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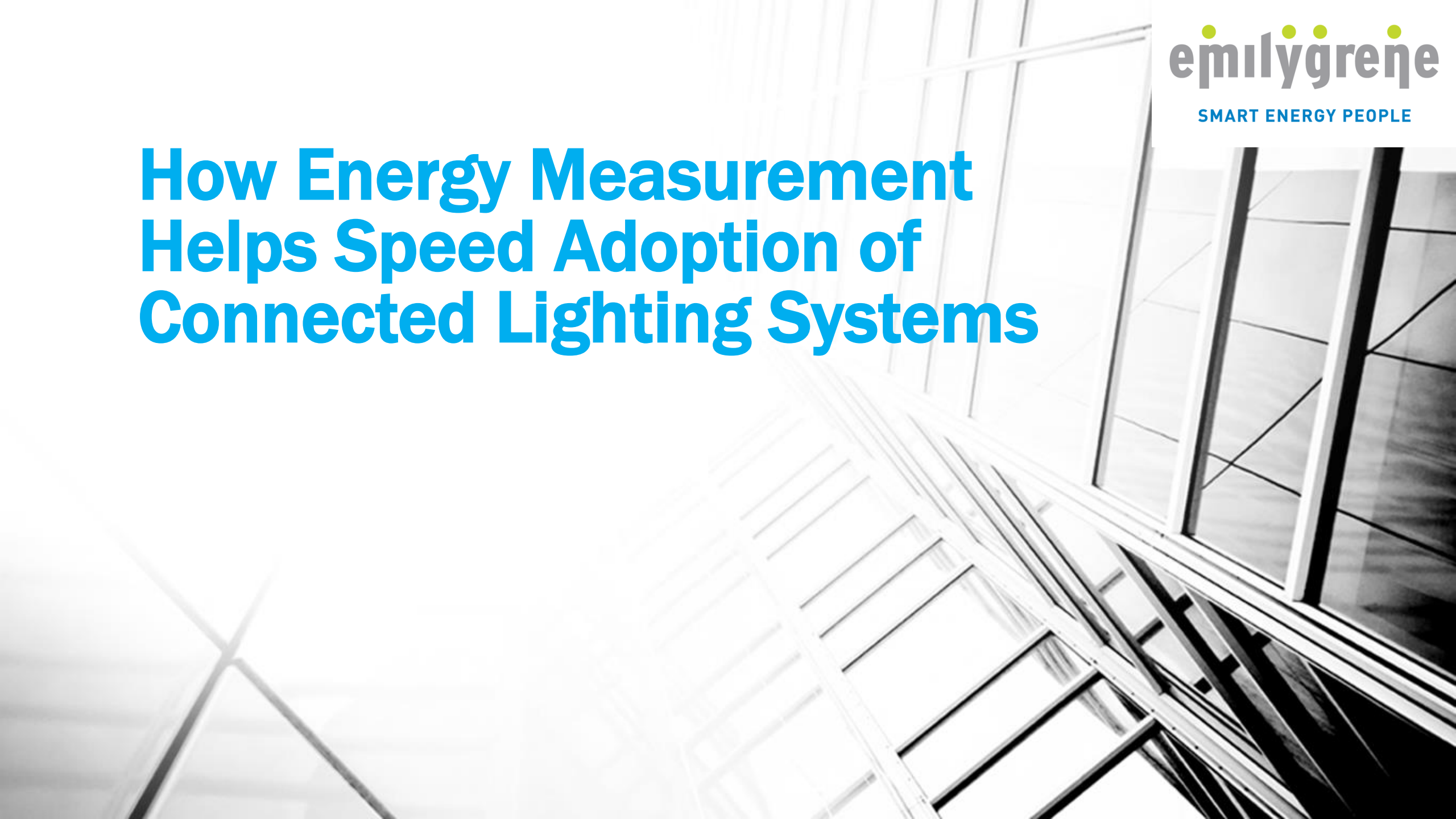
How Energy Measurement Helps Speed Adoption of Connected Lighting Systems



Building Codes Drive Specifications

ASHRAE 90.1

California Title 24

US Green Building Council

ESCO or Contractors

Non-Residential Customer

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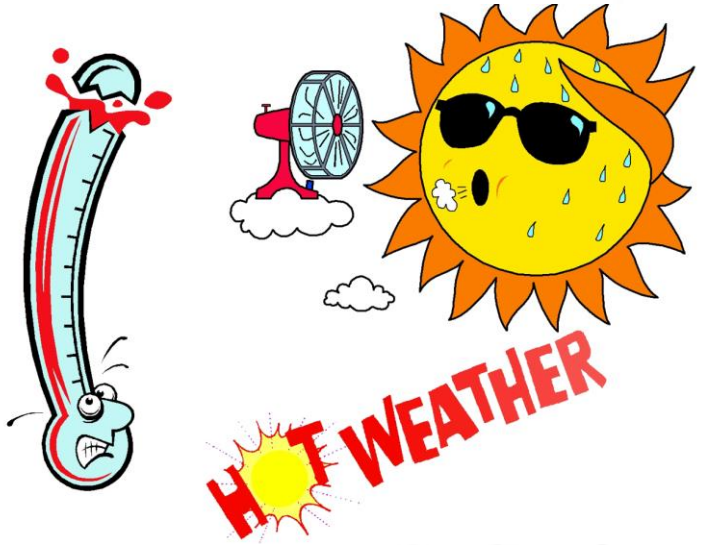
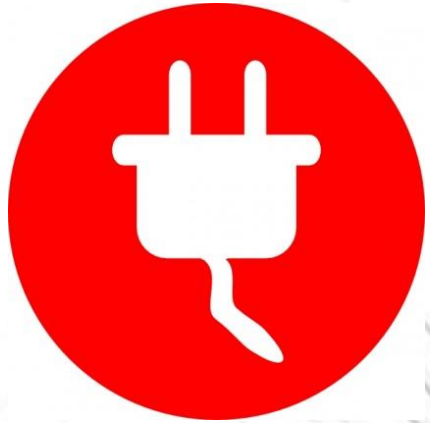
Customer Objections to Typical Proposal

- Lighting retrofits are risky – your promised savings won't materialize
- Initial capital costs are much too high
- I am looking for a 6 month payback – 200% ROI
- Can't take on debt

Measuring Energy Savings

- Old method – compare electric bill before and after lighting retrofit
- Very inexact – weather variations, plug load additions, new equipment, utility increases





Humboldt County Gas Station

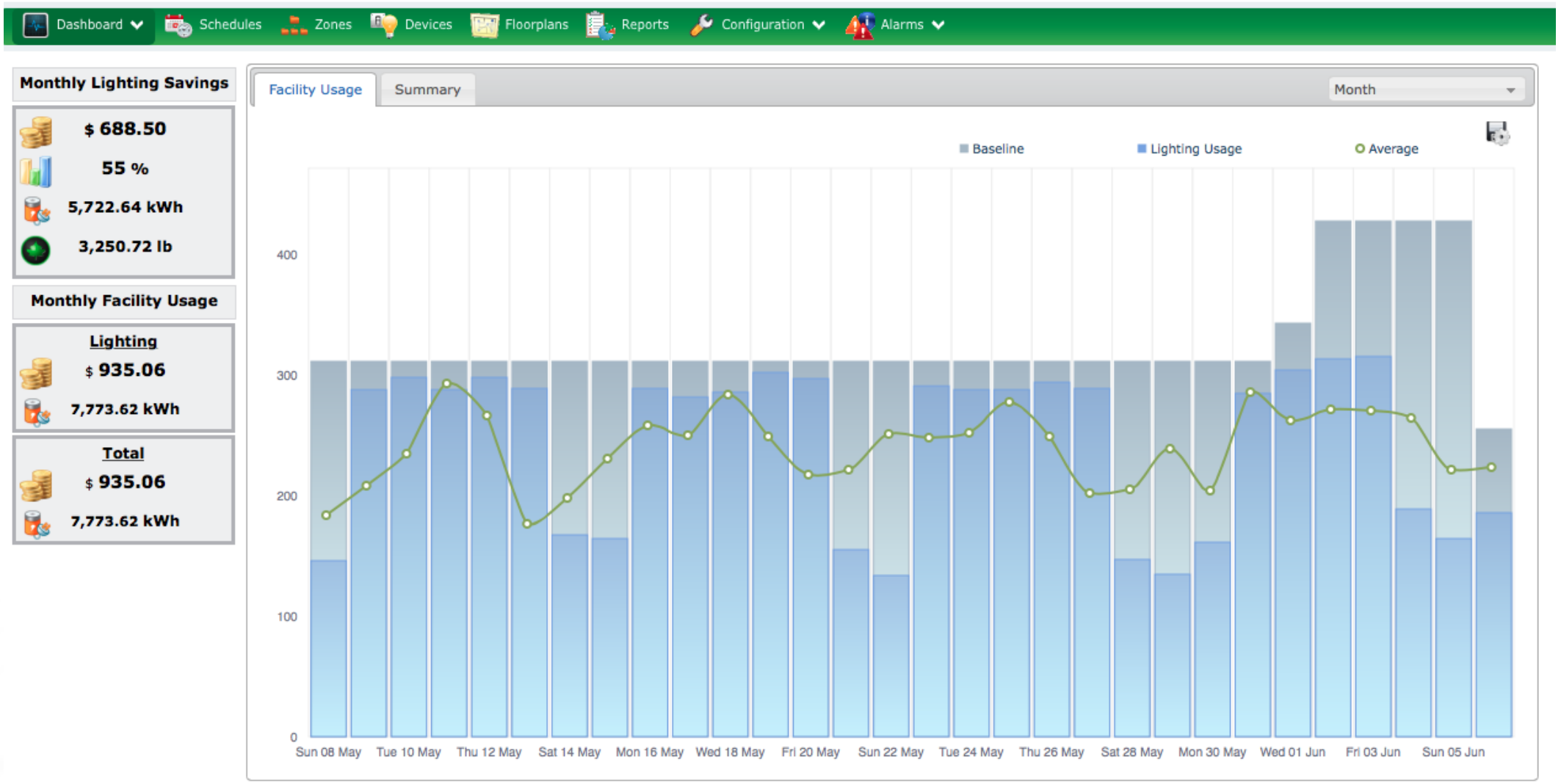
- Retrofitted gas station exterior with LED lighting
- Installed meters on each circuit leg – lighting and non-lighting
- Savings on utility bill did not materialize
- Reviewed meters
  - Lighting savings exceeded promises
  - Underground storage tank pumps running 24/7 (failure)

Orange County Light Industrial Campus

- Installed Connected Lighting System to linear fluorescent fixtures and removed lamps
- Utility bill did not reflect promised savings
- Customer installed 10 electric vehicle charging stations
- Customer rebuilt testing lab with new equipment adding to electric load
- Connected Lighting System showed reductions in lighting energy exceeded predictions

Measuring Energy Consumption

- Prior to installation, use data loggers to verify how many hours lights are on. Use utility energy loads for fixtures. Calculate energy load.
- Install connected lighting system
  - Use nominal fixture energy consumption
  - System calculates load accounting for trimming, occupancy, daylighting, task tuning
  - Energy load calculations can be done by fixture, by room, by floor, by building, by campus, system wide
  - Reported in real time: hour-by-hour, day-by-day, month-by month, etc.
- Luminaires may also report energy load to system – not common, may be more accurate


Dashboard
Schedules
Zones
Devices
Floorplans
Reports
Configuration
Alarms
Monthly Lighting Savings
$ 688.50
55 %
5,722.64 kWh
3,250.72 lb
Monthly Facility Usage
Lighting
$ 935.06
7,773.62 kWh
Total
$ 935.06
7,773.62 kWh
Facility Usage
Summary
Month
Baseline
Lighting Usage
Average
400
300
200
100
0
Sun 08 May
Tue 10 May
Thu 12 May
Sat 14 May
Mon 16 May
Wed 18 May
Fri 20 May
Sun 22 May
Tue 24 May
Thu 26 May
Sat 28 May
Mon 30 May
Wed 01 Jun
Fri 03 Jun
Sun 05 Jun

Customers Purchasing Financial Investment

- While the vehicle is lighting, the customer is actually making financial investment
- Project is evaluated most often on Simple Payback Period and compared to other potential investments such as new machinery, HVAC, etc.
- While connected lighting systems have a higher upfront cost, payback is often similar to basic LED retrofits

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	Simple LED Retrofit	LED & Controls Retrofit
# of Fixtures	1,981	1,981
Annual Savings		
Lighting kWh	$90,368	$108,560
Controls kWh	$14,869	$47,437
Fixture Maintenance	$5,960	$5,960
HVAC	$15,791	$27,433
First Year Total Savings	**$126,988**	**$189,390**
Contract Price	**$389,287**	**$647,546**
Estimated Incentive	**$40,312**	**$139,370**
Net Project Cost	**$348,975**	**$508,176**
Simple Payback	2.7	2.7
First Year ROI	36%	37%
Net Present Value	**$525,176**	**$795,534**
Internal Rate of Return	37%	38%
Modified Internal Rate of Return	**21%**	**21%**
Savings to Investment Ratio	**2.5**	**2.6**
kWh Reduced	578,222	857,124
Peak Demand (kW) Reduced	114	139

Summary

- Codes push product specification
- Risk reduction is critical to buying decision – connected lighting systems with energy measurement and reporting reduce risk
- Savings from future upgrades much easier to validate

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Thank You

For Additional Information:

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