PUBLIC RAIL NOW

Climate & Community INSTITUTE

FROM MARGINS TO GROWTH

THE ECONOMIC CASE FOR A PUBLIC RAIL SYSTEM

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I. EXECUTIVE SUMMARY

The structure of the railroad industry in the United States constitutes a massive and ongoing missed opportunity. Freight service is in decline, and passenger service lags enormously behind international peers. Long-term trends of decreased freight service, decreased market share, and decreased employment have accelerated in recent years, particularly with the advent of precision-scheduled railroading (PSR) across most Class 1 railroads. **In many ways, these are predictable consequences of how the industry is structured: as a set of massive, largely underregulated, regional duopolies.**

Oligopolistic industries, particularly in the absence of effective and enforced regulations, will tend to collude to control prices; decrease service to accept only the most profitable customers; and scale back investment, employment, and capacity to accommodate the strategy of pursuing only the highest margin customers. Trends that are abundantly clear in the data and in accounts from industry stakeholders, including private shippers and passenger associations, outline in countless ways these predictable consequences of the industry's structure. **This focus on margins has also led the industry to an overreliance on specific commodities, especially coal, that set the industry up for further, more precipitous decline, as shipped coal volumes are set to steeply fall in the near future.**

In conjunction with massive subsidies for on-road and air transportation relative to rail, oligopolistic conditions lead to a marked underutilization of rail for both freight and passenger service. The American public and the American economy suffer as a result. Different modes of transportation have different financial costs to users and pose different levels of external costs to the public. Where financial and social costs can be quantified and compared across modes, rail tends to have far lower public and private costs than on-road transportation or air travel. For freight, rail tends to be three to five times cheaper per ton-mile compared to trucking. Trucking generates eight times as much greenhouse gas (GHG) pollution, kills six times as many people in crashes, injures 14 times as many people, and generates three times as much non-carbon air pollution for moving the same tonnage the same distance. Trucking also creates congestion on roads and highways

and contributes to their deterioration. These large costs of time, money, and shortened lifespans are offloaded from the trucking industry onto others. For passenger travel, movement by cars, pickups, or SUVs causes 27 times more deaths and 160 times more injuries from crashes relative to diesel rail and creates five times as much GHG pollution for moving the same number of people the same distance. Air travel generates five to six times more carbon pollution than diesel rail per passenger-mile traveled while also contributing substantially to climate change through other, nonemission effects. While rail is already more climate friendly than these other modes of transportation when powered by diesel fuel, it is also far easier to decarbonize entirely.

Meanwhile, cost savings from shipping would help consumers, reduce prices, and improve US export competitiveness for key sectors. Shipping comprises a substantial portion of product costs, often accounting for 10% of product prices, but this share is estimated to reach as high as 40% for some agricultural commodities.[1] Given that rail can achieve much greater cost effectiveness compared to trucking—even while trucking is currently so highly subsidized in comparison—**improved coverage and quality of rail service is a potentially enormously powerful lever to reduce prices for US consumers and costs for US businesses**, especially those in agriculture, manufacturing, and other sectors that produce and move physical products. Conversely, when underregulated oligopolistic conditions and vastly unequal levels of public investment and subsidies push traffic from rail to trucks, the costs to society, the economy, businesses, and consumers all grow enormously.

The primary goals of this report are to quantitatively assess the extent and costs of this underprovision of rail in the US and evaluate the feasibility of public rail ownership to help reverse course. This report introduces new modeling on mode shift potentials for both freight and passenger travel, catalogs private and public costs across modes, and uses modeled mode shift scenarios to calculate the scope of potential benefits realizable from mode shift. A study of the industry structure in the US and a comparative analysis of historical and international rail institutions establish the role public ownership and other reforms could play in achieving modeled mode shifts.

1. Peterson and Choe, "The Effects of Rail Prices on U.S. Agricultural Exports."

Mode shift scenarios are constructed from historical trends and forecasted travel patterns for both freight and passenger movement. For freight, mode shift scenarios envision reversing prior shifts from rail to truck, bringing the majority of long-distance truck freight onto rail, and shifting back to rail substantial portions of agricultural and other commodities that are already well-suited for rail. For passenger travel, mode shift scenarios are constructed from national household travel data, with a portion of intercity trips shifted from on-road transportation to rail for the moderate scenario. The ambitious scenario also imagines a new build out of high-speed rail (HSR) that shifts some passenger travel from air to rail.

Combined with the differential costs by mode, the modeled scenarios allow estimates for the scope of potential benefits from mode shift. In short, the scope of benefits would be huge. The ambitious mode shift scenario modeled in this report shows that, by 2050, the US could save up to $400 billion annually on shipping costs; avert over $190 billion annually in averted public health, environmental, and fiscal costs; create 180 thousand new jobs in the railroad sector; and create up to four million other new jobs throughout the economy through indirect economic effects. These would be in addition to a range of other benefits that are not quantified in this report.

> "...the US stands to avert over **$190 billion in public health, environmental, and fiscal costs**; save up to $400 billion annually on shipping costs; create **180,000 new jobs in the railroad sector**; and create up to four million other new jobs throughout the economy through indirect effects."

The estimated $190 billion in annual averted public health, environmental, and fiscal costs breaks down across GHG emissions, other forms of air pollution (particulate matter [PM2.5] and nitrogen oxides [NOx]), crash deaths and injuries, road wear and tear, and traffic congestion. While new jobs in the railroad sector are likely to be offset or partially offset by fewer jobs in trucking, the vast majority of jobs created from this shift would be due to decreased shipping costs from rail, which would spur employment in a wide range of industries without declines elsewhere. The combined benefits from decreased shipping costs and averted social costs here amount to nearly $600

billion annually by 2050—a sum equal to 2% of US gross domestic product (GDP) in 2022. For additional context, many estimates put the total fiscal cost of the Inflation Reduction Act (IRA) at around $100 billion per year, meaning that **if rail service is improved and expanded in the US, the IRA could be paid for four times over by 2050 from shipping savings alone.**

Not only does public ownership have the potential to trigger a mode shift that would spur economic growth and deliver benefits to the public in the form of improved health and safety, time savings, and reduced shipping costs, this mode shift is also essential to reaching global climate emission targets. On its own, the average annual emissions reductions from mode shift to rail estimated here would **cut 1/10 from current transportation sector emissions**. By 2050, the total GHG emissions averted through mode shift to rail would reach nearly 5,000 million metric tons of carbon dioxide equivalent (MMT CO2e)—equivalent to 2% of the world's remaining carbon budget to maintain a 50% chance of staying within 1.5°C of warming. The transportation sector is currently the largest source of GHG emissions in the US and is seeing the slowest progress in decarbonization. Decreasing emissions in this sector by 10% would therefore constitute a major step toward decarbonization.

"By 2050, the total GHG emissions averted through the mode shift to rail would reach nearly 5,000 million metric tons of carbon dioxide equivalent (MMT CO2e) — equivalent to 2% of the world's remaining carbon budget to maintain a 50% chance of staying within 1.5°C of warming."

These economic, social, and climate benefits are realizable by reversing current trends of decline in rail freight while also meaningfully expanding passenger service. **But changing railroads' current trajectory will necessitate deep changes to the structures that currently shape the industry.** Public rail ownership provides a direct and decisive path from the current structure as a set of large, underregulated duopolies to a cohesive entity, well-positioned to reverse decades of decline and worsening service.

International and historical examples, as well as existing lines in the US, establish the potential for publicly owned and operated rail lines to vastly improve service and utilization. Within the US, publicly owned passenger lines account for a huge proportion of total rail passenger-miles traveled (PMT) and see far greater investments in improved service and decarbonization compared to routes that run on primarily privately owned rail tracks. Internationally, many countries around the world with mostly public rail operations have seen consistent, excellent results. Direct comparisons of rail mode shares across countries should be made with caution, because other factors also dramatically affect mode share and large variation exists in railroad governance even within systems that are predominately public or predominantly private. However, countries with publicly operated rail lines tend to have more intensely used rail systems, even when geography or dominant shipped commodities are less favorable to rail. Examples of countries with successful, primarily publicly owned rail systems include Switzerland, Austria, Ukraine, Germany, France, China, South Korea, and India.

While increasing the number of rail operators, to increase competition, may seem to be an intuitive solution to the oligopolistic conditions that currently characterize the sector, international precedents and empirical research caution against this approach. In both public and private systems, fragmentation of rail ownership and operation tends to increase complexity and reduce transparency: hindering efforts to modernize, obscuring responsibility when things go poorly, and inducing economic and financial costs.

Institutions for rail system governance can have tremendous variation. Ownership and operation of rail lines may be managed by a single entity or split across multiple entities, which may be public, private, or a mixture of both. While in-depth plans on how public ownership should be implemented is not the focus of this report, a comparative analysis of railroad institutions and international practices indicate the promise of public ownership, particularly when paired with integrated public operation. **As a whole, the findings in this report highlight the urgency of investing in rail—and dramatically altering the institutions that have undergirded rail's decline and underuse for decades.**

BY THE NUMBERS

The US railroad industry is currently structured as **an underregulated, fragmented network of large regional monopolies or duopolies**, in which private railroads have immense market power.

Over **10% of Freight Analysis Zones**,[2] including entire major metro areas, have **access to only one Class 1 Railroad provider**.

Over **60% of Freight Analysis Zones** have access to no more than **two railroad providers**.

Oligopolistic power allows private railroads to focus on only the most profitable business, rather than market share or growth potential.

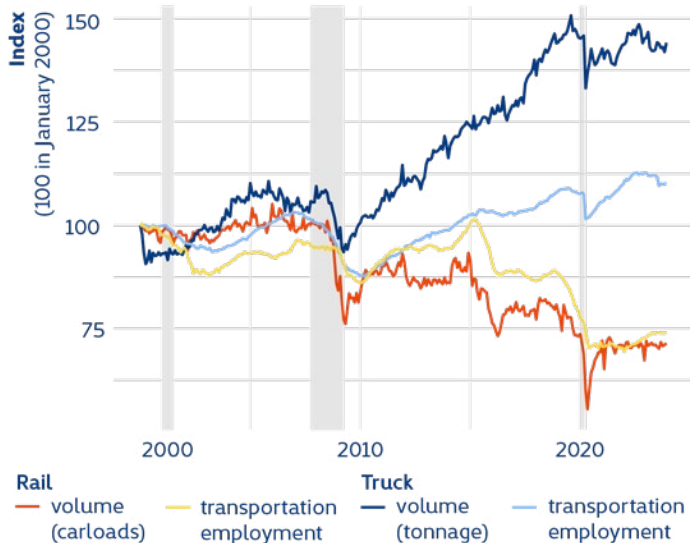
REVERSING RAILROAD DECLINE

Since 2000 ...

railroad **employment fell by 25%** and volume by **carloads fell over 30%.**

rail mode share has fallen 27% within agricultural freight, a key sector of the industry.

Trends in freight volume and employment in truck and rail



Over the last 30 years ...

rail has lost nearly 50% of its market share in agricultural freight. Trucks absorbed nearly 100% of all growth in this sector over this period, nearly quadrupling their tonnage, while the share by rail hardly budged.

The mileage of the Class 1 Railroad network declined by nearly 15%, or 30,000 miles.

Ongoing declines in rail freight are likely to accelerate further, as volumes of shipped coal, on which rail is currently extremely reliant, are set to fall precipitously.

2. Regions created by the Census Bureau to analyze freight flows;

ECONOMIC BENEFITS & AVERTED SOCIAL COSTS

Shipping accounts for ~10-40% of the cost for many commodities, **shipping by rail can be**

3-5 times

cheaper per ton-mile.

Increased rail service & frequency could save US shippers about

$400 billion

annually by 2050 and $100 billion by 2030.[3]

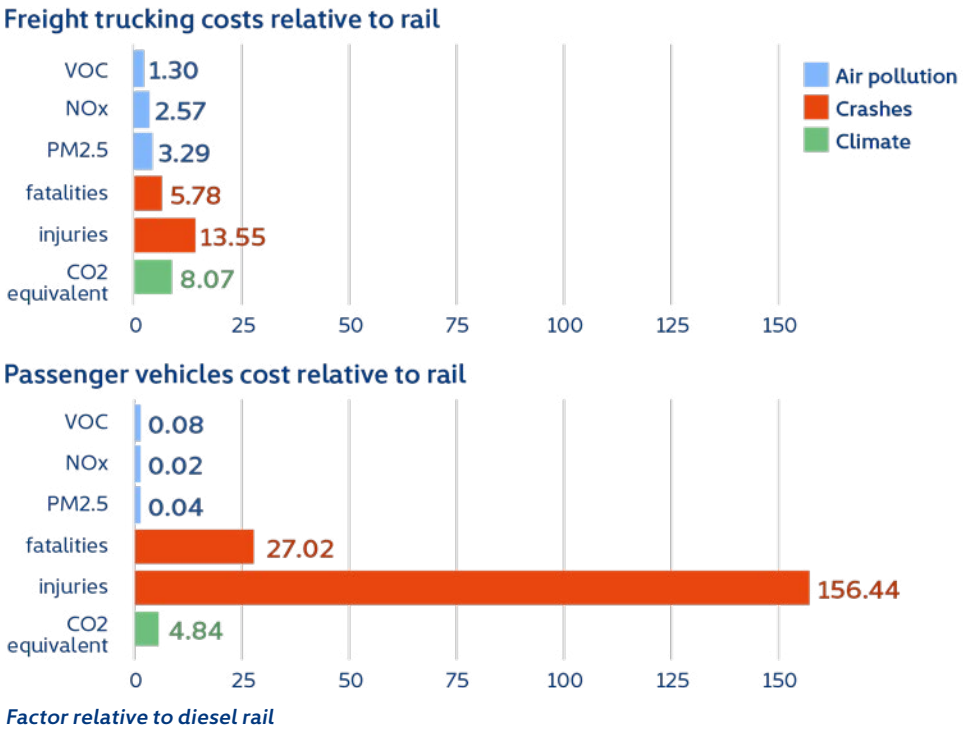
Shipping by rail would result in an estimated

4 million

new US jobs by 2050 & 1 million new US jobs by 2030.

Since shipping costs tend to be passed onto household consumers & other businesses, **lower shipping costs would decrease prices for US consumers and businesses and increase US export competitiveness.**

Social costs of transportation: trucks & cars cost more than rail



Factor relative to diesel rail

Different modes of transportationhave different financial costs to users and pose different levels of external costs to the public.

Compared to rail, **trucking generates eight times as much greenhouse gas pollution, kills six times as many people in crashes, injures 14 times as many people, and generates three times as much non-carbon air pollution** for moving the same tonnage the same distance.

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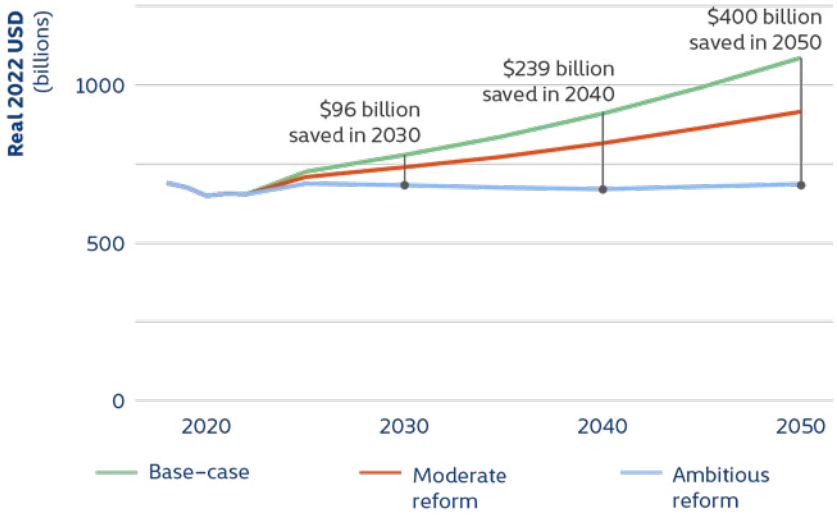
3. In real 2022 USD. $400 billion in savings would amount to about 1.5% of current US GDP.

FORECASTED COST SAVINGS AND JOB GAINS

By 2030, the US economy could be saving in real 2022 US dollars $100 billion in shipping costs per year, $240 billion by 2040, and $400 billion by 2050.

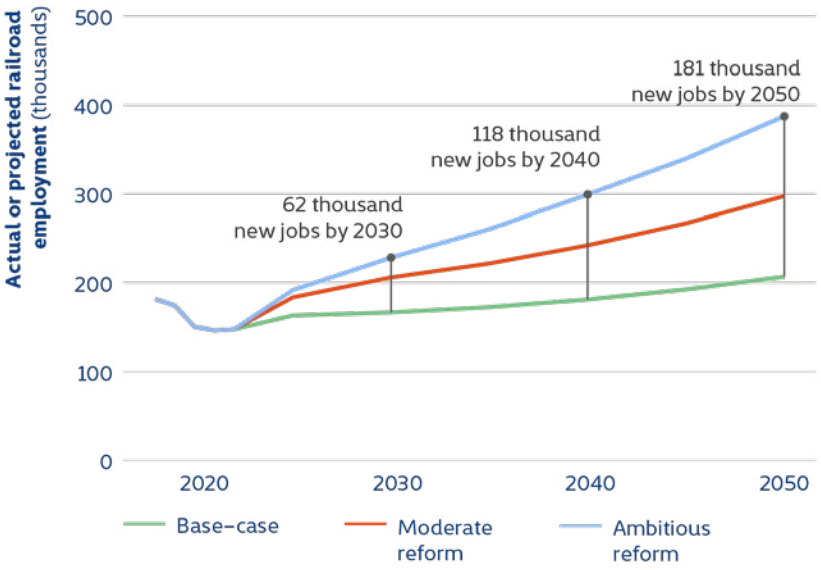
Shipping costs across forecast scenarios



Shipping freight by rail tends to have lower costs per ton-mile when service is available and reliable. Increasing rail's freight mode share relative to the baseline forecast therefore has the potential to reduce costs for goods throughout the economy. This figure shows how those savings are estimated to increase over time across freight forecast scenarios.

There are currently 153 thousand workers in railroad transportation in the US. **The ambitious reform scenario would see railroad workforce growth of over 150% by 2050,** while the baseline scenario sees growth of only 35%.

Railroad jobs across reform scenarios over time



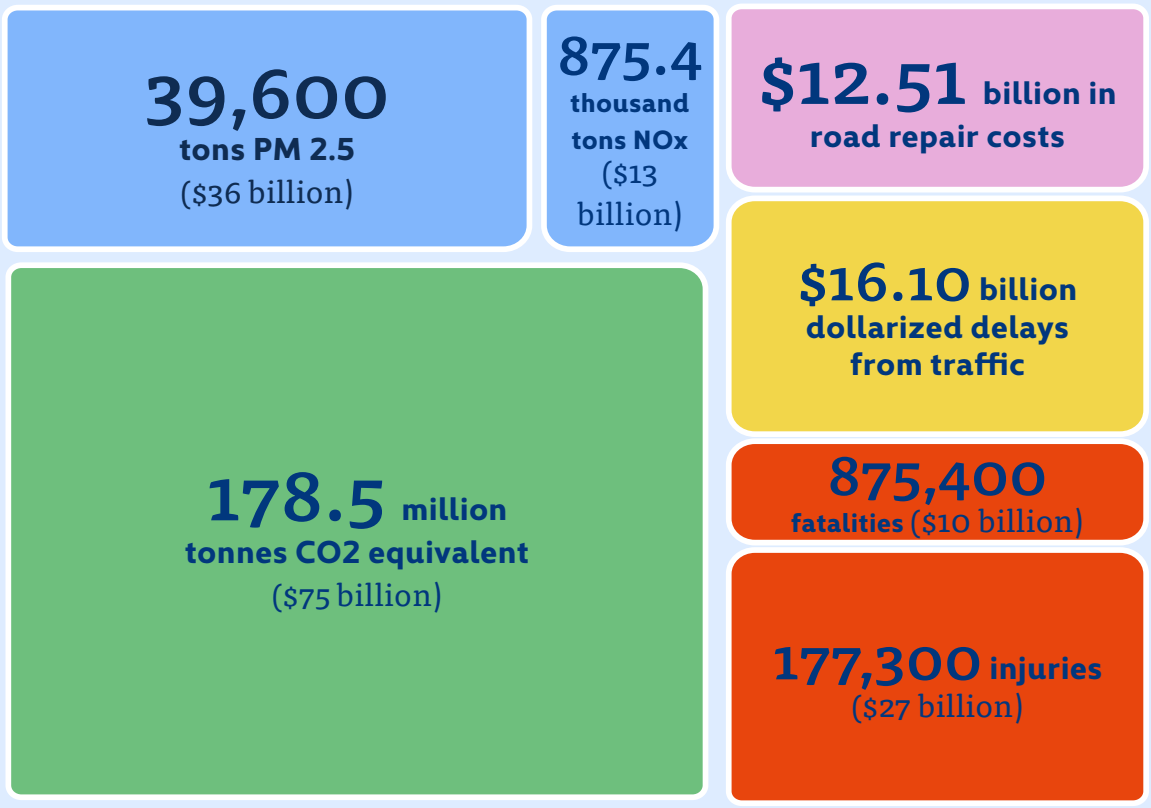
CLIMATE NECESSITY

On their own, the average annual emissions reductions from mode shift to rail estimated here would **cut 1/10 from current sectoral emissions.**[4]

By 2050, the total GHG emissions averted through mode shift to rail would reach nearly **5,000 MMT CO2e — equivalent to 2% of the world's remaining carbon budget to maintain a 50% chance of staying within 1.5°C of warming.**[5]

Technologies to decarbonize air travel and truck freight are still largely undeveloped, unavailable, or controversial. In contrast, rail travel can be straightforwardly decarbonized using proven technologies that carry co-benefits beyond electrification. **If the US moves as quickly as other countries in doing so, its entire rail network could be electrified over the next thirteen years.**

Rail reform and modeshift also has the potential to **avert over $190 billion annually in externalized costs over the next 25 years.**[6]



Boxes are sized by estimated dollarized value of averted costs.

4. US EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks."
5. Lamboll et al., "Assessing the Size and Uncertainty of Remaining Carbon Budgets."
6. Using conservative assumptions to convert public health benefits to their dollar values.

MODE SHIFT

By 2050, an ambitious, well-implemented rail industry reform could shift ...

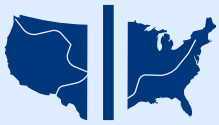
- **2,100 billion ton-miles** from trucks to rail
- **110 billion passenger-miles** from flights to rail
- **300 billion passenger-miles** from cars, pickup trucks, and SUVs to rail

PUBLIC & PRIVATE RAIL INSTITUTIONS

While endless variation exists among the institutions that structure rail systems, public operation predominates among the most successful and intensely used rail systems internationally. While many external factors, including geography and mix of commodities being shipped, also affect mode shares and intensity of rail use, many vertically integrated public systems internationally are extremely successful and see higher modal shares for rail than countries with primarily privately operated rail systems

Vertical Separation: ownership & management are separated. One entity owns rail infrastructure; others operate trains.

Vertical Integration: ownership & management are integrated. A single entity can own rail lines and operate trains on them.



Horizontal Separation: the rail network is geographically segmented. Separate entities own or manage different portions of the rail network, which is divided by region.

Horizontal Integration: the rail network is geographically integrated. The same entities operate nationally.

COUNTRY	VERTICAL SEPARATION OR INTEGRATION	HORIZONTAL SEPARATION OR INTEGRATION	TRACK OWNERSHIP	OPERATION	APPROX. FREIGHT MODE SHARE[7]	APPROX. PASSENGER MODE SHARE
United States of America	Vertically integrated for freight, primarily vertically separated for passenger	Horizontally separated	Primarily private	Primarily private for freight; primarily public for passenger	37%	0%
Canada	Vertically integrated for freight, primarily vertically separated for passenger	Horizontally separated	Primarily private	Primarily private for freight; primarily public for passenger	62%	(not reported)
Japan	Vertically integrated for passenger, primarily vertically separated for freight	Horizontally separated	Primarily private	Primarily private	7%	32%
United Kingdom	Vertically separated	Horizontally integrated	Primarily public	Primarily private	9%	10%
Korea	Vertically separated	Primarily horizontally integrated	Primarily public	Primarily public	5%	21%
Switzerland	Primarily vertically integrated	Primarily horizontally integrated	Primarily public	Primarily public	40%	17%
France	Primarily vertically integrated	Primarily horizontally integrated	Primarily public	Primarily public	15%	11%
Austria	Primarily vertically integrated	Primarily horizontally integrated	Primarily public	Primarily public	30%	6%
Ukraine	Primarily vertically integrated	Primarily horizontally integrated	Primarily public	Primarily public	70%	(not reported)

Railroad structure and mode shares for selected counties

To provide a sense of international variation across rail systems, the table to the left shows railroad structures and mode shares for a selection of countries.

7. Mode shares calculated from OECD ITF data using 2019 data. Mode shares refer to percent passenger miles or ton-miles for freight. Note that because OECD data is used for this table, the US mode share will not match values cited elsewhere in this paper, which are calculated from other data sources. "OECD Statistics." The denominators to calculate freight mode shares do not include coastal or ocean freight but do include inland waterways.