

The Next NAS 2025 Demand Projections

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The Story Begins with:

People...
Productivity...
And Planes!

The Chapters Unfold with:

More Runways...
Quieter Airplanes...
Airspace and Procedural Changes...
Understanding Socio-economic Drivers...

The 2025 NAS is not a technology push

People...

U.S. Bureau of the Census' Population Division projects population growth and demographics of that growth

- In-migration - movement between states
- Birth and deaths
- Immigration
- Metropolitan area growth
- Age, sex, race, and national origin

Population Factoids:

Today

292,823,000

2025

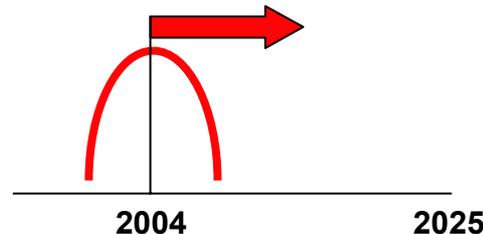
335,049,000

2050

419,900,000

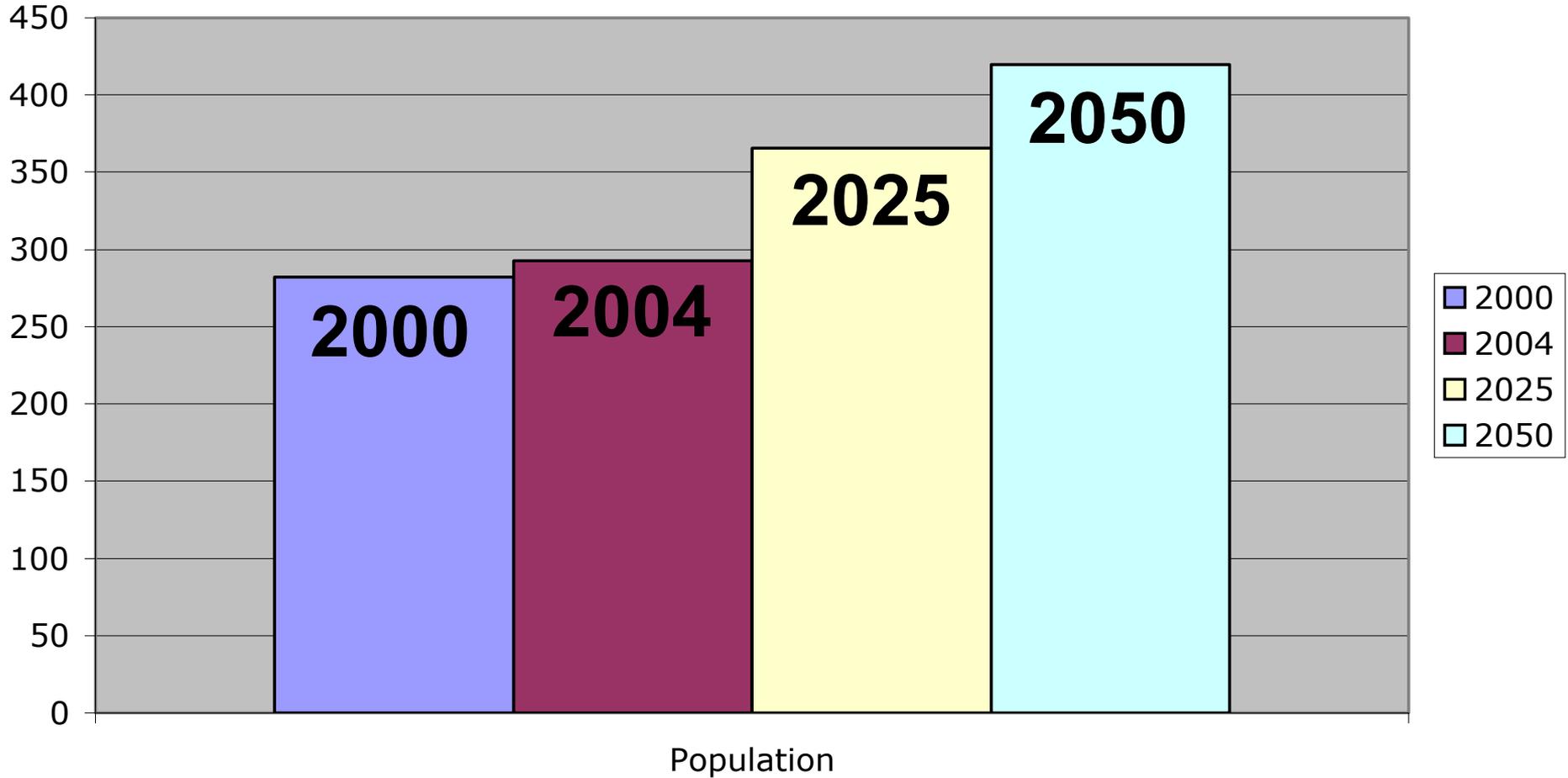
Tracking the “baby boomer” population hump

- A baby boomer is someone born between 1946 and 1964
- By 2025, these people (us) will be between 61 and 79



People...

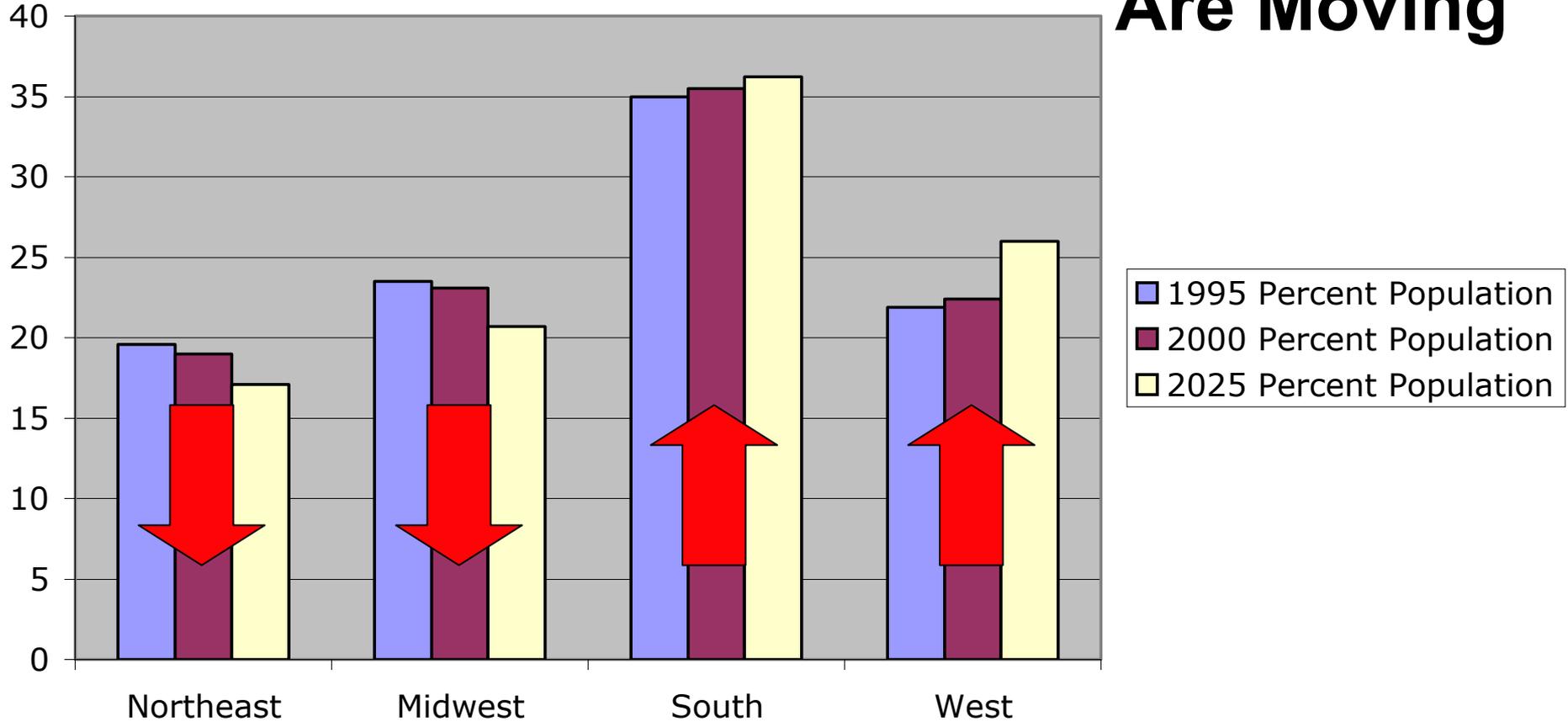
Population Growth (Millions)



People...

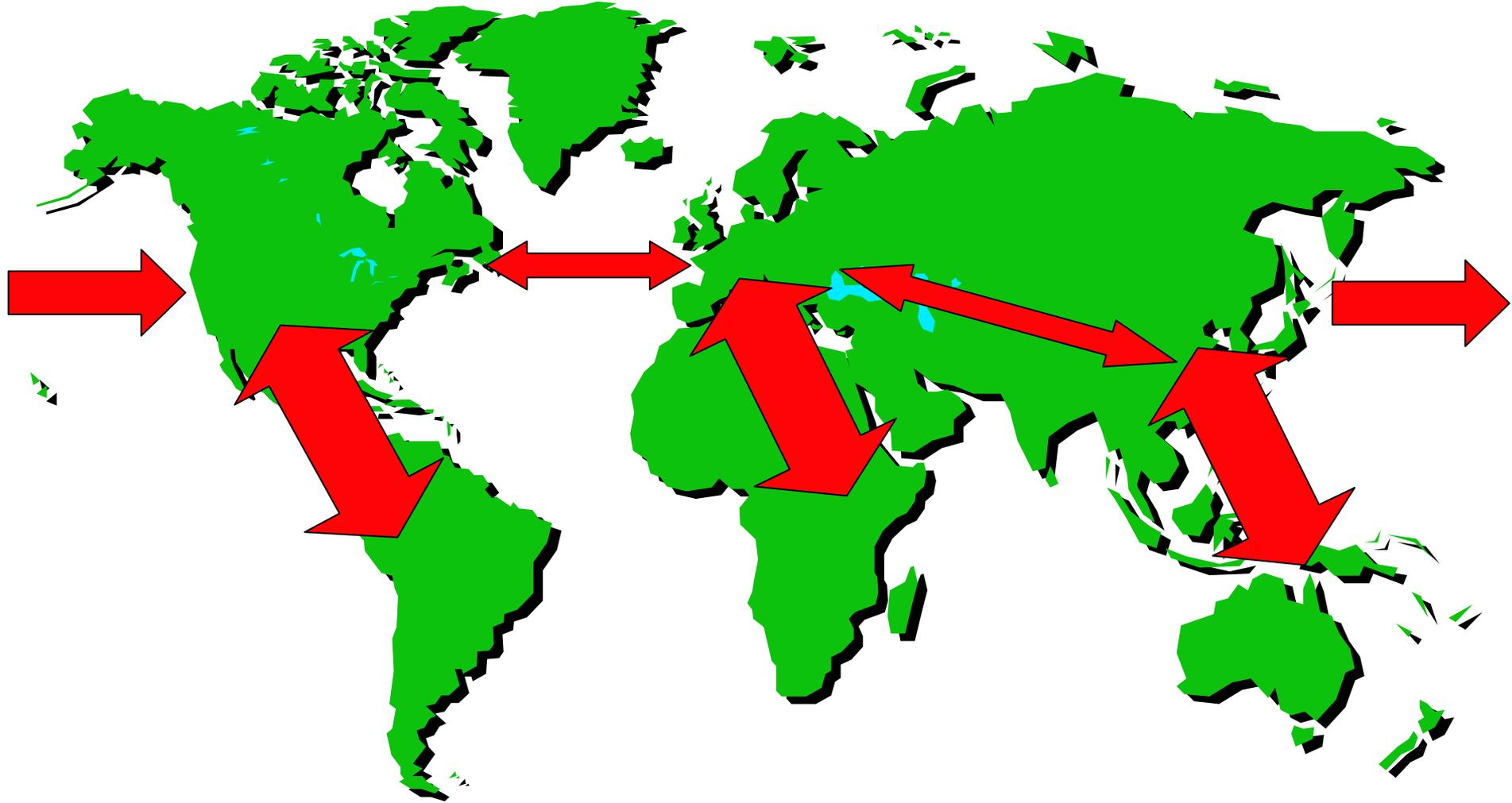
Regional Growth (Percent)

Where People Are Moving



People...

Major Air Migration Paths



People...

- **US Population will grow by 49%** during the next 50 years
- After 2030 the rate of increase might be the slowest since the Great Depression as the size of the “baby boomers” dies off
- The **Hispanic population** will increase by **188 %**, stimulating travel across the Americas
- The **Asian population** in the US increases by **213 %** mostly in California
- The Los Angeles area adds nearly 800 new residents per day
- California’s 17.7 million more people equals the current population of the state of New York

2025 Population

Factoids:

California

+ 17.7 million

Texas

+ 8.5 million

Florida

+ 6.5 million

People...

Large Metropolitan areas continue to grow

New York + 3.1 million (14.7%)

Los Angeles + 7.8 million (47.8%)

San Francisco + 3.3 million (47.4%)

Chicago + 1.1 million (12.4%)

Washington-

Baltimore + 1.7 million (22.2%)

Dallas-Ft. Worth + 2.2 million (43.0%)

Philadelphia + 0.5 million (7.9%)

Boston + 0.8 million (13.6%)

Houston + 1.8 million (38.1%)

Detroit + 0.2 million (3.1%)

+ 22.5 million

**2025 Population
Factoids:**

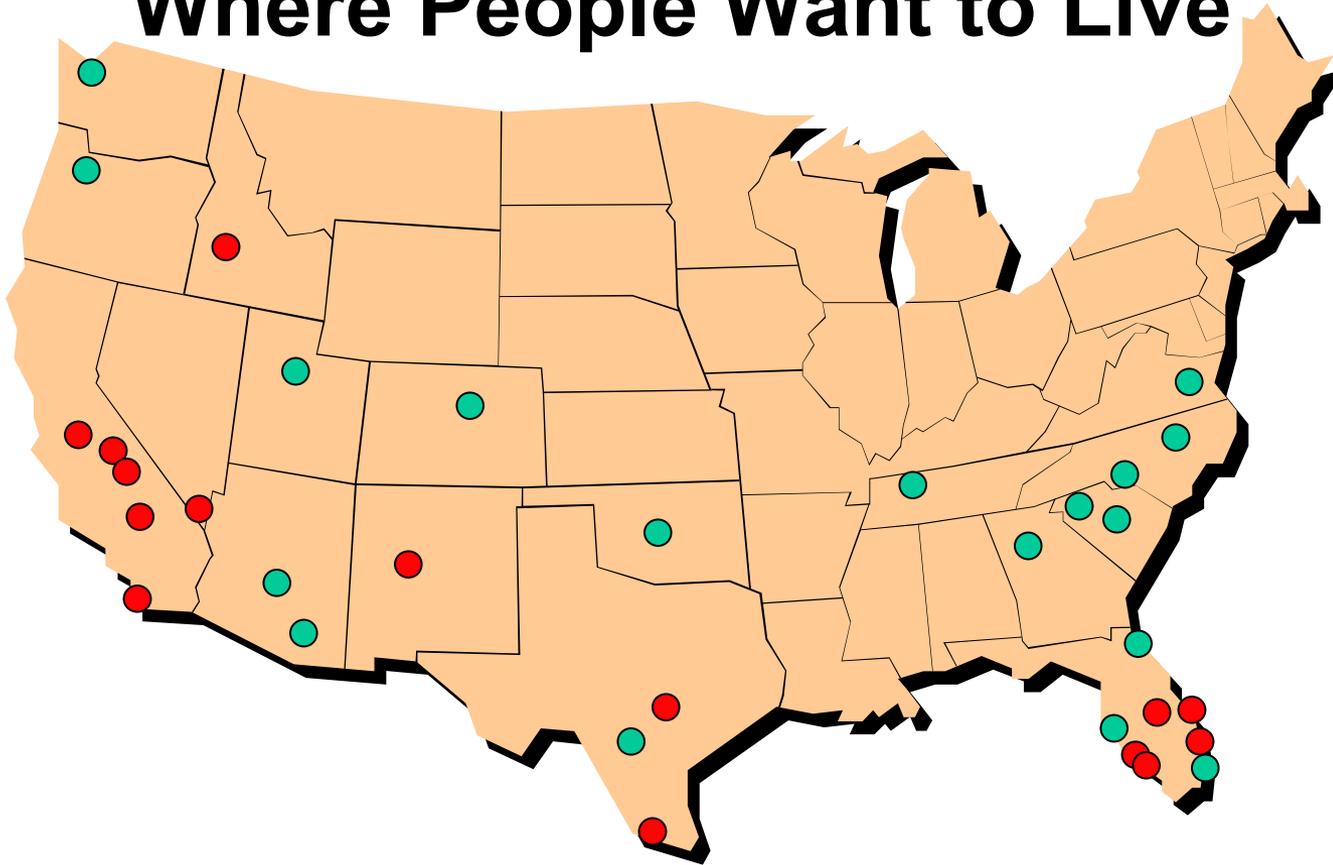
**More than
40 million people
move within the
US each year
Most seeking
economic
opportunity**

By 2025

The top 10 represent more than 1/2 of the population growth

People...

Where People Want to Live



**Many Cities are
Bursting at the Seams
By 2025**

- 40% or Greater Growth
- 20 to 38% Growth

People...

Are existing airports adequate? - NO

- By 2025, the leading edge of the “baby boomers” will decrease travel, but the trailing hoards are into leisure travel
- Communities in Florida, the Carolinas, and California need airports and airspace changes
- Long Island airports cannot take up the demand in New York - a new approach is needed that integrates operations as if each airport were just a runway at a megaport to leverage gaps in demand
- New airport west of Boston
- New airports east of Los Angeles and San Diego
- New airport west of Chicago after Milwaukee is saturated
- Better intermodal links in major metropolitan areas
- 24/7 operations will demand quieter operations

Productivity...

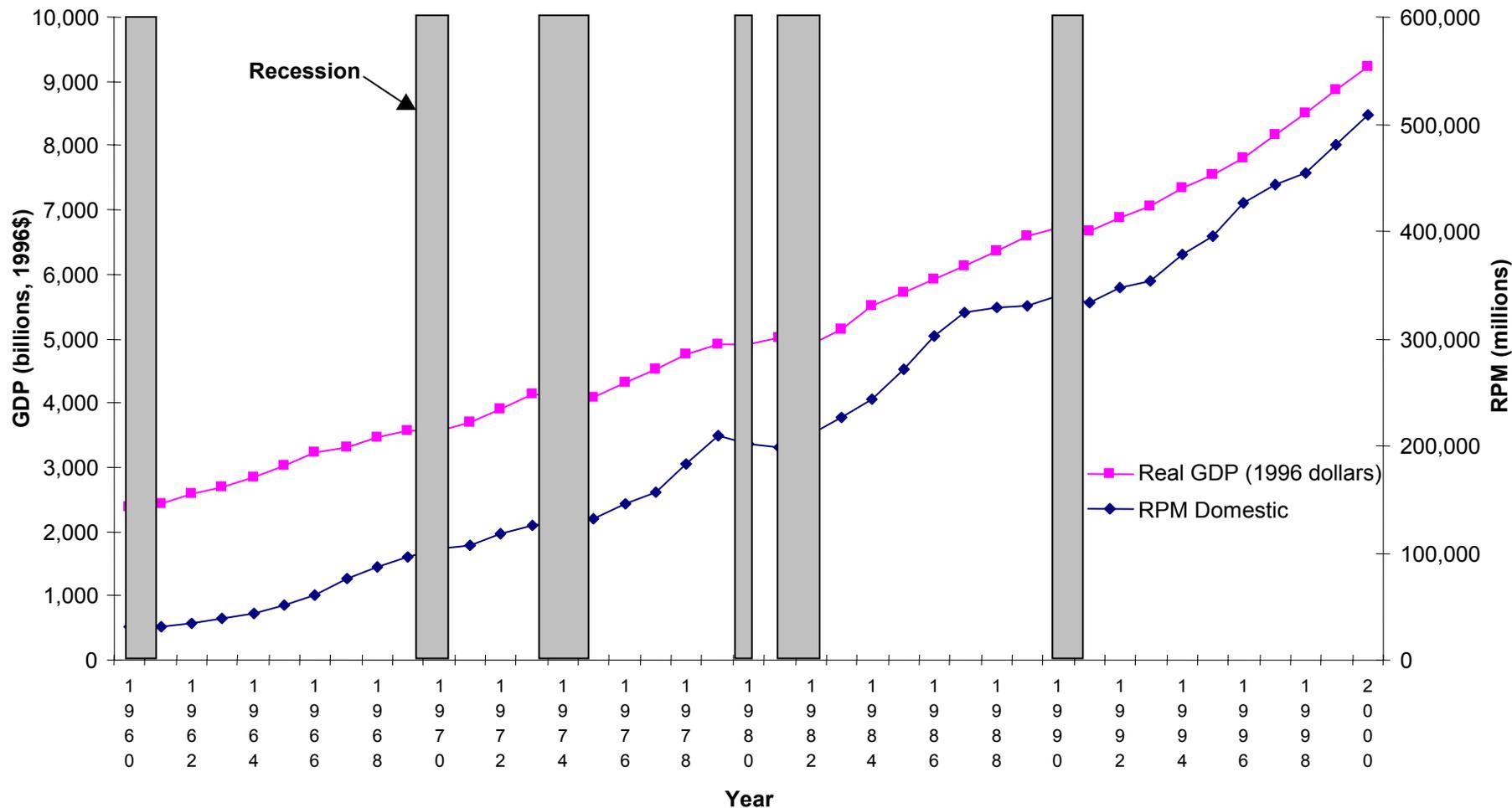
- A relationship exists between gross domestic product (GDP) and revenue passenger miles (RPM) or revenue passenger kilometers (RPK)
- GDP has a steady track record and shows economic growth for nations
- Used by Boeing and Airbus to project RPM demand beyond national aviation forecasts
- GDP supports the air transportation market
- Historic data is available for most nation's GDP
- An RPM is a paid and occupied seat traveling a mile - on a flight to Los Angeles you are 2,300 RPMs

There are Billions and Billions of RPMs

Productivity...

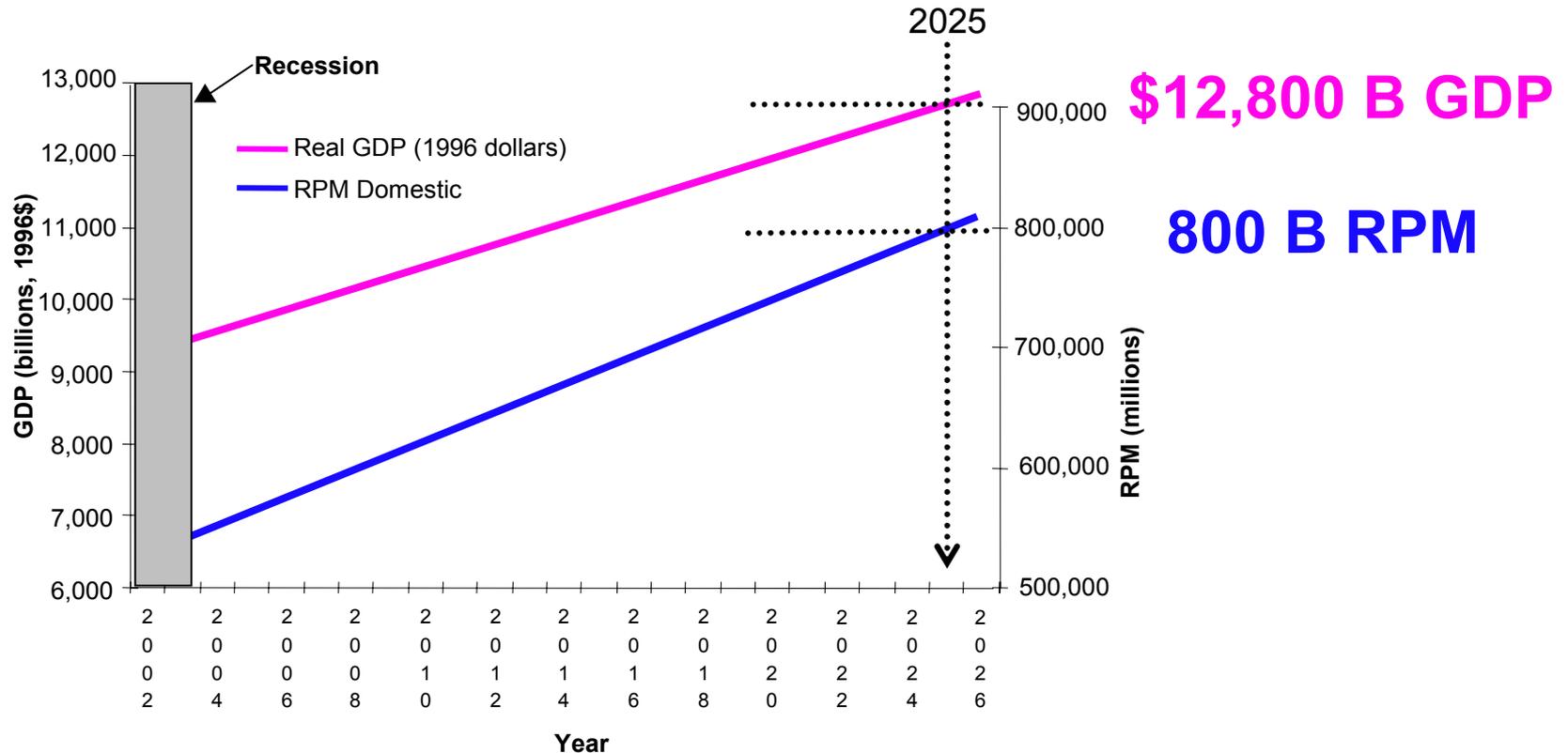
GDP and Domestic RPM: 1960-2000 Historic Baseline

RPM data from Air Transport Association
GDP data from Bureau of Economic Analysis, DOC
Recession markings from Dow Jones (approximate)



Productivity...

GDP and Domestic RPM: 2002-2025 Projected Performance



Productivity...

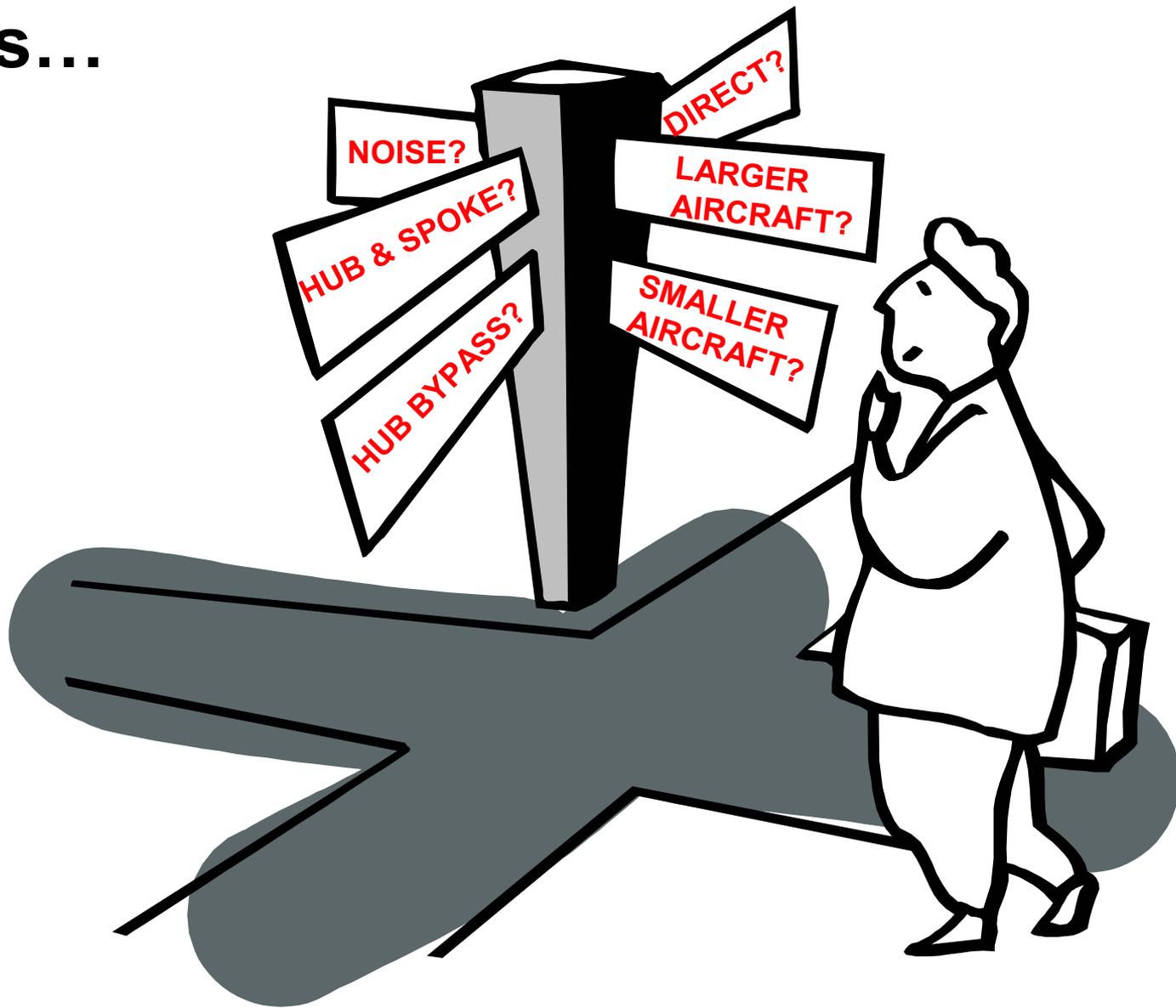
- Straight-line extrapolation of historic data produces a minimum of 800 B RPMs
- Boeing has estimated passenger growth at 4.4% to 2022 for 1,258 B RPMs
- Current aircraft load factors are on the order of 70%
- If all aircraft were flying full all the time and aircraft were replaced over time with the same capacity there would be a short-fall (unfulfilled demand) of between 140 B RPM on the low end and 600 B RPM on the high end for airline operations

RPM Factoids:
2003 US RPMs
488 Billion

2003 Available
Seat Miles (ASM)
Capacity
680 Billion on
8,600 aircraft

To sustain GDP, the number of aircraft operating in the NAS must grow to carry the passengers

Planes...



WHICH WAY FORWARD?

Planes...

- **The Boeing Bet** - smaller capacity, more frequency
- **The Airbus Bet** - Bigger new large aircraft
- **The RJ Bet** - more aircraft over longer segments with more frequency of service
- **The Business Jet Bet** - significant growth segment with greater frequency - fractional ownership is just beginning
- **The Micro-jet Bet** - faster, cheaper, better
- **The Military Bet** - UAV's and increased airspace needs for training
- **The Recreational Pilot** - more opportunity and access

The smart money is to cover all bets - but realize that the fleet mix will require significant NAS changes in airspace and procedures to realize the best return on aircraft investment

Planes...

Air Transports

Assuming a continuing 70% load factor for Air carrier aircraft in commercial service:

- The unmet demand in 2025 would require 14,100 to 22,200 aircraft to support the growth in RPM, slightly above the Boeing estimate
- This would generate approximately 10,000 to 15,700 aircraft actually flying at any one time in the NAS
- This is very close to the target of three times the traffic set by DOT Secretary Mineta with the President
- Three times the traffic in the air requires the ability to takeoff and land

Boeing Estimate For 2022

US Fleet

- **12,758 aircraft**
- **747 or larger 2%**
- **Twin-aisle 15%**
- **Single-aisle 57%**
- **Small Regional Jets 26%**

Planes...

Greatest growth in operations has been with the **Regional Jets (RJ)**

Between March 2001 and March 2003

- Growth in domestic traffic has been 51%
- This is 7 % of all traffic
- Number of routes has increased over the same period by 21%
- By the end of 2004, approximately 560 RJ aircraft will be flying
- Growth projections of 3,300 to 5,000 aircraft by 2022

RJ Factoids:
Average Seats Available = 53
Average Stage Length = 310 NM
Approximately 20 departures per route

No gain without pain

38 % of Chicago O'Hare traffic - Up 29 percent for the year

35 % of Dallas-Ft. Worth traffic - Up 11 percent for the year

Loss of use of "turbo-prop" runways due to noise and length

Lower climb rate and speed

Planes...

Business Jets

Fractional Ownership extends benefits of business aviation to new customers

- 7 % of current fleet
- 45 % of current order backlog going to fractional ownership
- 15 - 16 % of annual deliveries going to fractionals

In 1986, there were 3 ownership shares (NETJETS)

- By 2002 there were 5,827 shares
- NETJETS is the 6th largest fleet, behind Southwest Airlines and has 400 additional jets on order and total orders in excess of \$21Billion
- NETJETS had over 98,000 flights and 260,000 flight hours in 2002

BusJet Factoids:

- 8,000 Jets flying
- 12,300 by 2014
- 16,000 estimated by Honeywell
- 29% of en route operations in US

Planes...

Micro-jets

Cessna, Eclipse Aviation, Adam Aircraft Safire Aircraft, and Avocet Aviation seeking the market

- Selling for \$1 to 2.6 Million and about \$350/hour to operate (\$0.69/mile) with 4-6 passengers
- An air taxi business model with a fractional ownership twist

Micro-jet Factoids:

Eclipse Aviation

- 2,100 firm orders
- Shipping 1,500 per year

Demand is

**estimated at
8,000 - 15,000**

Business Jet Fractional Market - approx 100,000 shares

- \$25+ M net worth for individuals (Approximately 55,000 people)
- \$30+ M in business revenue (Approximately 45,000 businesses)

Micro-jet market is four times larger with over 250,000 people and 200,000 businesses

Planes...

Air transport aircraft set the performance today - will they in 2025? The mix gets more complicated

- RJ's climb slower cruise slower than larger air carriers
- Business Jets climb faster, cruise higher and climb higher than larger air carriers
- Micro-jets climb slower, cruise slower and climb into the same airspace as larger air carriers
- Turbo-props and pistons “own” the airspace below FL180

Air carrier aircraft, RJ's, business jets and micro-jets can fly the same approaches, but each has quite different climb and descent profiles

Planes...

James Coyne, President of the National Air Transport Association has coined the phrase the **Third Dimension in American Air Transportation** -

Air transportation today is two dimensional -

- **Large, fast** aircraft with professional pilots
- **Small, slow** private planes flown by private pilots

The micro-jet shatters this paradigm by adding -

Small, fast aircraft with private pilots creates this third dimension

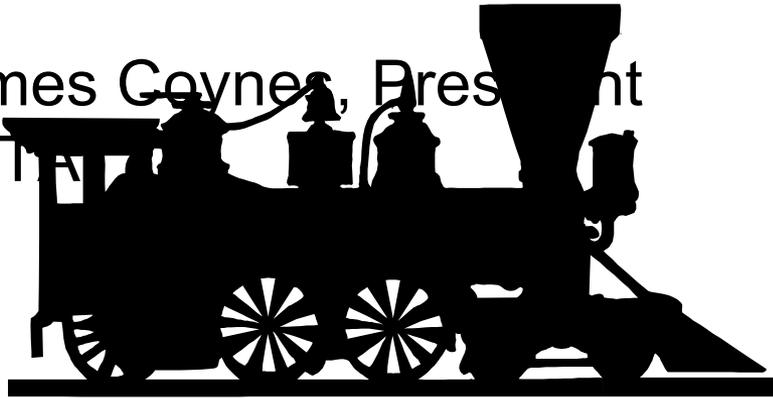
The traveler can decide whether to fly large and fast, small and fast, or small and slow, scheduled, fractional, or on-demand

The micro-jet is 15-35% smaller and 5-10% slower than the business jet, with operating costs less than half the business jet

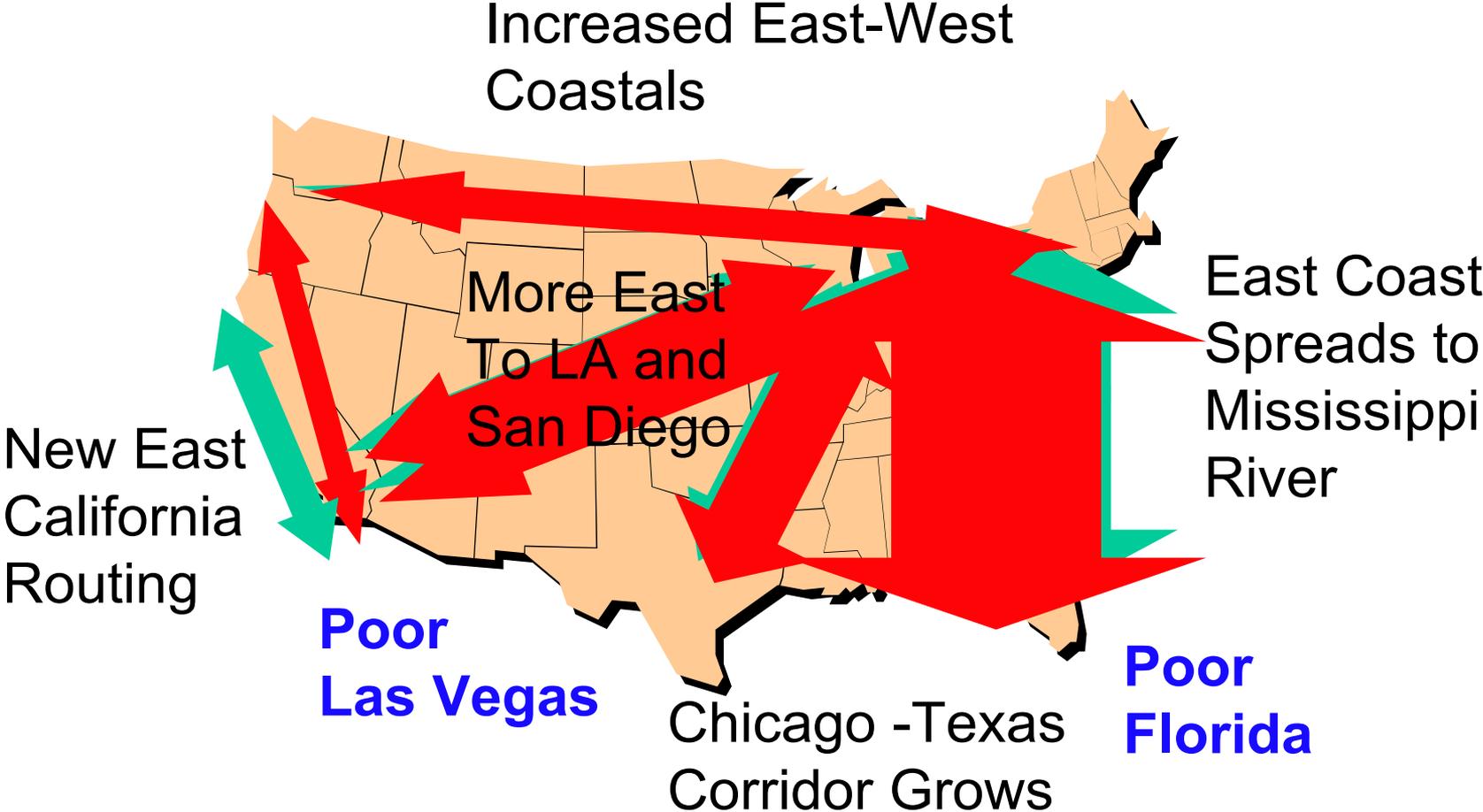
Planes...

“The new **Third Dimension of Air Transportation** could be as revolutionary as the transformation of ground travel was a century ago. Then, as now, the two dimensional choices were big/fast (trains and trolleys) or small/slow (horse/buggy/carriage) and then along came small/fast (the automobile). Back then, the big money stuck with the train, trolley, and even buggy whip investments and soon didn't know what hit them. Will something similar happen in the air?”

James Coyne, President
NATA



Airspace Changes Due to Safety and Demand...



Creation of airspace requires transformation - vertically, laterally, and longitudinally, with time as the fourth dimension

The Point...

- Recover “lost” turbo-prop runways
- Build more runways for fast growing cities
- Consider the megaport - airspace for multiple airports
- Lateral separation becomes more valuable than vertical separation
- Mixed Mach operations require passing
- Controller workload must be reduced
- 24/7 airports with 2 am departures means quiet aircraft
- Three times the traffic requires the ability to land and depart
- Fractionals, micro-jets, and UAVs are in the “air carrier airspace”
- En route wake vortex separation?
- Adaptive NAS, not the lowest common denominator in airspace
- New airspace structure for California/Nevada
- New airspace structure for Florida
- Caribbean (Gulf) airspace for the baby boomers

