



Working Paper

Cascadia High-Speed Rail Opportunity

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In 1830, it took two days to travel the 120 miles between New York City and Philadelphia. The two growing metropolises were worlds apart, in distance and in culture. Today, with high-speed Acela service between the cities in little over an hour and multiple transit and transportation options, the economies of the two cities have become closely linked, still independent of one another for life style, brand and urban identity, yet integrally intertwined for jobs and business, education, and cultural enjoyment. Over 20 million trips are made each year between the two metropolitan areas, many by train, resulting in a vibrant economic union that benefits both cities and the entire region.

Imagine if Vancouver and Seattle, two cities with a projected combined 2040 regional



Seattle, Washington

population of nearly nine million people, were to experience a similar economic integration, able to maintain the cultural and life style characteristics that make each city so unique, but leverage the synergies of

two strong economies such that one plus one equaled far more than two. Many factors play a role in the economic integration of nearby cities and communities, but none more so than transportation. Full economic integration can only happen when getting between two cities becomes seamless and so fast as to amount to little more than an afterthought.

Could such a transportation system be built? Would it help to support and sustain economic integration? The answer is yes, as has been successfully demonstrated over the past several decades through construction and operation of new high-speed, high-



Vancouver, British Columbia

frequency transportation systems in Europe and Asia. Safe, reliable rail service between Vancouver and Seattle in less than one hour can play a critical role in making Cascadia a

reality. While other transportation modes – even autonomous cars – will be necessary to support the regional economy, they cannot offer the fast, frequent and convenient transportation so vital to full economic integration.

Imagine the Possibilities

- Jennifer has a 12:15 p.m. luncheon meeting at the Blue Water Cafe in downtown Vancouver. She leaves her 2nd Avenue Seattle office at 10:45 a.m., catches the 11:00 a.m. high-speed train, arriving in the new downtown Vancouver HSR station just before noon, and is at the restaurant by 12:10.
- Frank has a new programming job with a high-tech firm with offices in Seattle and Everett. While he would like to live in Seattle, his significant student debt and starting salary limit affordable housing options in downtown Seattle. Instead, Frank shares a two-bedroom apartment in Everett for a fraction of the rent he would pay to live in the urban center. He commutes between his firm's two offices on a high-speed train in less than 20 minutes, and will also be able to use Sound Transit train service when the system completes planned expansion. With trains leaving several times each hour, he can get to work faster and easier than many other workers actually living in Seattle.
- Vancouver's own "Cookie Duster" is playing a concert at VC Place in Vancouver at 7:30 pm. Doug, a Seattle musician, hops the 6:00 pm train in Seattle, arriving in Vancouver before 7:00 pm, rocks on for several hours, and then returns on the 11:00 pm train. He is in bed shortly after midnight.

Building Cascadia

Cascadia represents the transformation of the Pacific Northwest into an integrated economic corridor, where growth occurs through the melding of the economies of the region rather than by each urban enclave striving to outdo the others. It leverages the unique economic strengths, amenities, and character of Seattle and Vancouver, and the cities in between, to support jobs and businesses, and to inspire new technologies and innovation without creating a continuous urbanized area or compromising the quality of life each community has defined for itself.

There have been several recent studies offering different visions for Cascadia, and how high-speed rail can help to fuse the Pacific Northwest into an integrated economic powerhouse.ⁱ

Common to these analyses is the recognition that fast, frequent transportation between Cascadia's hubs is essential, particularly for a regional economy increasingly focused on professional services, technological innovation, and information sharing. The ability to travel between Seattle and Vancouver in less than one hour will serve as a catalyst for and help to drive economic integration.



Amtrak Acela - High-Speed Rail in the US

Importantly, however, as exciting as a new regional high-speed rail system may appear, it is essential that high-speed rail not be seen simply as an end in itself. This is a reason for the failure of HSR to advance in many US corridors: HSR is not a strategy; it is a tactic for



High-Speed Rail in Zuoying, Taiwan

achieving some other objective. Here, the case for economic integration must be persuasive, achievable and supported by strong regional consensus. With that in place, high-speed rail system becomes a key tool in driving that integration.

Less than one-hour service cannot be achieved on the current passenger rail route, owned by the BNSF Railroad. The route is slow and filled with freight trains; current Amtrak service between the two cities takes four hours. Downtown-to-downtown service in less than one hour requires construction of a new high-speed, high-capacity, high-performance rail system that can whisk business travelers, visitors, families and day-trippers between Seattle and Vancouver BC several times each hour. The new system – whether based on conventional high-speed rail, magnetic levitation, or other developing technology – would connect into the extensive and growing local transit networks in Seattle and Vancouver, and eventually extend south to Portland, Eugene, and even California, which is building its own high-speed rail network. Growth and sustainable development can be strategically managed through the siting of high-speed rail stations and expanded public transportation/transit options. Stations areas can be used to concentrate innovation hubs, corporate headquarters, and resident/retail and cultural/community centers, helping to preserve areas where development and resulting sprawl are not desired.

With high-speed rail, residents and employees can:

- Live where they want, yet still access jobs quickly and fully enjoy the renowned cultural and recreational opportunities available only in the Pacific Northwest.
- Reliably and safely travel between information and service hubs in a stress-free, productive environment. This is essential for a region that specializes in innovation and the harnessing of ideas and service industries – intellectual capital for our Knowledge Economy – and simply does not exist today in the region.
- Travel using a sustainable, environmentally positive transportation system. Economic integration will mean significant growth in regional travel. High-speed rail supports the region’s environmental and sustainability objectives.

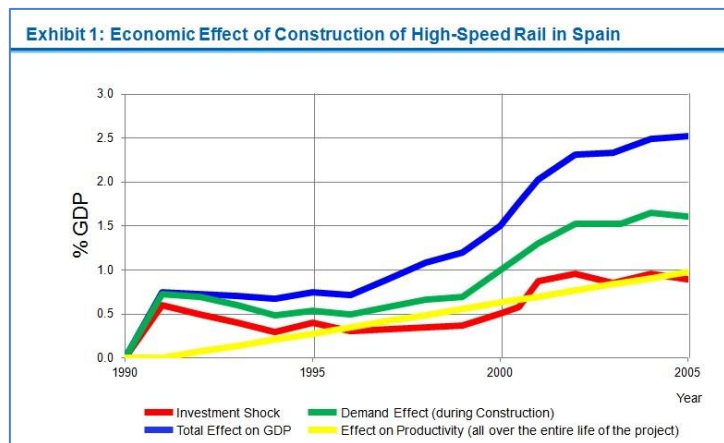
Impossible dream? Not really. While there are few examples of high-speed rail designed specifically to catalyze the economic integration of two large neighboring cities, there are many examples of the beneficial impacts of high-speed rail for cities and regions along a route. High-speed rail has been operating in Japan for over 50 years and across Europe and

Asia for decades. It has resulted in accelerated growth in cities connected to the high-speed rail system and a concentration of business activities near the train station. It also has proven to be an important tool for expanding access to qualified employees and broadening job opportunities, both critical for competing in technology and other services-focused economies.

A study by the Spanish government underscored the positive impact resulting from the construction and operation of the high-speed rail network. The construction impact alone on the Spanish GDP totaled some 2.5%.ⁱⁱ

In a 2010 study, Gabriel Ahlfeldt and

Arne Feddersen found that counties adjacent to two intermediate high-speed rail stations in Germany (Limburg and Montabaur) experienced a 2.7% level shift in GDP, compared to the rest of the study area.ⁱⁱⁱ



A recent report assessing options for high-speed connections in the United Kingdom noted the following:

With the development of HSR infrastructure, metropolitan city regions are now forming larger networks [such as the formation of the Randstad/ Ruhrgebiet mega-city region, and the Belgian mega-city region around Brussels with Lille as its southern flank. The networked city crosses traditional political boundaries and calls into question accepted models of urbanity. It creates a new model which is both central and dispersed where each location defines its appropriate strengths, linked within a networked conurbation. The Randstad, a conurbation of over seven million, has points of intense concentration, alongside more dispersed settlements forming a low-density city in a high-density landscape.^{iv}

In Lille and Tours, France, each about an hour or less from Paris on the TGV high-speed train, the number of daily trips to and from Paris has increased dramatically. Where business

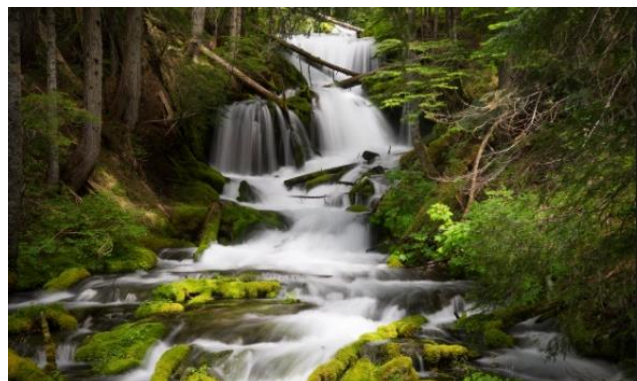


High-Speed Rail through Tours, France

travelers might travel on a weekly basis between the cities prior to the start-up of TGV service, today they commute daily. The downtown areas near the train stations have become more concentrated, as businesses and employees incorporate frequent travel into their daily lives, reducing development pressures on areas further away from the station. The local economies of these cities

also have become more professional- and technology-services focused, leveraging easy access to work, markets, and collaboration centers. Zaragoza, Spain, about 160 miles from Madrid, has become a center for professional and high-technology services sectors since the inauguration of one-hour AVE high-speed service between Zaragoza and Madrid.

With economic integration – and the significant associated increase in economic, cultural, and business collaboration across the region – Cascadia can fit this mold for economic success catalyzed by seamless and fast transportation options. Population and employment are growing at high rates in both cities. Metro Vancouver expects the



Forests of the Pacific Northwest

metropolitan area population to grow some 50 percent – from 2.2 to 3.4 million residents -- with total employment projected to grow from 1.15 to 1.75 million jobs in the region by the year 2040. The Puget Sound Regional Council expects the region's population to grow to over 5 million residents by the year 2040, some 30 percent more than in 2000. Total employment is also expected to increase from about 1.8 million to 3 million by 2040. Both cities have strong and diverse economies and are well-positioned to lead in the innovation economy of the 21st century. Importantly, these cities have become magnets for millennial

professionals who are attracted to the diversity and excitement of urban living, yet adamant about protecting the natural beauty and recreational opportunities found only in the Pacific Northwest. In addition, both cities face spiraling housing costs, requiring transit options for workers living in less expensive areas outside the urban core. A regional high-speed rail system, linked to a wide web of transit connections, is tailor-made to support this type of regional economic integration.

Travel in Less Than One Hour

High-speed rail can take several forms. Chinese, French, and Japanese high-speed trains operate at speeds up to 250 mph. Japan is building a new rail line using magnetic levitation technology with speeds in excess of 350 mph. Other futuristic technologies could offer even faster travel. Because technology is likely to continue to develop as planning for Cascadia advances, selection of a preferred technology should be postponed until later in the planning process. However, regardless of the technology used, the most important characteristic of the new system will be travel time. The economic integration of Seattle and Vancouver requires the ability to travel from one to the other in as little time as a cross-town taxi ride.

What would a Seattle-Vancouver high-speed rail system look like? Key attributes would include the following:

- **Trip Time:** Express downtown-to-downtown service would take less than one hour, which is achievable today for trains operating in excess of 200 mph. The train would also likely serve Everett and Bellingham.



High-Speed Trains in Paris-Gare de Lyon

- **High-Frequency Service:** Economic integration means travelers moving between the two metropolitan areas frequently and at all times of the day – almost like a

subway. A two-track high-speed guideway can reliably support 6-8 trains per hour in each direction. This would mean a train connecting Seattle and Vancouver every 10-15 minutes, with some operating as non-stop express and others stopping at Everett and Bellingham. As noted, with the success of the system, service could be extended to Portland and Eugene and even link up with the future high-speed rail service across California.

- **Productive and Fun:** Trains would be equipped with the latest technologies to make the trip comfortable and productive. This includes connectivity to the internet, table-top desks, and seating that can be used as conference space. Trains also would accommodate bicycles, skis, and other sporting and recreational equipment. A food service would provide the finest in Northwest foods, craft beer, and wines.
- **A New Electrified Right-of-Way:** The system would be powered by electricity and operate on a new passenger railroad right-of-way with long stretches of straight track, enabling the train to operate at high speed for most of the trip. Significant sections of the system likely would be in tunnel or on bridge structures to maintain grade through the challenging geography and to minimize impacts to the natural and built environments, including for access to downtown Seattle and Vancouver. The two-track right-of-way would be 50-100 feet wide, with additional tracks and platforms at the Seattle, Vancouver, and intermediate stations.
- **Seamless Connections:** The high-speed system would link to local transit at stations, providing travelers with convenient door-to-door travel options. Both Seattle and Vancouver already are served by expanding public transportation systems. These could be further expanded to meet the market needs of an economically integrated region connected by rail.

- **Fast, Automated Border Crossing:** One of the largest impediments today to economic integration is the time and inconvenience of completing US/Canadian border customs and integration inspections. Linking the regional economy will require a different way to manage border crossings – from automated, card swipe technologies for frequent travelers, to on-line and pre-trip clearance.
- **Cost:** High-speed rail will provide significant economic, transportation, and environmental benefits. These can be quantified in subsequent studies based on data from high-speed rail systems already in operation. Building a new high-speed system requiring extensive tunneling, however, will be expensive, even for the



Delayed Construction of California's High-Speed Rail

relatively short 140 miles spanning Seattle and Vancouver. For planning purposes, it is better to err on the conservative given the many unknowns about route, time-frame, and technology. Based on data from the California high-speed rail system

(currently under construction), Texas Central high-speed rail program (currently in planning), and Northeast Corridor experience, project costs per mile can range from \$125 million to nearly \$1 billion depending on the terrain and required structures. Detailed planning and engineering will be required to develop a defensible project cost. For conceptual planning purposes here, it is fair to project a cost of \$20-\$30 billion to build and equip the system. This compares with \$65 billion for high-speed rail between Los Angeles and San Francisco and \$15 billion for the Houston-Dallas high-speed rail project. Additional funding also would be required to support continued growth of local transit systems. Benefit-cost analysis will be important to quantify the net regional benefits from an investment of this size. Funding the cost for a Seattle-Vancouver high-speed rail system is certainly not unprecedented, but it will require a broad and creative mix of financial funding sources and tools,

including public-private partnerships; loan guarantees; Federal, state and local grants; and franchising arrangements.

- **Impacts:** US and Canadian, as well as state and provincial, environmental laws require extensive analysis to quantify the transportation, economic, and air quality benefits with the effects on the natural environment – wildlife, wetlands, endangered species – and built environment – environmental justice, required property takings, noise – resulting from both construction and operation of the system.

This is not a program that can be built overnight. It will take comprehensive analysis and extensive planning. But with a regional commitment to making the project happen, and the full engagement of public and private leaders to expedite and streamline the approval processes, a new high-speed system could reasonably be planned and built within 15 years.

Key Factors for Success

We have learned much from 50 years of global high-speed rail and today have a better understanding of how to harness high-speed transportation as a tool to drive economic growth and sustainable development. We also have learned what it takes to plan and support implementation of a complex and costly new high-speed transportation system. These lessons are directly applicable to Cascadia.

What are the key factors that determine success? Three stand out.

1. Regional Consensus on Need for High-Speed Rail

Probably the most important criterion for achieving Cascadia is consensus, built through extensive and proactive public engagement, on a vision of regional economic integration and the transportation system necessary to facilitate and sustain it. This includes agreement on the rationale for regional economic integration, its objectives and benefits, and an understanding of the significant changes the integral linking of economies might

bring. It also requires a full understanding and acceptance of the costs and time-frame to construct high-speed rail.

As noted, it is essential that high-speed rail not be seen simply as an end in itself, but rather a key tool for driving and facilitating economic integration. Proponents often become so engrossed in the excitement of 200+ mph trains rivaling those of the Europeans and Asians that they forget the very premise of transportation in the first place. People don't travel from one place to another just to get there; they travel for a purpose – for business, to buy things, to negotiate deals, to see family and friends.

Moreover, the only point in investing in a new mode of transportation is because it is a better approach for achieving the underlying objectives than building or enhancing other modes. Here, there is a compelling case that safe, convenient, frequent, and reliable one-hour train service between Seattle and Vancouver can support the economic integration of the region's economies more effectively, and with less pollution, congestion, and adverse land-use impacts, than expanding highways and automobile access (autonomous or not). But this case needs to be studied in depth and proven to justify the investment necessary to make high-speed rail a reality and to ensure that both the private sector and the public support it.

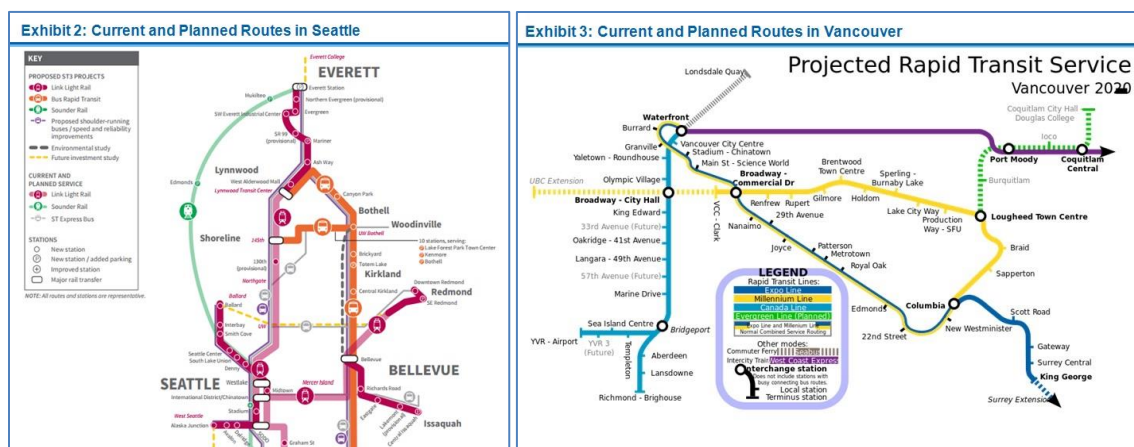
2. Long-term Champions to Maintain the Momentum

Critical to achieving consensus is outspoken, proactive, and accountable leadership, both at the public and private levels. Champions will play an essential role in articulating the business case for economic integration and the high-speed transportation system necessary to achieve it. They can advocate for the program, defend it when there are challenges, and explain it to successive waves of new residents and businesses that may not have yet bought into the vision. This requires public and private leaders willing to explain how Cascadia represents the region's best approach to the future and how the benefits of regional economic integration outweigh the costs. Champions from the private sector can best articulate the business case and build the narrative of economic integration. Only with strong and passionate leaders can the region leverage consensus to support the hard work at hand: funding and financing, building complementary transit expansion, and addressing

critics who may not share the vision of regional economic integration or who are directly impacted by construction of the high-speed transportation system.

3. Robust Local Transit

Arriving quickly by high-speed train from another city provides little benefit if the traveler is left stranded at the station. What makes rail travel so appealing and successful in Europe and Asia is the broad network of public transportation available at most rail stations that enables the traveler to complete his or her trip – other rail lines, buses and rail transit systems that disperse travelers across the local area. The high-speed trip is only one element of the door-to-door experience of the traveler, and in the absence of good travel connections at stations, the high-speed system cannot meet its potential, regardless of how fast the train goes. As noted, the citizens of both Seattle and Vancouver have made the decision to support local transit, including both near-term plans and new initiatives for major expansion. This bodes extremely well for a future high-speed system that can tap directly into these systems and build off the important land-use and environmental benefits that local transit generates. Planning for a new high-speed system should be viewed as an integral component – even an extension – of the regional transit planning process, helping to ensure that regional transportation functions as a single, highly integrated, and coordinated network and system.



Moving Forward

High-speed rail can be a game changer that helps to drive a vibrant and competitive regional economy. It is an essential tool that can help achieve and sustain the broader goal of an economically integrated Cascadia. Moving forward on planning for high-speed rail requires first moving forward on articulating a powerful vision for Cascadia.

As consensus forms around a long-term vision, planning for one-hour high-speed service should commence with the goal of defining the program's transportation, land-use and environmental objectives and the challenges to its implementation. These will include understanding environmental, geological, and topographic constraints and political and community concerns, and discussions on how best to advance a project that spans an international border. Exploring these issues will then lead to the detailed engineering and environmental analyses that will define the new transportation system, quantify its benefits and costs, and define the funding mechanisms that can best be utilized to pay for it.

Partnerships will be essential to success, the most important of which starts with the residents and businesses that call the region their own. There must be proactive and vigilant outreach to the public to ensure their voices are heard and that the project reflects their needs and input. Regardless of the funding approaches used to build the new system, the public will be called upon to foot a portion of the bill. Residents across the region have demonstrated a remarkable willingness to fund transportation initiatives. But their support can never be taken for granted.

Other critical partnerships include those between:

- Government officials, transit agencies, state/federal transportation authorities and regional planning organizations at all levels – local, city, state and Federal – to plan, coordinate and expedite the implementation process and to integrate the new system with existing and future transit operations

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- Private companies and public agencies to determine how best to allocate roles and responsibilities to enhance efficient planning, provide funding, and to implement and operate the high-speed rail system
 - US and Canadian governments to coordinate efforts and to develop approaches to expedite customs and immigration inspections
 - Project sponsors and Federal officials to streamline the approval and permitting processes

The vision of an economically integrated Cascadia is achievable. High-speed rail linking the downtowns of Seattle and Vancouver in less than one hour is an important element of and catalyst for that integration. With good planning that reflects both an engaged public and the lessons of 50 years of high-speed rail experience, implementation of high-speed rail can be a positive process that accelerates economic integration and protects the region's unique resources and lifestyle for generations to come.

ⁱ See, for example:

1. Peter Severinson, *Cascadia: The New Frontier* BCBusiness (2010)
2. *Connecting Cascadia, A high speed Rail Vision for the Pacific Northwest*, America 2050 Briefing book, 2010
3. Seltzer et al. 2011, *Ecolopolis 5.0: High Speed Rail in Cascadia*, (<http://www.america2050.org/2011/05/ecolopolis-50-high-speed-rail-in-cascadia.html>)

ⁱⁱ UNIFE Position on High Speed Rail, Updated 20 October 2010

ⁱⁱⁱ Ahlfeldt and Feddersen, from periphery to core: economic adjustments to high speed rail, in: LSE Research Online, September 2010.

^{iv} *Ambitions & Opportunities, Understanding the Spatial Effects of High Speed Rail*, Independent Transport Commission, November 2014, at p. 28