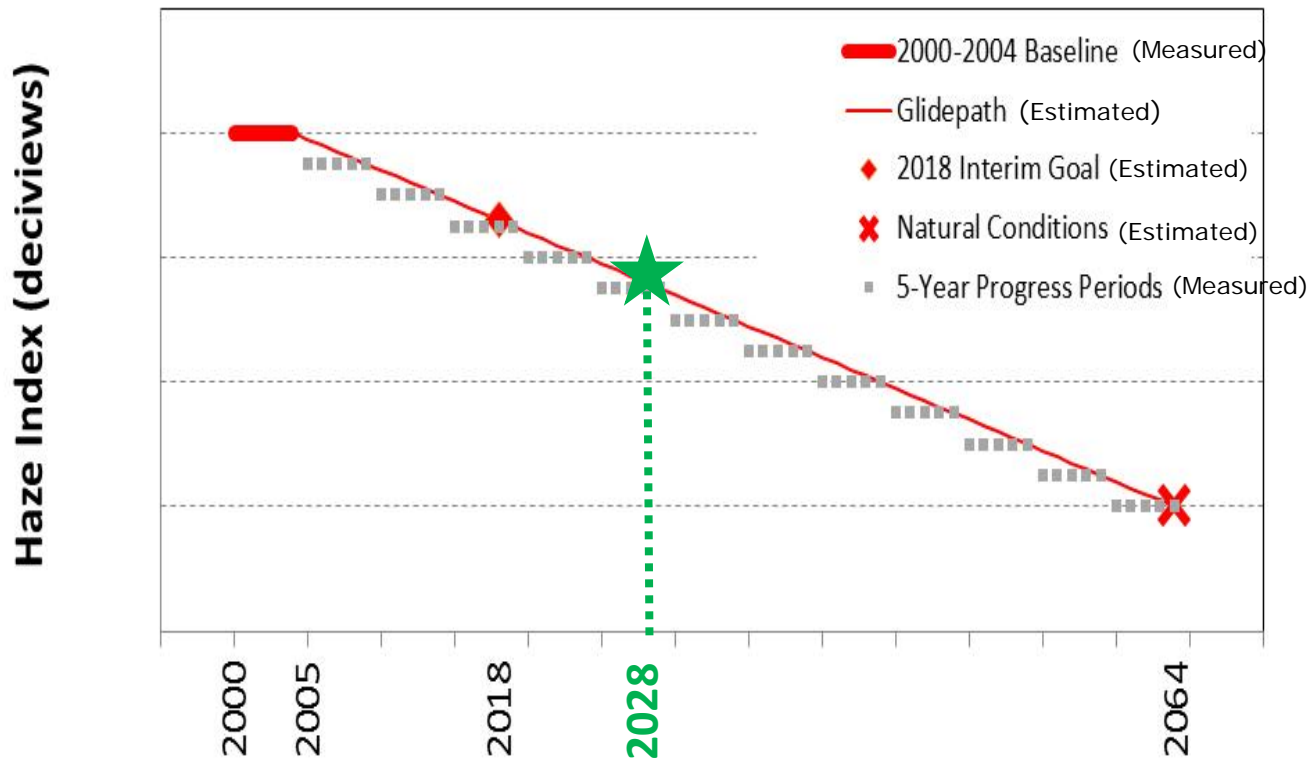


MODELING REASONABLE PROGRESS GOALS

Idealized RHR Glidepath



WESTAR-WRAP
Regional Haze
Planning
Workshop

December 7, 2017
Denver, Colorado

RH SIP TASK: SET REASONABLE PROGRESS GOALS

Purpose: to show improvements in visibility over time

Steps in the Process:

- Quantify “controllable” anthropogenic emissions
- Determine “reasonable” control measures
- Quantify reductions achievable before 2028
- *Model future conditions*
- Predict deciview levels on 20% most impaired days
- Justify anticipated progress in respective planning period

Overall Goal:

Reduce anthropogenic impairment of visibility at Class I Areas

QUANTIFY EMISSIONS INPUTS

Understand annual in-state contributions at CIA Monitor

- Inventory exercise
- By stationary, mobile, area, natural
- By NO_x, SO_x, NH₃, PM, VOC (haze precursors)

Communicate with Regional Modeler

Learn probable Out-of-State contributions at In-State CIA

- Modeled Output Exercise
- Use Baseline Source Attribution from WRAP-TSS
- Separates International from in-Country
- Separates Natural and Anthropogenic
- Separates by Precursor Species
- Separates by Source Type

DETERMINE REASONABLE CONTROLS

Quantify reductions achievable 2028

- Four-Factor Analysis
- Consider sources emitting precursors to key haze species drivers
- Consider sources near monitors (in- and out-of-state)
- Consider large individual sources and source categories with feasible controls

Start with on-the-books with planned reductions, given growth

- Modeler does base case run

Add additional achievable reductions

- Consult with up-wind states on their expected reductions
- Modeler does additional runs to check for additional visibility improvements

JUSTIFY REASONABLE PROGRESS GOAL

Is the **Glide Path Correct?**

- Reconstruct baseline (2000-2004)
- Remove Extreme Episodic Events
- Quantify International Emissions
- Add Prescribed Burning Allowance

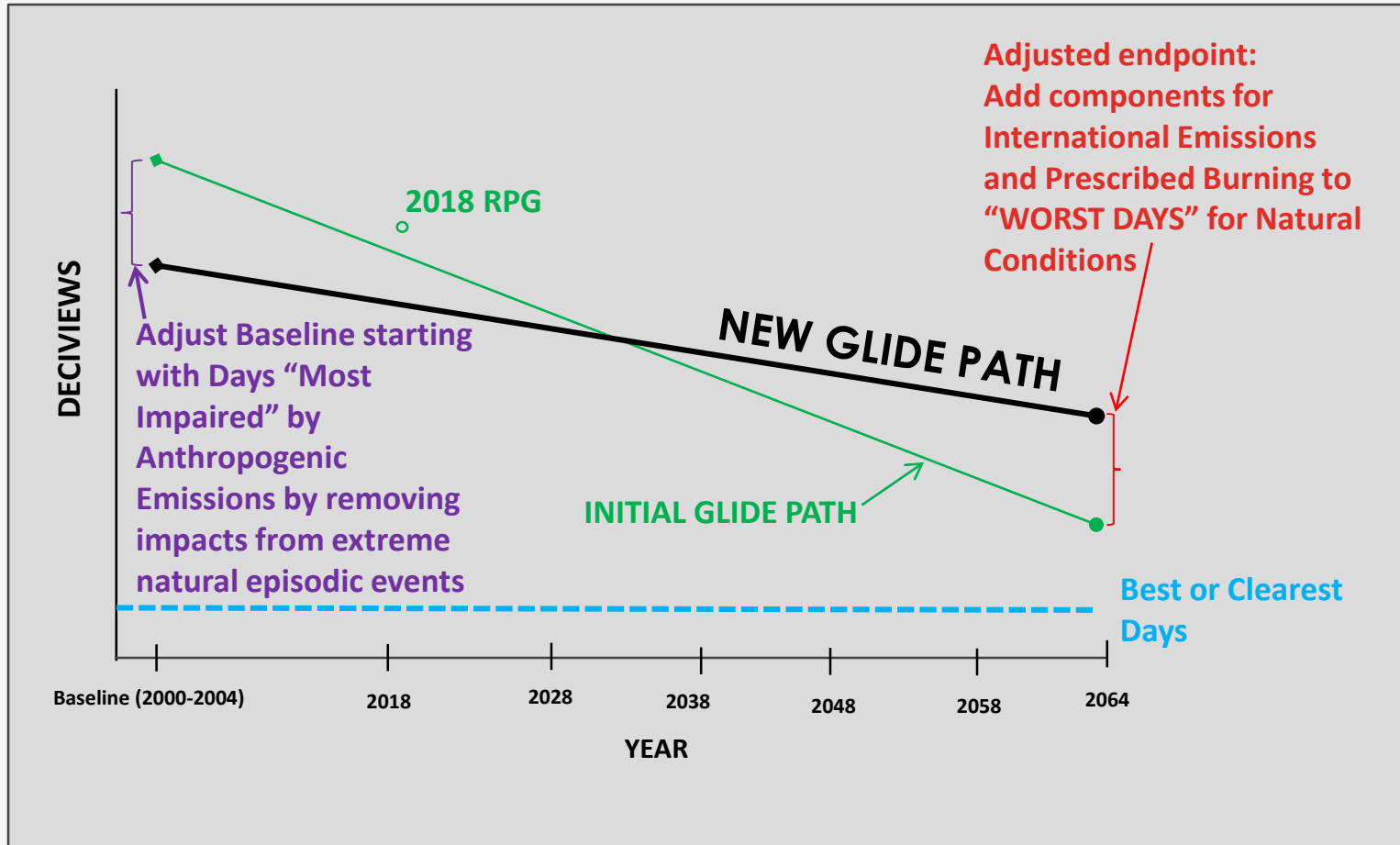
Is the **2064 Default Deciview Level Appropriate?**

- Check regional assumptions for Worst Days Natural Conditions appropriate for the monitor location
- Correct errors in assumptions about Worst Days Natural Conditions
- Add International Emissions and Prescribed Burning Allowance to Recalculated Worst Days Natural Conditions

Provide Documentation for adjusting Glide Path

Justify RPG in relation to Adjusted Glide Path

SCHEMATIC FOR DISCUSSION



KNOWNNS, UNCERTAINTIES, AND MARGIN OF ERROR

Know that the tools we use have precision limitations

- Emissions Categories
- Forecasting Protocols
- Modeling Method Assumptions
- Back Trajectory Modeling
- Source Apportionment
- Photochemical Modeling
- Grid Size affects modeling results

**Both Natural and Anthropogenic Sources have
fluctuations and episodes**

Utilize that knowledge when justifying RPGs

WHAT DOES REASONABLE PROGRESS GOAL REALLY MEAN?

Theoretically, RPG in deciviews is a MODELED forecast, estimate, or prediction

- Want decrease in haze species impacts at CIA monitor since prior benchmark
- Need representation that in-state anthropogenic emissions are decreasing
- Links key precursor emissions reductions to decreases in haze species

Might indicate that Upwind Anthropogenic Sources from Out-of-State are not significantly impeding visibility improvements

- Includes changes in international contributions
- Benefits from out-of-state, in-country, controls might be detectable

Indicator that Natural Emissions Impacts are not fluctuating much (or that they are!)

Several other retrospective ways to show VISIBILITY IS IMPROVING at CIA monitor

- Percentage Emissions reductions from Key Precursor Species
- Deciview Level decrease on Most Anthropogenically Impaired Days
- Visual Range improves (on Average or in middle percentiles)
- Best Days Average Deciview (Visual Range) is not deteriorating

MESSAGE TO PUBLIC AND REGULATED COMMUNITY

Fixed Benchmarks on Glide Path CANNOT be RPGs because 2064 is an estimate

- Future is Unknown
- Natural Conditions Change; so does Rate of Progress
- All Anthropogenic Impacts may not be removable by 2064, or ever

The Rate of Progress in Deciviews is NOT a Uniform Rate over time

- Five Year average does not smooth out *large* unanticipated variations
- Reductions in Anthropogenic Emissions are not steady but stepwise and uneven due to technology advances, regulatory processes, global economic shifts
- Integrated Impact of Natural Events (drought, climate change)

Measure and Demonstrate Visibility Improvements by Alternative Means

- Visual Range Improving; Remote Western locations already >100 miles
- Percentage increase in visual range most improved in areas closest to populated areas (throughout country)
- Percentage emissions reductions in key haze precursors – better measure of meeting legislative intent than deciview change

REALITY CHECK

These are just some pictures that make me think about purpose....



Urban-Wildland Interface Policies



Natural catastrophes



Geopolitical Changes; Economic Shifts



Future - Unknown ...
Plan as best you can!