
GreenLandings™
Real Time, Aircraft Landing
Time Management
February 9, 2024

Rapid, Inexpensive Implementation

Our Points are Simple:

1. What we are currently doing to prevent airline delays, congestion and excess CO2 is not working.
2. The root cause of these problems are the easily solvable, highly random, “day of” point overloads of our airports and airspace.
3. Airlines and pilots must participate in the solution for an efficient outcome.
4. Our environment can no longer wait for airlines to stop wasting over 5% of their fuel and unnecessarily dumping the excess CO2 into our atmosphere.
5. GreenLandings™ is the only shovel ready, inexpensive, FAA, Embry-Riddle and GE Aviaiton validated solution that rapidly reduces delays, congestion and excess CO2.

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Not Working!

Airlines have consistently delivered 30% of their customers late for the last 40 years.

During this time:

- ATC has continuously promised delay/congestion relief
- ATC has literally spent $100s of Billions
- Airlines have spent $100s of Billions on new aircraft/avionics
- Yet, the ATC solution is always 10 years and $100 Billion into the future. This was true in 1980, 1990, 2000, 2010, and still true in 2022.

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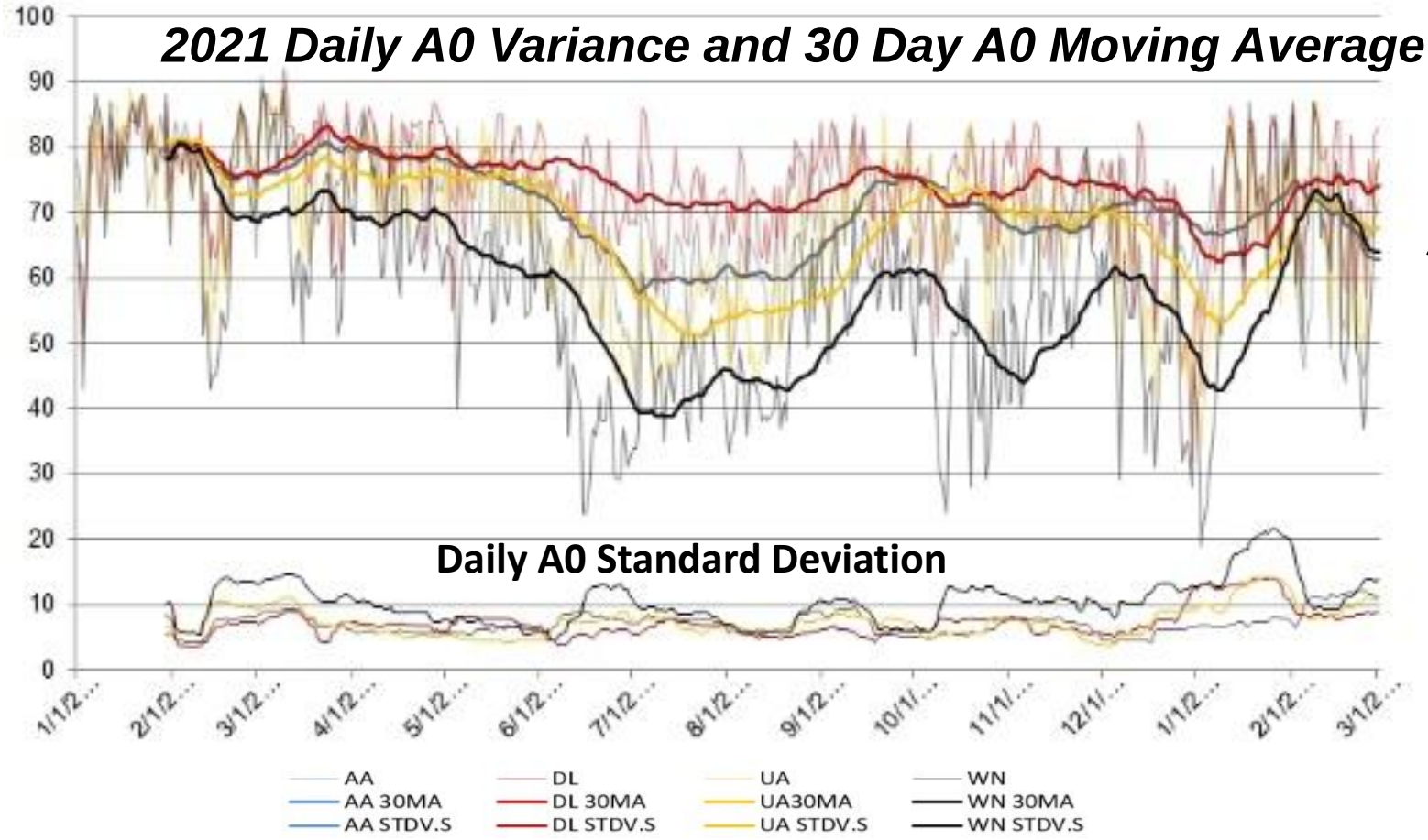
Airlines Desperately Need To Solve This



DOT 2021 A14 Ontime Statistics
(DOT Air Travel Consumer Report)

AA - 81.5%
DL - 89.0%
UA - 80.3%
WN - 76.3%

Customers Feel Variation, Not Averages

(***Making Six Sigma Last***, George Eckes, 2001)

Data/graph provided by AERA Air Ops View , RW Mann and Company and DOT Air Travel Consumer Reports

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Capacity and Schedule Are Not The Problem

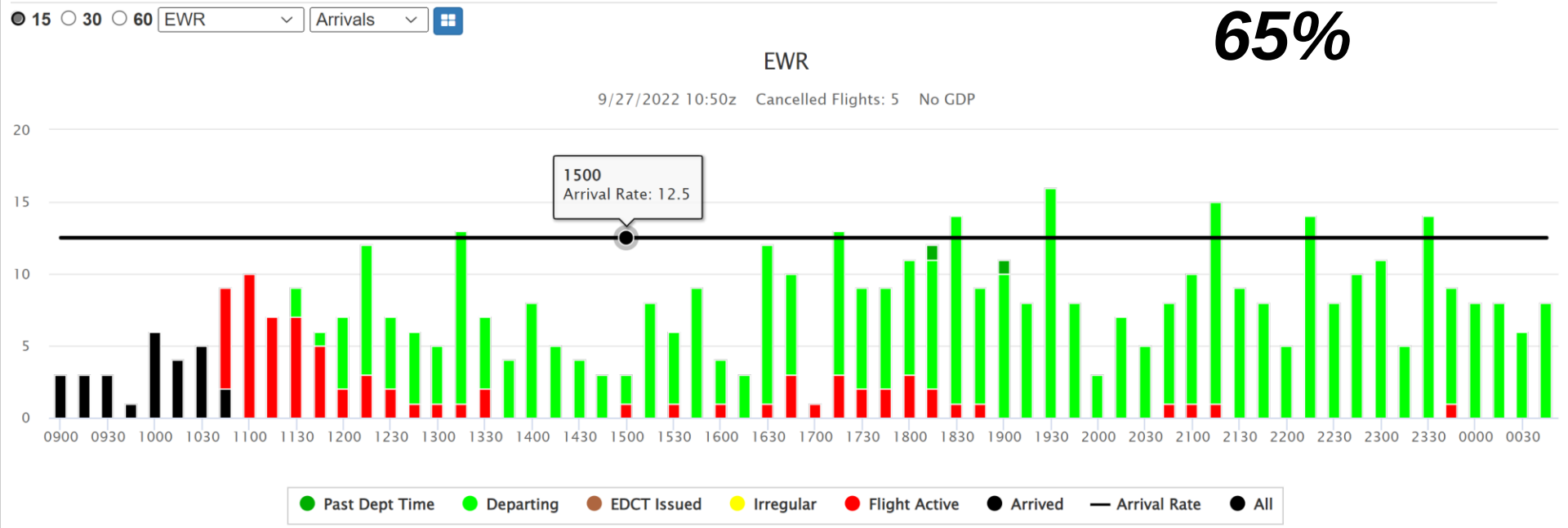
On Time, Uncongested Landing Capacity available forward in time

Airport Arrival Demand Chart

Add New Graph

Newark A0 for Sep 27th

65%



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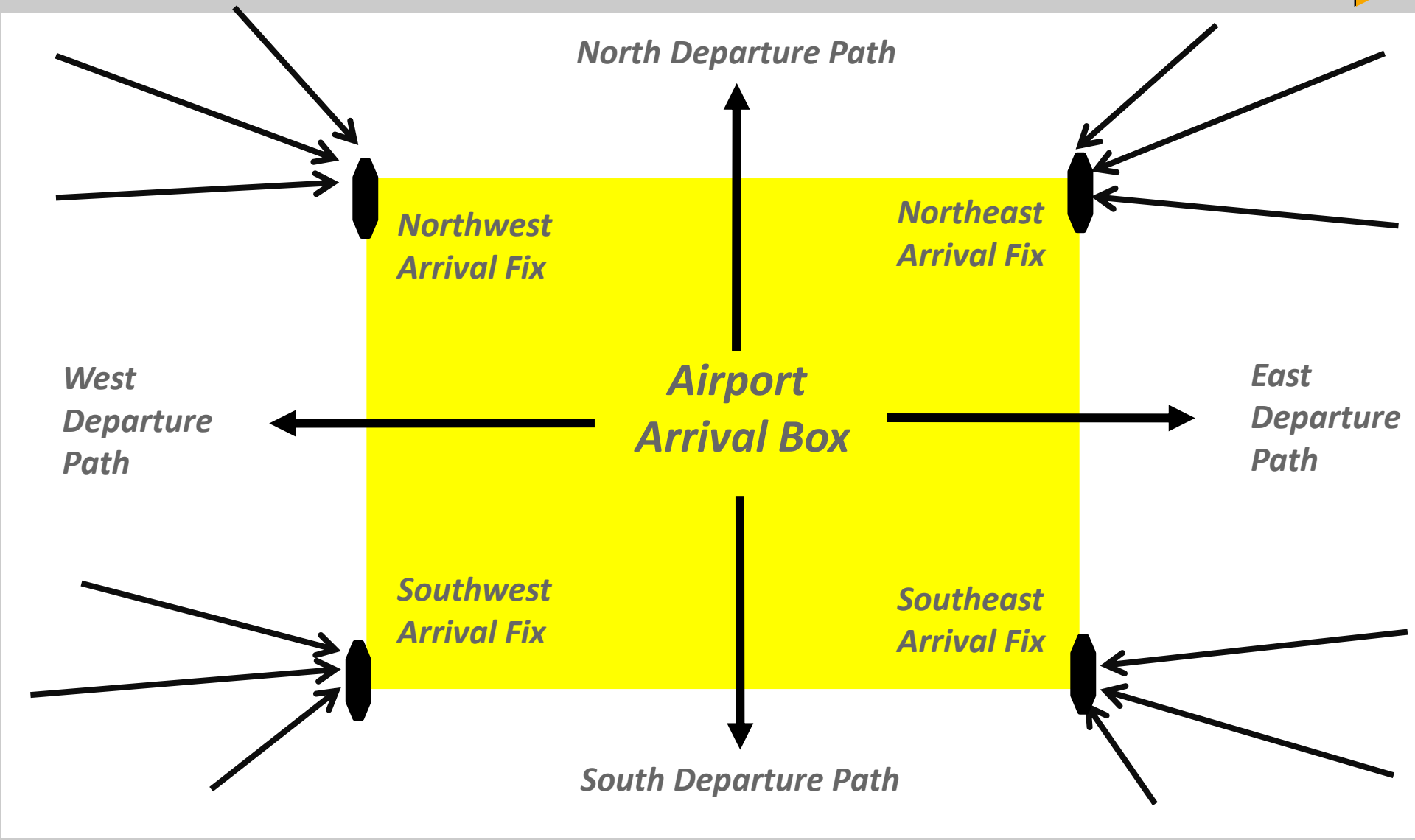
Cutting Delays/CO2/Noise - Don't Overload The Box



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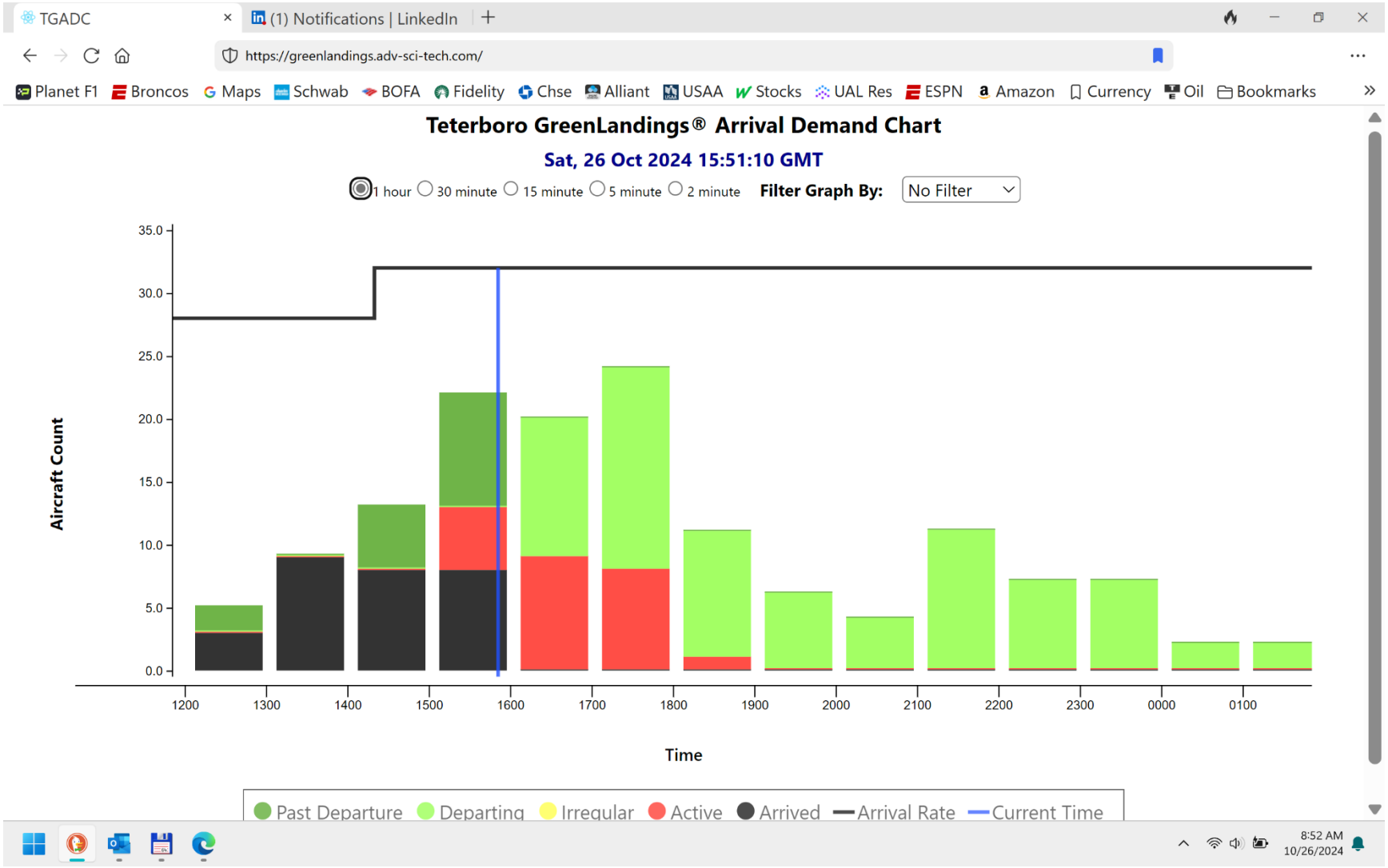
TEB Arrival Versus Demand



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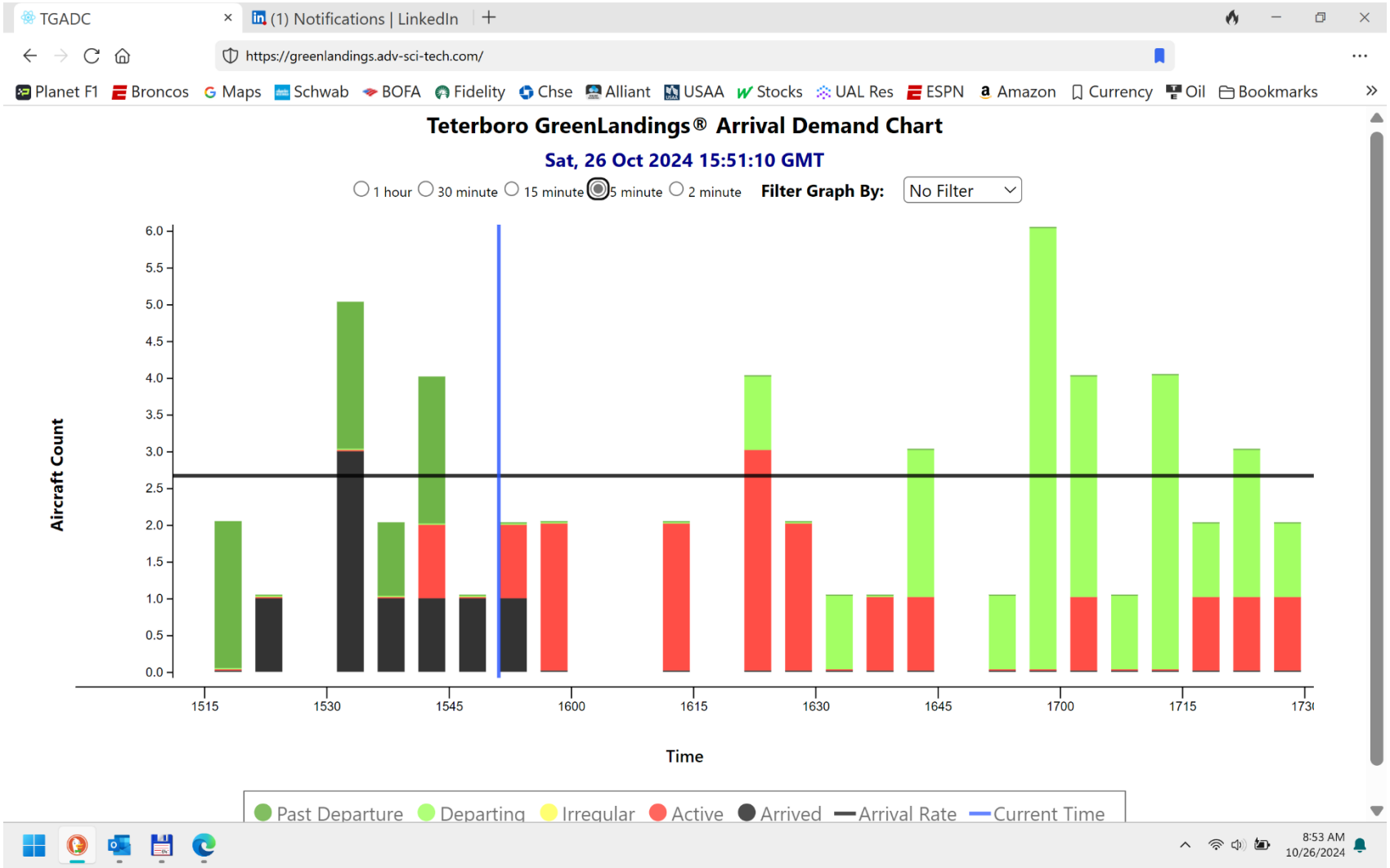
Short Bursts of Random Point Overloads



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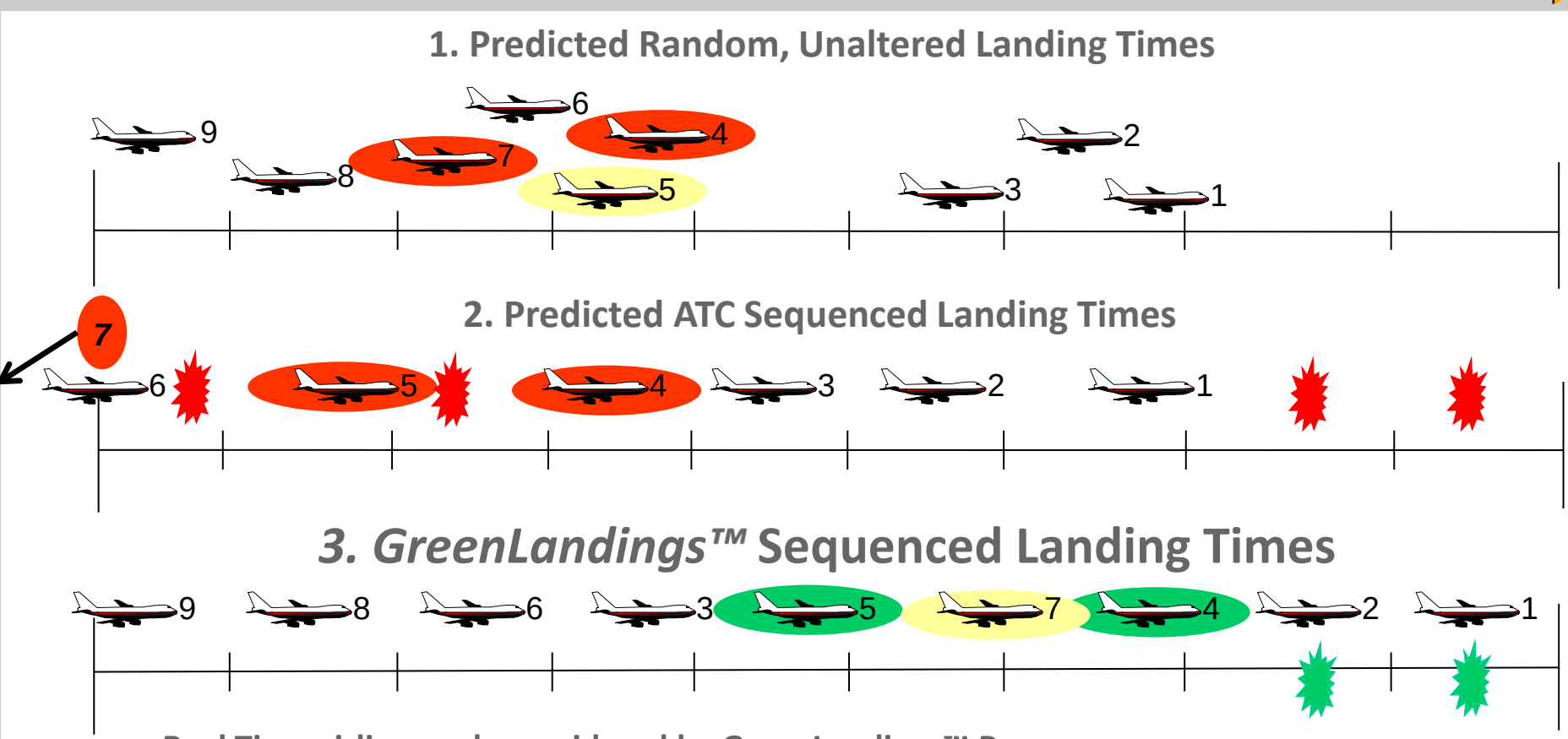
GreenLandings™ - Defect Prevention



- Real Time airline goals considered by GreenLandings™ Process
  - Aircraft #1 and #2 are early, but benefit entire queue by moving forward
  - Aircraft #4, #5 and #7 are late but managed to early
  - Aircraft #3 is slightly ahead of schedule and may be re-sequenced to remain OT
- Capacity Spoilage and Recovery

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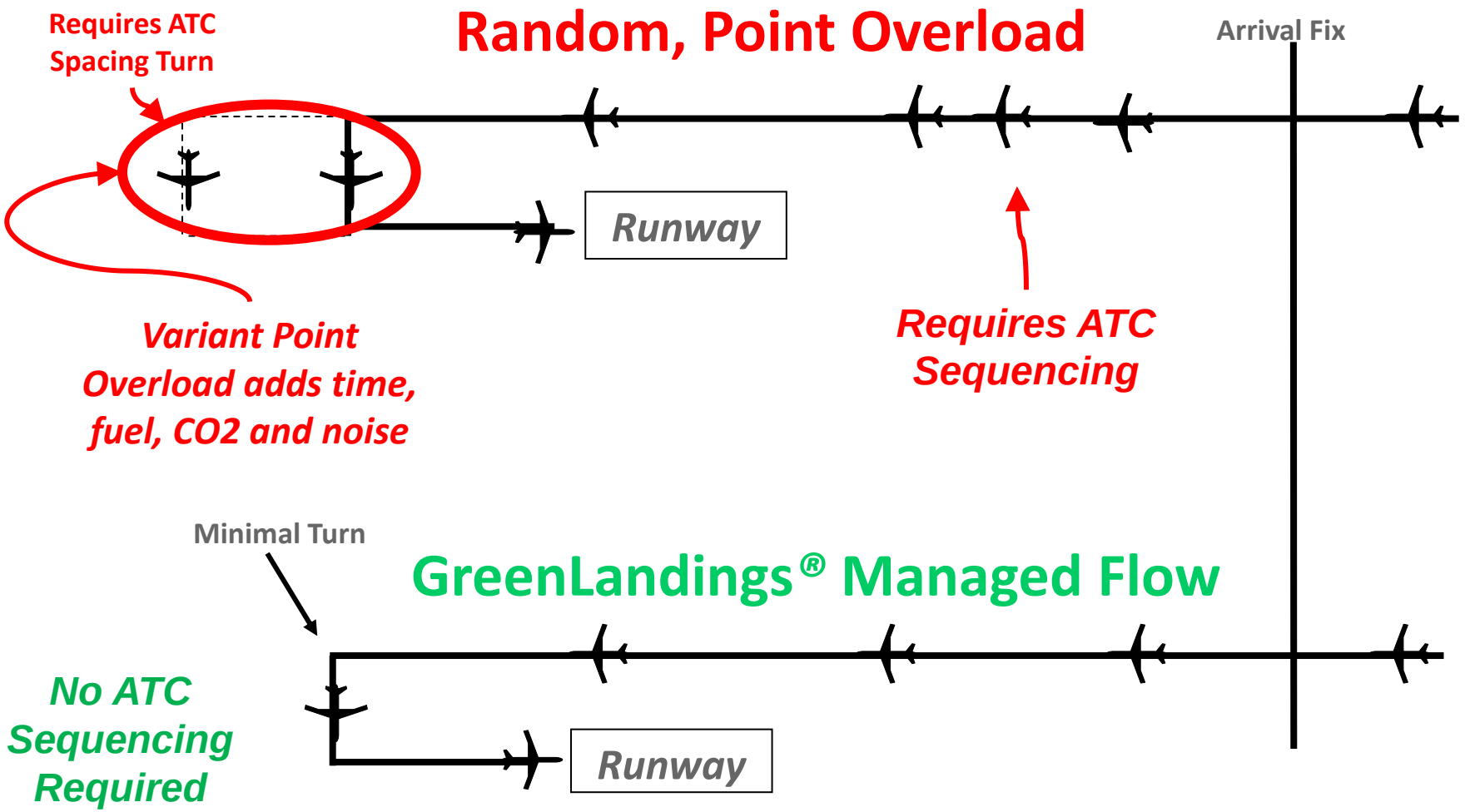
Variant Point Overloads Are Preventable



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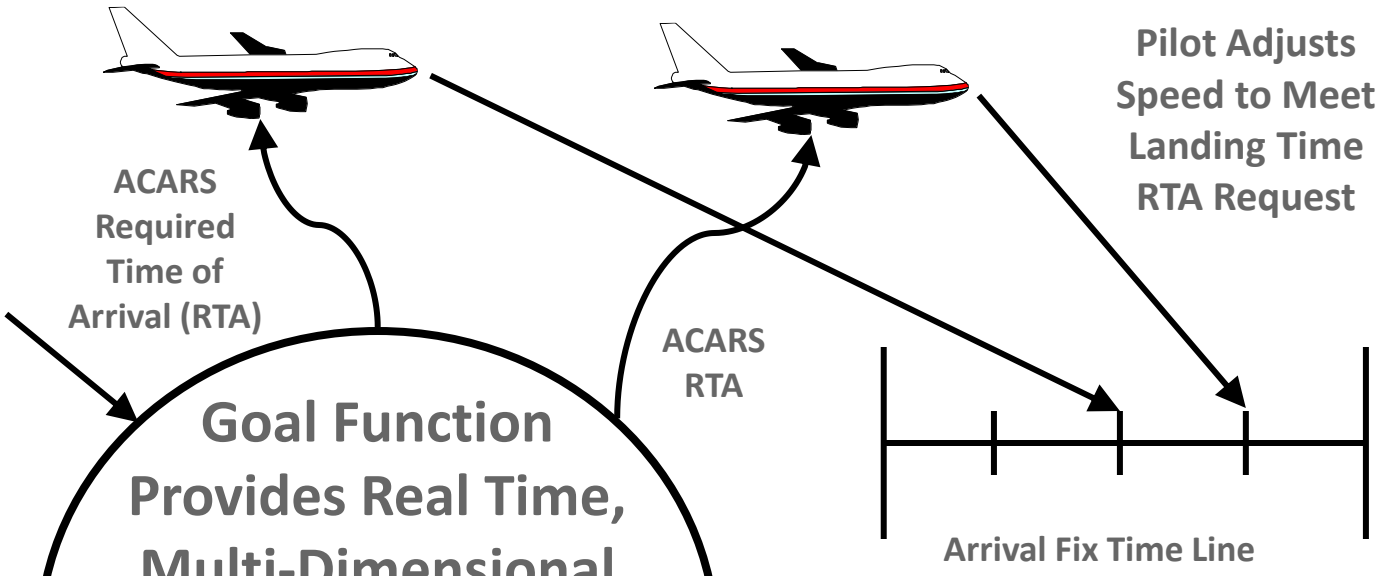
GreenLandings™ Operational Concept

Big Data *"Day of"* Predictions

Cornerpost, landing and gate ETA , enroute speed, altitude and path, weather, etc. (SWIM, Flt Plan, FMS, ADS-B/C, airport capacity, runway direction, etc.), ***starting hours prior to landing.***

Airline *"day of"* Business Goals

CO2 Reduction, schedule, connections, gate availability, maintenance, crew legalities, weather, etc.



Dispatchers/Pilots Already Take GreenLandings™ Like Landing Time Actions Every Day. GreenLandings™ Just Adds Real Time Sustainability and Business Focused System Based Coordination

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GreenLandings™ Potential

Single Airline Annual GreenLandings™ Benefit Analysis

Preventing CO2, Defects, Fuel Waste and Productivity Loss

Annual Crew Buffer Cost	$	304,166,667
Annual Defect Rework Cost	$	113,150,000
Annual Overnight Rework Cost	$	169,725,000
Annual Fuel Buffer Cost	$	937,145,672
Annual Aircraft Lost Productivity Cost	$	3,090,333,333
Annual Lower Ticket Revenue with Low A0 Quality	$	226,300,000
Total Single Airline Annual Buffer/Rework Cost	**$**	**4,840,820,672**
Annual Recoverable Crew Buffer Cost	$	91,250,000
Annual Recoverable Defect Rework Cost	$	28,287,500
Annual Recoverable Overnight Rework Cost	$	42,431,250
Annual Recoverable Fuel Buffer Cost	$	281,143,701
Annual Recoverable Aircraft Productivity Revenue	$	618,066,667
Annual Additional Ticket Revenue with A0 Quality	$	226,300,000
Total Annual Recoverable Buffer/Rework Cost	**$**	**1,287,479,118**
Total Annual Tons of Single Airline CO2 Generated		**32,686,567**
Total Annual Tons of Buffer/Excess CO2 Generated		**4,358,209**
Total Annual Tons of Buffer/Excess CO2 Easily Prevented		**1,307,463**
Total Annual Fuel (gallons)		**3,268,656,716**
Total Annual Buffer/Excess Fuel (gallons)		**435,820,896**
Total Annual Buffer/Excess Fuel Easily Saved (gallons)		**130,746,269**
Total Buffer/Excess Aircraft Required		**103**
Total Buffer/Excess Aircraft Easily Recovered		**21**
Total Number of Buffer Pilots Required		**1,333**
Total Number of Buffer Pilots Easily Recovered		**400**

800 LB Gorilla

Primary inputs:

- ***4,000 flights per day***
- ***20 buffer min per flight***
- ***Recovery of 6 min per flight***
- ***$2.15/gallon***

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Independent View of Schedule Padding

JFK/EWR to LAX

Padded Time Min

Year	Alaska	American	Delta	JetBlue	Spirit	United	Total
2017	5.4	12.2	5.5	6.6		5.5	7.2
2018	11.3	14.4	10.4	7.7		6.6	10.2
2019	7.6	9.9	9.0	8.2		5.6	8.1
2020	15.9	19.3	14.4	10.3		15.9	14.9
2021	17.5	18.0	13.4	17.3		11.4	15.2
2022	12.3	8.6	8.3	9.8	13.2	12.8	10.1
2023	9.3	11.8	6.8	9.9	6.8	11.3	9.7
Total	9.5	12.7	9.2	9.8	8.7	9.0	10.1

JFK/EWR to SFO

Padded Time Min

Year	Alaska	American	Delta	JetBlue	United	Total
2017	3.4	2.6	11.3	7.3	4.0	5.5
2018	8.0	6.6	13.7	6.0	5.6	7.8
2019	6.7	6.9	12.2	12.9	4.3	7.9
2020	19.2	17.5	22.2	16.1	15.8	17.7
2021	17.8	14.3	29.5	20.2	12.9	18.5
2022	11.5	7.1	25.2	16.5	14.0	14.7
2023	11.3	12.0	22.6	12.4	14.2	14.6
Total	9.2	8.3	18.0	12.6	8.7	11.1

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United Airlines 1995 Analysis

Sample Value of Productivity Gains

Domestic Aircraft Only (727, 737, 757, DC10-10)	411 aircraft
Average Daily Flight Hours (Block)	10.85 hours/day
Average Number of Flights	4.92 flts/day
Average Hours per Flight (Block)	2.21 hrs/flt
Average Time Savings (all sources)	18.08 mins/flt

18.08 mins/flt x 4.92 flts/day x 1 hour/60 mins = 1.48 hrs/day/airplane

1.48hrs/day x 1flt/1.91hrs x 411 airplanes = 319 flights per day

100 pax/flight x $160/pax = $16,000 per flight (does not include cargo)

$16,000 revenue/flt - $5,000 direct cost/flt = $11,000 contribution per flight

$11,000 contribution/flight x 319 flts/day x 365 days/year =

$ 1.3 Billion per year additional contribution

Source: United Airlines

Note: Unaudited Data, for illustration purposes only

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GE Aviation Independent Analysis

GreenLandings™ Actual Dubai Results

KEY METRIC	RESULT
A0 Improvement (Passive to Active)	14.82 %
A14 Improvement (Passive to Active)	12.04 %
Dwell Time Reduction	2.98 Minutes
Fuel Reduction	25,055 Kg / Day

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GreenLandings™ Actual Atlanta Results

August 2006 through October 2013

GreenLandings™ Delivers the Green for Delta

Over $74,069,046 Saved in Fuel Alone

- **Fuel Saved in Gallons……30,091,899**
- **CO2 Reduction in Pounds……634,788,613**
- **Flight Time Saved in Minutes……1,662,726**
- **Days of Operation……2,432**
- **Slots Recovered…… 34,375**

FAA Task J Actual Validated Benefits

Table 2. Monetized Benefits Summary (for first year of operation)

	US Airways-CLT		*Delta Air Lines-MSP*	
	Active Phase 1	*Active Phase 2*	*All Observations*	*Representative Days*
Total System Costs	$1,587,458	$4,337,458	$1,553,530	$1,553,530
System Monetized Benefits	$1,232,774	$5,649,473	$12,328,152	$5,242,340
System Benefit/Cost Ratio	0.78	1.30	7.94	3.37
Total Participant Costs	$1,587,458	$1,587,458*	$1,553,530	$1,553,530
Participant Monetized Benefits	$1,130,337	$3,127,668	$3,330,214	$1,373,975
Participant Benefit Cost Ratio	0.71	1.97	2.16	0.88

(*)One Airline Attila™ system

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GreenLandings™ Benefits

- Improved profits
- Increased on time arrival
- Reduced fuel burn, CO2 and NOX
- Increased crew and system productivity
- Reduced ramp congestion
- Better gate utilization
- Improved product quality
- Increased NPS and less passenger stress
- Reduced ATC complexity and costs

Each benefit pays for the program many times over. All benefits together make this a huge win for your passengers and shareholders.

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Sustainability, Quality and Profits

- GreenLandings™ is critical path to Operational Excellence and rapidly benefits the airline, pax, environment, ATC
- GreenLandings™ focuses on ***defect prevention*** versus defect correction
- GreenLandings™ independently validated by FAA, Embry-Riddle, GE Aviation, Georgia Tech and others
- GreenLandings™ implementation at first airport in 9 months and system wide at all an airline's airports within 3 years
- GreenLandings™ require no new avionics, no new airborne/ground equipment and no new ATC procedures
- ***Immediate Benefits - cash-on-cash ROI achieved in months***

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Additional Information

GreenLandings™ Articles and Videos

- Can Airlines Internally Rapidly Reduce CO2 and Delays? (Leeham News and Analysis, 2023-07-31)
- ATC is Not the Problem (Managing the Skies, Spring 2022)
- Aviation Needs a New Direction - Driven by Vision and Leadership (Managing the Skies, Nov/Dec 2019)
- GreenLandings™ Heathrow Interview (video - 46:46, 2020-12-30)
- GreenLandings™ Independently Validated Benefit Summary 2022-05
- Air Traffic Control Is Not The Real Cause Of Airline Delays (Forbes.com, 2017-03-23)
- Institutionalizing Airline Operational Dismality, (Managing the Skies, Fall 2021)
- Fastest Airlines in the U.S. (Forbes.com, 2019-06-17)

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