

# Integrating HSR Into Existing Regional Transportation Systems

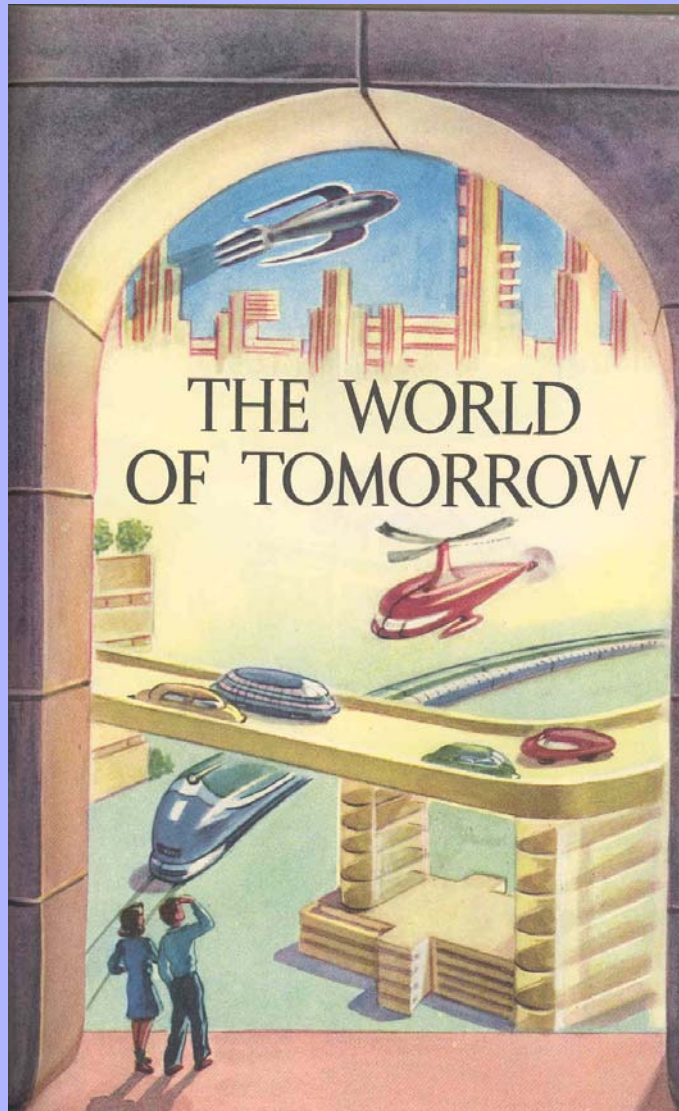
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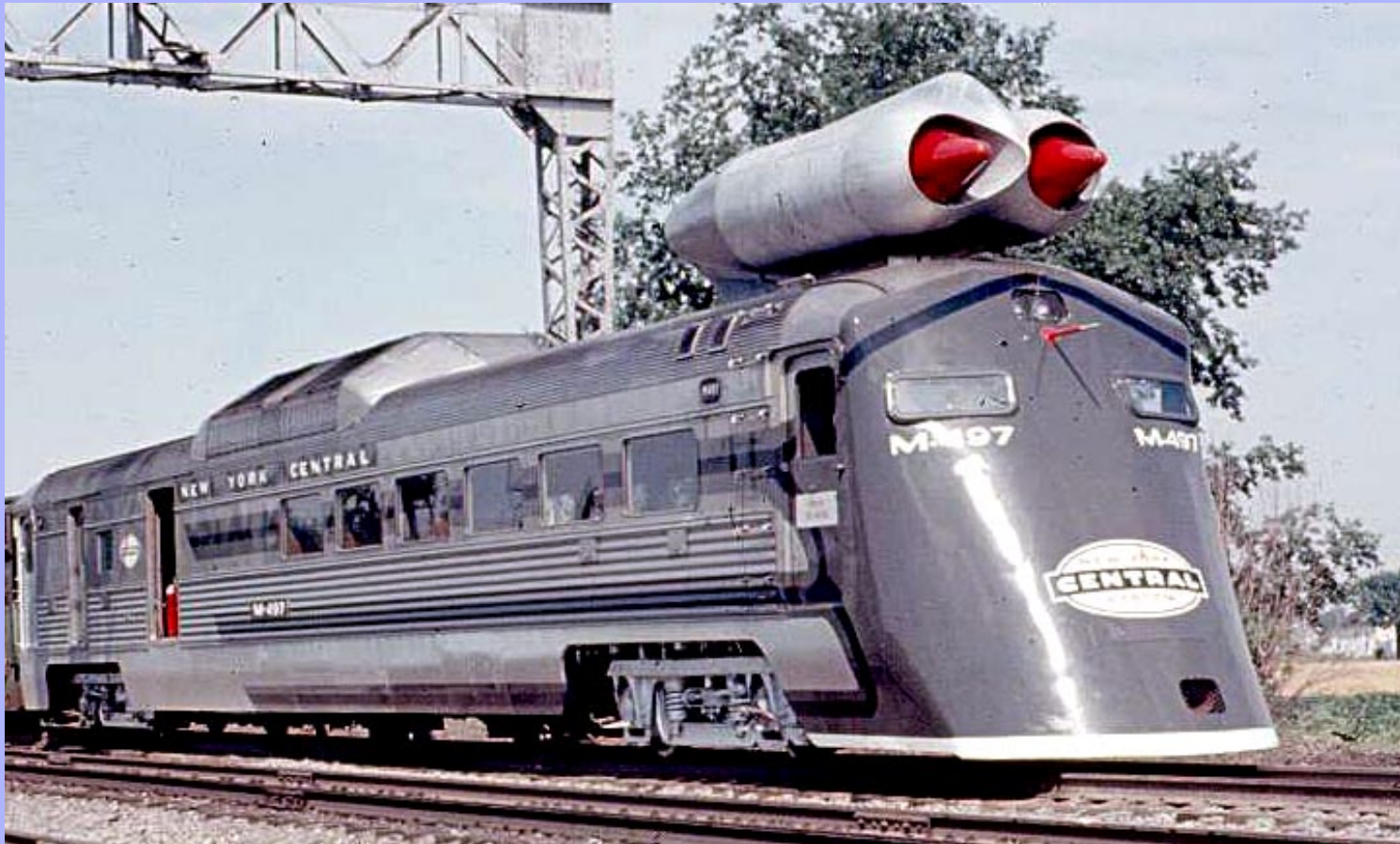
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# 2 Questions hold the key to successful integration of HSR into US mobility



- How fast will 'high-speed' trains run in North America?
- How will Americans get around in 2025?

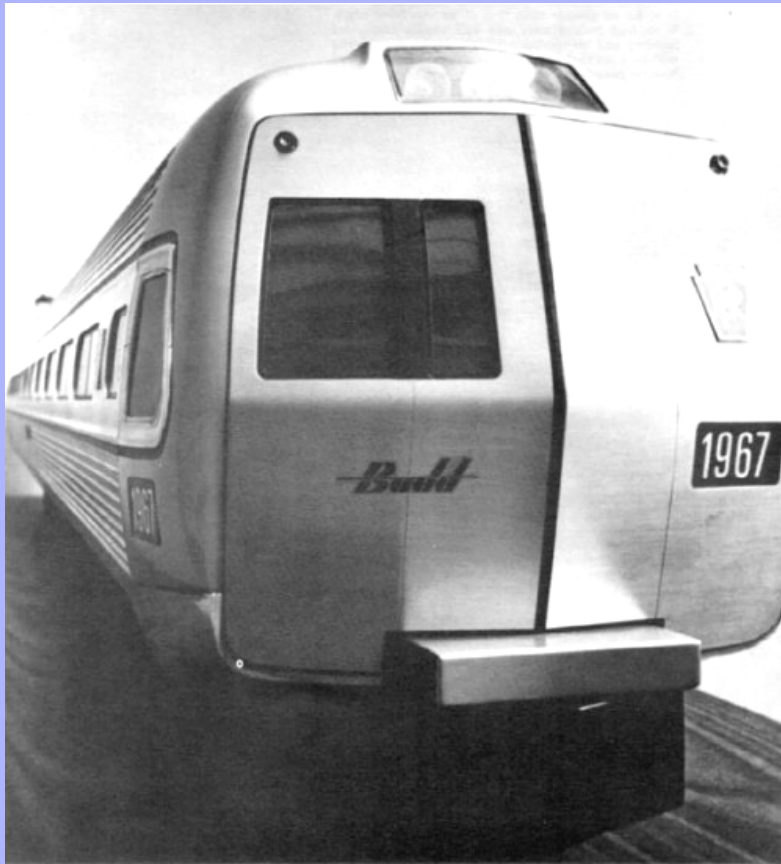
# America's rediscovery of high speed trains has been a long time in coming



1966: New York Central sets North American rail speed record– 183.85 mph

# First wave of US high speed rail development was fast

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- Metroliner was originally a “public-private partnership” for HSR launched in 1965.
- \$12.9 million in public funds leveraged \$60 million from PRR, Budd, GE, & Westinghouse.



# After 1971, decades-long battles over Amtrak's fate slowed trains down

## AMTRAK. WE'RE MAKING THE TRAINS WORTH TRAVELING AGAIN

(All we ask from you is a little patience)

What is Amtrak? We're America's first nationwide passenger rail system.

When President Nixon signed the Rail Passenger Service Act, it gave us the responsibility for managing the country's basic intercity rail network starting May 1, 1971.

That meant merging the services and solving the obstacles of what had been 22 different passenger railroads, each with its own built-in problems. While at the same time running 1300 trains a week over 20,000 miles of track to 340 cities in the U.S.A.

It may not be the country's biggest headache. But it's close. That's why when we took over we made only one simple promise. To make the trains worth traveling again. It's going to take time, and work. But we're going to do it. Just be patient, please.

**You're going to ride the best 1200 cars in the country.** You can't run a good railroad without good railroad cars. So our first order of business was to take stock of our rolling stock.

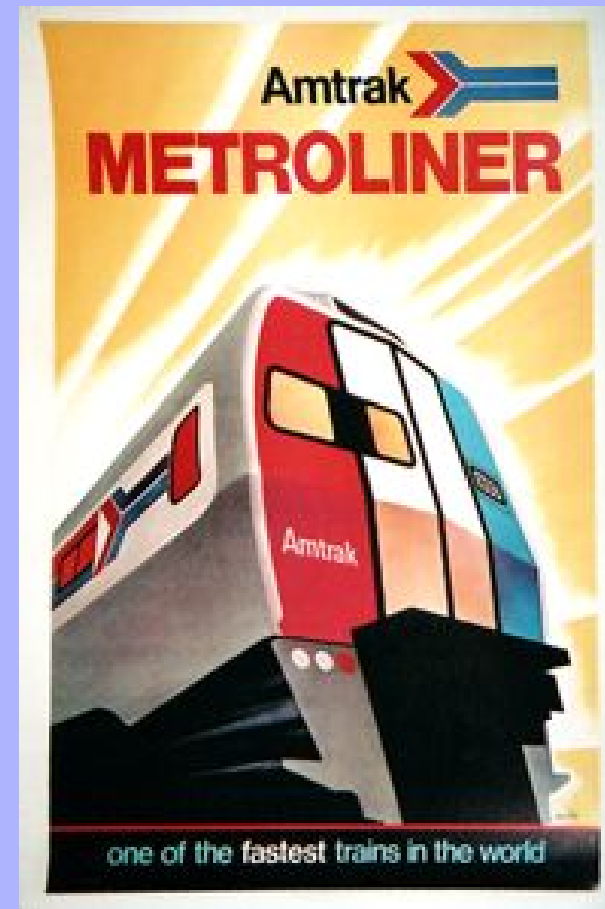


already made it clear that we want your trains to run faster than they've been running. And they will be.

**Eat a little better.** Now we're concerned with making sure that a good dinner ever enters our dining cars. Even a snack in a coach is always free. But in the future, that gourmet streusel out and surprise you.

**We want to save money and aggregate.** Some of the most problems of going place before you get aboard. And we know. That's why we're a high priority on simpler reservation, ticketing procedures like red tape any other than you do.

Meanwhile we're the schedules of half our trains to departure times and connections. Increasing frequency on some. Inaugurated new

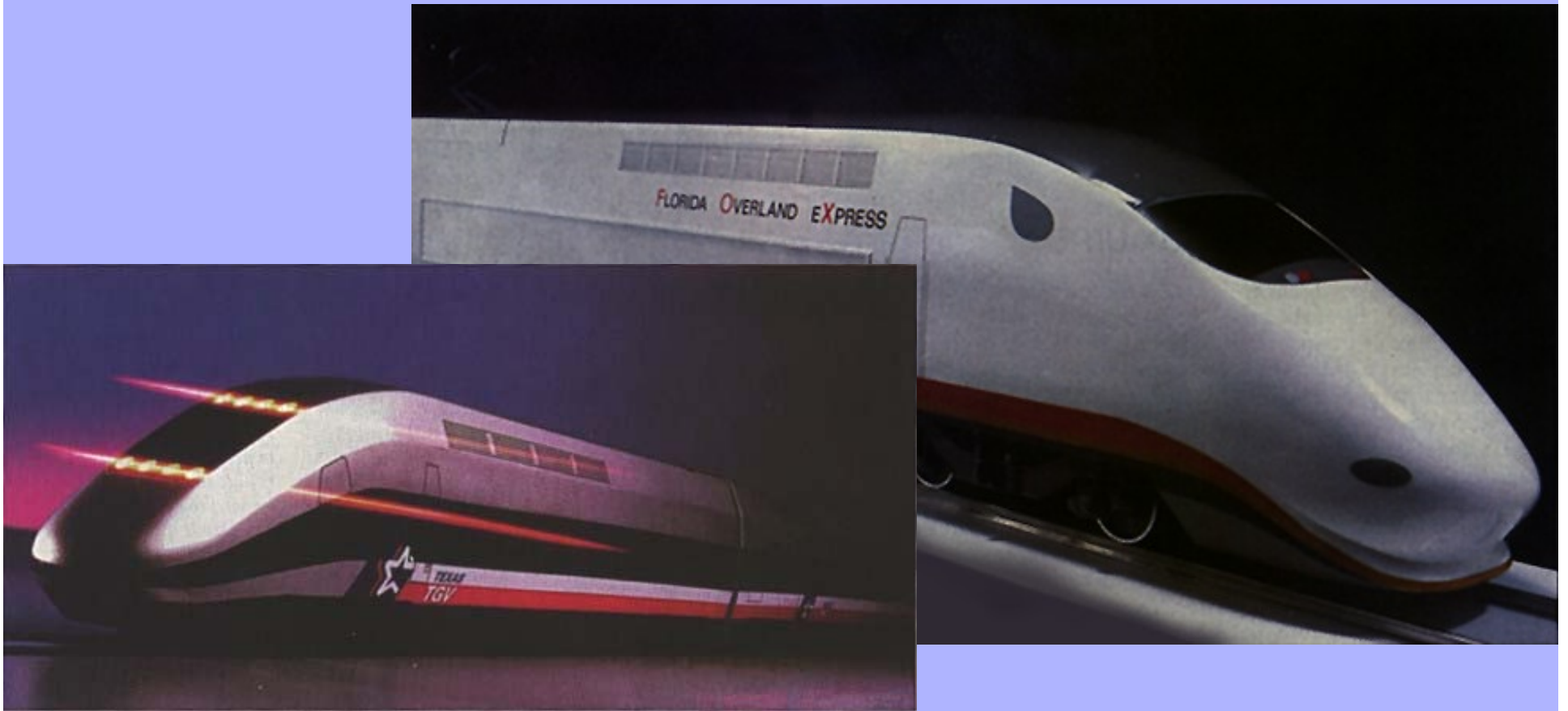


A political stalemate developed, with neither supporters nor skeptics able to advance their preferred policy options.

# State-led efforts to launch HSR could not overcome the U.S. policy vacuum

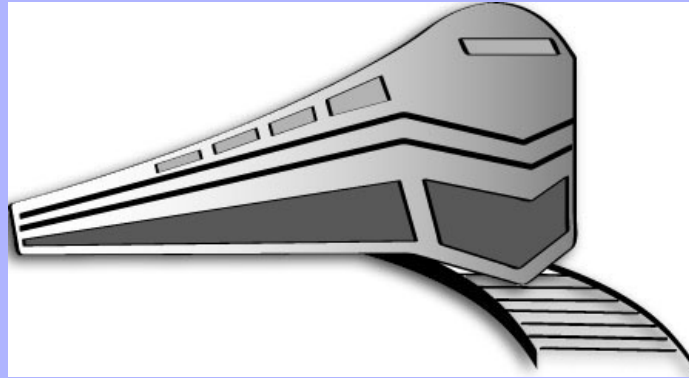
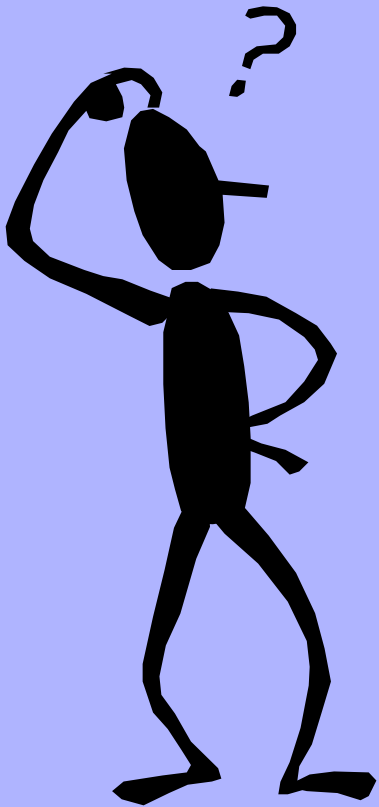
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CA, OH, TX and FL each led false starts with HSR development during the 1980s and 1990s.

# New leadership & economic crisis puts HSR back on the federal agenda but leaves 'how to' undefined



\$8 billion for high-speed investment in American Recovery and Reinvestment Act of 2009.

# Incremental HSR pursues organizational change, akin to Low Cost Carrier air service redesign





# Comprehensive HSR requires new infrastructure to support leading edge train technology

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bigpicture.in

# Will the US pursue incremental or comprehensive passenger rail redesign?



Answer, so far:  
**Both!**



60% of ARRA funding went to incremental upgrades;  
40% of ARRA funding went to new-build HSR

# Incremental and comprehensive HSR connect with the world differently

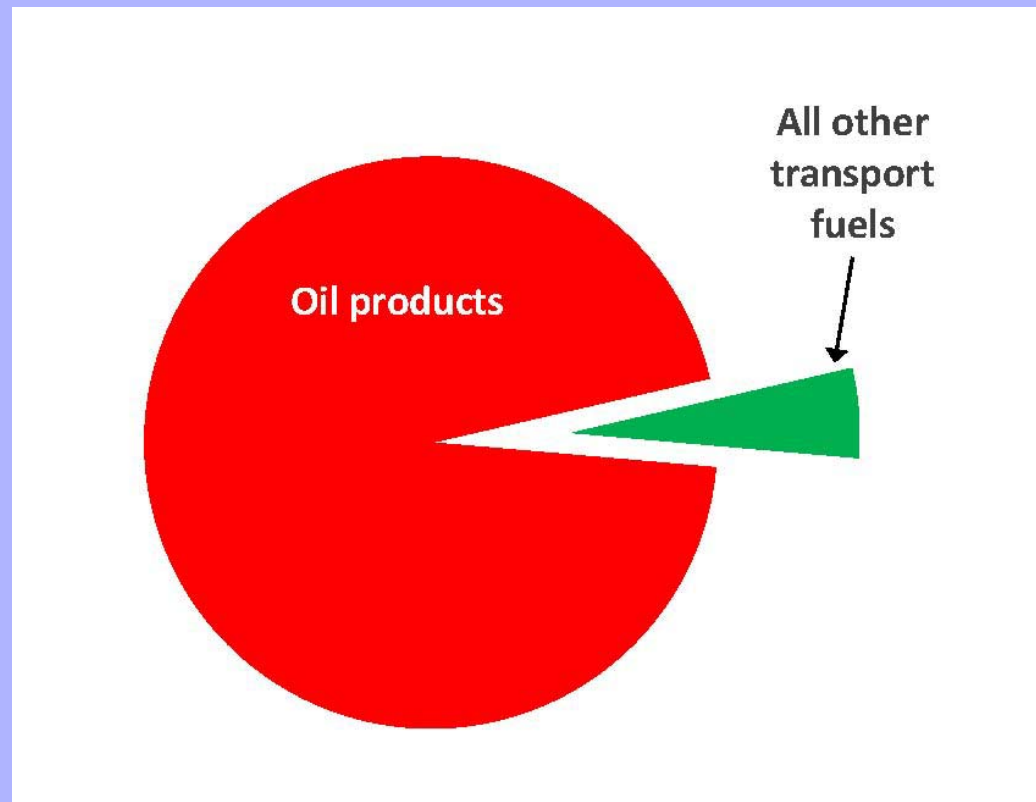


- Incremental HSR can use existing tracks and stations, building on intermodal connections that exist today.



- Comprehensive HSR creates new corridors, new stations and new connections.

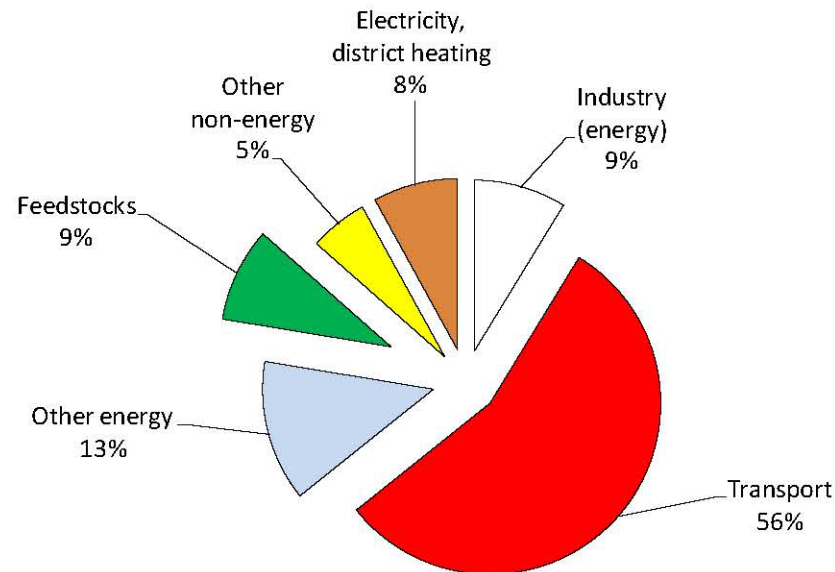
While US HSR moves along, the world's transportation systems will be shifting to a post-carbon energy future because:



Oil powers ~95% of global mobility



# More than half of the world's oil now goes into mobility



Data are for the world for 2005, from International Energy Agency, *Energy Balances of Non-OECD Countries, 2004-2005*, IEA, Paris, France, 2007. Canadian data show a similar share for transportation. (US data show a much higher share for transportation.)

## More than two-thirds of US oil consumption occurs in transportation.

# Risks and costs of producing the 'extreme' oil we now seek are much higher than the oil we have grown accustomed to

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# Relying on oil for future mobility creates high economic risks

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# Electricity could enable a smooth energy shift in mobility because it can blend sources ...

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# As we incrementally shift away from non-renewable fuels

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# China's plan for the world's largest HSR network, 8,164 miles, is part of an electric mobility strategy



2,165 km in operation  
8,070 km under construction  
2,903 more km planned

# Electric mobility will play a growing role in local travel, but specifics remain unclear





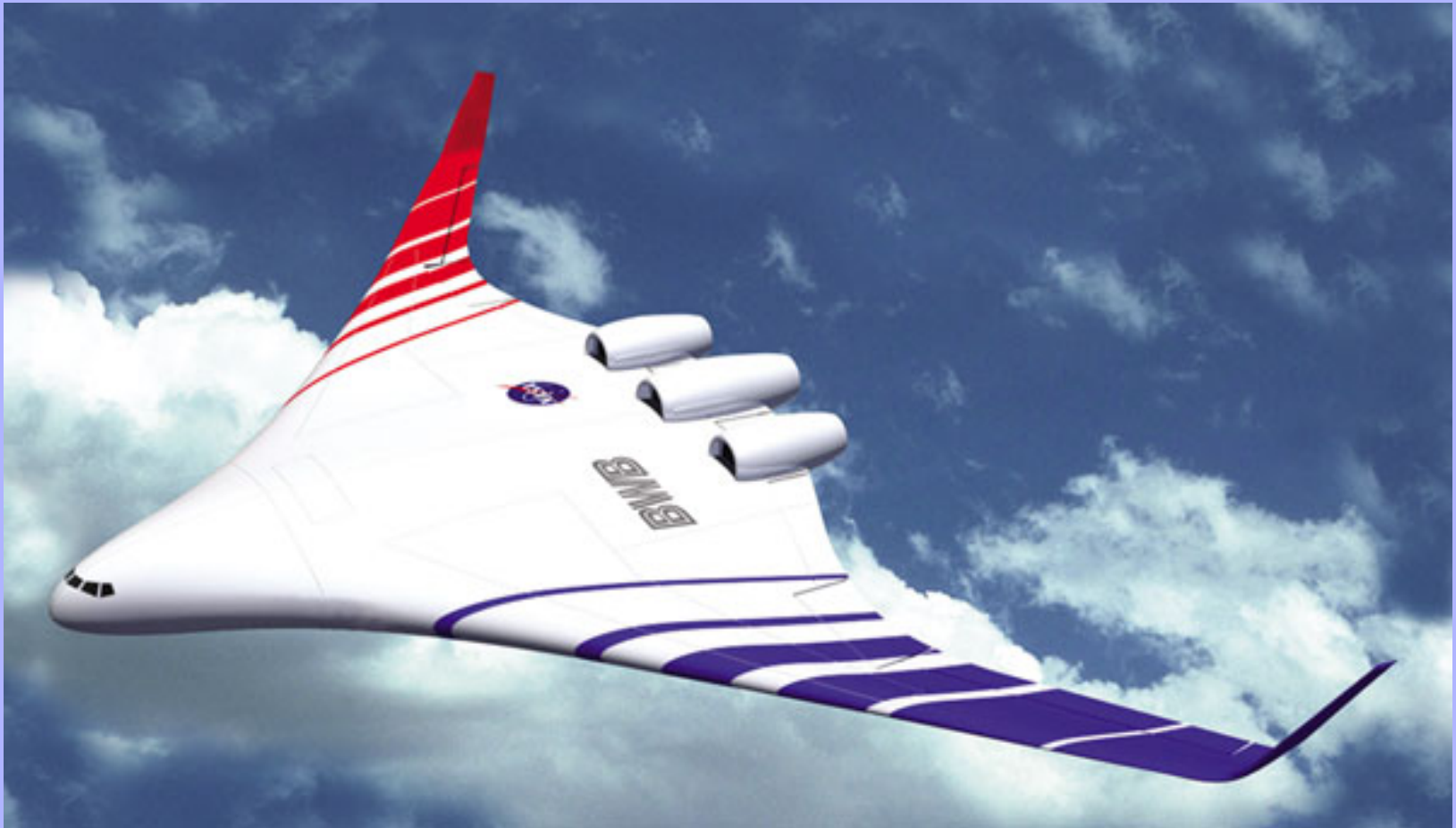
# Electric motors won't do much for aviation over the next 25 years





Best case scenario: new technology can cut aviation fuel use by 50%

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This won't be enough to keep aviation growing in North America

# Financial turmoil adds another layer of uncertainty about how much the US will be able to invest in new infrastructure



# No definitive ‘solution’ for HSR integration in the US is yet apparent

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It's important to keep scanning for evidence of where both HSR and post-carbon mobility will be heading

# The next 20 years will likely see a blend of incremental and comprehensive HSR development

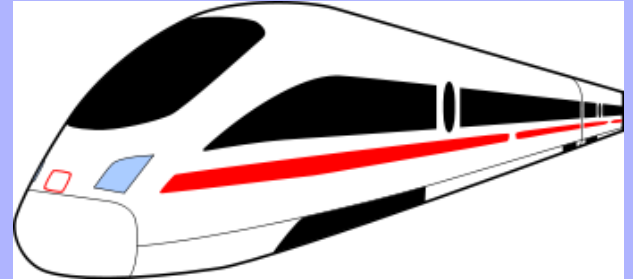
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HSR development efforts will need a flexible strategy for intermodal connection



# A faster roll out of US HSR, would favor comprehensive development



More investment will be available for HSR if the US transportation sector moves away from oil sooner, rather than later

# Slower pace of US HSR would likely stimulate incremental development



Amtrak  CASCADES

"Your link to the Pacific Northwest and British Columbia"

High driving costs would boost travel on slower trains

# If we wait too long....





# Energy-first transportation planning: a 5 step process for assessing the pace of HSR development

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1. Set the key parameter - how much to reduce liquid petroleum fuel use in transport between start and end of the plan.
2. Estimate current transport activity and energy use.
3. Anticipate future available modes and energy use.
4. Develop a plausible balance of future modes that reflects desired activity levels and energy use.
5. Continually refine and improve energy use estimates and proposals for transport activity.



# A Fast Track Scenario: Moving Americans almost as far with 40% less oil by 2025

Values and totals in this table are rounded to aid comprehension  Mode	2007				2025						
	pkm in billions (except per capita)	Fuel use per pkm, in MJ	Total liquid fuel use in EJ (GJ for per capita)	Total electric ity use in EJ (GJ for per capita)	Local pkm in billions (except per capita)	Non-local pkm in billions (except per capita)	Fuel use per pkm in MJ	Total liquid fuel use in EJ (GJ for per capita)	Total electric ity use in EJ (GJ for per capita)	Liquid fuel powere d pkm	Electri- cally powere d pkm
<b>Personal vehicle (ICE)</b>	<b>7,700</b>	<b>2.6</b>	<b>20.4</b>		<b>2,300</b>	<b>2,000</b>	<b>2.1</b>	<b>9.0</b>		<b>4,300</b>	
<i>Personal vehicle (electric)</i>					<i>1,000</i>		<i>1.0</i>		<i>1.0</i>		<i>1,000</i>
<i>Future transport</i>					<i>200</i>		<i>0.5</i>		<i>0.1</i>		<i>200</i>
<b>Local public transport (ICE)</b>	<b>50</b>	<b>2.8</b>	<b>0.1</b>		<b>100</b>		<b>2.0</b>	<b>0.2</b>		<b>100</b>	
<i>Local public transport (electric)</i>	<i>40</i>	<i>0.6</i>		<i>0.0</i>	<i>400</i>		<i>0.5</i>		<i>0.2</i>		<i>400</i>
<b>Bus (inter-city, ICE)</b>	<b>200</b>	<b>0.7</b>	<b>0.1</b>			<b>500</b>	<b>0.5</b>	<b>0.3</b>		<b>500</b>	
<i>Bus (inter-city, electric)</i>						<i>500</i>	<i>0.4</i>		<i>0.2</i>		<i>500</i>
<b>Rail (inter-city, ICE)</b>	<b>6</b>	<b>0.9</b>	<b>0.0</b>			<b>100</b>	<b>0.6</b>	<b>0.1</b>		<b>100</b>	
<i>Rail (inter-city, electric)</i>	<i>3</i>	<i>0.3</i>		<i>0.0</i>		<i>400</i>	<i>0.2</i>		<i>0.1</i>		<i>400</i>
<b>Aircraft (domestic)</b>	<b>950</b>	<b>2.0</b>	<b>1.9</b>			<b>600</b>	<b>1.8</b>	<b>1.1</b>		<b>600</b>	
<b>Aircraft (international)</b>	<b>330</b>	<b>2.3</b>	<b>0.8</b>			<b>400</b>	<b>2.1</b>	<b>0.8</b>		<b>400</b>	
<b>Airship (dom. and int.)</b>						<b>100</b>	<b>1.2</b>	<b>0.1</b>		<b>100</b>	
<b>Marine (dom. and int.)</b>						<b>100</b>	<b>0.7</b>	<b>0.1</b>		<b>100</b>	
<b>Totals</b>	<b>9,300</b>		<b>23.4</b>	<b>0.0</b>	<b>4,000</b>	<b>4,700</b>		<b>11.7</b>	<b>1.6</b>	<b>6,200</b>	<b>2,500</b>
<b>Per capita</b>	<b>30,500</b>		<b>76.5</b>	<b>0.1</b>	<b>24,500</b>			<b>32.8</b>	<b>4.5</b>		

# HSR network design has evolved from traditional to multi-tiered

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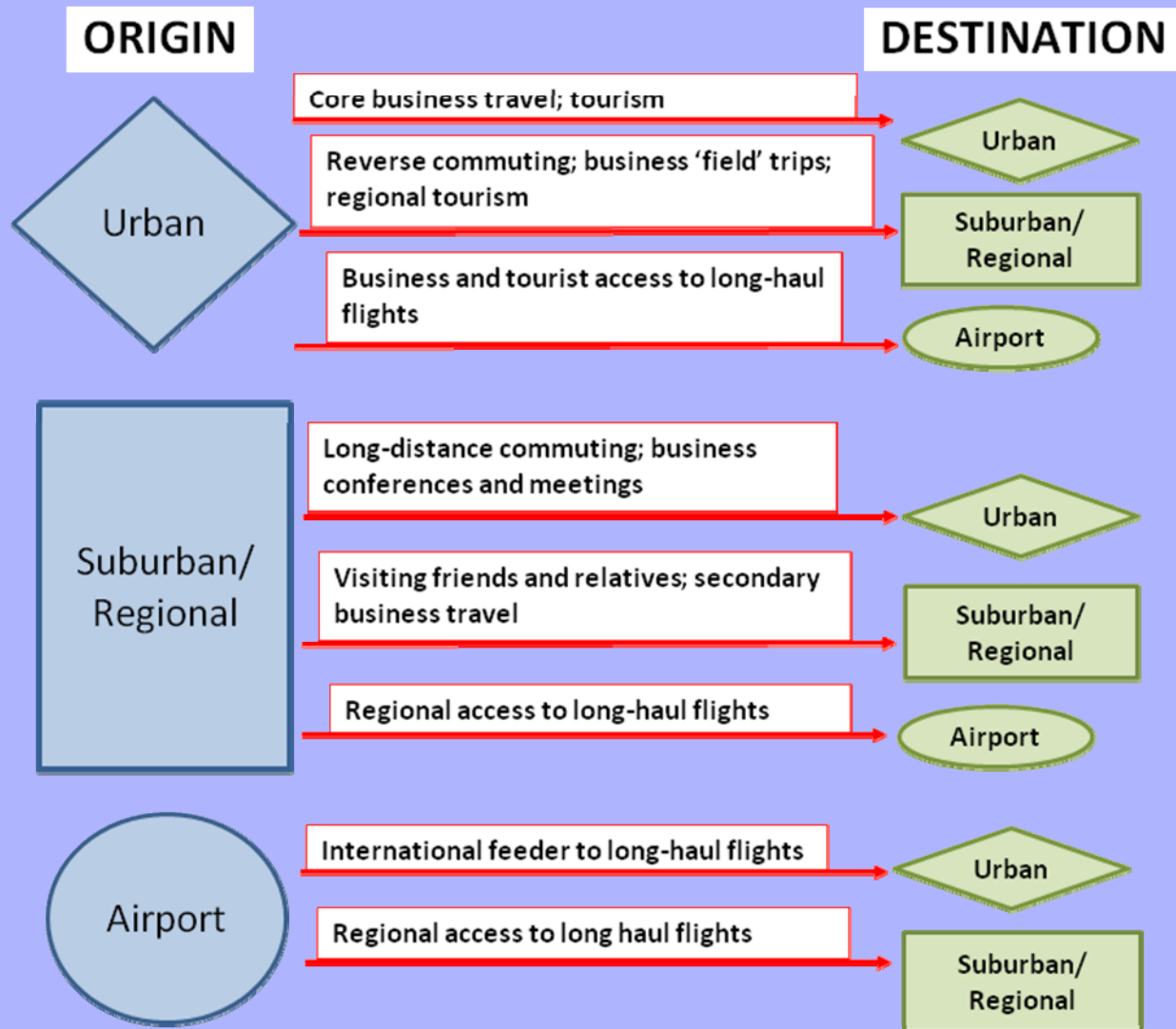
Japan's Shinkansen offers local and express HSR in the tradition of railroad *Limiteds*



# European HSR serves a wider range of travel markets with different station types



# Europe's HSR network structure seeks to serve many trips made by car or plane





# North American travel patterns and station types are still more intricate

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# New station types will have to be created

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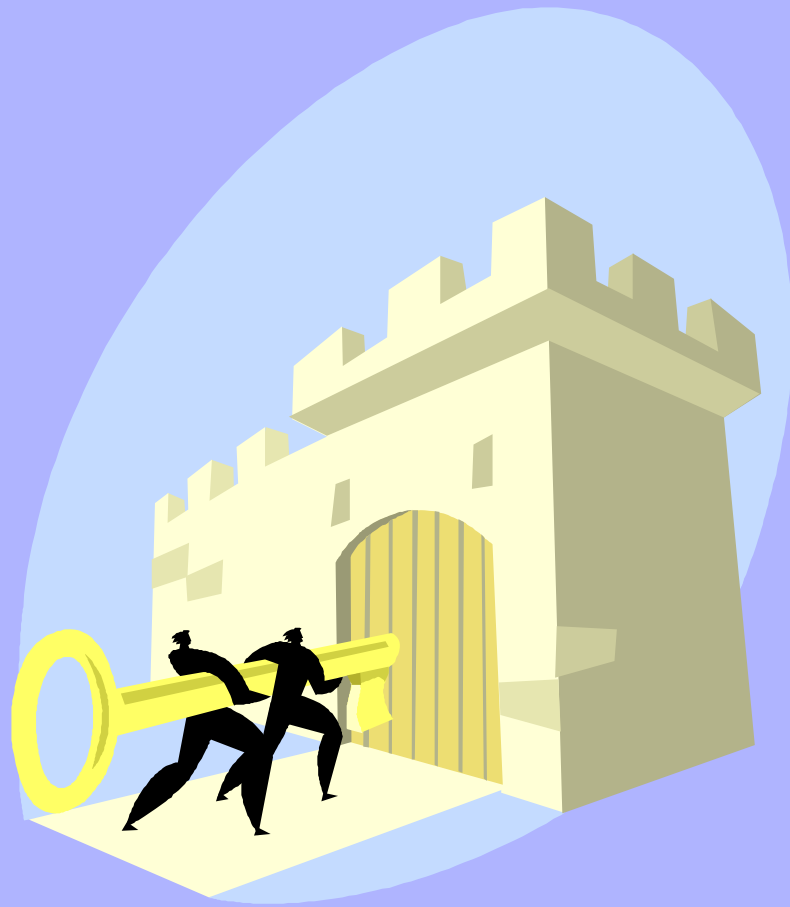
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# Policy tools will be needed to enable HSR integration

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- Introduce fiscal flexibility that shift taxes from high to low carbon mobility
- Enable public-private partnerships in rail through infrastructure condominiums
- Encourage carbon sunsets through development of 'stranded assets'



# Monetizing road use provides the fiscal engine for post-carbon infrastructure





# Comprehensive HSR projects would benefit from an 'Infrastructure Condominium'

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# Alameda Corridor project offers a precedent for creative financing



Special Purpose  
Authority  
Created to work  
with Ports, Cities,  
State, USDOT,  
and railroads.

# \$2.5 billion in financing split between:

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\$1.2 billion in  
revenue bonds.

\$1.295 billion in  
public grants

Bonds are being  
serviced from  
freight rail  
payments





Creating this  
20 mile  
infrastructure  
innovation took:

8 years to organize

4 years to build



# Today's airport expansions could create tomorrow's intermodal terminal space

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A post-carbon transportation redesign including high(er) speed rail will require more change in the next 10 years than US passenger transportation has seen over the past 40 years

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# Leadership has revolutionized US transportation before





# America's Great Pause in Motorization Was Implemented in 1942 – 43



- 3.8 million autos produced in 1941
- 143 autos produced in 1943

Gas and tire rationing yielded  
40% driving drop in two years

