Assessing the Business Case ROI for Intercity Passenger Rail Corridor Investments

VOLUME 1:
Guide for Decision Makers

APTA AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
AASHTO

Prepared by EBP US Inc. with assistance from Mineta Transportation Institute

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June 2021

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Acknowledgements

This guide, and the accompanying appendices and ROI tool, were developed by Glen Weisbrod, Ira Hirschman and Adam Blair of EBP, with Simon Tan of the Mineta Transportation Institute (MTI). The authors are grateful to additional associates at EBP and MTI who also helped with this process.

The project to develop this guide was overseen by Art Guzzetti, Vice President of APTA, with active ongoing input from a Technical Committee consisting of Charlie Quandel (Quandel Consultants), Sharon Greene (Infrastructure Strategies), Toni Horst (AECOM), Jonathan Dees (North Carolina DOT, also representing the AASHTO Committee on Rail Transportation), and Eric Peterson (representing the APTA High Speed and Intercity Passenger Rail Committee).

The project also gained from review by an Advisory Committee consisting of Donna DiMartino (Managing Director, LOSSAN Rail Corridor Agency), Al Engel (former Chair of the APTA HS&IPR Committee), Shayne Gil (AASHTO Program Director for Multi-Modal Transportation), Tim Hoeffner (former Director of the Office of Rail, Michigan DOT), David Kutrosky (former Executive Director of the Capital Corridor), Mariah Morales (Manager, Government Affairs, Amtrak), Stacey Mortensen (Executive Director, San Joaquin Regional Rail Commission), Richard Mudge (Compass Transportation and Technology Inc.), Ron Pate (Director of Rail, Freight, and Ports Division at Washington State DOT), Patricia Quinn (Executive Director, Northern New England Passenger Rail Authority), Arun Rao (Manager of Rail, Wisconsin DOT and Chairof States for Passenger Rail), James Redeker (former Commissioner of Connecticut DOT), Professor P.S. Sriraj (Director, Urban Transportation Center, University of Illinois at Chicago), Emily Stock (Virginia Department of Rail and Public Transportation), Julie White (Deputy Secretary, North Carolina DOT), Christopher Zappi (Director, Government and External Affairs , Amtrak), and Matt Dickens (APTA).

The authors and APTA are appreciative of the effort and input provided by all of these individuals. Financial support for this effort was provided by the American Public Transportation Association (APTA), APTA Business Member Group, the American Association of State Highway and Transportation Officials (AASHTO), AECOM, Quandel Consultants, and the Mineta Transportation Institute.

This project effort represents the second phase of a larger multi-year effort to enhance methods for evaluating the returns from public investment in intercity passenger rail facilities and services. It builds directly upon work done for the 2017 report: *Methodology for Social Return on Investment Analysis for High Speed & Intercity Passenger Rail (HSIPR)*, prepared for APTA by the Urban Transportation Center, University of Illinois at Chicago and EDR Group (now EBP).

Executive Summary

Objective. This guide has been developed to assist cities, metropolitan agencies, state DOTs, and federal agencies by providing a common methodology, utilizing best practice methods, to measure public benefits and assess return on investment (ROI) for proposed high speed and intercity passenger rail (HS&IPR) projects. It is intended to assist public agencies to assess whether and how they can most appropriately participate in supporting and enabling these projects.

To accomplish this goal, the guide lays out ways to produce more robust and useful economic benefit evaluations, with results that can align widely recognized benefits and corresponding cost contributions. This broader evaluation approach is referred to as a business case ROI assessment.

This volume, ***Guide for Decision Makers***, lays out the concept of a public franchise and the factors that can be part of a public return on investment (ROI) for HS&IPR Investments. It explains three core concepts that define the business case ROI for these types of investments:

- A *more complete benefit perspective* that recognizes impacts addressing public planning and policy goals in addition to transportation efficiency goals,
- a *multiple perspective view* that can recognize the differing interests and benefit viewpoints of local, state, and federal agencies, and their private sector partners, and
- an *allocation* approach to differentially recognize benefits and the associated ROI for different levels of government, based on factors that are relevant to them.

By better aligning the interests of various public groups involved in making "go/no-go" and funding decisions, this guide enables a more comprehensive approach to business case ROI that can also provide a basis for federal-state-local-private cooperation and funding participation.

A second volume, ***Methodology***, provides further information on precedence for the multiple perspective view, a description of available tools and methods that can be used, and step-by-step instructions for measuring the various elements of public benefit that can be result from HS&IPR investment. It also provides instructions for use of the accompanying ROI tool.

The ROI tool is a separate spreadsheet. It provides a way to allocate benefits among relevant parties and then calculate ROI for different stakeholder groups.

All of these work products build upon a foundational **Phase 1 Report**, *Framework for Assessing the Return on Investment from High Speed and Intercity Passenger Rail Projects,* prepared by the Urban Transportation Center, University of Illinois at Chicago and EDR Group (now EBP). That report lays out details of the research literature and prior studies measuring the social rate of return from intercity passenger rail investments. These reports are available on the APTA web site.

Note: The principles and methods discussed in the guide, appendices, tool and phase 1 report may also be of some use for other transportation modes and other kinds of investment projects, though these documents are aimed at addressing issues specific to investment in intercity rail projects.

1. Purpose of Guidance

Key Aspects of HS&IPR Projects and Why That Matters. There is need for a special guide on evaluating HS&IPR projects because intercity rail investment typically involves a combination of elements that make it distinct from both aviation investment and road investment. This includes:

- Requirements for right-of-way, stations, and station area access involving multiple communities, and broader areas that may span multiple states
- Requirements for rolling stock operated by a dedicated service franchise agreement
- Concentration of traveler activity at station stops in intermediate cities, as well as endpoints
- Requirements for supporting feeder transportation services connecting with HS&IPR stations.

This combination of elements can lead to a unique and more complicated pattern of funding and development for HS&IPR, that can involve multiple levels of government along with private stakeholders. These funding arrangements tend to include the following attributes: (a) common involvement of *federal, state and local agencies* in planning and co-funding these projects, (b) common appearance of *multi-state coalitions* to pool planning and investment efforts, and (c) common involvement of *private sector* players (who may be landowners, investors or operators) who work with government agencies via contracts or cooperative partnership agreements. They create a need for broader and more inclusive approaches for evaluating the case for funding HS&IPR projects.

Audience. This guide is designed primarily for public agencies involved in "go/no-go" decision-making and funding for HS&IPR capital investments. It lays out a process for agencies to assess their own "business case" for moving forward on funding and support for HS&IPR projects. There are many other types of stakeholders - parties who may also be directly or indirectly affected by HS&IPR investments. While this guide is directed at investment decision-makers, the tools and benefit measures defined in Appendices B and C can potentially help assess impacts on other parties, though it may not be complete in covering issues of interest to them. The general approach of business case ROI can also be of some relevance for evaluating other modes of travel and multi-modal alternatives, though the content of this guide and its appendices are tailored for the context of regional and multi-state rail investment.

Defining the Business Case and Return on Investment. Because of the multi-party characteristics of HS&IPR funding and development, it makes sense that all parties should assess the business case for their respective investments. This creates a need to recognize the perspectives of multiple levels of government and multiple types of organizations, as they respectively consider the following fundamental questions underlying a business case: Is the proposed action (investment or other in-kind contribution) consistent with my organization's mission, goals and institutional capacity? And if so, will it provide a return on investment (ROI) in terms of achievement towards my organization's goals and objectives? These answers need

> The Business Case documents the justification for undertaking a project, based on the estimated cost of development and implementation against the risks and anticipated benefits to be gained.

to be explicitly considered, in order to make a *clear, concise and compelling case* for local, regional, state and national decisionmakers to invest in HS&IPR projects.

The concept of a sound business case is assumed in private sector decision-making, as it brings together all relevant factors in investment decisions. There is a parallel need for decision-making in public sector transportation funding and development. In fact, business case analysis is codified in the UK's transport appraisal guidance and is discussed in APTA's transit guidance[1]. This approach is effectively recognizing that high speed and intercity passenger rail represents a "*public franchise*" – i.e., a business venture that has parallels to a private franchise, except that its goals are to fulfill public rather than private interests.

- A private franchise, such as Brightline demonstrates an ROI to acquire investors and private funding, and therefore, needs to accurately estimate construction costs, operating costs, cyclic capital and expensed maintenance costs, and predict ridership and "project" revenues.
- A public franchise is similar but has to demonstrate a sound business case to local, regional, and national decision makers showing that an ROI to the public can be realized.

When private businesses consider the business case for an investment, they do not just assess the present value of a profit flow; they also consider the value of other factors such as what the investment may do for their business market position (e.g., complementarity with other opportunities), reputation (e.g., equity impacts) and long-term prospects (sustainability). All these factors may be part of a comprehensive ROI.

In the same way, when public agencies consider whether to proceed with a project, there should be parallel considerations of broader public ROI. A summary of public ROI factors that can be applicable for HS&IPR is shown in *Exhibit 1*. These factors are further defined and discussed in the *Methodology* volume, Section C. These factors will have differing relevance for various levels of government, as each level of government has a different perspective for viewing its mission, constituency, and responsibilities.

[1] *The Business Case for Investment in Public Transportation*, American Public Transportation Association, 2016, https://www.apta.com/wp-content/uploads/APTA-Business-Case-2016.pdf ; *Transport Business Cases*, Department for Transport, UK, 2013, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918399/dft-transport-business-case.pdf

Exhibit 1: Examples of Business Case ROI Factors that can be relevant for HS&IPR Investments

1. User Benefits	Benefits to travelers, which may include savings in time, reliability and/or expenses for (a) those who already were using rail, (b) those who switch from car, bus, or air travel to use of the rail service, (c) those who remain using car, bus or air travel but benefit from less congested roads or airports, and (d) those who were not previously traveling or will travel more with the new or improved rail service. There may also be benefits for freight shippers.
Travel Time Savings	
Travel Cost Savings	
Travel Time Reliability	
Induced Travel	
2. Societal Spillovers	Benefits affecting travelers and non-travelers due to changes in modes and other travel characteristics, including impacts on (a) greenhouse gas and pollution emissions, and (b) safety including damage, injuries, and deaths.
Emissions	
Safety	
3. Spatial Connectivity	Benefits occurring because rail service improvements enhance accessibility, enabling greater economic development. Improvements can include (a) links among complementary industries and markets, increasing regional productivity, (b) air/rail transfer opportunities that enhance access to smaller cities, and/or (c) economic opportunities for low-income areas gaining more access to higher paying jobs.
Regional Economic Integration	
Intermodal Access to Broader Markets	
Regional Equity	
4. Risk Reduction	Long-term benefits of maintaining functional rail corridors to reduce risks of undesirable future situations, by offering (a) alternatives for car, bus or air travel in case of road or airport closures due to natural disasters, weather events or infrastructure failures, and (b) options for capacity expansion to sustain economic growth and diversification for future generations.
Resilience/Redundancy	
Sustainable Economic Future	
5. Local Land Impact	Localized income gain from concentration of activity at rail stations, which can enable (a) more efficient land use patterns for municipalities, and (b) higher business productivity and greater localized growth. (Value capture is handled below.)
Local Development	
6. Operator Impact	Government or other public or quasi-public agencies may be involved in project development, operation, and/or revenue generation. Private operators may also obtain revenue from value capture and/or fees on other facilities and services, and they may incur additional expenses related to these arrangements.
Revenues	
Life Cycle Cost Savings	

A common thread among the benefit elements cited in Exhibit 1 is the breadth of ways in which HS&IPR can interact with other modes – specifically highway and aviation systems. That is because passenger rail investment, at least in the US context, may be best viewed as a dedicated high-capacity travel corridor within the context of broader road and air system networks. Many of the benefits come from mode shifts, and can reflect the net outcome from a combination of positive and negative effects associated with changing modes and travel patterns. Ridership forecasts are also affected by the presence of complementary modes at rail stations that together enable multimodal transfer and distribution benefits. This perspective, analyzing rail investment in the context of the other modes and multiple levels of government, becomes necessary to make the case for passenger rail in a way that typically is not needed for highway and airport investment.

The Concept of Multiple Perspectives. The United States features multiple levels of government (federal, state, and local) responsible for their own planning and taxing. Consequently, they tend to focus on different types of issues. Goals of interest at a national scale may not be relevant for local governments, and vice versa. For instance, local land development and job access tend to be a concern for local and regional agencies, but is usually not a federal concern. Conversely, interstate network flows are a concern for federal agencies but are usually not a concern of local governments. State and regional agencies may also be concerned with the need for transportation

investments to support the growth of state or regional productivity and industry clusters. The differing perspectives of various levels of governments can be seen in the factors that they tend to consider in decision-making, as illustrated by *Exhibit 2*. For some projects, the additional perspectives of transportation agencies and PPP (public-private partnership) developers may also be important to consider.

Exhibit 2: Illustrative Example of How Benefits Are Viewed by Different Levels of Governments

Perspective	Constituency	HS&IPR Public Policy Talking Points (benefit issues)
National Benefit	**US (taxpayers, residents, and business)**	• saves time, expense, and improves safety for travelers • enhances national productivity and hence GDP • can alleviate the need for investments in aviation and highway systems • reduces greenhouse gas emissions
State Benefit	**State (taxpayers, residents, business)**	• enhances efficiency of the state's highway, rail,and aviation facilities • effectively enlarges labor and business markets • leads to more economic activity and tax base growth over time
Local Benefit	**Station area, city, or metro (taxpayers, residents, business)**	• supports growth (of jobs, income, investment) around HSR stations, adding tax revenue • visitors may also dwell longer and spend more money in the city

As HS&IPR projects often span multiple jurisdictions (states, counties, cities, and metro areas), a project may provide limited benefit for any one level yet provide a wider range of benefits when considering all levels. Current federal and state benefit-cost methods are often not designed to fully account for multimodal, multi-spatial, or future outcomes, goals, and impacts. They may discuss economic development and public-private sharing benefits as mere "transfers", though those effects can create very real productivity gains that can help pay for rail investments through mechanisms such as value capture finance.

This guide builds upon these concepts of multi-level perspectives and broader business case benefits to lay out a more comprehensive business case methodology for evaluating the potential ROI from HS&IPR projects. In fact, there is substantial precedent for recognizing and measuring the benefits of HS&IPR from the different perspectives of federal, state, and local levels of impact. Examples -- ranging from California and Washington State to the Midwest, Northeast Corridor and Europe -- are provided in the *Methodology* volume, Section A.

2. Key Elements of the Guidance

The business case guidance presented here is built on a recognition of the multi-level and multi-faceted elements of benefit or ROI that are introduced in Section 1. It specifically incorporates three elements of methodology, which are explained in this section:

A. A robust ROI concept that extends well beyond factors covered by traditional benefit-cost analysis.

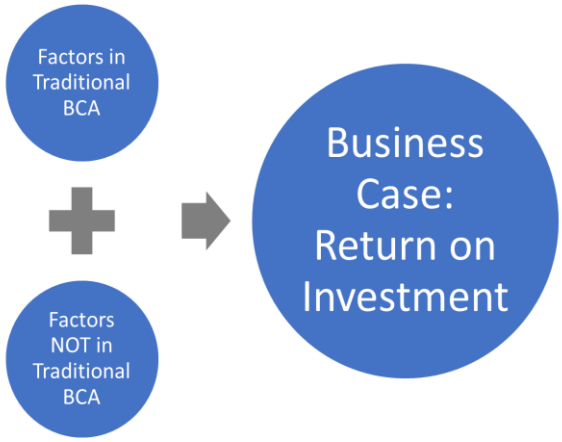
B. Use of best practices to assess and quantify benefits for the different parties involved in project development and funding, through a range of analytic methods.

C. Application of a benefit allocation concept to recognize applicable benefits among parties and levels of government, so all benefits can be appropriately recognized in the evaluation process.

(A) Distinguishing Business Case ROI from Benefit Cost Analysis (BCA). In a business case assessment, all relevant impact factors are recognized as components of ROI, regardless of how they can be measured. This means that the business case ROI can encompass all aspects of BCA, plus additional factors not traditionally captured in BCA. To understand why, consider the following observations concerning *Exhibit 3*.

While BCA provides an important way of representing the value of benefits from HS&IPR, it is not necessarily the only means for identifying those rail investment benefits. The original intent of BCA was to compare all benefits to all costs in a consistent way. Over time, the process for transportation BCA has become more highly formalized into a methodology that focuses on measuring aggregate effects on transportation system efficiency -- encompassing user (traveler) time and cost savings, and associated safety and air emissions. It has been widely adopted by federal and state transportation agencies,[2] for which it represents "traditional BCA."

Exhibit 3: Elements of a Business Case



But this is not the full story. Traditional BCA methods capture *efficiency* effects but not *equity* effects (distribution of winners and losers) including socioeconomic, spatial, and intergenerational equity effects. BCA methods as currently promulgated by state and federal transportation agencies were defined in earlier times, and today they can fall short of addressing public policy objectives relating to the sustainability, equity, quality of life, regional productivity, and economic growth

[2] *Benefit-Cost Analysis Guidance for Discretionary Grant Programs*, US Dept. of Transportation, 2021, https://www.transportation.gov/sites/dot.gov/files/2021-02/Benefit%20Cost%20Analysis%20Guidance%202021.pdf ; *Benefit-Cost Analysis Guidance for Rail Projects*, Federal Railroad Administration, US DOT, 2016, https://railroads.dot.gov/elibrary/benefit-cost-analysis-guidance-rail-projects ; *User and Non-User Benefit Analysis for Highways*, American Association of State Highway and Transportation Officials, 2010.

opportunity benefits associated with investment in intercity transportation links. These effects comprise the "factors not in traditional BCA" shown in Exhibit 3. The methods for addressing them are further discussed in the *Methodology* volume, Section B.

In response to the limitations of current BCA coverage, many state DOTs and MPOs now assess broader public benefits of proposed projects by using rating and scoring systems that utilize Multi-Criteria Analysis (MCA) in addition (or sometimes instead of) BCA. The MCA methodology provides a means of assessing the effectiveness of a project in achieving desired public objectives through use of quantitative and/or qualitative rating measures of impact. Importance weights can be applied to these measures in a scoring system for project prioritization and investment decision-making. In effect, MCA provides a potentially less precise but certainly more comprehensive means of evaluating ROI factors that are not captured by traditional transportation BCA methods. The MCA ratings and their associated scoring weights, when used for prioritization decisions, can implicitly indicate the relative willingness to incur costs to achieve various types of additional public benefits.

Efforts have also been made in recent years to combine the best of these methods to develop more complete measures of overall impact, allowing for a more robust and clearer business case ROI. That is the approach taken in this guide. It recognizes that a business case should use quantitative metrics when possible to support accurate and inclusive assessment of overall ROI, allowing for both rigorous BCA metrics and broader MCA measures to capture all relevant benefit considerations. At the same time, this guide takes steps to allocate benefits to relevant stakeholders and levels of government, while avoiding double counting in assessing overall impacts.

Enhancing BCA though a Business Case Appraisal. There is academic literature that compares BCA against MCA and argues that "all else equal," BCA is more precise and accurate due to its more rigorous formulation and derivation. It also points out that, in theory, one could improve BCA by defining net present values for equity, sustainability and other benefits not currently being captured in traditional BCA. That is may indeed be true, but all else is *not* equal, as current practice for transportation BCA does not provide a means of capturing the broader set of benefit considerations now being captured by MCA, including impact factors that lack market prices and time streams. Recognizing this situation, the UK's Transport Appraisal Guide calls for a form of transportation investment evaluation called an "appraisal table" to be used along with BCA. Another body of academic literature points the way for hybrid methods that combine the best of both methods. (See the *Methodology* volume, Section B4, for article references.) This guide builds upon these

(B) Best Practice Methods for Evaluating All Relevant Types of Benefits. In a business case ROI assessment, all applicable impacts are considered using available methods which may vary from factor to factor. The *Methodology* volume, Section C presents a range of different types of impacts and their measurement definitions. In general, there are two very distinct classes of impact:

- Value of an annual benefit stream. Benefits that are directly related to transportation system use and performance -- such as travel time savings, travel cost savings, safety improvement and emissions reduction -- can be measured in terms of a *stream of future annual impacts*. They can then be monetized by applying established market values – which may be derived from statistical studies of travel behavior (e.g., value of time or value of a life), cost surveys (e.g., car repair and medical care), or established market prices (e.g.,

emissions trading). A discount rate can then be applied to calculate a net present value of those benefit streams.

- Value of achieving a social improvement scenario. Other benefits that represent public policy objectives may be documented in terms of gaps or disparities and then valued in terms of government willingness to pay for actions to improve those conditions. Examples may include efforts to reduce socioeconomic inequalities, improve economic opportunity for distressed areas, and improve conditions for global environmental sustainability. For those benefit factors, *scenario analysis methods* (including statistical analysis and simulation models) can help document how future conditions may vary with or without targeted transportation improvements. The willingness to incur costs for those scenario improvements is an indicator of the present value placed on achieving those improvements, even though there may not be any formal stream of annual benefits to which a discount rate can be applied.

Benefits in the first category are typically calculated through use of travel demand models that represent changes in mode split, travel activity, and access times. Benefits in the second category are typically calculated through supplemental use of regional economic models, land use/value models, and environmental impact models. The data and analysis methods used to calculate the various benefits are covered more thoroughly in the *Methodology volume*, Section C.

(C) Benefit Allocation. Since HS&IPR projects often span multiple states and can be of interest to multiple levels of government that have different evaluation perspectives, it is necessary to appropriately align benefits among relevant parties. In the context of assessing the broader business case ROI for HS&IPR projects, there are three fundamental rules.

1) Sharing common benefits among adjacent jurisdictions. If a proposed rail line passes through multiple jurisdictions, then the total benefit can be proportionally allocated among jurisdictions. For instance, if a rail project spans three states, then the benefit could be allocated among those three states based on a factor such as the share of total trip ends occurring in each state.

2) Allocating distinct benefits among levels of government. If a rail project involves multiple levels of government that recognize distinctly different benefit factors, then each level of government could recognize a different project benefit. For instance, consider a case where the State DOT uses a BCA measure that recognizes travel time savings but not local quality of life benefits, while a city in that state uses an evaluation approach that recognizes local quality of life gains but not wider statewide travel network improvements. With benefit allocation, each party can recognize its applicable benefits

3) Recognizing overlap without double counting. With an expanded multi-perspective framework, some benefits may be recognized by multiple levels of government, and thus said to be overlapping. For example, systemwide travel time savings will be recognized at the federal level, while individual states may also recognize a share of those benefits in proportion to trips generated within their boundaries. While a cardinal rule of return on investment analysis is to avoid double counting, jointly recognized benefits are not double counted. Rather, some benefit types are being mutually embraced in different proportions, depending on the stakeholder perspective.

Note on Overlapping and Varying Impact Perspectives. Context matters, as terminology varies among stakeholders and audiences. For instance, economists may acknowledge benefits associated with the concentration of travelers at stations, bringing scale economies that reduce costs and enable higher value development in those areas. Regional planners may see this same effect as enabling denser development clusters and more efficient land use patterns. Local officials may see this as a "value capture" opportunity that can increase tax revenue and pay for supporting improvements. All parties may be correct as they view the same phenomenon from different perspectives.

3. Applicable Types of Projects

When the Guidance Should and Should Not be Used. This guidance and associated methodology and ROI toolkit are intended to provide both decision making support and to buttress public and stakeholder buy-in for the merits of developing a HS&IPR project. It is intended to provide a more expansive view of public benefits and associated return on investment, grounded in economic impacts that are relevant to specific stakeholders, particularly at different levels of government. It is not intended to supplant USDOT's or FRA's BCA guidance for federally funded grant projects. Clearly, when formal federal discretionary grant funds are being sought, projects should comply with and satisfy federal requirements to obtain funding. However, when state or local jurisdictions are also involved in supporting or approving of projects, this business case guidance should prove a highly useful way to view economic ROI perspectives for relevant parties.

Note that fully privately developed projects are not appropriate candidates for use of this ROI approach. In those cases, the primary goal is to obtain an investment grade rate of financial return, and public benefits may not be germane to the private developer's consideration. This ROI approach can be applicable for projects with private involvement along with public support.

- *Examples of Purely Private Projects.* The Brightline rail system in Florida exemplifies the purely private set of relationships. In this case, the operator works in partnership with the FEC, which owns the track, while the developer is a subsidiary of the Fortress Investment Group. Developers such as Fortress provide the capital, allocate risk, partner with contractors, and take out equity through fares and other user revenues via direct sales to consumers.
- *Distinguishing Private Capital Investment from Private Concession Operations.* Where private-sector roles are concerned, it is important to distinguish between companies that may operate rail service and infrastructure developers. Unlike infrastructure developers, who provide all or some of the project investment funding, train operators are not project financiers. Rather, they perform under a contract with the railroad's owner. Owners may also serve as operators.
- *Private Stakeholders and Value Capture.* Private rail developers have a stakeholder interest in value capture funding, which can fund privately developed systems (typical outside of the US). Here, the local government, as the entity which administers property taxes, would be the entity most likely to impose value capture rules or taxing formulas on land developers, who also benefit from the rail investment. The landowner is not, for purposes of this tool,

considered a "stakeholder" (although they have a keen interest in the commercial benefits to their land and properties near stations), but are essentially entities whose land value increases are partially passed through to local entities, who in turn pass the value capture funding on to private project developers or owner/operators who receive value capture funding through the taxing authority of the local government entity.

4. Suggested Process for Applying the Guidelines

There are four steps involved in developing and applying business case ROI measurements.

Step 1. Identification of Relevant Parties and Agreement on Business Case Analysis. The planning and evaluation of HS&IPR projects need to be coordinated among relevant planning parties and funding agencies. So, when there is a solid proposal for a new investment project, it is necessary to identify the relevant parties whose benefit perspectives will be important for making "go/no-go" and funding decisions. These are the parties for which is can be most useful to assess ROI. The list can include the federal government (FRA and FTA), multiple State DOTs, and regional and/or local agencies (MPO and City administrations). Jurisdictions that encompass station stops represent the most direct public beneficiaries whose perspectives need to considered, and it may also be important to recognize jurisdictions with right-of-way but no stops.

These parties can then be invited to a discussion of planned roles in project evaluation, planning and implementation. This business case analysis process may be done in addition to work fulfilling the formal BCA requirements of FRA, FTA and/or state DOTs.

A lead agency should be selected to assure consistency of the evaluation approach across jurisdictions. This can be any of the relevant parties, though usually the lead agency is an authority, commission or State DOT for the simple reason that most localities are too small to have rail expertise, while larger jurisdictions can be in a better position to represent a wide regional vision.

Step 2. Assembly of Business Case ROI Evaluation Factors. It is important at the outset to identify the benefit and impact factors of importance for HS&IPR capital investment decision-making by the relevant parties. There are several sources for this information. Some state DOTs have published criteria for evaluating proposed intercity passenger rail investments. In addition, essentially all State DOTs, most MPOs, and many cities also have one or more of the following: (a) public statements of the agency mission, (b) criteria they use for evaluating alternatives in their long-range plan, and (c) criteria they use for prioritization of highway, transit, and multimodal projects. These sources should help establish relevant business case factors. Some agencies may also wish to expand the list of relevant factors for HS&IPR projects.

The lead agency should be responsible for assembling applicable benefit evaluation factors recognized by the relevant State DOTs, MPOs, and city transportation departments. With that information, it can compile a consolidated set of benefit criteria and flesh out a business case evaluation framework that will allow for multi-party and multi-level factors to all be considered. Exhibit 4 provides an illustrative example of a business case evaluation framework; it shows the business case criteria and how they can vary among parties involved in HS&IPR investment decisions. The specific parties to be involved and the factors of importance to them may be different depending on the project and its context. (Note: this framework focuses on ROI

calculation; other considerations like land takings, legal and regulatory compliance, institutional capacity, and public meeting issues can ultimately affect project feasibility but they fall outside of the ROI benefit calculations that are the focus of this guide.)

Exhibit 4: Illustrative Example: Business Case Evaluation Framework

Decision Factors for a HS&IPR Business Case	Federal View	State View	Local or Metro View	Public Transport Agency View	PPP Developer View
1. User Benefits					
Travel Time Savings	❁❁❁	❁❁	(❁)	(❁)	(❁)
Travel Time Reliability	❁❁❁	❁❁	(❁)	(❁)	(❁)
Travel Cost Savings	❁❁❁	❁❁	(❁)	(❁)	(❁)
Induced Travel	❁❁❁	❁❁	(❁)	(❁)	(❁)
2. Societal Spillover Benefits					
Emissions	❁❁❁	❁❁	❁		
Safety	❁❁❁	❁❁	❁	❁❁	
3. Spatial Connectivity Benefits					
Regional Economic Integration		❁❁❁			
Intermodal Access to Broader Markets	(❁)	❁❁❁		(❁)	(❁)
Regional Equity		❁❁❁	❁❁❁		
4. Risk Reduction Benefits					
Resilience/Redundancy		❁❁❁	❁❁❁		
Sustainable Economic Future		❁❁❁	❁❁❁		
5. Local Land Impacts					
Local Land Development			❁❁❁		❁❁❁
6. Operator Impact					
Revenues				❁❁❁	❁❁❁
Life Cycle Costs	❁❁	❁❁		❁❁❁	❁❁❁

Symbols denote typical role in as an investment decision element for each type of stakeholder: ❁❁❁ primary factor, ❁❁ secondary factor, (❁) indirect or contributing element.

Step 3 Evaluation Process. The evaluation process will involve the assembly of data required to measure how the project will affect the ROI factors identified in Step 2. It will include the traditional evaluation process for developing and evaluating project alternatives, except that the traditional BCA analysis may be replaced or supplemented by the Business Case ROI. It will include measures of impact for designated HS&IPR options compared to a base (no build) case, for current conditions, and for medium- and long-term futures. Once impacts are calculated, they can then be monetized (converted to a $ measure of their present value).

The definition and derivation of (not yet monetized) impacts can be accomplished through the following four types of calculations:

A. Estimates of HS&IPR impacts on travel time, cost, and reliability – derived by incorporating travel demand modeling (trip generation, mode split, distribution, and assignment). This should account for HS&IPR impacts including: (a) increases in overall trip making, (b) shifts to HS&IPR from air, car, and bus modes, (c) shifts in intermodal transfers, allowing for schedule and transfer times at airports, bus stations, and rail stations, (d) changes in annual trip cancellations due to inclement weather or vehicle breakdowns affecting air and car modes, and (e) long-term effects on reducing costs associated with private car, business bus/van, and corporate aircraft fleets. Effects on freight movement may also be included.

B. Estimates of HS&IPR impact on the environment – including *local* pollution (e.g., noise and particulates), *regional* pollution (e.g., NO_x and SO_x), and *global* greenhouse gas (carbon emissions). They can be derived by applying measures of impact on air, rail, car, and bus vehicle-trips and trip-miles (building on "A" above) to models (or factors) for calculating emissions, air quality, and noise generation.

C. Estimates of HS&IPR impacts on local and intercity access times – derived using multimodal travel demand models to calculate differences in the size of population and employment accessible within various travel time ranges (e.g., 60-240 minutes for one way travel) from each major station stop. This represents the typical size of travel sheds (markets) for same-day, round-trip travel. This information can be used to calculate impacts on market size agglomeration, regional connectivity, and economic opportunity for distressed areas via application of regional economic impact models.

D. Estimates of HS&IPR impacts on social, economic, and environmental sustainability and equity – derived using data on current disparities and conditions along with information from "A", "B", and "C" to extrapolate future scenarios showing upside and downside potentials for medium- and long-term change including intergenerational impacts that may extend beyond 50 years.

The monetization factors that translate impacts into dollars fall into three categories:

- Published unit values that are widely accepted for use in traditional benefit cost measures. These unit values cover Category A (travel impacts) and Category B (environmental) factors. They include US government designated unit values plus unit valuations documented from other organization sources.
- Values derived from statistical studies that establish coefficients and elasticity factors for effects on income, productivity, and/or land value. They cover elements of Category C (accessibility impacts) and Category D (land development impacts). Valuation for these impacts are derived from regional and local access impact studies.
- Values derived from existing programs and policies. This applies to benefits that can be documented but do not have a market-based valuation, which covers Category D. Valuation can potentially be derived by (a) observing funding for existing public programs aimed at supporting these objectives, and/or (b) comparison of the weights given to these factors in the project prioritization scoring systems adopted by state DOTs (relative to the weights they assign for time and cost savings). This approach is used for equity and sustainability impacts.

The *Methodology* volume, Section C, provides step-by-step instructions for carrying out the benefit measurement calculations. It also identifies available tools and sources of valuation factors to carry out the benefit monetization process.

Step 4 Apply the ROI Calculator and Communicate Results – Once the applicable impacts have been measured and monetized , the ROI Calculator can be used to allocate benefits and portray ROI for the various levels of government and public-private partnerships (if any).

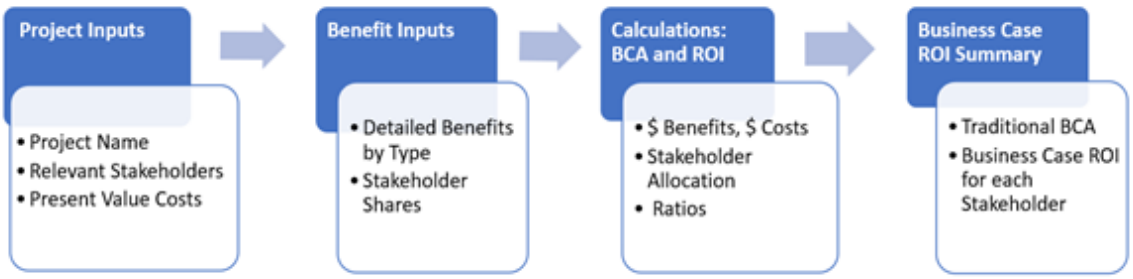
5. Implementation Using the ROI Calculator Tool

There are methods for measuring each of the impact elements in a Business Case evaluation of HS&IPR projects. The *Methodology* volume, Section C, describes these methods, their information sources, and instructions for their use. An ROI Calculator tool has been developed to implement the multi-perspective accounting framework required to calculate the business case ROI for each party and the overall result. This section summarizes the ROI Calculator tool with examples that illustrate how it responds under different situations and under different assumptions. Stakeholders are typically recognized to be the federal government, each state served by the HS&IPR, each city served by the HS&IPR, and P3 project developers and operators from the private sector. Further instructions for the tool and examples of its use are provided in *The Methodology volume, Section D*.

Overview of the ROI Calculator Tool. The ROI Calculator is an Excel workbook file that provides a straightforward means of progressing through key decision points to arrive at ROI measures that compare the value of benefits to costs for each stakeholder. It is important to note that the tool provides for this comparison in a computational sense but is not prescriptive as to how investment costs should or will ultimately be borne by federal, state, local, or private sector stakeholders. Decisions about investment funding responsibilities are matters of policy and are arrived at by negotiated processes. Instead, the scenarios discussed below apply alternative assumptions about the assignment of benefit and investment responsibilities, as they represent an essential element to any ROI metric in which benefits are mathematically related to project investment costs. The assignments among stakeholders are made *only* for purposes of illustrating the tool's operation.

The ROI Calculator has four elements summarized in Exhibit 4:

Exhibit 4: Elements of the High-Speed and Intercity Passenger Rail ROI Calculator Tool



The ROI Calculator generates a traditional benefit/cost ratio and a business case ROI reflecting all relevant business case factors. These results are shown for the overall project, based on the total project cost and total benefits. Results are also calculated separately *for each stakeholder,* showing their benefit share assuming it allocated based just on *user benefits* and again assuming it is allocated based on all relevant business case factors.

Illustrative Examples of Business Case ROI Calculations and Results. It can be useful to consider three examples to illustrate how the allocation of benefits among stakeholders can differ in different contexts:

(1) Three State Project - A scenario where the context is a rail line spanning three adjacent states, creating commonly recognized benefits that do not overlap among states. In this scenario there are no unaccounted benefits, no public-private partnerships, and no federal involvement.

(2) Federal/Local Sharing - A scenario where there are both federal and local organizations involved, with distinctly different (non-overlapping) benefits recognized by each level of government. In this scenario there is no public-private partnership and no state involvement. The federal jurisdiction would be the primary driver of the project, but it would occur in a corridor with a targeted local economic development strategy for a specific area.

(3) Overlapping Benefits with Value Capture - A scenario where federal, state, and local governments are all involved, along with private operators and developers. Each party recognizes some of the benefits, with significant overlap. Value capture is represented in a public-private partnership.

These three scenario examples illustrate how there can be significant variation in terms of (a) which groups of stakeholders are involved in decision-making and funding for a HS&IPR project, and (b) whether benefits of different types are vested jointly by multiple stakeholders or are the exclusive concern of a single stakeholder. In other words, the benefit allocations can reflect whether particular categories of benefit are claimed by multiple stakeholders and whether those benefits are "nested" (i.e., whether they overlap) within the overall total.

An example of a nested or overlap benefit would be user benefits/travel time savings. With this example, 100% of the benefits may be relevant to the Federal stakeholder, while individual states comprising the corridor may also recognize a share of user benefits based on allocation variables such as trip origins within the state. The ROI calculator provides a way to allocate overlapping benefits among parties in a way that avoids double-counting or otherwise over-estimating ROI.

These three examples further demonstrate that different ROI results can emerge depending on (1) how investment costs are distributed among the stakeholders; and (2) whether overlap benefits are considered from the individual stakeholder perspective.

As seen in the examples, the tool first calculates an overall ROI ratio from a traditional standpoint, where stakeholders are not considered, and no overlapping benefits arise. This results in a single, consolidated ROI measure. The tool then calculates individual stakeholder ratios using alternative *illustrative* assumptions about the distribution of investment levels among stakeholders, as follows:

- One set of stakeholder-based ROI ratios corresponds to a case where investment levels are allocated based on the overall share of benefits including overlap benefits. In this case, each stakeholder's ratio is the same, by definition, since the numerator and the denominator are both distributed among stakeholders using the same percentages. Because of overlapping

benefits and a more inclusive set of benefits, the stakeholder ratios are higher than the traditional global ROI ratio when overlaps benefits are not considered.

- A second set of ROI ratios is also calculated in the examples, where investment levels are allocated based only on user benefits (a common approach often used in multijurisdictional funding formulas). In this case, ratios differ by stakeholder. Ratios are again larger than the single traditional ROI measure when benefit overlaps are not considered.

This is an important result, as ROI will depend ultimately not only on benefits but the consensus allocation of investment costs among stakeholders.

Typical inputs and ROI results are presented in *The Methodology volume, Section D*. The variations in results among scenarios demonstrates how key factors can enhance and expand ROI to build a more nuanced and robust business case for a particular HS&IPR project. It can help with efforts to achieve greater public support, particularly cases where recognition of local benefits of a rail project can translate into stronger public support from state and local stakeholders.