# AFFIRMATIVE

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### Advantage One – Industry

#### The Advantage is Aviation

#### Switch to NextGen will help the aviation industry and lock in economic growth

Bourgeois 10 **(**Daniel Bourgeois, August 2010, Masters of Science Science, Technology and Public Policy, Rochester Institute of Technology, “The Next Generation Air Transportation System: An Answer to Solve Airport Efficiency?”page 171, 172, http://gradworks.umi.com/1480274.pdf)

Disappointingly, there is a cut in the money allotted for air traffic control and wake turbulence mitigation research, which are some of the largest reasons for airport congestion. Some say that we are at a critical point because over the next ten years the use of our air system will double and then soon triple over time. If we are to keep this economy moving in the right direction, we must start taking action now. NextGen is the answer that we are looking for that will save the air travel industry and as well as American aviation Currently, the reality is that if the transformation does not occur, the aviation sector and all of it related services which contribute to about nine percent of the overall gross domestic product will become less productive. NextGen will flexibly and efficiently meet that growing demand with ease. Every end of the aviation industry will benefit from this, law enforcement, commercial, defense, and recreation. Someday, it will also be able to handle the use of low earth orbit vehicles. Currently the UPS hub at Louisville Kentucky is using the ADS-B system and it is saving time and money just by taking off, landing, and moving aircraft on the ground more efficiently. The new demonstrations, technologies, and procedures with become the backbone that is going to bring our air system into the 21st century. Just like the railways and highways did in allowing Americans the freedom to travel and to provide goods and services all across the nation.

#### AND – even the pessimistic numbers show there will be a major economic boost

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Based on these estimates, the total cost of accidents to the general aviation community in 2010 was about $1.449 bil- lion. Even with on-board ADS-B, the prospect of greater situ- ational feedback and data could be undermined by human error of judgment. However, a reasonably moderate esti- mate can be made where greater situational awareness does contribute to preventing some accidents. Table 5 shows savings to the general aviation community under various levels of NextGen’s impact on safety. Even if NextGen plays a small role in improving safety and reduc- ing incidents in general aviation, the potential benefits are substantial.28

Summary of NextGen Benefits

Table 6 summarizes the potential annual NextGen benefits to the aviation community, assuming complete infrastructure and equipage. For commercial airlines, reduced delays and fuel consumption could bring up to $1.45 billion/year of benefits. For passengers, the estimated value of reduced de- lays and travel time is about $852 million/year for a 20 per- cent delay reduction and $1.5 billion/year for a 35 percent delay reduction. The benefits are quite substantial for the general aviation community as well. One important point to note is that even for a small impact of NextGen, benefits can be very high. The value of reduced travel time is esti- mated to be $10.69 million/year for a one percent reduction, and $53.47 million/year for a five percent reduction. The value of reduced fuel consumption is about $45.31 million/ year for a one percent reduction and $226.54 million/year for a five percent reduction. Safety benefits could range from $14.21 million/year to $142.2 million/year in terms of reduced accident fatalities, while the cost of lost aircraft can be reduced by up to $2.83 million/year.

#### Switching to NextGen vital to sustaining the aviation industry and national economic growth

Wood 10 (Janice wood; 3-9-10; “Forecast links NextGen and national economic growth”; writer for General Aviation News; <http://www.generalaviationnews.com/2010/03/09/forecast-links-nextgen-and-national-economic-growth/>)

WASHINGTON, D.C. — The FAA is forecasting that key airspace safety and efficiency modernization efforts will play a vital role in spurring long-term sustained growth in air travel and the nation’s overall economic health. The forecast, which comes after a short-term period of slow growth in aviation activity, underscores the need for the Next Generation Air Transportation System (NextGen) and continued investment in airport infrastructure projects, officials said upon releasing it March 9. “A safe, efficient and vibrant aviation system is vital to our nation’s economic health,” said Secretary of Transportation Ray LaHood. “We must find long-term solutions that will keep the U.S. aviation industry competitive and moving forward into the future.” While much of the forecast deals with airlines, there are some GA-specific predictions as well: •The general aviation fleet will increase from 229,149 aircraft in 2009 to 278,723 in 2030, growing an average of 0.9% a year. •Fixed-wing turbine aircraft will grow at a rate of 3.1% per year, fixed-wing piston aircraft will grow at a rate of 0.1% per year, and rotorcraft will grow at a rate of 2.8% per year. •General aviation hours flown are forecast to increase from 23.3 million in 2009 to 38.9 million in 2030, an average annual growth rate of 2.5% a year. •Fixed-wing turbine aircraft hours flown will grow at a rate of 4.6% per year, fixed-wing piston aircraft hours flown will grow at a rate of 1% a year, and rotorcraft hours flown will grow at a rate of 3% per year. The 20-year forecast calls for total operations at airports to decrease 2.7% to 51.5 million in 2010, and then grow at an average annual rate of 1.5%, reaching 69.6 million in 2030. At the nation’s 35 busiest airports, operations are expected to increase 60% from 2010 to 2030. “This forecast makes a very strong business case for NextGen,” said FAA Administrator Randy Babbitt. “Without NextGen, we won’t be able to handle the increased demand for service that this forecast anticipates.” NextGen is transforming air traffic control from the ground-based radar system of today to a satellite-based system of the future. FAA officials say NextGen technologies and procedures will increase capacity and safety and reduce fuel burn, carbon emissions and noise by providing more efficient air routes and procedures. Other innovations include improved weather forecasting, data networking and digital communications. Hand in hand with these state-of-the-art technologies are airport improvements that are beginning to give pilots and controllers a more precise picture of the location of aircraft and vehicles on runways and taxiways. The American Recovery and Reinvestment Act of 2009 is providing significant infrastructure improvements to meet growing airspace needs, FAA officials note. It has provided $1.1 billion to airports nationwide. To date, 326 grants for over 360 projects have been distributed to airports that support passenger and cargo service as well as general aviation. Recovery Act grants are being used at both urban and rural airports to fund a variety of different modernization efforts including facility construction, safety enhancements and the rehabilitation of runways, taxiways and other infrastructure. Other forecasts in the report deal with workload. For instance, operations at airports with FAA Traffic Control and Contract Tower Service are forecast to decrease 2.7% to 51.5 million in 2010, and then grow at an average annual rate of 1.5% for the remainder of the forecast period, reaching 69.6 million in 2030. The average annual growth rate for the entire 21-year forecast period is 1.3% percent. General aviation operations are forecast to decrease 3.1% in 2010, and grow at a rate of 1.3% thereafter, totaling 35.1 million in 2030. Terminal Radar Approach Control (TRACON) operations are forecast to decrease 1.1% to 39 million in 2010, and then grow at an average annual rate of 1.7% for the remainder of the forecast period, reaching 54.4 million in 2030. The average annual growth rate for the entire 21-year forecast period is 1.5%. General aviation TRACON operations are expected to decrease 0.3% in 2010, and grow at a rate of 1.2% thereafter, totaling 17.9 million in 2030. Instument Flight Rules (IFR) aircraft handled at FAA air route traffic control centers are forecast to decrease to 39.4 million (-1.6%) in 2010 and then grow 2.5% a year over the remaining 20 years of the forecast period, reaching 64.1 million in 2030. General aviation IFR aircraft handled is expected to decrease 2.7% during 2010. Thereafter, general aviation IFR aircraft handled is expected to grow at an average annual rate of 0.9%, reaching 7.3 million in 2030.

### Scen 1 – Economy

#### Scenario One is Economic Growth

#### Implementation key to economic growth

HUERTA 12 Administrator of the Federal Aviation Administration [Michael P. Huerta; March 2012; “NextGen Implementation Plan]

WHy NextGeN MatteRS

NextGen benefits everyone from frequent flyers to those who rarely travel by air. NextGen will provide a better travel experience, with fewer delays, more predictable trips and the highest level of safety. Many people who live in neighborhoods near airports will experience less aircraft noise and fewer emissions. Communities will make better use of their airports, strengthening their local economy. Our nation’s economic health depends on a vital aviation industry.

Hat IS NextGeN?

The Next Generation Air Transportation System, or NextGen, is a transformative change in the management and operation of how we fly. NextGen enhances safety, reduces delays, saves fuel and reduces aviation’s adverse environmental impact. This comprehensive initiative, which is already providing benefits, integrates new and existing technologies, including satellite navigation and advanced digital communications. Airports and aircraft in the National Airspace System (NAS) will be connected to NextGen’s advanced infrastructure and will continually share real-time information to provide a better travel experience. The foundations of NextGen have been solidly built upon four major pillars: economic impact, sustainability, flexibility and safety.

ECONOMIC IMPACT

The overall health of the U.S economy is highly dependent on the aviation industry. As recently as 2009, civil aviation contributed $1.3 trillion annually to the national economy and constituted 5.2 percent of the gross domestic product. It generated more than 10 million jobs, with earnings of $394 billion. Given the economic challenges faced by the country today, it is imperative that we protect and expand this vital economic engine. By implementing technologies and procedures that enable operators to burn less fuel and operate more efficiently and competitively, NextGen is intended to do just that.

#### Updating NextGen would spur economic growth and keep avoid an inevitable future collapse

BLAKEY 11 President and CEO of Aerospace Industries Association [Marion C. Blakey, The future of NextGen, 02/15/11, http://thehill.com/blogs/congress-blog/economy-a-budget/144119-the-future-of-nextgen]

The House and Senate have each declared passage of a new FAA Authorization bill a top legislative priority, very welcome news after more than three years of short-term extensions. Air transportation is a proven economic engine; passage of this bill is an investment in our nation’s economic recovery.

The U.S. air transportation system has been the world’s gold standard for more than half a century. But to remain so, we need to bring our system into the 21st Century. Air service demand will return to pre-recession levels, but along with the return of that demand will come the return of gridlock—you can count on it

The best means of addressing the gridlock to come is acceleration of the full deployment and implementation the Next Generation Air Transportation System. That makes funding NextGen a government investment, not government spending. Even in these tough economic times, it makes more sense to accelerate NextGen than slow it down. Cutting NextGen will ultimately cost the government and our economy much more than it will save.

One of the larger challenges facing our ability to realize NextGen’s enormous benefits is the issue of establishing a sound business case for equipping civil aircraft with upgraded avionics systems. Quite frankly, without equipage there is no NextGen.

Innovative and careful structuring of government support for equipage can help resolve the obstacles to full implementation of NextGen. However, with the nation’s need to address the growing federal deficit, it is important also to look at ways to leverage the available private-sector capital markets.

To this end, AIA recommends language in the FAA Reauthorization bill that encourages funding equipage with the participation of private-sector investment capital. FAA should have the authority to enter into government-guaranteed loan arrangements that can be used in innovative ways to incentivize the retrofitting of commercial and general aviation aircraft with NextGen avionics equipment.

Critical to leveraging available private-sector capital markets is reducing risk to stimulate investment. A key message from industry throughout the FAA Reauthorization deliberations is the need for government accountability for achieving progress. FAA must establish a set of progress metrics so that the administration, the Congress, industry stakeholders and the public can measure and track the operational improvement that is actually being achieved by the program. These metrics need to track performance outcomes, not just activity. Both industry and the regulators must be capable of determining whether efforts are actually improving safety, capacity and efficiency

A big part of NextGen are the thousands of new satellite-based procedures that allow more efficient takeoffs and landings. All these airspace procedures must be designed and implemented, and most will require an environmental assessment. The National Environmental Policy Act process can be extremely protracted and time-consuming. Given the volume of expected airspace redesigns and the immediate economic and environmental benefits their implementation will provide, AIA recommends including NextGen-related airspace redesigns in the Airport Streamlining Approval Process as defined in Section304 of Vision 100 and an FAA-EPA interagency review to produce a more streamlined process.

With a streamlined NEPA process, new flight tracks and procedures will be implemented expeditiously. FAA estimates these satellite-guided procedures will be quieter, reduce delays and save fuel. By 2018, these procedures will save aircraft 1.4 billion gallons of fuel, which means they will emit 14 million fewer tons of CO2. To implement these procedures even quicker, AIA recommends the FAA certify third- party procedure development. Far more procedures could be put in place in less time and each would be checked and approved by FAA inspectors

The civil aviation industry is an economic engine that contributes positively to the U.S. trade balance, creates high paying jobs, keeps just-in-time business models viable and connects all Americans to friends, family and business opportunities. All of that economic activity is funneled through the nation’s air traffic system. Full NextGen deployment requires the production and installation of hundreds of thousands of high-tech avionics products assembled by skilled workers in U.S. factories and maintenance stations in every state.

Lack of an authorization bill has kept NextGen and other critical programs on life support. It’s time to give FAA the tools to keep our nation the leader in civil aviation.

#### Economic collapse risks global wars that go nuclear

AUSLIN & LACHMAN 09 1. Resident Scholar – American Enterprise Institute 2. Resident Fellow – American Enterprise Institute [Michael Auslin & Desmond Lachman, “The Global Economy Unravels”, Forbes, 3-6, http://www.aei.org/article/100187)

What do these trends mean in the short and medium term? The Great Depression showed how social and global chaos followed hard on economic collapse. The mere fact that parliaments across the globe, from America to Japan, are unable to make responsible, economically sound recovery plans suggests that they do not know what to do and are simply hoping for the least disruption. Equally worrisome is the adoption of more statist economic programs around the globe, and the concurrent decline of trust in free-market systems. The threat of instability is a pressing concern. China, until last year the world's fastest growing economy, just reported that 20 million migrant laborers lost their jobs. Even in the flush times of recent years, China faced upward of 70,000 labor uprisings a year. A sustained downturn poses grave and possibly immediate threats to Chinese internal stability. The regime in Beijing may be faced with a choice of repressing its own people or diverting their energies outward, leading to conflict with China's neighbors. Russia, an oil state completely dependent on energy sales, has had to put down riots in its Far East as well as in downtown Moscow. Vladimir Putin's rule has been predicated on squeezing civil liberties while providing economic largesse. If that devil's bargain falls apart, then wide-scale repression inside Russia, along with a continuing threatening posture toward Russia's neighbors, is likely. Even apparently stable societies face increasing risk and the threat of internal or possibly external conflict. As Japan's exports have plummeted by nearly 50%, one-third of the country's prefectures have passed emergency economic stabilization plans. Hundreds of thousands of temporary employees hired during the first part of this decade are being laid off. Spain's unemployment rate is expected to climb to nearly 20% by the end of 2010; Spanish unions are already protesting the lack of jobs, and the specter of violence, as occurred in the 1980s, is haunting the country. Meanwhile, in Greece, workers have already taken to the streets. Europe as a whole will face dangerously increasing tensions between native citizens and immigrants, largely from poorer Muslim nations, who have increased the labor pool in the past several decades. Spain has absorbed five million immigrants since 1999, while nearly 9% of Germany's residents have foreign citizenship, including almost 2 million Turks. The xenophobic labor strikes in the U.K. do not bode well for the rest of Europe. A prolonged global downturn, let alone a collapse, would dramatically raise tensions inside these countries. Couple that with possible protectionist legislation in the United States, unresolved ethnic and territorial disputes in all regions of the globe and a loss of confidence that world leaders actually know what they are doing. The result may be a series of small explosions that coalesce into a big bang.

### Scen 2 - Aviation

#### Scenario Two is Aviation

#### NextGen boosts the airline industry – they’ll invest in other systems

Laing 6-14-12 (Keith; national political journalist; The Hill; “Obama: 'NextGen' air traffic control system a 'smart investment'”; <http://thehill.com/blogs/transportation-report/aviation/166373-obama-nextgen-air-traffic-control-system-a-smart-investment->)

During President Obama's meeting of his Jobs and Competitiveness Council in swing state North Carolina this week, the Southwest Airlines CEO Gary Kelly suggested building a new air traffic control system could stimulate economic growth. Kelly, who is a member of Obama's jobs council, told the president that the new system known as "NextGen" could save the airlines 15 percent, which could they could be using for other activities that would stimulate jobs. "We want to grow, we want to buy more airplanes, but we're not just generating sufficient profits to make those kinds of investments," Kelly said to CNNMoney. President Obama seemed open to the idea, the agency said, though Republicans have indicated they are unlikely to go along with his proposal for a $556 billion transportation spending bill. "As we move forward, distinguishing between smart investments and dumb investments, it's not something that's often highlighted in these debates," Obama said. The Federal Aviation Administration has long planned to switch the air traffic control system from World War II-era radar technology to a satellite-based system. But in the series of continuing resolutions approved this spring as Congress was working to avert a government shutdown, lawmakers cut about $200 million from the FAA's budget that would have gone to the conversion. Additionally, a long-term overall funding bill for the FAA has also been bogged down in discussions over the labor rights of airline and railroad employees.

#### Airline growth directly boosts Aerospace industry sales

GOMEZ et al 12 [Ben Hur Gomez, John Simon, Alan Ibrahim, undergraduate at Harvard University pursuing a degree in quantitative finance through the statistics department, and an economics degree 2. Zachs Analyst 3. worked at Wikinvest for 3.5 years as a content writer, industry analyst, and summer intern. Graduated from Harvard with a degree in economics and a secondary field in environmental science and public policy “Dependence on key customers”, http://www.wikinvest.com/stock/Precision\_Castparts\_(PCP)]

Demand in the aerospace market

PCP’s commercial sales depend substantially on the production rates of both Boeing Company (BA) and Airbus , which in turn depend upon deliveries of new aircraft. The ultimate drivers of orders and deliveries of aircraft are underlying air travel demand, financial health of airlines, growth prospects for airline capacity, and overall economic growth. The current increase in aerospace demand is dependent on increased spending by foreign carriers and domestic airlines who must upgrade aging fleets. PCP stands to benefit from expected aircraft deliveries by Boeing and Airbus, and from the replacement cycle of aging turbines and aircraft that will be upgraded or overhauled. Any factor that adversely affects the aerospace industry (similar to the tragic events of 9/11 or the SARS travel scare) would likely pressure PCP’s operations and profitability. Bankruptcy of another airline, continued high oil prices, or the possibility of a major terrorist attack threaten to change the course of the recovery in the aerospace cycle and likely impact PCP.

#### NextGen explicitly benefits the aerospace industry

Bourgeois 10 **(**Daniel Bourgeois, August 2010, Masters of Science, Science Technology and Public Policy, Rochester Institute of Technology, “The Next Generation Air Transportation System: An Answer to Solve Airport Efficiency?”page 24,25, http://gradworks.umi.com/1480274.pdf)

There are six objectives that the JPDO set forth to accomplish. They are to retain the United State’s leadership in aviation, expand the capability of the current air system, ensure safety is still in place, protect the environment, ensure national security, and ensure that the system itself is secure. In 2005 the JPDO set out on this task by developing a high level vision to communicate the principles to all of the related agencies. The most difficult part about NextGen is its scope and breath. NextGen encompasses all of the aerospace transportation industry, not just aviation or air traffic management or (ATM). Working with these multiple agencies is critical in getting the goals of NextGen accomplished. After meeting with these agencies the JPDO came out with a NextGen vision briefing. The NextGen vision briefing document details eight different capabilities the new system must have in order to accomplish the six goals that were set for the system.

#### Strong aerospace key to overall US Hegemony—even a moderate decline in the industry would be disastrous

Thompson 9 (David, President – American Institute of Aeronautics and Astronautics, “The Aerospace Workforce”, Federal News Service, 12-10, Lexis)

Aerospace systems are of considerable importance to U.S. national security, economic prosperity, technological vitality, and global leadership. Aeronautical and space systems protect our citizens, armed forces, and allies abroad. They connect the farthest corners of the world with safe and efficient air transportation and satellite communications, and they monitor the Earth, explore the solar system, and study the wider universe. The U.S. aerospace sector also contributes in major ways to America's economic output and high- technology employment. Aerospace research and development and manufacturing companies generated approximately $240 billion in sales in 2008, or nearly 1.75 percent of our country's gross national product. They currently employ about 650,000 people throughout our country. U.S. government agencies and departments engaged in aerospace research and operations add another 125,000 employees to the sector's workforce, bringing the total to over 775,000 people. Included in this number are more than 200,000 engineers and scientists -- one of the largest concentrations of technical brainpower on Earth. However, the U.S. aerospace workforce is now facing the most serious demographic challenge in his 100-year history. Simply put, today, many more older, experienced professionals are retiring from or otherwise leaving our industrial and governmental aerospace workforce than early career professionals are entering it. This imbalance is expected to become even more severe over the next five years as the final members of the Apollo-era generation of engineers and scientists complete 40- or 45-year careers and transition to well-deserved retirements. In fact, around 50 percent of the current aerospace workforce will be eligible for retirement within just the next five years. Meanwhile, the supply of younger aerospace engineers and scientists entering the industry is woefully insufficient to replace the mounting wave of retirements and other departures that we see in the near future. In part, this is the result of broader technical career trends as engineering and science graduates from our country's universities continue a multi-decade decline, even as the demand for their knowledge and skills in aerospace and other industries keeps increasing. Today, only about 15 percent of U.S. students earn their first college degree in engineering or science, well behind the 40 or 50 percent levels seen in many European and Asian countries. Due to the dual-use nature of aerospace technology and the limited supply of visas available to highly-qualified non-U.S. citizens, our industry's ability to hire the best and brightest graduates from overseas is also severely constrained. As a result, unless effective action is taken to reverse current trends, the U.S. aerospace sector is expected to experience a dramatic decrease in its technical workforce over the next decade. Your second question concerns the implications of a cutback in human spaceflight programs. AIAA's view on this is as follows. While U.S. human spaceflight programs directly employ somewhat less than 10 percent of our country's aerospace workers, its influence on attracting and motivating tomorrow's aerospace professionals is much greater than its immediate employment contribution. For nearly 50 years the excitement and challenge of human spaceflight have been tremendously important factors in the decisions of generations of young people to prepare for and to pursue careers in the aerospace sector. This remains true today, as indicated by hundreds of testimonies AIAA members have recorded over the past two years, a few of which I'll show in brief video interviews at the end of my statement. Further evidence of the catalytic role of human space missions is found in a recent study conducted earlier this year by MIT which found that 40 percent of current aerospace engineering undergraduates cited human space programs as the main reason they chose this field of study. Therefore, I think it can be predicted with high confidence that a major cutback in U.S. human space programs would be substantially detrimental to the future of the aerospace workforce. Such a cutback would put even greater stress on an already weakened strategic sector of our domestic high-technology workforce. Your final question centers on other issues that should be considered as decisions are made on the funding and direction for NASA, particularly in the human spaceflight area. In conclusion, AIAA offers the following suggestions in this regard. Beyond the previously noted critical influence on the future supply of aerospace professionals, administration and congressional leaders should also consider the collateral damage to the space industrial base if human space programs were substantially curtailed. Due to low annual production rates and highly-specialized product requirements, the domestic supply chain for space systems is relatively fragile. Many second- and third-tier suppliers in particular operate at marginal volumes today, so even a small reduction in their business could force some critical suppliers to exit this sector. Human space programs represent around 20 percent of the $47 billion in total U.S. space and missile systems sales from 2008. Accordingly, a major cutback in human space spending could have large and highly adverse ripple effects throughout commercial, defense, and scientific space programs as well, potentially triggering a series of disruptive changes in the common industrial supply base that our entire space sector relies on.

#### Hegemony solves nuke war and extinction

Barnett 11 (Thomas P.M, Former Senior Strategic Researcher and Professor in the Warfare Analysis & Research Department, Center for Naval Warfare Studies, U.S. Naval War College American military geostrategist and Chief Analyst at Wikistrat., worked as the Assistant for Strategic Futures in the Office of Force Transformation in the Department of Defense, “The New Rules: Leadership Fatigue Puts U.S., and Globalization, at Crossroads,” March 7 <http://www.worldpoliticsreview.com/articles/8099/the-new-rules-leadership-fatigue-puts-u-s-and-globalization-at-crossroads>

It is worth first examining the larger picture: We live in a time of arguably the greatest structural change in the global order yet endured, with this historical moment's most amazing feature being its relative and absolute lack of mass violence. That is something to consider when Americans contemplate military intervention in Libya, because if we do take the step to prevent larger-scale killing by engaging in some killing of our own, we will not be adding to some fantastically imagined global death count stemming from the ongoing "megalomania" and "evil" of American "empire." We'll be engaging in the same sort of system-administering activity that has marked our stunningly successful stewardship of global order since World War II. Let me be more blunt: As the guardian of globalization, the U.S. military has been the **greatest force for peace the world has ever known**. Had America been removed from the global dynamics that governed the 20th century, **the mass murder never would have ended**. Indeed, it's entirely conceivable there would now be no identifiable human civilization left, once nuclear weapons entered the killing equation. But the world did not keep sliding down that path of perpetual war. Instead, America stepped up and changed everything by ushering in our now-perpetual great-power peace. We introduced the international liberal trade order known as globalization and played loyal Leviathan over its spread. What resulted was the collapse of empires, an explosion of democracy, the persistent spread of human rights, the liberation of women, the doubling of life expectancy, a roughly 10-fold increase in adjusted global GDP and a profound and persistent reduction in battle deaths from state-based conflicts. That is what American "hubris" actually delivered. Please remember that the next time some TV pundit sells you the image of "unbridled" American military power as the cause of global disorder instead of its cure. With self-deprecation bordering on self-loathing, we now imagine a post-American world that is anything but. Just watch who scatters and who steps up as [the Facebook revolutions](http://www.worldpoliticsreview.com/articles/8089/the-realist-prism-politics-vs-social-media-in-the-arab-uprising) erupt across the Arab world. While we might imagine ourselves the status quo power, we remain the world's most vigorously revisionist force. As for the sheer "evil" that is our military-industrial complex, again, let's examine what the world looked like before that establishment reared its ugly head. The last great period of global structural change was the first half of the 20th century, a period that saw a death toll of about 100 million across two world wars. That comes to an average of 2 million deaths a year in a world of approximately 2 billion souls. Today, with far more comprehensive worldwide reporting, researchers report an average of less than 100,000 battle deaths annually in a world fast approaching 7 billion people. Though admittedly crude, these calculations suggest a 90 percent absolute drop and a **99 percent** relative **drop in** deaths due to **war**. We are clearly headed for a world order characterized by multipolarity, something the American-birthed system was designed to both **encourage and accommodate**. But given how things turned out the last time we collectively faced such a fluid structure, we would do well to keep U.S. power, in all of its forms, **deeply embedded in the geometry** to come. To continue the historical survey, after salvaging Western Europe from its half-century of civil war, the U.S. emerged as the progenitor of a new, far more just form of globalization -- one based on actual free trade rather than colonialism. America then successfully replicated globalization further in East Asia over the second half of the 20th century, setting the stage for the Pacific Century now unfolding.

### Advantage Two – Environment

#### Advantage Two is the Environment -

#### Improving flight efficiency is critical to combat warming. Airline industries impact is unique and produces multiple gases & causes

COPOCCITTI, KLARE, & MILDENBERGER 10 1. Aviation Industry Consultant 2. Centre for Innovative Management - Athabasca University 3. IPE Media University Stuttgart [Sam Capoccitti 1, Anshuman Khare 2, Udo Mildenberger 3, Aviation Industry - Mitigating Climate Change Impacts through Technology and Policy, Journal of Technology Management & Innovation v.5 n.2 Santiago ago. 2010, http://www.scielo.cl/scielo.php?pid=S0718-27242010000200006&script=sci\_arttex]

Environmental impact of Flight

The main environmental concerns associated with aircraft are climate change, stratospheric ozone reduction (leading to increased surface UV radiation, regional pollution, and local pollution. During flight, aircraft engines emit carbon dioxide, oxides of nitrogen oxides of sulphur, water vapour, hydrocarbons and particles - the particles consist mainly of sulphate from sulphur oxides, and soot. These emissions alter the chemical composition of the atmosphere in a variety of ways, both directly and indirectly (RCEP, 2002).

While much of the CO2 is absorbed on Earth in plants and the ocean surface, a huge amount goes into the atmosphere, where it and other gases create a kind of lid around the globe --the so-called greenhouse effect. Heat that would normally escape into space is thus reflected back to Earth, raising global temperatures (Lehrer, 2001). Nitrogen oxides (NOx) and H2O vapor from aircraft increase the formation of cirrus clouds and create contrails, which are visible from the ground.

The combination of " contrails and cirrus clouds warm the Earth's surface magnifying the global warming effect of aviation. Together, NOx and water vapour account for nearly two-thirds of aviation's impact on the atmosphere (IPCC estimated that radiative forcing from all aircraft greenhouse gas emissions is a factor of 2 to 4 times higher than that from its CO2 emissions alone). Hence any strategy to reduce aircraft emissions will need to consider other gases and not just CO2" (GreenSkies, n.d.; pg.1).

The environmental issues associated with flight are also correlated with the altitude at which the carbon dioxide is emitted, the higher the attitude the greater damage to the ozone layer. Research has shown that the majority of flights fly at an altitude between 29,500 ft and 39,400 ft (9-12 km). Figure 1 (Federal Aviation Administration, 2005; pg. 32 ) highlights the distribution to total fuel burn and emissions by 1 km altitudes for the year 2000.

The lower spike in fuel burn and emissions in the 0-1 km range is attributed to aircraft emissions from the ground when aircraft are idling or taxiing. It was noticed after the events of 9/11 (when there was a temporary halt to all commercial flights) that the Earth's temperature was 1 to 2 degrees Celsius colder, which coincides with the theory that aircraft emissions do impact the environment.

Approaches to Mitigating Environmental Impacts

The aviation sector these days is buzzing with talks about aviation emissions. There is a call for aviation emissions by the airlines to be included in climate change pacts (Fogarty, 2009). Talk is now turning to ways of mitigating air travel's future impact on climate change, and these "generally fall within two spheres: technology development, and policy mechanisms" (GLOBE-Net, 2007).

Engine Technology, Aerodynamic Body and Weight

It is estimated that the aircraft we fly today are 70% more efficient than those 10 years ago. IATA predicts that by 2020, another 25% efficiency will be added to the present day fleet (GLOBE-Net, 2007). Improvements in aerodynamics, engine design and weight reduction are the main areas of improvement to counter the dependence on fossil fuel. Though the replacement of fossil fuel is being vigorously pursued with some limited success, fossil fuels will not expect to be replaced in the near future.

Apart from engine efficiency, finding an alternative fuel is part of the challenge for the aviation industry.

GLOBE-Net (2007) reports that the majority of efficiency improvements over past aircraft have been achieved through the development and improvements in engine technology. Engine improvements, as in the case of automobiles, must increase fuel efficiency (and therefore, decrease CO2 emissions) with reductions in NOx, water vapour, and other air pollutants. Some technological advancement in engine technology uses high pressure ratios to improve efficiency but this worsens the problem with NOx. If new control techniques for NOx are developed to keep within regulatory compliance limits, high pressure ratios will likely be the path pursued by aircraft manufacturers

Further reduction in emissions can be achieved by matching the advancements in engine technology with better aerodynamic shape and use of light weight material to reduce drag. This certainly contributes to reducing the impact on environment and also can be promoted as a cost-saving measure (e.g., savings in fuel costs)

Boeing (2007; pg. 1) indicated that "four key technologies contribute to an impressive 20% improvement in fuel use for the 787 Dreamliner as compared to today's similarly sized airplane. New engines, increased use of light weight composite materials, more-efficient systems applications and modern aerodynamics each contribute to the 787's overall performance."

Aircraft manufacturers are also exploring the benefits of other technologies such as the use of winglets, fuselage airflow control devices and weight reductions. These could "reduce fuel consumption by a further 7% says the IPCC, although some have limited practicability" (GLOBE-Net, 2007). In the long term, new aircraft configurations (such as a blended wing body) may achieve major improvements in efficiency.

Alternate Energy Solutions

The time for zero emission aircraft is still far away. The technologies that may make that possible are still in early stages of development and evaluation. Second-generation biofuels, solar power and fuel cells are all being investigated by the aviation industry as well as the automobile industry.

The more fuel aircraft burns, the more emissions emitted into the atmosphere thereby increasing its environmental footprint. The aviation industry has come a long way with fuel technology and with the help of Boeing and Airbus (the world's largest aircraft manufacturers). Today aircraft are lighter, quicker and more fuel efficient

Boeing has an ongoing legacy of integrating environmental performance improvements through technology advancements. Over the last 40 years, airplane CO 2 emissions have been reduced by around 70% and the noise levels have been reduced by approximately 90 percent. The noise footprint of the new 787 Dreamliner is 60% lower than any similar aircraft (Boeing 1998-2007; pg. 14).

That legacy continues today with every airplane they design and build (Boeing, 1998-2008; pg. 16). One of the many initiatives supported by Boeing is its search for alternative energy solutions. This initiative will lead to reducing greenhouse gas emissions and at the same time Boeing is pioneering three key environmental advancements:

• Advanced-Generation Biofuels - Boeing, Virgin Atlantic and GE Aviation conducted the first commercial flight using a biofuel mix with traditional kerosene-based fuel in February 2008.

• Solar Cells - Converting sunlight into electricity

• Fuel Cells - Convert hydrogen into heat & electricity without combustion, reducing the need for conventional fuels and eliminating emissions.

Like Boeing, Airbus has partnered with Honeywell Aerospace, International Aero Engines and Jet Blue Airways in pursuit of developing a sustainable second-generation bio-fuel for commercial jet use, with the hope of reducing the aviation industry's environmental footprint. Alternative fuel research is a core tenet of Airbus' eco-efficiency initiatives (Airbus, 2008).

Airbus research has also lead to test flights using gas to liquid kerosene, which is similar to jet fuel but results in lower emissions and is a much cleaner fuel source. Airbus has also researched other types of alternative fuels; for example, bio-mass to liquid and coal to liquid. On February 1, 2008 an Airbus 380 (in collaboration with Shell International and Rolls Royce) conducted a test flight using gas to liquid kerosene in one of the A380 engines.

Over the last year, four airlines have flight tested on biofuel: Virgin Atlantic (in February 2008), Air New Zealand (in December 2008), Continental Airlines and Japan Airlines (in January 2009). They have "already flown on routes with one engine part-powered by a range of biofuels including algae and jatropha. Jatropha, a poisonous plant that produces seeds that can be refined into biofuels, is being touted as a good alternative fuel and a potentially powerful weapon against climate change. Experts say the perennial plant can grow on marginal land with limited rainfall, and does not compete with other food crops or encourage deforestation. Following its flight using jatropha in late December, Air New Zealand has set a goal to have 10 percent of fuel coming from biofuel sources by 2013, while Virgin is aiming for 5 percent by 2015" (Szabo et al., 2009).

Pew (2009) reports that "the push in development of biofuels continues with a recent $25 million contract awarded by the Defense Advanced Research Projects Agency to SAIC. The company is being tasked to lead a team in development of an integrated process for producing JP-8 from algae at a cost target of $3/gal." The two-phase program aims to conclude with the design and operation of a pre-pilot scale production facility. But another project that involves Boeing, Honeywell, and CFM hopes to see biofuel production levels in the hundreds of millions of gallons per year by 2012 (Pew, 2009).

The International Air Transportation Association (IATA) feels that any alternative fuel should be tested for performance and environmental impact before introducing into the marketplace. IATA researched has shown that the conservative nature of the industry will foster alternative fuels that originally are combined with conventional jet fuel. According to IATA (2008a), alternative fuel systems derived from biomass sources have the potential to lower the carbon footprint and lower other emissions as well. New technologies and more economic integration of alternative fuels along with government subsidies will accelerate the acceptance of these fuels in the market place (IATA, 2008a).

In "Are bio-fuels really an alternative?" Jeff Gazzard (2009), a board member of the Aviation Environment Federation contends that the biofuel issue may not be as clear as it seems. The jury is still out as to whether either synthetic or biofuels are yet capable of being either entirely fail-safe for aviation use or environmentally sustainable in the longer term. According to Gazzard (2009) alternate fuels looked attractive when oil was marching towards $147 a barrel, but now that oil has fallen back to below $50 a barrel, $75-$85 a barrel for biofuel is not as attractive. He points out that another issue is that aviation consumes approximately 240 million tones of kerosene a year. Replacing the current aviation fuel with bio-fuel from productive arable land that does not compete with food production would take almost 1.4 million square kilometers, which is greater than twice the area of France.

Gazzard (2009) is not convinced that aviation would be the best end-user even if biofuels could be produced sustainably. The industry has also followed with increasing interest in algae as a potential source of aviation fuel but is unconvinced that any cost-effective algae-derived aviation fuel could be produced within a practical timeframe that would allow such fuels to make any substantial contribution to climate change policies of today. Regardless of the skepticism, more and more airlines are testing alternative fuel sources and as global warming continues to escalate in the minds of the consumers.

The assessment of GLOBE-Net (2007) is similar - "biofuels could mitigate some aircraft emissions, but the production of biofuels to meet the aviation industry's specifications and quantity demands is currently untested. Ethanol and biodiesel both have properties that make them currently unsuitable for jet fuel, but companies such as Virgin are pursuing biofuels research, investigating possibilities including the use of microorganisms."

Further, the option of solar power is still in its infancy and largely unexplored. Boeing (1998-2008; pg. 16) is working with their wholly-owned subsidiary Spectrolab in this area. Spectrolab is one of the world's leading manufacturers of solar cells, powering everything from satellites and interplanetary missions.

However, without the commercialization of these and other novel new technologies, annual air traffic growth is expected to outstrip efficiency improvements, resulting in a net rise in CO2 emissions of around 3-4% per year, along with increases in NOx and water vapour emissions.

Better Traffic Management

One possible contributor to greater aircraft efficiency is improved air traffic management. According to the IATA (2007), there is a 12% inefficiency in global air traffic management which could largely be addressed by three 'mega-projects': a Single Sky for Europe, an efficient air traffic system for the Pearl River Delta in China and a next generation air traffic system in the United States. However, there has not been much progress on these initiatives much to the disappointment of IATA and its leadership.

Scientists and aviation experts worldwide are investigating improved air traffic management, lower flight speeds, reducing idling and other efficiencies, searching for areas of potential emissions reductions.

Policy Mechanisms

In February 2009, four leading airlines and an airport authority - Air France/KLM, British Airways, Cathay Pacific, Virgin Atlantic and airport operator BAA - called for aviation emissions to be included in a broader climate pact. This can be seen as a move to ward off criticism from environmental groups and to probably have a negotiated deal instead of a one that is imposed upon them. Even with only 2% of global pollution coming from airlines, the pressure of the aviation industry has been mounting to participate in emission reduction initiatives (Fogarty, 2009).

This call was a prelude to the 2009 Copenhagen Summit on Climate Change where nations are expected to find an agreement around a climate pact that replaces the Kyoto Protocol whose first phase ends in 2012. To date "international air travel is exempt from carbon caps under the Kyoto Protocol. Neither do airlines pay tax on fuel. Understandably, lawmakers are wary of disrupting aviation since air travel represents a cash cow for governments. In the US, for example, the average tax on a $200 ticket is 26%, amounting to about $15bn a year. And the air travel industry picks up the tab for its own infrastructure, an annual bill of about $42bn, according to IATA" (Balch, 2009).

In recent years, governments and international organizations have looked at policy options that could create incentives or impose requirements on aircraft operators and manufacturers to reduce emissions. At the forefront of this push is the European Union, which has proposed that aircraft be covered under the region's Emissions Trading Scheme (ETS). Under the proposal, emissions from all flights within the EU will be covered in 2011, with international flights to be included in 2012. The EU hopes to serve as a model for other countries (GLOBE-Net, 2007). An Ernst & Young (2007) study commissioned by the airline industry projects the system would cost airlines more than 40 billion Euros from 2011 to 2022.

The IATA states in its climate change strategy that it prefers emissions trading to a carbon tax or other charges, but would rather participate in a worldwide voluntary scheme instead. "The challenge is for the International Civil Aviation Organization (ICAO) and its 190 member States to deliver a global emissions trading scheme that is fair, effective and available for all governments to use on a voluntary basis" (IATA, 2007).

Short-term Measures

In recent times some airlines have started offering passengers a chance to purchase carbon offsets to neutralize/minimize their carbon emission footprint. Air Canada partners with ZeroFootprint while Westjet has partnered with Offsetters.ca. In 2009, Japan airlines joined hands with Recycle One to help its passengers offset the carbon caused by their flight. "The total emissions figure is based on factors such as distance of travel, aircraft type, baggage and passenger to cargo ratios" (Balch, 2009). Continental, SAS, Qantas, British Airways, JetStar, Virgin Atlantic and Virgin America and some other airlines offer similar programs.

Such programs are leading the way now but stronger action may be required to bring a significant reduction in GHG emissions.

Long-term Thinking

To address the problem of Climate Change, like all other industries, airlines will also have to re-think their business model. They will have to probably agree to be part of a network that moves people and goods from one place to another in an efficient and timely manner. To achieve this goal, they will have to collaborate and network with other transport operators like the railways. "In the Netherlands, airlines and rail companies have a history of cooperation. Long before its merger, KLM had already cancelled several short-haul flights on routes where fast train links existed. Many of KLM's international flights to Dutch cities also finish with a final leg by train" (Balch, 2009).

The "Flight" Ahead

As demonstrated, the aviation industry plays a vital role in the global economy and provides economic and social benefits. It is also apparent that global temperatures continue to rise while the aviation industry continues to grow. The combination of aviation growth and climate change leads us to believe that CO2 emissions from the aviation industry is one of the many other factors impacting global warming. It has to be addressed even though its impact today is limited to a very low percentage. But with a potential to grow, it cannot go unattended. With this in mind, the following main areas have been identified in order to help reduce aviation emissions

• Strengthen the global leadership strategy (for example, add aviation emissions to Kyoto protocol; revisit fuel surcharge (taxation) issue; create an emissions charge; implement an emissions cap on aviation emissions; enforce Carbon offset programs for all airlines; etc.)

• Increase Alternative Fuel technology/implementation (for example, increase biomass fuel technology; etc.)

• improvements in Aircraft Technology Efficiency (for example, reduce aircraft fuel consumption and CO2 emissions by replacing older, less fuel efficient aircraft with aircraft using latest fuel efficiency technology and navigation equipment; reduce aircraft noise - mitigate inefficient noise procedures; reduce oxides of nitrogen - try to go beyond compliance limits; etc.

• Improvements in Air Traffic Management (for example, cut inefficiency in current flight patterns - more fuel efficient approaches and overall routing; encourage flight patterns that minimize the impact of non CO2 emissions; optimize aircraft speed; etc.)

• Improvements in Operational Efficiencies (for example, increase load factors; eliminate non-essential weight - reassess the value of onboard materials; limit auxiliary power (APU) use by reducing engine idle times and by shutting down engines when taxiing to reduce APU use and fuel burn; reduce taxiing time of aircraft; etc.)

All these suggestions require stimulating technology advancements and innovation. Holliday et al. (2002) state that innovation is critical for any organization and industry if it wants to operate in a new global business environment which puts emphasis on environmental alignment of business goals

The aviation industry (airlines, governments, non government organizations, suppliers, manufactures) must work together and create technology advancements that catapult the industry into the future. The innovation created must not only look at how the aviation industry can improve on their CO2 emissions but also how it can change the CO2 emissions landscape. Improving current practices is not good enough. The aviation industry must change the way they operate in order to reduce CO2 emissions. Governments must get involved and work with airlines to spur innovation and remove obstacles for airlines leading the environmental movement.

#### Integrated Air traffic control reduces 40 million tons of CO2 each year – cost efficient flights and removes pollutants

Richard 11 – Editor of transportation, science, and technology, for treehugger.com from Discovery Channel, (Michael Graham Richard, Computerized Air-Traffic Control Could Save CO2 Equivalent of Denmark's Economy” [http://www.treehugger.com/aviation/computerized-air-traffic-control-could-save-co2-equivalent-whole-denmark-economy.html]

If you are going somewhere in a vehicle that burns a lot of fossil fuels, it's never a good idea to take unnecessary detours. Sadly, most airplanes can't take the most elegant and efficient route to their destinations because of the limitations of the air-traffic control system that guides them. It's not the fault of the traffic controllers - they do a good job - but rather of the technology with which they have to work; **the foundations of the system are 50-60 years old** and produce flight paths that are far from optimal when it comes to saving fuel (and thus reducing CO2 emissions), saving money, and saving time for passengers. So what can we do about it?It seems like the general idea of what is required is well known, but implementing it will be a huge task. Right now, my understanding is that the current air-traffic control system makes planes fly with a lot more space between them than is required even by stringent safety standards, and that their flight paths are often far from optimal, something that could be corrected if they were computer-generated (and if the computer took into account more variables, such as wind speeds and directions, etc). The Guardian has interviewed an engineer working on such a system: "[David Parkinson] believes that using computers to calculate perfectly smooth trajectories for planes could painlessly cut 8% of aviation emissions. [...] 'We've already done it on the railways,' Parkinson says. 'Many people assume that train signals are still controlled manually by signalmen, but in truth the system was automated years ago.'" **This 8% cut would be equivalent to about 40m tonnes each year**, or the size of the Danish economy, but **the impact would be even bigger since it would also remove pollutants** from the high atmosphere. GE Aviation is also working on what they call the NextGen air-traffic control system. They claim some pretty big benefits, considering that there are no other modifications to the planes: There’s an environmental and economic benefit in the reduction of fuel burn—a total of 5 to 15 percent for a typical narrow body operation in the U.S. We can reduce noise in the order of 30 percent for a given point on the ground near the airport. And as we continue to gain experience, we’re seeing we can improve the capacity of the air space between 3 and 10 percent.

#### Warming causes multiple environmental problems – results in human extinction

TICKELL 08 Climate Researcher

[Oliver Tickell, The Gaurdian, “On a planet 4C hotter, all we can prepare for is extinction”, <http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange>]

We need to get prepared for four degrees of global warming, Bob Watson told the Guardian last week. At first sight this looks like wise counsel from the climate science adviser to Defra. But the idea that we could adapt to a 4C rise is absurd and dangerous. Global warming on this scale would be a catastrophe that would mean, in the immortal words that Chief Seattle probably never spoke, "the end of living and the beginning of survival" for humankind. Or perhaps the beginning of our extinction. The collapse of the polar ice caps would become inevitable, bringing long-term sea level rises of 70-80 metres. All the world's coastal plains would be lost, complete with ports, cities, transport and industrial infrastructure, and much of the world's most productive farmland. The world's geography would be transformed much as it was at the end of the last ice age, when sea levels rose by about 120 metres to create the Channel, the North Sea and Cardigan Bay out of dry land. Weather would become extreme and unpredictable, with more frequent and severe droughts, floods and hurricanes. The Earth's carrying capacity would be hugely reduced. Billions would undoubtedly die. Watson's call was supported by the government's former chief scientific adviser, Sir David King, who warned that "if we get to a four-degree rise it is quite possible that we would begin to see a runaway increase". This is a remarkable understatement. The climate system is already experiencing significant feedbacks, notably the summer melting of the Arctic sea ice. The more the ice melts, the more sunshine is absorbed by the sea, and the more the Arctic warms. And as the Arctic warms, the release of billions of tonnes of methane – a greenhouse gas 70 times stronger than carbon dioxide over 20 years – captured under melting permafrost is already under way. To see how far this process could go, look 55.5m years to the Palaeocene-Eocene Thermal Maximum, when a global temperature increase of 6C coincided with the release of about 5,000 gigatonnes of carbon into the atmosphere, both as CO2 and as methane from bogs and seabed sediments. Lush subtropical forests grew in polar regions, and sea levels rose to 100m higher than today. It appears that an initial warming pulse triggered other warming processes. Many scientists warn that this historical event may be analogous to the present: the warming caused by human emissions could propel us towards a similar hothouse Earth.

### 1ac – Plan

#### PLAN: The United States federal government should invest in upgrading air traffic control infrastructure to NextGen.

### 1ac – Solvency

#### The USFG should do the plan – only a strong federal signal will get the system in place and operational.

ALPA 12 Air Line Pilots Association International. [June 2012 White Paper, Leveling the Playing Field for U.S. Airlines and Their Employees, <http://www.alpa.org/publications/ALPA_White_Paper_Leveling_the_Playing_Field_June_2012/ALPA_White_Paper_Leveling_the_Playing_Field_June_2012.html#top>]

Invest in NextGen to Improve Safety and Increase Efficiencies While Decreasing Costs to Airlines

To maintain a competitive advantage in the international marketplace, the United States’ national airspace system (NAS)—which is composed of the entire air- and ground-based infrastructure, including air traffic control surveillance and communication, navigation, airports, aircraft, vehicles on the surface, and others—must be modernized. The current system of air traffic control and air traffic management is based on technologies, techniques, and processes that date back decades. The infrastructure continues to deteriorate, and the ability of the FAA and operators in the NAS to guarantee the safest possible travel is similarly being diminished.

Existing and emerging technologies hold the promise of significant increases in the ability to maintain or improve levels of safety while improving capacity and efficiency of our system, allowing our airlines to grow and ultimately save costs, resulting in a better business environment and more level playing field for U.S. airlines.

NextGen, in its mature state, will improve efficiency of operations, enhance both the accuracy and coverage of controllers’ ability to pinpoint the position of aircraft in flight and on the ground, increase capacity, reduce delays in the air and on the ground, and cut down greenhouse gas emissions. With the rising cost of fuel, less fuel will be consumed, resulting in immediate cost savings. Reduced taxi and flight time also translates into less noise and emissions. Better knowledge of exactly where the aircraft is on the ground translates into more efficient gate management, reduced tarmac delays, and fewer runway incursions. More accurate airborne position knowledge will allow the air traffic controller to arrange aircraft into more efficient streams. All of these benefits lead to profitability and growth of our airlines and our nation’s economy, as well as a better customer experience

The upgrade from the current outdated system to a modern, more efficient one is as complex as the technologies themselves. It is simply impossible to “turn off” the current system while changes are made. Every major upgrade to the system must be undertaken while the system is in full operation, with the existing workforce. Thus, development of equipment and procedures, acquisition and deployment strategies, and training for pilots, controllers, and technicians must all be fully integrated

Policy Recommendation: The U.S. government can help level the playing field for U.S. airlines and their employees by investing in NextGen to promote greater safety and efficiency.

The administration and Congress must work to accelerate the FAA’s NextGen plan. The scope, duration, and cost of NextGen require that decisions on critical aspects, such as funding and equipage, must be timely, accurate, and focused on the overall needs of the public. Strong government leadership, consistent long-term funding, and cooperative planning are all needed in establishing standards and requiring minimum levels of equipage.

#### Federal investment spurs industry adoption and overcomes all current stalemates

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

The aviation system that is part of the life-blood of our economy is poised to face rising demand with limited additional capacity and outdated technology. This could put considerable stress on the system in terms of con- gestion and efficiency. The Next Generation Air Transportation System (NextGen) represents a series of incre- mental policies, procedures, and technological changes to modernize the air traffic control (ATC) system into a more efficient, state-of-the-art satellite-based system.

On the technology side, NextGen is composed of two main components: aircraft based equipment that re- cords and transmits the exact location of the aircraft using Global Positioning System (GPS), and ground based infrastructure that can receive and analyze the GPS data. Infrastructural improvements also entail devising

more direct and fuel-efficient routes, and upgrading the computer and backup system used at 20 Federal Avia- tion Administration (FAA) air traffic control centers nationwide. The infrastructure implementation is currently in the hands of the FAA and funded by the Airport and Airway Trust Fund (AATF), while aircraft equipage is expected to be paid for by the operators.

On-board equipage could allow improved decision-making capabilities and accessibility during adverse weather, as well as better data communications between cockpit and ATC. This more precise system has the potential to reduce the minimum aircraft separation standard and allow more direct flight patterns, thus decreasing fuel consumption, carbon emissions, and congestion.

On the policy-side, there are several obstacles to NextGen that hinder progress and the likelihood of a timely and cost- efficient implementation. First of all, there are uncertainties regarding the extent of the benefits NextGen can potentially provide. It is difficult to make forecasts about how much congestion or fuel consumption can be reduced to make the **infrastructure** investment worthwhile. This makes it chal- lenging to create sustained political, financial, and industry support for the project

Secondly, there are doubts about costs and the FAA’s ability to deliver technology solutions of this magnitude. In the early 1980s, aviation modernization projects were pro- jected to cost $12 billion and be ready in 10 years. NextGen **infrastructure** and equipage is now estimated to cost about $40 billion with expected completion by 2025.1 Testimony by the US Department of Transportation Inspector Gen- eral and a recent report by the Government Accountability Office (GAO) have pointed out cost overruns and delays in several NextGen programs. This continued uncertainty regarding the total infrastructure and equipage cost figure of NextGen has planted seeds of doubt amongst stakeholders and potential NextGen beneficiaries.

Third, the airlines and general aviation users have been hesi- tant to bear equipage costs due to low profitability, econom- ic turmoil, and a lack of clear incentives to justify investing in NextGen. Operators are unlikely to invest until, at a minimum, the FAA is ready to deliver the promised benefits. This leads to a stalemate: operators are uncertain whether investing in NextGen is worthwhile, when the **infrastructure** is not yet fully in place, and without equipage the infrastruc- ture by itself is ineffective. The FAA has mandated equi- page of Automated Dependent Surveillance-Broadcast Out (ADS-B) that allows the equipped aircraft to send transmis- sion to other equipped aircraft ADS-B ground stations for all operators by 2020. However, there is uncertainty over when other NextGen on-board equipment will be required, particularly ADS-B In which allows the equipped aircraft to receive transmission from other ADS-B ground stations and other aircraft

Fourth, NextGen faces funding issues that pose some very difficult policy decisions. Work on the ground infrastruc- ture aspect of NextGen is currently funded by the Facilities and Equipment account of the AATF and some progress, albeit slow, has been made on this project. However, recent reports by the Congressional Budget Office and the Gov- ernment Accountability Office show that current AATF revenues are inadequate to fund NextGen.2 Despite recent resolution over the long overdue FAA reauthorization bill, little progress has been regarding securing a full-fledged modernization funding plan. The current bill authorizes a flat amount of $2.731 billion over four years for Next- Gen and funding is still subject to annual appropriation. A project that is already endangered by uncertainties regarding its worth would benefit from a stable and adequate funding source.

A fifth problem facing NextGen is lack of Congressional political leadership in prioritizing a project of such potential value. In July 2011 the House of Representatives passed a short-term extension bill that failed to pass the senate, resulting in a shutdown that lasted a fortnight. The AATF received no tax revenues during the shutdown. As Con- gressional leaders argued over the Essential Air Services program, the trust fund lost over $400 million in foregone tax revenues. Those are funds that could have potentially been used towards an investment like NextGen. Further- more, according to the FAA some of the NextGen program delays can be attributed to the furlough of some of the FAA employees in July 2011 and a freeze on contractor funding which resulted in work stoppage orders for several projects.3 This impact of the impasse on NextGen was also docu- mented on the GAO report on the FAA’s NextGen cost- management.4

In order for NextGen to succeed, there must be greater certainty about potential benefits and costs. In the highly competitive low profit-margin airline industry, few want to take on the burden of paying for something that spreads speculative benefits so widely. It will also be essential to have a mechanism that raises sufficient capital for NextGen **infrastructure** in a transparent and equitable manner, while imposing minimal burdens on those who pay for it. Without a sustainable, stable, and reliable strategy for both continued infrastructural improvements and incentives for equipage, there is no guarantee that NextGen can be implemented in a timely and cost-effective manner. Without strong politi- cal leadership, a clear and unbiased delineation of costs and benefits, a transparent source of funds, and incentives for operators to equip, it is unlikely that NextGen benefits can be delivered in a timely manner if at all.

#### Building the infrastructure will incentivize users to pay for the equipage – overcomes all private investment barriers

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Most US operators have been less than enthusiastic about paying for NextGen equipage because the technology does not provide benefits unless the infrastructure and ATC procedures are in place to use it. Investing in new technol- ogy for which the infrastructure is not yet in place poses a significant financial risk operators are not incentivized to bear. Equipage is at a standstill due to concerns of rapid technological obsolescence and uncertainty. “If I go first, I’ll have to bear the cost of updating the software, and when NextGen is turned on, I’ll have the oldest, most obsolete systems out there”,34 is an oft-expressed concern, accord-ing to Russell Chew of Nexa Capital, a private financing firm for NextGen equipage. Operators have also expressed concerns regarding the lack of control over benefits arising from NextGen, which can only be reaped if a majority of operators decide to equip. If only some operators equip, that may lead to freeriding by other operators. Low profitability due to increasing fuel costs and post-9/11 recessionary demand-side shocks is another reason why commercial carriers have been reluctant to pay for NextGen equipage. Some carriers have lobbied in vain for federal stimulus funding for NextGen equipage during this period.35

Operators would have an incentive to invest in NextGen if they can be sure it will generate profits by reducing operating costs. As discussed earlier, NextGen could significantly reduce operating costs by reducing delay and fuel consump- tion. Whether this would increase airline profits depends to some extent on the intensity of competition between opera- tors.36 However, assuming that the underlying assumptions and analyses are correct and annual airline benefits exceed the total equipage cost, there is a sensible business case for the industry as a whole to invest in NextGen, meaning there is a reason for operators to pay for their own equipage. From a policy side, a strong set of incentives needs to be provided to facilitate this equipage. The FAA has already begun to provide some aid to airlines for equipage, but it has not been enough to counter the continuing risk across the larger industry.37

## Inh

### Not implemented now – Money & politics

#### Won’t get implemented – major financial & political support

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

On the policy-side, there are several obstacles to NextGen that hinder progress and the likelihood of a timely and cost- efficient implementation. First of all, there are uncertainties regarding the extent of the benefits NextGen can potentially provide. It is difficult to make forecasts about how much congestion or fuel consumption can be reduced to make the infrastructure investment worthwhile. This makes it chal- lenging to create sustained political, financial, and industry support for the project

Secondly, there are doubts about costs and the FAA’s ability to deliver technology solutions of this magnitude. In the early 1980s, aviation modernization projects were pro- jected to cost $12 billion and be ready in 10 years. NextGen infrastructure and equipage is now estimated to cost about $40 billion with expected completion by 2025.1 Testimony by the US Department of Transportation Inspector Gen- eral and a recent report by the Government Accountability Office (GAO) have pointed out cost overruns and delays in several NextGen programs. This continued uncertaint regarding the total infrastructure and equipage cost figure of NextGen has planted seeds of doubt amongst stakeholders and potential NextGen beneficiaries.

#### Won’t have enough money now – needs a new influx of financing

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Funding NextGen

While reaching consensus on the costs and benefits has been a contentious issue, little progress has been made towards devising a funding strategy for NextGen. This section explores options for aligning the burden of pay- ing for NextGen with those who benefit from it. This looks at funding for two aspects of NextGen: infrastructure and equipage. Under the current program, the FAA is responsible for funding and implementing the infrastructure side of the program and the airlines and general aviation operators are left to equip their own aircraft with the appropriate technologies. This section will review funding options for infrastructure and then discuss ways to incentivize and finance equipage.

Infrastructure Funding

This analysis stems from the premise that funding levels in the AATF are neither adequate to implement neither Next- Gen nor effective at accelerating modernization, which is crucial to making the most out of AATF funds. According to the FAA:

By 2022, we estimate that this failure [to implement Next- Gen in a timely manner] would cost the U.S. economy $22 billion annually in lost economic activity. That number grows to over $40 billion by 2033 if we don’t act. Even as early as 2015 our simulation shows that without some of the initial elements of NextGen we will experience delays far greater than what we are seeing today.38

The results of the Deloitte study that showed significant ad- ditional costs by delaying implementation buttress the FAA’s estimates above.

The AATF has been the primary funding source for Next- Gen to date. It receives revenues from a variety of user fees and taxes paid by both commercial and general aviation op- erators as well as passengers (Table 9). According to a report by GAO,39 current sources of revenue in the Airport and Airway Trust Fund might be inadequate to cover anticipated future costs of NextGen without drawing from other reve- nue sources, and this is likely unfeasible given ongoing fiscal and political constraints. Total trust fund expenditures have gone up since 2000 from under $10 billion to about $14 bil- lion in 2010 (Figure 3). However, trust fund revenues have not increased proportionately to keep up with rising expen- ditures. Several economic studies have shown that inflation- adjusted fares in the airline industry have been declining for several reasons such as expansion of low-cost carriers and two major demand-side shocks in the past decade.41 In fact, the Congressional Budget Office earlier this year adjusted its projection of the trust fund revenues to $25 billion less than its 2007 forecast for through 2017.

Past shortfalls have been fulfilled by increasing general fund contributions, covering 34 percent of the FAA’s expendi- tures in 2010 and 24 percent in 2009. The current fiscal cri- sis and Congressional discourse on debt-reduction seriously besets the possibility of continued general fund transfers to the AATF.

Furthermore, the trust fund’s end-of-year uncommitted bal- ance, the surplus of revenues after spending commitments from FAA’s appropriations, has also decreased dramatically from $7.07 billion in 2000 to only $770 million in 2010.

This was partly due to Airport Improvement Program (AIP) funding and due to revenues not rising sufficiently to meet expenditures as discussed above. A low uncommitted bal- ance means inadequate FAA funding to cover new projects and programs. Even though the FAA has been able to initiate some work on NextGen infrastructure, a diminish- ing uncommitted balance leaves very little room for other unforeseeable expenses.42 And the current trend of outlays growing faster than revenues could mean further decreases in that balance.

In order for NextGen modernization to reach comple- tion, determining an adequate funding source is essential. Although the recent FAA reauthorization bill authorizes a fixed funding for NextGen over the next four years, it is unclear whether the current revenue sources are adequate to fund NextGen, particularly with no new law on aviation taxes or fees. If NextGen continues to be funded through the AATF, it is likely necessary to consider future sources of revenues or there needs to be greater prioritization of Next- Gen to allow general funds to supplement the AATF. The following is an analysis of the relative merits and weaknesses of each revenue source, and they might propel or stagnate NextGen progress. An effective funding mechanism behind NextGen should be equitable, transparent, efficient and po- litically feasible. The following explains each of these criteria and how they help alleviate the obstacles facing NextGen.

### Outdated

#### Current Transport System is outdated - unable to accommodate growing demand

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

The goal of NextGen air traffic and airports to achieve greater safety and efficiency. Security functions will protect. airspace, people, and infrastructure. Environmental impacts from aviation will be managed for sustainability and for an overall improvement in environmental quality. The CONOPS forms a baseline that can be used to initiate a dialogue with the aviation stakeholder community to develop the policy agenda and encourage the research needed to achieve our national and global goals for air transportation. The NGATS Integrated Plan (2004) clearly defines the problem: The U.S. air transportation system as we know it is under significant stress. With demand in aircraft operations expected to grow up to three times. the current air transportation system will not be able to accommodate this growth. Antiquated systems are unable to process and provide flight information in real time, and current processes and procedures do not provide the flexibility needed to meet the growing demand. New security requirements are affecting the ability to efficiently move people and cargo. In addition, the growth in air transportation has provoked community concerns over aircraft noise, air quality, and congestion. In order to meet the need for increased capacity and efficiency while maintaining safety, new technologies and processes must be implemented. **The goals for NextGen focus on significantly increasing the safety, security, and capacity of air transportation operations and thereby improving the overall economic well-being** of the industry These benefits are achieved through a combination of new procedures and a technology deployed to manage passenger, air cargo, general aviation (GA), and air traffic operations. The NGATS Vision Briefing (2005) identifies eight key capabilities needed to achieve these goals:

• Network-Enabled Information Access

• Performance-Based Services (now Performance-Based Operations and Services)

• Layered Adaptive Security

• Broad-Area Precision Navigation (now Position, Navigation and Timing Services

• Aircraft Trajectory-Based Operations

• Equivalent Visual Operations (EVO)

• Super Density Operations.

Capacity and efficiency are increased

## ECONOMY ADV

### Industry on the brink

#### Airline industry on the brink – small profit margin, overly burdened by the government

ALPA 12 Air Line Pilots Association International. [June 2012 White Paper, Leveling the Playing Field for U.S. Airlines and Their Employees, <http://www.alpa.org/publications/ALPA_White_Paper_Leveling_the_Playing_Field_June_2012/ALPA_White_Paper_Leveling_the_Playing_Field_June_2012.html#top>]

Introduction

The United States’ airline industry and its employees operate in a hypercompetitive international marketplace. The U.S. airline industry has lost $53 billion since 1999, on a net basis. Only three years out of the last ten have been profitable. This is an industry that has been unable to meet its cost of capital and is known for not generating healthy margins, even in the best of times. It is very clear that the airline industry continues to face significant challenges. Competition from foreign airlines, which are often state owned or heavily state sponsored and vertically integrated, and operate from countries with low or nonexistent tax and regulatory burdens, is growing rapidly and impeding international growth for U.S. airlines. In addition, foreign airlines are expanding into markets previously dominated by U.S. airlines, threatening our carriers in their own backyard. U.S. airlines, as a result, find themselves in survival mode, adapting to the global marketplace that presents an uneven playing field for U.S. airlines.

Around the world, the expansion of airlines like Emirates and others with similar business models threaten U.S. carriers on international routes. Many foreign carriers do not encounter tax and regulatory burdens like by U.S. airlines. The current taxes and fees the U.S. airline industry endures are higher than nearly every other industry in the United States, adding to the financial burden on the airlines and the traveling public

Today, the commercial airline industry leads all others in America with 17 unique taxes and fees from the federal government, resulting in 20 percent or more of the total airline ticket prices going to taxes. These taxes discourage commercial flying in the United States. Further, the tendency of the U.S. government to emphasize consumer interests at the expense of the financial viability of the industry has resulted in a series of passenger protection regulations that place a significant financial burden on U.S. airlines, exacerbating the cost disadvantages that U.S. carriers face in the international marketplace.

#### Airlines are currently not making profit.

Franke 7 (Markus, January 2007, writer for Science Direct, author of “Journal of Air Transportation Management”, Science Direct, “Innovation: The winning formula to regain profitability in aviation?” page 23, http://www.sciencedirect.com/science/article/pii/S0969699706000998)

Most airlines have overcome the immediate effects of the recent global aviation crisis partly because of economic upturn and partly because of massive restructuring. Legacy network carriers had to take on the challenge of low-cost carriers, and regain competitiveness in short- and mid-haul business through considerable cost cutting and more flexible pricing models and are now profitable. On the other hand, many airlines do not make a reasonable profit, and the majority of carriers do not earn their capital cost. Airlines claim that they are still squeezed between their neighbors in the aviation value chain that leverage local monopolies (such as airports) or oligopolies (such as aircraft equipment manufacturers). Many legacy carriers, however, have not properly prepared for an era of deregulated and changing markets. They have not yet taken appropriate steps to escape from there positions between the few successful premium carriers and low-cost carriers. This middle position has little differentiation potential, an unsatisfactory growth perspective, and poor profitability prospects. Further, despite ongoing liberalization, the regulatory framework still does not enforce far-reaching consolidation, leaving the industry in a fragmented status with massive overcapacities. Consequently, the industry needs to further leverage external deregulation as well as internal restructuring to establish more efficient and competitive business models. Aside from basic cost cutting, innovation may become the decisive driver of progress, comprising advanced business models, customer segmentation, and technologies.

### Econ Benefits

#### NextGen air traffic control boosts the economy – lowers emissions, helps air congestion, and increases jobs – government officials and aviation experts agree

Meehan 2/14 – Quoting Patrick Meehan, a member of the House Aviation Subcommittee of the Transportation and Infrastructure Committee, Don Chapman, a facility representative with the National Air Traffic Controllers Association, and Mark Gale, CEO of the Philadelphia International Airport. (“Meehan Says NextGen Air Traffic Control Investment Key to Regional Economy” February 14, 2012[http://meehan.house.gov/latest-news/meehan-says-nextgen-air-traffic-control-investment-key-to-regional-economy/]

Tuesday February 14, 2012 *Urges President to Sign New FAA policies That Will Improve Safety, Decrease Congestions at PHL* PHILADELPHIA – U.S. Rep. Patrick Meehan (PA-07) today urged President Obama to sign the Federal Aviation Administration reauthorization bill, saying key investments in the bill like the NextGen air traffic control system will boost our regional economy and improve the safety of our skies. Meehan made the comments while touring the air traffic control tower and meeting with controllers at the Philadelphia International Airport. Meehan, a member of the House Aviation Subcommittee of the Transportation and Infrastructure Committee, was joined by Don Chapman, a facility representative with the National Air Traffic Controllers Association, and Mark Gale, CEO of the Philadelphia International Airport. “This bipartisan bill means **faster and safer travel, lower emissions,** and an **increase in private sector jobs**,” said Meehan. “It will also advance badly needed modernization of our air traffic control system, which is **essential in our congested mid-Atlantic airspace** that sees one out of every six flights in the world. This is particularly important here at Philadelphia International – no airport in the northeast sees more takeoffs and landings.” Meehan said the FAA reauthorization legislation will advance the modernization of the country’s air traffic control system to a GPS-based system known as NextGen. This will help ease congestion, decrease delay times and reduce fuel waste. NextGen technologies are expected to **bring a net $281 billion to the overall U.S. economy.** The FAA authorization bill contains no earmarks and does not raises taxes or passenger facility charges. The bill provides **long-term stability for the aviation industry, which accounts for $1.3 trillion in economic activity, and as much as 11 percent of GDP**. The FAA authorization law expired five years ago and is currently on its 23rd short-term extension. The bill, which authorizes funding for four years, has been passed by the House and Senate and is awaiting signature from the President.

### Failure to switch

#### Failure to switch to NextGen creates losses of 30 billion dollars ANNUALLY – time delays devastate profits

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

In 2005, the JPDO developed a high-level vision to communicate the key operating principles and characteristics of the NextGen. This vision emphasizes a shift in how information is accessed, allowing those who use the air transportation system to have more direct access to information affecting their operations. The intent of this CONOPS is to describe a system that meets these national goals. The U.S. aviation system must transform itself and be more responsive to the tremendous s ocial, economic, political, and technological changes that are evolving worldwide. We are entering a critical era in air transportation, in which we must either find better, proactive ways to work together or suffer the consequences of losing $30B ANNUALLY **due to people and products not reaching their destinations within the time periods we expect today.**

#### US air traffic is growing and will continue to grow – failure to update the air traffic infrastructure will cost 40 billion annually

Federal Aviation Administration Air Traffic Organization (ATO) 08 (The national aviation authority of the United States and an agency of the United States Department of Transportation “The economic impact of civil aviation on the U.S. economy” [http://www.faa.gov/about/office\_org/headquarters\_offices/ato/media/2008\_Economic\_Impact\_Report\_web.pdf Accessed 6/27/12](http://www.faa.gov/about/office_org/headquarters_offices/ato/media/2008_Economic_Impact_Report_web.pdf%20Accessed%206/27/12))

By 2025, U.S. aIr TraffIc is predicted to increase up to two times over the current level. The existing air traffic control system will not be able to cope with growth on such a scale. NextGen is the solution for this shortfall between the capabilities of the existing air traffic system and the level of flight activity that forecasters anticipate for these future years. NextGen will increase the system’s adaptability, enabling aircraft to quickly adjust to changes in factors affecting flight itineraries, such as weather, traffic congestion, aircraft position, flight trajectory patterns and security issues. By 2025, all aircraft and airports in U.S. airspace will be a part of the NextGen network, able to share information in real time as necessary to improve efficiency and safety while accommodating the predicted increase in air transportation demand. An undertaking of the magnitude of NextGen will require a significant investment by both the U.S. government and private enterprise. FAA’s current reauthorization request for the NextGen investment portfolio is $4.6 billion over the next 5 years. These key investments will enable FAA to transform from the current ground-based air traffic control system to a satellite based system. That total is made up of $4.3 billion in ATO capital and $300 million in research. Based on the current NextGen plan, major investments are also expected for the period from FY 2013 to FY 2017. Total FAA spending over the first 10 years is expected to range from $8 billion to $10 billion, and estimates through 2025 range from $15 billion to $22 billion in FAA investments. Such an infrastructure project will, without doubt, have a significant economic impact on the U.S. for years to come in regards to the increased productivity generated for beneficiaries of the system and the financial commitment to put the system in place. The cost of not implementing NextGen could lead to significant losses in productivity in the skies and in the economy. By 2022, the FAA estimates that failure to implement NextGen could cost the U.S. economy $22 billion annually in lost economic activity. Should no action be taken, the cost to the economy could grow to over $40 billion by 2033. 7 An FAA simulation shows that even as early as 2015, without some of the initial elements of NextGen, U.S. airspace will experience delays far greater than what we are seeing today. The importance of aviation cannot be overemphasized to keep the economy vital and healthy in the future. The next section reports the results of economic impact of civil aviation on the U.S. economy for 2006.

### Helps Industry

#### NextGen capabilities are key to the NATIONAL airline industry – mobilizes key actors

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

NextGen is a complex system with many public and private sector stakeholders that must smoothly, promptly, and capably integrate with the changes in the global air transportation system. National defense, homeland security, Air Traffic monitoring, commercial and GA operators, and airports work together to support passenger, cargo, recreational, and military flights. Through a net centric infrastructure, enterprise services provide users with a common picture of operational information necessary to **perform required functions**. These integrated capabilities of NextGen will provide the capacity required to meet the nation’s need for air travel in the most effective,efficient, safe, and secure manner possible.

#### Improving NextGen is key to the entire industry – the system interconnects all the sectors

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

The role of the JPDO is to establish how to transform the air transportation system. Part of this transformation involves integrating and reshaping capabilities across all aspects of air transportation so that the entire system operates as an interconnected structure. In many cases, this operational concept builds on visionary material that captures the aviation community’s goals for different aspects of transportation. • For ATM, many of the concepts build on the National Airspace System (NAS) Concept of Operations and Vision for the Future of Aviation (RTCA 2002) and the International Civil Aviation Organization’s (ICAO) Global ATM Operational Concept, which represent a globally harmonized set of concepts for the future. • Additional foundational and related conceptual documents will be referenced in future versions of this document. **A point of departure for NextGen is its scope. NextGen encompasses all air transportation, not just Air Traffic Management.** In addition to technological innovation, NextGen emphasizes changes in organizational structure, processes, strategies, policies, and business practice, including shifts in government and private sector roles that are required to fully exploit new technology.

#### Air travel demand will increase – improving the air traffic system NOW is key to prevent loss of the industry

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

The air transportation system transformation is motivated by the need for aviation to grow and continue to serve the nation and international community while responding to tremendous social, economic, political, and technological changes worldwide. **During the next two decades,** demand will increase**, creating a need for a system that (1) can provide two to three times the current air vehicle operations**; (**2) is agile enough to accommodate a changing fleet** that includes very light jets (VLJ), unmanned aircraft systems (UAS), and space vehicles; (3) addresses security and national defense requirements; and (4) can ensure that aviation remains an economically viable industry. The NGATS Integrated Plan (2004) recognizes these national needs and identifies 6 national and international goals and 19 objectives for the NextGen (see Table 1-1). Separately, each goal represents an ambitious agenda. Meeting these goals and objectives requires a transformation that embraces new concepts, technologies, networks, policies, and business models.

#### NextGen Key to Improve Airline Industry- 1. Realtime Displays 2. Faster decision making 3.Increase Communications

Federal Aviation Administration Air Traffic Organization (ATO) 08 (The national aviation authority of the United States and an agency of the United States Department of Transportation “The economic impact of civil aviation on the U.S. economy” [http://www.faa.gov/about/office\_org/headquarters\_offices/ato/media/2008\_Economic\_Impact\_Report\_web.pdf Accessed 6/27/12](http://www.faa.gov/about/office_org/headquarters_offices/ato/media/2008_Economic_Impact_Report_web.pdf%20Accessed%206/27/12))

In the coming years, the Next Generation Air Transportation System (NextGen) will be a source of further economic productivity improvements as the industry moves toward greater reliance on digital and automated services for air-to-ground communications, navigation and surveillance. The objective of NextGen is to increase the capacity, safety and efficiency of the air transportation system in order to enable continued growth in air transportation services. The technologies and concepts to bring this about are being put into place today. By making these investments, the FAA is setting the stage for continued productivity improvements. These productivity gains will rely on

capabilities provided by such technologies as:

1. Automatic Dependent Surveillance - Broadcast (ADS-B) will enable both pilots and controllers to see the same real-time displays of air traffic, substantially improving safety while increasing system capacity.

2. System Wide Information Management (SWIM) will reduce redundancy and better facilitate information sharing. It will also enable new and

faster modes of decision making.

3. NextGen Data Communications technologies will allow for the exchange of routine controllerpilot messages and clearances via digital data transmission. This will enable controllers to safely handle more traffic, improving air traffic controller productivity while enhancing the capacity and safety of the nation’s airspace.

### Jobs

#### Plan creates Jobs and increases tax revenue- Prefer our studies

**NEXA 11** (Nexa Advisors, A Private Aerospace Consultant Company “NextGen Equipage Fund” April) \*NextGen Equipage Fund is loan guarantees fund requesting federal backing <http://www.nextgenfund.com/files/downloads/NEF_Economic_Study.pdf> (Pitman)

In an important recent study, “The Economic Impact of Civil Aviation on the U.S. Economy”i, the Federal Aviation Administration (FAA) estimated that civil aviation accounted for 12 million U.S. jobs and $1.3 trillion in economic activity annually. FAA also estimated that implementing the Next Generation Air Transportation System (“NextGen”) infrastructure and procedures through 2018 would reduce total flight delays by 21 percent and provide $22 billion in cumulative direct, indirect, and induced benefitsii. The NextGen Equipage Fund, LLC (the “NextGen Fund” or the “Fund”) has been established for the purpose of facilitating the rollout of the avionics side of NextGen for U.S. commercial aircraft operators. It will provide affordable financing to equip U.S. commercial aircraft with hardware and software systems needed to make use of NextGen ground infrastructure. The NextGen Fund removes the barriers that have continued to impede the air carrier equipage decisions needed to ensure the successful, rapid implementation of the nation’s NextGen program. In this supplemental study, NEXA Advisors estimates that by overcoming airline barriers to equipage, the NextGen Fund can provide significant near term economic benefits beginning in 2013, accounting for as much as 32 percent of the FAA’s estimated benefits from accelerated implementation of NextGen through 2018. These estimates include creating up to 31,480 U.S. jobs, $6.9 billion in direct, indirect and induced economic activity, and up to $23.5 billion in total economic activity when catalytic effects are counted (Figure 1). This total economic activity would also drive an estimated $4.7 billion in new Federal revenue contributions. Economic impact is calculated by NEXA Advisors using a widely accepted input‐output method of economic modeling of direct, indirect, induced, and catalytic benefits to the U.S. economy. The direct economic impacts result from direct Fund expenditures into the U.S. supply chain. These expenditures will purchase NextGen avionics hardware and software, almost exclusively from U.S. suppliers, also paying for up front installation of the equipment on thousands of U.S. aircraft. The indirect economic impacts are those stimulated economic activities of the supply chain itself, hiring workers, purchasing second tier components, and completing installation of the NextGen avionics. The induced benefits are the ripple effects of spending that creates economic activity throughout the aviation industry and spilling into other industries. Catalytic impacts capture the extent to which aircraft equipage stimulates growth in air transport, thereby accelerating growth of other sectors of the economy. This effect includes passenger benefits from more reliable air travel and environmental benefits as NextGen reduces emissions, noise, and congestion around airports. Catalytic economic benefits are in addition to the direct, indirect, and induced benefits of the fund. U.S. jobs are directly created through the NextGen Fund’s purchases of avionics from manufacturers, and the installation and support of the equipment (Figure 2). These jobs include engineers, software developers, production workers and other high‐tech specialists needed to support the development and manufacture of the NextGen technologies. In addition, highly skilled installation and maintenance jobs will be created to install and support the equipment on aircraft. In addition to jobs and economic benefits, the NextGen Fund will make significant tax contributions through both increased payroll taxes from the jobs created and Federal taxes on higher economic activity (Figure 3). The analysis projects that the Federal tax revenue contribution could be between $2.6 and $4.7 billion by 2018. Without NextGen, FAA predicts that there will be gridlock in the skies. NEXA Advisors concludes that without the early investments made by the NextGen Fund beginning in 2013, aircraft equipage could be delayed by several years or more likely, for a decade, and many of the economic and job benefits identified herein will be lost permanently

#### Initial investment creates 4 Billion Creates 77,000 jobs

. **NEXA 11** (Nexa Advisors, A Private Aerospace Consultant Company “NextGen Equipage Fund” April)  
\*NextGen Equipage Fund is loan guarantees fund requesting federal backing <http://www.nextgenfund.com/files/downloads/NEF_Economic_Study.pdf> (Pitman)

The FAA Office of Aviation Policy, Plans, and the Environment estimated that an infusion of $4 billion in funding for NextGen would generate 77,000 jobs based on the Bureau of Labor Statistics data. NEXA Advisors first used FAA’s methodology contained in the FAA’s annual study on the Economic Impact of Civil Aviation on the U.S. Economy to estimate the number of jobs NextGen will create. Based on this analysis, aircraft equipage is estimated to create 24 jobs, defined as Full‐Time Equivalents (FTE), for every $1 million dollars invested in the year the funds are spent.vi The estimate of equipage includes ADS‐B and Ground‐Based Augmentation System (GBAS). NEXA Advisors also researched job creation across other industries (Figure 5) and found an average of 17 jobs are created per million dollars invested

### Consumers

#### Plan spills over to consumer productivity

. **NEXA 11** (Nexa Advisors, A Private Aerospace Consultant Company “NextGen Equipage Fund” April) \*NextGen Equipage Fund is loan guarantees fund requesting federal backing <http://www.nextgenfund.com/files/downloads/NEF_Economic_Study.pdf> (Pitman)

Consumers will benefit because NextGen equipage will enable the air transport sector to operate a more reliable and predicable passenger services model and system that will lead to improved productivity for passengers. The National Center of Excellence for Aviation Operations Research found the cost to passengers of flight delays and cancellations, in quantifiable terms of lost productivity, to be $16 billion annuallyxii. Equipage of aircraft with NextGen technology will increase the ability of airlines to create connections by improving the efficiency of the overall system. Connectivity enhances the productivity by providing better access to more markets, enhancing business communications and interactions, and by providing ease of access to a much larger labor pool. Sustained improvements in connectivity increase exports and facilitate tourism. IATA found that a 10 percent increase in connectivity results in a 0.07 percent increase in productivity.xiii Better connectivity also improves air cargo services and facilitates just‐in‐time shipping. Just‐in‐time shipping reduces supply chain production and development cycle times and reduces inventory requirements.xiv.

### Profitability - costs

#### Generates airline profitability – cutting down fuel costs – major expense for airlines. Even a 1% reduction saves hundreds of millions

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Benefits to Commercial Aviation

The FAA maintains that NextGen will benefit operators by increasing fuel efficiency and reducing congestion, poten- tially saving the industry billions of dollars in the process. First the direct fuel savings are calculated, followed by the congestion savings to operators.

The current aviation system uses radar to scan through an area periodically and reports any nearby operating aircraft to ATC. The lack of continuous precise detection means that aircrafts must maintain a minimum separation distance of at least five miles in the en route airspace and three miles in the terminal airspace for safety. Moreover, airplanes are required to fly through predetermined air corridors similar to imaginary highways in the air, limiting en route flex- ibility, though this is a procedural requirement by the FAA and not necessarily due to the limits of existing technology. The precision of GPS would allow reduction in the aircraft separation standard, which would greatly enhance air traffic management and flow. NextGen’s Area Navigation (RNAV) would allow pilots to choose more direct and shorter routes, to their destination, assuming FAA develops appropriate procedures to allow direct navigation. This could result in substantial fuel savings.

Another procedure through which NextGen would save fuel is during aircraft landing. Under the current system, an air- craft follows a fuel-intensive stepped descending approach where it descends to a lower altitude, levels off to a constant altitude, and then descends further by periodically altering engine power. Optimal Profile Descent (OPD) would allow the aircraft to glide continuously prior to landing instead of using additional engine power.9

By reducing fuel consumption, NextGen could provide relief to the airline industry’s fuel costs, one of the largest components of total operating cost. Airline profitability

in recent years has been stifled in part due to substantial increases in fuel prices: from under $1/gallon between 20002004 to over $2.20/gallon in 2010, including record prices of about $3/gallon in 2008 (Figure 8, Appendix A). Prior to jet fuel price hikes starting in 2004, fuel expenses accounted for about a quarter of total operating expenses. Since 2004, about half of total operating expenses are from fuel costs

(Figure 1).

Fuel Cost Savings to Airlines

The burden of increased fuel expenses is further exacer- bated by airport congestion and existing inefficiencies in an aviation system that uses outdated technologies and proto- cols. Congestion is a problem, particularly at certain busy airports where the congestion is caused by capacity con- straints, and will likely get worse as the economy recovers from the recession and travel demand rises.10

In 2010 major airlines reported that about 40 percent of arrivals and departures are delayed.11 Every additional minute spent by operators sitting on the tarmac or circling an airport awaiting clearance means additional fuel, equip- ment depreciation and maintenance, increased labor costs, employee fatigue, and a possible loss of customers.

According to the latest FAA estimate, NextGen could save about 1.4 billion gallons of fuel through 2018.12 This estimate assumes continued benefits of some of the Next- Gen capabilities already in place at some airports and timely implementation of the FAA’s mid-term goals. This amounts to, on average, about 200 million gallons annually assuming full implementation of NextGen. Using the current jet fuel price of about $2.86/gallon in 2011, total fuel savings to operators would be about $600 million annually.

However, the FAA has not made public the details of their estimation, simulation models, or methodology. Some in- dustry experts may remain skeptical of the FAA’s estimates without a clear indication of the methodology or basis behind these figures.

The following is a simple yet plausible independent measure of NextGen’s fuel savings. In 2010 the total fuel consumption by all US commercial airlines in domestic flights was

10.205 billion gallons of fuel worth $22.84 billion at an aver- age fuel price of $2.24/gallon.13 Assuming a one percent improvement in fuel efficiency following NextGen imple- mentation, which is a very conservative assumption, the re- sulting fuel savings amount to about 102 million gallons of fuel annually worth $229 million using the average 2010 fuel price. The savings from fuel also have environmental ben- efits. The 102 million gallons of fuel saved translates into reduced carbon dioxide emissions by approximately 1.076 million tons.14 This helps mitigate the airline’s industry impact on the environment and has real economic savings in a carbon offset market worth $7.9 million.15 Table 1 simply expands the figures for higher levels of fuel reduction.

The results show that the benefits could be significant when only considering modest estimates of NextGen’ fuel ef- ficiency. A more ambitious five percent fuel consumption reduction leads to about $1.145 billion dollars of fuel saved and 5.380 million tons of reduced carbon emissions annu- ally.

### Profitability – delays

#### Boosts airline profits – cuts down on delays

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Delay Cost Savings to Airlines

Congestion in aviation is a serious problem with direct quantifiable costs to airlines and other operators.16 Ac- cording to the FAA’s Cost-Benefit Analysis Guidance,17 the value of reduced time of aircraft delay can be measured by the aircraft’s variable operating costs including crew costs, maintenance, and fuel and oil costs. Fuel costs, which are analyzed separately above, are a part of the congestion sav- ings included in this analysis.

Figure 2 shows the percentage of flights reported by carriers that arrived or departed late.18 Post 9/11 dips in delays up to 2003 are indicative of decreased demand for flying, as indicated in green, and hence less congestion. Since then the percentage of flights delayed increased progressively as the impact of 9/11 on the airline industry slowly diminished. Towards the end of 2007 about 24 percent of reported flights arrived at least 15 minutes late, while 21 percent departed late. Delay numbers decreased in 2008 significantly following the recession, although they have climbed back up again as the economy began to recover. Today, about 20 percent of flights arrive or depart delayed.

NextGen’s delay cost savings to commercial airlines is esti- mated as follows: First, using the Department of Transpor- tation’s airline delay data, the cost of current congestion to all airlines is calculated. Next the value of reduced conges- tion is quantified for various levels of delay reduction. The value of the FAA’s estimate of 20-35 percent delay reduc- tion is calculated and compared to the savings from much lower levels of delay reduction.

Major airlines are required to submit delay data to BTS.19 The total delay for each reporting airline is calculated, amounting to 1.22 million hours of plane delays in 2010 overall. For every airline, the total cost of delays is calculated using an airline-specific hourly operating cost.20 Using this data, the total cost of delays to major reporting airlines in 2010 was about $3.58 billion.

Using very modest estimates of NextGen’s delay reductions, the delay savings are about $35.8 million annually for a one percent delay reduction and $179 million for a five percent delay reduction. These figures are much lower than the ben- efits using the FAA’s 20-35 percent delay reduction estimates of 715.9 million-$1.25 billion, but still represent substantial annual savings.

Limiting the analysis to only the reporting operators un- derestimates the true cost to the entire airline industry that includes many smaller low-cost regional operators as well as cargo operators, which are not required to report to the BTS. A one percent delay reduction saves the rest of the low cost regional operators $3.33 million, five percent saves $16.67 million, 20 percent reduction of delay saves a total of $66 million while a 35 percent delay reduction saves about $117 million.21

Table 2 summarizes the delay savings. Note that a portion of these savings includes fuel savings. The total fuel savings in the previous section include both delay fuel savings as well as fuel savings during regular operation, so delay fuel savings are included in both calculations.

#### NextGen is key to growth and sustainability of air transportation – reduces delays and congestion: increases automation

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

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VERSION 1.2

Advancements in aircraft capabilities allow for reduced separation and support the transition from rules-based operations to performance-based operations. Controller workload is no lo limiting factor because of tools and automation, which provide expanded information and improved decision-making capabilities. In addition, the transition of separation responsibility from the controller to the flight crew in some areas allows controllers to focus on overall flow management instead of individual flight management. Increased levels of service and dynamic resource management will enable the NextGen to meet demand rather than constrain demand the meet available resources.

Airports are the nexus of many of the NextGen transformation elements, including air traffic management (ATM), security and environmental goals. Accordingly, the sustainability and advancement of the airport system is critical to the growth of the nation’s air transportation operations as well as shifts in demand, making NextGen a scalable system. Net-centricity also information that is communicated and interpreted between machines without the need for human intervention. A reliable, common weather picture system. Airports form a diverse system that serves many aviation operators and communities with different needs. Airport operators include a mix of private and local government/public entities that are responsible for aligning their activities with NextGen goals. New technology procedures will improve access to airports, enabling better utilization of existing infrastructure and currently underutilized airports.

#### Plan solves airport congestion – results in federal policies

Schank 3/16 - President and CEO of the Eno Center for Transportation, a non-profit foundation with the mission of improving transportation policy and leadership. Urban planner has worked on federal and state transportation policy over a decade. (Joshua L Schank, “Next Generation Air Traffic Control: Looking at the Big Picture” [http://www.enotrans.org/eno-brief/next-generation-air-traffic-control-looking-at-the-big-picture] March 16 2012)

Airport Congestion The prolonged economic downturn has put this issue on the backburner temporarily, but it will be back with a vengeance when the economy begins to grow quickly. While most airport delays are related to weather, many are also due to the fact that often the number of aircraft seeking to takeoff or land at a given airport at a given time can exceed the capacity at an airport. If bad weather hits at one of these times, and at a crucial hub airport such as Chicago O’Hare or Atlanta Hartsfield, the entire system can be crippled very quickly. In theory, NextGen should help alleviate some of this congestion. Improved ATC [technology](http://www.enotrans.org/eno-brief/next-generation-air-traffic-control-looking-at-the-big-picture) can increase the effective capacity of the aviation system by reducing separations between aircraft allowing a greater number of planes to land safely in the same period of time. However, the extent to which such improvements actually reduce congestion will depend in large part on policy. Congestion is a tricky thing – providing more capacity does not necessarily reduce delay if there is latent demand. If aircraft operators choose to take advantage of the new capacity by flying more frequent flights – [and airlines](http://www.enotrans.org/eno-brief/next-generation-air-traffic-control-looking-at-the-big-picture) in particular are prone to do this because frequency and market share are directly related – some of these congestion savings could be negated. We have no comprehensive national policy in place to effectively reduce airport congestion, and many congested airports have struggled in their attempts to add runways or smooth out demand. One way that we could potentially improve the policy and take advantage of the NextGen benefits would be to provide federal incentives for airports that price their runways in an innovative way that reduces delay. Even better would be if the federal government provided funding for multimodal intercity planning that could coordinate across all intercity modes to deliver greater throughput for passengers into congested regions. There may be other ideas out there as well, and it is essential we begin considering them now, not after NextGen is a reality, so that we can tailor NextGen appropriately to support various policy scenarios.

### Cutting delays saves money

#### Reduces delay times – key to save consumers money

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Time Savings to Commercial Passengers

In addition to reduced operating costs, passengers will also save time with reduced congestion, which is an economic resource. Any unneeded time spent due to congestion adds to the opportunity cost of foregone work or leisure, as well as any discomfort incurred. Travel time saved can thus be valued to reflect both the opportunity cost and discomfort during travelling.22 The transportation literature suggests measuring this value of time in terms of, or as a percent-age of, an hourly wage rate. For this analysis, the FAA “all purpose” hourly rate of $28.60 is used. The total cost of delays to passengers is estimated to be about $5.37 billion, or about $25.84 per passenger, which is about 7.7 percent of the average nominal ticket price of $336 in 2010.23 Table 3 shows the estimated value of the time that NextGen can save passengers under different delay reduction scenar- ios and the resulting average dollar savings per passenger.24

The results show that for a one percent reduction in delays, the total value of travel time saved is about $53.7 million, or about 25 cents per passenger. For a five percent delay reduction, total savings is $268.5 million annually or $1.292/ passenger. For a moderate 10 percent delay reduction, this is about 5.4 minutes saved per flight per passenger, the total savings amount to $537 million per year, or $2.584 per pas- senger. The savings are significantly larger using the FAA’s delay savings estimates: $1.074 billion per year or $5.167 per passenger for a 20 percent delay reduction, and $1.88 billion/year or $9.042 per passenger for a 35 percent delay reduction.

#### Cost of Delay is High even without Spillover- $14 Billion

NEXTOR et al. 10 ( Nextor- Government-Academic-Industry alliance dedicated to the advancement of aviation research and technology. NEXTOR is sponsored by the Federal Aviation Administration (FAA) Office of Technology Development and Operations Planning Michael Ball- Co-Director, Cynthia Barnhart, Martin Dresner, Mark Hansen, Kevin Neels, Amedeo Odoni, Everett Peterson, Lance Sherry, Antonio Trani, Bo Zou- Employed by NEXTOR. With assistance by Rodrigo Britto, Doug Fearing, Prem Swaroop, Nitish Uman, Vikrant Vaze, Augusto Voltes. “Total Delay Impact Study A Comprehensive Assessment of the Costs and Impacts of Flight Delay in the United States,” [http://its.berkeley.edu/sites/default/files/NEXTOR\_TDI\_Report\_Final\_October\_2010.pdf Accessed 6/26/12](http://its.berkeley.edu/sites/default/files/NEXTOR_TDI_Report_Final_October_2010.pdf%20Accessed%206/26/12)) KT

Other studies have examined the total cost of delay. According to a report prepared for the Senate Joint Economic Committee, the total cost, to airlines, passengers, and the rest of the economy, is estimated to be as high as $41 billion in 2007, including $31 billion in direct costs and $10 billion in spillovers (JEC 2008). The Air Transport Association, using a different methodology, estimates costs (for the year 2008) to be $14 billion, not including spillovers (ATA, 2009b).

### Cutting delays key to industry

#### Delays and Congestions Threatens Airline industry growth- Key to U.S. Economy

Manley and Sherry 08 Center for Air Transportation System Research George Mason University (Bengi, Lance. “The Impact of Ground Delay Program (GDP) Rationing Rules on Passenger and Airline Equity” [http://catsr.ite.gmu.edu/pubs/ManleySherryICRAT08MAIN.pdf Accessed 6/26/12](http://catsr.ite.gmu.edu/pubs/ManleySherryICRAT08MAIN.pdf%20Accessed%206/26/12)) KT

The purpose of the air transportation system is the cost effective, rapid, safe transportation of passengers and cargo. In this way the **air transportation** system is a **significant “engine**” **of the national economy** and provides a service that cannot be achieved by other modes of transportation (Duke and Torres, 2005). Passenger and cargo demand for air transportation has been growing steadily over the years and is forecast to grow at the same rate for several decades (FAA Forecast, 2007). The growth of air transportation capacity to meet this demand has been lagging (MITRE, 2007). Denver International (DEN), Dallas Fort Worth (DFW) and George Bush Intercontinental (IAH) airports are the only new airports opened in the last 40 years. The capacity of these airports is helpful, but does not solve the current congestion problems at the nation’s busiest airports, such as Newark (EWR) or Chicago O’Hare (ORD). The most congested airports cannot expand due to land and/or environmental problems (Howe et.al. 2003). Further, the full capacity improvement benefits of Next Generation Air Transportation System are not expected to be operational before 2025. This imbalance between demand for flights and available capacity is estimated to cost passengers $3 billion to $5 billion a year in trip delays (Robyn, 2007). Congestion related flight delays are estimated to cost the financially fragile U.S. airlines an estimated $7.7 billion in direct operating costs in 2006 (MITRE, 2007). These delays also have environmental and climate change implications as well as regional economic repercussions (Miller and Clarke, 2003). In the presence of over-scheduled arrivals at airports, Traffic Flow Management (TFM) initiatives are used to resolve the daily demand-capacity imbalance. In particular, the Ground Delay Program (GDP) collaborates with the airlines to manage the scheduled arrival flow into airports consistent with the airport’s arrival capacity. The current GDP rations the arrival slots according to the scheduled arrival time of the flights. This rationing scheme is adjusted to account for penalties suffered by long-distance (e.g. transcontinental flights) flights when arrival capacity increases (e.g. due to improving weather) and the GDP is cancelled. The rationing scheme is also adjusted to more equitably allocate arrival slots between airlines to ensure that one airline (e.g. with a hub operation) is not excessively penalized.

#### Congestion and Delays Threaten Airline Profits- unpredictable Weather. Air Traffic Management Solves

Xiong 2010 (Jing- Ph. D CANDIDATE Department of Precision Instruments and Mechanology Tsinghua University, Beijing, China University of California, Berkeley, California “Revealed Preference of Airlines’ Behavior under Air Traffic Management Initiatives” <http://search.proquest.com/docview/749362635/previewPDF?accountid=10747> Accessed 6/26/12) KT

1.1 Problem StatementThe aviation system is facing unprecedented challenges in dealing with increasing demand and unpredictable weather. The Federal Aviation Administration (FAA) forecasts that the number of air passengers will increase at a 2.7% annual rate and reach 1.1 billion by 2025, which is 1.6 times the number of passengers in 2007 [1]. Although part of the demand can be accommodated by using more large-size aircraft, high demands still impose great stress on the current infrastructure. In addition, the air transportation system is vulnerable to severe weather, which reduces both airport capacity and en-route capacity. For example, the landing capacity of San Francisco International Airport (SFO) could be 60, 45, 36 or 30 aircraft per hour depending on various weather conditions. However, at major US airports, air traffic is often scheduled close to (or sometimes even above) the maximum capacity. Therefore, a capacity drop caused by bad weather will often result in a demand-capacity imbalance, which then creates disruptions and delay. Moreover, the very competitive commercial airline market and high cost of owning commercial aircraft encourages high utilization of aircraft. Consequently, scheduled turnaround times (from the scheduled arrival time to the schedule departure time of a given aircraft) are often quite short relative to the magnitudes of the delays incurred. In these cases an arrival delay at a given airport will often result in a departure delay. Such delay propagation can make a capacity drop at a single airport affect much of the network. Congestion and delays from capacity shortfalls are costly to air passengers, airlines and the overall economy. The total cost of air traffic delays in 2007 was estimated by the Joint Economic Committee (JEC) to be as much as $41 billion to the American society [2]. Increasing capacity through physical infrastructure expansion or advanced technology implementation are two solutions to reduce delays, but come with high investment costs and environmental impacts. Mitigating the consequences of aviation system capacity shortfalls by improving the efficiency of the existing system is another alternative. Under these circumstances, Air Traffic Management Initiatives (TMIs) are developed by the FAA to manage situations where demand exceeds capacity under severe weather operations. The objective of TMIs is to shift the demand to alternative resources, such as different routes, or different times in order to minimize congestion.

#### Airline Industry Key to the U.S. Economy but is threatened by delays- $1.3 Trillion in Economic Output Lost

NEXTOR et al. 10 ( Nextor- Government-Academic-Industry alliance dedicated to the advancement of aviation research and technology. NEXTOR is sponsored by the Federal Aviation Administration (FAA) Office of Technology Development and Operations Planning Michael Ball- Co-Director, Cynthia Barnhart, Martin Dresner, Mark Hansen, Kevin Neels, Amedeo Odoni, Everett Peterson, Lance Sherry, Antonio Trani, Bo Zou- Employed by NEXTOR. With assistance by Rodrigo Britto, Doug Fearing, Prem Swaroop, Nitish Uman, Vikrant Vaze, Augusto Voltes. “Total Delay Impact Study A Comprehensive Assessment of the Costs and Impacts of Flight Delay in the United States,” [http://its.berkeley.edu/sites/default/files/NEXTOR\_TDI\_Report\_Final\_October\_2010.pdf Accessed 6/26/12](http://its.berkeley.edu/sites/default/files/NEXTOR_TDI_Report_Final_October_2010.pdf%20Accessed%206/26/12)) KT

1 Introduction **Flight delay is a serious and widespread problem in the United States**. In 2007, **nearly one in four airline flights arrived at its destination over 15 minutes late** (BTS, 2009). About a third of these late arrivals were a direct result of the inability of the aviation system to handle the traffic demands that were placed upon it, while another third resulted from airline internal problems. Most of the remainder was caused by an aircraft arriving late and thus having to depart late on its next flight (BTS, 2009). Between 2002 and 2007, as the air transport system recovered from the 9/11 attacks, scheduled airline flights increased about 22 per cent, but the number of late-arriving flights more than doubled. Since 2007, traffic and delays have declined somewhat because of the recession, but the FAA expects growth to resume, with air carrier flight traffic reaching 2007 levels by 2012, and growing an additional 30 per cent by 2025. It is widely recognized that delay increases nonlinearly as demand approaches the capacity in the system (Figure 1-1). If current demand in the system is D1 with delay at delay1 level, it is likely that, without substantial upgrades to aviation infrastructure, such growth (for example, to D2) would result in flight delays far in excess of any we have heretofore experienced (delay2). **Growing delays threaten the competitiveness of the US in the world economy**, by limiting the ability of the air transport system to serve the needs of the US economy. The growth in gross domestic product and air travel demand are closely linked; a recent multi-national study found a strong correlation between growth in economic productivity and growth in business travel (Oxford Economics, 2009). Business travel accounts for about half the dollars spent on domestic air transport (BEA, 2009), and with good reason—a recent study estimates that a dollar spent on business travel earns a return of about $12 in increased revenue to the traveler’s employer (Oxford Economics, 2009). In addition to improving business performance generally, air transport impacts the economy through the jobs and revenue it directly creates in air transport related industries, the expenditures of air travelers on auxiliary goods and services, and the secondary impacts that result as these dollars recycle throughout the economy. FAA estimates **the total economic impact from civil aviation at $1.3 trillion in economic output**, nearly $396 billion in earnings, and 12 million jobs in 2007 (FAA ATO, 2009).

#### Delays Threaten the Economy- Decrease in demand and business productivity

NEXTOR et al. 10 ( Nextor- Government-Academic-Industry alliance dedicated to the advancement of aviation research and technology. NEXTOR is sponsored by the Federal Aviation Administration (FAA) Office of Technology Development and Operations Planning Michael Ball- Co-Director, Cynthia Barnhart, Martin Dresner, Mark Hansen, Kevin Neels, Amedeo Odoni, Everett Peterson, Lance Sherry, Antonio Trani, Bo Zou- Employed by NEXTOR. With assistance by Rodrigo Britto, Doug Fearing, Prem Swaroop, Nitish Uman, Vikrant Vaze, Augusto Voltes. “Total Delay Impact Study A Comprehensive Assessment of the Costs and Impacts of Flight Delay in the United States,” [http://its.berkeley.edu/sites/default/files/NEXTOR\_TDI\_Report\_Final\_October\_2010.pdf Accessed 6/26/12](http://its.berkeley.edu/sites/default/files/NEXTOR_TDI_Report_Final_October_2010.pdf%20Accessed%206/26/12)) KT

The impacts of flight delays are not confined to airlines and their passengers. Other segments of the economy are also affected. Increases in airline costs caused by delay and schedule padding cause passengers to pay higher fares. These higher fares affect not just the demand for leisure travel but also lead to increases in the cost of production for industries that rely on air transportation to conduct business. Demand for the output of such industries in turn decreases. Schedule padding and flight delays also add to the time required for business trips, leaving business travelers with less time to do their work. As a result, delays cause employers to experience a loss in productivity. Tracing out these various effects requires an integrated model of the national economy. For this purpose, we utilized a single-region Computable General Equilibrium (CGE) model. This model was modified to reflect our findings on the direct costs of delay. We explicitly modeled the increases in airline costs caused by delay, and the loss in productivity for business travelers. The CGE framework then traced the effects of these changes in cost as they rippled through the economy. The model traced the effects of cost increases on the growth of the U.S. economy over the period from 2005 through 2013 Two sets of simulations were performed to assess the macroeconomic impact of flight delays. A baseline simulation projected the effects of changes in income, consumer tastes, and technology on the demand for air transportation and the amount of flight delay over the period from 2005 and 2013, assuming no policies or actions are taken to reduce flight delays. The second set of simulations assumed the elimination of delays (actually reduction by 90%) for a given level of industry output. In this way we calculate that in 2007 U.S. GDP was approximately $4 billion lower than it would otherwise have been in the absence of delays. Of course, the investments and expenditures required to reduce delays would also generate economic impacts, but these are not considered here. We note that this estimate is lower than others that have previously been published (see, for example, the JEC study -- JEC 2008). Many of these prior studies focus solely on delay-induced changes in cost, and fail to account fully for how these cost changes affect the growth of the economy. In contrast, our analysis took into account the fact that increases in the efficiency of air transportation would actually decrease certain direct economic activities associated with this sector since fewer pilots, flight crews, etc would be required to carry out the same business functions. On the other hand, there would be an increase in the economic activity of other businesses due to the reduction in the cost of a component of their production (air transportation). The net effect is certainly a positive increase in economic activity but perhaps not as great as some earlier studies have estimated

### Profitability - productivity

#### NextGen Improves U.S. Economy- Increased Productivity- Key to Growth

Federal Aviation Administration Air Traffic Organization (ATO) 08 (The national aviation authority of the United States and an agency of the United States Department of Transportation “The economic impact of civil aviation on the U.S. economy” [http://www.faa.gov/about/office\_org/headquarters\_offices/ato/media/2008\_Economic\_Impact\_Report\_web.pdf Accessed 6/27/12](http://www.faa.gov/about/office_org/headquarters_offices/ato/media/2008_Economic_Impact_Report_web.pdf%20Accessed%206/27/12))

NextGen will be a source of further economic productivity improvements as the industry moves toward greater reliance on digital and automated services… In economic analysis, productivity refers to the efficiency with which an economy’s productive inputs are utilized to produce economic goods and services. Improvements to productivity, especially labor productivity, is one of the most important sources of economic growth. Economists at the Bureau of Labor Statistics (BLS) estimate changes in productivity by examining year to year changes in the ratio of output to inputs or factors of production (e.g., output per hour of labor). Changes in productivity reflect changes in how inputs are utilized in the production process, and include changes in technology, worker skills, capital utilization and economies of scale, among other things. Measures of productivity in the economy provide a quantitative picture of overall economic efficiency and its sources.

### Efficiency & delays

#### Creates efficiency and decreased flight delays – studies prove – answers critics

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

NextGen Benefit

NextGen has the potential to reduce congestion and fuel consumption significantly while increasing safety due to more precise location information of air traffic. While most agree that air traffic control would improve under NextGen, there are varying estimates on the magnitude of the potential benefits of NextGen among experts in the airline industry.

One concern is that NextGen might not have a significant impact on increasing the airport acceptance rates (AAR), which is an important factor in reducing congestion, particularly at large hub airports.5 Even if Next- Gen increases the number of operations in en route airspace by reducing minimum separation standards and facilitating more direct routes, critics contend that airports can still only allow a fixed number of planes to land per hour.

Another criticism is that the operators cause most of the de- lays in some airports through flight scheduling for business reasons as opposed to due to airport capacity limitations. As a result it is argued that NextGen could do little to alleviate delays.

In part to counter these concerns, the FAA released its NextGen Implementation Plan in March 2011 where it esti- mated benefits from NextGen in terms of reduced conges- tion and increased fuel efficiency based on both simulations and in some case actual data:

In Atlanta, arrivals making use of Performance Based Navi- gation (PBN) procedures have saved hundreds of thousands of gallons of fuel and thousands of tons of carbon dioxide and air pollutants. Similar fuel savings and reductions in emissions have resulted from the use of precise, continuous descents into Los Angeles and customized descents into San Francisco. Preliminary results from a surface management initiative in Boston point to a fuel savings of 5,100 gallons and a reduction in carbon dioxide emissions of 50 tons dur- ing periods of heavy congestion. Shared surface surveillance data coupled with aircraft metering techniques are creating taxi-out time savings of up to 7,000 hours a year at New York’s John F. Kennedy airport and 5,000 hours a year at Memphis, Tenn.6

On one hand, the criticisms of NextGen might have some valid ground and have yet to be rebuked through published research. On the other hand, NextGen benefits have been demonstrated at certain airports in the US. These conflict- ing statements make it challenging to reasonably estimate NextGen benefits.

A recent Deloitte LLP report estimates the potential merits of accelerating the NextGen programs, as well as assessing the economic effect of potential implementation delays.7 The study finds that the net present value for NextGen deployment varies from $161 billion to $1.3 trillion through 2035, depending on how soon modernization is complete and whether the benefits include environmental and eco- nomic spillover effects. The study assumed certain levels of benefits based on previous studies and reports. For example, between 2009-2025 fuel efficiency was assumed to be reduced by 25 percent by the end year. Airline delays are assumed to be reduced by 78-85 percent by 2025, based on an earlier estimate by the Joint Planning and Development Office.8

### Spillsover – other improvements

#### NextGen spills over to other airline concerns – motivates development of better airport infrastructure

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

The sustainability of existing airports will be enhanced with a preservation program to enhance community support and protect against encroachment of incompatible land uses and impacts to airport protection surfaces. Finally, **new airport infrastructure will be developed using a** comprehensive planning architecture that integrates facility planning, finance, regional system planning, and environmental activities to enable a more efficient, flexible, and responsive system that is balanced with NextGen goals. At the heart of the NextGen concept is the information-sharing component known as net-cent infrastructure services or net-centricity. Its features allow the NextGen to adapt to growing demands provides the foundation for robust, efficient, secure, and timely transport of information to a broad community of users and individual subscribers. This results in a system that minimizes congestion, achieves integration, and facilitates the concepts of distributed decision-making by ensuring that all decision elements have exactly the same information upon which to base a decision, independent of when or where the decision is made. The net-centricity component binds NextGen operational and enterprise services together, thereby creating a cohesive link. Enterprise services provide users with a common picture of operational information necessary perform required functions.

### Accidents

#### Prevents flight accidents

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Safety

With more precise location information on all aircraft, con- trollers can have a much better sense of their location with respect to the location of other moving and non-moving aircraft in their vicinity. NextGen provides precision verti- cally guided approaches with no equipment expenditure on the ground. The direct result of the improved information is less of a risk of collisions on the ground or in the air, especially in times of low visibility. While commercial aviation in the United States has an unparalleled safety record, general aviation still faces sub- stantial flight incidents and casualties annually. An analysis of the National Transportation Safety Board’s (NTSB) data for general aviation accidents shows over 1,000 cases in 2010, including 245 casualties.25 A common probable cause for accident according to the NTSB’s investigation reports is pilot error due to lack of situational awareness, particularly during times of poor visibility.

In quantifying the cost of fatalities, the USDOT’s recom- mended value per casualty is $5.8 million, or a range of $3.2-$8.4 million due to uncertainty.26 Based on this estimate, the cost of general aviation accidents in terms of lives lost is about $1.421 billion or between $784 million-$2.058 billion annually.27

#### NextGen secures the management of flights – provides information of the whole system

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

The safety improvement culture is encouraged by management and utilizes non-reprisal reporting systems. Safety assurance focuses on a holistic view of operators’ processes and procedures rather than the individual pieces of the system. Modeling, simulators, data analysis, and data sharing are utilized in prognostic assessments to improve safety risk management. Data from the above services are used to provide real-time system-level risk assessments and operational personnel. evaluate and manage individual aircraft risk. Safety compliance is monitored through network enabled data gathering, which collects interaircraft and pilot-to-pilot performance data. This enhanced monitoring of operational characteristics facilitates the integration of “instantaneous” system performance metrics into system management decisions.

#### NextGen decreases the risk of crashes – better surveillance and shared situational awareness

Joint Planning and Development Office, ’07 {“Concept of Operations for the Next Generation Air Transportation System,” Draft 5 , Version 1.2, February 28, WEB 6/26/2012, http://www.jpdo.gov/library/nextgenconopsv12.pdf }

**The suite of enterprise services includes shared situational awareness.** (SSA), security, environment, and safety. SSA services offer a suite of tools and information designed to provide NextGen participants with real-time aeronautical and geospatial information. It provides data and automatic updates to a wide range of users, aiding optimal air transportation decision-making. PNT services reduce dependence on costly ground-based navigation aids (NAVAID) by providing users with current location and any corrections, such as course, orientation, and speed, that are necessary to achieve the **desired destination**. Real-time air situational awareness is provided by integrating cooperative and non-cooperative surveillance data from all air vehicles. CONCEPT OF OPERATIONS FOR THE NEXT GENERATION AIR TRANSPORTATION SYSTEM (NEXTGEN) EXECUTIVE SUMMARY VERSION 1.2 ES-3 JOINT PLANNING AND DEVELOPMENT OFFICE

#### NextGen deploys safety systems that are key – they will reduce the number of hazards encountered.

Darr 10 (Stephen Darr, June 2010, Dynamic Aerospace, Inc, National Aeronautics and Space Administration, “Safer Systems: A NextGen Aviation Safety Strategic Goal” page 5, <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5525314>)

Provide Safety Enhancements for Airborne Systems In the Next Generation Air Transportation System, airborne systems will become an increasingly integral part of the overall air traffic management system. The JPDO Concept of Operations for the Next Generation Air Transportation System proposes to include aircraft as interactive nodes on an air traffic management network under the Network Enabled Operations concept. It also identifies several key capabilities, such as Aircraft Trajectory-Based Operations, Equivalent Visual Operations, and Super Density Operations that will require aircraft automation systems to carry out functions that today are perfonned by air traffic control systems. Likewise, pilots, whether on-board, remote, 12 or automated, will be required to take on responsibilities traditionally perfonned by air traffic controllers. To increase system throughput, reductions in aircraft spacing (longitudinal, lateral, and/or vertical) in all operational phases of flight (including the ground phase) will be required. To minimize the risk of aircraft collisions and wake vortex encounters, barriers to reduced separation will be addressed, to include performance limits of communications, navigation, and surveillance systems. This objective focuses on integrating safety requirements into the development and implementation of capacity-enhancing advancements for aircraft, to maintain or improve safety as capacity is increased. The following five strategies will be adopted in the development and implementation of airborne systems. Improve the reliability and airworthiness of aircraft, through increased reliability of control, avionics, software, and information management systems, as well as the long-term structural airworthiness of new materials and advanced aircraft designs. The result will be reduced systems failures and reduced diversions or incomplete missions. Improve vehicle systems health management through advanced monitoring systems and decision aids. These systems can monitor all aspects of systems health, both during flight and through post-flight analysis, including vehicle structures, propulsion systems, control system elements, and avionics hardware and software. To provide pilots, dispatchers, and maintenance personnel with ready access to system health information, advanced aircraft monitoring systems will be developed that integrate sensor information. Integration of advanced monitoring systems will increase operators' timely and accurate understanding of system health, resulting in quicker identification of sub-system faults and failures and increased opportunity to successfully mitigate and prevent these failures. Enhanced decision aids will assist operators in preventing unacceptable safety risks from developing, enhancing operators' recognition and incorporation of complex factors in situation assessment, and mitigative decision-making. To ensure an efficient response, certain system failures will precipitate automatic transition to alternate operating parameters, with backup procedures in the event of anomalous conditions. Executing this strategy will help to reduce the number of hazards encountered, enhance the understanding of off-nominal conditions, and reduce the response time in making optimal decisions, ultimately improving operator awareness and mitigative response to airborne events and hazards. Increase the reliability and accuracy of data and information by implementing strict controls on the acquisition and processing of information critical for air crew response in both nominal and off-nominal operating conditions. The data acquisition process must ensure the integrity of data through quality checking for displayed data and for the execution of automated programming, especially those supporting automated reversion functions and automation-to-automation interfaces. Timeliness of data is critical to maintaining data accuracy and integrity for time-critical decisions. These controls will become increasingly important as aircraft are more highly integrated in the air traffic management system. This strategy will help to lower instances of system degradation caused by data latency, faults, and/or failures, and increase air crew confidence in the use of and reliance on the data. Ensure aircraft conformance to more stringent operations requirements; achieving many NextGen capacity gains will require a higher level of performance in some aspects of navigation, guidance, and control, especially for reduced-separation and trajectory-based operations. In meeting these requirements, careful examination must also be made that other causes of deviations from assigned flight trajectories will not increase the potential for near miss and collision incidents and accidents, or to runway incursions. While it is preferable to prevent rather than mitigate the consequences of aircraft accidents, ultimately, it is not possible to prevent all accidents, across all sectors of aviation, under all operating conditions. Therefore, work must be undertaken to increase aircraft system contributions to survival in crash scenarios, with systems and technologies designed to mitigate the consequences and hazards assOCiated with accidents, such as post-crash fires, toxic fumes, and impact loads. This will help reduce fatalities and severe injuries from the levels sustained in accidents today.

### Accidents threaten industry

#### Accidents and Emergencies Threaten Air Transit now

Zhang et al. 11(Wei- Member of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Claire J. Tomlin- fellow of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Maryam Kamgarpour- Student Member of IEE and with the Department of Mechanical Engineering, University of California at Berkeley. Dengfeng Sun- Member of IEE and with the School of Aeronautics and Astronautics, Purdue University. “A Hierarchical Flight Planning Framework for Air Traffic Management” Vol. 100, No. 1, January 2012 in Proceedings of the IEE. Accessed 6/20/2012) KT

Aside from being strained by the current level of demand, air transportation safety has recently been compromised to a level requiring immediate attention. It was reported that the number of certified air traffic controllers in 2008 reached the lowest level in 15 years, causing many major air traffic control (ATC) facilities to declare staffing emergencies. The lack of enough air traffic controllers has caused an upsurge of operational errors, many of which could have turned into major accidents. For example, the plane crash at Lexington, KY, on August 27, 2006, was partly due to the fatigue of the sole tower controller causing him to not respond promptly to the incorrect runway use. As a more recent example, the sole tower controller in the Ronald Reagan Washington National Airport (DCA), who was on his fourth straight overnight shift on March 23, 2011, fell asleep, forcing two commercial aircraft to land without assistance.

### Avoid weather

#### NextGen allows for Modifying, adjusting and fully designing flight plans. That’s Key to solving Air Traffic and Weather Hazards

Zhang et al. 11(Wei- Member of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Claire J. Tomlin- fellow of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Maryam Kamgarpour- Student Member of IEE and with the Department of Mechanical Engineering, University of California at Berkeley. Dengfeng Sun- Member of IEE and with the School of Aeronautics and Astronautics, Purdue University. “A Hierarchical Flight Planning Framework for Air Traffic Management” Vol. 100, No. 1, January 2012 in Proceedings of the IEE. Accessed 6/20/2012) KT

C. From Centralized to Hierarchical Decentralized Planning Among the various visions of NextGen, this work investigates the en-route flight planning problem of the future ATM system. The problem is concerned with modifying, adjusting, or even fully designing scheduled flight plans (represented by high-altitude cruise waypoints) to meet en-route airspace capacity constraints and weather restrictions. The planning decisions rely crucially upon two classes of information: traffic prediction and weather forecast. The highly regulated nature of the air transportation system enables reliable predictions for the future traffic distributions based on the approved flight path plans. The predictions can be facilitated by partial differential equation (PDE) models [12]–[14] that explicitly consider the spatial–temporal evolution of the traffic flow dynamics. On the other hand, numerous existing weather products can be used (mostly manually) to identify hazardous regions or quantify capacity drops over the affected parts of the airspace [15], [16]. With these traffic and weather outlooks, the traffic management decisions are often made with assistance from centralized optimization algorithms subject to appropriate constraints. Many centralized traffic management methods suffer from complexity and scalability issues. They are often only capable to determine ground delays [17]–[19] rather than designing the entire flight path. As such, modifications to flight plans to better utilize airspace resources are not explored. In addition, a centralized approach in general assumes a universal cost metric such as the total delay of all flights, which ignores the operation preferences of individual flights. For example, a large commercial flight with many passengers onboard may decide to take a relatively long detour to reduce departure delays as much as possible, while a small flight or a private plane would rather delay the departure until a shorter path becomes available. Moreover, it is difficult for a centralized traffic planning approach to explicitly consider different aircraft limitations in handling hazardous weathers. A typical idea shared by most weather-aware flight planning strategies [20]–[23] is to extract hazardous weather regions from certain weather products and treat these regions as common obstacles to be avoided by all flights during the planning process. However, in reality, the effects of weather on different flights could be substantially different [24]. For example, light or moderate icing conditions are important for intermediate-size aircraft with reciprocating engine and straight wings, but will in general not affect large commercial aircraft. Moreover, even with the same type of aircraft, experienced pilots may decide to fly through regions with adverse weather conditions while inexperienced ones would not.

### Aviation key to economy

#### Aviation key to the economy – spillover effects

HUERTA 12 Administrator of the Federal Aviation Administration [Michael P. Huerta; March 2012; “NextGen Implementation Plan]

Aviation sustains millions of jobs each year and accounts for more than 5 percent of the gross domestic product. Aviation enables the economic benefits of tourism, shipping and travel for business or pleasure. Through our airports, it delivers economic impact to large and small communities across this country. Continued economic growth in the aviation industry is supported through the ongoing implementation of NextGen technologies, policies and procedures, and we are pleased to report on the advancements that we have made.

#### Aviation Is Key to U.S. Economy- Makes up more than $779 billion

Federal Aviation Administration Air Traffic Organization (ATO) 08 (The national aviation authority of the United States and an agency of the United States Department of Transportation “The economic impact of civil aviation on the U.S. economy” [http://www.faa.gov/about/office\_org/headquarters\_offices/ato/media/2008\_Economic\_Impact\_Report\_web.pdf Accessed 6/27/12](http://www.faa.gov/about/office_org/headquarters_offices/ato/media/2008_Economic_Impact_Report_web.pdf%20Accessed%206/27/12))

TO FULLY UNDERSTAND the effects of commercial and GA services on the U.S. economy, this study provides both an overview and a detailed look at civil aviation by impact type. Using national data sources and studies, the primary direct and indirect impacts as well as induced impacts from the RIMS-II model are shown in Table 3a and 3b. • airline operations account for nearly half of the primary direct impact in dollar value as seen in Table 3 with $108 billion. Visitor expenditures account for most of the indirect impact with $205 billion. These two primary impacts yield $779 billion in secondary impacts. In the total economic impact, the largest impact is from commercial aviation use ($556 billion of the $1,223 billion) followed by commercial aviation provision. • Commercial aviation makes up the bulk of the impact under civil aviation. Commercial aviation generates $108 billion in direct impacts and $205 billion in indirect impacts, for a total of $313 billion. Total commercial aviation impacts account for 93 percent of civil aviation’s total economic impact, followed by GA and airport operations. • Ga also makes a sizable impact, as shown in Table 3. GA contributes $14 billion in direct impacts and $4 billion in indirect impacts. Although the total economic impact of GA is less than that of their commercial counterparts, GA contributes $81 billion, which is a significant contribution for non-scheduled service that includes all aircraft activity excluding major airlines and the military. In the United States, GA accounts for more than 5 percent of aviation-related services. GA has access to more than 5,300 public-use airports and a significant number of private airports making it one of the largest users of airports. 9

#### Aviation Industry Key to Global Economy- Trade and increase value of goods

Federal Aviation Administration Air Traffic Organization (ATO) 08 (The national aviation authority of the United States and an agency of the United States Department of Transportation “The economic impact of civil aviation on the U.S. economy” [http://www.faa.gov/about/office\_org/headquarters\_offices/ato/media/2008\_Economic\_Impact\_Report\_web.pdf Accessed 6/27/12](http://www.faa.gov/about/office_org/headquarters_offices/ato/media/2008_Economic_Impact_Report_web.pdf%20Accessed%206/27/12))

Every region of the U.S. depends on civil aviation to stimulate its economic growth and to strengthen global and local markets. THE CIVIL AIR TRANSPORT INDUSTRY offers many economic benefits for the United States and the world. In a world of increasing trade in high value goods, the U.S. civil aviation industry provides capabilities that bring tremendous benefits and opportunities to all Americans. Aviation keeps the nation competitive providing it with a unique engine for technological development. The report found that civil aviation represented a 5.6 percent share of the U.S. economy in 2006, once all impacts are fully accounted for. U.S. civil aviation contributes to economic growth and to stronger global and local markets for every region of the nation. The total output of civil aviation related goods and services amounted to $1.2 trillion in 2006 and generated nearly 11 million jobs with earnings of $369 billion. Specific areas of civil aviation, such as air cargo, have encouraged effective networking and collaboration between companies. However, in order to maintain and keep this system viable, profitability of commercial air carriers is a concern in today’s economy. The cost of fuel is a continuing concern for airlines today, leaving many analysts to believe that the price of oil and the shaky economy will continue to influence the airline industry and other industries for years to come. The role of air transportation will continue to grow for the U.S. and global economy, just as it has in the past century. The economic impacts of civil aviation summarized in this report represent several ways to quantify the benefits made possible by a vital and changing industry. The industry contributes positively to the US trade balance, creates high paying jobs, keeps just-in-time business models viable, and connects us to friends, family and commercial opportunities. As the role of air transportation evolves and becomes even more intertwined with our way of life, it is clear that a safe and efficient air transportation system will continue to be a vital component in a strong and healthy American economy in the 21st century

#### Airline industry Key to U.S. Economy but delays threaten growth- Losses of $41 Billion annually.

Ferguson et al. 11 (John. Karla Hoffman; Lance Sherry; George Donohue; Abdul Qadar Kara- Members of the Center for Air Transportation Systems Research, George Mason University, Fairfax, VA Rosa Oseguera-Lohr, NASA Langley Research Center, Aeronautics Systems Analysis Branch, Hampton, VA. “USING AN EQUILIBRIUM MODEL TO FORECAST AIRLINE BEHAVIOR IN RESPONSE TO ECONOMIC OR REGULATORY CHANGES” <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5935339> Accessed 6/26/12) KT

Introduction **The air transportation system is a significant driver of the U.S. economy providing safe, affordable, and rapid transportation** [1]. During the past three decades airspace and airport capacity has not grown in step with demand for air transportation which is projected to grow at average annual growth of +3.5% [2] . The failure to increase capacity at the same rate as the growth in demand will result in unreliable service and systemic delays [3, 4]. Estimates made on **the impact of delays** and unreliable service on the economy range **from $32 B/year [5] to $41B/year** [6].

#### Aviation is key to global economies.

EOS journal 7 (EOS, April 3 2007, Vol. 88, No. 14, “Evaluating the Impacts of Aviation

on Climate Change”, Environmental impacts <http://www.clas.ufl.edu/users/prwaylen/GEO2200ARTICLES/Part1/Aviation%20emissions.pdf>)

Aviation is an integral part of the global economic and transportation systems. In fact, aviation expansion outpaces the economic growth. Projections indicate that over the next 2 decades, the demand for aviation could grow to about 3 times its present level. This projected growth will likely result in higher aviation emissions and associated impacts on the environment and on human health and welfare, depending upon a variety of factors (such as the size and mix of the operational fleet necessary to meet the stated demand, as well as mitigation steps that could include new technological advances, more efficient operational procedures, market-based options, or regulatory intervention). Nonetheless, it is critical to balance the economic benefits of air travel with environmental concerns associated with this projected aviation growth.

### Econ Impacts

#### Extinction

Kemp 10 (Geoffrey, Director of Regional Strategic Programs – Nixon Center and Former Director of the Middle East Arms Control Project – Carnegie Endowment for International Peace, The East Moves West: India, China, and Asia’s Growing Presence in the Middle East, p. 233-234)

The second scenario, called Mayhem and Chaos, is the opposite of the first scenario; everything that can go wrong does go wrong. The world economic situation weakens rather than strengthens, and India, China, and Japan suffer a major reduction in their growth rates, further weakening the global economy. As a result, energy demand falls and the price of fossil fuels plummets, leading to a financial crisis for the energy-producing states, which are forced to cut back dramatically on expansion programs and social welfare. That in turn leads to political unrest: and nurtures different radical groups, including, but not limited to, Islamic extremists. The internal stability of some countries is challenged, and there are more “failed states.” Most serious is the collapse of the democratic government in Pakistan and its takeover by Muslim extremists, who then take possession of a large number of nuclear weapons. The danger of war between India and Pakistan increases significantly. Iran, always worried about an extremist Pakistan, expands and weaponizes its nuclear program. That further enhances nuclear proliferation in the Middle East, with Saudi Arabia, Turkey, and Egypt joining Israel and Iran as nuclear states. Under these circumstances, the potential for nuclear terrorism increases, and the possibility of a nuclear terrorist attack in either the Western world or in the oil-producing states may lead to a further devastating collapse of the world economic market, with a tsunami-like impact on stability. In this scenario, major disruptions can be expected, with dire consequences for two-thirds of the planet’s population.

#### Economic decline causes global war

Royal 10 (Jedediah, Director of Cooperative Threat Reduction – U.S. Department of Defense, “Economic Integration, Economic Signaling and the Problem of Economic Crises”, Economics of War and Peace: Economic, Legal and Political Perspectives, Ed. Goldsmith and Brauer, p. 213-215)

Less intuitive is how periods of economic decline may increase the likelihood of external conflict. Political science literature has contributed a moderate degree of attention to the impact of economic decline and the security and defence behaviour of interdependent states. Research in this vein has been considered at systemic, dyadic and national levels. Several notable contributions follow. First, on the systemic level, Pollins (2008) advances Modelski and Thompson's (1996) work on leadership cycle theory, finding that rhythms in the global economy are associated with the rise and fall of a pre-eminent power and the often bloody transition from one pre-eminent leader to the next. As such, exogenous shocks such as economic crises could usher in a redistribution of relative power (see also Gilpin. 1981) that leads to uncertainty about power balances, increasing the risk of miscalculation (Feaver, 1995). Alternatively, even a relatively certain redistribution of power could lead to a permissive environment for conflict as a rising power may seek to challenge a declining power (Werner. 1999). Separately, Pollins (1996) also shows that global economic cycles combined with parallel leadership cycles impact the likelihood of conflict among major, medium and small powers, although he suggests that the causes and connections between global economic conditions and security conditions remain unknown. Second, on a dyadic level, Copeland's (1996, 2000) theory of trade expectations suggests that 'future expectation of trade' is a significant variable in understanding economic conditions and security behaviour of states. He argues that interdependent states are likely to gain pacific benefits from trade so long as they have an optimistic view of future trade relations. However, if the expectations of future trade decline, particularly for difficult to replace items such as energy resources, the likelihood for conflict increases**,** as states will be inclined to use force to gain access to those resources. Crises could potentially be the trigger for decreased trade expectations either on its own or because it triggers protectionist moves by interdependent states.4 Third, others have considered the link between economic decline and external armed conflict at a national level. Blomberg and Hess (2002) find a strong correlation between internal conflict and external conflict, particularly during periods of economic downturn. They write: The linkages between internal and external conflict and prosperity are strong and mutually reinforcing. Economic conflict tends to spawn internal conflict, which in turn returns the favour. Moreover, the presence of a recession tends to amplify the extent to which international and external conflicts self-reinforce each other. (Blomberg & Hess, 2002. p. 89) Economic decline has also been linked with an increase in the likelihood of terrorism (Blomberg, Hess, & Weerapana, 2004), which has the capacity to spill across borders and lead to external tensions. Furthermore, crises generally reduce the popularity of a sitting government. "Diversionary theory" suggests that, when facing unpopularity arising from economic decline, sitting governments have increased incentives to fabricate external military conflicts to create a 'rally around the flag' effect. Wang (1996), DeRouen (1995). and Blomberg, Hess, and Thacker (2006) find supporting evidence showing that economic decline and use of force are at least indirectly correlated. Gelpi (1997), Miller (1999), and Kisangani and Pickering (2009) suggest that the tendency towards diversionary tactics are greater for democratic states than autocratic states, due to the fact that democratic leaders are generally more susceptible to being removed from office due to lack of domestic support. DeRouen (2000) has provided evidence showing that periods of weak economic performance in the United States, and thus weak Presidential popularity, are statistically linked to an increase in the use of force. In summary, recent economic scholarship positively correlates economic integration with an increase in the frequency of economic crises, whereas political science scholarship links economic decline with external conflictat systemic, dyadic and national levels.5 This implied connection between integration, crises and armed conflict has not featured prominently in the economic-security debate and deserves more attention.

## Aerospace

### Aerospace k2 Heg

#### Strong aerospace is critical to overall US military power – sustains heg

National Aerospace Week 10 (September 18, “Aerospace and Defense: The Strength to Lift America,” <http://www.nationalaerospaceweek.org/wp-content/uploads/2010/04/whitepaper.pdf>) National Aerospace Week

The beginning of a new decade presents the defense industry with challenges that aren’t new, but are becoming more urgent. Developing a national strategy to ensure a robust industrial base and modernizing our military hardware must become frontburner priorities. The health of the industrial base is at the heart of our ability to supply our nation with the weapons systems it requires. As we wrote in our landmark study on the industrial base in 2009: “Military technologies used to be much more closely related to civilian technologies. They even used common production processes. But because DOD is today the sole customer for industry’s most advanced capabilities, the defense industrial base is increasingly specialized and separate from the general manufacturing and technology sectors. That means even a healthy general economy will not necessarily help underwrite the industrial capabilities DOD most needs.” A huge step forward was made this year when the industrial base was included in the Quadrennial Defense Review as a factor to be considered in its long-term planning. We’re optimistic that the next step — inclusion of industrial base considerations in program plans and policy — will be executed as directed by the QDR — ensuring that it becomes incorporated into long-range defense plans. However, we remain concerned about the fragility of the supplier base. With another round of acquisitions and consolidations imminent along with a projected decline in defense spending, the supplier base remains particularly vulnerable. These small businesses are critical to the primes and to the government. They face multiple challenges overcoming barriers to federal contracting and once they leave the contracting base, they and their unique skills cannot be recovered. 2010 Aerospace Industries Association of America, Inc. 4 Along with our concern about the industrial base is the long-term issue of modernizing our military hardware. The 1980s defense build-up is now 25 years old, and systems acquired then are in need of replacement. The decade of 2010-19 is the crucial time to reset, recapitalize and modernize our military forces. Not only are many of our systems reaching the end of their designed lives, but America’s military forces are using their equipment at many times the programmed rates in the harsh conditions of combat, wearing out equipment prematurely. Delaying modernization will make it even harder to identify and effectively address global threats in the future. The requirements identified in the QDR — for the United States to overmatch potential adversaries and to execute long-duration campaigns in coming years against increasingly capable potential opponents — will require complex and expensive aerospace capabilities. This is a concern that the Defense Department recognizes. Under Secretary of Defense Ashton Carter has said that the department is looking to develop a “family of systems” for future strike options that will be supported by the “family of industry.” 9 This is welcome news. However, defense modernization is not optional. While the fiscal 2011 budget request is a reasonable target that takes into account funding needed to fight two wars, the pressure on the procurement and research and development budget is sure to increase in the future. At the same time, America must adapt its defenses to new kinds of threats. A large-scale attack on information networks could pose a serious economic threat, impeding or preventing commerce conducted electronically. This would affect not only ATM transactions, but commercial and governmental fund transfers and the just-in-time orders on which the manufacturing sector depends. It could even pose threats to American lives, interrupting the transfer of medical data, disrupting power grids, even disabling emergency communications links. In partnership with the government, our industry is on the forefront of securing these networks and combating cyber attack. The American people also demand better security for the U.S. homeland, from gaining control of our borders to more effective law enforcement and disaster response. The aerospace industry provides the tools that help different forces and jurisdictions communicate with each other; monitor critical facilities and unpatrolled borders, and give advance warning of natural disasters, among other capabilities. In many cases, government is the only market for these technologies. Therefore, sound government policy is essential not only to maintain current capabilities, but to ensure that a technology and manufacturing base exists to develop new ones.

#### Airpower sustains US leadership and makes power projection credible

Richard Hazdra 01, Mayor- USAF, Air Mobility: The Key to United States National Security Strategy, Fairchild paper, August) <http://aupress.au.af.mil/fairchild_papers/hazdra/hazdra.pdf>

In shaping the international environment, the United States must possess a credible military force where military activities include overseas presence and peacetime engagement and the will to use military force.2 According to the NDP, overseas presence is the key to a stable international environment.3 Peacetime engagement includes rotational deployments that help sustain regional stability by deterring aggression and exercises with foreign nations that solidify relations with those nations.4 Deployments and exercises both require air mobility in the form of both airlift and air refueling in order to transport the necessary troops and equipment. Peacetime engagement also includes other programs such as the Nunn–Lugar Cooperative Threat Reduction Program where the United States assists members of the Commonwealth of Independent States in dismantling and storing WMD.5 Here, air mobility is the lead component by transporting nuclear weapons to the United States from compliant nations. Airlift also plays a crucial role in responding to threats and crises by enhancing our war-fighting capability.6 The United States may move some forces nearer to a theater in crisis and rapidly deploy other forces into that theater. Depending on the crisis, forces from the Army, Navy, Air Force, Marines, or any combination of military personnel and equipment could comprise the force structure required. Consequently, the United States must airlift these forces along with the needed logistics support. In addition, the focused logistics concept of Joint Vision 2010 requires the transportation of supplies and materials to support these forces within hours or days rather than weeks, a mission solely suited to air mobility. In responding to crises, forces may deploy in support of smaller-scale contingencies which include humanitarian assistance, peace operations, enforcing NFZs, evacuating US citizens, reinforcing key allies, limited strikes, and interventions. 7 Today, US forces find themselves globally engaged in responding to these contingencies more frequently and maintain longer-term commitments to support these contingencies. In these situations, many deployments occur in the absence of forward basing.8 The loss of forward basing has reduced AMC’s worldwide infrastructure from 39 locations in 1992 to 12 in 1999.9 Thus, the United States must again use air mobility to deploy forces overseas in a minimum amount of time for an operation to be successful.

#### Air Power can sustain hegemony – it outweighs sea power and land power

Douglas 02**,** Department of Political Science at Columbia University [Francis "Scott" Colin, ISA Annual Convention in New Orleans, <http://www.isanet.org/noarchive/douglas.html>]

Logically air power should hold pride of place within both the political science and policy-oriented study of coercion. Since aircraft can strike a wider array of targets than land or sea-bound forces, Robert Pape argues the study of air power can cut to the core of the larger coercion debate because it "most cogently reveals the relative effectiveness of different coercive strategies." (Pape Bombing to Win 39) As Pape goes on to argue, Unlike land power, [air power] can reach deep into the enemy's homeland from the outset of a conflict, and it promises to achieve its effects at sharply lower cost in lives than land power. Unlike sea power, bombing can focus on specific categories of targets, attacking either political, economic, population, or military targets in isolation or combination. Given adequate intelligence, air power can also attack selective target sets within these categories, which can be helpful if, for example, there are bottlenecks in key industries.(Bombing to Win 45) Therefore, analyzing the success or failure of air campaigns provides more than policy-relevant answers to a narrow military question; it provides a rigorous test of different coercive theories which have been operationalized for real-world application. Air campaigns also warrant close study because they are becoming the military tool-of-choice for statecraft, particularly for the United States. As Eliot Cohen notes, "air power is an unusually seductive form of military strength, in part because, like modern courtship, it appears to offer gratification without commitment." (Cohen Mystique of US Air Power 109) Raising the stakes even further, Cohen recently argued that air power as seen in its recent incarnation over Kosovo begins to reveal the strengths and limitations of the emerging "New American Way of War." (Cohen Kosovo and the New American Way of War in Bacevich & Cohen)

### 2NC Econ !—biggest issue

#### The Aerospace industry provides the SINGLE LARGEST NET GAIN for our economy—we cant jeopardize it

Slazer, 2012 [Frank, Vice President for Space Systems at the Aerospace Industries Association, June 7, Congressional Testimony, http://insurancenewsnet.com/article.aspx?id=345260]

The Aerospace Industries Association (AIA) represents over 350 aerospace manufacturing companies and their highly-skilled employees. These companies make the spacecraft, launch vehicles, sensors, and ground support systems employed by NASA, NOAA, the Department of Defense, the National Reconnaissance Office (NRO), other civil, military and intelligence space organizations throughout the globe, and many of the commercial communication satellites. This industry sustains nearly 3.5 million jobs, including much of the high-technology work that keeps this nation on the cutting edge of science and innovation. The US aerospace manufacturing industry remains the single largest contributor to the nation's balance of trade, exporting $89.6 billion and importing $47.5 billion in relevant products, for a net surplus of $42. n1 billion.

### XT—K2 Economy

#### Aerospace remains a huge part of the economy and are pillars of our national security and competitiveness

AIAA 09 [Aerospace Industries Association of America, “Aerospace and Defense: The Strength to Lift America”, http://www.aia-aerospace.org/assets/wp\_strength\_aug09.pdf /Ghosh]

As the U.S. economy moves through uncertain times, America’s aerospace industry remains a powerful, reliable engine of employment, innovation, and export income. Aerospace contributed $95.1billion in export sales to America’s economy last year.1 Conservatively, U.S. aerospace sales alone account for 3-5 percent of our country’s gross domestic product, and every aerospace dollar yields an extra $1.50 to $3 in further economic activity.2 Aerospace products and services are pillars of our nation’s security and competitiveness. In these challenging times, the aerospace industry is solidly and reliably contributing strongly to the national economy and the lives of millions of Americans. We strongly believe that keeping this economic workhorse on track is in America’s best interest, To accomplish this, our government must develop policies that strengthen the positions of all workers in all industries, especially economic producers like aerospace and defense. This paper explains what’s at stake, and ways to ensure that a proven economic success continues to endure and thrive.

#### Aerospace is becoming more and more important to the economy – trade is a vital link between the two.

GAO 6[United States Government Accountability Office; “U.S. AEROSPACE

INDUSTRY…”; September 2006; <http://www.gao.gov/new.items/d06920.pdf>; Boyce]

The impact of the aerospace industry on the U.S. economy is significant, with the industry estimating $170 billion in sales and approximately 625,000 people employed in 2005. 5 The importance of this industry to the U.S. economy will continue to grow in the future. According to FAA, the U.S. commercial aircraft fleet is estimated to grow from 7,836 in 2005 to 10,677 in 2017. Both passenger capacity and cargo operations are expected to continue to grow, with passenger capacity in 2007 increasing by 4.6 percent and then increasing by an average of 4.2 percent per year until 2017. FAA estimates that over 1 billion passengers will use U.S. airports by 2015. Domestic cargo revenue-ton miles are projected to increase at an average annual rate of 3.2 percent until 2017, exceeding 23 billion. Furthermore, the U.S. aerospace industry consistently shows a foreign trade surplus—reaching $31 billion in 2004. Aerospace exports constituted 6.9 percent of the total value of U.S.-exported merchandise in 2004.

### 2NC ENVNT !

#### Aerospace is key to a cleaner environment

AIAA 09 [Aerospace Industries Association of America, “Aerospace and Defense: The Strength to Lift America”, http://www.aia-aerospace.org/assets/wp\_strength\_aug09.pdf /Ghosh]

The aerospace industry knows it has an obligation to grow responsibly, and it understands that environmentally sustainable growth is not only good for the planet, but also good for the economic health of the industry and the nation as a whole. As Rep. Jerry Costello, Chairman of the House Transportation and Infrastructure Aviation Subcommittee, wrote, “Airlines, airports, manufacturers and the Air Force are at the forefront of developing better planes, technology and operating procedures to conserve fuel and reduce emissions. They are a perfect example of how innovation is driven by necessity, as fuel costs are the largest single expenditure for the airlines. Moreover, the industry is leading the way in research on alternative fuels. Besides the positive impact on the bottom line, there are obvious positive environmental impacts from these efforts, with lessons for the rest of the country.”12 A 10-year, $20 billion investment in NextGen, in time to meet future demand, will mean millions of new high-paying jobs and hundreds of billions of dollars in economic activity. Moreover, this growth will come from an industry with a proven track record in improving fuel efficiency and overall environmental stewardship. These are two of the nation’s top priorities: economic growth and recovery, and a cleaner environment. Very few government investments have the potential to positively influence two policy objectives at the same time. This is an investment we cannot afford to postpone.

### XT—ENVNT !

#### Aerospace is key to new green tech solutions

Scott and Piper 9 [\*John Scott is Head of Risk Insight at Zurich Global Corporate UK, a part of Zurich Financial Services Group, an insurance-based financial services provider. Adam Piper is Director, Corporate Risks UK & Europe at Miller Insurance Services Limited, an independent specialist insurance and reinsurance broker; “ Aerospace, Defence and Climate Change: The Risk Dimension”; June 2009; <http://www.zurich.com/NR/rdonlyres/B7D44964-EA09-4E31-8D46-55D10B416203/0/E2DIJune15.pdf>; Boyce]

T he aerospace and defence industry has been active in developing new technologies that either have a role in reducing emitted carbon dioxide (CO2e) or improving resilience and adaptation to climate change. Similarly, the insurance industry has been active in addressing the challenges of climate change, working with customers from various industries, including aerospace and defence, to create risk transfer products and provide risk management advice. Working together could be a catalyst for both industries to play a significant role in reducing CO2e and the potential impacts of ongoing climate change

#### The industry is a green tech R and D powerhouse

Scott and Piper 9 [\*John Scott is Head of Risk Insight at Zurich Global Corporate UK, a part of Zurich Financial Services Group, an insurance-based financial services provider. Adam Piper is Director, Corporate Risks UK & Europe at Miller Insurance Services Limited, an independent specialist insurance and reinsurance broker; “ Aerospace, Defence and Climate Change: The Risk Dimension”; June 2009; <http://www.zurich.com/NR/rdonlyres/B7D44964-EA09-4E31-8D46-55D10B416203/0/E2DIJune15.pdf>; Boyce]

The aerospace and defence industry has been a powerhouse of technology R&D in the search for ever more powerful and power-efficient systems for military use. Harnessing this activity to meet the challenges of climate change could bring significant advances to reducing CO2e. The products available from the insurance industry have been designed to protect private assets, whereas the climate is a public good. Despite this limitation, there are many examples where insurance has been used to encourage the use of new carbon reducing technologies and the adoption of adaptive behaviours. This is especially so in the areas of power generation and transportation, but also in energy efficiency and building resilience. Examples include insurance covers for solar and wind power generation, as well as liability cover for carbon capture and sequestration (CCS) and insurance covers for ‘green’ and weather resilient construction. The majority of anthropogenic CO2e comes from burning fossil fuels for power generation - roughly 50% (gas, coal and oil) - and from land transportation (car, truck, bus) or sea transport (ship), around 20%. A relatively small amount of anthropogenic CO2e comes from air transport. Technologies that significantly reduce greenhouse gas (GHG) emissions from these activities are imperative if Intergovernmental Panel on Climate Change (IPCC) GHG reduction targets are to be met. In power generation, a move to a mix of nuclear, renewable and CCS coal- or gas-fired power stations would help meet GHG reduction commitments and improve fuel security (i.e. make western economies less reliant on Middle Eastern and Russian oil and gas). The defence industry has experience of working with nuclear power for military use and has developed a range of technologies to improve the efficiency and viability of renewable energy sources (hydro, solar, wind, wave, tidal). It has even developed technologies that can improve the low carbon fossil fuel efficiency of power generation (especially coal and gas). Examples of this type of R&D include stealth technology to reduce the radar impact of wind turbines, thereby allowing them to be used near air traffic control radars (QinetiQ and Lockheed Martin). Similarly, research on the sonar impact of wind turbines on marine wildlife has led to changes in turbine construction offshore. In the CCS arena, improvements in CO2 compression using supersonic combustion ramjet engine technology have significantly reduced the costs and power requirements of compression, one of many key areas of risk in the successful commercial implementation of CCS. This is also an area where the insurance industry has begun to address the operating liability risks of CO2 injection as well as the cost uncertainties associated with long term storage and sequestration. In particular, the insurance industry has been informing policymakers on the best approaches to managing long-term storage and sequestration risks based on the lessons and experiences of running different types of funding and risk transfer mechanisms – for example, in the flood defence, oil pollution and nuclear arenas. In solar panels, there has been considerable research interest in improving the performance of these for military and civilian use. One example is barrier film technology which improves protection of photovoltaic cells and can improve performance over their lifetime. Lifecycle operating and risk issues are also areas that have been addressed by the insurance industry which has been active in developing insurance covering the cost uncertainties associated with recovery, buyback and disposal of solar panels, so that manufacturers can comply with the requirements of the EU Waste from Electronic and Electrical Equipment (WEEE) Directive. Linked to this is the risk of distributed power systems failing and not providing power, or the potential loss of income from that power to the owner-operators. There is increasing appetite to develop new and emerging insurance products that cover off-grid power business interruption caused by equipment failure or property damage. The other big new technology opportunity to reduce CO2e lies in the development of alternative engines and fuels for cars. The aerospace and defence industry has multiple opportunities and incentives to develop technologies in this area. If nothing else, military planners now have different asset requirements for forces fighting regional conflicts and anti-terrorist actions than they did in the past. In contrast to Cold War requirements for heavily armoured vehicles, the emphasis is now on more highly mobile forces, using fuel-efficient ‘platforms’. Fuel efficiency and reduced GHG emissions go hand-in-hand with high-efficiency. Diesel engines, hybrid electric/petrol or plug-in hybrid or electric-powered vehicles are becoming increasingly common. To help manage the risks of these new fuels and engine technologies, the insurance industry has been developing products and services that either reward use of new technology, for example insurance premium discounts for hybrid vehicles, or encourage driving smarter – either by driving fewer miles or using less fuel such as pay-as-you-drive auto insurance or telematics-enhanced systems that improve safety and efficiency.

### Impact Calc—Ignore Envnt.

#### The environmental benefits of trains over planes are marginal—prefer our economy impacts first

Transport Research Center, 2009 [ “Competitive Interaction between Airports, Airlines and High-Speed Rail”, OECD Report, <http://www.internationaltransportforum.org/jtrc/discussionpapers/DP200907.pdf>]

Given the limited scope for cheap greenhouse gas abatement in aviation, Section 5 asks if it makes sense to increase the availability of high-speed rail alternatives. High-speed rail can substitute for air transport on mid-range distances and produces fewer emissions per trip, especially when electricity is produced in non-carbon-intensive ways. However, life-cycle emissions, relevant in an *ex ante* analysis, for rail arguably are high, given the high emissions from track infrastructure construction (see, e.g., Chester and Horvath, 2008) and maintenance. However, a broader comparison of costs and benefits shows that (a) high-speed rail links are socially desirable in a certain set of circumstances and should not be viewed as a general alternative to air transport, and (b) environmental benefits play a fairly minor role in the overall evaluation of high-speed rail projects.

## Environment

### Emissions rising

#### Current ATM Sucks- Cant keep up with demand, creates costly delays and contributes to climate change

Zhang et al. 11(Wei- Member of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Claire J. Tomlin- fellow of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Maryam Kamgarpour- Student Member of IEE and with the Department of Mechanical Engineering, University of California at Berkeley. Dengfeng Sun- Member of IEE and with the School of Aeronautics and Astronautics, Purdue University. “A Hierarchical Flight Planning Framework for Air Traffic Management” Vol. 100, No. 1, January 2012 in Proceedings of the IEE. Accessed 6/20/2012) KT

Notable Issues in Current ATM Air traffic demand in the past 20 years has grown by over 64%, while human traffic controllers and airspace resources such as airports and runways have not kept up with this growth rate [3]. It has been estimated that domestic air traffic delays in 2007 cost the U.S. economy about $41 billion, including more than $19 billion in direct operating costs [4]. The delays also contributed to about 740 million extra gallons of jet fuel, and an additional emission of about 7.1 million tons of carbon dioxide. The situation will be further aggravated by the expected two- to threefold increase in air traffic demand over the next two decades [5]. Meanwhile, the need to constrain the rapid growth of aviation’s impact on the global climate is becoming increasingly clear. Global carbon dioxide emissions from aircraft grew about 45% between 1992 and 2005. It has also been forecasted that aviation emissions will increase an additional 150% above the 2006 level by 2036 [6], [7].

### Reduces C02

#### Reduces Co2 by 14 million tons

**FAA 11**(Federal aviation administration “Next gen Implementation plan” http://www.faa.gov/nextgen/media/ng2011\_implementation\_plan.pdf) (Pitman)

As airports and operators reap the benefits of the investments and deployments we are making today, the FAA continues to sharpen its projections of the benefits we expect NextGen to provide during the mid-term. Our latest estimates, which are sensitive to traffic and fuel price forecasts, indicate that by 2018, NextGen will reduce total delays (in flight and on the ground) by about 35 percent compared with what would happen if we did nothing. That delay reduction will provide, through 2018, $23 billion in cumulative benefits to aircraft operators, the traveling public and the FAA. In the process, we will save about 1.4 billion gallons of aviation fuel during this period, reducing carbon dioxide emissions by 14 million tons. The FAA expanded the demonstration activities and trials we use to develop NextGen capabilities, and which provide direct benefits to the members of the aviation community who partner with the FAA to conduct those activities. In Memphis, Tenn., both FedEx and Delta have reported savings from technologies and operational practices aimed at preventing long lines from forming at the end of the runway. Highly specialized Optimized Profile Descents known as Initial Tailored Arrivals have proven so successful, they are moving from demonstration to operational use at airports in San Francisco, Los Angeles and Miami. In addition to helping curb delays, surface management and Initial Tailored Arrivals help the environment by reducing fuel burn and emissions, and offering opportunities to manage noise. NextGen technologies will work together to provide greater situational awareness both in the air and on the ground, enhancing safety throughout the system. Likewise, our efforts to collect, analyze and share information on aviation trends will assist us in identifying and mitigating any potential risk associated with NextGen implementation.

#### Plan quickly lowers airline pollution --- emerging R+D solves in the long-run

Dillingham 8 – Dillingham, 05-06-2008, Gerald L. Dillingham, Ph.D. Director, Physical Infrastructure Issues, “NextGen and Research and Development Are Keys to Reducing Emissions and Their Impact on Health and Climate”, <http://www.gao.gov/new.items/d08706t.pdf>

Aviation contributes a modest but growing proportion of total U.S. emissions, and these emissions contribute to adverse health and environmental effects. Aircraft and airport operations, including those of service and passenger vehicles, emit ozone and other substances that contribute to local air pollution, as well as carbon dioxide and other greenhouse gases that contribute to climate change. EPA estimates that aviation emissions account for less than 1 percent of local air pollution nationwide and about 2.7 percent of U.S. greenhouse gas emissions, but these emissions are expected to grow as air traffic increases. Two key federal efforts, if implemented effectively, can help to reduce aviation emissions—NextGen initiatives in the near term and research and development over the longer term. For example, NextGen technologies and procedures, such as satellite-based navigation systems, should allow for more direct routing, which could improve fuel efficiency and reduce carbon dioxide emissions. Federal research and development efforts—led by FAA and NASA in collaboration with industry and academia—have achieved significant reductions in aircraft emissions through improved aircraft and engine technologies, and federal officials and aviation experts agree that such efforts are the most effective means of achieving further reductions in the longer term. Federal R&D on aviation emissions also focuses on improving the scientific understanding of aviation emissions and developing lower-emitting aviation fuels. Next steps in reducing aviation emissions include managing NextGen initiatives efficiently; deploying NextGen technologies and procedures as soon as practicable to realize their benefits, including lower emissions levels; and managing a decline in R&D funding, in part, by setting priorities for R&D on NextGen and emissions-reduction technologies. Challenges in reducing aviation emissions include designing aircraft that can simultaneously reduce noise and emissions of air pollutants and greenhouse gases; encouraging financially stressed airlines to purchase more fuel-efficient aircraft and emissions-reduction technologies; addressing the impact on airport expansion of more stringent EPA air quality standards and growing public concerns about the effects of aviation emissions; and responding to proposed domestic and international measures for reducing greenhouse gases that could affect the financial solvency and competitiveness of U.S. airlines.

#### Next Gen solves for airline expansion – emissions coming

**Gupta Brasseur 10** (BY GUY P. BRASSEUR AND MOHAN GUPTA writer for the AMERICAN METEOROLOGICAL SOCIETY “IMPACT OF AVIATION ON CLIMATE” <http://www.faa.gov/about/office_org/headquarters_offices/apl/research/science_integrated_modeling/accri/media/Impact%20of%20Aviation%20on%20Climate.pdf> )(Pitman)

today, approximately 23,000 aircraft operated by more than 2,000 airlines carry more than 2.2 billion passengers annually and serve about 3,750 airports throughout the world (based on the BACK Official Airline Guide aviation fleet/schedule/ ancillary data; available online at www.oagaviation. com). Mostly confined within the flight corridor at cruise altitudes between 8 and 13 km (26,000– 40,000 ft), aircraft engines emit carbon dioxide (CO2), water vapor (H2O), nitrogen oxides (NOx), sulfur oxides (SOx), hydrocarbons (HC), and soot particles, which progressively mix and interact with the surrounding air. The NOx emissions enhance photochemical production and loss of tropospheric ozone and methane (CH4), respectively. Water vapor releases trigger the formation of contrails in sufficiently cold air. Contrails may persist for hours and thus increase cirrus cloudiness in ice-supersaturated air. At present, aviation accounts for approximately 2% of the worldwide CO2 emissions. For 2005, aircraft emissions impacts (excluding induced cirrus clouds) contribute 3.5% (in a range of 1.3%–10%, which is a 90% likelihood range) of total anthropogenic forcing. Inclusion of aviation-induced cirrus cloud impacts will increase this magnitude to 4.9% (2%–14%, which is a 90% likelihood range; see Lee et al. 2009). Aircraft emissions are expected to increase with projected growth in aviation and will likely result in enhanced environmental impacts unless scientifically informed mitigation measures are implemented. Environmental protection is an important component of the U.S. Next Generation Air Transportation System (NextGen; information online at www.jpdo. gov/nextgen.asp). NextGen is being implemented to meet projected growth in aviation and to achieve a balance between its economic and transport benefits and the environmental impacts. To meet NextGen environmental goals, the Federal Aviation Administration has developed the Aviation Climate Change Research Initiative (ACCRI) with participation from the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the Environmental Protection Agency (EPA). The main objective of ACCRI is to identify and address key scientific gaps and uncertainties while providing timely scientific input to inform decision making.

#### Key to the environment – FAA estimates

. **NEXA 11** (Nexa Advisors, A Private Aerospace Consultant Company “NextGen Equipage Fund” April)  
\*NextGen Equipage Fund is loan guarantees fund requesting federal backing <http://www.nextgenfund.com/files/downloads/NEF_Economic_Study.pdf> (Pitman)

In 2008 GAO advocated accelerated deployment of NextGen to realize environmental benefits.xv More efficient operations will lower unit emissions per passenger through lower fuel burn per passenger. Aviation emissions, like other combustible emissions, include pollutants that affect public health. The FAA estimates that NextGen could reduce aircraft greenhouse emissions by as much as 12 percent, which is equivalent to removing 2.2 million cars from the roads.xvi Additionally, improved air transportation will reduce the number of passengers diverted to their cars on the U.S. roadways and thereby reduce air pollution from cars and reduce congestion on the highways. NextGen procedures will reduce communities’ exposure to noise through better air traffic management. For example, Continuous Descent Arrivals will allow aircraft to remain at cruise longer as they approach destination airports, use lower power levels, and thereby lower noise and emissions during landing. These environmental benefits will also improve international flight efficiencies, further reducing emissions and greenhouse gasses.

### Efficiency good for the Env’t

#### NextGen cuts airline emission by boosting efficiency

Johnson 9 (Keith, Reporter – WSJ, “Cleared for Takeoff: Obama Budget’s Green Take on Air Travel”, Wall Street Journal, 5-8, http://blogs.wsj.com/environmentalcapital/2009/05/08/cleared-for-takeoff-obama-budgets-green-take-on-air-travel/)

The $865 million allocated to the next-generation of air navigation systems—creatively called NextGen—is a way to modernize the way commercial airliners take off, fly, and land at the nation’s increasingly crowded airports. Designed to improve safety and efficiency of the antiquated air-traffic control system through 2025, NextGen has some surprising environmental benefits: It promises to cuts fuel consumption, and emissions, from airliners.

The idea is basically to do for air travel what dashboard GPS devices have done for cars: Put high-tech satellite navigation to work in the cockpit. Some of the new technology, developed by companies like ITT Corporation, is slowly being rolled out. Last month, Miami joined airports Atlanta and Dallas-Fort Worth that have started using a new way to keep airliners in communication with the ground and with each other.

All of that helps safety, of course. And makes it easier for busy airports to safely juggle lots of airliners, improving efficiency and cutting down on delays. That was the main reason freight carriers such as UPS have been experimenting with new navigation technology—it helps the bottom line in a time-sensitive business.

But when it comes to the environment, little things add up. The new system lets aircraft fly straighter routes, for starters. And by allowing aircraft to glide in for landing in a gentle path, using practically no throttle, the new systems can cut fuel consumption around airports, traditionally one of the areas where fuel burn is heaviest. Other airlines like Southwest have already been experimenting with juiced-up navigation systems to boost efficiency.

Since early 2008, UPS has been using one of the new technologies developed by ITT, called automatic dependent broadcast surveillance, on flights into its Louisville hub. The new technology cuts emissions of its big Boeing 757 aircraft by 38%, UPS says.

“It improves safety, reduces delays, reduces fuel burn, and the attendant environmental impacts,” says John Kefaliotis, ITT’s vice-president for NextGen.

Overhauling the air traffic control system may not be the high-profile stuff President Obama’s green revolution is made of. But it does show, once again, that making things more efficient makes things work better, saves money—and can help the environment.

#### Good For environment – efficiency saves fuel & time

**FAA 11**(Federal aviation administration “Next gen Implementation plan” http://www.faa.gov/nextgen/media/ng2011\_implementation\_plan.pdf) (Pitman)

As with safety, our work to enhance aviation’s influence on the environment also benefits – and is a beneficiary of – NextGen. The operational improvements that reduce noise, carbon dioxide and other greenhouse-gas emissions from aircraft are the tip of the FAA’s environmental iceberg. Equally important are the other four-fifths of the agency’s environmental approach – aircraft and engine technology advances, sustainable fuels, policy initiatives and advances in science and modeling. Environmental benefits of operational improvements are simple and direct. When we improve efficiency in the NAS, most of the time we save time and fuel. Burning less fuel produces less carbon dioxide and other harmful emissions. And some of our NextGen improvements, notably landing approaches in which aircraft spend less time maintaining level flight and thus can operate with engines at idle, reduce ground noise too. But operational benefits go only so far; their net system-wide effect can be offset by growth of the aviation system. To accommodate system growth, we are looking to develop aircraft, engine and fuel technology. In 2009, we established the Continuous Lower Energy, Emissions and Noise program to bring promising new airframe and engine technologies to maturity, ready to be applied to commercial designs, within five to eight years. Similarly, we are part of a government-industry initiative, the Commercial Aviation Alternative Fuels Initiative, to develop sustainable lowemission alternative fuels and bring them to market. We have developed and are using the NextGen Environmental Management System (EMS) to integrate environmental protection objectives into NextGen planning and operations. The EMS provides a structured approach for managing our responsibilities to improve environmental performance and stewardship. We also are analyzing the effect on aviation of environmental policy and standards and of market-based measures, including cap-and-trade proposals.

#### No alt causes --- NextGen solves other transportation emissions and improves international efficiency

NEXA 11

(NEXA Advisors, A NEXA Capital Company, April 2011, NEXA Capital Partners provides corporate and strategic financial advisory services, and capital investment, to the aerospace, transportation, logistics and homeland security sectors (Venture Capitalist). “NextGen Equipage Fund Job Creation, Economic Benefits, and Contribution to Federal Revenues” p. 12 <http://www.nextgenfund.com/files/downloads/NEF_Economic_Study.pdf>) MJA

In 2008 GAO advocated accelerated deployment of NextGen to realize environmental benefits. xv More efficient operations will lower unit emissions per passenger through lower fuel burn per passenger. Aviation emissions, like other combustible emissions, include pollutants that affect public health. The FAA estimates that NextGen could reduce aircraft greenhouse emissions by as much as 12 percent, which is equivalent to removing 2.2 million cars from the roads. xvi Additionally, improved air transportation will reduce the number of passengers diverted to their cars on the U.S. roadways and thereby reduce air pollution from cars and reduce congestion on the highways. NextGen procedures will reduce communities’ exposure to noise through better air traffic management. For example, Continuous Descent Arrivals will allow aircraft to remain at cruise longer as they approach destination airports, use lower power levels, and thereby lower noise and emissions during landing. These environmental benefits will also improve international flight efficiencies, further reducing emissions and greenhouse gasses.

### Fuel Savings

#### Plan saves fuel and reduces warming

**Salam 12** (Sakib bin Salam; April 2012; “NextGen Aligning Costs, Benefits and Political Leadership”; Eno Center for Transportation Policy and graduate program at Oregon State University) (Pitman)

Fuel Cost Savings to Airlines The burden of increased fuel expenses is further exacerbated by airport congestion and existing inefficiencies in an aviation system that uses outdated technologies and protocols. Congestion is a problem, particularly at certain busy airports where the congestion is caused by capacity constraints, and will likely get worse as the economy recovers from the recession and travel demand rises.10 In 2010 major airlines reported that about 40 percent of arrivals and departures are delayed.11 Every additional minute spent by operators sitting on the tarmac or circling an airport awaiting clearance means additional fuel, equipment depreciation and maintenance, increased labor costs, employee fatigue, and a possible loss of customers. According to the latest FAA estimate, NextGen could save about 1.4 billion gallons of fuel through 2018.12 This estimate assumes continued benefits of some of the NextGen capabilities already in place at some airports and timely implementation of the FAA’s mid-term goals. This amounts to, on average, about 200 million gallons annually assuming full implementation of NextGen. Using the current jet fuel price of about $2.86/gallon in 2011, total fuel savings to operators would be about $600 million annually. However, the FAA has not made public the details of their estimation, simulation models, or methodology. Some industry experts may remain skeptical of the FAA’s estimates without a clear indication of the methodology or basis behind these figures. The following is a simple yet plausible independent measure of NextGen’s fuel savings. In 2010 the total fuel consumpFueltion by all US commercial airlines in domestic flights was 10.205 billion gallons of fuel worth $22.84 billion at an average fuel price of $2.24/gallon.13 Assuming a one percent improvement in fuel efficiency following NextGen implementation, which is a very conservative assumption, the resulting fuel savings amount to about 102 million gallons of fuel annually worth $229 million using the average 2010 fuel price. The savings from fuel also have environmental benefits. The 102 million gallons of fuel saved translates into reduced carbon dioxide emissions by approximately 1.076 million tons.14 This helps mitigate the airline’s industry impact on the environment and has real economic savings in a carbon offset market worth $7.9 million.15 Table 1 simply expands the figures for higher levels of fuel reduction. The results show that the benefits could be significant when only considering modest estimates of NextGen’ fuel efficiency. A more ambitious five percent fuel consumption reduction leads to about $1.145 billion dollars of fuel saved and 5.380 million tons of reduced carbon emissions annually.

#### Key to Reduction in Fossil Fuels

**Steenblik 11**  (Jan W. Steenblik Technical Editor “ALPA: Future of U.S. Airline Industry Depends on NextGen” November 2011 Air Line Pilot

<http://www.alpa.org/portals/alpa/magazine/2011/Nov2011_NextGen.pdf> (Pitman)

The business case Tom Captain, vice chairman, principal, and aerospace and defense sector leader at consulting firm Deloitte LLP, discussed an extensive study that Deloitte conducted independently on the business case for NextGen, published in May. He concluded, “The business case appears to be an open-and-shut case. The real challenge is in its execution.” Captain noted, “We found that successful implementation of NextGen by 2025, using reasonably conservative assumptions about future demand for travel, price increases of oil, and other factors, results in an estimated net present value (NPV) of $281.3 billion and aninternal rate of return of 44.8 percent. By 2026, the study found $29 billion of firstyear net benefits, which only increases each year thereafter. This is made up of 830 million gallons of jet fuel savings, 900 thousand hours of time saved, and 6.8 million metric tons of carbon emissions avoided.”

### Plan Green Jobs

#### Plan Key to green jobs

**FAA 11**(Federal aviation administration “Next gen Implementation plan” http://www.faa.gov/nextgen/media/ng2011\_implementation\_plan.pdf) (Pitman)

Today, our funding requests are approximately $1 billion. The White House and the U.S. Department of Transportation have declared NextGen a top national transportation and infrastructure priority. There is good reason for that. Aviation is crucial to our nation’s economy. As recently as 2009, civil aviation contributed $1.3 trillion annually to the national economy, and constituted 5.2 percent of the gross domestic product. It generated more than 10 million jobs, with earnings of $397 billion.2 NextGen is vital to protecting those contributions. The current system simply cannot accommodate anticipated growth in the aviation industry. Congestion continues to increase at many of our nation’s busiest hub airports, a problem that will only be exacerbated now that traffic levels are starting to rebound from the impact of the economic recession. NextGen has further provided additional opportunities for environmental stewardship. Our efforts are enhancing energy efficiency and reducing aviation’s environmental footprint, while promoting increased energy security and diversity. Our plans promote the creation of green jobs, and support our nation’s farmers through the creation of sustainable fuels. By providing greater safety, efficiency and environmental performance, NextGen plays a critical role in protecting America’s economic and environmental health. While the FAA and the aviation community can take pride in all that NextGen has accomplished so far, we remain keenly aware of the challenges that remain. The interdependence of NextGen systems means that challenges faced by one program could create challenges for another. Some of the capabilities deployed by the FAA will not be able to provide benefits until sufficient numbers of operators have equipped to take advantage of them. New procedures implemented by the FAA will have no impact if controllers and pilots have not been trained in their proper execution. The FAA has anticipated these challenges and developedrisk mitigation strategies to keep NextGen on track and sustain its momentum.

### Airline Emissions key

#### Airline emissions are key

Hodgkinson 7 – David Hodgkinson et al, June 2007, Associate Professor in the Law School at UWA; Special Counsel with Clayton Utz, a national Australian law firm; and a principal of The Hodgkinson Group, a consulting firm with advisors located around the world. David is the co-author of the book Global Climate Change: Australian Law and Policy (2008) and the general editor of Australian Climate Change Law and Policy (2009). As executive director of EcoCarbon, a non-profit organisation, he manages an industry partnership which is building capacity in mechanisms designed to reduce greenhouse gas emissions. He also leads an international project team working on a draft convention for persons displaced by climate change, “STRATEGIES FOR AIRLINES ON AIRCRAFT EMISSIONS AND CLIMATE CHANGE: SUSTAINABLE, LONG - TERM SOLUTIONS”, <http://www.hodgkinsongroup.com/documents/Hodgkinson_airline_emissions.bak.pdf>

A number of organisations such as the Intergovernmental Panel on Climate Change (IPCC), Oxford University, the Massachusetts Institute of Technology (MIT) and the Tyndall Centre, for example, have studied the impacts of aviation on the global atmosphere. These studies, together with reports from Royal Commissions and other inquiries, make the following points clear: the climate change impacts of aviation are significantly worse than those of its carbon dioxide emissions alone. Further, reference to aviation being responsible for 2% of global carbon dioxide emissions is misleading as the figure (a) is based on total anthropogenic carbon dioxide emissions in 1992 (as determined by the IPCC), not 2007; (b) does not take into account aviation’s non-CO2 greenhouse gas (GHG) emissions which significantly contribute to the climate change impacts of aviation; and (c) ignores growth in air travel; air travel demand is growing at unprecedented rates, yet substantial reductions of aviation GHG emissions are not possible in the short to medium term; not only are emissions from air travel increasing significantly in absolute terms but, against a background of emissions reductions from many other sources, their relative rate of increase is even greater. Put another way, “if the [recommended] reductions in carbon dioxide emissions from groundlevel activities … are achieved, and the growth in air transport projected by the IPCC materialises, then air travel will become one of the major sources of anthropogenic climate change by 2050;”development of alternative jet fuels and aircraft technological developments, together with the development of more efficient operational practices and more efficient air traffic management systems and processes, will only partially offset the growth in aviation emissions; there is presently no systematic or compulsory incentive to reduce international aviation emissions; 􀁸 without government action to significantly reduce aviation growth within the UK, for example, aviation emissions may be greater than those forecast for all other sectors of the economy. As a result, aviation may exceed the carbon target for all sectors by 2050.

### Shift to worse forms

#### Improving flights key to prevent the shift to worse forms of transportation

NEXTOR et al. 10 ( Nextor- Government-Academic-Industry alliance dedicated to the advancement of aviation research and technology. NEXTOR is sponsored by the Federal Aviation Administration (FAA) Office of Technology Development and Operations Planning Michael Ball- Co-Director, Cynthia Barnhart, Martin Dresner, Mark Hansen, Kevin Neels, Amedeo Odoni, Everett Peterson, Lance Sherry, Antonio Trani, Bo Zou- Employed by NEXTOR. With assistance by Rodrigo Britto, Doug Fearing, Prem Swaroop, Nitish Uman, Vikrant Vaze, Augusto Voltes. “Total Delay Impact Study A Comprehensive Assessment of the Costs and Impacts of Flight Delay in the United States,” [http://its.berkeley.edu/sites/default/files/NEXTOR\_TDI\_Report\_Final\_October\_2010.pdf Accessed 6/26/12](http://its.berkeley.edu/sites/default/files/NEXTOR_TDI_Report_Final_October_2010.pdf%20Accessed%206/26/12)) KT

2.3 Cost of Lost Demand Flight delay degrades the quality of the airline product. While many air travelers choose to “grin and bear it” others respond by switching to alternative transportation modes, or simply not traveling at all. Such travelers do not bear the costs of air travel delay discussed in Section 2.2, t still incur a loss in welfare. In the air transportation market, both passengers’ decision on traveling and airlines’ pricing behavior are influenced by flight delays. We explicitly model passenger demand and fare to be functions of flight delays (see Section 3.5.1). By simultaneously estimating the demand and fare functions, the demand and supply interactions on the route level are investigated. The model results indicate that delays have an upward impact on fares, while at the same time decreasing people’s willingness to pay for travel by air. Using a discrete choice model, we find some of the trips are shifted to automobile, and the additional road traffic generates congestion costs on other road users and environmental costs on society at large. Table 2-3 summarizes these results. The first component is an estimate of the difference in the value (or welfare) that certain air travelers would have achieved using air transportation in a delay-free (or low delay) environment and the value they did achieve having chosen to shift to another mode because of air transport delays. There is an additional externality due to the switch to automobile. Specifically, car travel is less safe than air travel so that this switch from air to car will cause additional fatalities (see Section 3.5.2). An estimate of this cost is also provided in Table 2-3.

### Planes bad for the evironment

#### Airline industry major cause of global warming and ocean acidification

**Kol and lumpur 12** (writers for new straight times “Aviation impact on environment” 16 February 2012 | Last updated at 09:30PM<http://www.nst.com.my/channels/niexter/aviation-impact-on-environment-1.47093?localLinksEnabled=false> (Pitman)

The same industry that unlocked the gateway to a boundary-free world by allowing us to travel far greater distances than we otherwise could, has also resulted in many environmental issues such as the anthropogenic climate change and air pollution. To further my case, according to http://www.parliament.uk, “Aircraft, airport vehicles and road traffic to access airports emit air pollutants, such as nitrogen oxides, fine particles, carbon monoxide and hydrocarbons. Set alongside the forecast growth in air travel, emissions from aircraft are likely to become more significant as a source of air pollution around airports.” The contrail from an aircraft engine is formed by the combustion of precious fuels that release harmful carbon dioxide and greenhouse gases into our atmosphere. This is bound to accelerate global warming and ocean acidification. With global warming on the rise, warmer water in the ocean is causing tropical storms. Droughts and wildfires will also become worse, and so will the intensity of rainstorms. Ocean acidification leads to marine-life destruction. Reef-forming corals that are home to vulnerable sea-dwellers, algae and phytoplankton – the very fundamentals of the oceanic food web – will become useless due to their inability to adapt to small changes in pH. In a nutshell, the climate changes and air pollution caused by the aviation industry pose a danger to the balance of Earth’s biodiversity. Moreover, aircrafts are known as a major source of noise pollution. The noise emitted, especially from the airport, upsets the tranquility of the surrounding areas. Based on the World Health Organisation’s "Community Noise“ report in 1993, if an airport is too close to a housing area, it may cause disturbance while sleeping, interference with communication and speech perception, stress, cardiovascular problems, and even mental disorders. Apart from climate change and noise pollution, which are deemed the most striking tribulations inflicted by the aviation industry, allow me to voice another string of possible impacts caused by the existence and operation of airport infrastructure, exempli gratia, land conversion. Constructing airports requires a large piece of land, and thus, wipes out the previous inhabitants of the particular area – be it a tropical rainforest or land of heritage. Next, terminal buildings at airports might also cause nuisance in the way of waste management. Problems could arise with regard to non-renewable resources, which are oil and petroleum derivatives. The website http://www.britishairways.com stated that “six million tones of jet fuel (are used) a year”, and yet, oil and petroleum scarcity is a raging crisis around the world. Facing queries concerning the availability of oil and petroleum in the decades to come, should this alarming rate of resource extraction continue, I am rendered speechlessness by the prospect of a not-so-positive result, achieved by the means of simple math. Fortunately, a number of countries are aware of the environmental impacts of the aviation industry, and various actions are being taken with the help of modern technology to diminish the increase of negative environmental impacts.

### A2: Planes Pollute

#### Planes aren’t that bad—investment in clean tech means they are actually relatively green

Sacramento Bee, June 6 [“Airlines for America (A4A) Calls on U.S. Government to Block EU ETS ” http://www.sacbee.com/2012/06/06/4543381/airlines-for-america-a4a-calls.html#storylink=cpy

A4A and its member airlines are committed to reducing greenhouse gas emissions from aviation and, with fuel-efficiency improvements eliminating 3.3 billion metric tons of carbon dioxide since 1978, have a strong record of meeting that commitment. By investing billions of dollars in fuel-saving aircraft and engines, innovative technologies and advanced avionics, the U.S. airline industry improved its fuel efficiency by 120 percent between 1978 and 2011, resulting in emissions savings equivalent to taking 22 million cars off the road each of those years.

### Warming is real

#### Warming is real, human caused, and getting faster

Rahmstorf 8 (Richard, Professor of Physics of the Oceans – Potsdam University, “Anthopogenic Climate Change?”, Global Warming: Looking Beyond Kyoto, Ed. Zedillo, p. 42-49)

It is time to turn to statement B: human activities are altering the climate. This can be broken into two parts. The first is as follows: global climate is warming. This is by now a generally undisputed point (except by novelist Michael Crichton), so we deal with it only briefly. The two leading compilations of data measured with thermometers are shown in figure 3-3, that of the National Aeronautics and Space Administration (NASA) and that of the British Hadley Centre for Climate Change. Although they differ in the details, due to the inclusion of different data sets and use of different spatial averaging and quality control procedures, they both show a consistent picture, with a global mean warming of 0.8°C since the late nineteenth century. Temperatures over the past ten years clearly were the warmest since measured records have been available. The year 1998 sticks out well above the longterm trend due to the occurrence of a major El Nino event that year (the last El Nino so far and one of the strongest on record). These events are examples of the largest natural climate variations on multiyear time scales and, by releasing heat from the ocean, generally cause positive anomalies in global mean temperature. It is remarkable that the year 2005 rivaled the heat of 1998 even though no El Nino event occurred that year. (A bizarre curiosity, perhaps worth mentioning, is that several prominent "climate skeptics" recently used the extreme year 1998 to claim in the media that global warming had ended. In Lindzen's words, "Indeed, the absence of any record breakers during the past seven years is statistical evidence that temperatures are not increasing.")33 In addition to the surface measurements, the more recent portion of the global warming trend (since 1979) is also documented by satellite data. It is not straightforward to derive a reliable surface temperature trend from satellites, as they measure radiation coming from throughout the atmosphere (not just near the surface), including the stratosphere, which has strongly cooled, and the records are not homogeneous' due to the short life span of individual satellites, the problem of orbital decay, observations at different times of day, and drifts in instrument calibration.' Current analyses of these satellite data show trends that are fully consistent with surface measurements and model simulations." If no reliable temperature measurements existed, could we be sure that the climate is warming? The "canaries in the coal mine" of climate change (as glaciologist Lonnie Thompson puts it) ~are mountain glaciers. We know, both from old photographs and from the position of the terminal moraines heaped up by the flowing ice, that mountain glaciers have been in retreat all over the world during the past century. There are precious few exceptions, and they are associated with a strong increase in precipitation or local cooling.36 I have inspected examples of shrinking glaciers myself in field trips to Switzerland, Norway, and New Zealand. As glaciers respond sensitively to temperature changes, data on the extent of glaciers have been used to reconstruct a history of Northern Hemisphere temperature over the past four centuries (see figure 3-4). Cores drilled in tropical glaciers show signs of recent melting that is unprecedented at least throughout the Holocene-the past 10,000 years. Another powerful sign of warming, visible clearly from satellites, is the shrinking Arctic sea ice cover (figure 3-5), which has declined 20 percent since satellite observations began in 1979. While climate clearly became warmer in the twentieth century, much discussion particularly in the popular media has focused on the question of how "unusual" this warming is in a longer-term context. While this is an interesting question, it has often been mixed incorrectly with the question of causation. Scientifically, how unusual recent warming is-say, compared to the past millennium-in itself contains little information about its cause. Even a highly unusual warming could have a natural cause (for example, an exceptional increase in solar activity). And even a warming within the bounds of past natural variations could have a predominantly anthropogenic cause. I come to the question of causation shortly, after briefly visiting the evidence for past natural climate variations. Records from the time before systematic temperature measurements were collected are based on "proxy data," coming from tree rings, ice cores, corals, and other sources. These proxy data are generally linked to local temperatures in some way, but they may be influenced by other parameters as well (for example, precipitation), they may have a seasonal bias (for example, the growth season for tree rings), and high-quality long records are difficult to obtain and therefore few in number and geographic coverage. Therefore, there is still substantial uncertainty in the evolution of past global or hemispheric temperatures. (Comparing only local or regional temperature; as in Europe, is of limited value for our purposes,' as regional variations can be much larger than global ones and can have many regional causes, unrelated to global-scale forcing and climate change.) The first quantitative reconstruction for the Northern Hemisphere temperature of the past millennium, including an error estimation, was presented by Mann, Bradley, and Hughes and rightly highlighted in the 2001 IPCC report as one of the major new findings since its 1995 report; it is shown in figure 3\_6.39 The analysis suggests that, despite the large error bars, twentieth-century warming is indeed highly unusual and probably was unprecedented during the past millennium. This result, presumably because of its symbolic power, has attracted much criticism, to some extent in scientific journals, but even more so in the popular media. The hockey stick-shaped curve became a symbol for the IPCC, .and criticizing this particular data analysis became an avenue for some to question the credibility of the IPCC. Three important things have been overlooked in much of the media coverage. First, even if the scientific critics had been right, this would not have called into question the very cautious conclusion drawn by the IPCC from the reconstruction by Mann, Bradley, and Hughes: "New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the twentieth century is likely to have been the largest of any century during the past 1,000 years." This conclusion has since been supported further by every single one of close to a dozen new reconstructions (two of which are shown in figure 3-6). Second, by far the most serious scientific criticism raised against Mann, Hughes, and Bradley was simply based on a mistake. 40 The prominent paper of von Storch and others, which claimed (based on a model test) that the method of Mann, Bradley, and Hughes systematically underestimated variability, "was [itself] based on incorrect implementation of the reconstruction procedure."41 With correct implementation, climate field reconstruction procedures such as the one used by Mann, Bradley, and Hughes have been shown to perform well in similar model tests. Third, whether their reconstruction is accurate or not has no bearing on policy. If their analysis underestimated past natural climate variability, this would certainly not argue for a smaller climate sensitivity and thus a lesser concern about the consequences of our emissions. Some have argued that, in contrast, it would point to a larger climate sensitivity. While this is a valid point in principle, it does not apply in practice to the climate sensitivity estimates discussed herein or to the range given by IPCC, since these did not use the reconstruction of Mann, Hughes, and Bradley or any other proxy records of the past millennium. Media claims that "a pillar of the Kyoto Protocol" had been called into question were therefore misinformed. As an aside, the protocol was agreed in 1997, before the reconstruction in question even existed. The overheated public debate on this topic has, at least, helped to attract more researchers and funding to this area of paleoclimatology; its methodology has advanced significantly, and a number of new reconstructions have been presented in recent years. While the science has moved forward, the first seminal reconstruction by Mann, Hughes, and Bradley has held up remarkably well, with its main features reproduced by more recent work. Further progress probably will require substantial amounts of new proxy data, rather than further refinement of the statistical techniques pioneered by Mann, Hughes, and Bradley. Developing these data sets will require time and substantial effort. It is time to address the final statement: most of the observed warming over the past fifty years is anthropogenic. A large number of studies exist that have taken different approaches to analyze this issue, which is generally called the "attribution problem." I do not discuss the exact share of the anthropogenic contribution (although this is an interesting question). By "most" I imply mean "more than 50 percent.” The first and crucial piece of evidence is, of course, that the magnitude of the warming is what is expected from the anthropogenic perturbation of the radiation balance, so anthropogenic forcing is able to explain all of the temperature rise. As discussed here, the rise in greenhouse gases alone corresponds to 2.6 W/tn2 of forcing. This by itself, after subtraction of the observed 0'.6 W/m2 of ocean heat uptake, would Cause 1.6°C of warming since preindustrial times for medium climate sensitivity (3"C). With a current "best guess'; aerosol forcing of 1 W/m2, the expected warming is O.8°c. The point here is not that it is possible to obtain the 'exact observed number-this is fortuitous because the amount of aerosol' forcing is still very' uncertain-but that the expected magnitude is roughly right. There can be little doubt that the anthropogenic forcing is large enough to explain most of the warming. Depending on aerosol forcing and climate sensitivity, it could explain a large fraction of the warming, or all of it, or even more warming than has been observed (leaving room for natural processes to counteract some of the warming). The second important piece of evidence is clear: there is no viable alternative explanation. In the scientific literature, no serious alternative hypothesis has been proposed to explain the observed global warming. Other possible causes, such as solar activity, volcanic activity, cosmic rays, or orbital cycles, are well observed, but they do not show trends capable of explaining the observed warming. Since 1978, solar irradiance has been measured directly from satellites and shows the well-known eleven-year solar cycle, but no trend. There are various estimates of solar variability before this time, based on sunspot numbers, solar cycle length, the geomagnetic AA index, neutron monitor data, and, carbon-14 data. These indicate that solar activity probably increased somewhat up to 1940. While there is disagreement about the variation in previous centuries, different authors agree that solar activity did not significantly increase during the last sixty-five years. Therefore, this cannot explain the warming, and neither can any of the other factors mentioned. Models driven by natural factors only, leaving the anthropogenic forcing aside, show a cooling in the second half of the twentieth century (for an example, See figure 2-2, panel a, in chapter 2 of this volume). The trend in the sum of natural forcings is downward. The only way out would be either some as yet undiscovered unknown forcing or a warming trend that arises by chance from an unforced internal variability in the climate system. The latter cannot be completely ruled out, but has to be considered highly unlikely. No evidence in the observed record, proxy data, or current models suggest that such internal variability could cause a sustained trend of global warming of the observed magnitude. As discussed, twentieth century warming is unprecedented over the past 1,000 years (or even 2,000 years, as the few longer reconstructions available now suggest), which does not 'support the idea of large internal fluctuations. Also, those past variations correlate well with past forcing (solar variability, volcanic activity) and thus appear to be largely forced rather than due to unforced internal variability." And indeed, it would be difficult for a large and sustained unforced variability to satisfy the fundamental physical law of energy conservation. Natural internal variability generally shifts heat around different parts of the climate system-for example, the large El Nino event of 1998, which warmed, the atmosphere by releasing heat stored in the ocean. This mechanism implies that the ocean heat content drops as the atmosphere warms. For past decades, as discussed, we observed the atmosphere warming and the ocean heat content increasing, which rules out heat release from the ocean as a cause of surface warming. The heat content of the whole climate system is increasing, and there is no plausible source of this heat other than the heat trapped by greenhouse gases. ' A completely different approach to attribution is to analyze the spatial patterns of climate change. This is done in so-called fingerprint studies, which associate particular patterns or "fingerprints" with different forcings. It is plausible that the pattern of a solar-forced climate change differs from the pattern of a change caused by greenhouse gases. For example, a characteristic of greenhouse gases is that heat is trapped closer to the Earth's surface and that, unlike solar variability, greenhouse gases tend to warm more in winter, and at night. Such studies have used different data sets and have been performed by different groups of researchers with different statistical methods. They consistently conclude that the observed spatial pattern of warming can only be explained by greenhouse gases.49 Overall, it has to be considered, highly likely' that the observed warming is indeed predominantly due to the human-caused increase in greenhouse gases. ' This paper discussed the evidence for the anthropogenic increase in atmospheric CO2 concentration and the effect of CO2 on climate, finding that this anthropogenic increase is proven beyond reasonable doubt and that a mass of evidence points to a CO2 effect on climate of 3C ± 1.59C global-warming for a doubling of concentration. (This is, the classic IPCC range; my personal assessment is that, in-the light of new studies since the IPCC Third Assessment Report, the uncertainty range can now be narrowed somewhat to 3°C ± 1.0C) This is based on consistent results from theory, models, and data analysis, and, even in the absence-of any computer models, the same result would still hold based on physics and on data from climate history alone. Considering the plethora of consistent evidence, the chance that these conclusions are wrong has to be considered minute. If the preceding is accepted, then it follows logically and incontrovertibly that a further increase in CO2 concentration will lead to further warming. The magnitude of our emissions depends on human behavior, but the climatic response to various emissions scenarios can be computed from the information presented here. The result is the famous range of future global temperature scenarios shown in figure 3\_6.50 Two additional steps are involved in these computations: the consideration of anthropogenic forcings other than CO2 (for example, other greenhouse gases and aerosols) and the computation of concentrations from the emissions. Other gases are not discussed here, although they are important to get quantitatively accurate results. CO2 is the largest and most important forcing. Concerning concentrations, the scenarios shown basically assume that ocean and biosphere take up a similar share of our emitted CO2 as in the past. This could turn out to be an optimistic assumption; some models indicate the possibility of a positive feedback, with the biosphere turning into a carbon source rather than a sink under growing climatic stress. It is clear that even in the more optimistic of the shown (non-mitigation) scenarios, global temperature would rise by 2-3°C above its preindustrial level by the end of this century. Even for a paleoclimatologist like myself, this is an extraordinarily high temperature, which is very likely unprecedented in at least the past 100,000 years. As far as the data show, we would have to go back about 3 million years, to the Pliocene, for comparable temperatures. The rate of this warming (which is important for the ability of ecosystems to cope) is also highly unusual and unprecedented probably for an even longer time. The last major global warming trend occurred when the last great Ice Age ended between 15,000 and 10,000 years ago: this was a warming of about 5°C over 5,000 years, that is, a rate of only 0.1 °C per century. 52 The expected magnitude and rate of planetary warming is highly likely to come with major risk and impacts in terms of sea level rise (Pliocene sea level was 25-35 meters higher than now due to smaller Greenland and Antarctic ice sheets), extreme events (for example, hurricane activity is expected to increase in a warmer climate), and ecosystem loss. The second part of this paper examined the evidence for the current warming of the planet and discussed what is known about its causes. This part showed that global warming is already a measured and-well-established fact, not a theory. Many different lines of evidence consistently show that most of the observed warming of the past fifty years was caused by human activity. Above all, this warming is exactly what would be expected given the anthropogenic rise in greenhouse gases, and no viable alternative explanation for this warming has been proposed in the scientific literature. Taken together., the very strong evidence accumulated from thousands of independent studies, has over the past decades convinced virtually every climatologist around the world (many of whom were initially quite skeptical, including myself) that anthropogenic global warming is a reality with which we need to deal.

### Warming Impact

#### Extinction

Cummins 10 (Ronnie, International Director – Organic Consumers Association and Will Allen, Advisor – Organic Consumers Association, “Climate Catastrophe: Surviving the 21st Century”, 2-14, http://www.commondreams.org/view/2010/02/14-6)

The hour is late. Leading climate scientists such as James Hansen are literally shouting at the top of their lungs that the world needs to reduce emissions by 20-40% as soon as possible, and 80-90% by the year 2050, if we are to avoid climate chaos, crop failures, endless wars, melting of the polar icecaps, and a disastrous rise in ocean levels. Either we radically reduce CO2 and carbon dioxide equivalent (CO2e, which includes all GHGs, not just CO2) pollutants (currently at 390 parts per million and rising 2 ppm per year) to 350 ppm, including agriculture-derived methane and nitrous oxide pollution, or else survival for the present and future generations is in jeopardy. As scientists warned at Copenhagen, business as usual and a corresponding 7-8.6 degree Fahrenheit rise in global temperatures means that the carrying capacity of the Earth in 2100 will be reduced to one billion people. Under this hellish scenario, billions will die of thirst, cold, heat, disease, war, and starvation. If the U.S. significantly reduces greenhouse gas emissions, other countries will follow. One hopeful sign is the recent EPA announcement that it intends to regulate greenhouse gases as pollutants under the Clean Air Act. Unfortunately we are going to have to put tremendous pressure on elected public officials to force the EPA to crack down on GHG polluters (including industrial farms and food processors). Public pressure is especially critical since "just say no" Congressmen-both Democrats and Republicans-along with agribusiness, real estate developers, the construction industry, and the fossil fuel lobby appear determined to maintain "business as usual."

## UAVs

### Nextgen 🡪 UAVs

#### **NextGen key to Safely increased UAV Traffic**

Federal Aviation Administration 12 (The national aviation authority of the United States and an agency of the United States Department of Transportation “NextGen Implementation Plan March 2012 ”http://www.faa.gov/nextgen/implementation/media/NextGen\_Implementation\_Plan\_2012.pdf Accessed 7/2/12)

With NextGen, we continue to advance safety as we look to increase air traffic and accommodate unmanned aircraft systems and commercial space flights. To minimize risk as we bring together a wave of new NextGen capabilities during the next decade, the aviation community relies on integrated safety cases and other proactive forms of management that allow us to assess the risk of proposed changes. Policies, procedures and systems on the ground and on the flight deck enable the mid-term system. We enhance technologies and procedures that are in use today, as we introduce innovations that will fundamentally change air traffic automation, surveillance, communications, navigation and the way we manage information. In addition to the advances we develop through NextGen transformational programs and implementation portfolios, the mid-term system depends on coordination across FAA lines of business, including specialists on safety, airports, the environment, policy development and air traffic management. FAA information and management systems must keep these activities synchronized as we approach the mid-term, reach it and move forward. We use a strategic Environmental Management System approach to integrate environmental and energy objectives into the planning, decision making and operation of NextGen.

#### **UAV is only Possible with NextGen**

McEntee, Nix and Lloyd 08 ( Kevin, Bill, Geoff- Associates of the Sensis Corporation “UNMANNED AIRCRAFT RESEARCH IN SUPPORT OF NEXTGEN TRAJECTORY BASED OPERATIONS” <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4702830> Accessed 7/2/12) KT

UAS will be playing a prominent role in accelerating the American aviation economic engine in the not-too-distant future. This fact presents a number of challenges to the various agencies within the government who, together, are responsible for American aviation safety and security in all its various elements. The Department of Defense (DOD) is responsible for defending our country on a worldwide scale; the Department of Homeland Security (DHS) is responsible for the security of the Homeland; and of course, the Federal Aviation Administration (FAA) is responsible for the safety of the aircraft operating in the National Airspace System (NAS). A key question that must be answered is: How can a UAS operate safely and securely within the NAS? Coincidentally, at this time, planning and research is underway for developing the Next Generation (NextGen) Air Transportation System. Significant progress has been made in defining future concepts of operations, which includes elements such as Position, Navigation, and Timing (PNT) Services, and Trajectory Based Operations (TBO). NextGen needs to include provision for safe and secure UAS operation in the NAS. This point was highlighted in the May 2008 General Accounting Office (GAO) UAS Report to Congress. The report stated that “UAS development could lead to technological advances that could benefit all national airspace system (NAS) users.” The GAO Report also noted that one of current problems with determining impact of UAS operations on the NAS is that “the impact of routine access remains generally speculative” and that “the impact will depend on a number of factors that, today, are unpredictable due to a lack of data[1]. This paper proposes a method to address the lack of data.

#### Collisions prevent Economic measurement of UAS- NextGen key for testing ground.

McEntee, Nix and Lloyd 08 ( Kevin, Bill, Geoff- Associates of the Sensis Corporation “UNMANNED AIRCRAFT RESEARCH IN SUPPORT OF NEXTGEN TRAJECTORY BASED OPERATIONS” <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4702830> Accessed 7/2/12) KT

The economic and security potential of Unmanned Aircraft Systems (UAS) will not be fully realized until standards and procedures are put in place to allow for their safe operations in nonsegregated airspace. The standards development process requires the analysis and specification of complex issues including multiple disciplines such as systems, algorithms, human factors, safety and exensive evaluation and testing. The current Federal Aviation Administration (FAA) roadmap shows the development and approval of a comprehensive set of standards being completed around 2017. Add the time required for manufactures and potential users to meet the standards and widespread access to the National Air Space (NAS) is not likely until after 2020. The two predominately challenging issues facing the development of these standards are the needs to provide Collision Avoidance and UAS Command & Contol Link Integrity. This paper focuses on the collision avoidance. The Collision Avoidance solution is best thought of as a layered approach consisting of airspace design, separation services, automation aided collision avoidance systems and when all else fails, the pilots’ ability to “See and Avoid”. The last two levels consists of two parts, the ability of the UAS or pilot to sense all potentially intruding aircraft, including balloons and gliders, and the ability of the system to correctly decide upon an appropriate avoidance maneuver.

### Unsafe now

#### Commercial UAS Lacks Safe airspace technology

Euteneuer and Papageorgiou 11 (Eric A.- Department of Aerospace Engineering and Mechanics in University of Minnesota. Dr. George - Honeywell Aerospace Advanced Technology “UAS INSERTION INTO COMMERCIAL AIRSPACE: EUROPE AND US STANDARDS PERSPECTIVE” <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6096084>

UAS are already in production and use today. However, they are limited in their use within civil airspace due to the lack of mature sense-and-avoid technology and undefined methods for proving safety. These key requirements will not only enable military, civil, and eventually commercial objectives, they will have a direct impact in initial and operating costs. Therefore, to unlock the potential of UASs, it is required to develop affordable UAS solutions that can be safely and transparently integrated into nonsegregated airspace.

### pipeline monitoring

#### UAVS key to pipeline monitoring

Aeronautics 07 (Aeronautics Ltd, specializes in providing comprehensive Defense Solutions. Aeronautics has established itself as a primary global provider of security consulting services and defense applications. “Commercial UAVs” <http://www.aeronautics-sys.com/?CategoryID=259&ArticleID=188(Pitman)>

Pipeline Monitoring & Oil and Gas Security Offshore oil & gas installations are extremely valuable assets, situated across extensive maritime areas that are difficult to guard. Attacks or damage to such installations can lead to enormous ecological damage, revenue losses and chaos on international oil markets. Improving oil and gas security security is a matter of global importance. UAVs are today emerging as highly effective tools for confronting pipeline monitoring, and oil and gas security challenges. While others have speculated about the possible use of UAVs in offshore oil security, Aeronautics has put theory into practice, becoming a world pioneer in this field.

### Ocean monitoring

#### Key to ocean monitoring

Itri, Corsco, Etro 05 (A. S. Lomax Itri Corporation, Director NOAA Projects W. Corso Lockheed Martin Space Operations J. F. Etro Itri Corporation, President “Employing Unmanned Aerial Vehicles (UAVs) as an Element of the Integrated Ocean Observing System” http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=1639759)

A. IOOS Core Variables and Societal Goals UAVs have current capabilities and future potential to measure several IOOS core variables in order to support several of the seven societal goals of the IOOS. An example of this may be illustrated by a case of a Harmful Algal Bloom (HAB). Extensive research efforts have been dedicated to modeling the spectral characteristics of various species of harmful algae in hopes of ultimately developing algorithms for measuring concentrations of these algae in optically-complex coastal waters. However,in the practical sense, marine resource managers and public health officials may not require an absolute quantitative value of algae concentration in order to decide whether or not to suspend fishing in coastal areas or close beach access to the public. Instead, these decision-makers may only need high-resolution, near-realtime imagery that shows a clearly-defined, in space and time, plume of color in the ocean. This plume could be imaged using a panchromatic camera and enhanced through the use of filters or image processing techniques. It is this type of operational product that can be made readily available through the use of a UAV. Another application of UAVs is based in the flexibility of changing sensor characteristics. It is possible to quickly change out filters on an optical sensor so that very specific bands may be quickly understood and observed. For example it has been noted that the limited spectral resolution of widely available sensors represented a challenge to mapping sea grasses in coastal areas of the State of Washington because the spectral band sets do not provide the resolution to discriminate between co-occurring plant species [2]. It may be possible with UAVs to tune the band observed very specifically to the phenomena or species of interest by a quick and inexpensive trial and error process. The National Ocean Research Leadership Council (NORLC) has identified that an IOOS must be designed to provide data and information that serves seven societal goals: (1) Improve predictions of climate change and weather and their effect on coastal communities and the nation (Weather & Climate); (2) Improve the safety and efficiency of maritime operations (Maritime Operations); (3) More effectively mitigate the effects of natural hazards (Natural Hazards); (4) Improve national and homeland security (Homeland Security); (5) Reduce public health risks (Public Health); (6) More effectively protect and restore healthy coastal ecosystems (Ecosystem Health); and (7) Enable the sustained use of ocean and coastal resources (Living Resources). [3] In order to achieve these goals, the NORLC identified 20 core variables that must be measured and monitored. Many of these core variables, listed in Table II, can be measured using existing technologies that can be mounted on or deployed by UAVs. Each of these capabilities or potential capabilities is discussed briefly below. • Salinity Current remote sensing techniques for measuring salinity employ microwave wavelengths. Small enough microwave sensors do not currently exist to permit such measurements from small UAVs but as technology progresses, this could be possible in the future. While a new technique for estimating salinity has been proposed using outgoing longwave radiation (OLR - a parameter that could be measured using infrared sensors) [4], this technique requires the use of large-scale

## Solvency

### Federal Key

#### Federal Government key to the airline industry.

Bourgeois 10 **(**Daniel Bourgeois, August 2010, Masters of Science Science, Technology and Public Policy, Rochester Institute of Technology, “The Next Generation Air Transportation System: An Answer to Solve Airport Efficiency?”page 54,55, http://gradworks.umi.com/1480274.pdf)

We can apply this same concept to the current government intervention in the implementation of the Next Generation Air Transportation System. Externalities are effects which are outside of the business transaction that have an impact on a third party. They can be positive or negative, but in either case the cost or benefit of these are not captured in the price of the transaction. A classic example of a negative externality in the aviation community is the increase in global warming caused by Condensation Trails (Con-trails). National Aeronautics and Space Administration (NASA) scientists say contrails from jet exhausts create cirrus clouds, likely trapping heat rising from the Earth's surface. This theory is also supported according to a Reuters report which concluded the same. When you buy a ticket to fly from New York to Chicago 0% of that ticket price is going to toward countering the problems of contrails. But, if there was a fee, it is very likely that the price would be drastically different from what it is now. The government needs to be, and is the only candidate, able to enforce compliance from the airline industry to combat these problems. Positive externalities on the other hand only reinforce and further encourage government involvement in the aviation sector. Traditionally, air travel has only survived largely through government intervention, especially for airports whether in the form of equity or subsidies, it is easy to notice how most airports are named for their location i.e., Greater Rochester International Airport or Cook County Airport, it is because the airport is owned by that county or state. The airline industry has had cumulative losses in its history, subsidies such as aircraft development and airport construction are necessary just to keep the aviation sector afloat. But, it is the ―… positive externalities, such as higher growth due to global mobility, outweigh the microeconomic losses and justify continuing government intervention‖ (Edemariam, 2006). A historically high level of government intervention in the airline industry can be seen as part of a wider political consensus on strategic forms of transport, such as highways and railways, both of which receive public funding in most parts of the world (Kay, 2005). The only way that the airlines can stay alive and stay competitive is by involvement from the state and federal government. So can we say that if left alone the airlines will invest in updating the current air transportation system to one that works better? No, probably not. The Government needs to intervene and mandate these changes because they will not happen on their own, or if left in the hands of private companies.

### Solves Delays

#### NextGen Solves Delays- Federal Approach is Key

NEXTOR et al. 10 ( Nextor- Government-Academic-Industry alliance dedicated to the advancement of aviation research and technology. NEXTOR is sponsored by the Federal Aviation Administration (FAA) Office of Technology Development and Operations Planning Michael Ball- Co-Director, Cynthia Barnhart, Martin Dresner, Mark Hansen, Kevin Neels, Amedeo Odoni, Everett Peterson, Lance Sherry, Antonio Trani, Bo Zou- Employed by NEXTOR. With assistance by Rodrigo Britto, Doug Fearing, Prem Swaroop, Nitish Uman, Vikrant Vaze, Augusto Voltes. “Total Delay Impact Study A Comprehensive Assessment of the Costs and Impacts of Flight Delay in the United States,” [http://its.berkeley.edu/sites/default/files/NEXTOR\_TDI\_Report\_Final\_October\_2010.pdf Accessed 6/26/12](http://its.berkeley.edu/sites/default/files/NEXTOR_TDI_Report_Final_October_2010.pdf%20Accessed%206/26/12)) KT

Building on a strong domestic market, aerospace manufacturing had the highest net exports— some $60 billion – of any U.S. industry in 2008 (FAA ATO, 2009). The four largest airlines in the world are all U.S. carriers, as are five of the world’s top ten busiest airports. The FAA Air Traffic Organization is the largest, busiest, and (arguably) most efficient provider of air navigation services in the world. It may be difficult to maintain such competitive strength if future growth is stifled by high delays. Substantial investments are required in order to modernize and expand our aviation infrastructure so that it can accommodate anticipated growth without large increases in delay. The Next Generation Air Transportation System (NextGen) will deploy improved systems for communications, surveillance, navigation, and air traffic management and also require flight operators to invest in new on-board equipment. Substantial improvements in air transportation capacity also require airport infrastructure enhancement. Estimates of these combined investments reach well into the 10’s of billions of dollars (GAO, 2008; ACI, 2009). The Federal Government together with the air transportation industry must decide on a level of investment to make in future system capacity. Other approaches to reducing delay, such as reducing incentives to over scheduling flights, might also be considered. To help inform decision making on such issues, the FAA has sponsored this study of the total economic impact of flight delay in the United States. Focusing on the year 2007—the worst on record in terms of flight delays—the study attempts a comprehensive accounting of the economic cost of flight delays to airlines, air travelers, and the rest of society. The analysis assesses the cost to society of all air transportation system delays. To be sure it would be impossible to eliminate all of these delays and their costs, and even unwise to seek to do so. In this regard, the TDI study is similar to others that attempt to measure the size—i.e. the social cost--of a problem, such as air pollution (e.g. Muller et al, 2007), motor accidents (e.g. Cambridge Systematics, 2008), or crime (e.g. Anderson, 1999), while recognizing that the problem cannot be entirely eliminated. At the same time, it is quite reasonable to seek to eliminate—through policy innovation, research and development, and capital investment--a substantial portion of these delays and the magnitude of the costs involved suggests that doing so could benefit society significantly. The calculation of the cost of delays is one way to estimate the potential benefits of capacity increases. The air transportation system will react to any capacity increases by altering service patterns. For example, if future capacity is increased, the system might move to D3 and delay3 in Figure 1-1, instead of D2 and delay2. Thus, the benefits of such capacity increases could manifest themselves as both delay decreases and better service offerings. Nonetheless, assuming capacity is used efficiently, the cost of the delays the capacity could eliminate provides a lower bound on the benefits the capacity increases provide to society.

#### NextGen Solves Air Traffic- Optimizes Routes and Weather Predictions

Zhang et al. 11(Wei- Member of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Claire J. Tomlin- fellow of IEE and with the Department of Electrical Engineering and Computer Sciences, University of California at Berkeley. Maryam Kamgarpour- Student Member of IEE and with the Department of Mechanical Engineering, University of California at Berkeley. Dengfeng Sun- Member of IEE and with the School of Aeronautics and Astronautics, Purdue University. “A Hierarchical Flight Planning Framework for Air Traffic Management” Vol. 100, No. 1, January 2012 in Proceedings of the IEE. Accessed 6/20/2012) KT

As the demand continuously increases, the need for a shift from the current centralized ATM system to a more distributed traffic management architecture becomes more apparent. To enable such a shift, many research agendas have been proposed. For example, the traffic flow management problem was formulated as a multiplayer game played by airline companies in [25], and a market mechanism was then designed with a provable convergence to an equilibrium depending on the cost metrics of the airline companies. Alternatively, the concept of credit points was introduced in [26] to specify flight priorities, which allows the ATM system to assign delays to flights that are relatively less important to an airline. Although both approaches incorporated airlines’ preferences on existing paths, optimizing individual path plans to further improve the overall performance was not considered. The increased information exchange in NextGen would provide numerous opportunities to improve efficiency and address individual preferences. To design this future ATM system, a critical step is to determine how much responsibility should be distributed to the users1 and how to achieve such a transition in a reliable way. This paper presents one set of preliminary results towards a better understanding of these important questions. Our main contribution is the development of a hierarchical decision and information architecture for large-scale en-route traffic planning, which fully respects preferences of individual flights and systematically considers both weather risks and en-route capacity constraints. With the proposed architecture, the overall functionality of the ATM system is decomposed into two interactive decision layers: traffic regulation and performance optimization. The regulation layer is responsible for computing traffic and weather predictions and setting up traffic regulation rules based on these predictions, while the optimization layer optimizes the cost functions of individual flights subject to the regulation rules imposed by the regulation layer. Through this hierarchical decomposition, the performance optimization task can be accomplished in a fully decentralized way and can be distributed to individual users without violating safety constraints. This gives each user full freedom to make its preferred decisions subject to traffic regulations, which may greatly improve its operational efficiency and passenger satisfaction. In addition, the proposed flight planning framework can design the entire 4-D flight path plans, represented by sequences of waypoints and the corresponding timestamps, instead of just computing the ground delays. This is certainly in line with the TBO initiative in NextGen.

### Overcomes Hurdles

#### Plan overcomes 4 hurdles to implementation – Uncertainty, FAA delivery, getting money, and equipage. IT fiats or incentivizes all of those

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Conclusion

NextGen is faced with four major hurdles:

Uncertainty Regarding NextGen’s Benefits. These is still disagreement among industry experts regarding to what extent NextGen can improve aviation. This is one of the reasons behind the failure to make a sufficient business case for operators to invest in on-board equipage.

Uncertainty Regarding the FAA’s Ability to Deliver. Even though a lack of strong political stimulus is certainty an issue, at the core of the problem is the uncertainty whether the FAA can efficiently deliver NextGen. “Next- Gen” has been around since the 1980’s under various different names and modernization projects with very little progress. Today, there is no certainty regarding how long it will take for NextGen benefits to be delivered, and how much it will cost. This uncertainty exacerbates the lack of incentives for operators to invest in equipage.

Securing funding for infrastructure. The AATF has relied on increasing general fund contributions in recent years to meet increasing outlays. This has led to a rapidly depleting uncommitted funds level. In this fiscal climate, it is not reasonable to continue to expect general fund injections. Furthermore, there is no clear source of funds for NextGen in the upcoming years to ensure its continuity. There is a lack of an equitable long term funding mechanism for FAA’s portion of NextGen’s capital investment needs.

Equipage. Operators have shown little progress towards equipping their aircraft. This is primarily due to the first two problems discussed above- uncertainty regarding NextGen’s benefits and a lack of clear incentives to invest, and uncer- tainty about the FAA’s ability to deliver efficiently. There is a concern that equipping early will cost them more in the long run due to technological obsolescence. Operators want to see more “skin in the game” from the FAA than prom- ises of benefits. However, airlines have lobbied in the past for federal stimulus funds to cover equipage costs. While revenues generated from the system have been and should continue to be used to fund NextGen’s infrastructure and capital needs, operators will eventually have to invest in equipage particularly if there are benefits involved.

### Action now key

#### Now is Key- Any more Delays to NextGEN threaten its benefits

Mica 10 House Representative from Transportation And Infrastructure Committee (John L. “NEW DELAYS TO NEXTGEN BENEFITS” <http://transportation.house.gov/news/PRArticle.aspx?NewsID=1027> Accessed 6/24/12) KT

Washington, DC -- Incoming Chairman of the House Committee on Transportation and Infrastructure John L. Mica (R-FL) and Subcommittee on Aviation top Republican Tom Petri (R-WI) express growing concerns following the DOT Inspector General’s assessment of the FAA’s implementation of NextGen: The Department of Transportation Office of Inspector General today released a letter to the leaders of the Committee on Transportation and Infrastructure describing the Federal Aviation Administration’s (FAA) difficulties in delivering the benefits associated with its air traffic control modernization plan, known as NextGen. The letter also details the Inspector General’s concerns with the FAA’s oversight of the $2.1 billion foundational modernization program known as En Route Automation Modernization, or ERAM. “This is yet another in a succession of assessments that are critical of the FAA’s efforts,” said Petri. “We need to get to the bottom of these delays in the ERAM program. ERAM is a critical element of the FAA’s NextGen plan. The Aviation Subcommittee will pursue vigorous oversight of the FAA’s NextGen implementation plan focusing on the FAA’s efforts to deliver measurable NextGen benefits so that taxpayer dollars are not wasted.” “FAA needs to tighten up its oversight of this critical and costly modernization program,” said Mica. “Delay in delivering NextGen benefits is unacceptable. Congress, the traveling public, and the aerospace industry have all been promised much by the FAA on how NextGen will improve the efficiency of the National Airspace System, reducing fuel burn and environmental impacts, while improving the passenger experience. It’s time for the FAA to begin delivering measurable NextGen benefits over the next few years to build the confidence of passengers, operators, and Congress.”

## Off Case

### A2 States CP – will be ignored

#### Only the Federal government has the authority or ability

Herdman 94 United States Office of Technology Assessment [Roger C. Herdman, “Institutional and Management Issues for Civil Aviation Research and Technology”, Federal Research and Technology for Aviation, p. 35-36]

The federal government is involved in most aspects of a typical aircraft flight in the United States. The aircraft design, its flight and maintenance crew, and the public airport it operates out of must all be certified by the Federal Aviation Administration (FAA), under the U.S. Department of Transportation (DOT). On the infrastructure side, most of the pavement, lights, and navigation devices at the airport are financed with federal funds, and air traffic control (ATC) and airspace systems through which the aircraft flies are owned and operated by FAA.

The tremendous size of the air transportation system and its importance to the U.S. economy, the federal responsibility for ATC, and the lack of commercial market or profit potential for certain safety, environmental, and air traffic management research have propelled the federal government into the role of major provider of aviation research and development (R&D). Within the United States, only the federal government has the resources to support large-scale, applied R&D programs for aviation safety and infrastructure. This chapter describes the present organizational framework for aviation R&D and discusses management and technology issues of concern to Congress.

ORGANIZATIONAL FRAMEWORK

Federal involvement in aviation began shortly after the inception of powered flight. At the end of World War I, Congress created the National Advisory Committee for Aeronautics (NACA) as an advisory group for aviation research, thus intertwining the federal government’s interest in aviation for military and civil purposes from early on.

Many organizations hold prominent roles in U.S. civil aviation, especially in the areas of policy, regulation, and research and technology. This section looks at the roles of FAA, the National Aeronautics and Space Administration (NASA), and other organizations in providing the technical underpinnings for civil aviation. Federal Aviation Administration FAA promotes safety and fosters air commerce in three key areas—safety regulation, infrastructure development, and ATC system operation—and in the research and technology development to support them. FAA’s regulatory authority covers virtually every aspect of aviation, from airports and airways to aircraft and the people who work in and around them. The agency is responsible for the nation’s ATC system, a complex amalgam of people and equipment that must run 24 hours a day, every day of the year, in numerous locations across the United States and its territories.

#### State Action will be ignored in favor of federal programs

WEIGAND 01 (Tory A., Partner – Morrison, Mahoney & Miller, “Air Rage and Legal Pitfalls for State-Based Claims Challenging Airline Regulation of Passenger Conduct During Flight”, Boston Bar Journal, May / June, 45 B.B.J. 10, Lexis)

However, many courts, including the First Circuit, have found implied preemption over various aspects of air safety. n22 Indeed, the Second Circuit in Abdullah v. American Airlines, Inc. recently held that the Aviation Act's safety purpose and scheme preempts all state standards in the area of safety. According to the Court, "the evident intent of Congress that there be federal supervision of air safety and from the decisions in which courts have found federal preemption of discrete, safety related matters . . . [establishes] that federal law preempts the general field of aviation safety." n23 The Court in Abdullah found that only a federal standard of care could apply, although state law could provide for a damage remedy if one is not available under the federal scheme.

n22 French v. Pan Am Express, Inc., 869 F.2d 1 (1st Cir. 1989).

n23 Abdullah, 181 F.3d at 371.

Under Abdullah, a substantial argument can be made that the FAA regulatory scheme preempts any state action regulating or providing for a standard of care for the removal of passengers or diversion of flights based upon passenger conduct. The FAA has, in fact, enacted significant regulation granting considerable discretion to the airline, particularly the pilot, in controlling aberrant passenger behavior. The regulatory scheme includes:

- prohibiting anyone from interfering, intimidating or threatening a crew member or interfering with his or her duties;

- granting to the pilot's sole judgment the right to divert a flight due to concerns of safety;

- granting to the pilot complete control over and responsibility for all passengers and crew, "without limitation;"

- granting to the pilot final authority as to all aspects of the operation of the aircraft; and

- requiring the pilot to ensure that there is no "activity during a critical phase of a flight which could distract any flight crew member from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties." n24

### A2 non congress actor – congress controls

#### Congress controls airfields

BARKOWSKI 10 J.D. Candidate, Pepperdine University, 2010; B.A. in Economics, University of California, Berkeley, 2007; Instrument-Rated Private Pilot Certificate [Justin T. Barkowski, Comment: Managing Air Traffic Congestion Through the Next Generation Air Transportation System: Satellite-Based Technology, Trajectories, and - Privatization?, Pepperdine Law Review, 37 Pepp. L. Rev. 247]

The fundamental goal of NextGen is to "establish an agile air traffic system that accommodates future requirements and readily responds to shifts in demand from all users." n8 As such, the system will be designed specifically to "respond to market elasticity, having the flexibility to deliver capacity and efficiency improvements, and ensuring that equipment and personnel are able to support a wide range and number of operations tailored to customer needs." n9 Undoubtedly the technology needed to incorporate such a system is currently available. n10 But NextGen leaves one significant issue unaddressed, namely, the lack of governmental accountability needed to keep pace with rapidly changing technology. n11 As one author noted, the [\*251] FAA "develops capacity in terms of a 10-year time frame," while the airlines and consumers generating the demand "are changing decisions every three months." n12 Forming an increasingly accountable FAA to engineer a successful transition to NextGen, however, would only address part of the air traffic congestion issue, leaving government-operated airports to continue mismanaging access to the national airspace system.

Given the relatively fixed amount of airport facilities available, n13 the fact that the demand from air carriers has continuously outpaced supply has resulted in significant flight delays that have rippled throughout the country. n14 Yet Congress continues to impose regulatory control over municipally-owned airports across the country, forcing them to provide non-discriminatory access to the airfield. n15 With the non-discriminatory access [\*252] requirement, airports are not allowed to use pricing as a method of allocating ground facilities, which, in turn, renders them unable to control access to the national airspace system. n16 Solely focusing on NextGen and expanding airspace capacity without corresponding corrections in these demand-management policies will only provide greater incentive for airlines to over-schedule in order to fill in the marginal increases in capacity. To avoid this escalation of congestion, the socially efficient solution is for local governments to transfer these "high-density airports" to the private sector on the condition that private owners focus on eliminating congestion. n17 The societal gains from eliminating congestion would outweigh any societal costs incurred from potential airport discrimination against airlines. n18 As a result, airport privatization may be the proper catalyst for exploiting the full potential of NextGen.

### A2 Privatize CP – they don’t want it

#### Industry and airports hate the counterplan – if they don’t want it then no one would run it

POOLE 10 Director of Transportation policy at Reason Foundation, MIT-trained engineer, has advised four presidential administrations on transportation policy issues. [Robert W. Poole Jr. & Chris Edwards, A Brief History of Federal Funding Privatizing Airports The Crisis in Air Traffic Control Commercializing Air Traffic Control, <http://www.downsizinggovernment.org/transportation/airports-atc>]

Why has the United States resisted these types of airport reforms occurring around the world?15 One reason is that U.S. state and local airports have for decades received federal aid for development and construction. Federal law generally provides that governments that have received federal aid for an infrastructure facility have to repay previous federal grants if the facility is privatized. Moreover, the FAA has interpreted a legal provision requiring that all "airport revenues" be used solely for airport purposes to apply to any lease or sale proceeds, which prevents a city from selling its airport and using the proceeds for its general fund.

Another important factor is that state and local governments can issue tax-exempt bonds to finance airports because they are government-owned facilities. Thus, borrowing can be done at a lower cost than borrowing by private airport owners issuing taxable debt. However, this bias against private ownership can be overcome. The federal government could pursue tax reforms to reduce or eliminate the tax exemption on municipal bond interest. Alternatively, the government could permit private airport operators to make use of tax-exempt revenue bonds ("private activity bonds"), as it has done for companies involved in the toll road business.

A final hurdle to airport privatization in the United States has often been the airlines. For various structural reasons, they worry that their costs may be higher or they may face more airline competition if airports were privatized. Typically, major airlines are like an anchor tenant in a shopping mall. At U.S. airports, major airlines generally have long-term lease-and-use agreements, which often give them control over terminals or concourses and the right to approve or veto capital spending plans. That gives them the power to oppose airport expansion if it would mean more airline competition in that location.

### A2 privatize CP – links to politics

#### Privatizing the aff links to politics

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

Privatization of ATC is a controversial topic. Proponents of privatization invoke free-market competitive efficiencies and optimal pricing that alleviates congestion and is self-suf- ficient in raising adequate operating revenues without need for bureaucratic delays and the appropriation process. Some have argued for privately funding NextGen by separating ATC from the FAA and funding its operations by charging private user fees to all aviation users.51 The idea is that the long-term trend of declining ticket prices due to increased market share for low-cost carriers means that the passenger ticket tax cannot be relied on as a source of funding for NextGen. Furthermore, political stagnancy is a hindrance to bringing about changes in a timely fashion. Finally, there are examples of successful privatized ATCs from countries such as Canada and the United Kingdom. Arguments against privatizing ATC make the general case that the private sec- tor might not cater to an outcome that is in the interest of society. A privatized ATC would still require some form of government oversight to ensure safety standards are met and pricing practices are fair.

Making a case for or against privatization is not the focus of this paper, as it deserves more thorough analysis. In any case, due to its controversial nature, privatization talks in Congress would likely cause more friction than fluency towards modernization efforts.

### A2 privatize CP – perm

#### The permutation to do both solves best – allows government control with privatized influx. Avoids the spending and politics net benefits

JDPO 04 Joint Planning and Development Office, <http://www.jpdo.gov/library/ngats_v1_1204r.pdf>

The role of Government must shift to allow industry to provide the most cost eﬀective solutions within a performance-based set of security, safety, and environmental rules. This understanding will be reﬂected in planning, decision-making, and implementing institutional reform that is mandatory for successful transformation. There is also a need to improve incentives to produce air traﬃc and airport services eﬃciently - to make sure that these services are put to their highest and best use. This roadmap in no way implies that government can solve all the problems facing aviation. The goal is not to create an industrial policy by which the government tries to pick winning technologies, but instead to provide a framework to utilize the creative forces of the market. Market forces should play a role wherever possible. Sparked by this leadership, these agencies, working closely with the private sector, have deﬁned eight strategies for transformation, each individually signiﬁcant yet interdependent on the other seven. The eight strategies are the ﬁrst steps toward a roadmap to provide a credible and stable path forward. As the term implies, this roadmap can guide our eﬀorts to arrive at our destination if the paths and connections are clearly identiﬁed. With this roadmap, both public and private sectors can develop long-term investment plans and activities that result in the Next Generation Air Transportation System.

### 15b over a decade

#### Plan would cost around 15billion over a decade

Bin Salam 12 Fellow, Eno Center for Transportation [Sakib bin Salam, NextGen: Aligning Costs, Benefits and Political Leadership, April 2012, ENO Center for Transportation]

NextGen Costs

This section shifts the focus from benefits to costs of NextGen, which has two distinct aspects- infrastructure and equipage. The infrastructural costs of NextGen involve paying for ADS-B, improved decision-making capa- bilities during adverse weather, devising more direct routes, better data communications between cockpit and ATC, and replacing the En Route Host computer and backup system used at 20 FAA air Route Traffic Control Centers nationwide with En Route Automation Modernization (ERAM). In order for NextGen to be fully imple- mented, operators need to install NextGen equipment on their aircraft, which entails a separate equipage cost. Any on-board technological investment to be made by operators is referred to as equipage, which is different from ground infrastructure that is currently being paid for by the facilities and equipment account of the AATF. direct routes, critics contend that airports can still only allow a fixed number of planes to land per hour.

Infrastructure Costs

According to the FAA, the total infrastructure cost of Next- Gen through 2025 is approximately $15 billion-$20 billion. However, the FAA has not published its cost breakdowns for individual infrastructure projects. To the best of our knowledge, the only published source for the project costs is the recent GAO report that tracks the status of NextGen projects and associated costs. Based on that report, Table 7 shows 30 major NextGen programs with FAA approved budget and schedule,29 with an estimated total cost of about $14.243 billion.

### Plan popular

#### Plan is popular – heavily anticipated

BARKOWSKI 10 J.D. Candidate, Pepperdine University, 2010; B.A. in Economics, University of California, Berkeley, 2007; Instrument-Rated Private Pilot Certificate [Justin T. Barkowski, Comment: Managing Air Traffic Congestion Through the Next Generation Air Transportation System: Satellite-Based Technology, Trajectories, and - Privatization?, Pepperdine Law Review, 37 Pepp. L. Rev. 247]

In 2007, "congested skies brought a 10 percent spike in delays," and with projections of air travel demand more than doubling by 2025, the need for an air transportation infrastructure to efficiently accommodate demand has never been more important. n3 The current system is running primarily on air traffic control (ATC) n4 technology developed in the 1940s, resembling "something that was used to guide the Beatles during their first trip to America." n5 Over half of a century later, Congress has finally called for the creation of the Next Generation Air Transportation System (NextGen), n6 and nearly every political constituency is heavily anticipating the transformation, including President Barack Obama's Secretary of Transportation, Ray LaHood, who has called NextGen the Federal Aviation Administration's (FAA) next priority. n7