WATER LOSS SPECIALIST GROUP

the international water association

Leakage Emissions Initiative

www.leigroup.org

Improving our air by preserving our water

Outside Investors Paying for Leakage…. Really?

The Leakage Emissions Initiative and the New Funding Sources through the Leakage-Carbon Nexus

April 15, 2024

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Relevant Roles:

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CAVANAUGH

Stewardship Through Innovation

Water Loss 2024

April 14-17, 2024 San Sebastián

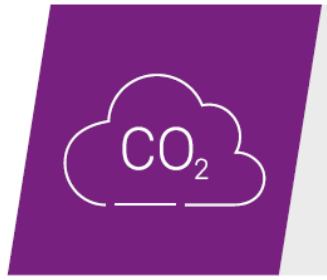
About 126 billion cubic meters of water is lost every year

Equal to 100%

of the fresh water withdrawals in Germany, France, Spain, Italy, and the U.K. combined

$187.2 bil.

in lost revenue, based on average rates at rated U.S. municipal water utilities



11.9 bil. kg CO2

is generated annually in treating non-revenue water globally

>30%

of water withdrawals in two-thirds of countries

Source: S&P Global Ratings.

Sustainability Insights Research: Lost Water: Challenges And Opportunities

In this research, S&P Global Ratings looks at water infrastructure challenges through the lens of non-revenue water (NRW), meaning water that a utility sources and treats but for which it receives no financial compensation. NRW, or lost water, deters investment in water infrastructure assets. Reducing it can have many benefits, including increasing universal access to safe water, mitigating water stress, reducing the impacts of freshwater withdrawals on ecosystems, and mitigating global greenhouse gas emissions. Investment decisions made today could significantly affect future NRW rates. Yet, in many cases--particularly emerging markets--access to private-sector funding is limited and regulatory incentives are insufficient.

Download

Leakage Emissions Initiative

Following Water Loss 2022 in Prague, The IWA WLSG proposed an initiative that seeks to quantify the impact unchecked leakage has concerning avoidable carbon emissions.

The goal was to update the water balance to include an accounting on the carbon emissions for each balance component with a specific initial focus on Leakage.

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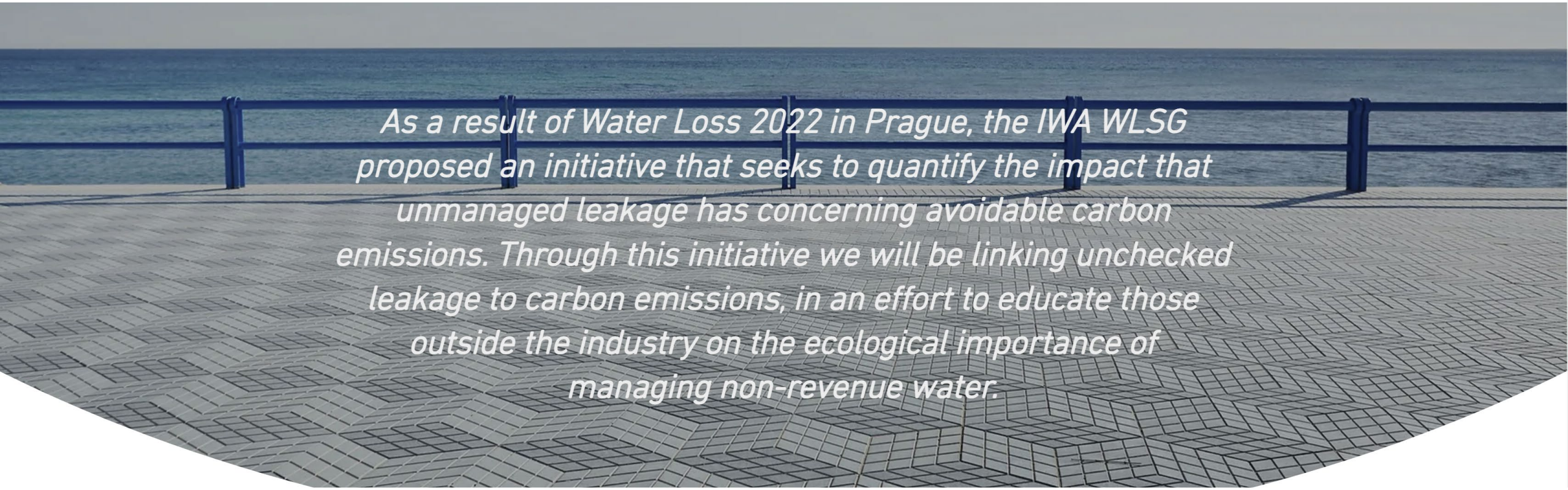

As a result of Water Loss 2022 in Prague, the IWA WLSG proposed an initiative that seeks to quantify the impact that unmanaged leakage has concerning avoidable carbon emissions. Through this initiative we will be linking unchecked leakage to carbon emissions, in an effort to educate those outside the industry on the ecological importance of managing non-revenue water.

Leakage Emissions Initiative: Establishing a Standard Carbon Balance for Drinking Water Utilities

Version 4.3

April 21, 2023

Keywords: Carbon Emissions, Carbon Intensity, Energy Intensity, Real Loss, Physical Loss, Leakage, Standard Water Balance, Standard Carbon Balance

Introduction

Importance of Reducing Carbon Emissions and how it relates to Real Loss

Interest in carbon reduction to combat climate change has been growing rapidly since the mid 2000's. In 2015, the Paris Accords were established to influence a societal change to a carbon neutral future. The Paris Accords specifically seek to limit the mean rise in global temperatures to below 2 degrees Celsius above pre-industrial levels, among other stated measures intended to benefit humanity in combatting climate change. These Accords are responsible for numerous policies and legislation enacted by the European Union and 193 other signatory member states to align financial incentives with a greener future. The financial incentives aim to inspire breakthroughs in technology for production of greener energy and/or direct reduction of carbon emitting practices. Reduction of carbon-emitting practices that accompany the production of useful items and services is as critical to carbon neutrality as production of greener and more sustainable energy.

Real Loss (leakage) is generally defined by the International Water Association (IWA) as leakage resulting from failed distribution system infrastructure. Unmanaged leakage is a problem that is already being addressed by various global entities. However, the carbon impact of that leakage has not been definitively established. Every unit of water distributed by a utility, results in the production of a certain amount of greenhouse gas emissions (carbon cost) due to the energy expended in the extraction, treatment, pumping and distribution of that unit of water. These emissions are known as Scope 2 emissions, which are indirect emissions an entity is responsible for as a result of purchasing carbon intensive electricity used in an entity's operations[1]. Every unit of water lost to leakage results in carbon emissions that would otherwise be avoided if such leakage were reduced. In general, it is not economically viable for a utility to eliminate 100% of its leakage. However, utilities can, and should, strive to achieve the technical minimum that is possible. Excessive leakage provides no benefit for the utility or its customers and therefore, carbon emitted in the process is unnecessary. It can also be reasoned that for those utilities with renewable energy sources, excessive leakage represents a waste that could be otherwise used to further offset carbon-emitting energy sources.

The intent of the Leakage Emissions Initiative (LEI) is to incentivize utilities to aggressively identify and reduce leakage, generating carbon credits which can then be sold to organizations seeking to achieve carbon neutrality. This begins with utilities adopting the Standard IWA/AWWA Water Balance (Standard Water Balance) and the newly added Carbon Balance methodology. A new revenue stream from

[1] "Scope 1 and Scope 2 Inventory Guidance." EPA, Environmental Protection Agency, 9 Sept. 2022, https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance#:~:text=Scope%202%20emissions%20are%20indirect,of%20the%20organization's%20energy%20use.

Acknowledgements

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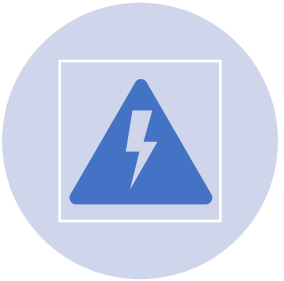
JUNE 9, 2023 Climate Change Society Water Supply

IWA Water Loss Specialist Group White Paper: Leakage Emissions Initiative

The Water Loss Specialist Group (WLSG) is a group of the International Water Association that promotes best practice in the management of water loss and non-revenue water across the world.

How “Dirty” is the Energy Source?



Grams CO_2/kWh

How much <u>Energy</u> does the Utility use to deliver its <u>annual water production</u>?

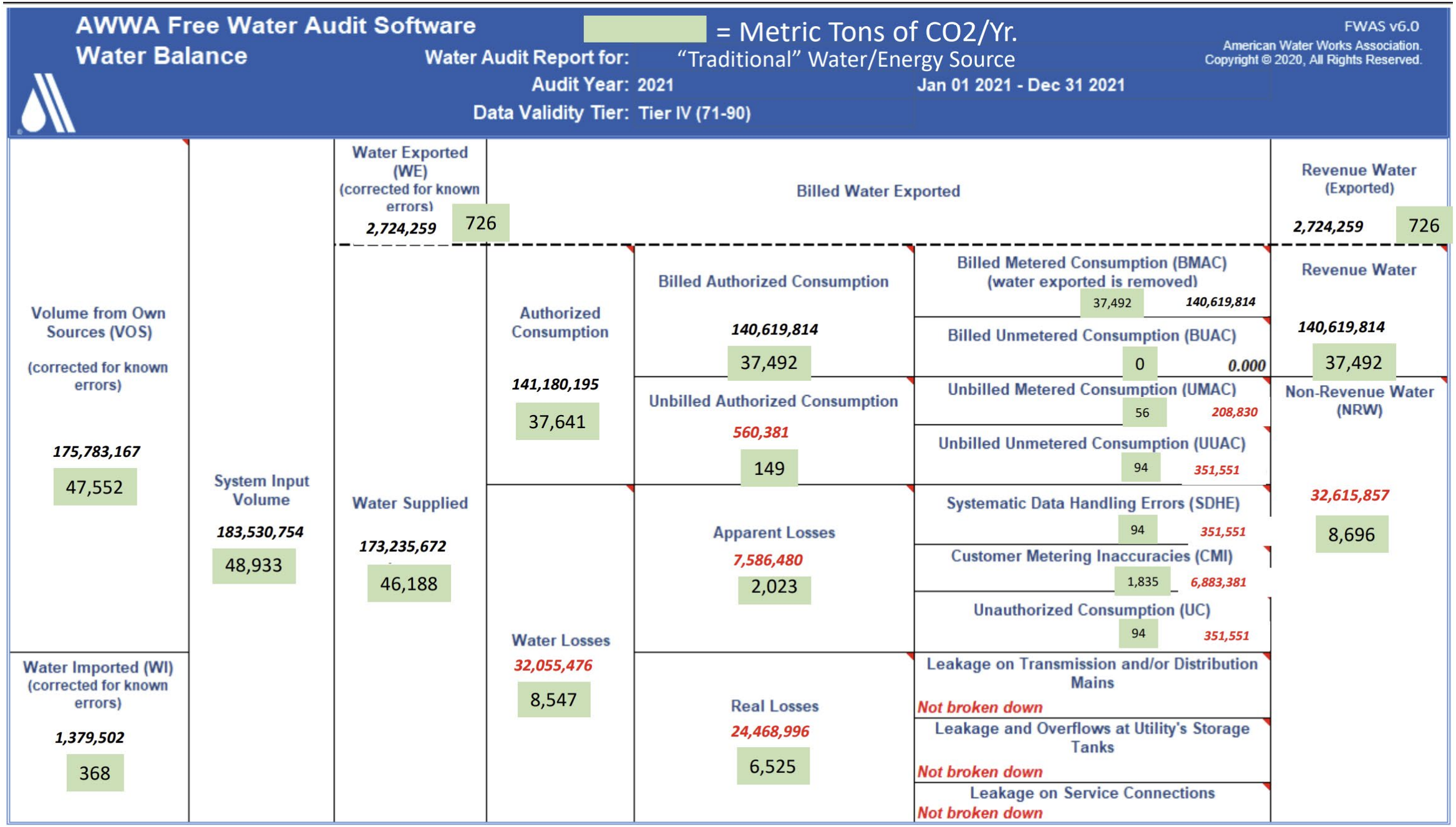
kWh/M³ (kWh/Mgal)

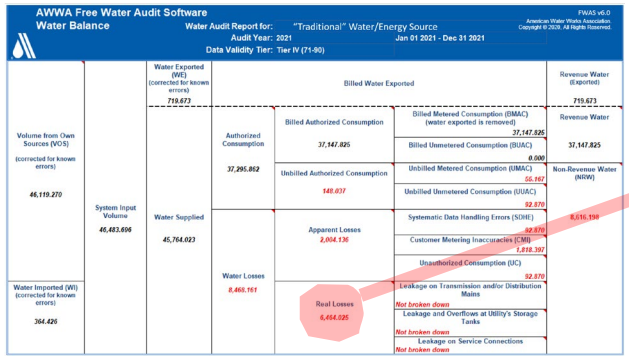
Generates Utility Specific Carbon Intensity

Grams CO_2/M³

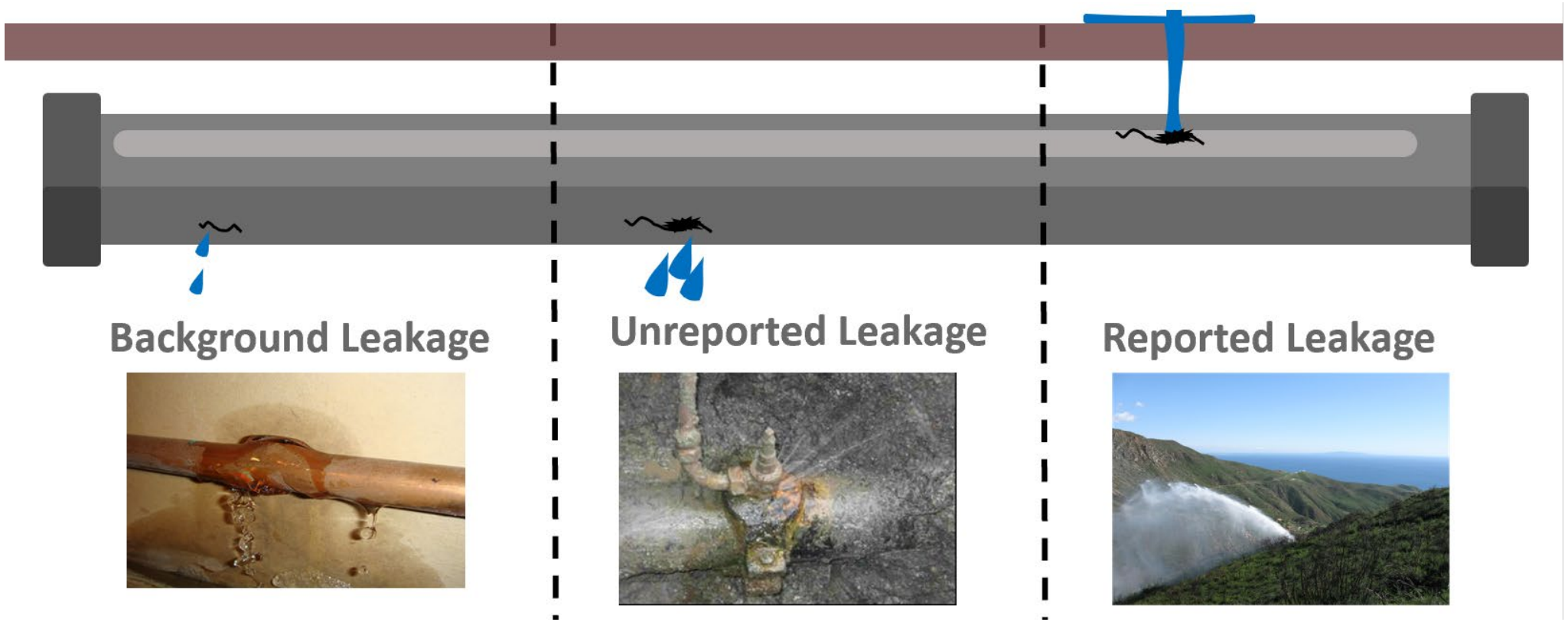
(Grams CO_2 /Mgal)

https://app.electricitymaps.com


AWWA Free Water Audit Software
Water Balance
= Metric Tons of CO2/Yr.
Water Audit Report for: "Traditional" Water/Energy Source
Audit Year: 2021
Jan 01 2021 - Dec 31 2021
Data Validity Tier: Tier IV (71-90)
FWAS v6.0
American Water Works Association.
Copyright © 2020, All Rights Reserved.
Volume from Own Sources (VOS)
(corrected for known errors)
175,783,167
47,552
Water Imported (WI)
(corrected for known errors)
1,379,502
368
System Input Volume
183,530,754
48,933
Water Exported (WE)
(corrected for known errors)
2,724,259
726
Water Supplied
173,235,672
46,188
Billed Water Exported
2,724,259
726
Authorized Consumption
141,180,195
37,641
Water Losses
32,055,476
8,547
Billed Authorized Consumption
140,619,814
37,492
Unbilled Authorized Consumption
560,381
149
Apparent Losses
7,586,480
2,023
Real Losses
24,468,996
6,525
Billed Metered Consumption (BMAC)
(water exported is removed)
37,492
140,619,814
Billed Unmetered Consumption (BUAC)
0
0.000
Unbilled Metered Consumption (UMAC)
56
208,830
Unbilled Unmetered Consumption (UUAC)
94
351,551
Systematic Data Handling Errors (SDHE)
94
351,551
Customer Metering Inaccuracies (CMI)
1,835
6,883,381
Unauthorized Consumption (UC)
94
351,551
Leakage on Transmission and/or Distribution Mains
Not broken down
Leakage and Overflows at Utility's Storage Tanks
Not broken down
Leakage on Service Connections
Not broken down
Revenue Water (Exported)
2,724,259
726
Revenue Water
140,619,814
37,492
Non-Revenue Water (NRW)
32,615,857
8,696



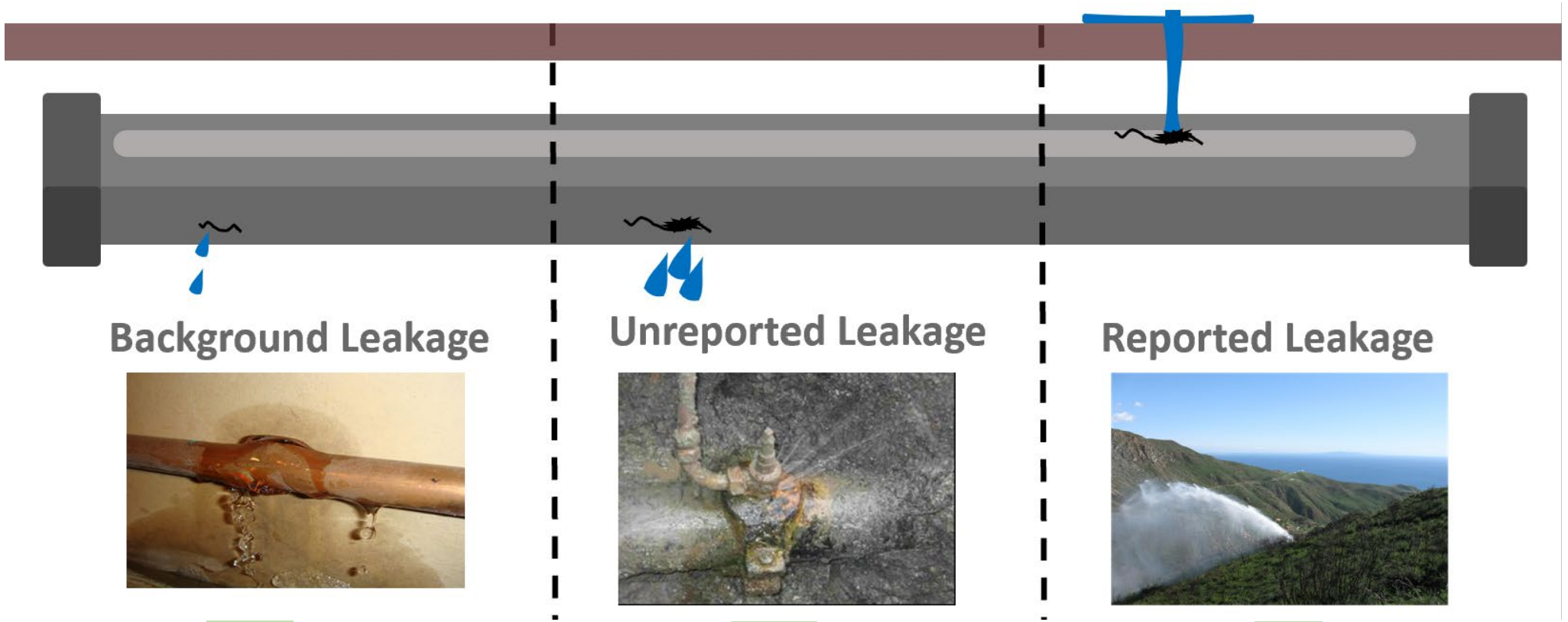
Water Balance Real Loss	24,468,996 m^3
Reported Leakage Through Repairs	1,892,706 m^3
Background Leakage	8,399,829 m^3
Estimate of Unreported Real Loss	14,176,461 m^3 (Recoverable)



= Metric Tons of CO_2/Yr.

Water Balance Real Loss	24,468,996 m^3	6,525
Reported Leakage Through Repairs	1,892,706 m^3	505
Background Leakage	8,399,829 m^3	2,240

Estimate of Unreported Real Loss 14,176,461 m^3 (Recoverable) 3,780



2,240

8,399,829

3,780

14,176,461

505

1,892,706

AWWA Committee Report – In progress

	Imperial Units Example		SI Units Example		Calculation Notes
Calculator: Utility Carbon Intensity					
Volume of Water Supplied	10,000	MG/yr	37,854	ML/yr	From Standard Water Balance
Reference Carbon Intensity	540	g/kWh	540	g/kWh	From Utility's energy source(s)
Utility Energy Usage	23,000,000	kWh/yr	23,000,000	kWh/yr	From Utility Energy Bill(s)
Utility Energy Intensity	2,300	kWh/MG	608	kWh/ML	*Utility Energy Usage* divided by *Volume of Water Supplied*
Utility Carbon Intensity	1,242,000	g/MG	328,102	g/ML	Multiply *Reference Carbon Intensity* by *Utility Energy Intensity*

Example Utility Carbon Intensity Calculation

	Imperial Units Example		SI Units Example		Calculation Notes
Calculator: Carbon Reduction					
Utility Carbon Intensity	1,242,000	g/MG	328,102	g/ML	From *Utility Carbon Intensity* calculator
Target Leakage Reduction	1,450	MG/yr	5,489	ML/yr	Manual input, based on analysis of leakage reduction potential
Carbon Reduction	1,800,900,000	g/yr	1,800,900,000	g/yr	Multiply *Target Leakage Reduction* by *Utility Carbon Intensity*
Carbon Reduction	1,801	mt/yr	1,801	mt/yr	Conversion to Metric Tons per year (divide grams/1,000,000)

Example Carbon Reduction Calculation

Carbon Leakage Credits (CLCs), Maybe?

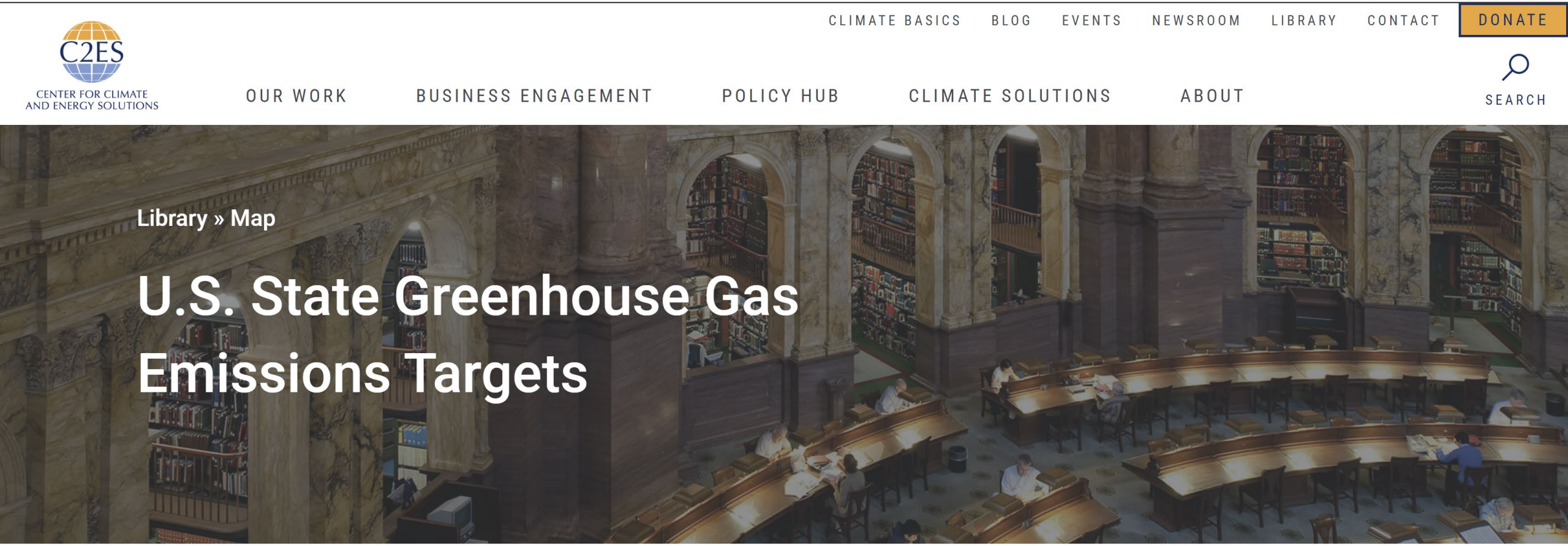
The Leakage Emissions Initiative may lead to a system where a utility can generate Carbon Leakage Credits when they reduce their Leakage Emissions by reducing their Real Loss.

CLCs may represent a measurable decrease in emissions and wasted water

CLCs may then be sold to corporations who have sustainability goals related to a reduction in GHG emissions and water conservation

The revenue generated from CLCs can bolster funding for:
Fixing leaks, Pressure Management, Asset Rehabilitation

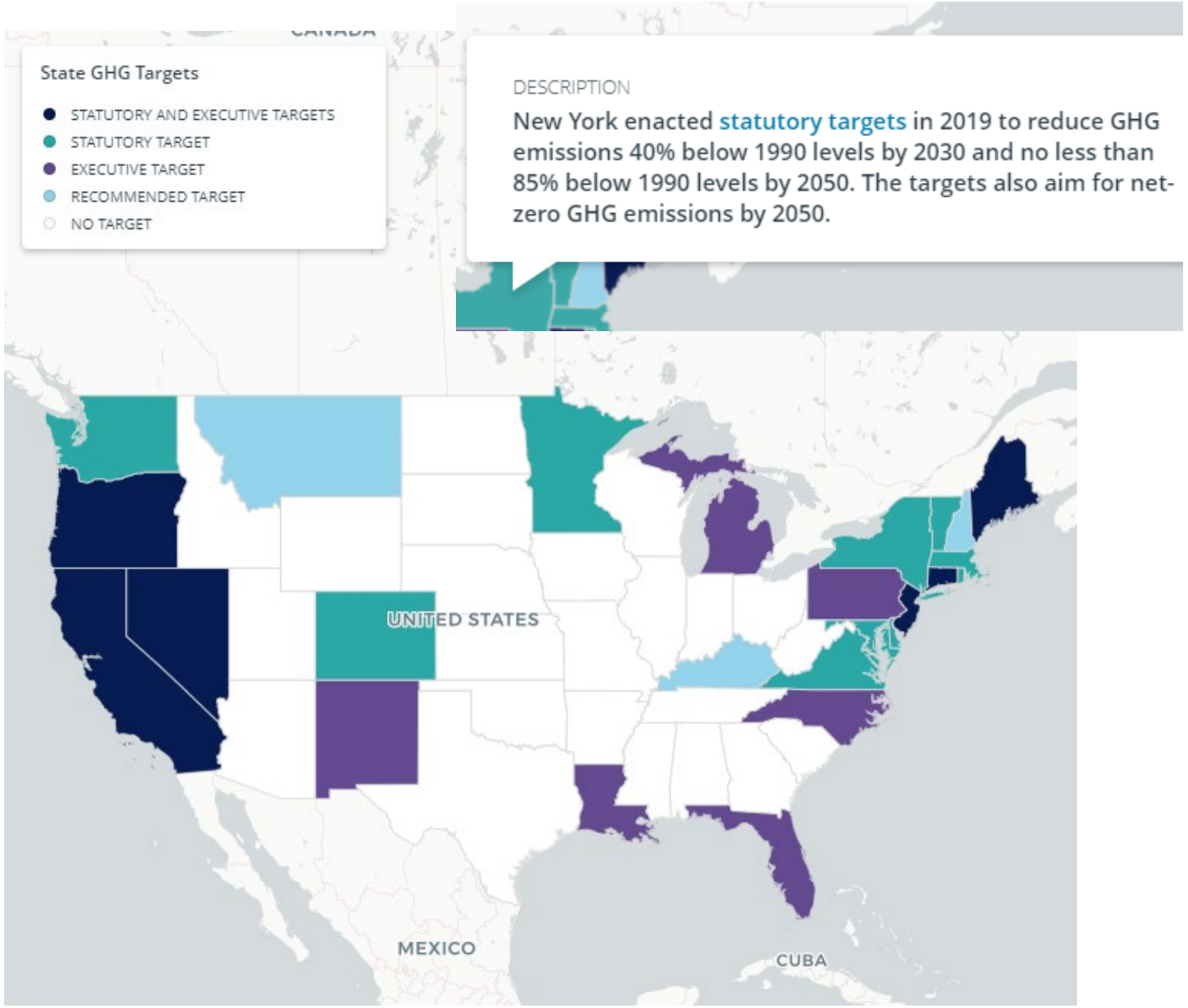
National and State Goal Compliance, Maybe? (Nationally Determined Contributions – NDCs)



https://www.c2es.org

US GHG Reduction Goals

- US Federal Government goals
  - Reducing U.S. greenhouse gas emissions 50-52% below 2005 levels in 2030
  - Reaching 100% carbon pollution-free electricity by 2035
  - Achieving a net-zero emissions economy by 2050
  - Delivering 40% of the benefits from federal investments in climate and clean energy to disadvantaged communities
- Leakage Reduction can help the state and federal government get closer to net zero emissions



https://www.c2es.org/document/greenhouse-gas-emissions-targets/

Carbon Insetting

- Carbon insetting - Directly reducing emissions associated within an organization’s supply chain
- US State and Federal Governments have their own emissions reductions goals they need to achieve (previous slide).
- By funding Non-Revenue Water projects, they can directly reduce a significant amount of carbon from domestic water supply chains.
- Every ton of carbon avoided by LEI based programs can help US State and Federal Governments inset against their total emissions

Leakage Emissions Horizon

- Methodology Endorsed by Verification Body – example: Gold Standard
- Case Studies from recent and ongoing Leakage Reduction Projects
- Education to Global Financial Institutions

Considerations and Discussion

- Time horizon to “count” avoided CO2 – 10, 15 years?
- What about new leakage after a reduction project
- Addressing “Leakage Lagging Mindset/Misconception” (LLM)

  “Utilities should have already reduced their leakage”

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