LIMU AND NITROGEN POLLUTION

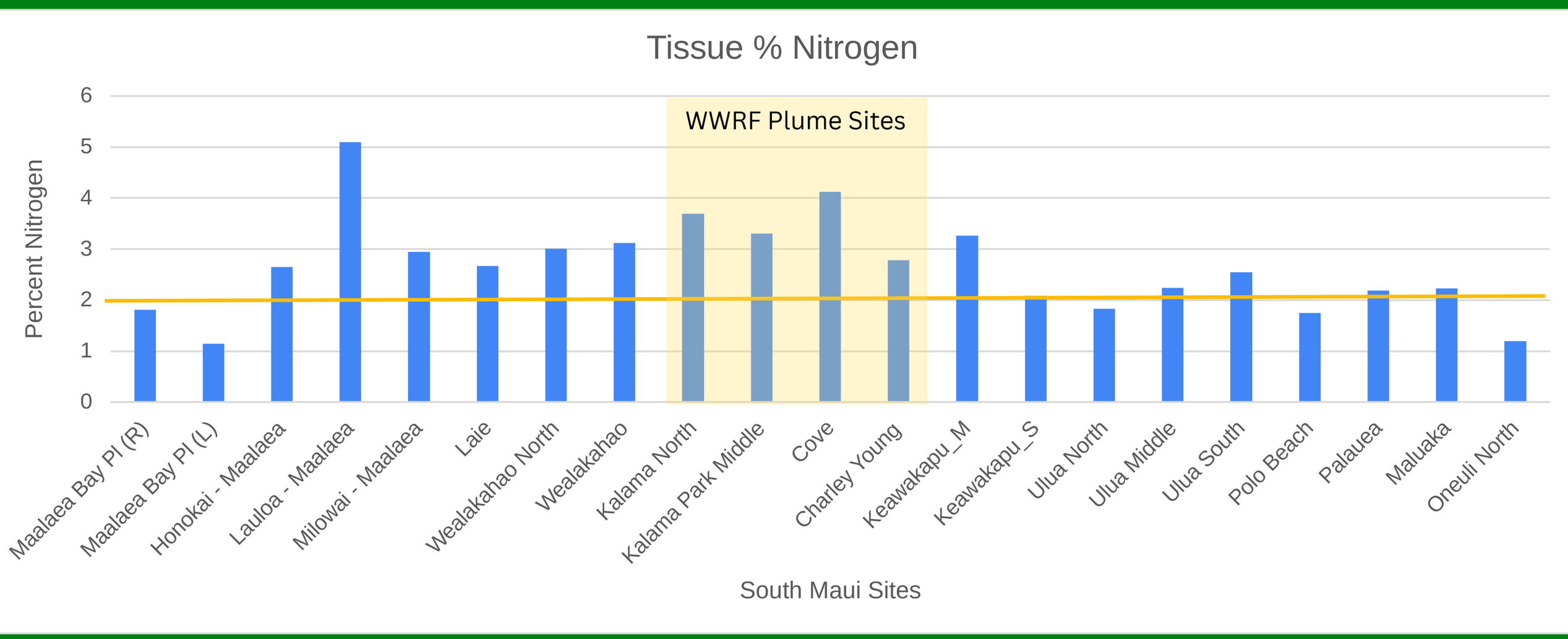
South Maui

KEY FACTS

- Elevated nitrogen levels in marine algae (*limu*) show that nutrient pollution is associated with the presence of development in North Maui.
- Previously documented nitrogen enrichment from wastewater persists in the area downstream from the Kihei Wastewater Reclamation Facility injection wells due to groundwater flow.
- Nitrogen values at Welakahao and Laie suggest the presence of wastewater.
- Results at Maalaea and Keawakapu suggest fertilizer as a possible nitrogen source.

NITROGEN LEVELS

Nitrogen is an essential nutrient for limu, which can absorb and store it when concentrations are high. However, excess nitrogen - often from fertilizers, wastewater, or a combination of both - can disrupt coastal ecosystems.



Maalaea and **Keawakapu** show high nitrogen levels, possibly linked to commercial fertilizer sources. Nitrogen levels in the vicinty of Kalama Park variable but when considered alongside isotope data (see next graph), they indicate wastewater as a probable nitrogen source. Laie in central Kihei also shows nitrogen patterns that suggest wastewater in the environment, but it is not clear what the source might be. Several sites in South Maui also have nitrogen signatures that are not definitive, but may be influenced by wastewater.

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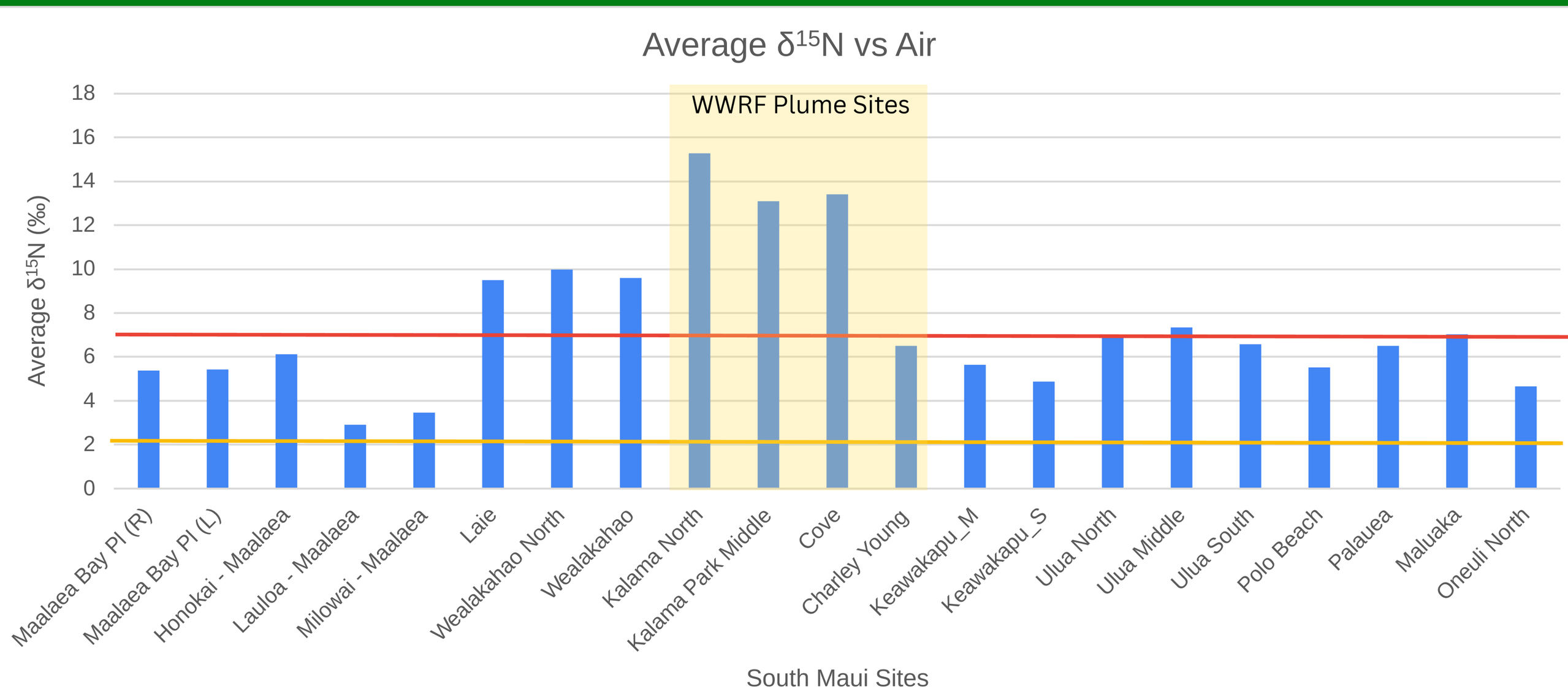
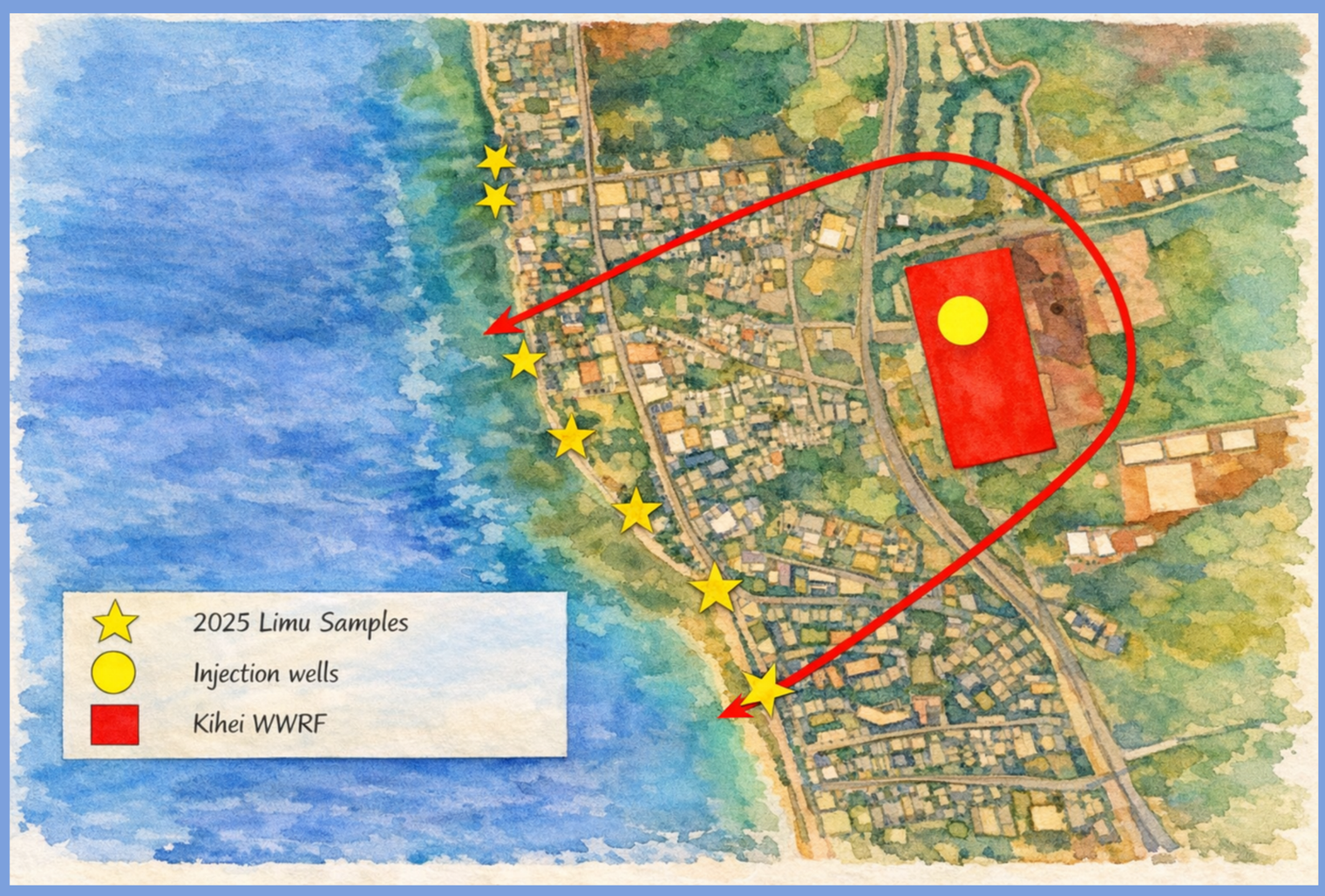
Nitrogen Ratios: Isotopes ^{14}N vs ^{15}N

Bacteria remove lighter nitrogen 14 (^{14}N) from the environment and leave more nitrogen 15 (^{15}N). As ^{15}N isotope levels increase, we suspect wastewater as the source of nitrogen at a site. In **Kalama Park**, the nitrogen signature is from the **Kihei WWRF** injected wastewater, confirming that injection wells continue to pollute this area. At **Welakahao** and **Laie** a clear source of wastewater is currently unknown.



WASTEWATER PLUMES

Wastewater from treatment plants is injected into the ground and eventually reaches the ocean, creating a plume of polluted water that is detectable in limu. Maui County is working to upgrade treatment processes to remove excessive nutrients and eliminate pathogens before injection.



NEXT STEPS

We are left with many sites in South Maui where we cannot identify a definitive source of nitrogen or where the nitrogen signature does not clearly point to wastewater. We are working with local partners and community members to gain a better understanding of the history and environment to better identify sources of excess nutrients. In 2026, we will retest many of these sites to build upon data, detect trends in nutrient pollution, and identify sites that need mitigation.

We greatly appreciate the support of the County of Maui's Environmental Protection & Sustainability Division, which made this work possible and will enable continued progess in 2026.

Environmental Protection & Sustainability Division

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