



COLORADO
OIL & GAS
ASSOCIATION



American
Petroleum
Institute

COLORADO OIL & GAS ASSOCIATION

AND

API COLORADO

OZONE INTERIM COMMITTEE PRESENTATION

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OVERVIEW

Colorado's Oil and Gas Industry

Ozone and Industry's Commitment to Reducing Emissions

Overview of ECMC's Permitting Process

Overview of CDPHE APCD's Permitting Process

Modeling Versus Monitoring

Electrification

Conclusions





COLORADO'S OIL & GAS INDUSTRY



COLORADO'S OIL AND GAS INDUSTRY

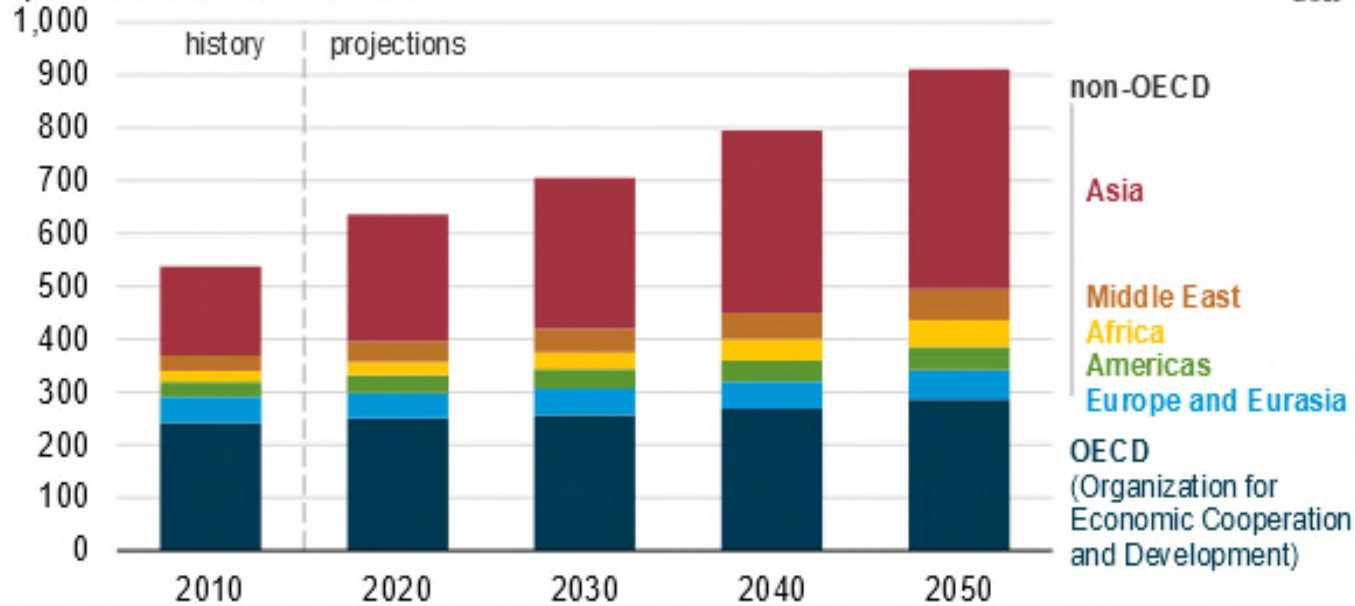
- 5th largest oil producer in U.S., 8th largest natural gas producer
- Cleaner energy molecules
 - Gold Standard Environmental Rules
 - Methane, ethane and VOCs have all decreased over past decade
- High-tech industry, innovative, pioneering technology
- Responsible, safe
- More than 100,000 direct and indirect jobs
- Taxes fund state government, schools, community projects



THE WORLD NEEDS ENERGY

EIA projects nearly 50% increase in world energy usage by 2050, led by growth in Asia

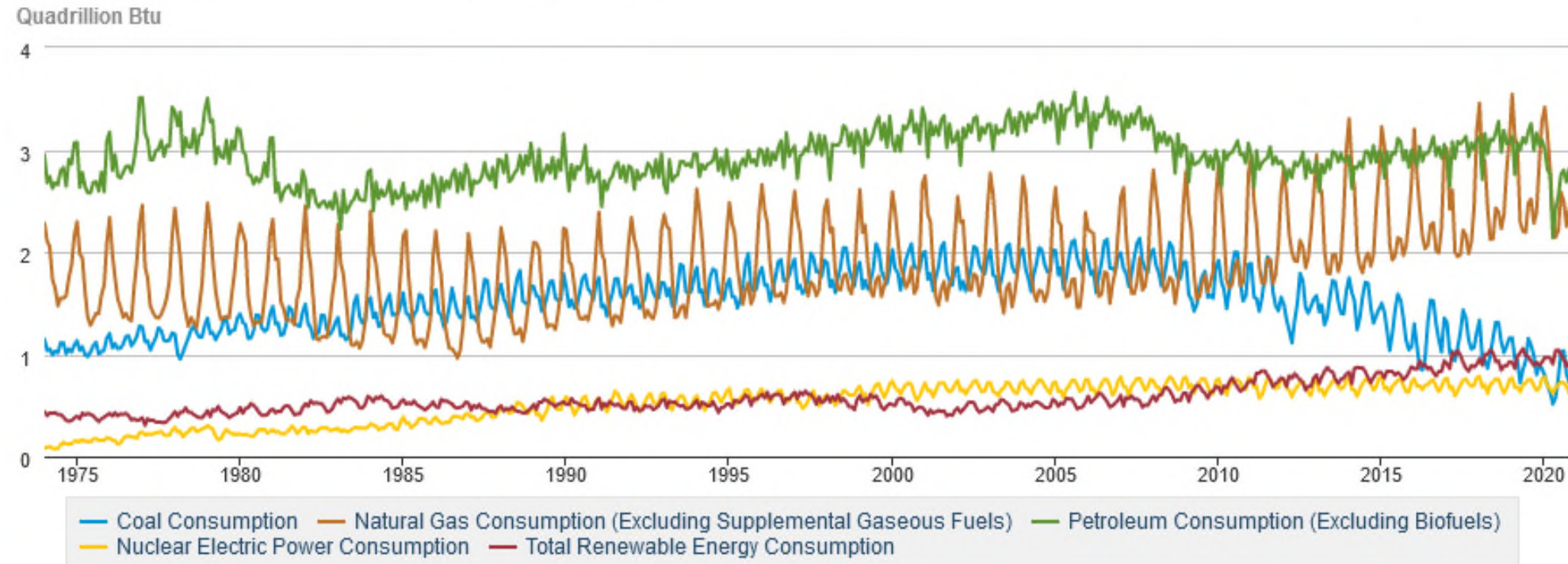
Global primary energy consumption by region (2010-2050)
quadrillion British thermal units



Source: U.S. Energy Information Administration, *International Energy Outlook 2019* Reference case

WHERE WE GET OUR ENERGY

Table 1.3 Primary Energy Consumption by Source



eia Source: U.S. Energy Information Administration

DEMAND FOR OIL AND GAS GOING UP

SHALE DAILY
MARKETS | E&P | ENERGY TRANSITION | NGI ALL NEWS ACCESS

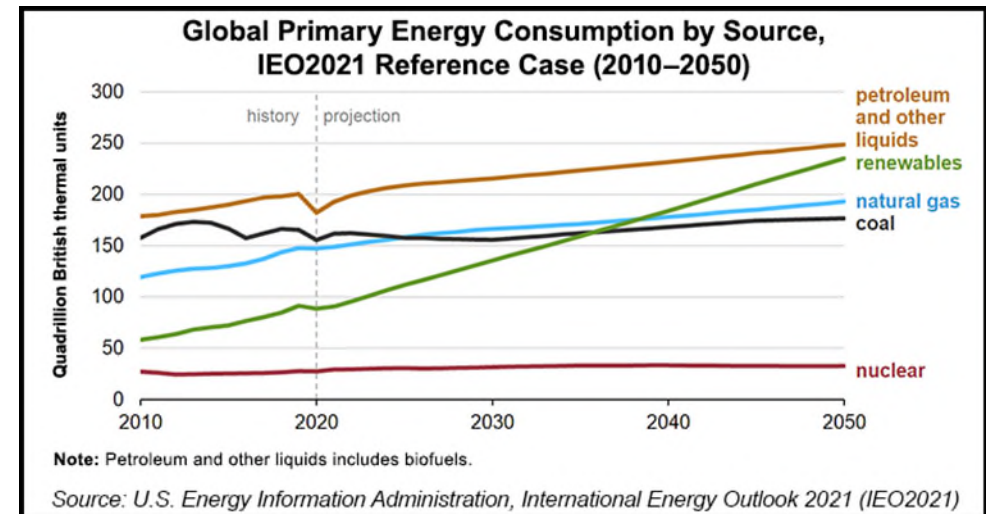
World Energy Demand, Including Oil and Gas, Rising to 2050, EIA Says



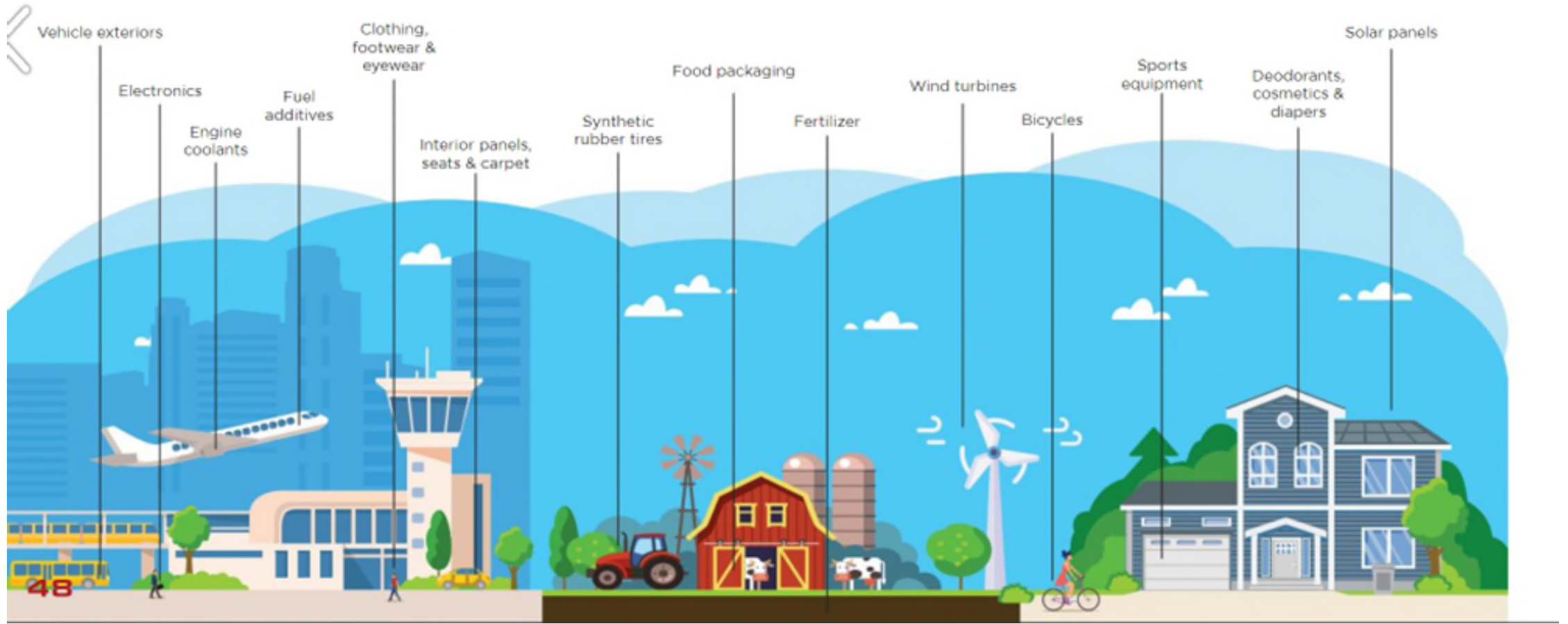
BY JEREMIAH SHELOR
October 7, 2021

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Under current policies, oil and natural gas production will continue growing through 2050 amid rising global energy consumption driven by developing Asian economies, according to the latest long-term projections from the U.S. Energy Information Administration (EIA).



WHERE WILL YOU USE HYDROCARBONS NEXT?



MORE THAN 30 RULEMAKINGS IN TEN YEARS

- 2010 - Clean Air Clean Jobs
- 2011 - Hydraulic Fracturing Fluid Disclosure
- 2012 - Groundwater Monitoring and Baseline Sampling
- 2013 - Setbacks
- 2013 - Spill Reporting
- 2013 - Wildlife Mapping
- 2014 - Leak Detection and Repair; enforcement and penalties
- 2016 – AVO inspection; dehydrators, storage tanks
- 2017 – Adoption of EPA Control Technique Guidelines; pneumatic controllers; LDAR; pneumatic pumps
- 2018 - Setbacks from Schools
- 2019-20 - SB-181
 - Flowlines
 - Wellbore Integrity
 - Location Assessment
- Cumulative Impacts
- Air Monitoring, Inventory, Storage Tank and Controls, Loadout, LDAR, Control Controllers, Well Plugging; Safety Valve Controls
- Mission Change and more
- 2021-22 SB-181 & HB 1261
 - Financial Assurance
 - Permitting Fees
 - GHG Intensity Rule
 - Pneumatic control and safety LDAR
 - Performance testing and maintenance; LDAR
- 2023
 - 4 Air Rulemakings
 - High Priority Habitat
 - Worker Certification



CURRENT REGULATORY ACTIVITIES

- December Ozone SIP Rulemaking
- RAQC stakeholder process
- Federal regulations
- Ongoing reductions soon from past rulemakings and legislative directives



DEVELOPING OUR RESOURCES CLEANER AND BETTER

- State rules and technological advances have led to:
 - Decreased emissions
 - Reduced leaks
 - Limited venting and flaring
 - Less disturbed land
- Ambient methane concentrations from oil and gas have gone down 50 percent from 2013-2019
- Ethane concentrations went down 65 percent from 2013-2019
- Total Volatile Organic Compounds are down 57 percent from 2011 to 2019, including Front Range
- The United States saw the largest decline in energy-related CO2 emissions in 2019 on a per capita country basis, according to International Energy Agency.





OZONE AND INDUSTRY'S COMMITMENT TO REDUCING EMISSIONS



SPECIFIC PROBLEMS NEED SPECIFIC SOLUTIONS

**Climate Change
GHG Emissions**

**Ozone
NOx & VOC Emissions**

**Public Health
Air Toxics, Ozone, Climate**



OZONE IS A REAL PUBLIC HEALTH ISSUE

- Respiratory disease
 - Asthma
 - Emphysema
 - COPD
- Inflammatory and metabolic effects
 - Heart attack
 - Stroke
 - Others

COLORADO SUN

JULY 17, 2023

“Parts of Colorado’s Front Range have topped ozone limits for nearly 20 years. Will they ever do better?”



OZONE 101

- Ozone is a secondary air pollutant made up of NO_x and VOC that react with sunlight.
- Clean Air Act designates two separate National Ambient Air Quality Standards for Ozone
 - 75 parts per billion was the standard for 2008.
 - 70 parts per billion was the new standard set in 2015.
 - Statewide Implementation Plans must meet these standards or be listed as in violation of both standards.
- EPA Non-Attainment Classifications
 - Marginal
 - Moderate
 - Serious
 - Severe (current Denver Front Range Designation)
 - Extreme



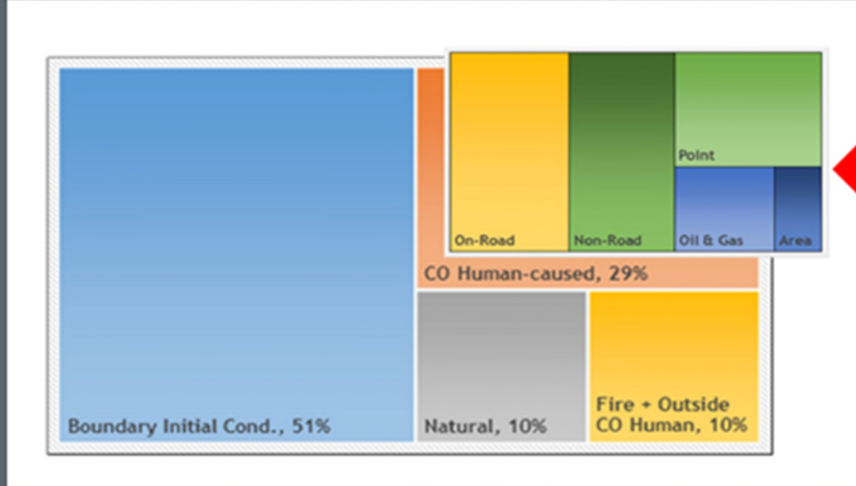
OZONE 101

- Natural Background Ozone in Colorado is between 30 and 50 parts per billion.
- Clean Air Act offers states two options for seeking relief from the Act's ozone standards: 179b for non-attainment areas and 319b for non-point sources including 319b and 179b.
- Colorado has 16 Ozone Monitors on the Front Range.



THE OIL AND NATURAL GAS INDUSTRY IS DOING ITS PART

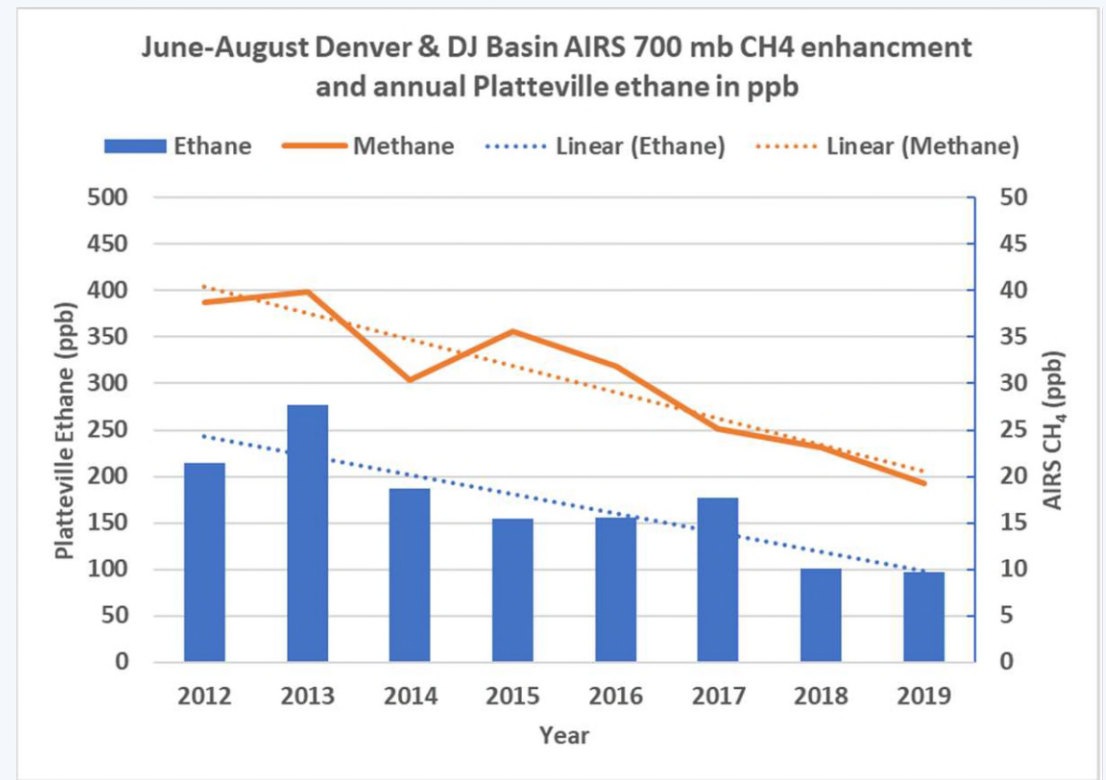
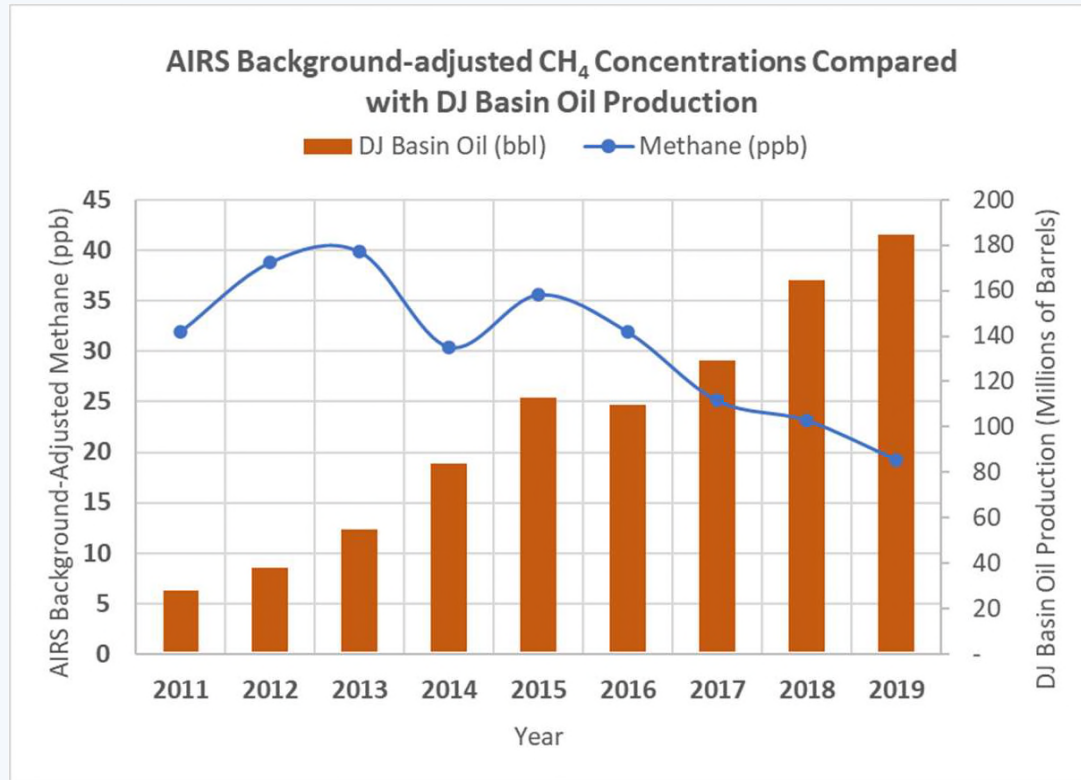
National Renewable Energy Lab (NREL)



- Ozone has multiple sources and simple solutions
- Cannot solve ozone problem by focusing only on oil and gas
- Oil and gas contribute about 3% - 8% of Front Range ozone
- Local man-made sources cause about 29% of Front Range ozone



FRONT RANGE OIL AND GAS METHANE AND ETHANE EMISSIONS ARE DOWN SHARPLY



Ozone Emission Reductions

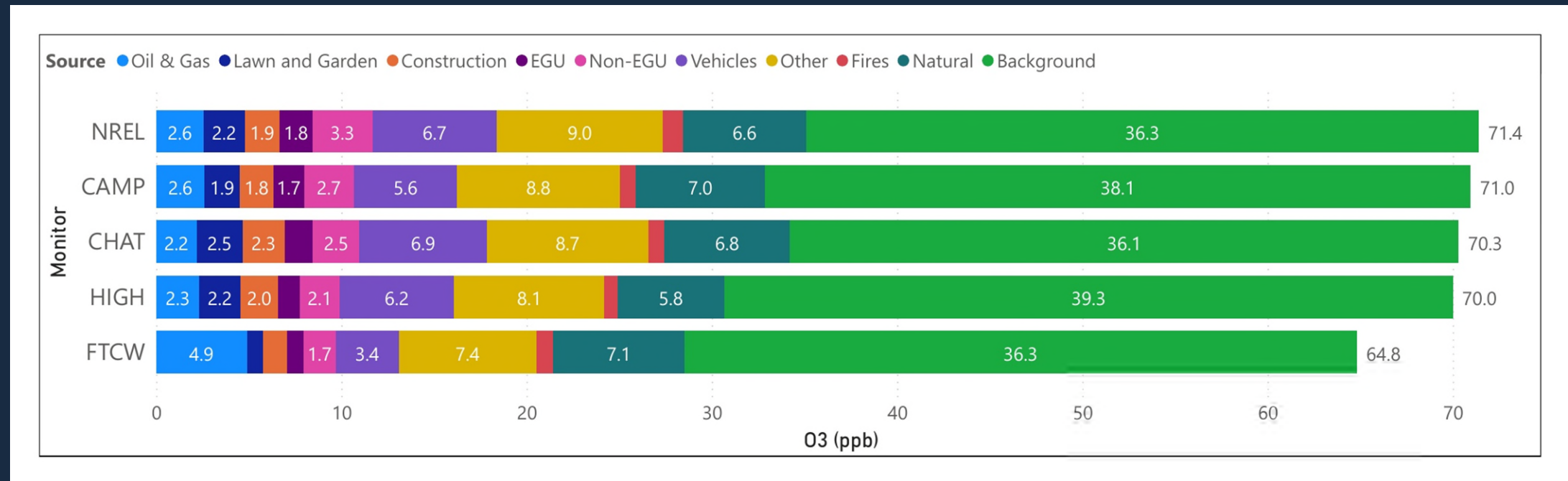
- [February 2021 Ramboll Report](#) of data from the Atmospheric Infrared Sounder sensor on a NASA Satellite shows that methane concentrations from oil and gas decreased by 52 percent from 2013-2019
- The same study, relying on CDPHE's ground-level Platteville monitoring site shows that concentrations of ethane, an indicator of oil and gas emissions, fell 65 percent between 2013 and 2019.
- A separate [September 2022 study](#) from researchers at the Environmental Defense Fund, Peking University, and Harvard University shows an even larger decrease of 72% between 2015 and the 2018-to-2020 time frame.
- The 2022 study is based on data from TROPOMI (a different satellite sensor) and not industry data. The satellite and Platteville monitoring show long term trends in data collected over many years, not single snap shots in time from singular research campaigns or aerial flights.

COLORADO OZONE MONITORING SITES IN THE NON-ATTAINMENT AREA

SITE NAME	AQS ID	COUNTY	LATITUDE	LONGITUDE
Welby	08-001-3001	Adams	39.83	-104.85
Highland Reservoir	08-005-0002	Arapahoe	39.91	-104.91
Aurora East	08-005-0006	Arapahoe	39.72	-104.83
Boulder Reservoir	08-013-0014	Boulder	40.05	-105.21
Denver - Camp	08-031-0002	Denver	39.74	-104.98
La Casa	08-031-0026	Denver	39.74	-105.00
Chatfield State Park	08-035-0004	Douglas	39.74	-105.07
Black Hawk	08-059-0005	Gilpin	39.74	-105.41
Welch	08-059-0006	Jefferson	39.74	-105.41
Rocky Flats - North	08-059-0011	Jefferson	39.9128	-104.91
National Renewable Energy Labs - NREL	08-069-0007	Jefferson	39.7437	-104.85
Rocky Mountain NP - Long's Peak	08-069-0011	Larimer	40.2781	-105.456
Fort Collins - West	08-069-1004	Larimer	40.5925	-105.1411
Fort Collins - CSU - S. Mason	08-123-0009	Larimer	40.5775	-105.0789
Greeley - Weld County Tower	08-047-0003	Weld	40.3864	-104.7374
Platteville Atmospheric Observatory	08-123-0013	Weld	40.1816	-104.726

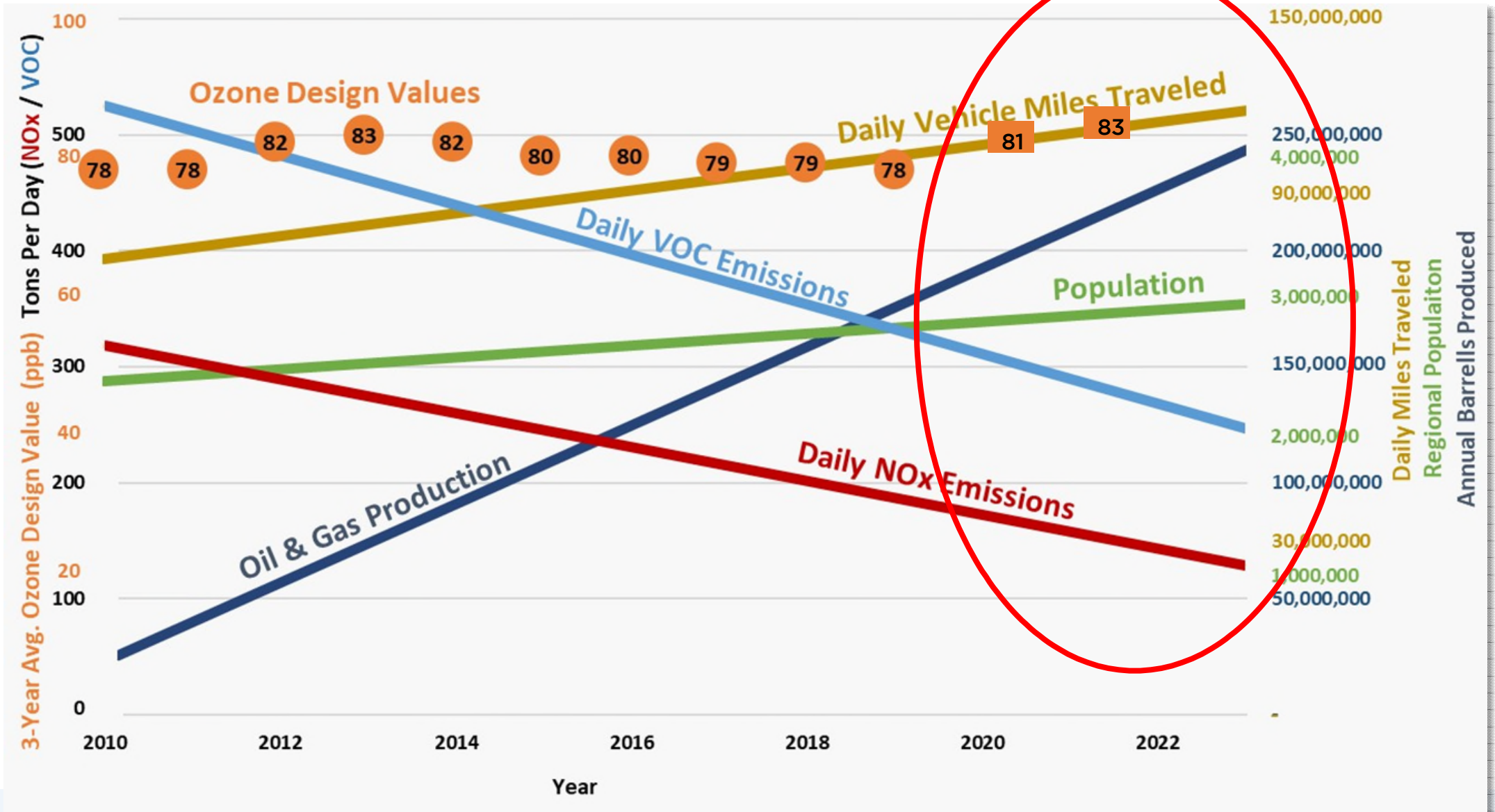
MODEST OIL AND GAS OZONE IMPACTS AT PROBLEM MONITORS

- Active monitors in NAA with projected 2023 DVs ≥ 70 ppb (2021 analysis)
- FTCW included due to history of exceedances



COGA depiction of data from the RAQC's [2023 Local Source Apportionment Analysis](#) (March 17, 2021)





NOx PRECURSORS

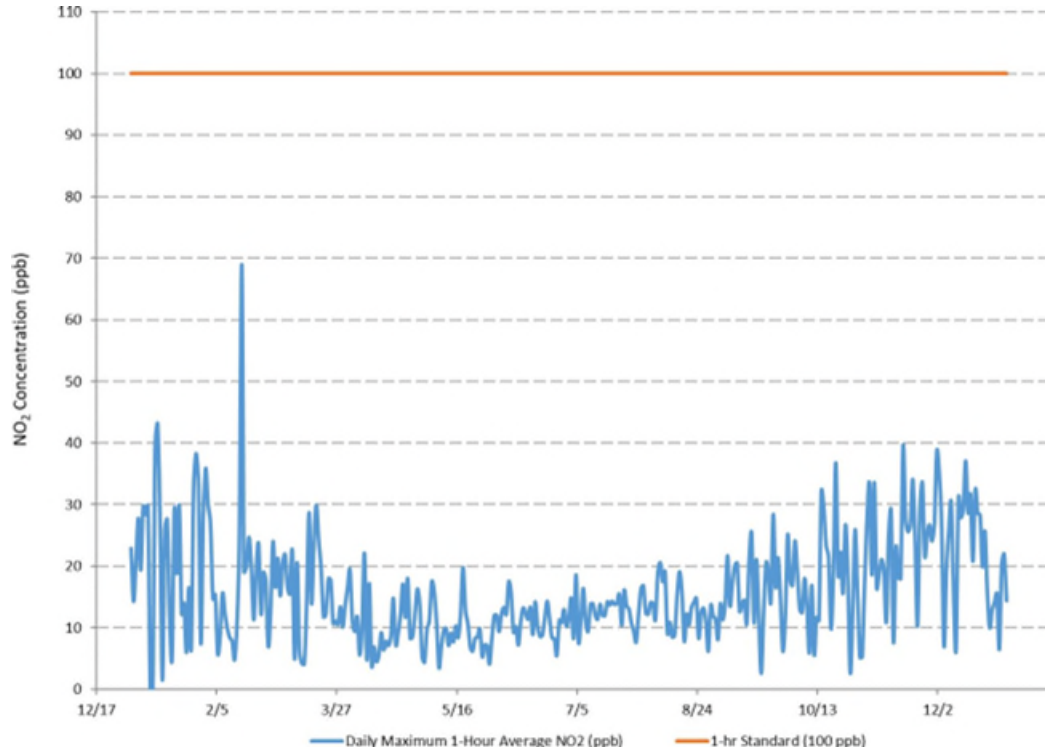


Figure 7. MSP 2021 Maximum Daily 1-hour Average NO₂.

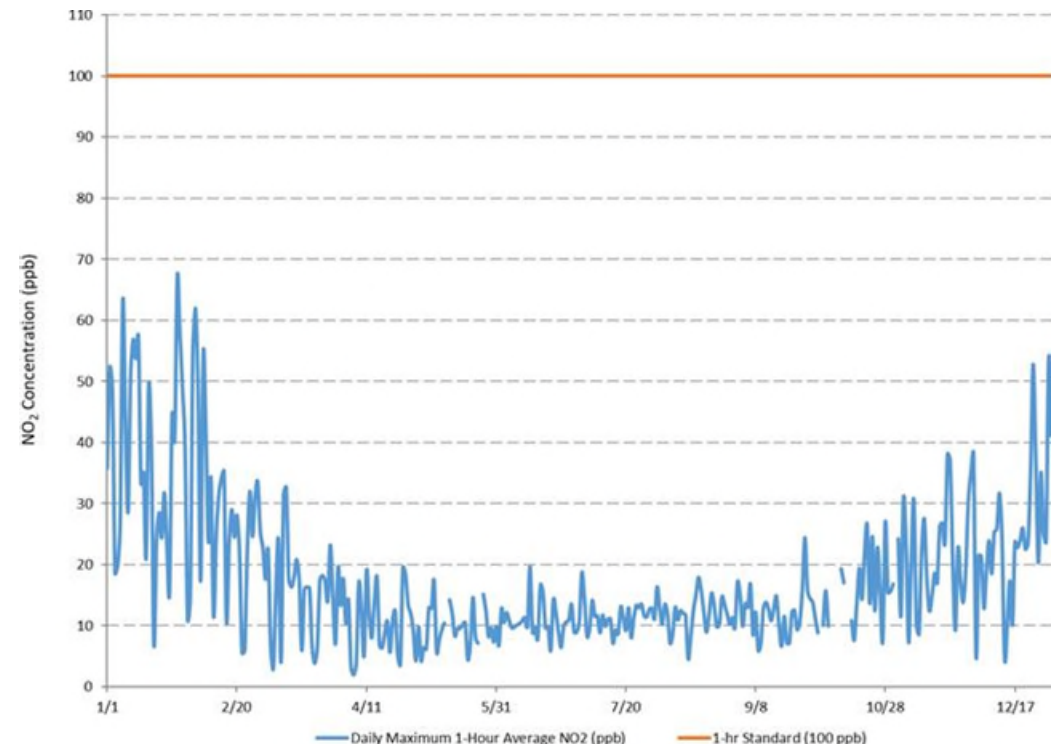
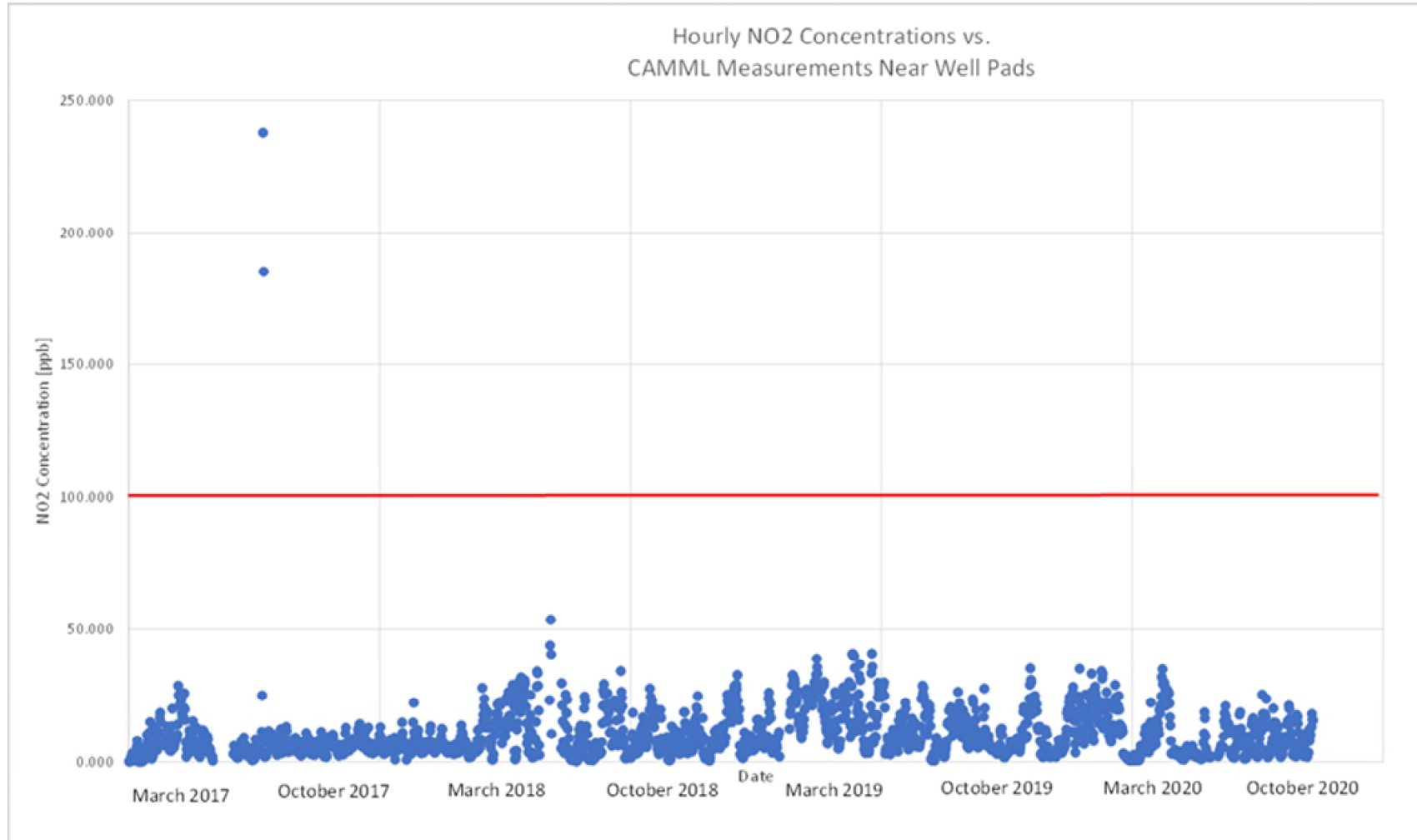


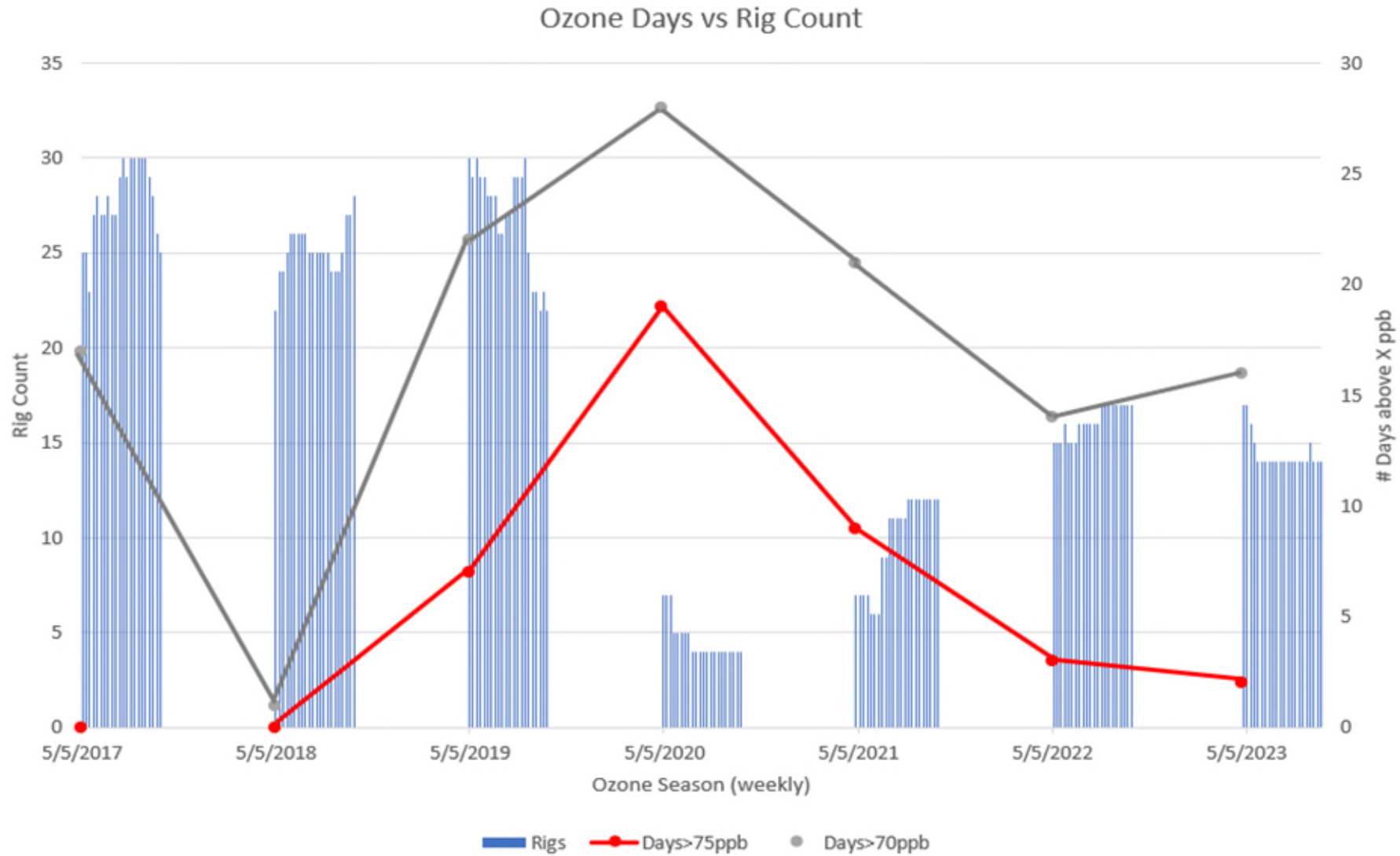
Figure 6. MSP 2022 Maximum Daily 1-hour Average NO₂.

Ambient NO₂ concentrations have never violated the NAAQS at Missile Site Park or at any of CDPHE's NO₂ monitoring sites.

NOx PRECURSORS



NOx PRECURSORS





OVERVIEW OF ECMC'S ENTIRE PERMITTING PROCESS



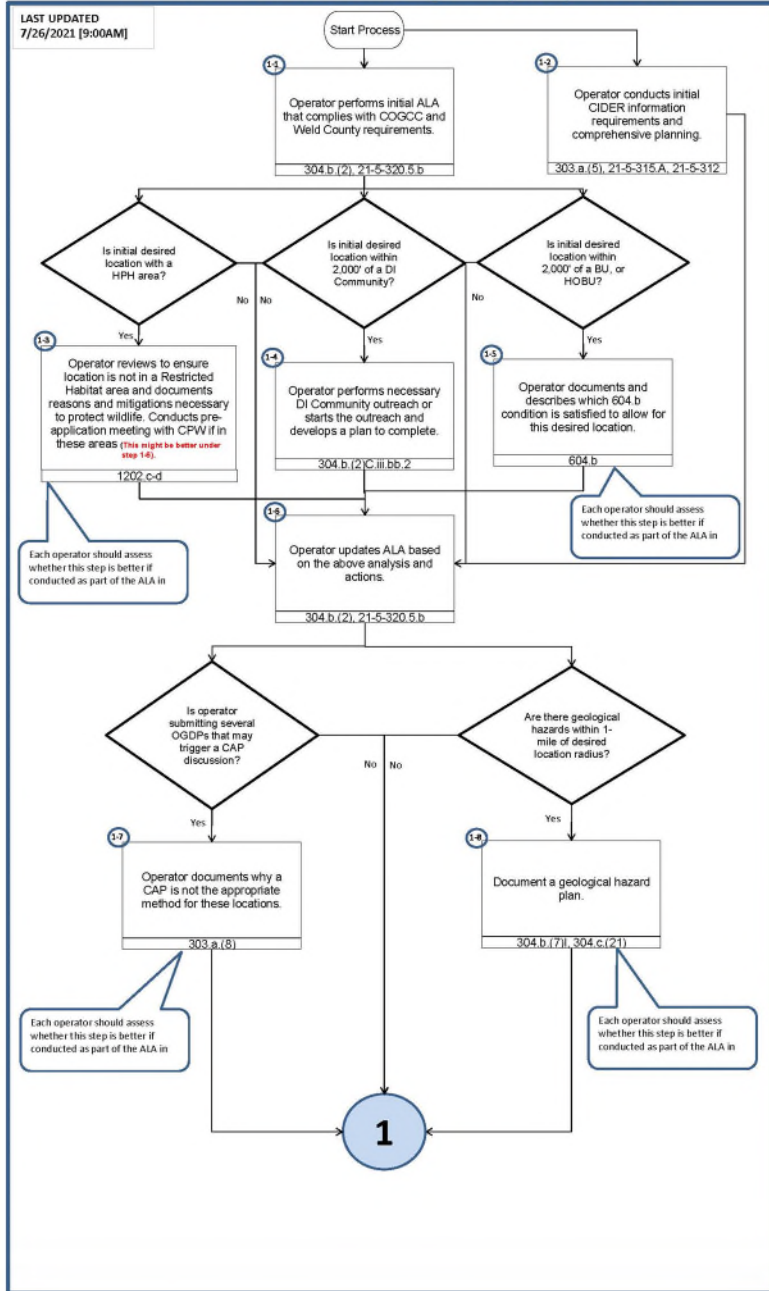
ECMC PERMITTING PROCESS PHASES

- **Phase 1** – Presubmittal Regulatory Requirements
- **Phase 2** – Pre-Application Meetings and Notices
- **Phase 3** – Formal Submittals and Completeness
- **Phase 4** – Notices, Referrals, and Consultations
- **Phase 5** – ECMC Review and Decision



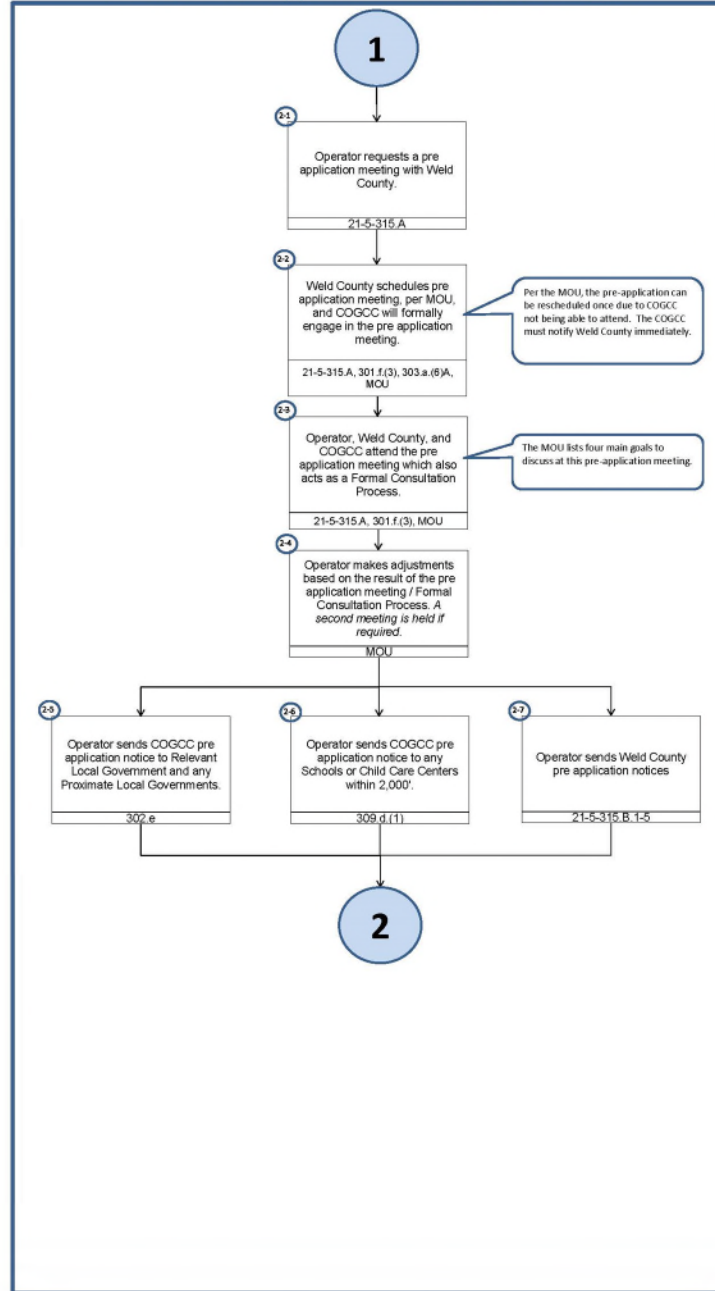
COGCC/Weld County Concurrent Process

PHASE 1 - Presubmittal Regulatory Requirements



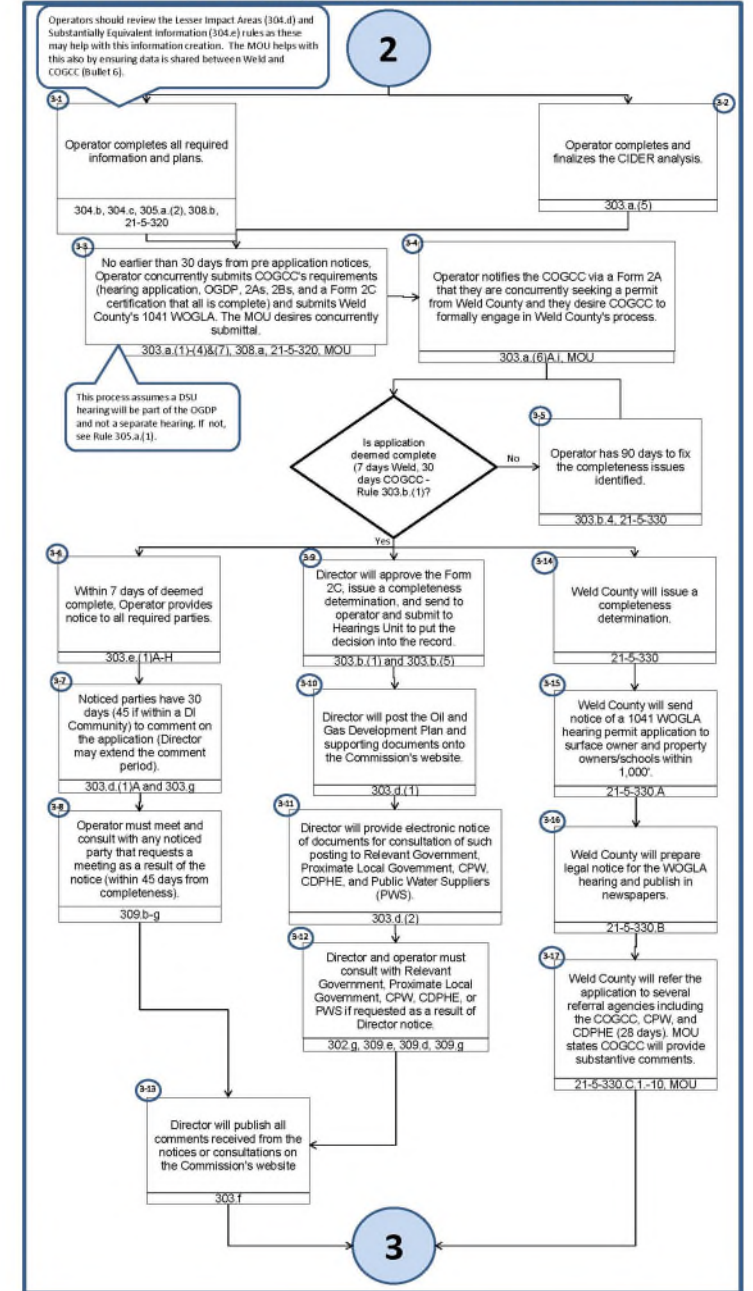
COGCC/Weld County Concurrent Process

PHASE 2 - Pre Application Meetings and Notices



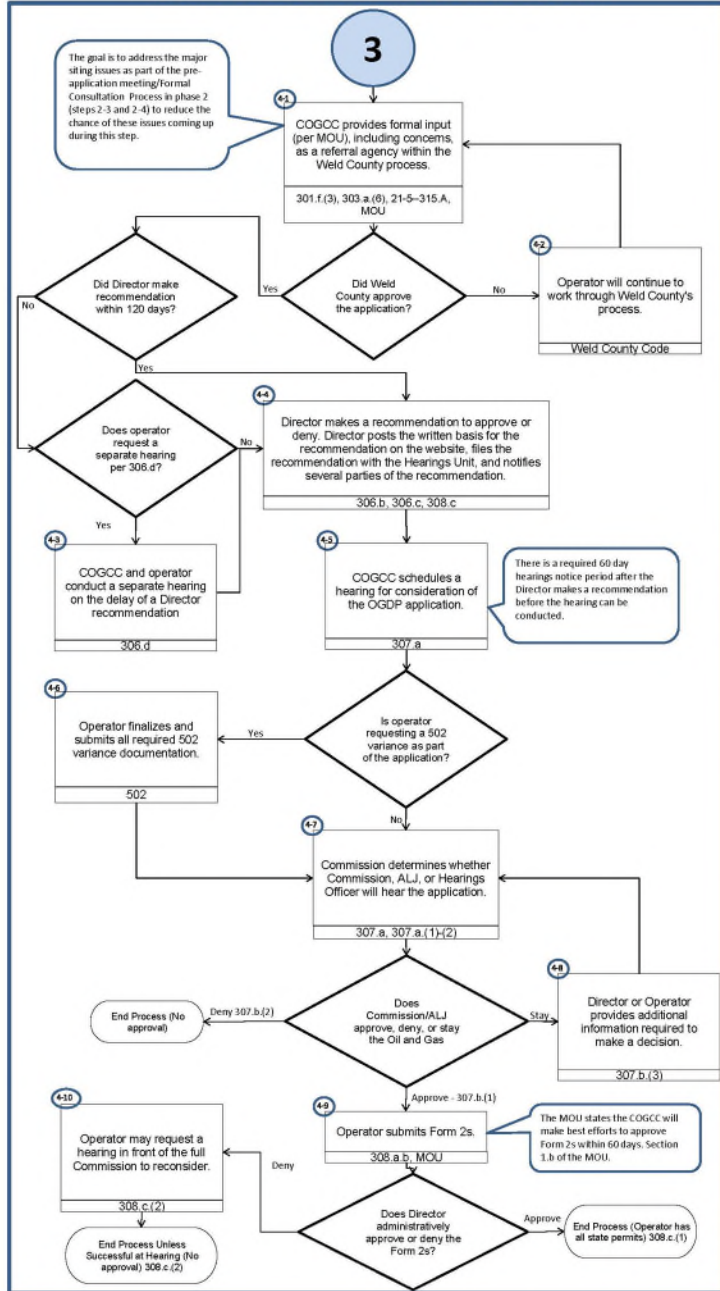
COGCC/Weld County Concurrent Process

PHASE 3 - Submittals, Completeness, Notices/Consultations



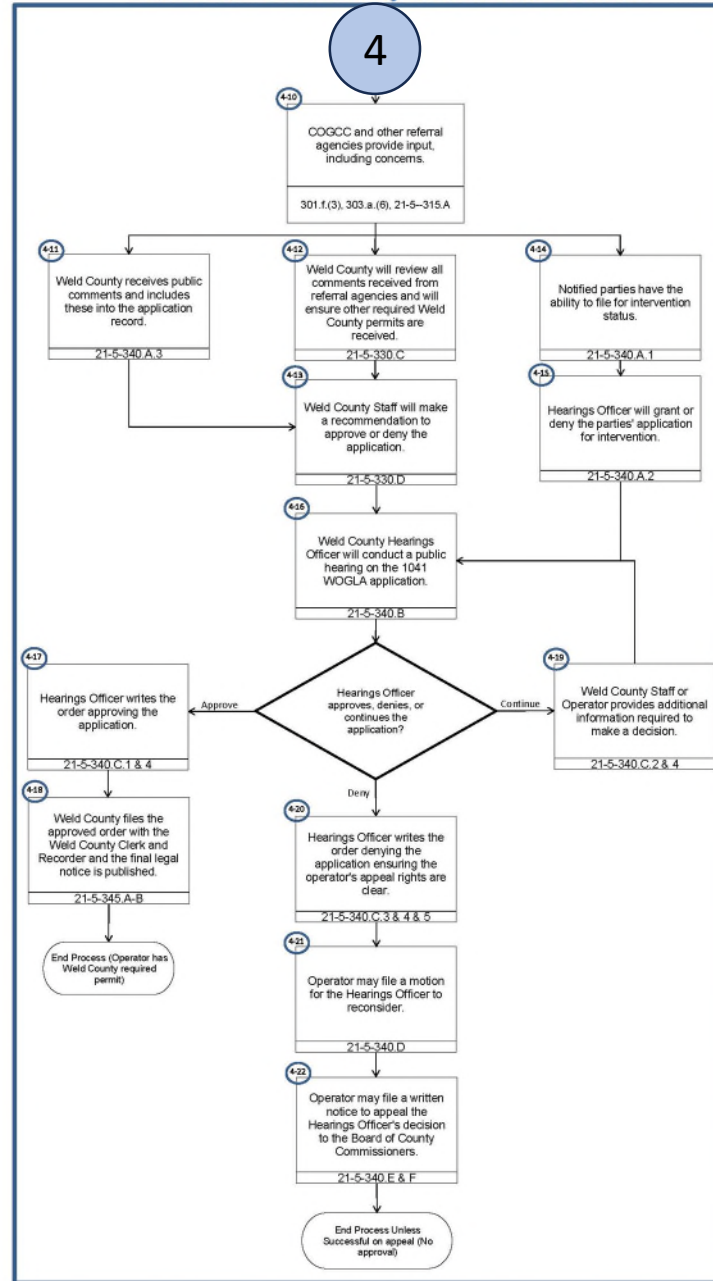
COGCC/Weld County Concurrent Process

PHASE 4a - COGCC Review and Decision



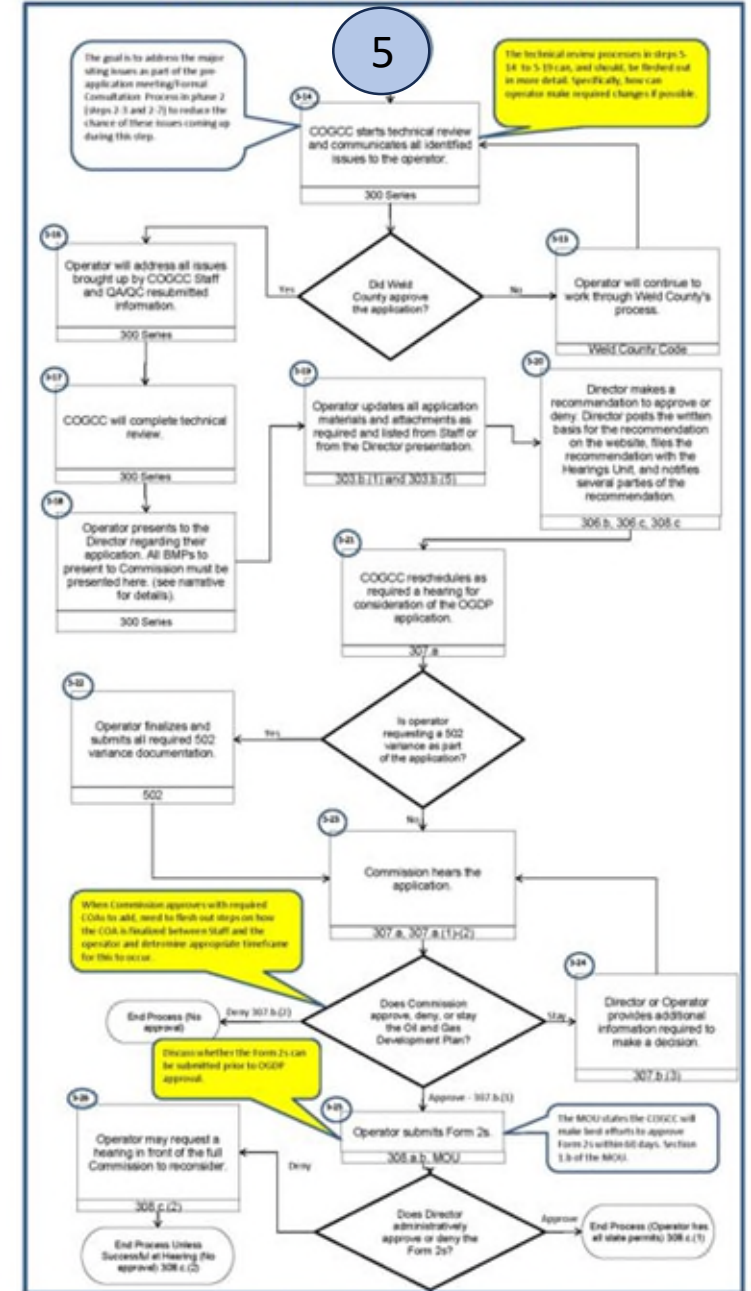
COGCC/Weld County Concurrent Process

PHASE 4b - Weld County Review and Decision



COGCC/Weld County Concurrent Process

PHASE 5b - COGCC Review and Decision



ECMC PERMITTING TIMES

Year OGDPA Approved	# of OGDPA Approved	Average # of Days Between Submit and Passed Completeness Review	Average # of Days Between Passed Completeness Review and Director Recommendation	Average # of Days Between Submit and Director Recommendation	Average # of Associated Form 2As to the OGDPA	Average # of Times Application Sent Back to Draft During CMP Review
2021	7	96	62	157	1	1
2022	47	110	110	219	2	1
2023	22	119	106	226	2	2
1Q2023	5	131	94	225	1	1
2Q2023	9	92	105	197	2	1
3Q2023	8	142	116	259	2	2





OVERVIEW OF CDPHE APCD'S PERMITTING PROCESS



COLORADO'S AIR PERMITS ARE RIGOROUS

- Very small sources require permits or Air Permit Emission Notices
- APCD modelers review every permit application to determine whether modeling is needed
- General Permit applications also reviewed

CO Permit and APEN Thresholds (tons per year)

	VOCs	NOx
Permits		
Attainment Areas	5	10
Nonattainment Areas	2	5
APENs		
Attainment Areas	2	2
Nonattainment Areas	1	1



MODELING DETERMINATION (FORM 114)

- Must be submitted and returned before permit application
- Required for all new and most modified sources
- Includes:
 - Form 114
 - Emission Source Addendum
 - Facility Map
 - Facility-Wide Emissions Form 102
 - Facility-Wide NOx and CO changes
- Determination returned in ~1 week
- If “No modeling required” determination, include final 2 pages in permit application
- If “Modeling Required” dispersion modeling must be completed before application is submitted



DISPERSION MODELING

- If a modeling determination is required it must be submitted and evaluated before permit applications, and concurrently for individual permits
- Requires requesting data from the PMU ~1 week
- Includes Model Report and all modeling files
- Once submitted, PMU evaluates in ~4-6 months if there are no issues identified and forthwith required
- Full PMU Model Report must be included in permit application
- Concerns timelines may increase as more modeling is required



PERMIT APPLICATION

FOR GENERAL PERMITS

- ≤60 day completeness determination
- Registration is conditionally approved after completeness determination and construction can commence
- GP permit requires approval/denial

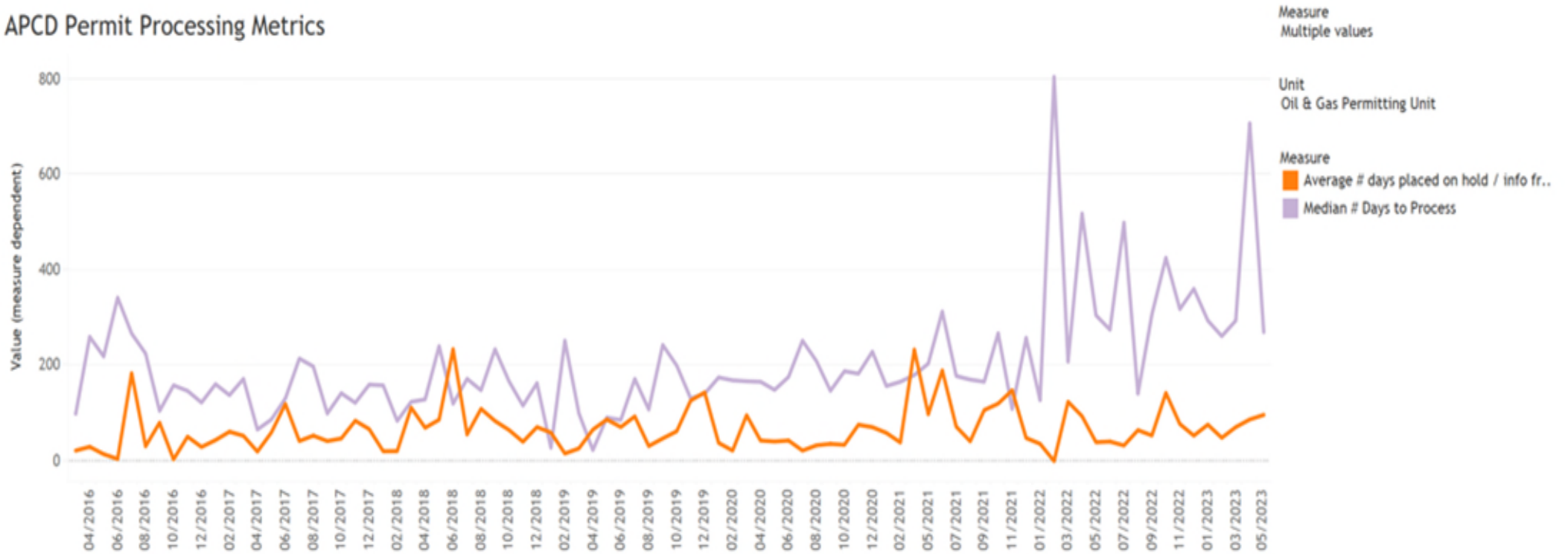
FOR INDIVIDUAL PERMITS

- Engineer review includes back and forth with applicant, updated application materials, etc.
- Followed by 30-day public notice
- Overall process can take 6-18 months



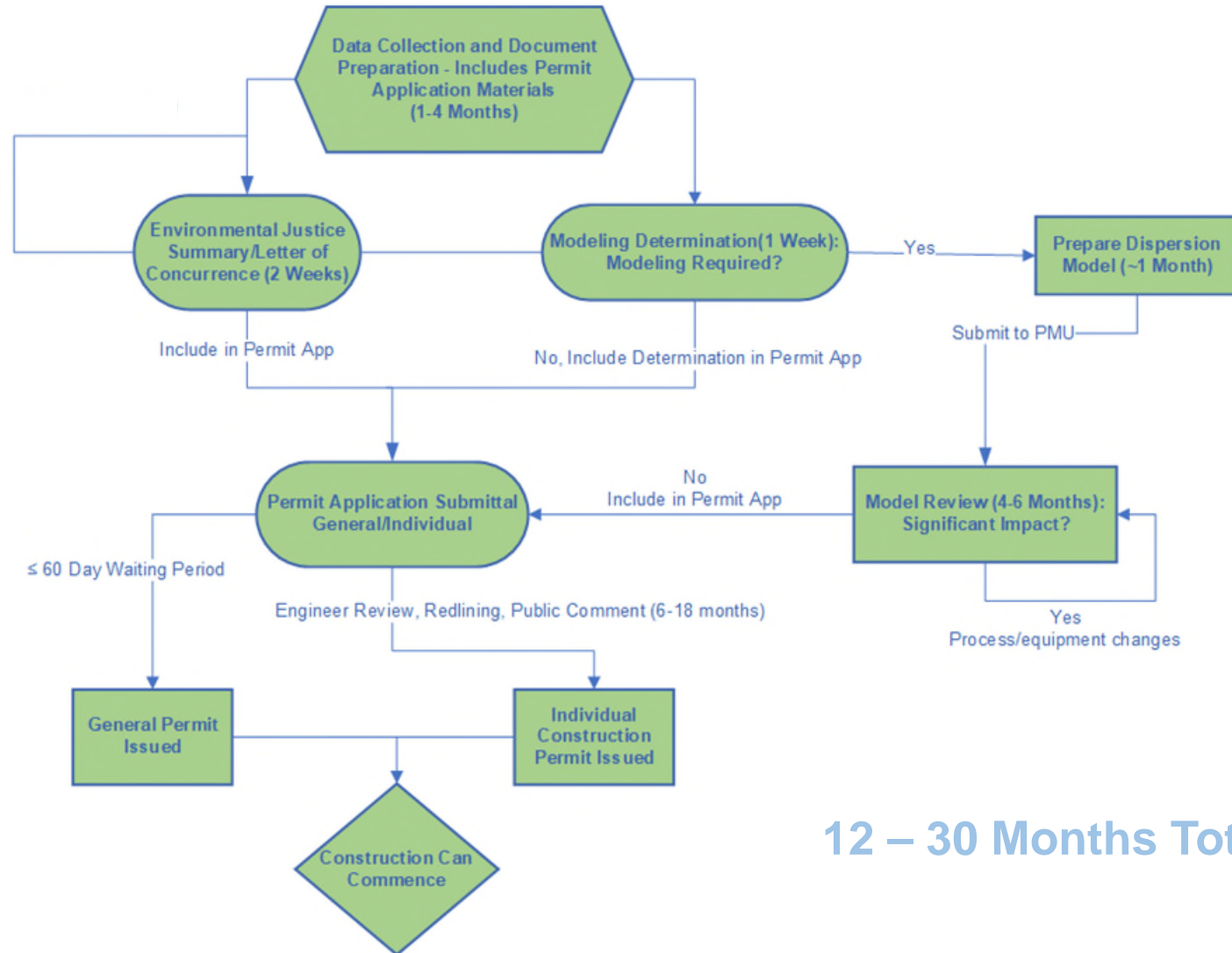
PERMIT DELAYS

APCD Permit Processing Metrics



<https://cohealthviz.dphe.state.co.us/t/EnvironmentalProgramsPublic/views/PermitMetricsMay212020/APCDPermittingDashboard?%3Aiid=1&%3AisGuestRedirectFromVizportal=>

OVERVIEW OF PROCESS



12 – 30 Months Total



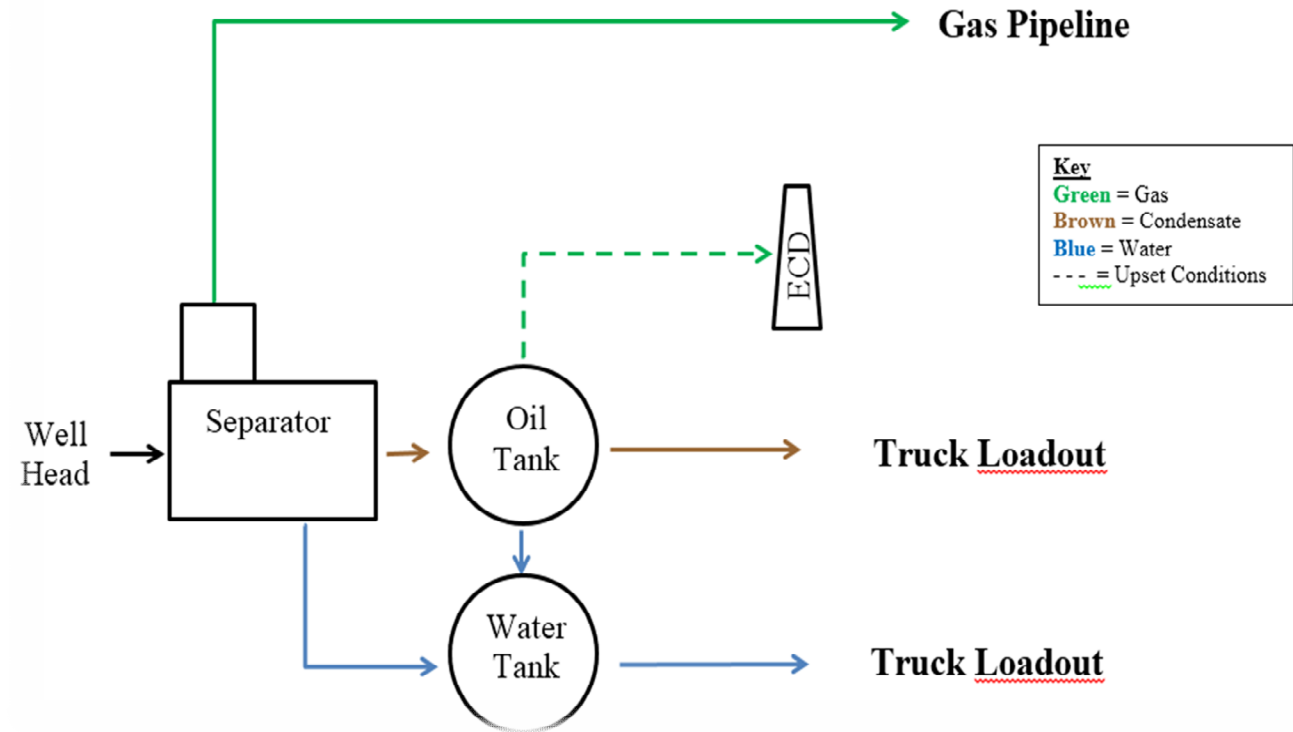
EVOLVING TECHNOLOGY & DESIGN



VERTICAL FACILITY DESIGN

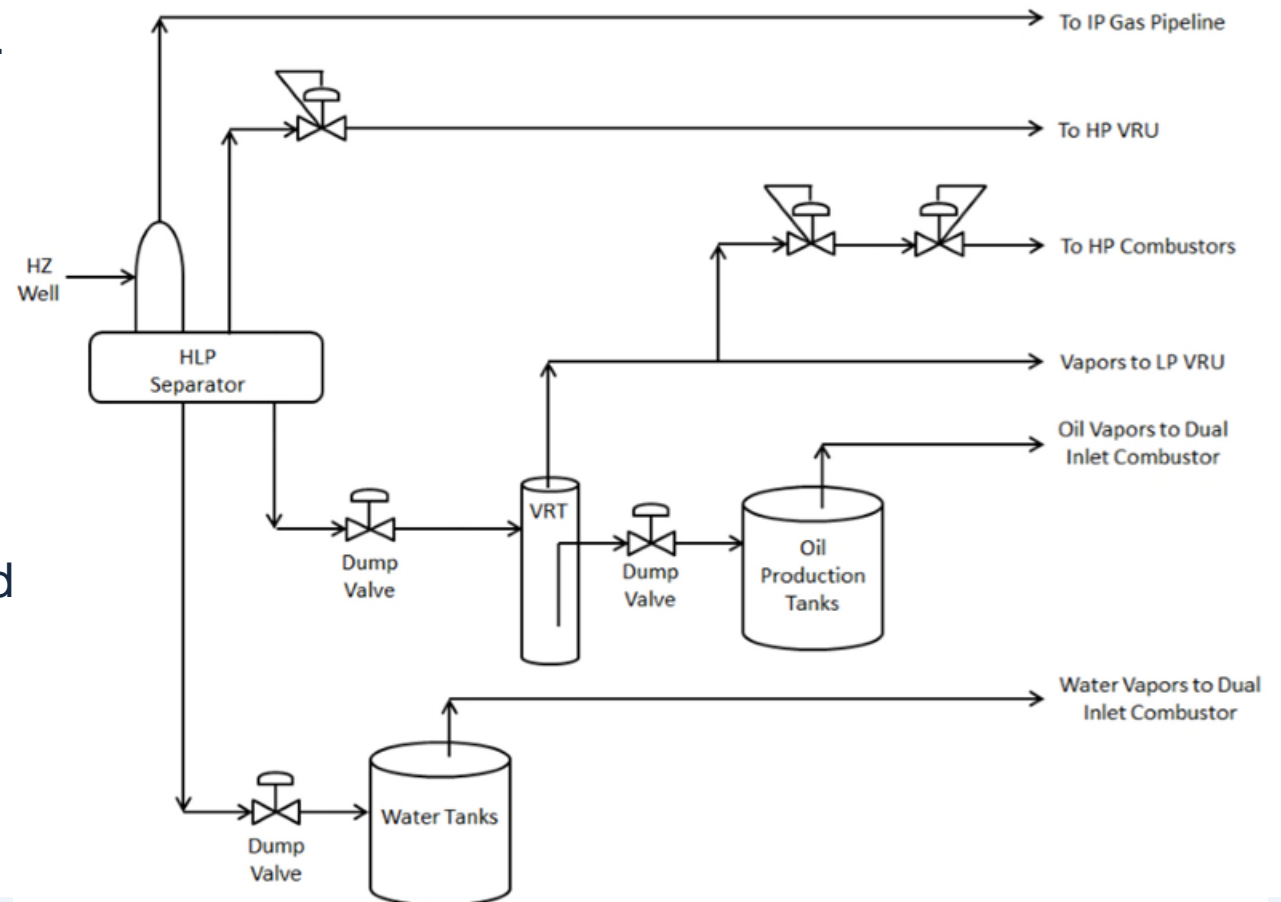
- Single or multiple well pads
- Lower producing vertical wells
- Began evaluation of high to low pressure separators

Flow Diagram: Tank Battery



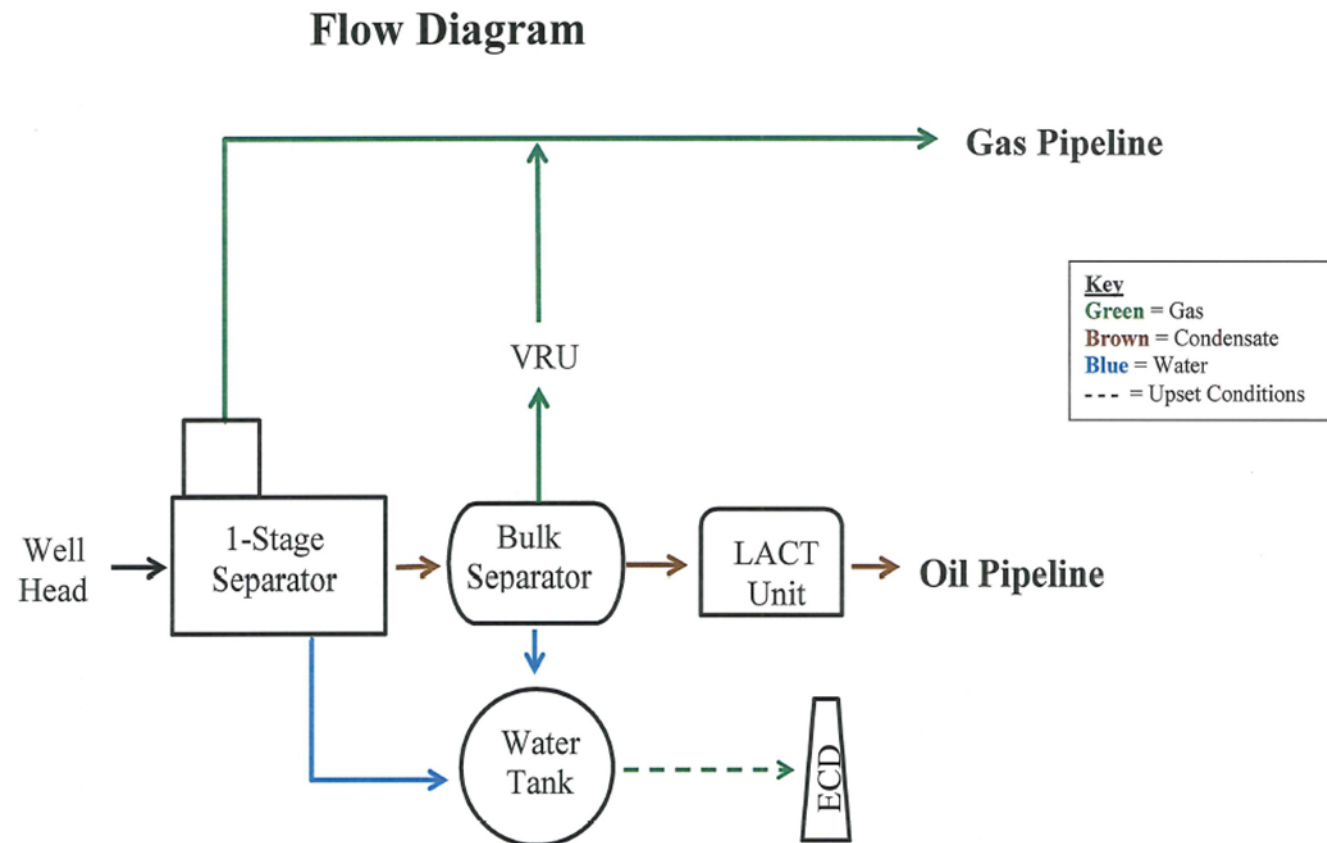
MULTI-STAGE SEPARATION DESIGN

- Oil stored in tanks is a stable product.
- Most have LACT units to pump condensate down the oil gathering system.
- Vapors from the VRT may be compressed with low pressure VRU(s) to gas pipeline.
- Uses air driven pneumatics.
- Numerous of these designs converted to newest stage of design over time



NEWEST GENERATIONS (BULK SEPARATOR)

- Loadout of condensate via truck is not an option.
- Liquid will only undergo one stage of separation from the gas.
- No VRU needed
- Condensate is stored in pressurized bullet tanks prior to oil pipeline.
- All non-emitting pneumatic controllers.
- Design continues to evolve to reduce separators and associated heaters.



PRODUCTION EQUIPMENT REGULATIONS

REGULATED SOURCE	Upcoming	Reg. No. 7	Reg. No 26	General Permits Individual Permits	EPA
PRODUCTION (Red connotes sources frequently designated out in more recent designs)					
Natural gas engines	December 2023		Yes	Yes	NSPS JJJJ, NESHAP ZZZZ
Crude oil/condensate tanks	NSPS OOOO b/c	Yes		Yes	NSPS OOOO/a
Produced water tanks	NSPS OOOO b/c	Yes		Yes	NSPS OOOO/a
Loadout from tanks		Yes		Yes	
Dehydration units/sweetening units	NSPS OOOO b/c	Yes		Yes	
Separators	NSPS OOOO b/c	Yes		Yes	
Pneumatic Controllers	RAQC Stakeholder Process, NSPS OOOO b/c	Yes		Yes	NSPS OOOO/a
Pneumatic pumps	NSPS OOOO b/c	Yes		Yes	NSPS OOOO a
Turbines			Yes	Yes	NSPS GG/KKKK
Well maintenance and unloading	NSPS OOOO b	Yes		Yes	
Fugitive emissions	NSPS OOOO b/c	Yes		Yes	NSPS OOOO a
Routine or Predictable Emissions	RAQC stakeholder process	Yes (e.g., thief hatch opening)		Yes	
Combustion devices	NSPS OOOO b/c	Yes		Yes	NSPS OOOO/a
Compressors	NSPS OOOO b/c	Yes		Yes	

PREPRODUCTION AND OTHER REGULATION

- Preproduction Operations
 - Regulations Pursuant to Regulation Number 7 and EPA NSPS OOOO/a/b
 - Flowback tanks (Regulation Number 7)
 - Drilling and fracturing engines (upcoming December 2023)
 - Completions of hydraulically fractured wells (NSPS OOOO/a and upcoming OOOOb)
 - Continuous monitoring preproduction and early production (Regulation Number 7)
 - Annual emissions inventory (Regulation Number 7 and EPA Subpart 99.43)
 - GHG Intensity and Verification (Regulation Number 7)
 - Protocol for measurement strategies upcoming December 2023



MODELING VERSUS MONITORING



MODELING VERSUS MONITORING

- After an ECMC ALA and permit process, a DIC Determination and a modeling determination are made at APCD. If the source has high enough emissions to trigger a possible detection above the threshold, then modeling is conducted – *before a permit can be issued*.
- All oil and gas drilling and production sites are also monitored for their air emissions. This is 10 days before the site is constructed and until 6 months after the date of completion. Some local governments monitor for much longer and many have robust programs.
- CDPHE also has monitoring equipment that is deployed in the field and collects tens of thousands of data points currently that need to be evaluated and can further inform the models.
- This data has also shown no long term or acute health effects near oil and gas activities.





ELECTRIFICATION



GHG ROADMAP

- Reduce oil and gas emissions 26% 2025, 50% 2030, 100% 2050.
- Reduce emissions from the midstream sector 20% by 2030.
- Reduce emissions from large manufacturing 20% by 2030.
- Reduce emissions from vehicles by adding 1 million EVs by 2030.
- Utilities reduce emissions by 80% by 2030.
- All through electrification – large emissions reductions have been announced – but have we looked at this holistically, or are we operating in silos?



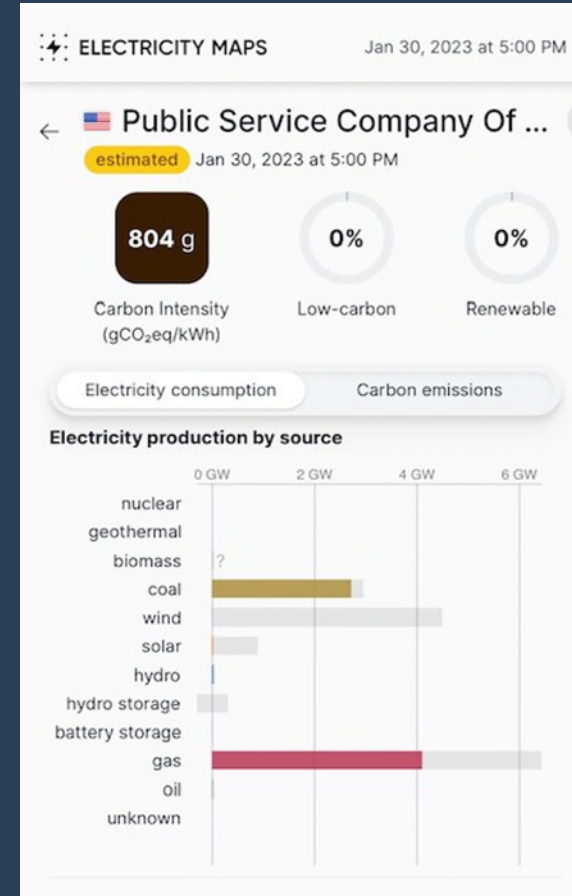
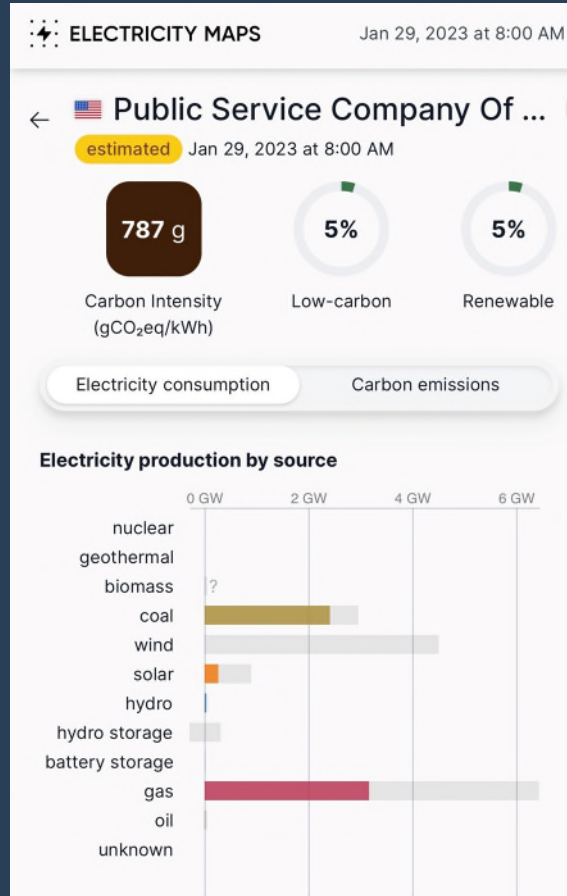
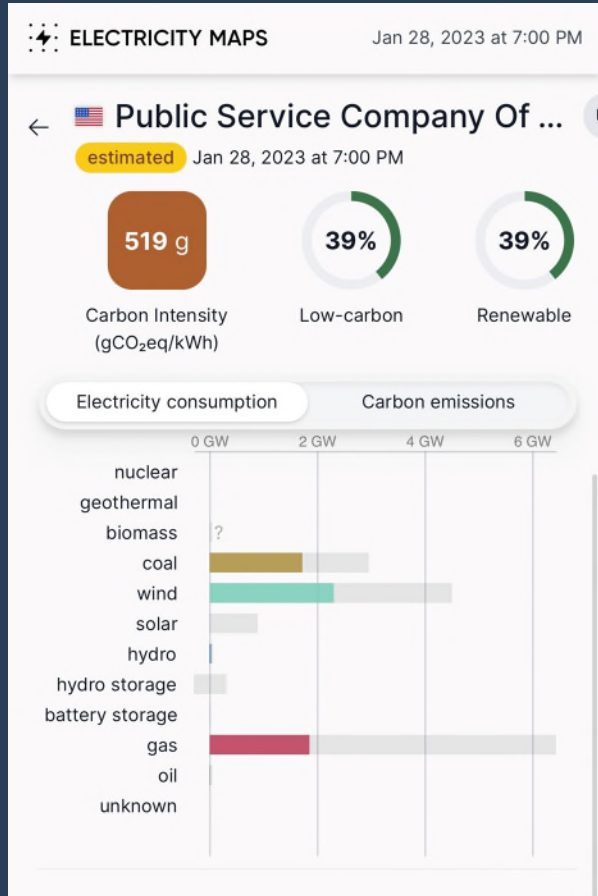
ELECTRIFICATION CHALLENGES

- 12 Rigs in DJ Basin – 3 MW each
- Drilling lasts between 3 and 10 days
- Completions crews – 12 to 24 MW each
- Average Completion is 4 to 7 days



WHERE DOES YOUR ELECTRICITY COME FROM?

HOW A 2023 COLD SNAP IMPACTED OUR GRID



CONCLUSION



ELEMENTS OF AN EFFECTIVE OZONE STRATEGY

- **Set realistic goals and expectations**
- **Improve the things we can control**
 - Address all relevant sectors and categories of emission sources
- **Focus on solutions, not blame**
 - Honestly assess what causes ozone
- **Spend our collective time and energy wisely**
 - Recognize what is achievable
 - Avoid spending resources on actions that won't make a difference
- **Consider Unintended Consequences**



CHOOSE SUSTAINABLE GROWTH OVER ANTI-GROWTH OR DE-GROWTH STRATEGIES

- Colorado needs air permits for:

- Energy
- Cement, steel, glass, asphalt, building products
- Meat & cheese plants, bakeries, breweries, sugar, other foods
- Pet food
- Manufacturing pharmaceuticals, microchips, wind turbines
- Back-up generators for hospitals, data centers, military bases
- Airports

- Coloradans need both a clean environment and a high quality economy

- Forcing producers to shut down will harm Colorado

- More truck and train traffic
- More vehicle idling



QUESTIONS?

