

Energy and air quality regulation: Perspective on enacting science- based policy in the age of community science

Air Toxics

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Energy & Environment
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PERPETUATION OF MIS-INFORMATION

Report: Cancer-causing benzene spiked more than once at Bella Romero

The report, commissioned by the environmental group 350 Colorado, uses California's more stringent thresholds

By John Herrick - March 11, 2020



Harmful ?

Safe ?

March 11, 2020

BREAKING: Report reveals Colorado school exposed to unsafe levels of fracking pollution

State Failed to Adopt Standard Appropriate for Schools and Allowed Numerous Exceedances

DENVER, CO – Nonprofit organization 350 Colorado [released a report today](#), conducted by Barrett Engineering PLLC, revealing that benzene emissions at Bella

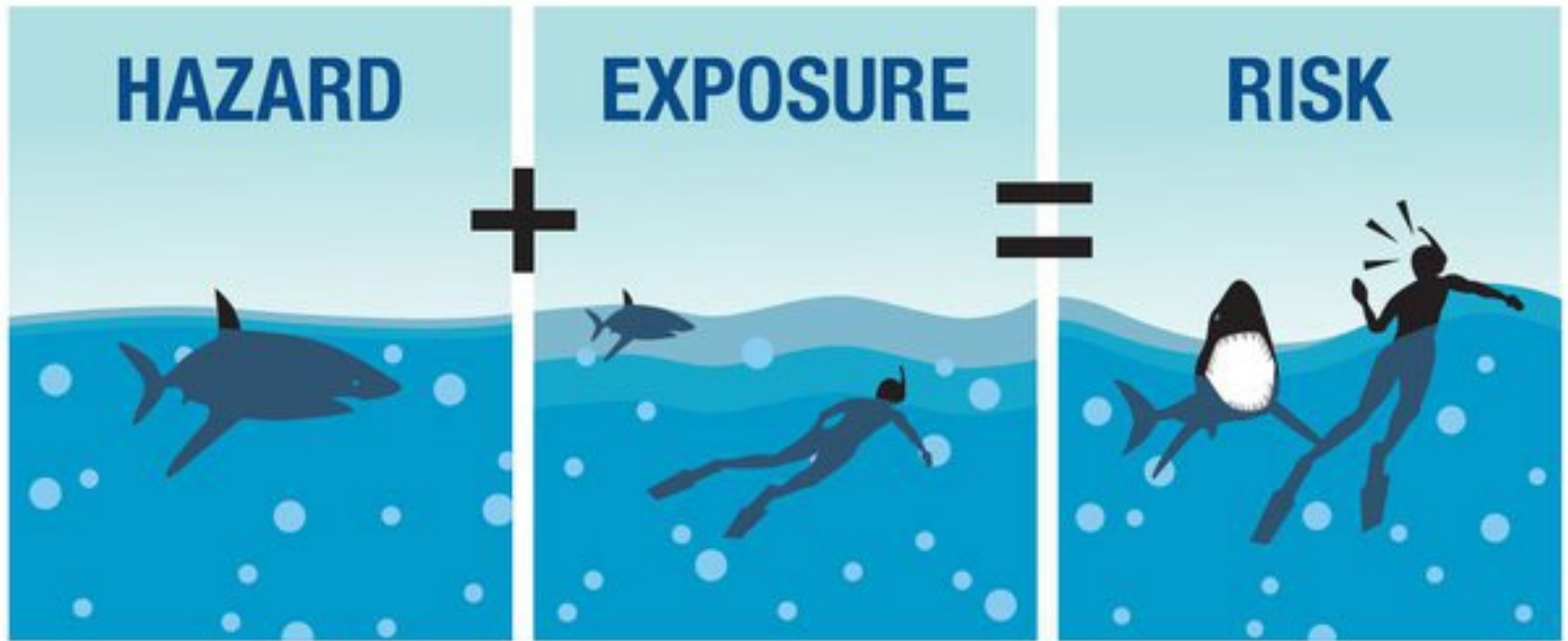
QUESTIONS PUBLIC HEALTH DECISION MAKERS WANT TO KNOW

How do I determine if people who live near and oil and gas facility are at risk of getting health problems from breathing the air?



What decisions need to be made, if any, to reduce the risk?

DEFINING RISK



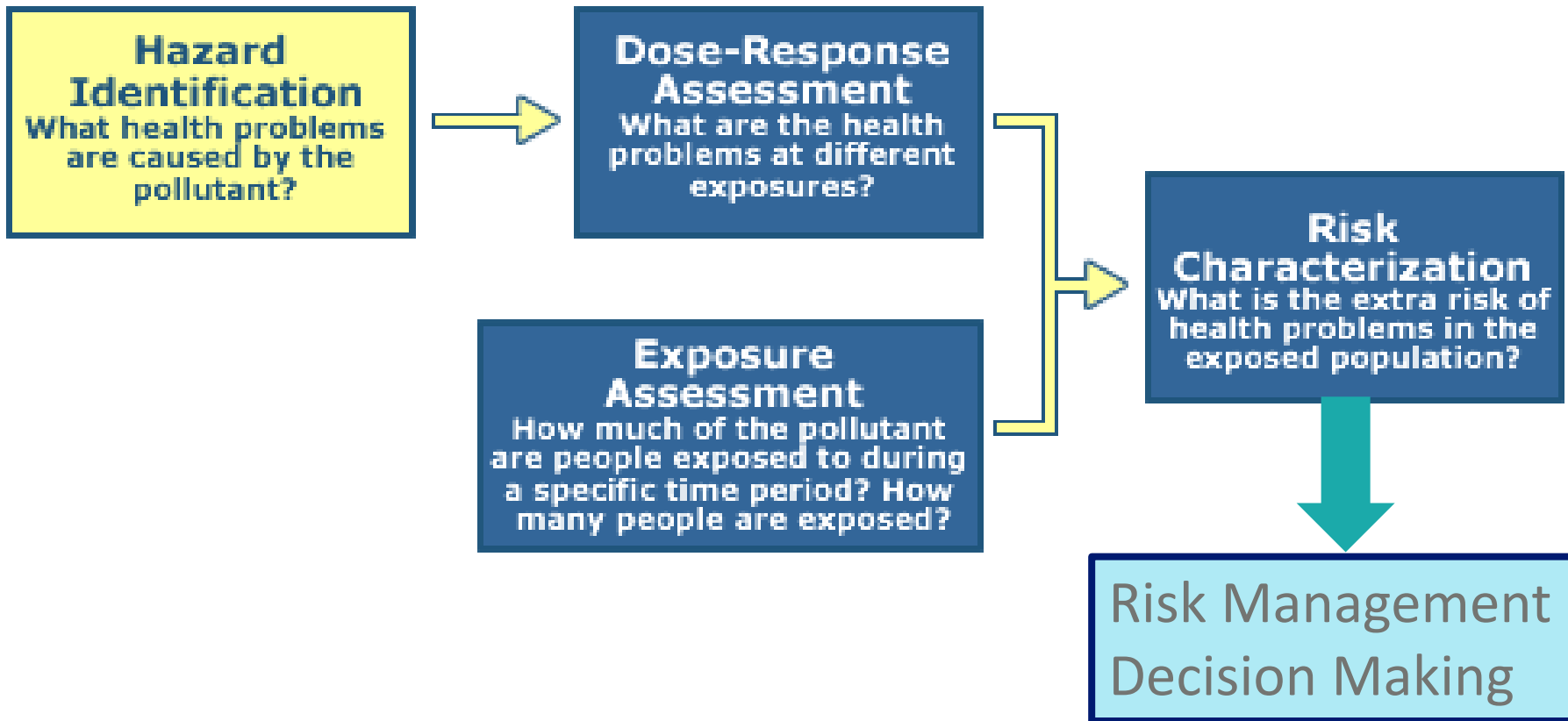
<https://synergist.aiha.org/202105-sharks-and-swimmers>

The theoretical probability of a harm arising from

- a particular exposure
- under specific conditions

DETERMINING RISK

The 4 Step Risk Assessment Process



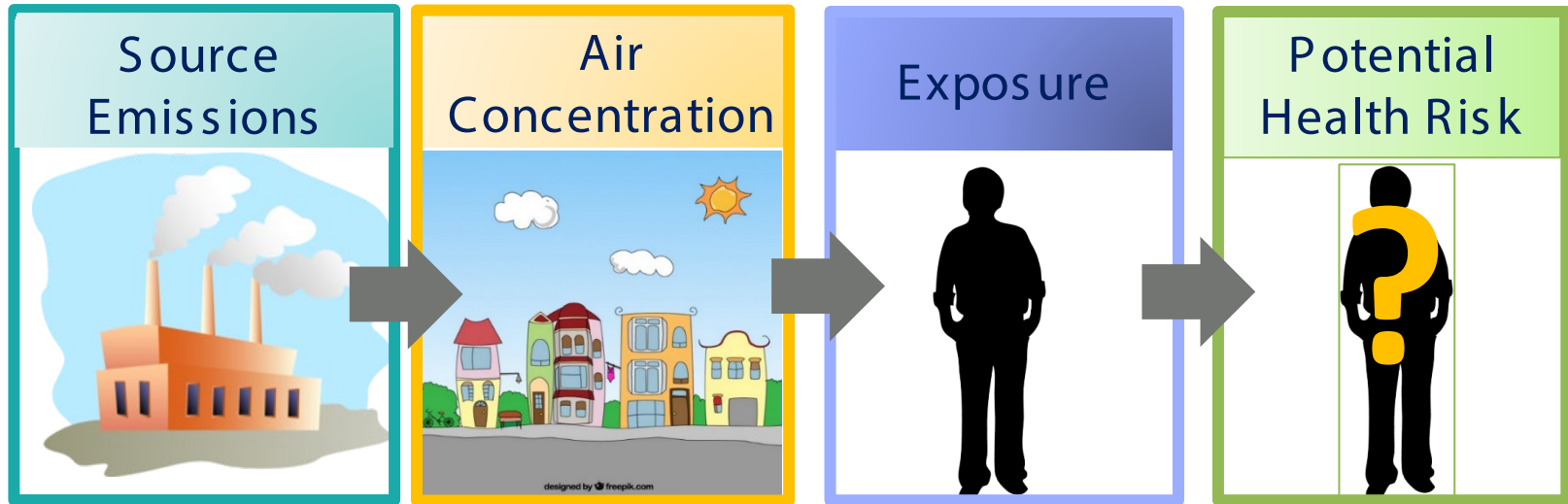
RISK ASSESSMENT – ONE TOOL FOR RISK DECISION MAKING

Text Box 2-3. The Silver Book Statements on Risk Assessment and Decision Context

- “Risk assessments should not be conducted unless it is clear that they are designed to answer specific questions, and that the level of technical detail and uncertainty and variability analysis is appropriate to the decision context” (NRC 2009, 247).
- “The technical framework for risk assessment presented in the [Red Book](#) should remain intact but should be embedded in a broader framework in which risk assessment is used principally to help to discriminate among risk-management options” (NRC 2009, 256).

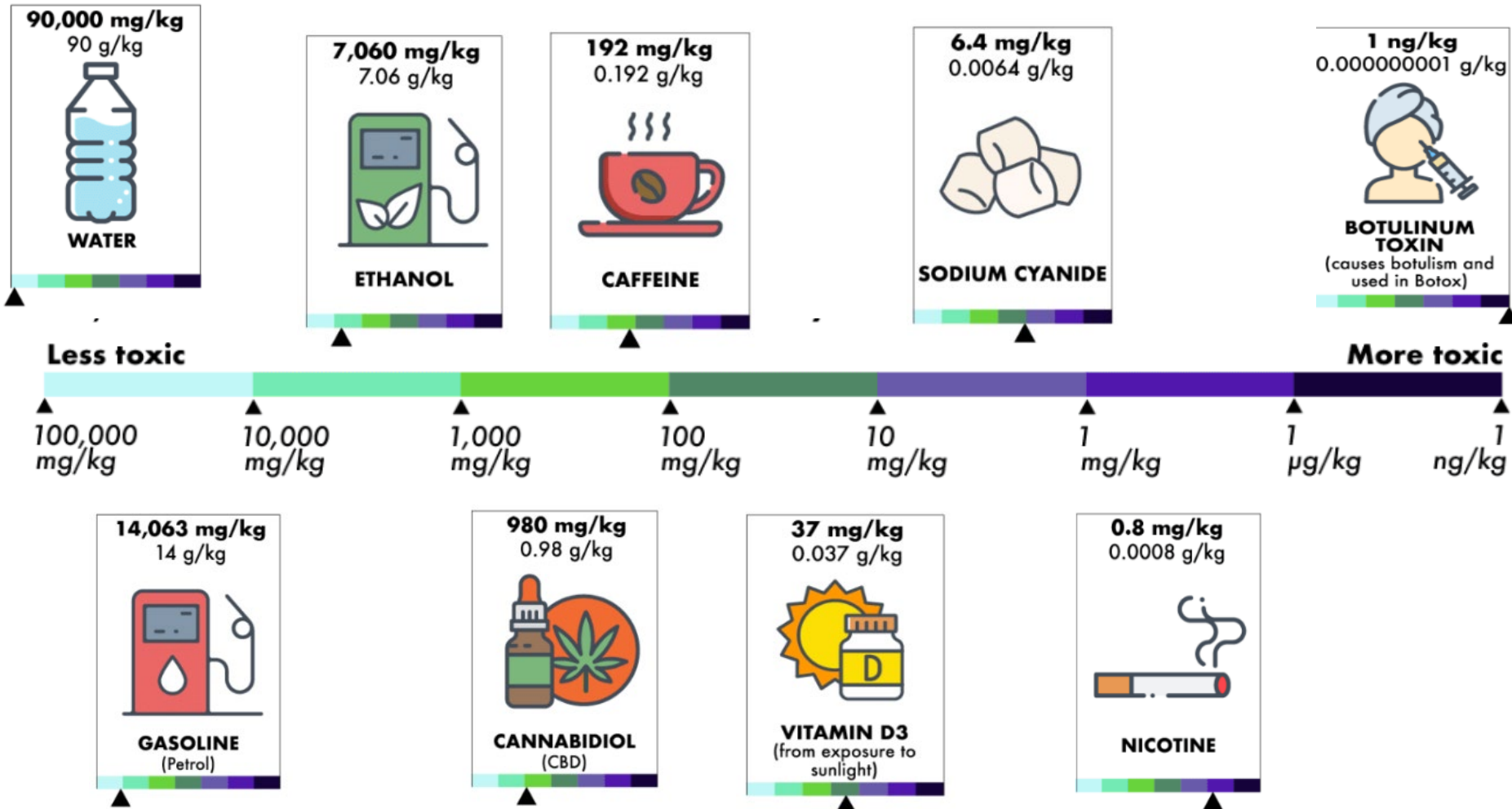
Risk assessment does NOT answer the question, has someone been harmed, it answers the question, do we need to take further action to PREVENT HARM.

EXPOSURE TO HEALTH RISK PATHWAY



- Emission of an air toxic does not equate to “harm”
- Detection of an air toxic does not equate to “harm”
- Exposure to an air toxic does not equate to “harm”

ANYTHING CAN BE HARMFUL AT SOME EXPOSURE LEVEL

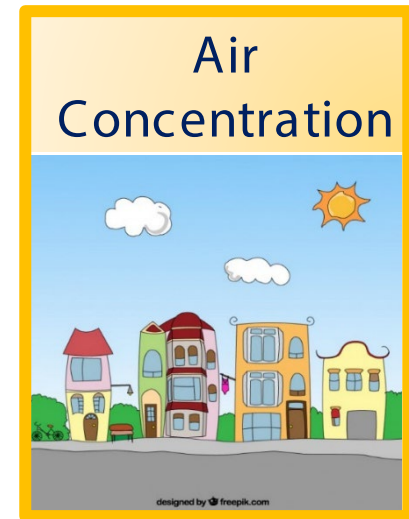


EXPOSURE FACTORS

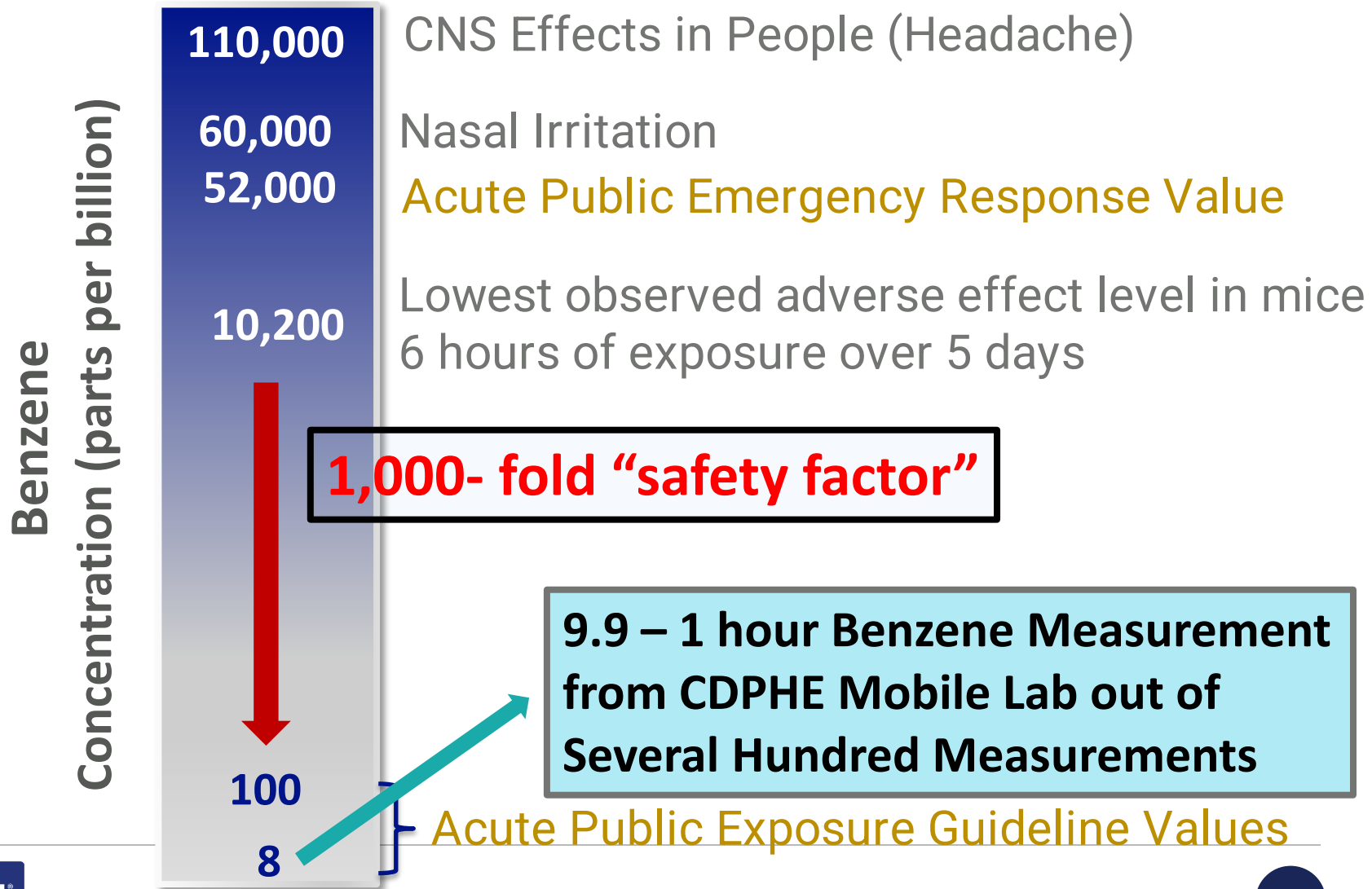
- ✓ **How Much?**
 - Maximum or Average

- ✓ **How Long?**
 - Short-term
 - Long-term

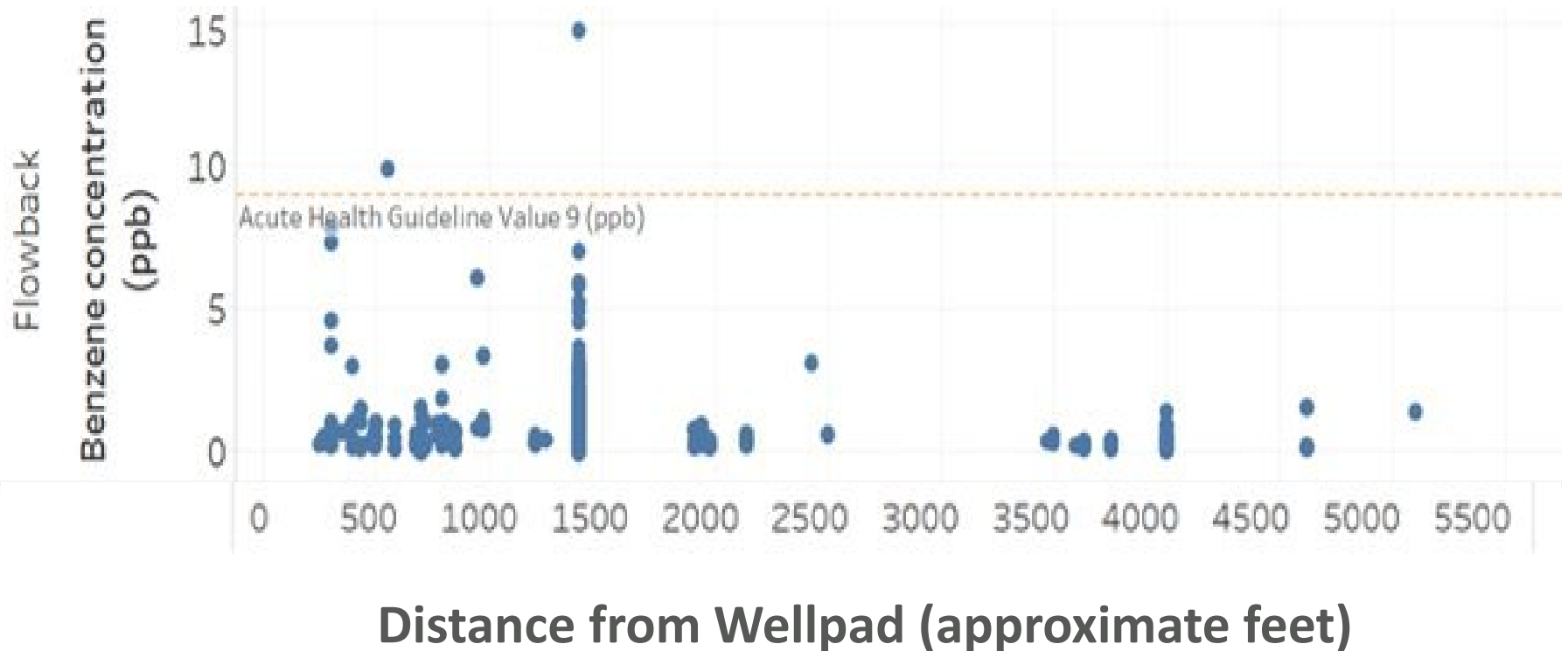
- ✓ **How Often?**
 - Once
 - Intermittent
 - Constant



HEALTH PROTECTIVE EXPOSURE GUIDELINE VALUES



COMPARING AIR DATA TO EXPOSURE GUIDELINES



The mere exceedance of an exposure guideline value does not mean harm

CONSIDERATIONS FOR ESTIMATING PUBLIC HEALTH RISK

- ✓ Start with the end goal in mind before you conduct an air study –What do you want to know?
 - Short term or long term health risks?
 - Specific facility information? Exposure in a community?
 - What VOCs are you concerned about? Why?
 - *Ex. Total VOCs won't tell you about health risks, only tells you about changes in air quality*

- ✓ Know how you will analyze the data
- ✓ Know how you will communicate your data
- ✓ Lots of EPA resources available

CONCLUDING REMARKS

- ✓ The mere exceedance of an exposure guideline value does not mean harm
- ✓ Air studies should be designed as fit for purpose
 - ❖ Before collecting data, know your “why” and what you will do with it
- ✓ Air measurement studies are intended to be used for public health risk management decisions, not to prove causality
- ✓ Accurate communication about the difference between harm versus risk is critical to reducing unnecessary public fear.



Evaluating the Public Health Impact of
Oil and Gas Emissions

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ENERGY AND AIR QUALITY REGULATION: PERSPECTIVE ON ENACTING SCIENCE- BASED POLICY IN THE AGE OF COMMUNITY SCIENCE

Eric Hodek
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RAMBOLL

Bright ideas. Sustainable change.

LEGISLATIVE DRIVERS

Senate Bill 19-181

Additional public welfare protections for oil and gas operations

House Bill 19-1261

Statewide greenhouse gas (GHG) emissions reductions

Senate Bill 19-096

Statewide GHG emissions reporting

House Bill 20-1265 House Bill 21-1189 House Bill 22-1244

Increased public protection from air toxics

Senate Bill 21-260

Sustainability of the transportation system

House Bill 21-1266

Environmental justice

Senate Bill 20-204

Air quality enterprise fund

- Funding for "Air Quality Modeling, Monitoring, Assessment, Data Analysis and Research"
- Stationary monitors, aerial monitoring, exposure/risk assessment
- <https://cdphe.colorado.gov/air-quality-enterprise>

Senate Bill 22-193

Omnibus Air Quality Bill

House Bill 22-138

Greenhouse gas

AIR POLLUTION ISSUES ARE DISTINCT

Criteria Air Pollutants



6 pollutants

Ozone and precursors

Regulated through
NAAQS

Harmful to humans and
environment

Greenhouse Gases



4 primary pollutants (CH_4 ,
 CO_2 , N_2O , FCs)

Regulated through
GHGRP

Affects global climate

Hazardous / Toxics



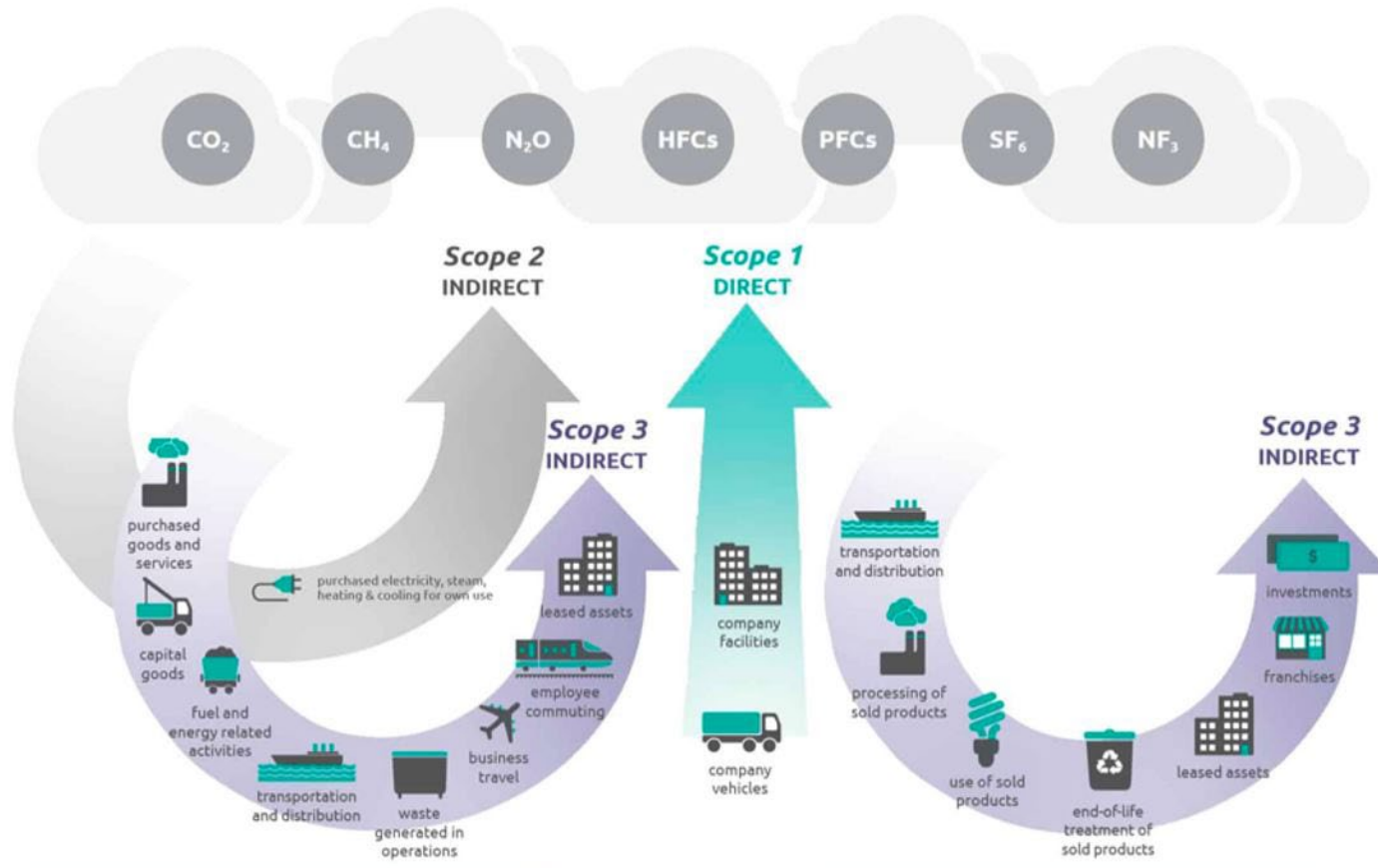
187 pollutants

Regulated through
NESHAP

Harmful to humans

DEVELOP BASELINE GHG INVENTORY

EMISSION SOURCES & SCOPES

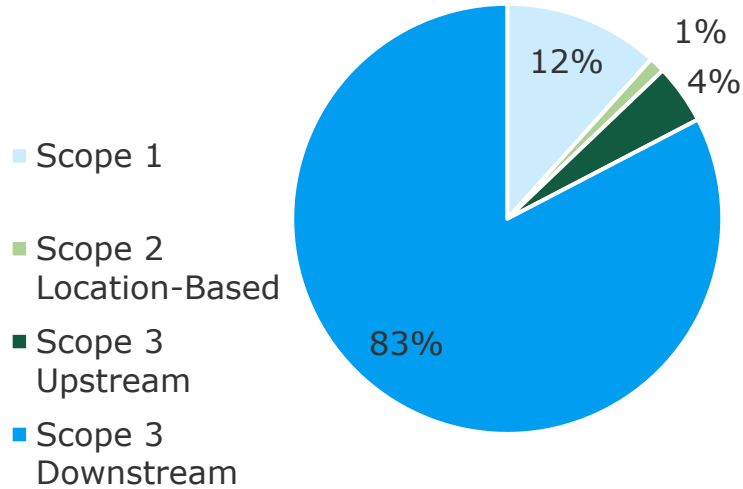


Consider the entire supply chain

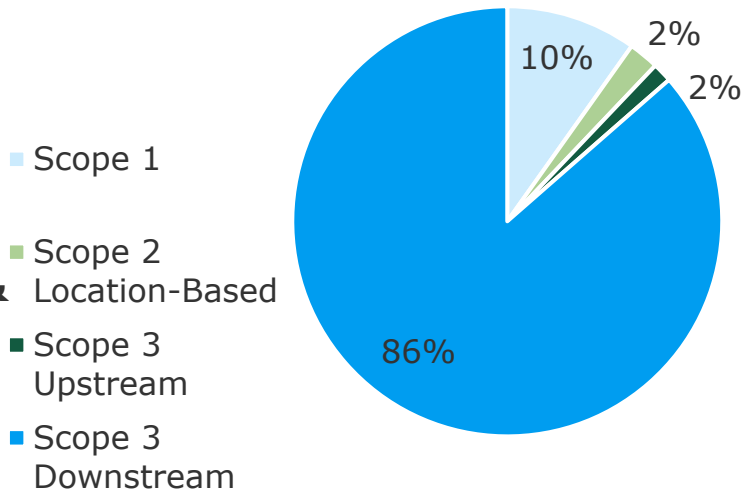
- Scope 1 – Direct emissions owned or controlled by the company
- Scope 2 – Indirect emissions from purchased energy (heat, steam, electricity)
- Scope 3 – Indirect emissions upstream or downstream
 - Supply chain emissions to produce or consume
 - Optional for reporting, **but** –
 - Orders of magnitude higher than Scope 1 and 2

SCOPE 3 EMISSIONS

Oil & Gas Processing

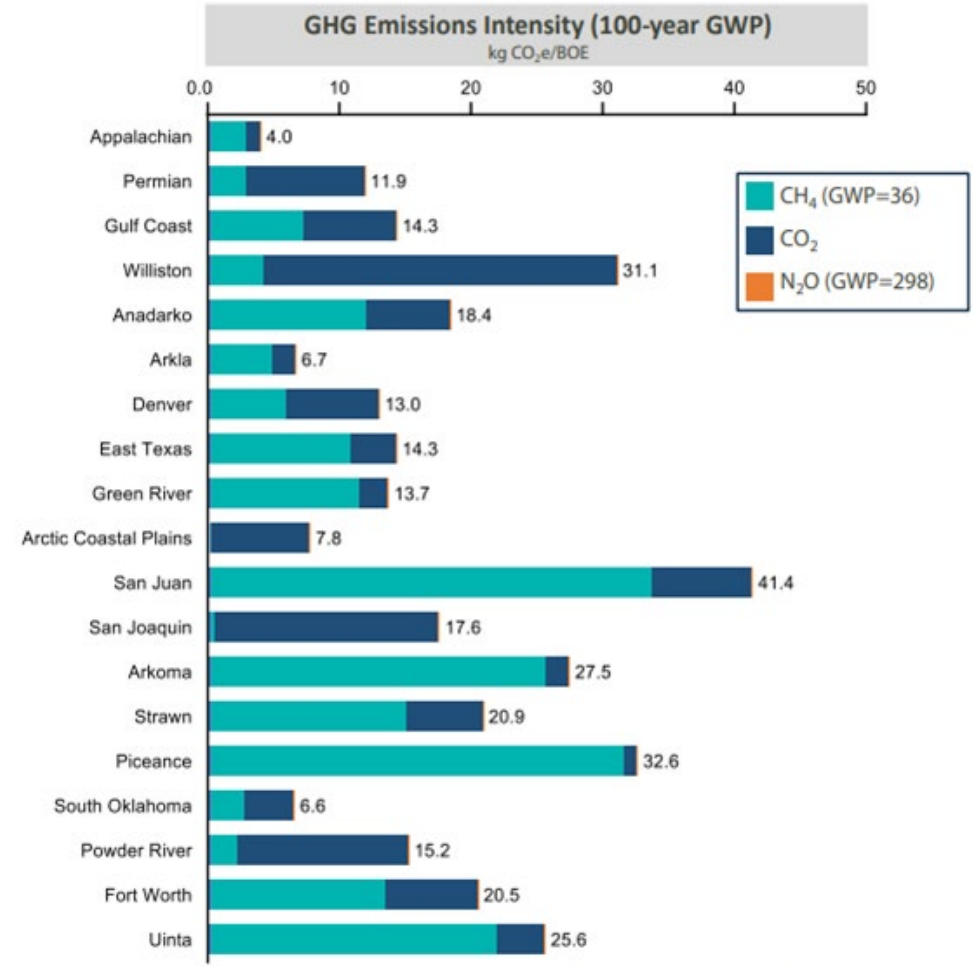


Oil & Gas Storage & Transportation



Source: 2020 Carbon Disclosure Project

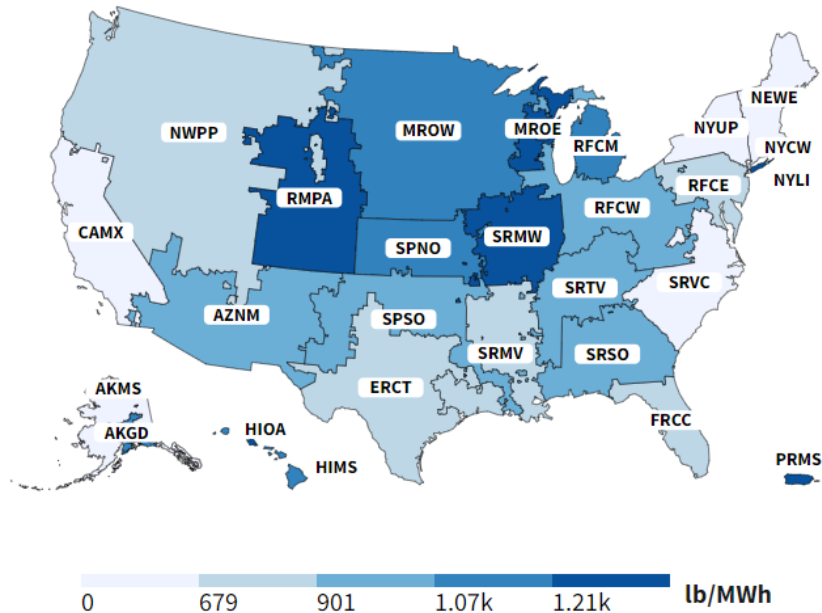
Upstream Production



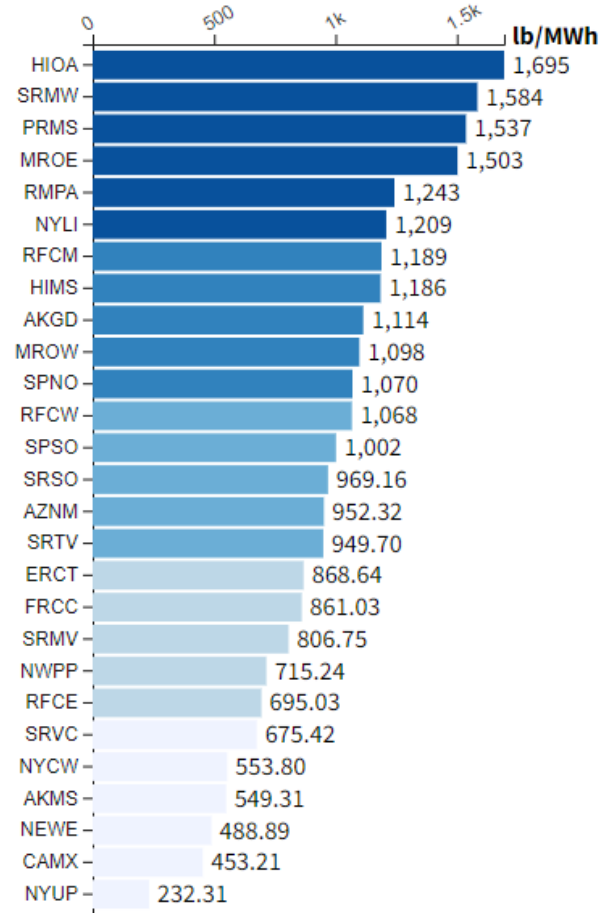
Note: Basins are ranked in descending order of hydrocarbon production (BOE)

Source: MJ Bradley Report-
https://www.mjbradley.com/sites/default/files/OilandGas_BenchmarkingReport_2021.pdf

ELECTRIFICATION



US: 884.23 (lb/MWh)



The efficacy of electrification is regional due to the varying carbon intensity and usage

- Natural gas engines vary from ~1,000 to 1,600 lb/MWh depending on size, type, and use compared to 1,243 lb/MWh on local grid
- Electric vehicles uses 24-30 kWh/100 miles or 0.3 to 0.4 lb/VMT in RMPA
- Average carbon intensity of fuel-fired vehicles are 0.9 lb/VMT

This considers direct emission only – must consider Scope 1 and 2 from construction, transport, infrastructure

Must consider economic, reliability, and safety concerns as well

Source: eGRID, 2021, <https://www.epa.gov/egrid/data-explorer>



COMMUNITY SCIENCE AND IMPACTS TO GREENHOUSE GAS POLICIES

Greenhouse gas and climate change are **global not local** issues

- Local concentrations of methane and carbon dioxide do not correlate to global temperature impacts
- GHGs do not recognize political boundaries. Policies must consider **leakage** and not provide incentive to produce energy less efficiently.

You must consider emissions across the supply chain (life cycle analysis)

- **Direct emissions are a fraction** of energy's carbon intensity
- **Transparency** and **verification** in the inventories is vital to preclude double-counting and ensure real reductions occur

Electrification is not a panacea – but it is a tool in the toolkit to be used appropriately

COMMUNITY SCIENCE AND PUBLIC HEALTH POLICY

Air quality **sensors** are becoming widely available and inexpensive

- Allows for the community collection of ambient concentrations
- Vary greatly in the analytes, detection level, periodicity, and duration
- Often **pollutants of concern are not directly monitored** or use surrogates creating uncertainty and potential misinformation
- Varying degrees of quality assurance and data reduction
- While they can be useful to detect a change, often ill-suited for health risk assessment

However, community science can be useful provided proper implementation of data collection within the confines of a **rigorous, unbiased** health risk assessment framework

- You cannot have an agenda (either way)
- You must consider all available data (properly reduced) in the **context** of relevant health guidelines