Missoula COUNTY

GREENHOUSE GAS EMISSIONS REPORT

2023

ACKNOWLEDGEMENTS

This report would not be possible without the support of the Missoula County Board of County Commissioners, contributions from the Carbon Neutrality Team, and the data and expertise provided by each department.

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Missoula County Carbon Neutrality Team

We thank you for your continued support in our efforts to achieve carbon neutrality.

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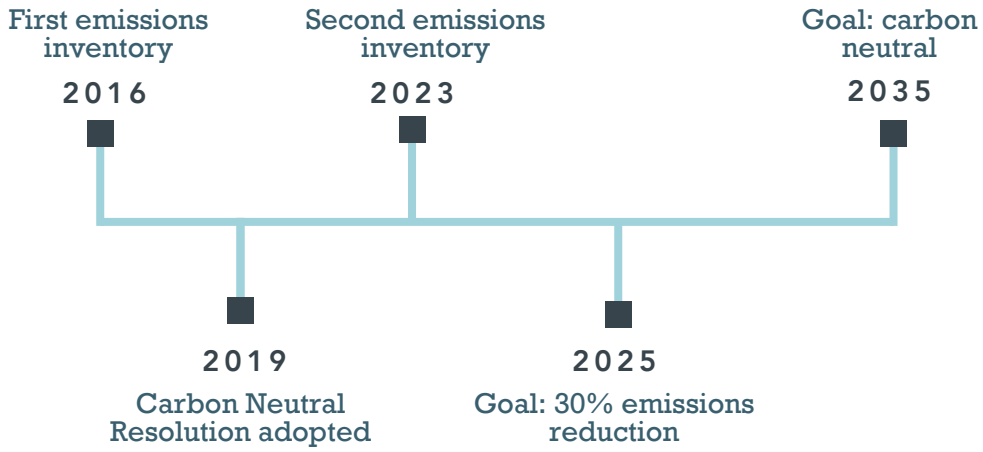
BACKGROUND

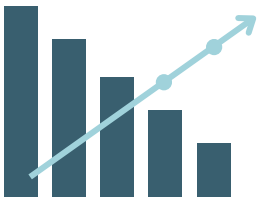


This report is intended to be brief. It focuses on higher level results and analysis and does not provide a depth of detail on methodology, data collection, etc. More information about the methodology and data collection is available upon request to County Climate Action Staff.

In August 2017, Missoula County published the Missoula County Operations Greenhouse Emissions Inventory Report and Analysis, an analysis of 2016 emissions and the first emissions inventory for County operations. In 2019, Missoula County adopted a resolution establishing a goal of Carbon Neutral Operations by 2035 with an interim goal of a 30% reduction of emissions from 2016 levels by 2025. Between 2022 and 2023, Climate Action staff conducted an inventory of 2021 greenhouse gas emissions as a 5-year update and comparison to the 2016 Inventory. Both inventories utilized ICLEI – Local Governments for Sustainability's ClearPath tool, the leading software for analyzing local government carbon emissions. This report provides a summary of the 2021 greenhouse gas emissions inventory.

BY THE NUMBERS

MISSOULA COUNTY GHG EMISSIONS



We achieved a decrease in emissions despite seeing an increase in employees

19%
increase in employees

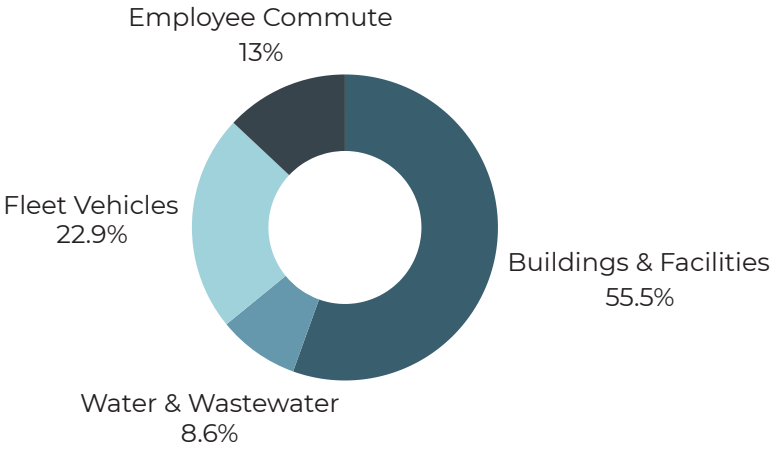
27%
decrease in emissions/employee

Total Reduction

The County successfully reduced emissions by 9.4% from 2016 levels, achieving the largest reduction in the employee commutes sector by prioritizing remote work during COVID-19.

9.4%

Total GHG Emissions by Sector, 2021

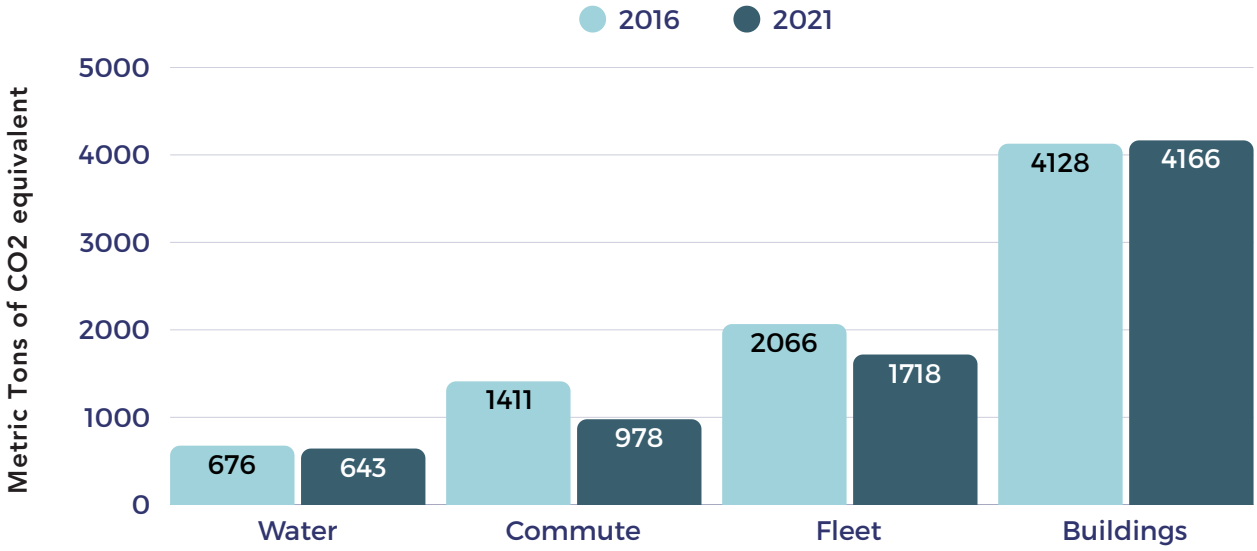


7,505 mtCO2e*

***equal to 1,631 passenger vehicles driven in one year**

Emissions Reduction by Sector

The GHG inventory focused on 4 high-emitting sectors: Buildings & Facilities, Fleet Vehicles & Equipment, Employee Commutes, and Water & Wastewater.

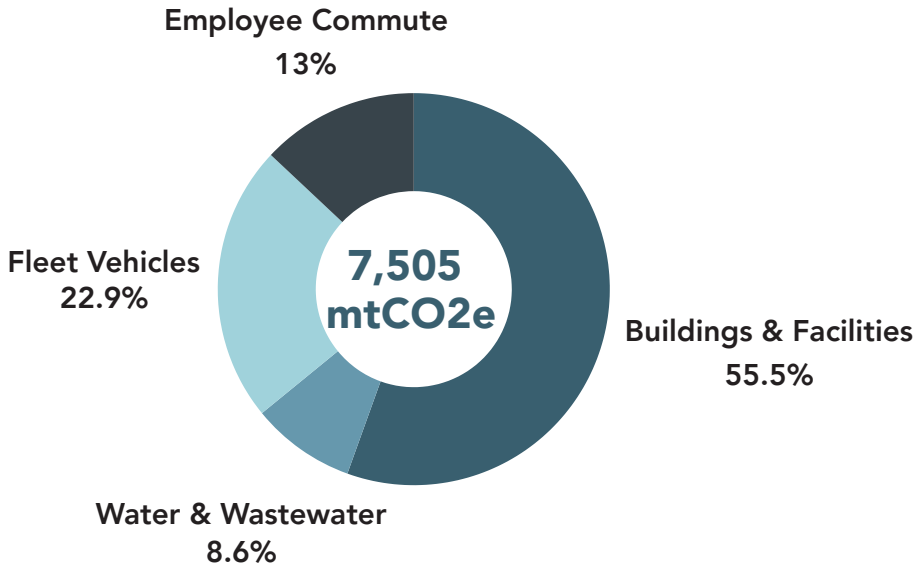


INVENTORY RESULTS

The County's total 2021 emissions were broken into four sectors: Buildings & Facilities; Fleet Vehicles & Equipment; Water & Wastewater; Employee Commutes. These are consistent with the sectors used in the 2016 inventory. The chart below shows the contribution of each sector to the total overall emissions. Employee Commute and Water and Wastewater had much lower total contributions.

The County's total 2021 emissions were 7,505 metric tons of CO2 equivalent (mtCO2e.)

TOTAL GHG EMISSIONS BY SECTOR, 2021



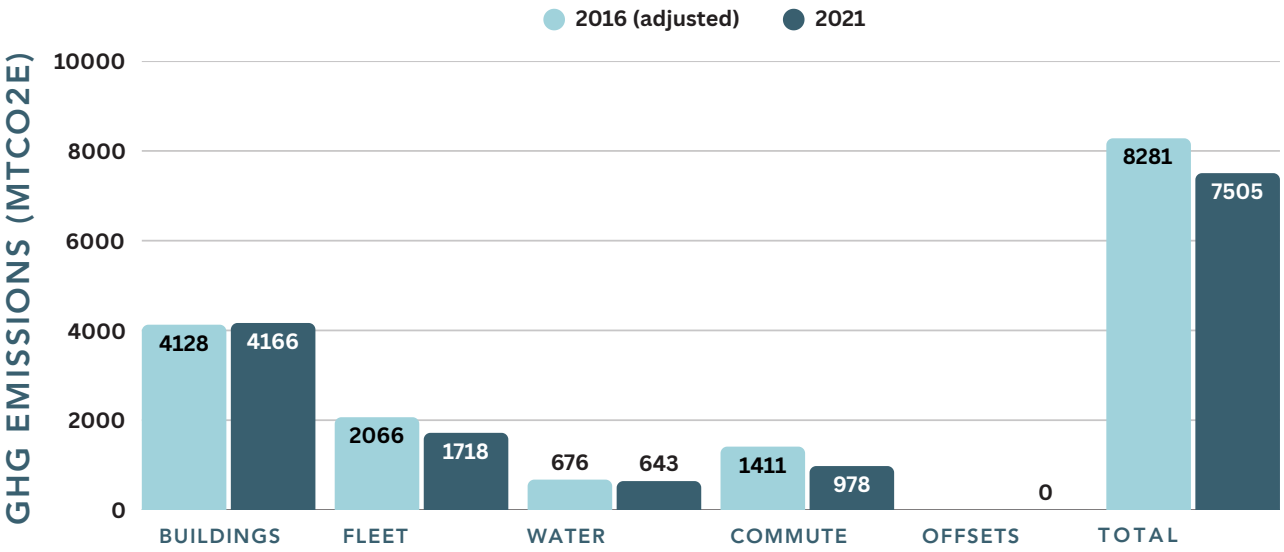
The largest contributor was Buildings and Facilities, accounting for 55% of the total emissions. This is more than double the next largest category, Fleet, which accounts for 23% of total emissions. Employee Commute (13%) and Water and Wastewater (9%) had much lower total contributions.

SECTOR	EMISSIONS (mtco2e)
BUILDINGS & FACILITIES	4,166
FLEET VEHICLES & EQUIPMENT	1,718
EMPLOYEE COMMUTE	978
WATER & WASTEWATER	643
TOTAL EMISSIONS	**7,505**

COMPARISON TO 2016

Before comparing the 2021 inventory to the 2016 inventory, it was necessary to create a copy of the 2016 inventory and update certain emissions factor multipliers to allow for an apples-to-apples comparison. The 2016 inventory used publicly available regional emissions values provided by the U.S. Environmental Protection Agency (USEPA) to calculate emissions associated with electricity use. Since the 2016 Inventory was completed, the USEPA began releasing state-specific emissions factors that more accurately reflect the fuel that supply resources use to generate the electricity consumed in each state.

COMPARISON OF 2016 AND 2021 EMISSIONS, BY SECTOR



The regional values used for the original 2016 inventory underestimated the state-specific emissions rates by nearly 50%. This is largely due to differences in Montana's use of coal (much higher) and natural gas (much lower) compared to the regional values.

In order to conduct a more accurate comparison, a clone of the 2016 inventory was created in ClearPath and was re-calculated with the Montana-specific factor sets for electricity. This only impacted the Buildings & Facilities and Water & Wastewater categories because those sectors include the use of power from the electrical grid, and thus are impacted by the grid's carbon intensity. Once that was completed, the 2021 inventory could be compared in a more apples-to-apples way. Those results are shown in the chart below. The County's 2021 emissions were 9.4% lower than the 2016 (adjusted) emissions. As of 2021 the County was approximately a third of the way towards achieving its interim goal.

SECTOR ANALYSIS

This section discusses the 2021 inventory in comparison to the 2016 adjusted inventory. It is organized by sector, from the largest emissions reduction to the smallest and include offsets. Emissions reductions are reported in relation to the reduction within that specific sector, rather than a percentage of the overall emissions.

01

EMPLOYEE COMMUTE

31% reduction

Employee commute data was collected through an employee survey.

02

FLEET VEHICLES AND EQUIPMENT

17% reduction

Fleet data was collected from vehicle miles travelled annually.

03

WATER AND WASTEWATER

5% reduction

Water data was collected from purchased electricity and the use of coefficients for calculating emissions from septic tanks.

04

BUILDINGS AND FACILITIES

1% increase

Buildings data was collected from purchased electricity.

05

EMISSIONS OFFSETS

.009% reduction

Offset data was collected from community solar subscriptions.

01 EMPLOYEE COMMUTE

GHG REDUCTION

31%

The largest impact to the reduction in emissions came from the Employee Commute sector, which fell 31% compared to 2016. Annual vehicle miles traveled (VMT) in gasoline-fueled cars are the dominant source of emissions for employee commuting largely because that is the most common form of commute for employees. County employees traveled nearly 1 million fewer miles in this subcategory compared to 2016, a 31% reduction. At the same time, the number of Person-Days[1] spent working from home increased 1,500%. This is likely due to the impact of the COVID-19 pandemic on remote work flexibility and options.

02 FLEET VEHICLES AND EQUIPMENT

GHG REDUCTION

17%

Emissions from the County's vehicle and equipment fleet were the second largest decrease in total emissions, reducing fleet sector emissions by 17%. The County has four fleets: Public Works, Sheriff's Office, Detention Center, and Motor Pool (Central Services and other departments). County departments are regularly upgrading their vehicles to newer models, which improves fuel economy. The impact of using more fuel-efficient vehicles cannot be overstated.

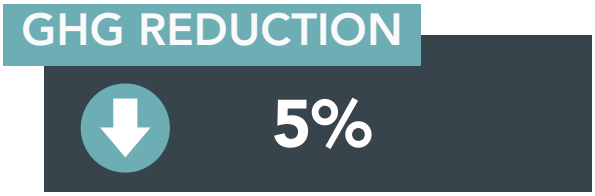
Of note, in 2021 Central Services implemented a new mechanism for vehicle procurement for the Motor Pool fleet in which they partner with Enterprise Fleet services to procure vehicles that are rotated in and out of the fleet every five years. As a result, the County will increase its use of newer and generally more fuel-efficient vehicles. This will also allow the County to procure and increase the use of hybrid vehicles.

KEY FINDING

Total emissions decreased 17% even though total vehicle miles traveled across all 4 fleets increased 22%.

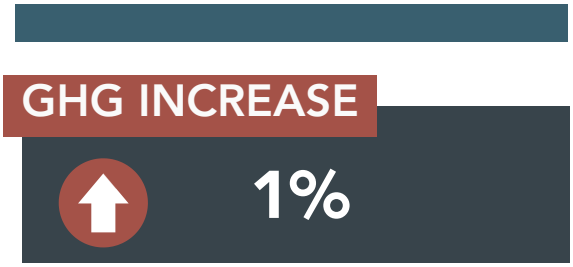
[1] A Person-Day is an individual day worked by a single employee. For example, a full-time employee working a typical five-day workweek will account for five Person-Days

03 WATER AND WASTEWATER



The County's Water and Wastewater emissions decreased 5% compared to the 2016 adjusted inventory. Population served is the most important factor in calculating these emissions. Total population served across the four facilities included in the inventory increased approximately 21% from 2016 to 2021. Despite this increase, the emissions from grid electricity decreased approximately 8%. Emissions from grid electricity is by far the biggest factor, contributing 65% of the total emissions in the Water & Wastewater sector.

04 BUILDINGS AND FACILITIES



The County's emissions from operating our buildings and facilities showed a marginal increase in emissions, growing 1% since 2016. Over that period, the County significantly reduced its use of propane (-69%), which was largely impacted by the closure of a propane-using facility in the Seeley Lake area. Electricity use increased only 1%, though the usage across utilities was very different. Electricity purchased from NorthWestern Energy decreased by 1% while electricity purchased from Missoula Electric Cooperative (MEC) increased by 59%. This demonstrates the importance of the supply resources that serve each utility.

Since MEC's electricity comes from the Bonneville Power Administration – whose supply mix is 95-96% emissions free – the large increase in electricity purchase from the cooperative did not drastically impact the County's overall emissions. Of note, the newly built solar project at the Missoula County Detention Facility was completed in November 2021 and its impact on purchased electricity is not accounted for in this inventory. That project is discussed later in this report. Natural gas usage increased 5% over the 5-year period across all utilities, with a 4% reduction in purchases from NorthWestern Energy but a 13% increase in purchases from Energy West.

The County also compared Energy Use Intensity across inventory years. Energy Use Intensity (EUI) is a measure of how much energy a building uses per square-foot, per year – measured in kBTU/sqft/year. The County's EUI value increased a nominal 5.3%, growing from 64.5 kBTU/sqft/year to 67.9 kBTU/sqft/year.

This increase is despite a slight reduction in building footprint across those two years (-3% in square-footage). EnergyStar provides information on typical EUI values across various sectors and property types. Buildings with similar uses to the County's operations (e.g., offices, courthouses, fire/police stations, libraries, etc.) can vary in EUI values from roughly 40 to more than 100. The County's EUI of 67.9 falls within this typical range, and close to the average value of 61.

05 EMISSIONS OFFSETS

GHG REDUCTION

.009%

Missoula County subscribes to several community solar programs through Missoula Electric Cooperative, which effectively count as emissions offsets for the purposes of this inventory. The County has purchased 47 total panels from the Cooperative's three solar projects (Lolo, Frenchtown, and "K3" in Bonner). Each month, the electricity production from the solar arrays is apportioned out to the panel owners on their electricity bills. In 2021, the County's subscriptions resulted in approximately 35,000 kWh of emissions-free electricity.

KEY FINDING

Adding clean, renewable energy sources to a more carbon-intensive energy grid offers more offset or emissions reduction potential than the same investment on a cleaner grid.

The community solar purchases were equivalent to 17% of our total electricity purchased from Missoula Electric Cooperative in 2021. This resulted in a reduction of 0.44 mtCO2e and a financial savings of approximately $2,500/year in electricity costs. The small nature of the emissions reduction is a direct result of the low-emissions supply resources from MEC, as discussed previously. As a comparison, if the County were to purchase the same amount of solar electricity from Northwestern it would result in a reduction of approximately 15 mtCO2e (a 3,200% increase in impact). This again demonstrates the impact of supply resources and the importance of working with partners to increase the amount of renewable energy on the grid. In part, this is why the County is excited to be working hand-in-hand with NorthWestern Energy and our partner communities of Missoula and Bozeman to develop a Green Power Program (GPP). The GPP effort will result in a newly built, Montana-based clean energy project that will provide emissions-free electricity for subscribing NorthWestern Energy customers (including the County). The GPP is an important strategy for reaching the County's clean electricity and emissions reductions goals.

ADDITIONAL ANALYSIS

In addition to the sector-by-sector comparison to 2016, the inventory allows for per-capita comparisons. In 2016, the County had approximately 837 employees and an emissions per employee factor of 9.9 mtCO2e/employee. In 2021, the County's capacity grew to 1,036 employees. However, the emissions per employee dropped to 7.2 mtCO2e/employee - a decrease of 27%.

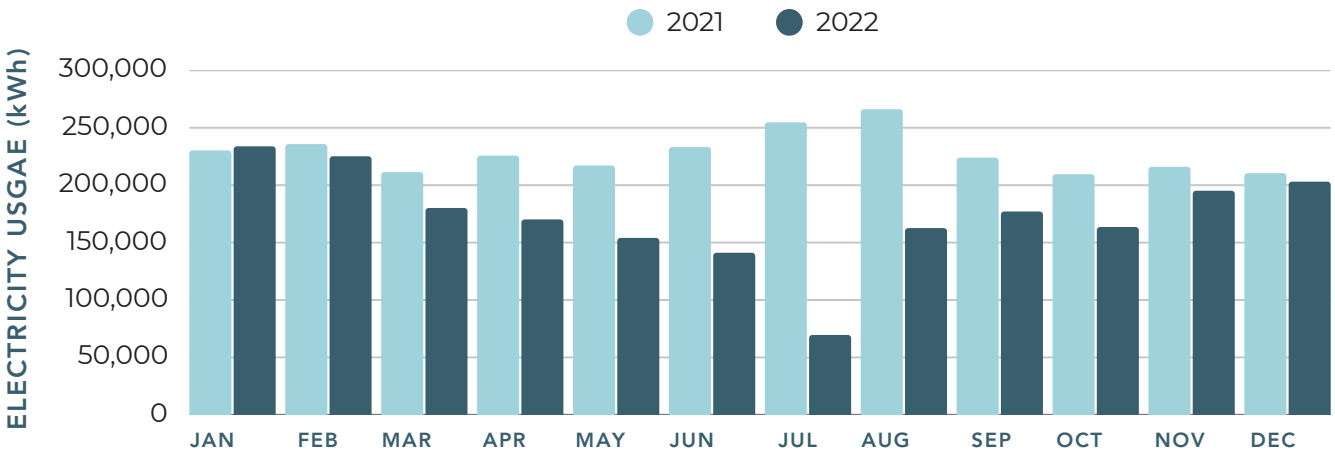
KEY FINDING

Local government services and capacity can grow while also reducing emissions.

SOLAR AT THE DETENTION CENTER

Not captured in the 2021 data is the impact of the large solar array on the Detention Center. The installation of a 432 kW-dc solar array on the roof of the Missoula County Detention Facility was completed in November of 2021. This became the largest rooftop solar array in the state of Montana. The project's impact was significant, resulting in a 24% reduction in the facility's annual electricity usage in 2022 compared to 2021. In July – a prime solar production month – the 2022 electricity usage at the facility was 72% lower than in 2021. This reduction in electricity is equivalent to a reduction of approximately 272 mtCO2e. This impact from the solar array equates to an additional 3.3% reduction in the County's total annual emissions as of 2022, bringing the County closer to its interim emissions reduction goal.

ANNUAL COMPARISON OF ELECTRICITY USAGE AT MCDF



CONCLUSION

The County reduced its total operational emissions 9.4% over the past 5 years. This is despite an increase in employees and an increase in population served by water & wastewater facilities. The progress is a direct result of the myriad projects, activities, and policies implemented by the County. The pace of the reduction – a 1.9% average reduction per year - does not put the County on the path that will achieve its interim goal of 30% reduction from the 2016 baseline by 2025. However, consider the impact of the solar project at the Detention Center. That project, alone, accounts for a 3.3% reduction in total emissions per year. This demonstrates that individual projects can have a significant impact. Looking forward, the County should focus on the following measures, some of which are already on-going efforts:

ENERGY EFFICIENCY

Energy efficiency and conservation in Buildings and Facilities, including consideration of projects identified in a recently completed investment-grade energy audit.

100% CLEAN ELECTRICITY

Continue to pursue the County's 100% Clean Electricity goal by developing on-site renewables and developing the Green Power Program in partnership with NorthWestern Energy.

FUEL ECONOMY

Continue to improve the fuel economy of the County fleet, including equipment and machinery.

WATER EFFICIENCY

Water efficiency and conservation in all County operations, particularly focusing on where hot water-related appliances are used.

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