



CALIFORNIA

High-Speed Rail Authority

CONNECTING AND TRANSFORMING CALIFORNIA

Frank Vacca, Chief of Rail Operations

UNLV Symposium

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Las Vegas, Nevada



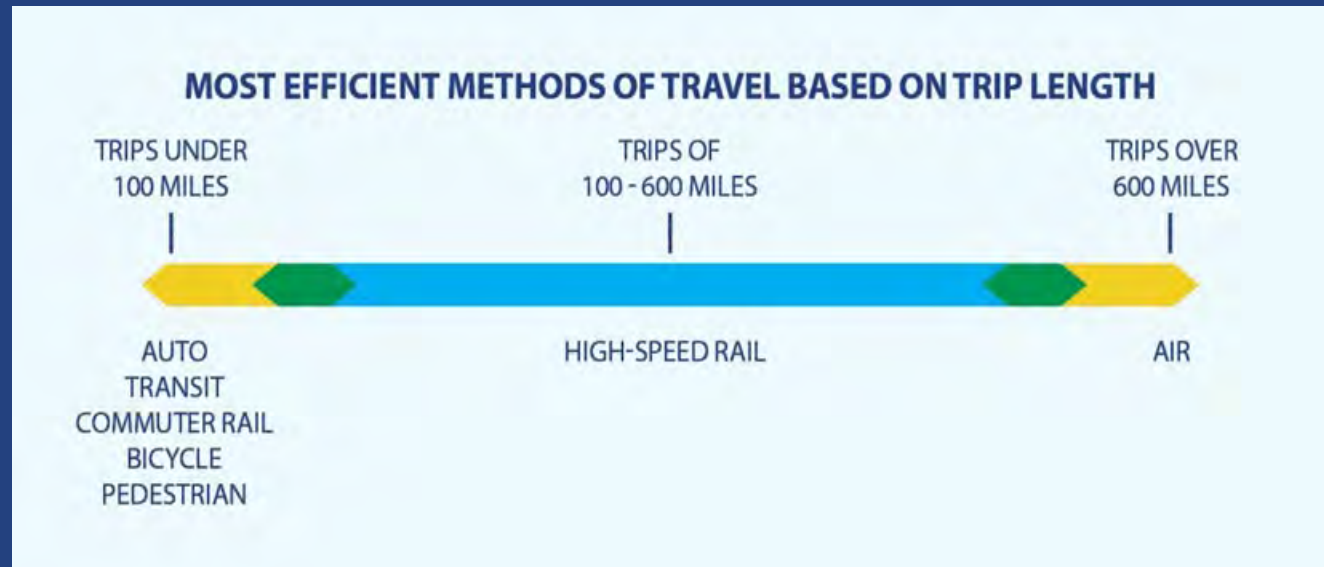
CONNECTING CALIFORNIA: Scope of Work



- **Phase I:**
 - » 520 Miles
 - » San Francisco to Los Angeles/Anaheim
- **Phase II:**
 - » Extends 300 Miles
 - » Connections to Sacramento and San Diego
- **At Least 220 mph**
 - » Design and construct for 250 mph
- **Up to 24 Stations**
- **Ties Economies Together**
 - » San Francisco to Los Angeles
 - 2 hours 40 minutes
 - » San Jose to Fresno
 - 60 minutes
 - » Bakersfield to Los Angeles
 - 60 minutes

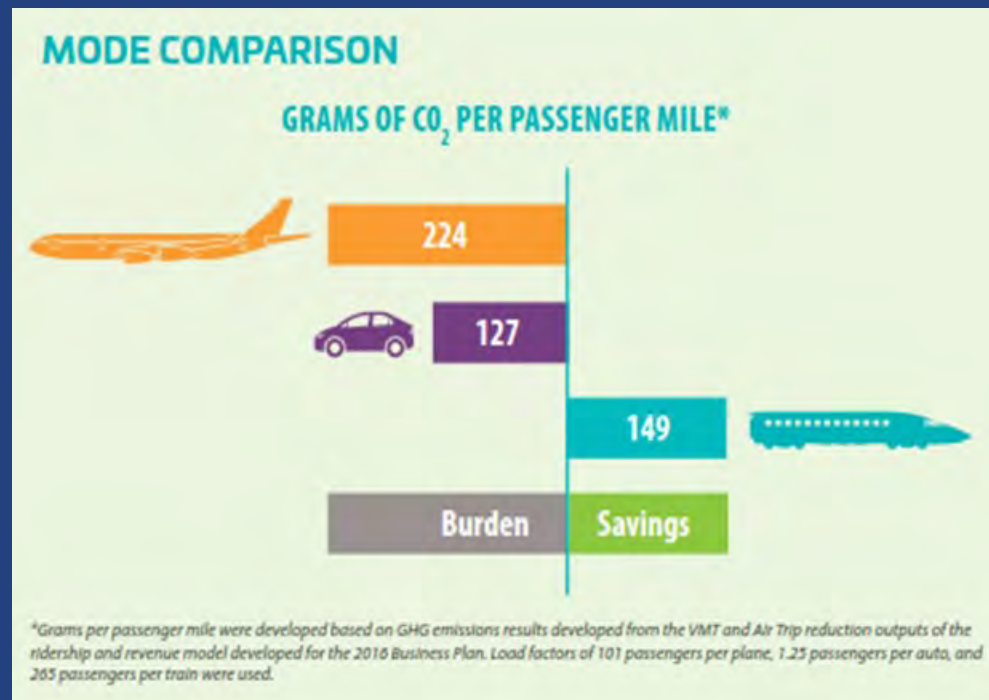
HIGH-SPEED: A More Efficient Alternative

- High-Speed Rail Fills a Gap in California's Infrastructure
- Equivalent New Capacity Between SF-LA would cost **\$158 Billion**, and would require:
 - » 4,300 New Highway Lane Miles
 - » 115 Additional Airport Gates
 - » 4 New Airport Terminals, Runways



HIGH-SPEED RAIL: A New Model For Infrastructure Delivery

- **Delivery Sets a New, Green Standard for Infrastructure**
 - » Operate with 100 Percent Renewable Energy
 - » Require Recycling Steel And Concrete from Demolition and Construction
 - » Invest in Clean Agricultural Equipment to Offset Emissions
 - » Require the Cleanest Equipment on Site



HIGH-SPEED RAIL: Helping Shape Cities

- **Ties Economies Together**
 - San Jose to Fresno = 60 Minutes
 - Bakersfield to Los Angeles = 60 Minutes
 - San Francisco to Los Angeles = 2 Hours and 40 Minutes
- **Connects With and Reinforces Local Mobility**
- **Foundation for Sustainable Growth**
- **Opportunities for Revitalization in Downtown Cores**



2018 BUSINESS PLAN: Our Commitments

- Deliver the Phase 1 System
- Deliver the Silicon Valley to Central Valley Line as soon as possible
- Invest bookend funds as full partner in the Burbank– LA– Anaheim corridor
- Continue planning for Phase 2 extensions



HIGH-SPEED RAIL: It's Happening!

- Approximately 119 Miles
- Madera to North of Bakersfield
- Over \$10 Billion Total Investment
 - » More Than \$3 billion in Construction Contracts
 - » More Than \$2 billion in Support Contracts



HIGH-SPEED RAIL AUTHORITY: Central Valley Project Delivery

- **Construction Package 1**
 - » 32 Miles
 - » \$1.55 Billion
 - » Tutor Perini/Zachry/Parsons (DB)
 - » Wong+Harris (PCM)
 - » 55.3% Complete*
- **Construction Package 2-3:**
 - » 65 Miles
 - » \$1.65 Billion
 - » Dragados/Flatiron (DB)
 - » Arcadis (PCM)
 - » 36.7% Complete*
- **Construction Package 4:**
 - » 22 Miles
 - » \$513 Million
 - » California Rail Builders (DB)
 - » HNTB (PCM)
 - » 20.5% complete*



* As of July 31, 2018

Construction Update

AUGUST 2018



NEED FOR A PARADIGM SHIFT

- **How can a high-speed rail system perform all safety inspections under the following conditions**
 - » 220 mph train operation
 - » Sealed corridor
 - » Trains operating between 5 am and 12 midnight
 - » Maintenance performed between 12 midnight and 5 a.m.
 - » No employee or individuals within sealed corridor during train operations
- **Use of FRA “Rule of Particular Applicability”**



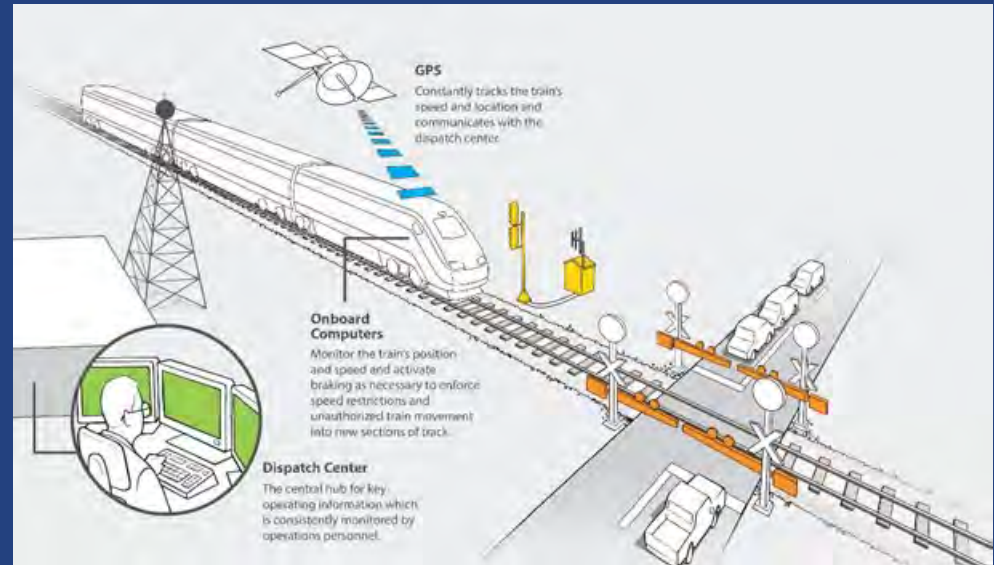
HIGH-SPEED RAIL: Technology Based Systems

- **Real time diagnostics**

- » Train accelerometers
- » Sub stations/High voltage equipment
- » Switch machines
- » Trainsets
- » Live SCADA monitoring of critical components

- **Safety**

- » Seismic warning
- » Intrusion detection
- » Broken rail protection
- » Alarm monitoring for wind/high temperature/high water
- » Derailment containment walls



HIGH-SPEED RAIL: Technology Based Systems

Technology Based Inspections are our foundation for High-Speed Rail Inspections

- Geometry inspection on daily revenue trains
- Computer vision
 - » ROW monitoring for vegetation, fencing, drainage and ditches
 - » Tie condition
 - » Clips
 - » Ballast Section
- Drones
 - » Bridge Inspection
- LiDAR



NEXT GENERATION OF RAILROADING IN THE USA

- High-speed rail may be the catalyst for change
 - » Safety for our employees
 - » Safety for our customers
 - » Minimize operating costs
 - » Minimize service disruption



STAY INVOLVED

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