

Reggio Emilia – Leakage Emissions Initiative Case Study

The Leakage Emissions Initiative (LEI), is a collaborative effort between members of the IWA Water Loss Specialist Group. It has developed the global methodology to quantify the impact of unmanaged leakage on avoidable carbon emissions¹. This case study highlights the outcomes of a leakage reduction project in the Reggio Emilia province of Italy and its subsequent carbon emission savings.



Figure 1 Reggio Emilia (Source: Wikipedia)

Methodology

The LEI has developed a methodology to determine a utility's specific energy intensity and apply it to quantify carbon emissions for each component of the standard water balance, creating a standard carbon balance. By conducting annual standard carbon balances in conjunction with leakage reduction projects, utilities can track metric tons of carbon emissions avoided through infrastructure and operational improvements.

Reggio Emilia Case Study

Between 2019 and 2023, Reggio Emilia invested in a Non-Revenue Water (NRW) program across multiple districts, achieving a reduction of nearly 2.5 million m³ of drinking water loss. The accompanying carbon balance calculation reveals that the utilities saved over 400 tons of carbon emissions annually due to these efforts.

Table 1: Carbon Calculation Results (SI Units)

Year	Leakage Volume Reduction (m ³ /Yr)	Carbon Reduction (Mt/Yr)	CO2 Source Emissions (g/kWh)	Power Consumption (kWh)	Power Carbon Intensity (g/m ³)
2020	559,000	85	306	22,683,447	151
2021	1,529,000	271	358	22,246,984	177
2022	-246,000	-45	370	21,778,341	183
2023	653,000	100	306	21,650,000	153
Total	2,495,000	411	-	-	-

Notably, despite an increase in power source emissions carbon intensity in 2021, the overall reduction in leakage resulted in a net decrease in carbon emissions. Maintaining these leakage

¹ IWA Water Loss Specialist Group White Paper: Leakage Emissions Initiative: <https://iwa-network.org/news/water-loss-specialist-group-white-paper-leakage-emissions-initiative/>

improvements could lead to over 1,500 MT of carbon avoidance by 2040. This is equivalent to the carbon emissions from:

- 6.3 million km of driving a car
- Burning 750,000 kg of coal
- Annual electricity usage of 300 homes
- 0.39% of the annual power produced by a natural gas-powered electricity generation facility

Conclusion

While Italian utilities already track their NRW progress, integrating the Leakage Emissions Methodology into future analyses could help establish a regional benchmark and forecast carbon reduction benefits for future NRW projects. This case study demonstrates the significant potential for carbon emission reduction through effective leakage management, highlighting the importance of incorporating environmental considerations into water resource management strategies. To learn more about the Leakage Emissions Initiative, visit us at www.leigroup.org.