars on a few rail lines, in the belief that such expenditures will cause a massively dispersed metropolitan region to revert its settlement patterns to those of the pre-automotive era. And what is equally fantastic is this: The very people who have committed the Puget Sound region to such an ill-fated transportation strategy are the same ones who, as county executives and council members, and those who double as leaders of the Puget Sound Regional Council and the Regional Transit Authority, have zoned and continue to zone lands to still-lower densities. Having failed to make tough, efficient, environmentally-sensitive land use decisions favoring compact development, now they calculate that their propensity to zone for sprawl somehow will be overcome by their propensity to spend for rail.⁹

The Problem With Urban Rail: Economic

Every US community that instigated rail lines in the past quarter-century experienced burgeoning transit costs and falling transit marketshare. Every one. The report of Seattle's Interim Monorail Committee described the reasons:

The very factors that drive congestion – dispersed neighborhoods and business centers, increased population, higher ratio of employed adults, high automobile ownership – undercut the viability of conventional public transit technologies. The bus is a flexible technology, and its capital cost is fairly modest. But it does not offer a reasonable alternative for most commuters in a dispersed metropolitan area, and it is poorly equipped to serve the “chain-linked” trips common to today’s travelers. Its high operating costs (especially labor) severely encapsulates its ability to serve mobility needs. Metro’s bus operations are 75% subsidized, underwritten by a hefty 6/10ths percent sales tax plus a share of the Motor Vehicle Excise Tax equivalent to 3/10ths percent sales tax – yet it struggles to maintain a mere three percent marketshare of trips.

⁹ Prior to RTA's ballot issue, King Cushman, chief transportation planner for the Puget Sound Regional Council, said that a precondition ought to be tough, compact zoning in the communities all along the rail corridor. But that was not done. The reason, according to RTA spokesman Paul Kraabel, was that such a policy would antagonize the development industry. The substitute for such timely land use decisions is now the mantra – “transit-oriented development” -- imputing that the dramatic commitment of many billions of dollars in fixed rail lines will “drive” good land use policies, painlessly, as if by magic. It won't.

Rail – save for the unusual circumstance in which a surplused freight rail line, located in a fairly heavily settled corridor, can be obtained inexpensively and converted to transit – is even less promising. Thirteen US metropolitan areas introduced or expanded rail service in the 1980s. The uniform result was a radical increase in required tax subsidies and a marked decrease in transit marketshare. The experiences of two of the 13 communities – one that expanded its rail service in the 1980s, Boston, and one that initiated rail systems, Los Angeles – illustrate the difficulties of rail in the relatively dispersed settings characteristic of American cities:

Avoiding reality in Boston: Compared to most American cities, Boston has an splendid transit system. Its metropolitan area features extensive, well-integrated bus and rail systems. Transit’s modal split is high by US standards – but still falls below ten percent of trips. But the system is in trouble, as documented by Dr. Jose Gomez-Ibanez, Professor of Urban Policy and Planning at Harvard University, in his definitive “Big-City Transit Ridership, Deficits, and Politics: Avoiding Reality in Boston.”¹⁰ His article begins with the following observation:

One natural response to a difficult public problem is to avoid it. If there is no politically palatable solution, it may be in no one’s interest to take the issue on, or perhaps even to acknowledge it exists....In the end, however, problems that keep growing cannot be ignored, and delays may add to the cost and difficulty of the eventual solution. We have been discovering this with, for example, the federal budget deficit, health care cost containment, and educational reform.

This pattern of avoiding hard choices is being repeated in the debate over public transportation ridership, service, and finance in most major United States metropolitan areas.

Professor Gomez-Ibanez’s analysis demonstrates that during the last thirty years metropolitan Boston’s bus/rail transit system has been effectively integrated, and substantially extended by adding new rail lines. Yet ridership has remained static, in spite of substantial reductions in fares in an effort to hold and attract riders. With static ridership and a growing population, transit marketshare has slipped badly. Meanwhile, the annual subsidy to the transit system ballooned from \$21 million in 1965 to \$575 million in 1991 – and the subsidies don’t fully amortize the capital plant, so the financial picture is even more bleak than it appears. Boston’s experience is a recipe for disaster, but at each turn the politically least demanding course is followed – more subsidies for more rail – in spite of burgeoning costs and fading marketshare.

Predictably, worsening congestion has fanned demands for new highway construction, including The Big Dig, the world’s most expensive highway

¹⁰ *American Planning Association Journal* (Winter 1996).

project. When wasteful, ineffectual rail investments are selected as the primary alternative to automobiles, then, as transit costs increase and marketshare falls, the political momentum will drive desperate people caught in gridlock to demand more highway investments.

Avoiding reality in Los Angeles: Los Angeles is America's number one traffic congestion poster-child. It also has the highest population density of any US city, including New York, and the highest bus ridership. Conventional transportation planners considered LA a good candidate for urban rail, but the reintroduction of rail into that setting has been a disaster. The story starts in the early 1980s when the citizens of Los Angeles voted for extensive urban rail development, and a hefty tax to finance it. Because construction was not ready to proceed, some of the new tax revenues were used in the interim to improve bus service and lower fares. The response was an encouraging jump in transit patronage. Then rail construction started. Its voracious financial appetite led to higher bus fares and cutbacks in bus service, on top of heavy taxing and aggressive borrowing. By 1995 the five percent of LA's transit riders on trains consumed 60 percent of the Metropolitan Transit Authority's operating and maintenance budget, while the 95 percent on buses received the lesser share. The result was an absolute decline in transit patronage: In 1985 LA's transit system carried 497 million passengers, but by 1995, after a decade of rail-building, transit patronage fell to 362 million passengers – a drop of 27 percent. With increasing population in the LA basin, the drop in transit marketshare was 38 percent.¹¹ In response to one of the MTA's fare increases, in 1994 the NAACP Legal Defense Fund filed a civil rights, class action suit on behalf of bus transit patrons and bus drivers. The suit prevailed, and the LA MTA was ordered to moderate bus fares, add buses, and improve service. Ridership has rebounded somewhat, but is still well below that of 1985. With additional lines the trains now carry nearly nine percent of transit passengers, and get 45 percent of the MTA's

¹¹ The figures are those of the official 1985 numbers of the Southern California Rapid Transit Authority (predecessor to the Los Angeles Metropolitan Transit Authority), and the MTA's 1995 figures. Transit ridership figures are reported on Form 406, submitted annually to the US Department of Transportation. Here's how Charles Lave, economist from the University of California at Irvine, described what happened: *What we had was an odd marriage between idealistic planners and cynical profiteers. The idealists wanted to improve Los Angeles. They perceived cars as a problem, and were so determined to cure the problem that they talked themselves into believing it could be done. The profiteers are the engineering companies that go around the country pandering to the idealists. These companies know that new rail systems cannot lure people out of cars -- no rail system built over the last twenty years has done so. But, like cancer quacks, consistent failures do not bother them. They know there is money to be made by peddling hope.*

operating subsidy, while the 91 percent on the buses get the other 55 percent. While that's more equitable than before, the average subsidy for rail patrons still is eight-to-ten times that of bus patrons, who generally are poorer and more likely to reside in the inner city. The MTA is struggling, because the rail projects have accumulated \$3.4 billion debt. The annual debt service is \$360 million per year on 30-year bonds – more than the cost of all MTA salaries. The MTA has determined that further rail development must cease, though the sections currently under construction will be completed. That will add another \$2.2 billion to the debt, on top of substantial capital investments the court is demanding for new buses, plus less stingy bus operating subsidies. In all, if it starts no more rail projects the MTA's debt will exceed \$6 billion, with annual bond payments in excess of \$600 million.

In response to this travesty, rail enthusiasts and transit-oriented development advocates urge that the rail building and capital borrowing continue, and that massive additional public subsidies be sought in order to promote amenities and “densification” along the rail corridors.¹²

Avoiding reality in Seattle: Metropolitan Seattle has joined the ranks of the most severely congested urban areas in the US. For three decades congestion has steadily worsened due to a relentless growth in population, exacerbated by a growth in vehicle miles traveled (VMT) more than triple the rate of population increase. Now, with an exceedingly strong economy buttressing its quality-of-life features, the central Puget Sound region is growing at an accelerated rate. Hills and waterways impose natural bottlenecks to travel; congestion is severe, and demographically destined to deteriorate at an alarming rate. The situation calls for civic leadership, the marshaling of public will and resources for prompt, effective, efficient measures to ameliorate the looming crisis.

For a time it looked as though there would be constructive leadership. Top officials in the Washington State Department of Transportation proclaimed, “We can't build our way out of congestion,” suggesting a serious effort to use the existing infrastructure more efficiently. A Growth Management statute was enacted by the state legislature. The legislature passed a Commute Trip Reduction Act requiring major employers (more than 100 employees) to reduce auto trips to work by 35 percent. While the act relied too much on bureaucratic red tape and sanctions, and lacked affirmative incentives, it was a bold and promising initiative, and some large employers, like Boeing, initially responded with encouraging results. The University of Washington enacted its U-Pass program, with higher parking fees for single-occupant cars, breaks for carpools,

¹² See for example Anastasia Loukaitou-Sideris, “Reviving Transit Corridors and Transit Riding,” *Access* (Spring 1994).

facilitation of vanpools, words of encouragement for pedestrians and bicyclists, better transit service to campus, and unrestricted, bargain-price transit passes (\$10 per month for students, \$13.50 for faculty and staff). The number of cars driven to campus was cut by more than 20%, at a program cost of roughly \$8 million per year.

A state transportation commission recommended measures to reduce traffic, leading with the application of least-cost planning, drawing on the approach that resulted in such dramatic savings in the Northwest electrical energy sector. Least cost transportation planning then was mandated by the state legislature. In Seattle an experiment in congestion pricing was pondered. The Puget Sound Regional Council (PSRC) contracted for a simplified exercise in least-cost planning, comparing prototypes of rail, freeway construction, and transportation demand management options. It was staffed by a well-regarded regional economic planning firm and overseen by a prestigious national panel of experts.¹³

But these promising initiatives have been superceded by a reinvigorated determination to “build our way out of congestion,” with rail joining freeways and bridges as sinks for economic resources. Now rail development absorbs virtually all the non-freeway construction capital, to be followed by huge increases in transit operating subsidies, while its proponents discredit and beggar superior options.

Congestion pricing was abandoned as too controversial. When the least-cost planning studies (including the one carried out under PSRC auspices) confirmed that rail projects and freeway projects – the favorites of the capital-intensive and the transit-oriented development set – were the least productive options, transportation least-cost planning was effectively abandoned.¹⁴ And there were to be no independent analyses of the economics of the proposed Regional

¹³ Puget Sound Regional Council, *Integrated Resource Planning: A Primer for Policymakers* (June 1995); and ECONorthwest, *Case Study: Testing Application of Integrated Transportation Planning Methods on System Level Evaluation*, prepared for Puget Sound Regional Council and US Department of Transportation Federal Highway Administration (May 31, 1996).

¹⁴ Cf. Edward W. Sheets and Richard H. Watson, *Least Cost Transportation Planning: Lessons from the Northwest Power Planning Council* (1993); and Dick Nelson and Don Shakow, Institute for Transportation and the Environment, *Least Cost Planning: A Tool for Metropolitan Transportation Decision Makers* (January 1995). Also PSRC memo from planning director King Cushman (February 15, 1995), and response from Emory Bundy (February 17, 1995).

Transportation Authority's projects.¹⁵ So concerned citizens initiated a privately-financed review by a prestigious economic consulting firm, ECONorthwest. The study was peer reviewed and its methodology endorsed by five eminent transportation economists and planners. It concluded that the RTA's \$4 billion project will have a net social benefit over its lifetime of minus \$2.5 billion, presuming it costs and performs exactly as projected by the RTA.¹⁶ Having failed to commission independent studies, the RTA then undercut ECONorthwest's analysis by releasing a report surreptitiously prepared by its own economic consulting firm, Porter and Associates, with data altered from the RTA's own official numbers in order to show a net benefit. (For example, the Porter analysis used doctored data that increased the RTA's own estimates of travel benefits by 58 percent, and calculated that maintenance costs will not increase as the system ages, contrary to all experience.)¹⁷

The RTA's officials expressed their desire to emulate Los Angeles' rail plan, and started with a \$13 billion proposal. It was judged too extravagant to win at the ballot, so was withdrawn in favor of a \$7 billion rail proposal, which lost. Following extensive polling and politicking, a \$4 billion rail (75 percent) and express bus (25 percent) proposal succeeded, and is now in the process of development. The RTA predicts this investment will deliver 100,000 "new riders" to the transit system – a number that conveys an inflated impression because it takes two "new riders" to equal one person, since every one-way trip is counted. So, it predicts removing from the roadways the cars of 50,000 SOV

¹⁵ This sad tale is summarized by Emory Bundy, *If the RTA Project is Defensible, it Could be Defended by Telling the Truth* (October 30, 1996), pages 5-8. Also, correspondence between Emory Bundy, member, and Dick Ford, chairman of the RTA's Regional Outreach Committee (April 15, May 7, May 20, and June 10, 1996), and letter from Bob White, RTA executive director, to Dick Ford (May 17, 1996), confirming that calls for independent review were resisted by the RTA.

¹⁶ ECONorthwest, *Benefit-Cost Analysis of RTA Plan* (October 15, 1996). The study was peer reviewed and its methodology endorsed by Paul Courant, chair of the economics department, University of Michigan; Jose Gomez-Ibanez, professor of urban policy and planning, Harvard University; John Kain, professor of economics, Harvard University, Steve Fitzroy, transportation consultant, and former director of research and forecasting for the Puget Sound Regional Council; and Anthony Rufolo, professor of urban studies and planning, Portland State University.

¹⁷ *Ibid.*, see covering letter by Daniel Malarkey for a summary of the discrepancies: *In Appendix C [of the official report] the RTA estimates benefits in 2010 at \$209 million excluding construction; Porter estimates the same benefits at \$331 million....The Porter analysis assumes that the operating costs of the system will not increase faster than inflation while the ridership and benefits grow over time.*

drivers by 2010, via 100,000 “new rider” trips. The 25 percent investment in express buses will deliver 63 percent of the “new riders,” and the 75 percent for rail only 37 percent – or 18,500 cars removed by 2010. That’s \$135,000 capital investment per car thanks to rail – if it’s built on budget, and if the projected patronage develops. Then all rail passengers, new transit riders and old, will be subsidized much more heavily than they currently are on the buses, which average \$7.50 per person per day for rush-hour commuters.

Meanwhile, during the 14-year ballot, building, and shake-down phase of the project, it is predicted that the metro area will add 600,000 people. That’s 32 times more than will be added to transit by the rail systems. And VMT is growing considerably faster than population. So if one accepts the RTA’s numbers, it’s clear that the enormous spending for rail development will be accompanied by severely deteriorating congestion. Yet it was sold to voters with campaign television ads showing severely congested highways, to which the RTA’s Sound Transit was the answer. The RTA’s materials even claimed that its light rail line alone could carry as many people as 12 freeway lanes.¹⁸ Currently Sound Transit’s ads on the radio announce it is building “a world class transportation system” – a sound bite calculated to appeal to those who like a big-league city image – that will offer “an alternative to congestion.” That’s a clever phrase that RTA folks, during their ballot campaign, would use in personal conversations, when they could not with a straight face claim that the trains will do anything to alleviate congestion. So, while privately conceding that, the phrase that they turned for public consumption is that Sound Transit will offer “an alternative” to congestion – for the fortunate few who may be handy to the rail lines and destinations. As it will. The problem is, the cost will be gargantuan, the subsidy outrageous, the opportunity costs will be immense, the number of people served in this fashion will be tiny relative to the challenge, lost public confidence will be great, and properly so, and congestion will compound even as the region sinks deeper into debt.

Granted, the \$4 billion also is portrayed as buying a “starter rail” line, implying that in time Sound Transit will build a sufficient network to catch up with the challenge. But here is the grim reality: IF the light rail and commuter lines are built on time and on budget,¹⁹ and have the anticipated ridership, by 2010 the

¹⁸ This is a form of deception that is used by rail proponents all over the country, postulating an extreme, hypothetical use of rail and contrasting it with severely underutilized freeways. See below, page 13-14.

¹⁹ Already, without soil samples having been completed, alignments finalized, or a construction contract let, the cost estimate for Seattle’s \$1.8 billion light rail line has ballooned \$400 million to \$2.2 billion. The local political response is to intensify the quest for additional state and federal subsidies.

region will have 32 times more new residents who are not on the trains, exacerbated by the larger quotient of VMT growth by people already here. The system will have added \$100 million annually to its operating and maintenance burden, and it will be \$1 billion in debt for the construction already completed. If it focuses solely on retiring the debt, by 2017 or 2020 it could be debt-free, and the fraction of its added revenue not absorbed by additional operating costs could be available for a rail development encore. By this point the population increase of residents NOT on the two rail lines will be more than 50-times the number of “new [round trip] riders”. In short, relying on rail investments as the non-auto antidote to congestion is a ticket to deteriorating congestion, higher taxes, ruinous debt, and foregone opportunities.

The Problem With Urban Rail: Environmental

There is a misconception that rail is an energy efficient, environmentally benign technology. While that impression has considerable truth when applied to long-haul freight, it is not true of rail as a passenger device in US urban communities. The automobile consumption of fuel per passenger mile, in 1993, was 3,593 BTUs. Rail transit was higher, 3,687 BTUs.²⁰ But actually, the picture for rail is considerably worse. The automobile takes its passengers directly from origin to destination, but rail typically requires supplemental trips to and/or from the station, whether park-and-ride, kiss-and-ride, or by bus.

For example, the Kent station along Sound Transit’s new commuter rail line is projected eventually to have 1,400 passengers per day. Accordingly, Sound Transit will provide 810 parking spaces for cars. If those spaces are filled with cars carrying merely the standard 1.1 average passengers per auto, its parking facility will accommodate 891 daily transit patrons, or nearly two-thirds of the total. Each car will have a “cold start” in each direction, causing nearly as much pollution as it would if driven the whole trip. Then each passenger will get on a second transportation mode, the train, less energy efficient per passenger mile than the car – having added extra travel miles in the trips to and from the station. While economically responsible and environmentally sensitive transportation advocates are promoting policies that impose on auto drivers more of the real costs they generate, hence are attacking parking subsidies, Sound Transit is busy facilitating and subsidizing car use all across the countryside by providing free parking. So add subsidized parking and the costs of driving to all the other extravagant capital and operating rail subsidies.

²⁰ US Department of Energy, *Transportation Energy Data Book* (15th edition, table 2.15), page 2-25.

Further, urban rail systems require local transit operators to alter bus routes to “feed” the rail, due to the limited coverage of its stations and its higher capacity. These feeder lines, as in Portland, are among the least cost-effective and least energy-efficient of the bus lines. And buses are far more fuel-consuming per passenger mile than automobiles (4,374 BTUs/mile vs. 3,593 BTUs), and are even less fuel efficient than trains (3,687 BTUs).²¹

A common device in selling a light rail system to a gullible public is to claim, as did the proponents of Seattle’s RTA proposal, that *One light rail line moves the same number of people as 12 lanes of freeway*. That deceptive statement, prominently splashed over three pages of the official publication describing the proposal, posits the most extreme, hypothetical capacity of the rail line (maximum six cars, each carrying two-thirds more passengers than there are seats, traveling at three minute intervals), and contrasts it with an underutilized, standard freeway lane. The truth is that not a single light rail line in America carries as many passengers as one conventional freeway lane. And the high-occupancy vehicle lane on Interstate 5, in north Seattle, carries, today, more than triple the number of passengers per hour, 6,000, as the nation’s most successful light rail line – and it is far from its optimal capacity, permitting as it does two-person carpools.²²

There are a myriad of environmentally superior options, including walking, bicycling, carpooling, vanpooling, congestion pricing, telecommuting, flexible working hours, parking reform, pricing strategies to improve bus utilization, etc. – that are beggared and largely ignored while the money and attention is directed to rail. As for good urban design, it’s jeopardized rather than aided by squandering money on high-capacity urban rail projects.

The Opportunity Costs

US communities need better alternatives to automobiles and freeways. In response, central Puget Sound voters were persuaded to tax themselves \$250 million per year to finance the Regional Transit Authority’s capital costs, which over the next dozen years also will entail federal subsidies, state subsidies, long-

²¹ Ibid. To verify local per-passenger mile bus fuel consumption, on May 21st 1999 the author asked Bill Roach, Seattle METRO transportation official, if he could confirm that METRO’s buses deliver but 20 passenger miles per gallon (i.e., dramatically less than an average car). Roach’s answer, *Your memory is correct – but that was a long time ago. METRO’s per-passenger mile fuel consumption isn’t nearly that good today.*

²² Emory Bundy, *If the RTA Project is Defensible, It Could be Defended by Telling the Truth*, (October 30, 1996), pages 1-2.

term bonded indebtedness against future revenues, plus perpetual added operating and maintenance costs. This is on top of the prior level of bus subsidies in the central Puget Sound area of approximately \$350 million per year, a total local transit tax of \$600 million annually. Because the primary financing mechanism is the sales tax, the burden falls most heavily on poor and modest-income citizens. The bulk of the new money will go to rail, the balance to additional express bus service. Next to nothing goes for everything else.

To separate people from their money, they were led to believe, by commission and omission, that this initiative is an effective response to the growing problems of severe, region-wide congestion. Accordingly, it has enervated the promising initiatives that had been set in motion. Not only will it prove to be ineffective, the opportunity costs – what could have been done instead, even with far fewer resources – are enormous, and have a psychological as well as a tangible dimension. To start with the tangible, what are some of the alternative uses for transportation tax revenues, reasonably calculated to deliver superior results, and much sooner? Wisdom begins with measures to make better use of the region's existing, huge transportation infrastructure investment.

Walking and bicycling: While many do not regard walking and bicycling as serious travel modes, in fact they are. Combined, they exceed the number of transit trips in most communities – and could do far better if better supported. For example, a small employer in San Francisco, who had to contract for parking from his landlord, decided to charge employees \$3 each day they drove to work, pay them \$3 each day they didn't, and to provide shower and locker facilities. That's a "swing" of \$120 per month. In short order almost all employees bicycled or walked, often in trips that also involved public transit. They pocketed \$60 monthly while the employer saved money too.

Even in the face of a great deal of discouragement, thousands of Seattlites are regular bicycle commuters. As in other US urban areas, over 70 percent of transportation trips are five miles or less, within easy reach of an experienced cyclist. Yet there are few good bicycle corridors in the metropolitan area, consequently considerable risk, plus a dearth of shower and locker facilities. Bicyclists feel fortunate to get even an occasional painted line down the side of a street. Though cyclists engage in an efficient and healthful mode of transportation, causing no harm to the environment, exceedingly little danger to anyone else, and pay all their own equipment and operating costs, there are few employers, including public agencies, that do anything to facilitate bicycling. If modest support, safe routes, and incentives were offered, the number of cyclists would increase dramatically – just how dramatically is hard to know, because transportation agencies don't even study the question. There is quite a contrast in treatment accorded cyclists, and the multi-billion dollar (first phase!) capital

allocations for rail transport, which will be followed by hefty subsidies for every single trip. The opportunity costs are prodigious, and any self-respecting bicyclist – and every taxpayer – should be madder than hell.

Vanpools: Seattle has been a national pioneer in vanpooling. The economic and environmental benefits are dramatically more attractive than either buses or trains. Today there are 6,500 vanpool riders – barely scratching the surface of the total transportation mix, but not trivial. They pay their own way, including all operating and maintenance costs, though they receive administrative support and bridge financing. The King County METRO staff that facilitates vanpooling calculates it will take \$11 million to extend this service to the next increment of 5,000 people. To compare costs, consider the RTA's new commuter rail project – a \$700 million capital investment to attract 5,000 “new riders” (i.e. 2,500 round-trip commuters currently driving to work), which will take years to implement, and then every passenger will be heavily subsidized for every trip. Twice as many vanpoolers could be attracted for one-sixtieth ($1/60^{\text{th}}$) the capital investment, they could be recruited in a fraction of the time, they would pay all their own maintenance and operating costs, and use a transportation mode enormously more energy-efficient than buses or rail. Yet the region's transportation and political leadership – including transportation-oriented development advocates – promote the \$700 million commuter rail line, and fail to support \$11 million to expand vanpooling!

Carpools: The central Puget Sound area has millions of automobiles, traveling from every conceivable origin to every conceivable regional destination at all hours of the day and night. On average they have 80 percent unutilized capacity. If an imaginative entity had a reasonable sum of money, and the authority, it could do vastly more to address the region's transportation needs than rail development will, merely by harnessing a small fraction of this unutilized capacity. If car utilization was increased from 1.1 to 1.2 passengers per car, it would do more to relieve congestion than everything the RTA aspires to do with \$4 billion and 14 years. And that is an exceedingly modest goal.

Gary Graham, former world-class designer for the Boeing space program, is a successful entrepreneur, manufacturing high-tech exercise equipment, The Shuttle. He believes that the combination of modest resources, modern communications technology, contemporary identification technology for security purposes, plus the ability to make electronic financial transactions, comprise all the necessary tools to provide a significant quotient of people an incentive to carpool, the means to link them, and to assure their safety and security. He further believes that the urban community that develops this application of technology and good public policy will create a highly profitable enterprise.

Commuter Trip Reduction: Washington State started down a promising path with its Commuter Trip Reduction (CTR) Act, though it burdened employers with excessive regulations and paperwork, and made more use of regulatory threats than carrots. It also excused employers of less than 100 people, the bulk of the workforce. But the idea is a powerful one and, like the examples above, could far more quickly and cost-effectively accomplish more than the RTA will. In fact, as a state program with a \$3 million annual budget, CTR has reduced traffic to and from work by 18,000—almost exactly what Sound Transit hopes its trains will do by 2010 for \$2.5 billion.²³ But given all the hype by Sound Transit that its rail projects will solve congestion, attention to and support for CTR has waned.²⁴

The U-Pass program: The University of Washington swiftly cut automobile driving to campus by more than 20 percent with its thoughtful U-Pass program offering alternatives, and some price restructuring.²⁵ The cost is but \$8 million a year—but it's even a better deal than that, because the program has eliminated, or at least deferred, the University's need for expensive new parking structures. If every institution of higher education in the central Puget Sound area instituted a similar program, similarly effective, it would do much more to alleviate congestion than the RTA's multi-billion dollar rail projects will do by 2010.

And the U-Pass program could be far more effective still. Mainly it tries to divert drivers to transit, by negotiating better prices and service from METRO, and subsidizes bus passes on top of METRO's generous subsidy. It aids vanpools and carpools a little by lower cost and more advantageously placed parking. But considering that walking, bicycling, carpooling, and vanpooling are far more economically efficient, energy efficient, and environmentally benign than transit is, it is unimaginative that the U-Pass program devotes less than three percent of its budget to promote and facilitate all four of those modes, combined. The least is done—less than one percent of the total budget—to support walking and bicycling, which are the most economic and environmentally benign options of all, and the most healthful.

Fare reforms: The Seattle-area's METRO buses are 75% subsidized, so it seems reasonable to ask the beneficiaries to cough up the remaining 25%. But only 14%

²³ One instrument used to good effect is METRO's Flex Pass—a discounted bus pass compliments of the employer, delivering a 100% increase in bus patronage at the companies that have applied it. See the following section on fare reforms.

²⁴ Some employers, like Adobe and Simpson Tacoma Kraft, have implemented terrific, incentive-based programs and shown very dramatic auto reductions. See Peyton Whitely's articles in *The Seattle Times*, July 26, 1999.

²⁵ Annual reports of the program are available from the Transportation Office, Box 355212, University of Washington, Seattle, Washington 98195-6709

of its bus seats are utilized, on average, so there is a prodigious, underutilized capacity. If a strategy of additional fare incentives could lure more passengers at a small fraction of the cost of new rail service, is that not a superior option?²⁶

In January 1999 Gerrit Moore gave an intriguing but hardly surprising presentation on transit fares and productivity to the Transportation Research Board. He documented that cheaper fares attract more riders, and calculated that the maximum performance of a transit system may be achieved with average fares of 30 cents. He found that very productive transit systems serve upwards of 7,000 passengers per seat per year – while King County METRO averages only 1,600.²⁷

To illustrate the interaction between fares and patronage, in 1982 Los Angeles lowered its adult bus fares from 85 to 50 cents. In three years patronage increased 40%. Then, between 1985 and 1995, fares were raised to \$1.35, to help pay for trains, and LA lost 30% of its bus riders.²⁸ If King County METRO cut its fares by half (a larger cut than LA), and as a result increased patronage by only 25% (a much smaller increase), it would cost the system less than \$30 million per year. That cost would attract twice as many new riders than predicted for the trains by 2010, do it much more quickly, at a more modest operating subsidy than for trains, markedly improve fuel efficiency, and spare taxpayers the \$2.5 billion capital investment for rail.

Flexible working hours: The concept of flexible working hours was pioneered in West Germany, in lieu of massive, new investments in highways. It is far more elegant and serious an initiative than is appreciated in the US, conducive to more efficient use of transportation infrastructure, ease of carpooling, better care of children, and more productive and satisfied workers. In some European communities more than half the workforce benefits from flexible working hours. It deserves to be one of the important tools to increase the efficient use of all transportation infrastructure, including transit, and to alleviate congestion.

Congestion pricing: The customers of utilities and other capital-intensive infrastructure-dependent services, like telephones and electricity, benefit immensely from congestion pricing. That is, pricing that moderates peak

²⁶ This issue is particularly relevant with respect to METRO, which has an uncommonly high per-bus per-hour operating cost, relatively poor fuel performance, and a mediocre record for equipment productivity.

²⁷ Gerrit R. Moore, “Transit Ridership Efficiency as a Function of Fares,” *Transportation Research Board, 78th Annual Meeting* (January 10-14, 1999).

²⁸ These calculations are based on LA’s official ridership numbers, as reported annually to the US Department of Transportation.

demand, and redirects that demand to underutilized capacity. The marginal price – which often is prodigious – is the cost of adding an increment of service capacity to the peak. Highways are destined to be used very wastefully so long as they are free, with no tools (save gridlock) to shift demand toward available capacity. It poses, of course, a political challenge to convince drivers and taxpayers that their interests can be served by imposing a fee on a service that has been provided without cost. Modern technology can ease this challenge, because the transactions can be performed instantaneously and electronically, without delays and without toll plazas. There are imaginative examples and experiments underway at the present time. In Orange County, California, new lanes were added to a chronically crowded ten-mile freeway, State Route 91. Cars that travel in those lanes are charged a sliding scale, calibrated to keep traffic moving smoothly. Cars in the original lanes continue free as before. In that fashion better service is offered everyone – since the original lanes have been relieved of some of their congestion. Those who avail themselves of the improved service pay for it, and also subsidize carpool use in the new lanes.

Least-Cost Planning

The key to an intelligent, systematic, and comprehensive application of the many options to improve transportation and relieve congestion is least-cost planning (LCP), as adapted from the electrical energy field. In that arena it also encompassed full-cost accounting, which is to say, in addition to direct costs, it monetized and accounted for the so-called “externalized” costs, like the health consequences of carbon releases, or impaired fisheries. The first large-scale application was Seattle’s Energy 1990 study (circa 1977) which attacked the question of whether it was desirable for Seattle City Light to invest in the Washington Public Power and Supply System’s (WPPSS) nuclear projects 4 and 5. Consultant Dr. Don Shakow, from Mathematics Northwest, systematically “disaggregated” the many end-uses of electricity, and discerned that Seattle’s future energy needs could be met much more economically and with less environmental impact by an array of identified measures like insulating hot water heaters, instituting more efficient lighting and heating measures, providing incentives for energy-efficient industrial processes, etc. Although very controversial at the time, Shakow’s least-cost planning prevailed, and Seattle’s ratepayers and the region’s environment benefited immensely as a result.

Then least-cost planning was introduced into the federal government’s Power Planning and Conservation Act of 1980, which created the Northwest Power Planning Council to carry it out. In less than two years the council completed its first long-range plan, which undercut the utilities’ advocacy for scores of coal and nuclear plants. Those thermal-fired plants were replaced primarily by cost-effective measures to increase the efficient use of existing energy resources.

Today the Northwest has only one nuclear plant, rather than the roughly 40 the utilities deemed essential, and fewer coal-fired plants than there were in 1980 – even while population has burgeoned and the economy has boomed. The gap has been filled by residential conservation, more efficient buildings, better commercial lighting technology and design, improved industrial processes, some wind generation, plus a number of gas-turbine generators that are fairly cost-effective, not so environmentally damaging as coal, and relatively swift to site and install. Regional least-cost planning requires judgment, information is never complete, it is not free of bias or politics – though they are restrained by the open and transparent character of the process, and the outcome is neither automatic nor perfect.²⁹ But it is an amazing and beneficial accomplishment, built on the shoulders of Dr. Shakow’s success with Seattle’s Energy 1990.

Key architects of this success have carefully described how to apply these techniques to transportation.³⁰ Unfortunately, but predictably, this has been resisted by the conventional transportation planners – just as least-cost planning was resisted by the electric energy establishment. A particularly cogent example was the fabrication of a history of least-cost planning in the electrical sector, by a well-positioned transportation planning functionary, en route to constructing roadblocks to LCP.³¹ The official also asserted it was simplicity itself to apply LCP principles to electric energy, while transportation is inordinately more complex. The author of this paper responded with an accurate summary of the pioneering history of least-cost planning in the Northwest electric sector, verified by Ed Sheets, who headed the Northwest Power Planning Council and directed its implementation in the region, and added the following rejoinder:

I do not concede that least-cost analysis of the regional power system – encompassing hydro, gas, nuclear, cogeneration, renewables, conservation, transmission, distribution, thousands of industrial processes, myriad residential and commercial applications, vast seasonal variables, diurnal cycles, and salmon and other environmental costs – is less demanding a task than an analysis of metropolitan Seattle's transportation requirements.³²

²⁹ Least-cost planning is entirely consistent with community values – like the importance of providing mobility for the roughly 50% of the community that is too old, young, infirm, or poor to drive. That is one element of judgment required of the process, but openly and transparently so.

³⁰ Edward W. Sheets and Richard H. Watson, *Least Cost Transportation Planning: Lessons from the Northwest Power Planning Council* (1993); and Dick Nelson and Don Shakow, Institute for Transportation and the Environment, *Least Cost Planning: A Tool for Metropolitan Transportation Decision Makers* (January 1995).

³¹ King Cushman memo (February 15, 1995).

³² Emory Bundy to King Cushman memo (February 17th 1995).

Be that as it may, unless and until there is a constituency for cost-effective transportation measures, and a weaning from excessive emphasis on supply-side, capital-intensive measures such as freeway and rail projects (analogous to the electric energy utilities' determination to limit choices to coal and nuclear plants), American communities will not successfully confront congestion and improve mobility. One of the tragedies is that the environmental community, which championed least cost planning/full cost accounting for electrical energy, is so enamored by rail that it can't seem to apply critical thinking to it.

The conceptual breakthrough of LCP is novel, but simple: All options are legitimate and should be treated equitably, whether capacity-building or demand-reducing. If insulating hot water heaters is cost-effective relative to the alternatives, do it. And if it is far more efficient to subsidize carpoolers or cyclists than train riders, do that. There is not a simple, singular solution, like Rail!, or Nuclear! What is strived for is an amalgam of cost-effective measures. Some of them may be very small, but in the aggregate, the assortment offers to deliver the most economic and environmentally desirable result.³³

When cost-effective measures are applied to transportation, as they have been to electrical energy, the region will improve mobility and relieve congestion, rapidly, and at comparatively modest cost. The evidence is compelling that rail is far too extravagant an option to be a good candidate in a fair, objective process to select the most promising mix of transportation elements.³⁴ Until the

³³ The author wants to be clear that, in advocating for the application of economically and environmentally superior options, he is not hostile to rail or road development – if and when those options are objectively competitive. Given that people own cars, newly developed communities require the provision of adequate highway infrastructure. There is nothing inconsistent with that, and with arguing for a more efficient utilization of a vast, existing road/freeway infrastructure, or for the quest for better transportation technologies.

³⁴ Regrettably, Seattle's *Mayor's Recommended Transportation Strategic Plan* (August 1998), illustrates the resistance to environmentally superior and cost-effective measures. The plan outlines many good alternatives, then fallaciously asserts that it is easy to prioritize alternatives "within programs" [e.g. one bicycle program vs. another], but claims you can't prioritize "across programs" [e.g. investments in rail vs. vanpools] – which is exactly what must be done to improve the efficiency of transportation allocations. By this subterfuge, the planners lock in the status quo emphases on roads, rail, and buses, just like the electric utilities tried to lock in their preferences for coal and nuclear. Cf. Page 110, "Making Choices."

prejudice in favor of rail is redressed, money will continue to be squandered while transportation problems grow more and more overwhelming.³⁵

Technological Innovation

An eminent architect, professor, and TOD advocate recently declared that it is vitally important to start building rail systems now, because they're never going to get any cheaper. The belief that technological innovation and enhanced economic efficiency are futile goals in the field of transportation is part of the mindset of the transit-oriented development constituency. Yet the contemporary era is the most extraordinarily innovative era the world has ever known. The implications of the microprocessor, it has been said, are akin to the agricultural or the industrial revolutions – save the transformation is even more profound and much faster-paced.³⁶ Rail, particularly within urban environments, is a rather dumb, heavy, intrusive, and very expensive 19th century technology. To promote public policies and expenditures on the premise that we can't do any better is contemporary Ludditism.

The development of light-weight, inexpensive, reliable microprocessors; the creation of strong, carbon-based, light-weight, recyclable materials; innovations in electric engines; and the development of the hydrogen fuel cell are among the inventions that make possible lighter, safer, higher-performing, more energy efficient, cost effective, secure, and consumer-friendly transportation modes.

While environmentalists rightly decry the immense environmental impacts of the automobile – air and water pollution, fossil fuel consumption and thereby contributions to global warming, costs of oil plus the defense implications of importing oil supplies, etc. – they gloss over the environmental impacts of buses and trains. They also are slow to appreciate that most of the adverse impacts of autos may be overcome in the near-future by the features Amory Lovins attributes to his beloved “Hyper-car” prototype: A high-performing, very energy-efficient, reasonably-priced, light-weight, hybrid-powered family of vehicles, made of strong and recyclable composite materials, complete with hydrogen fuel cells, with emissions consisting only of water. The component technologies are almost all developed, and the primary challenge is systems

³⁵ As stated earlier, if a rail project is legitimately competitive – as appears to be the case with Chicago's METRA – of course it should be treated as fairly as any other option.

³⁶ Christopher Evans, in *The Micro Millennium*, suggests that the Industrial Revolution saw the muscle power of humans and other animals extended by the power of machines. The microprocessor is extending the power of the brain.

design, fabrication, and marketing.³⁷ Even the more novel components – like hybrid technology and hydrogen fuel cells – are entering the marketplace, in Japan (Toyota’s hybrid car) and Germany (Mercedes’ development of the hydrogen fuel cell), as well as the US.

However, as Lovins himself readily concedes, these marvelous technologies will do nothing to solve congestion, or the increase in impermeable surfaces, and likely will make the situation even worse. Clearly, what also is needed is transit technologies sufficiently appealing to consumers to compete with the automobile in the urban setting – where congestion offers a powerful competitive opportunity. They need to be, in contrast to contemporary trains and buses, environmentally benign, and so cost-effective to install and operate that an extensive network sufficient to offer convenient service to multifarious destinations can be created. Instead of buying old, too-expensive, and poor performing technologies – like our public transit agencies do, supported by the TOD folks – a great service could be provided by cogently defining the performance criteria transit technologies must meet to be judged acceptable. Such an exercise would swiftly advance technological innovation.³⁸

When a major airline signals it needs planes with greater range, better fuel efficiency, less noise, or lower cost per passenger mile in order to stay profitable, it prompts a company like Boeing to assign its finest engineers to the challenge. Only by meeting the needs of the marketplace can a Boeing remain competitive. But in the monopoly public transit sector, agencies buy systems that do not meet minimally acceptable standards of performance – and fail to define and demand performance criteria that would drive needed innovation. As a consequence, transit product options remain relatively static, while the spatial characteristics of America’s urban communities and trip destinations have experienced a dynamic evolution. Transit technologies suited to the past ill-serve the present or future. Personal rapid transit systems have the requisite attributes to meet contemporary transit needs, and compete with cars in urban areas. Here is how one such technology, Pathfinder PRT, would work:³⁹

³⁷ Cf. Paul Hawken, Amory and Hunter Lovins, *Natural Capitalism* (1999).

³⁸ Professor Jerry Schneider, a civil engineer from the University of Washington, maintains a Website, <http://weber.u.washington.edu/~jbs>, that documents the progress of transportation technologies. With transportation planner Bill Eager of TDA, Inc., and John Basic, a project manager of Boeing’s pioneering PRT development in Morgantown, West Virginia, in the 1970s, Schneider has crafted a precise description of achievable performance criteria transit agencies need.

³⁹ The author hereby discloses that he is a participant in Pathfinder PRT, Inc., and is using it here as an example because of his familiarity with the technology. There are other excellent examples, many posted on Schneider’s Website.

For purposes of illustration, take a bus system in an urban community. The traveler does not need to wait for the bus, the PRT vehicle is waiting at the stop for the passenger. The vehicle travels overhead, not on the surface, entirely liberated from congestion. Each vehicle goes directly to the selected destination, without intervening stops, so the trip is must faster than it would be even by car. It's small – serves but a handful of passengers – and the passengers ride securely, either alone or with people traveling together. Each vehicle is self-directed by redundant computers, so it does not need a driver, achieving great operating savings. By proceeding at an even, constant speed, without stops, the vehicle consumes but one-tenth to one-twentieth as much energy, per passenger, as buses or trains. By traveling on urethane wheels, driven by a battery-powered electric engine, or hydrogen fuel cells, the vehicle makes virtually no noise. Since the vehicles are made of light-weight materials, the overhead beam from which they're suspended is scarcely more than a foot square in bulk. The pillars supporting the beams are scarcely more prominent than light standards – and the beams enclose all overhead wires, so replace telephone and lighting poles and obviate the need to lay cable. And when snow and ice impede the movement of cars and buses, the vehicles travel unimpeded – because their wheels and motors are located inside the guideway, protected from the elements.

By aggregating these features – immediately available service, direct origin to destination, much faster, more secure, far cheaper to build, far cheaper to operate, no driver required, vastly more energy efficient – the system would be so cost-effective that modest passenger fares could cover all or virtually all the capital and operating costs. And it would offer convenient service and customer appeal sufficient to attract a substantial and expanding ridership and marketshare. Additions to the network would be akin to expanding a tinker-toy structure, and the low per-mile capital cost makes expansion feasible as demand for service grows. The capacity of each line would be very substantial, and as the network proliferates the capacity would be so magnified that it would vastly exceed that of contemporary "high-capacity transit."

That is the kind of option that is available, today. Every bit of the requisite technology is proven and operating, the only tasks that remain are engineering and marketing. But, to attract the necessary private venture capital to engineer, refine, and market such technologies, customers – most notably transit system operators – have to signal that they are a market. They should offer transit contracts conditioned on cost and performance criteria that will enable transit systems to radically lower per-passenger costs and dramatically expand marketshare. That is what cities desperately need, rather than the opposite. Such reasonable criteria will preclude technologies like today's buses and trains. With such a market signal, qualified by performance standards, PRT or

comparable technologies will readily gain access to needed venture capital, quickly emerge, evolve, and proliferate.

This will not supplant cars, which can do many things PRT cannot, including park in one's own garage and convey an individual or a family anywhere the vast road network reaches. But PRT would offer service vastly superior to buses or trains, more economic, energy-efficient, secure, convenient, quiet, and fast, and in doing so extend the reach and appeal of transit. In many in-city applications it would be more convenient than cars, and also enable city dwellers to reach the sprawling suburban job market in a fashion difficult for buses and impossible for trains. Further, working in tandem with long-haul passenger rail service in corridors like San Francisco/LA or Portland/Seattle, PRT's ability to efficiently collect and distribute passengers would significantly strengthen the competitive opportunities for inter-city rail.

It is tragic that TOD Luddites have hitched themselves to outdated rail systems, and support the backward-looking proclivities of monopoly public transit agencies, instead of encouraging the development of innovative, environmentally and economically benign transit technologies. Instead of supporting a transition to greater efficiencies and superior service – as environmentalists did in the electrical energy sector – they are wedded to the functional equivalents of nuclear and coal-fired power stations.

Opportunity Costs: Psychological

Earlier it was asserted that the emphasis on capital-intensive projects, highways and rail particularly, leads to huge, forfeited opportunity costs, as superior options are neglected. A sampling of superior alternatives was presented, such as bicycles, carpooling, congestion pricing, and new transit technologies. Reference also was made to the psychological opportunity costs.

Consider the civic leadership in the central Puget Sound area, including leading political figures and institutions, the Chamber of Commerce, Boeing, and various good government and environmental associations. They have led the public to believe, in spite of compelling evidence to the contrary, that its salvation from congestion lies in a multi-billion dollar investment in a “starter-rail” project, to be followed by a sequence of additional multi-billion dollar rail projects. Since these projects cannot possibly catch up with the growing population, the approach also is supposed to “drive” the wholesale adoption of compact, pedestrian-friendly, environmentally-correct, rail transit-oriented communities, similar to those of the pre-automotive era. The unreality of these pretensions is self-evident, and the experiences of every American city that has preceded Seattle along this course demonstrates that the outcome isn't going to be pretty:

higher taxes, burgeoning debt, loss of transit marketshare, intensifying congestion.

One day it's going to be necessary to get serious about the problem, offer real choices, and begin to apply resources to good effect. And – here's the psychological opportunity cost – who's going to lead the way? How can the county executives, city and county council members, the editorial pages of the *Seattle Times* and the *Post-Intelligencer*, the staff of the Puget Sound Regional Council, or, most of all, the executive director of the Regional Transit Authority/Sound Transit say, *We've got a terrible problem! We've got to get serious! The day has come when we've got to quit wasting money and start generating some additional resources and spend them to good effect!* They can't; they're too compromised.

Further, as WPPSS already demonstrated, when the faucets of funds are set flowing, it is exceedingly difficult to turn them off, because any effort to do so will be mightily resisted by those to whom the money is flowing. The region's political and utility leadership, compromised as it was, never found itself able to take corrective action to arrest WPPSS, even when the estimated cost for the five nuclear projects had ballooned from \$5 to \$26 billion. WPPSS stopped only when Wall Street finally quit sending money, the System went bankrupt, and it was all over – save for a massive debt, under which the region is still laboring.

So the advice of this author to those who believe rail lines are a precondition for good urban planning, I'd urge some careful review. And also, call attention to a recent development in Orange County, California. There, on May 27, 1999, a grand jury took the Transit Authority to task for using its position to hype light rail, rather than honestly acquaint citizens with the facts, with the experiences of other communities, and with the expertise of disinterested authorities. Finding One was,

The OCTA [Orange County Transit Authority] Directors be made aware of the national experience in light rail over the past 18 years and light rail's documented inability to solve urban transit problems such as traffic congestion and pollution. Along those lines, we further suggest that disinterested experts from academia be invited to provide the historical perspective to the Directors. Inputs should come from a variety of sources, especially experts in economics, transit, and light rail, who do not have a vested interest in the promotion of light rail for the County.⁴⁰

⁴⁰ The full text of the report is available from the Orange County Grand Jury. It also can be found on Wendell Cox's Website, *The Public Purpose*, <http://www.publicpurpose.com/ut-orcorail.htm>

OCTA's behavior simply mirrors that of Puget Sound's RTA and LA's MTA. If observed, the sensible, public-spirited advice of the grand jury could change everything, and help replace the hype of urban transportation planning with some integrity and professional standards .

As a participant in a Puget Sound RTA committee during the pre-balloting process, I complained about the disingenuous conduct of the staff leadership. Executive director Bob White retorted, "Is it bad public policy to give the public a service for which they have voted and are willing to tax themselves?" To which I replied, "If those in positions of public responsibility and access to professional expertise and data fail to forthrightly acquaint voters with the best available information – worse, if they pander to wishful thinking, and mislead people – it is very bad public policy indeed, and a violation of public trust."⁴¹ That is precisely what the RTA has done, and many of its counterparts. If the good citizens of Orange County's grand jury succeed in setting a more appropriate standard for OCTA, it will offer a most salutary precedent.

Personal Conclusion

The huge map of the officially-adopted Seattle Transportation Plan, 1965, featured 13 (or was it 16?) freeways scheduled to criss-cross the city, five freeway bridges across Lake Washington, a cross-sound bridge to Vashon Island and the Olympic Peninsula, "upgrading" of the Alaskan Way Viaduct to six lanes in each direction, and lots of rail. The implications were stunning: The land required would necessitate the relocation of about 50,000 people and many businesses. Neighborhoods would be divided. Almost every resident would live within close earshot of from one to four freeways.

No responsible party volunteered an estimate of the capital cost, but something in the order of \$6 - \$12 billion, 1965-era currency, seems an approximate range. It was supported by the same parties that promote today's RTA rail projects: local transportation planners, regional government officials, Washington Department of Transportation, city council, and many business and civic leaders. Fortunately, "good government," neighborhood, and fledgling environmental organizations were skeptical, paid attention to what was going on elsewhere, organized, and in time protected most neighborhoods and the taxpaying public by dismantling the Plan.

⁴¹ Bob White to Dick Ford memo (May 17th 1996), and Emory Bundy to Dick Ford memo (June 10th 1996). Also, Emory Bundy, *If the RTA Project is Defensible, It Could be Defended by Telling the Truth* (October 30th 1996).

Trying to fathom what the transportation planners were thinking of, I carefully interviewed them at the time, as an employee of KING-TV. It was like discussing economics with a Marxist, in that you entered a closed-system of reasoning that, within its own terms of reference, made perfect sense – even as it seemed there must be a fatal flaw. The 1965 Plan was simply, and authoritatively, WHAT HAD TO BE DONE if Seattle was to avert total gridlock. Origin & Destination studies proved it. End of discussion.

Finally I thought to pose this question: *Government policy provides 90% federal subsidy for freeway construction, and nothing for anything else. If you ended that subsidy, would that change things?* The senior regional government planner with whom I was speaking apparently had never imagined such a thing, and he reflected pensively for a long time, before conceding, “Well yes, that WOULD make a difference!”

With Congress’ help we are revisiting 1965. In some cities yesterday’s urban freeways are today’s rail projects. The Portland City Council wants to make another try at a north extension of Portland MAX. The estimated cost, \$350 million for 5.6 miles of rail – \$62.5 million per mile – is crazy. The benefits can’t possibly approach the cost: even in Chicago they couldn’t justify a \$60 million per mile light rail system to serve so dense an area as The Loop. But Portland is counting on a 70% federal subsidy, \$240 million. So, with that premise, it’s less than \$20 million per mile for local folks, they hope to get lots of free money sloshing around in their economy compliments of the American taxpayer, and if they don’t worry now about increased operating and maintenance costs later, and if they don’t imagine that they’ll be expected to reciprocate and help underwrite similarly dubious projects in other jurisdictions – well, yes, in those conditions, there’s a certain logic to do what the Portland City Council, in its wisdom, supported by the “transit-oriented development” group, wants to do.

It’s predictable that public bureaucrats, the construction industry and unions, certain professional service providers, and even business associations would promote such projects, each reaching for a chance to cash in on some piece of the action. It’s also predictable such a powerful constituency would gain the support of pliable local politicians. But what’s different about urban rail projects like Portland’s MAX, Los Angeles’ lines, and Seattle’s Capitol Hill tunnel, is this: Unlike the 1965 Seattle Transportation Plan, the projects enjoy the support of many nonprofit civic associations, with no expectation of pecuniary gain. Why?

Searching for an analogy, one is reminded of David Brower, a leading environmental figure of the 20th century, who favored nuclear power. He wanted an alternative to dams that were blocking wild rivers and inundating fabulous landscapes like Glen Canyon. He was told, and believed, that nuclear

power was safe, non-polluting, and very cheap. His suppositions were akin to those of today's urban rail supporters: Brower thought Nuclear! offered salvation from dams; his counterparts hope Rail! will bring salvation from cars.

The difference is, David Brower learned. As events unfolded, he changed his mind. There is a well-worn statement that, to keep doing the same thing, expecting a different result, is the definition of insane. The people who paid attention to the development and evolution of nuclear power got an education. They noticed that nuclear projects in New England, the Midwest, and the Tennessee Valley were consistently behind schedule, over budget, had serious operating problems, and tended not to perform nearly as well as predicted. Further, it became clear there were better alternatives. In contrast, the people at WPPSS and their allies didn't let accumulated experience dent their enthusiasm for local nuclear projects.

In Boston, continued investment in rail is accompanied by burgeoning cost and plummeting transit marketshare, and a growing political clamor to build more highways. In Los Angeles, an ambitious rail strategy has brought enormous debt, higher operating costs, a radical drop in transit patronage, and strengthened demands for new freeway construction. Seattle is headed down that same path – a path brightly illuminated by the actual numbers of RTA/Sound Transit (even if, implausibly, it's projects are built within budget and perform as well as predicted): Prodigious capital costs, large additional operating and maintenance burdens, higher taxes, ballooning debt, meager new ridership, falling transit marketshare, intensified traffic congestion, and calls for more urban freeways and bridges.

In time, as taxes rise, debts accumulate, projects don't perform well, and congestion continues to deteriorate, rail projects will tend to discredit themselves – though bailouts from state and federal sources retard the learning curve. The question is, how long will it take, and how deep will the hole be, before damage control starts and events are set on a promising course? That necessitates a citizen constituency – the best candidates, as always, being nonprofit civic associations, like good government and environmental groups – to create the political climate for constructive change.

Rail construction, just like the proliferation of urban freeways, does not offer a solution to America's urban transportation crisis. The solution begins with policies and investments that extract more value from the existing transportation infrastructure (just like using electrical energy more efficiently), offer choices, and facilitate the development of superior transportation technologies.

The appeal of this presentation is for choices in transportation – rather than sinking enormous sums in freeways, and sinking almost all the non-highway money into rail projects, or rail and bus. Why can't demand-management strategies get some reasonable support, if they can do more for less? Why should pedestrians and cyclists and carpoolers and vanpoolers get at best a few crumbs, while Sound Transit splurges for rail? Why shouldn't public transit agencies be expected to set reasonable performance criteria, as a precondition of investing scarce public resources – especially, when doing so would call forth better-performing transit technologies?

And the appeal of this presentation is for a planning regimen that treats costs and environmental impacts seriously, levels the playing field, and strives for that mix of transportation investments that will accomplish the greatest benefit for travelers, taxpayers, and the community. A quarter-century ago the projected cost of nuclear power plants set the “marginal price” of electricity – against which compelling evidence was forthcoming that greater efficiencies could be achieved at one-sixth to one-half the cost, in less time. Today, in metropolitan Seattle, Sound Transit has established that the marginal cost of each “new [round trip] rider” is \$135,000 capital investment, plus hefty, perpetual operating subsidies – so extravagant a target that a plethora of superior options are readily available at a small fraction of the cost, within a much shorter time.

The Seattle area has a terrible congestion problem, growing worse at a rapid rate due to a growing population compounded by accelerating automobile use. The transportation establishment has failed to respond in a competent, cost-effective manner – worse, it has deflected attention away from superior options and given citizens irrational hope that at some distant day rail systems will save them. This reflects a terrible failure of leadership by the region's public institutions, and by their political and business boosters and beneficiaries.

But as remarkable and disappointing as that is, it is topped by the spectacle of nonprofit civic associations, with no discernible self-interest, supporting and promoting this travesty, while failing to advance superior transportation options. The reason for this failure has something to do with their professed belief in “transit-oriented development.” We need good land use – but we are not going to revert to 19th century land use patterns, because we are not confined by the limits of 19th century technology. People love cars, for understandable reasons, and cars must be accommodated – though, with innovations like those revealed by Amory Lovins, they can be effectively domesticated and relieved of most of their wasteful by-products. We need alternatives to cars, which today include the array of choices presented earlier, including new transit innovations. In stark contrast to rail, they must be cost-effective and environmentally benign.

But to get there from here, we need to generate the civic leadership that is so sorely lacking. As Professor Gomez-Ibanez points out,

This pattern of avoiding hard choices is being repeated in the debate over public transportation ridership, service, and finance in most major United States metropolitan areas....In the end, however, problems that keep growing cannot be ignored, and delays may add to the cost and difficulty of the eventual solution.⁴²

⁴² Jose Gomez-Ibanez, "Big-City Transit Ridership, Deficits, and Politics: Avoiding Reality in Boston," *American Planning Association Journal* (Winter 1996).