



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.

Not Working!

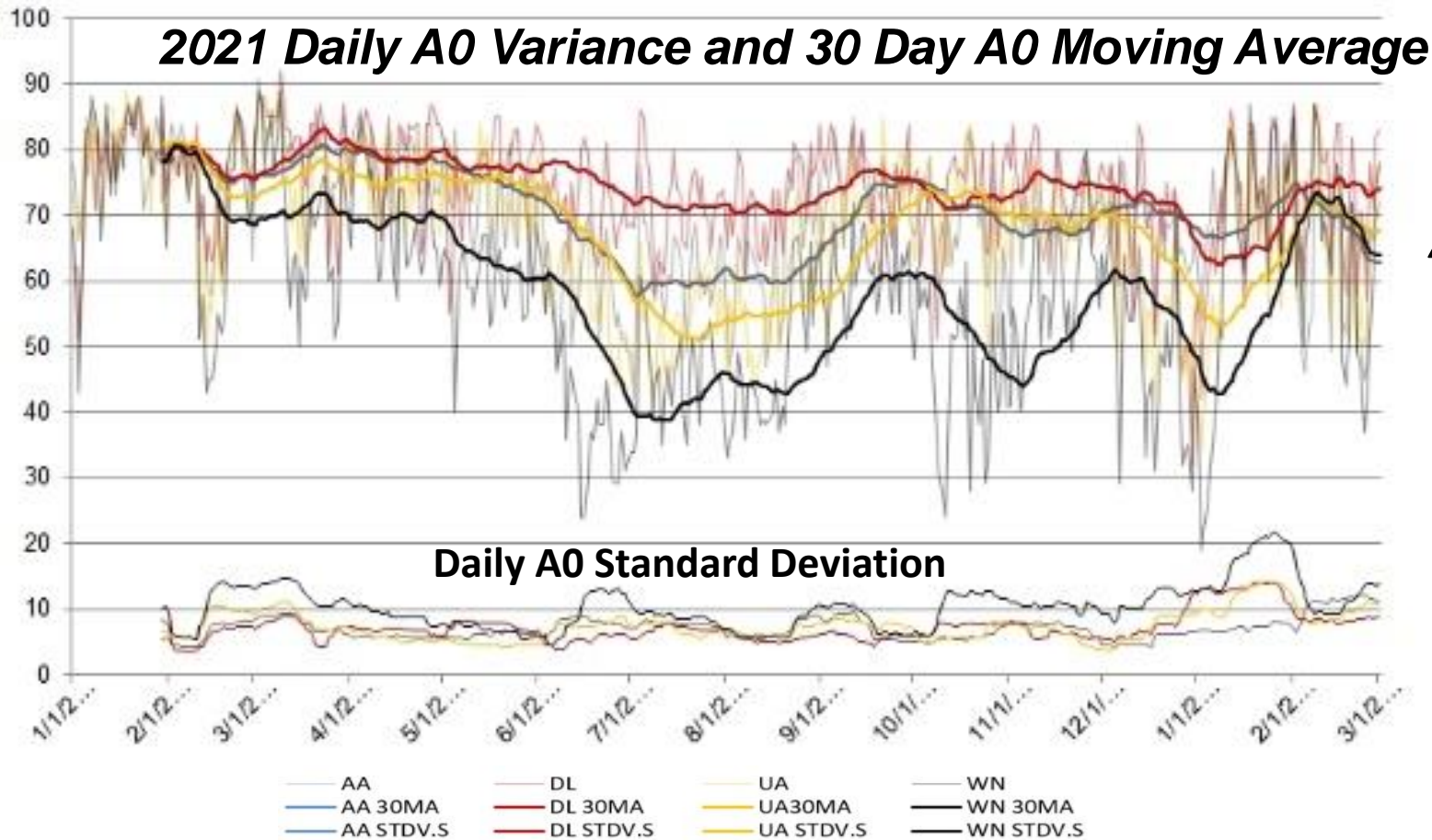


Airlines have consistently delivered 30% of their customers late for the last 40 years.

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.

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](#)

Capacity and Schedule Are Not The Problem

On Time, Uncongested Landing Capacity available forward in time

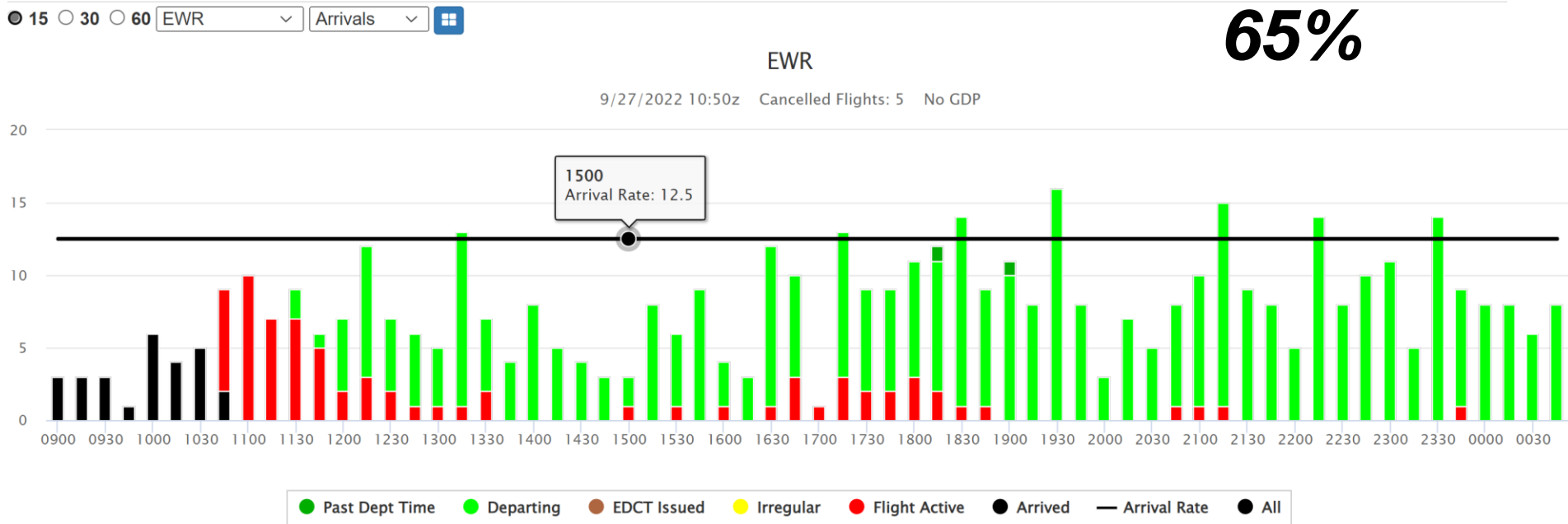


Airport Arrival Demand Chart

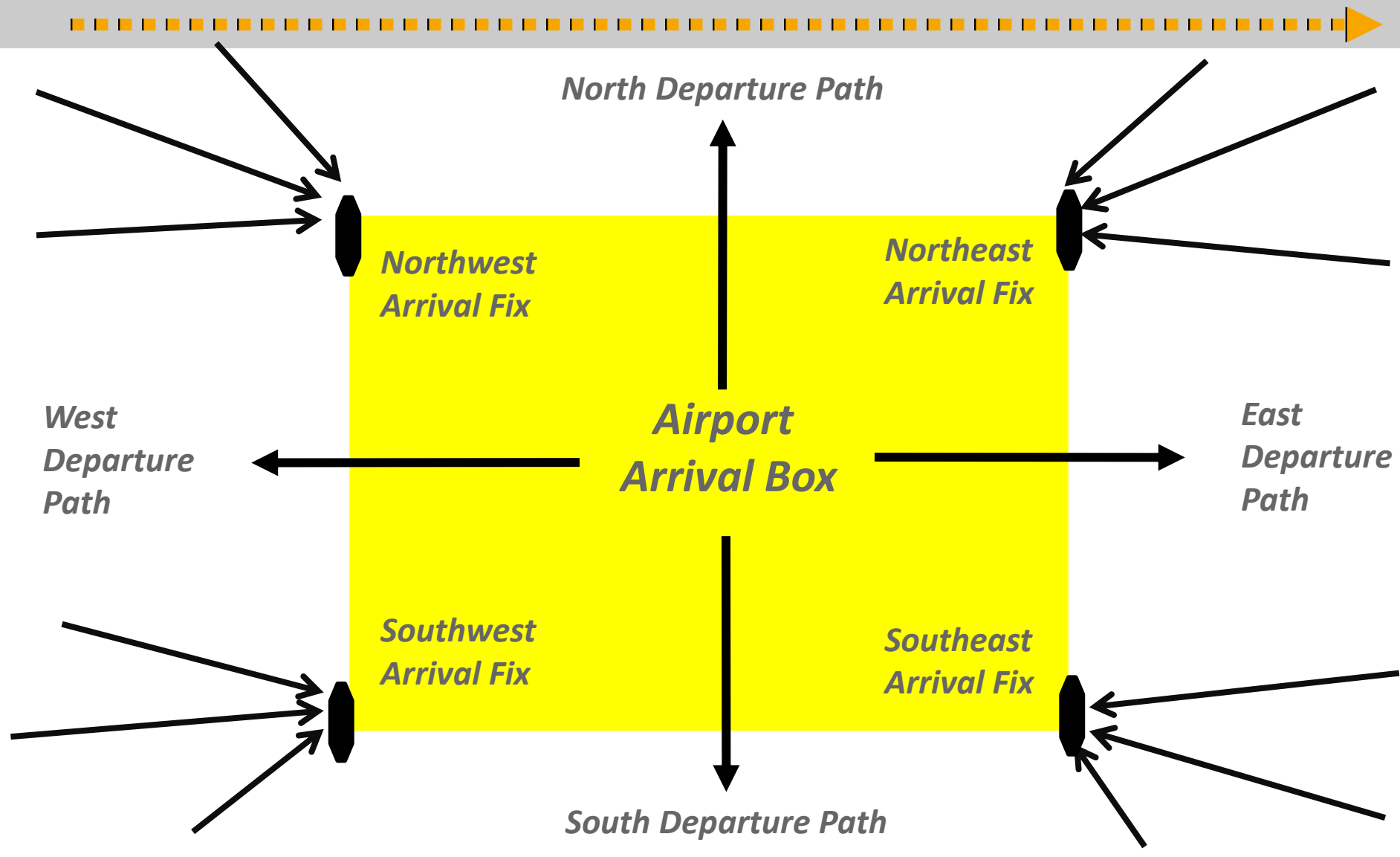
Add New Graph

Newark A0 for Sep 27th

65%



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



TEB Arrival Versus Demand

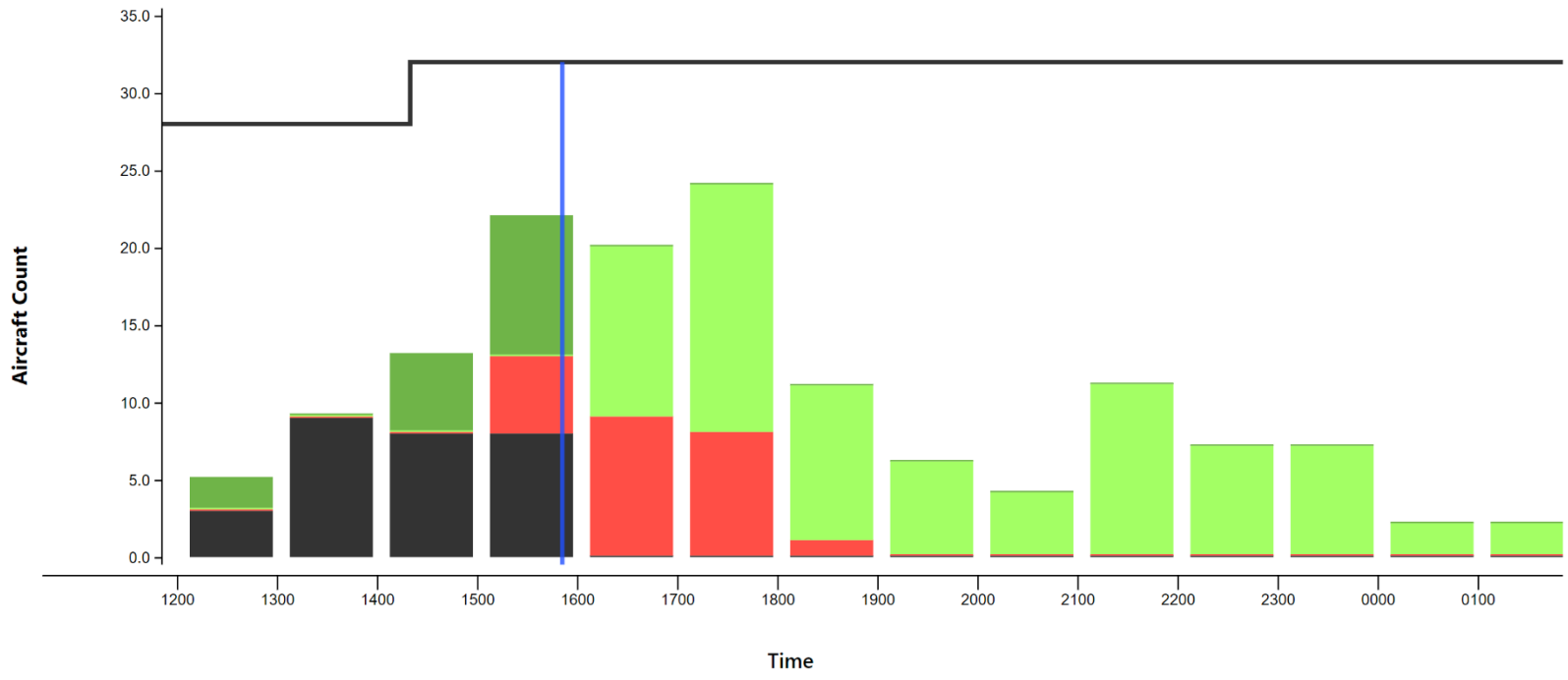


Browser interface showing tabs for TGADC and LinkedIn, address bar with URL <https://greenlandings.adv-sci-tech.com/>, and a bookmarks bar with various icons like Planet F1, Broncos, Maps, Schwab, BOFA, Fidelity, Chse, Alliant, USAA, Stocks, UAL Res, ESPN, Amazon, Currency, Oil, and Bookmarks.

Teterboro GreenLandings® Arrival Demand Chart

Sat, 26 Oct 2024 15:51:10 GMT

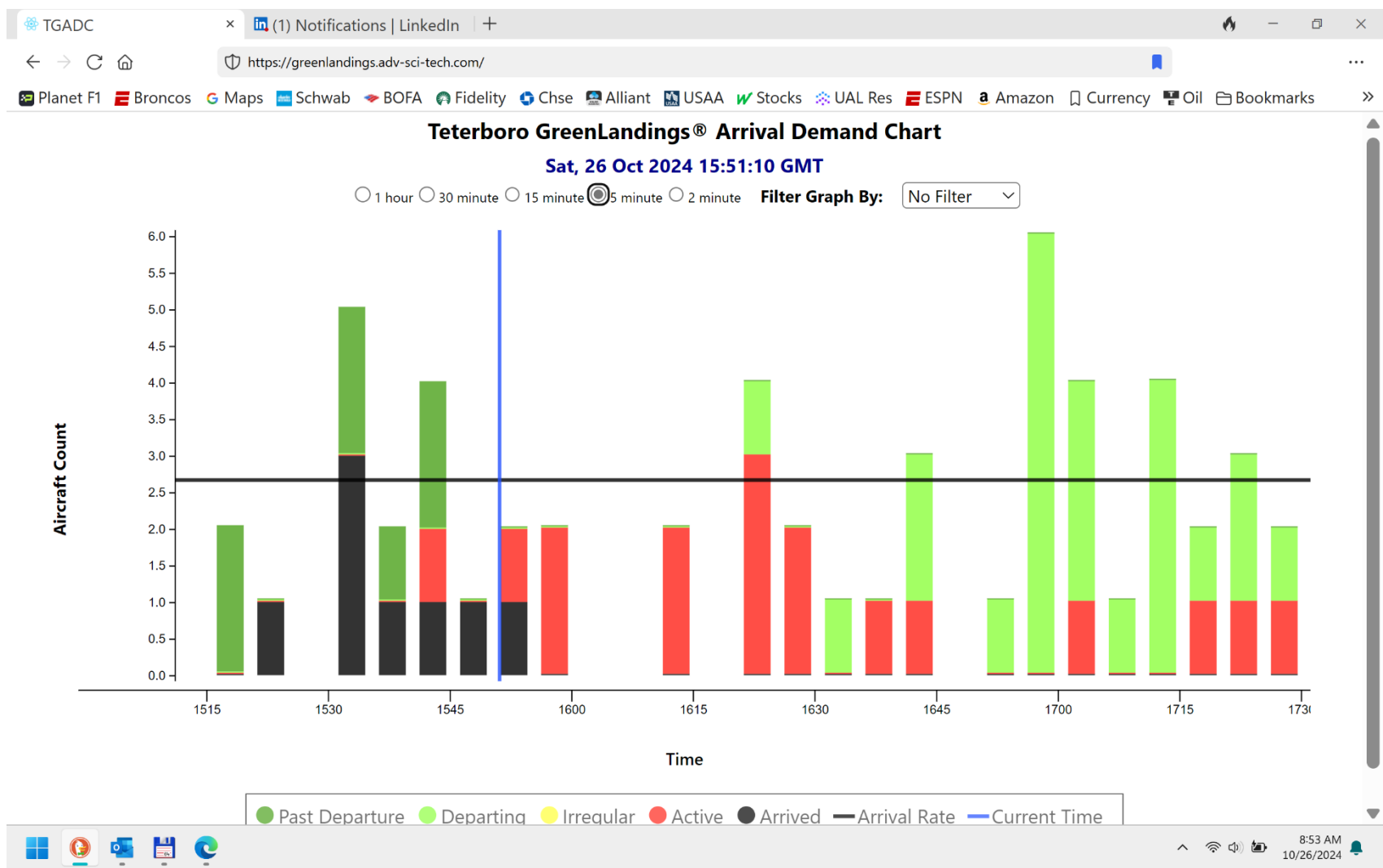
1 hour 30 minute 15 minute 5 minute 2 minute Filter Graph By:



● Past Departure ● Departing ● Irregular ● Active ● Arrived — Arrival Rate — Current Time

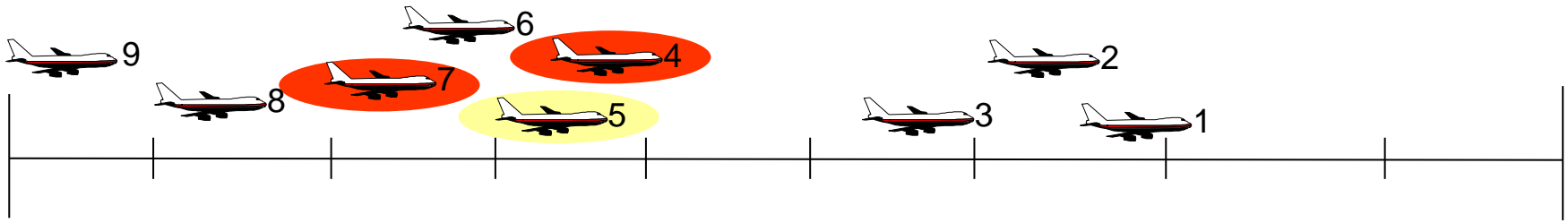
Windows taskbar showing icons for Start, File Explorer, Edge, and other applications. System tray on the right shows network, volume, and battery icons, along with the date and time: 8:52 AM, 10/26/2024.

Short Bursts of Random Point Overloads

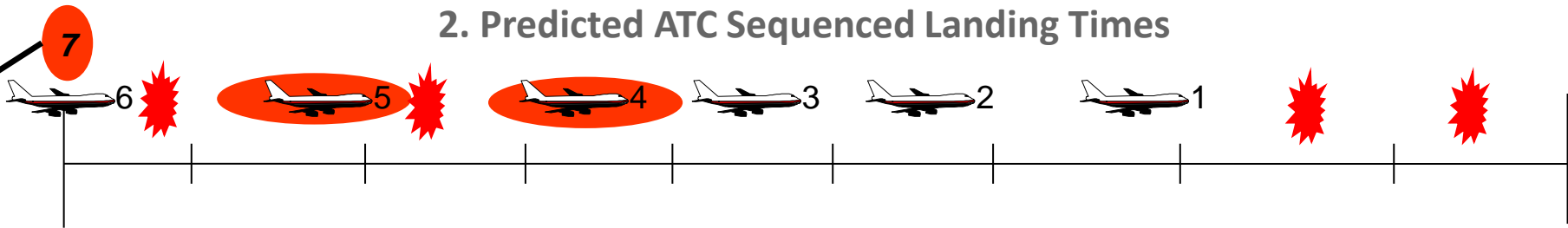


GreenLandings™ - Defect Prevention

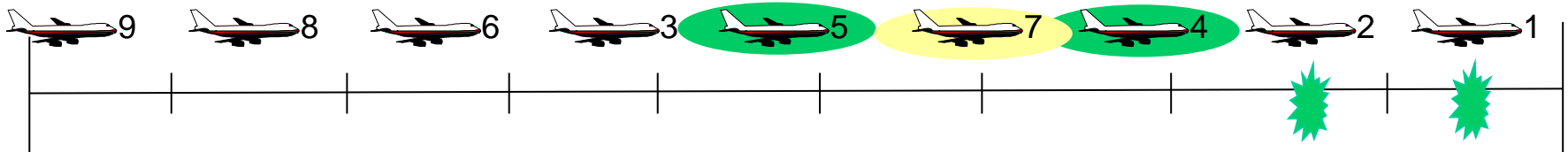
1. Predicted Random, Unaltered Landing Times





2. Predicted ATC Sequenced Landing Times



3. GreenLandings™ Sequenced Landing Times



- 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 

GreenLandings™ Operational Concept

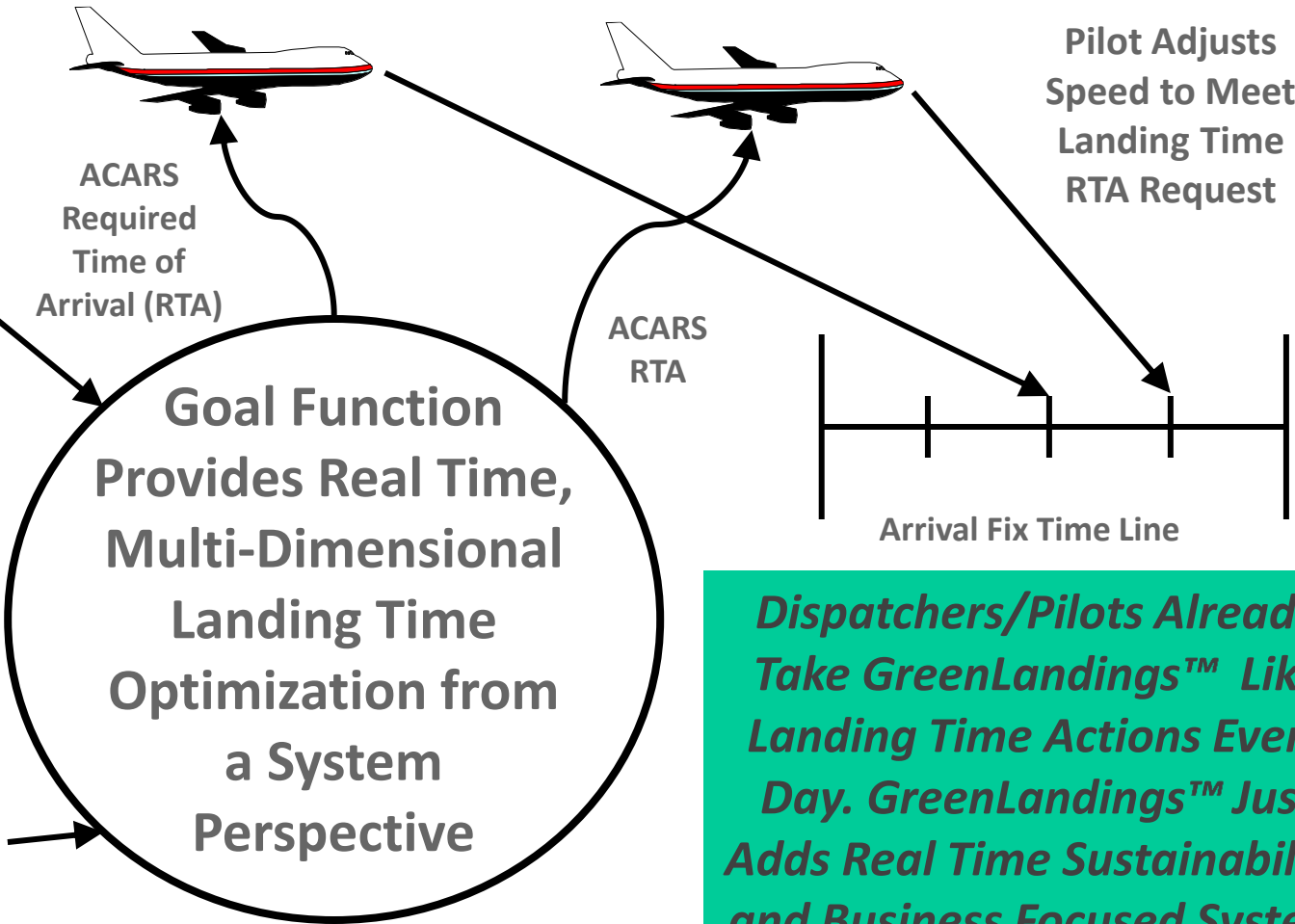


Big Data “Day of” Predictions

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

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

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

airinsight.com

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/fit
Average Time Savings (all sources)	18.08 mins/fit

$18.08 \text{ mins/fit} \times 4.92 \text{ flts/day} \times 1 \text{ hour}/60 \text{ mins} = 1.48 \text{ hrs/day/airplane}$

$1.48 \text{ hrs/day} \times 1 \text{ fit}/1.91 \text{ hrs} \times 411 \text{ airplanes} = 319 \text{ flights per day}$

$100 \text{ pax/flight} \times \$160/\text{pax} = \$16,000 \text{ per flight (does not include cargo)}$

$\$16,000 \text{ revenue/fit} - \$5,000 \text{ direct cost/fit} = \$11,000 \text{ contribution per flight}$

$\$11,000 \text{ contribution/flight} \times 319 \text{ flts/day} \times 365 \text{ days/year} =$

\$ 1.3 Billion per year additional contribution

Source: United Airlines

**Note: Unaudited Data, for
Illustration purposes only**

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

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)

	<i>US Airways-CLT</i>		<i>Delta Air Lines-MSP</i>	
	<i>Active Phase 1</i>	<i>Active Phase 2</i>	<i>All Observations</i>	<i>Representative Days</i>
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

Wide Ranging Benefits



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.

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***

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)