



ComEd 2021-2030 Economic Potential Assessment Draft Results

June 23, 2020

Agenda

Introduction

Study Overview
Approach

Results

Across sectors
Residential market
Non-residential market

Conclusion

Next steps

TEAM

Dunsky is comprised of
30+ clean energy
professionals.

Among them,
today's presenters:



Alex Hill
Managing Partner



Mathieu Lévesque
Consultant

EXPERTISE



Efficiency



Renewables



Mobility

SERVICES



Assess
Opportunities



Design
Strategies



Evaluate
Performance



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Economic Potential Assessment: Schedule

Today

	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
Measure Characterization	█	█	█	█	█	█	█					
Market Data Treatment					█	█	█	█				
Model Adjustments					█	█	█	█				
Model QA/QC with inputs							█	█	█			
Draft Results								█	█			
Final Results and Reporting									█	█	█	█

Deliverable	Date	Feedback by
SAG presentation	June 23	June 29
Final results	July 3	July 10
Draft report	July 17	July 31
Final report	August 7	-

Study Period

2021 to 2030

Study Geography

ComEd service territory

Sectors

Residential ▪ Income-Eligible ▪ Commercial ▪ Industrial

Savings Streams

Electric Energy Efficiency

Out of scope

Demand response, Fuel-switching, Solar PV, CHP, Transportation, Streetlighting, Voltage Optimization, Power Generation, Wastewater

DEEP Model

Applies bottom up model, using detailed ComEd markets and measures

Technical Potential

- Includes all commercially viable opportunities, based on equipment turnover schedules, regardless of economics
- Applies markets from Baseline Study findings

Economic Potential

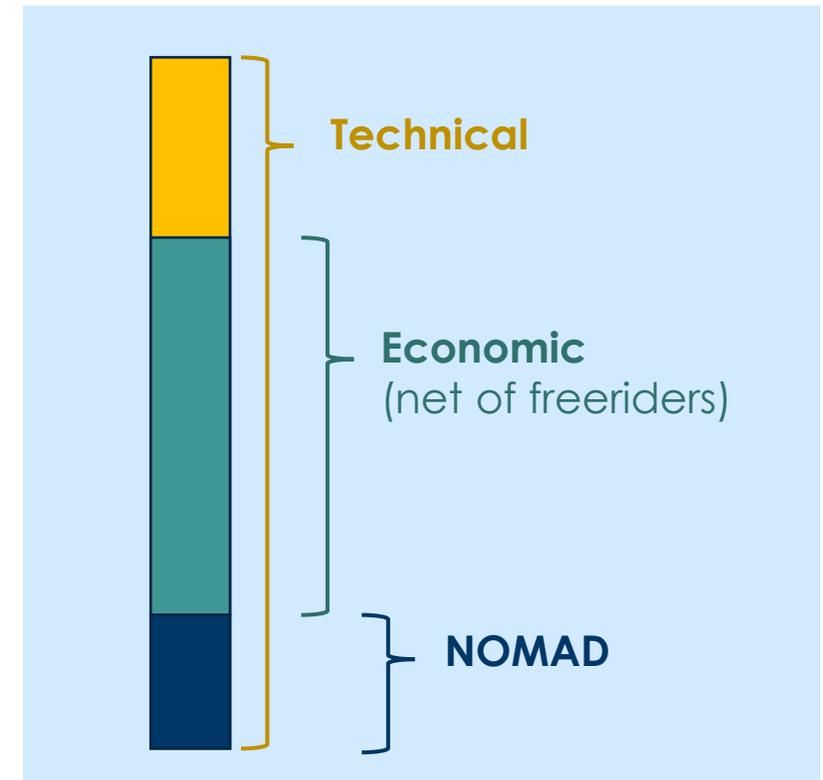
- Includes measures that pass the TRC threshold of 1.0
- Granular measure level and market segment analysis
- Does not account for customer economics or market barriers

Naturally Occurring Market Adoption (NOMAD)

- Highlights measures with significant natural adoption potential
- Applies calibrated markets and technology barriers

Program Achievable Potential *(out of scope)*

- Measure by measure annual uptake in ComEd programs
- Considers impacts of incentives and program strategies



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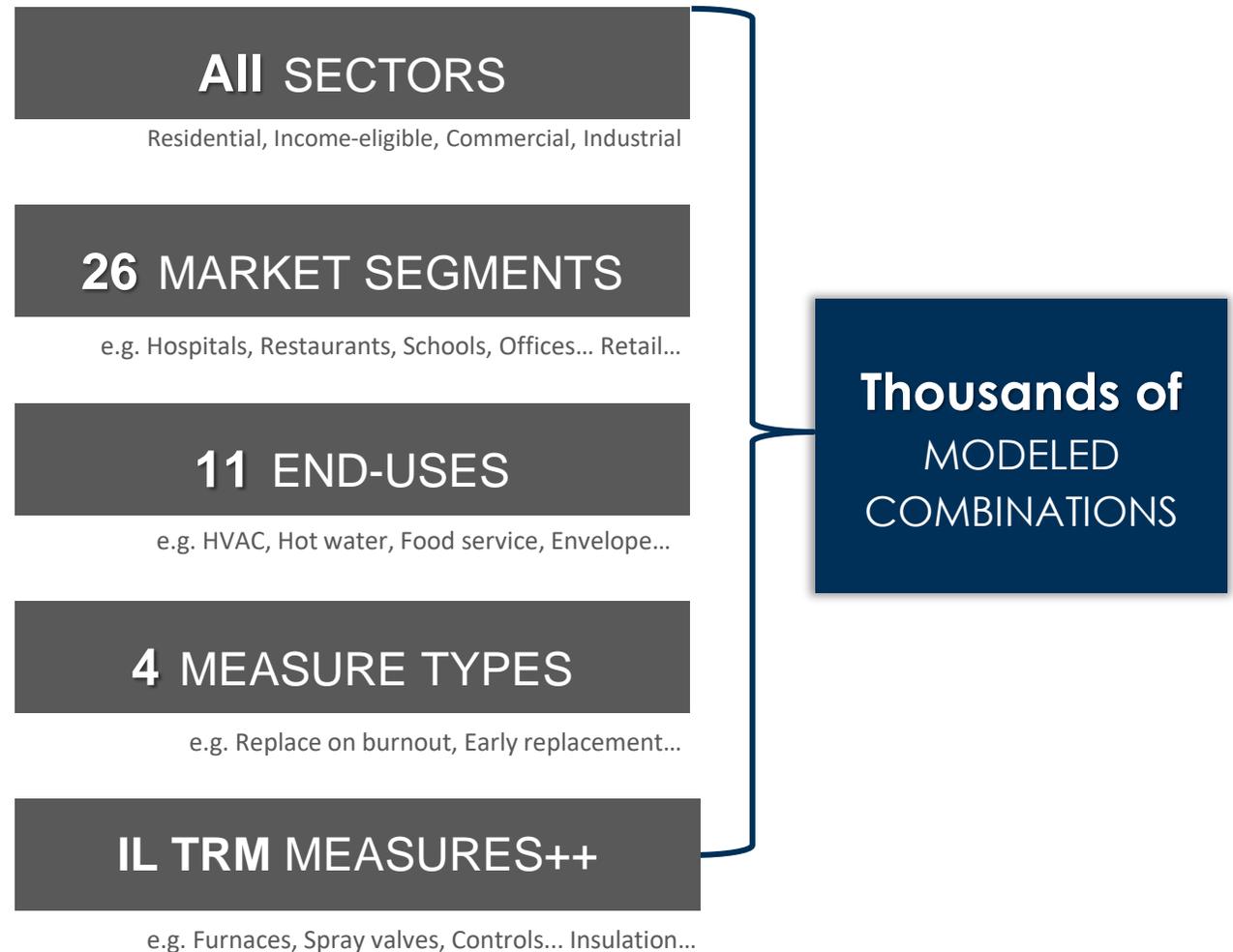
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- Comprehensive measures lists are **characterized using Illinois TRM v8** inputs and algorithms.
- **Measure size and usage categories** derived from Equipment Utilization Distributions
- **Includes Emerging Technologies** that are projected to be commercially viable within study period
- **Captures key segment characteristics:** EFLH, savings per unit, residential demographics



The ComED Economic Potential Assessment applied an enhanced level of market segmentation to harness the detailed baseline study data.

Detailed Market Segmentation

- **High market granularity** to align with baseline study
- **Reduced aggregation bias** by capturing more use-cases for each technology in each market
- Supports more precise measure of economic potential, giving **further program insights**.

Sector	Segment name
Residential	Single Family_Non-Low-Income_< 2000 sf_Medium
	Single Family_Non-Low-Income_> 2000 sf_Medium
	Single Family_Non-Low-Income_< 2000 sf_High
	Single Family_Non-Low-Income_> 2000 sf_High
	Multi Family_Non-Low-Income_All sf_SmAll
	Multi Family_Non-Low-Income_All sf_Medium
	Multi Family_Non-Low-Income_All sf_High
Income eligible	Single Family_Low-Income_< 2000 sf_All
	Single Family_Low-Income_> 2000 sf_All
	Multi Family_Low-Income_All sf_All
Commercial	Office
	Public Admin
	Retail
	Food
	Grocery
	Health
	Colleges
	Other Education
	Wholesale
	Lodging
	Other Commercial
Industrial	Industrial (Small)
	Industrial (Medium)
	Industrial (Large)

Prescriptive Measure Potential

(Lighting only)

- **Bottom-up approach** using Dunsky's DEEP model
- Itron adjusted the 2012 technology shares to account for growth in LED and T8

Custom Program Potential

(all other end-uses)

- **Top-down approach** using the “eligible” population and load by custom project type
- Leverages both the 2012 baseline study results and program tracking & evaluation data from ComEd's programs PY4 (2011) to PY9 (2017)

■ New Construction

- ▶ IECC Building Code: 3-year enforcement lag assumed (in 2021, 2024)
- ▶ High performance NC custom measure applied savings over an above IECC code, to meet LEED and Net-Zero certification
- ▶ Individual measures show market size growth to account for NC install opportunities

■ EISA Lighting: Assess total LED potentials regardless of EISA enforcement

- ▶ Market focusses on remaining non-LED filled sockets

■ HVAC

- ▶ HP and CAC new standard in 2023, with incremental efficiency increase for Tier 1 and 2

■ Emerging Technologies

- ▶ NLCs, high-efficiency TLED, Commercial Heat Pump Water Heaters

■ Lighting

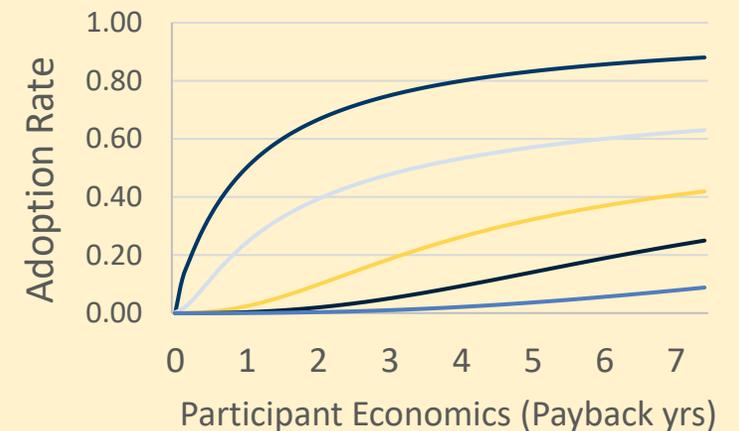
- ▶ **Bulbs:** blended baseline to account for high CFL penetration
- ▶ **LEDs have longer EUL**, which leads a reduced market turnover after the baseline tech EUL ends
- ▶ **NTG** is also reduced every year (by 15%), starting from the one defined using the NOMAD
- ▶ **T12s** still 25% of market. Applied T12 measures, including early replacement of luminaires (dual baseline) and T12 to TLED tubes replace-on-burnout (T12 as baseline).
- ▶ **High-Efficiency TLED** applied starting in 2025
- ▶ **NLC:** Applied to all segments. Note: IL TRC does not count NEIs

■ Home Energy Report

- ▶ Modeled the current program offering (~50% of customers)
- ▶ Added additional customers in order to reach 80%
- ▶ Consider the total persisting HER savings every year (apples to apples comparison)

	TECHNICAL	ECONOMIC	NOMAD*
MEASURE INTERACTIONS	Chaining		
ECONOMIC SCREENING	n/a	TRC cost-effectiveness	No screening
MARKET BARRIERS	No Barriers	No Barriers	Adoption Curves
COMPETING MEASURES	Winner takes all (most efficient)		Competition Groups
NET SAVINGS	Gross	Net of free-ridership	Gross

Model applies U.S.DOE adoption curves for NOMAD assessment, which estimate customer adoption as a function of the customer's economic payback, and market barriers.



* Naturally-occurring market adoption

Objective: account for freeridership associated with market factors (i.e. market transformation of LED lighting), but not program delivery factors.

Calibrate

- Adjust market factors and barriers to reach $\pm 10\%$ agreement at sector-level to current programs savings

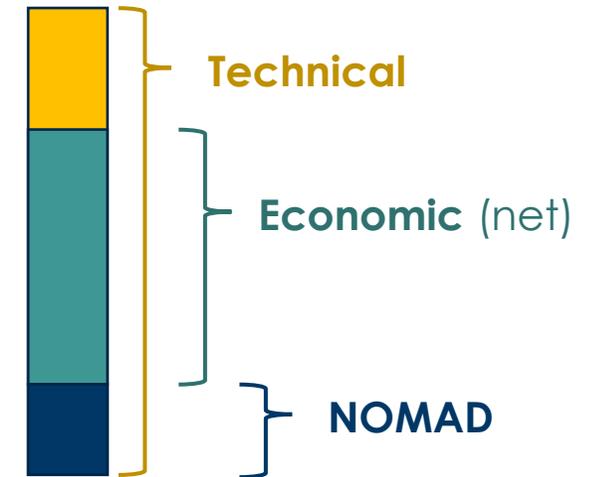
NOMAD

- Run model without programs to determine natural adoption
- Note: we do not account for C&S upgrade savings

NTGs

- Determine measure-level NTGs to capture NOMAD freeridership
- Apply new NTGs to run the net economic assessment

Market-based NTGs, different from program-based NTGs



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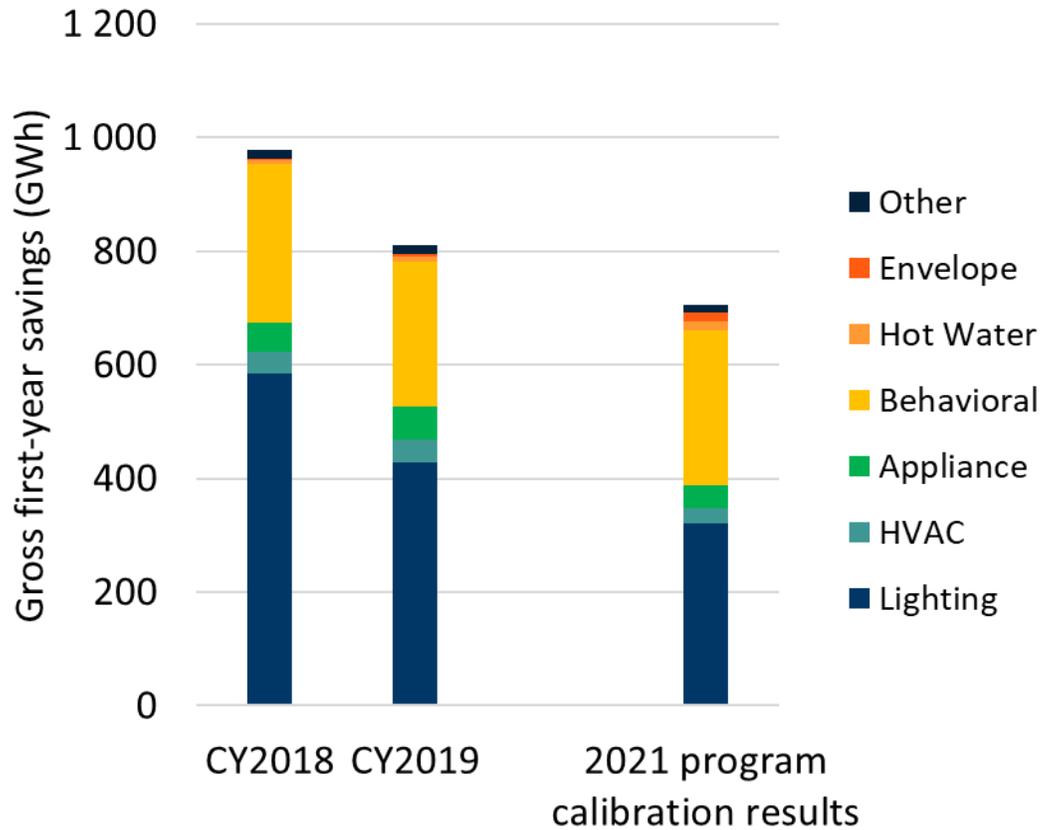
Results

Across sectors
Residential market
Non-residential market

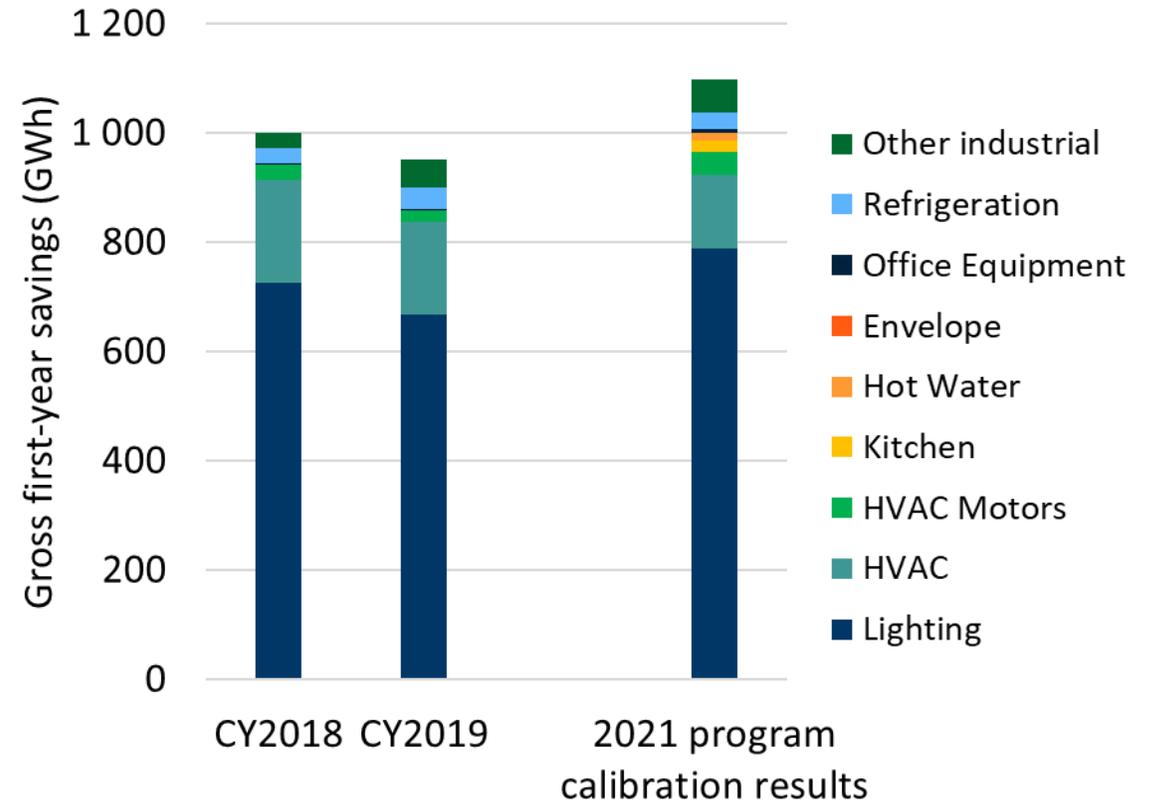
Conclusion

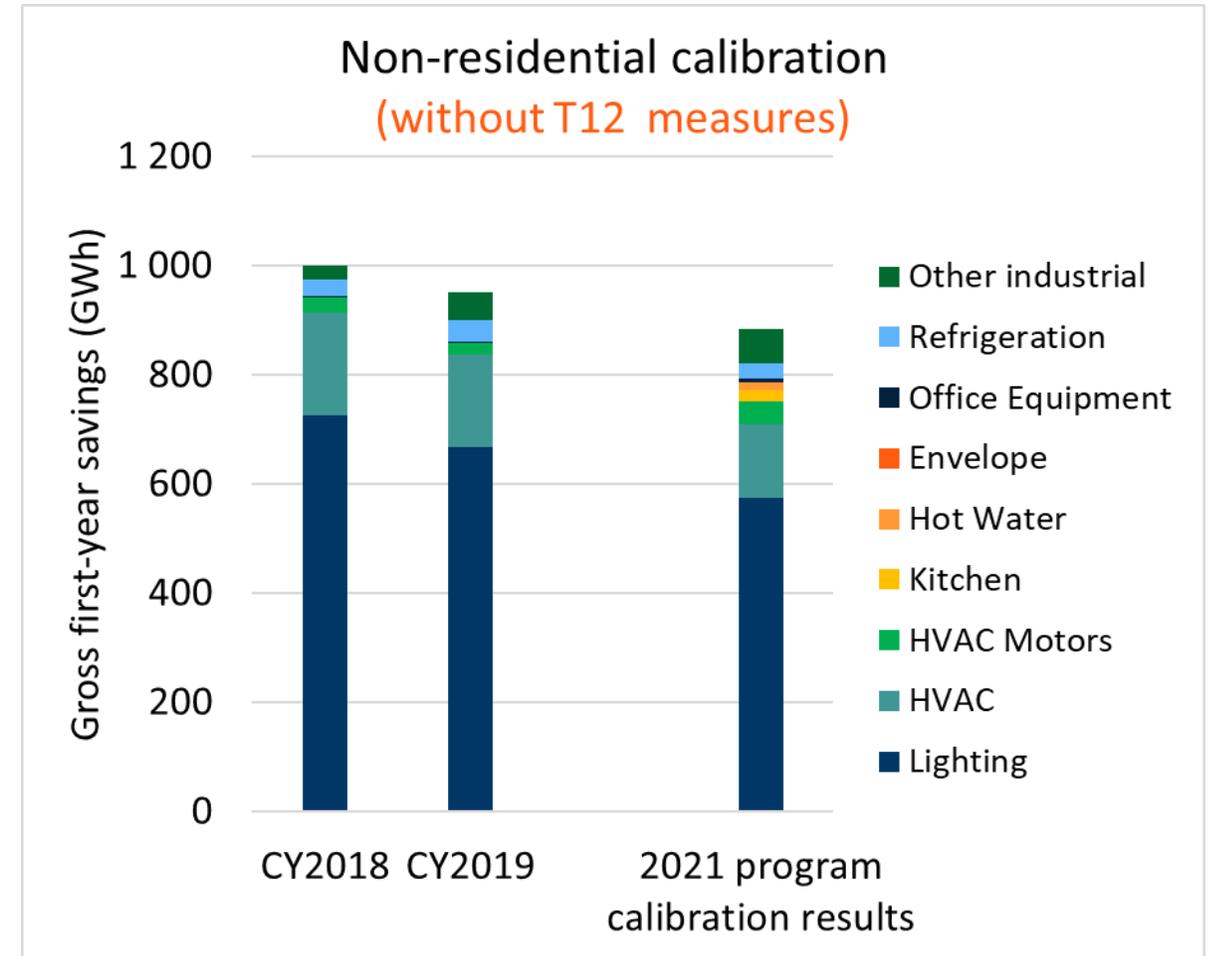
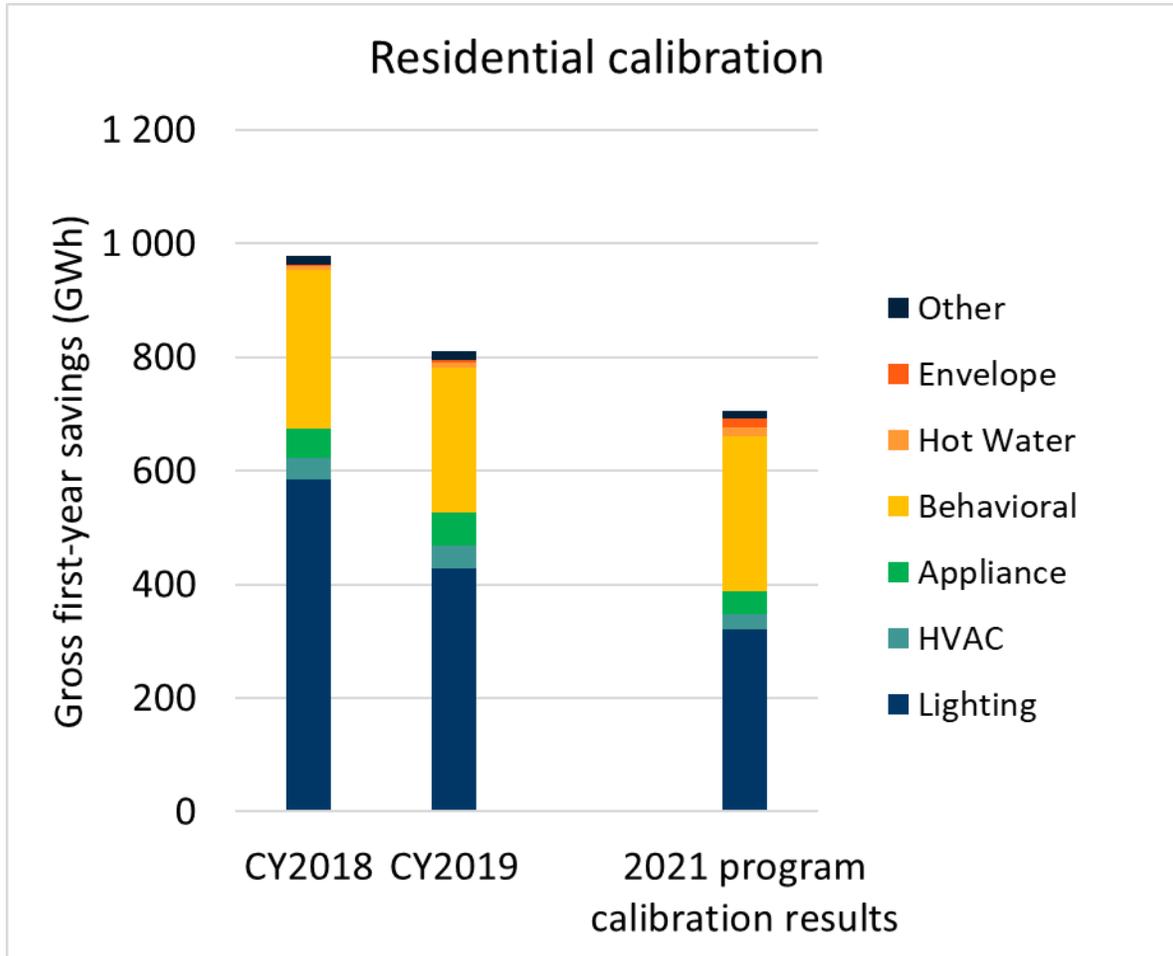
Next steps

Residential calibration

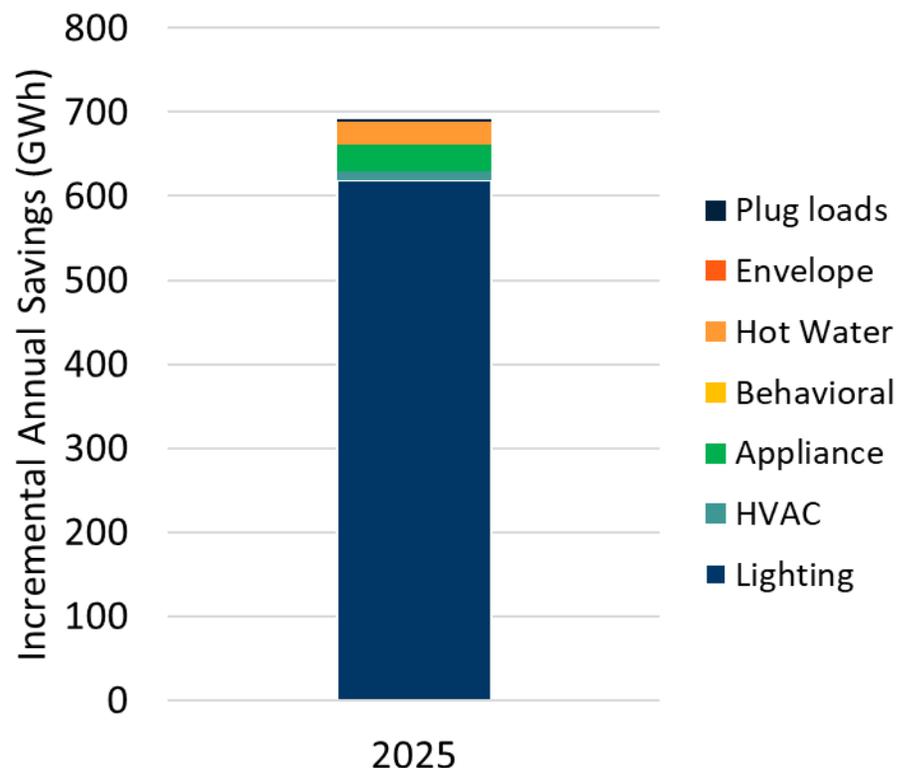


Non-residential calibration

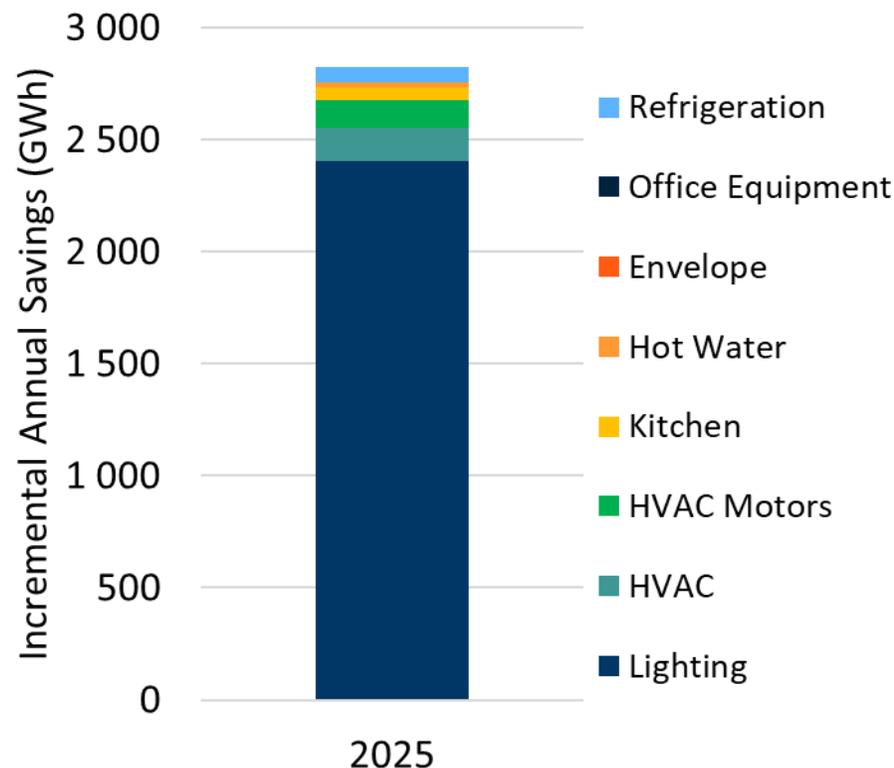




NOMAD Residential (excl. IE) electric savings, end use, cumulative 2025



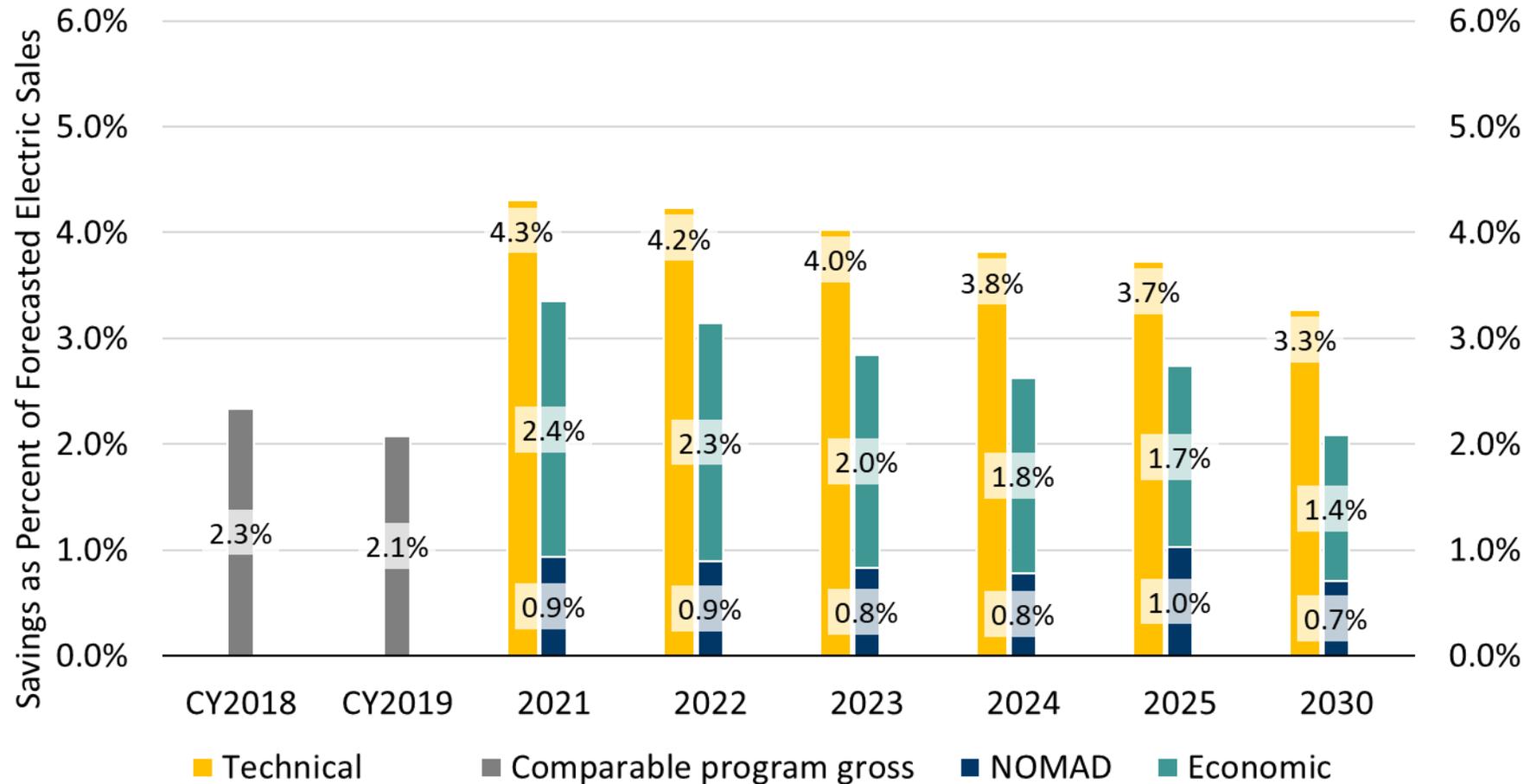
NOMAD Commercial electric savings, end use, cumulative 2025



Market NTG examples

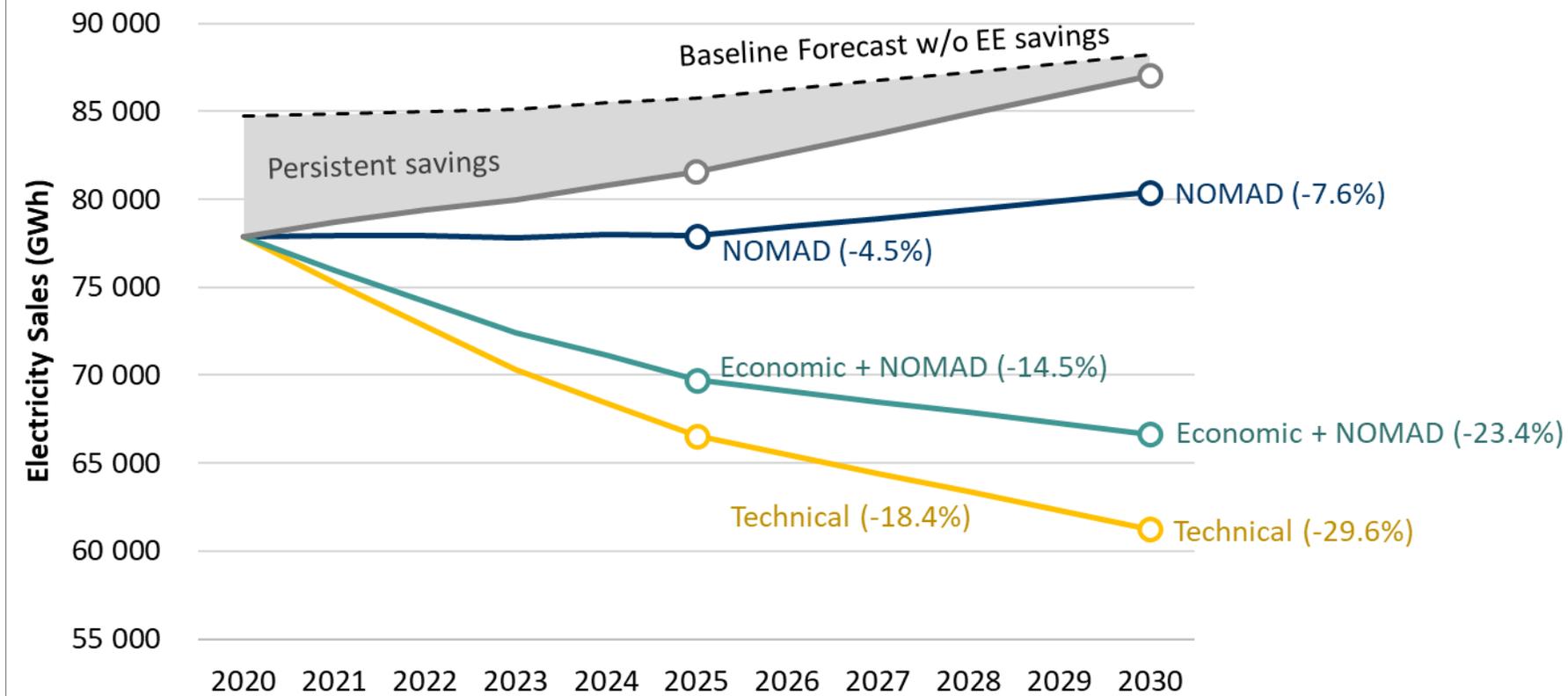
- ComEd's average weighted program NTG for residential lighting in 2019 was 0.65, but our NOMAD calculations yielded an economic NTG of 0.44 for 2021
- For Commercial lighting, we applied 0.54 instead of 0.84

Energy Efficiency Savings as Percent of Annual Electric Sales



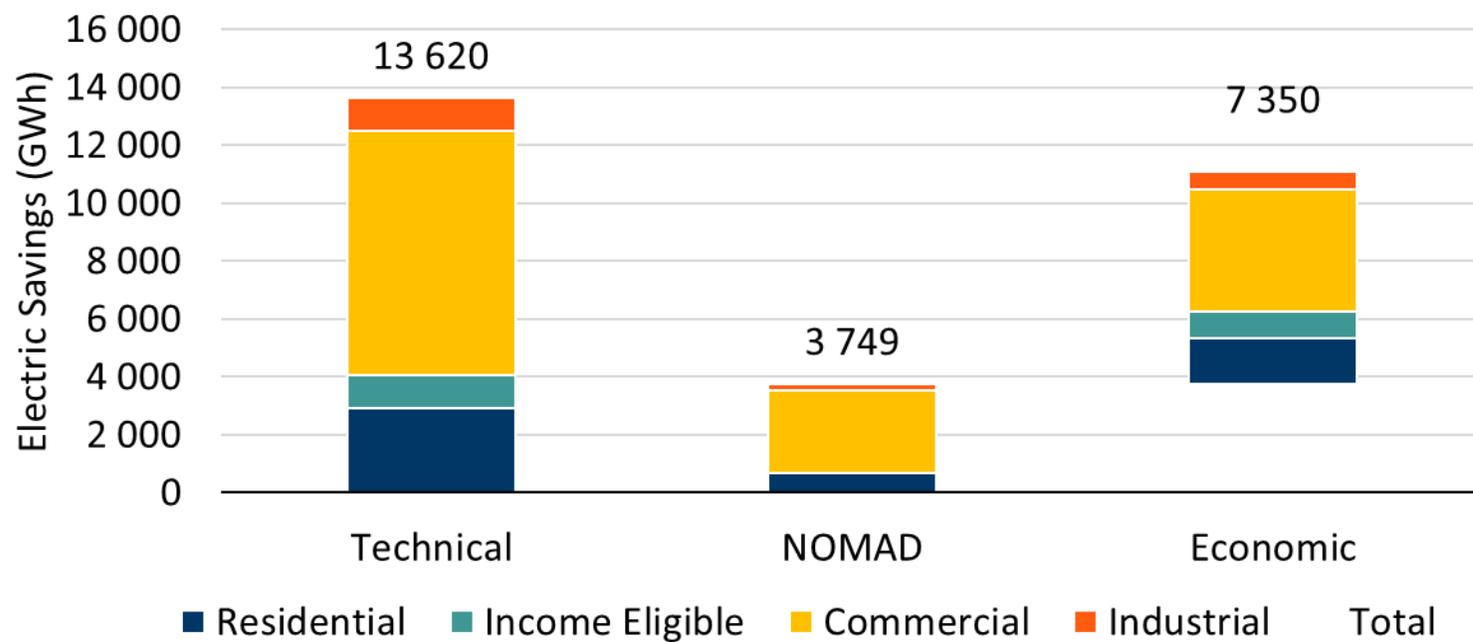
- Technical and NOMAD are gross, Economic is net
- NOMAD is all gross savings, based only on customer economics
- Around 80% of NOMAD would be counted in gross economic potential (i.e. TRC \geq 1)

Electric Sales under EE Scenarios

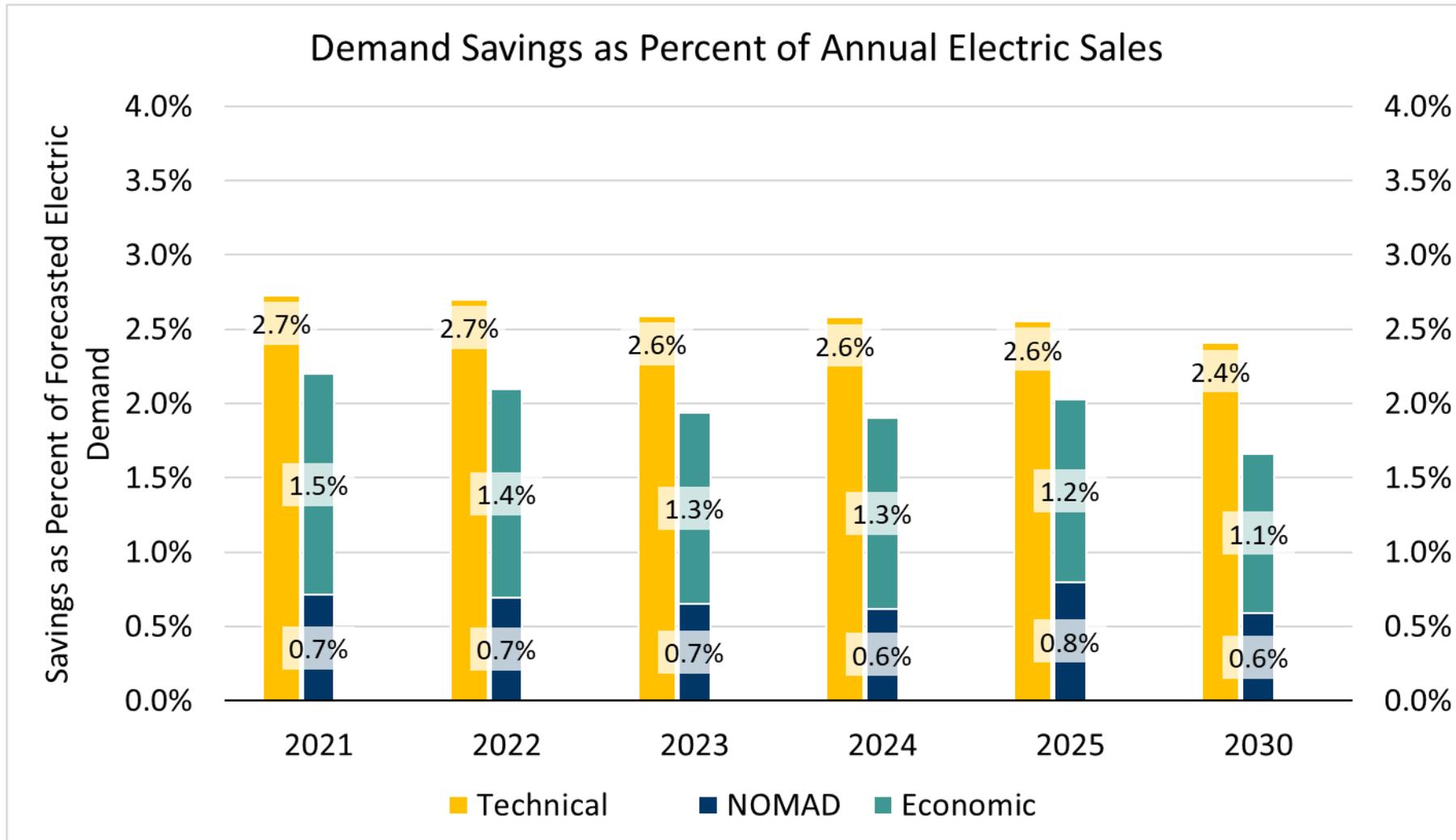


- Persistent savings from installations prior to study period (up to 2020)
- Part of the NOMAD potential is probably included in the Baseline Forecast
- Home Energy Report: excluded from persistent savings, included in net economic potential

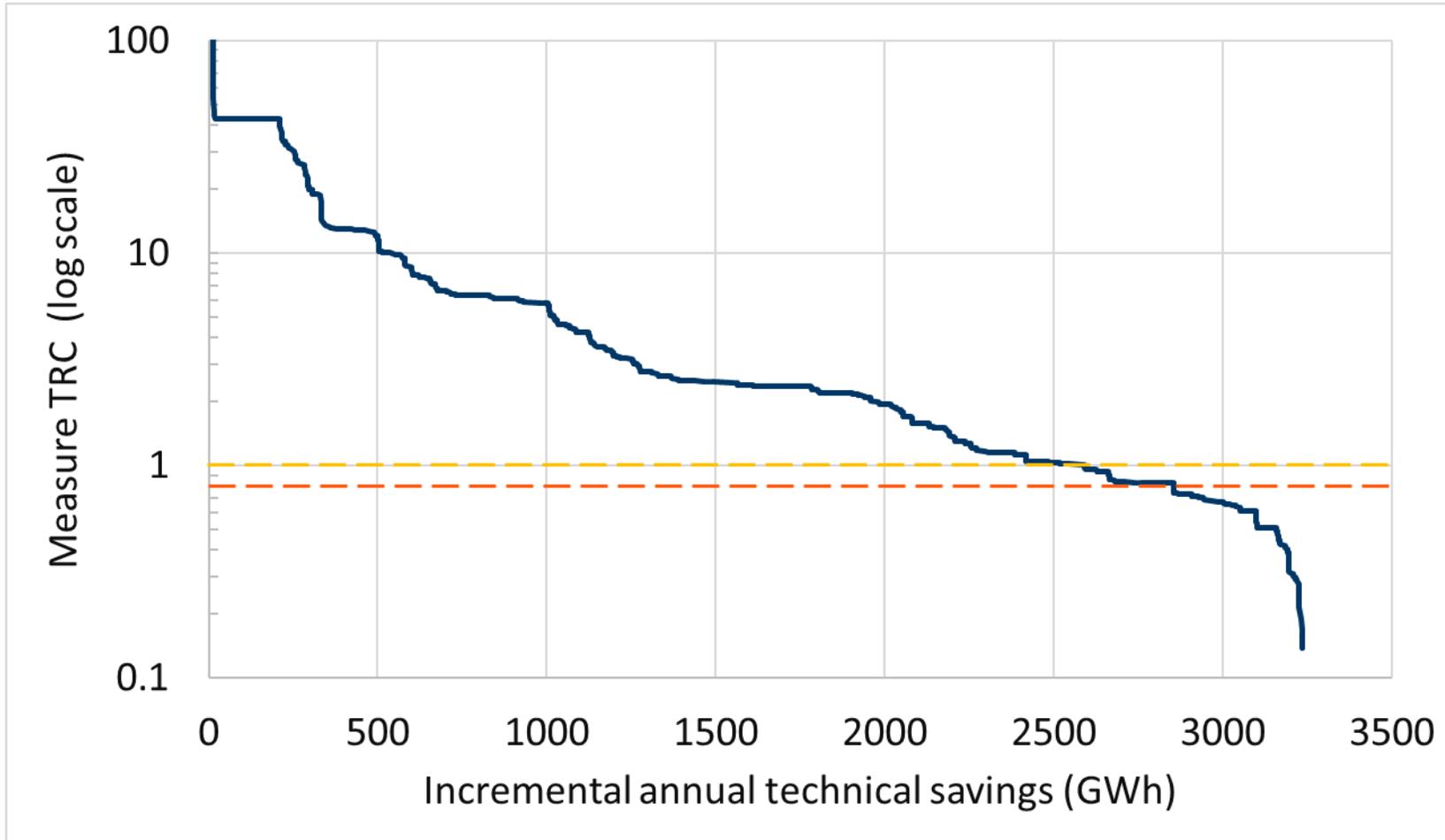
Cumulative Electric Energy Savings, 2025



- IE savings in NOMAD set to 0
- Commercial sector savings dominate, both NOMAD and Economic



TRC Supply Curve



- IL SAG asked for sensitivity of results to TRC level
- Vast majority of measures in model pass the TRC
- A few measures have very high TRC values – some have no IMC
- Approx. 260 GWh of savings fall in the 0.8- 1.0 TRC range and could contribute to cost-effective programs

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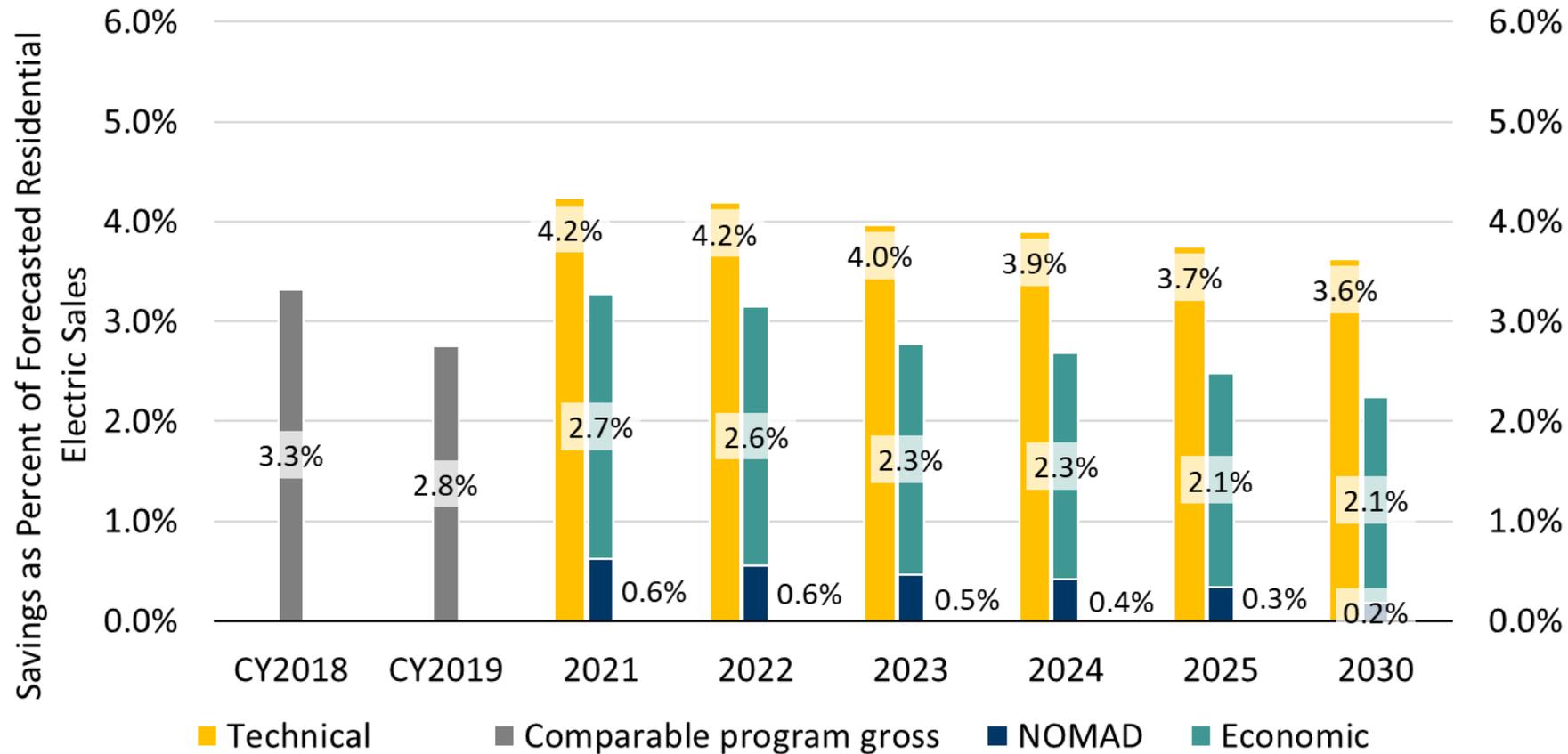
Across sectors
Residential market
Non-residential market

Residential sector
Income-eligible sector

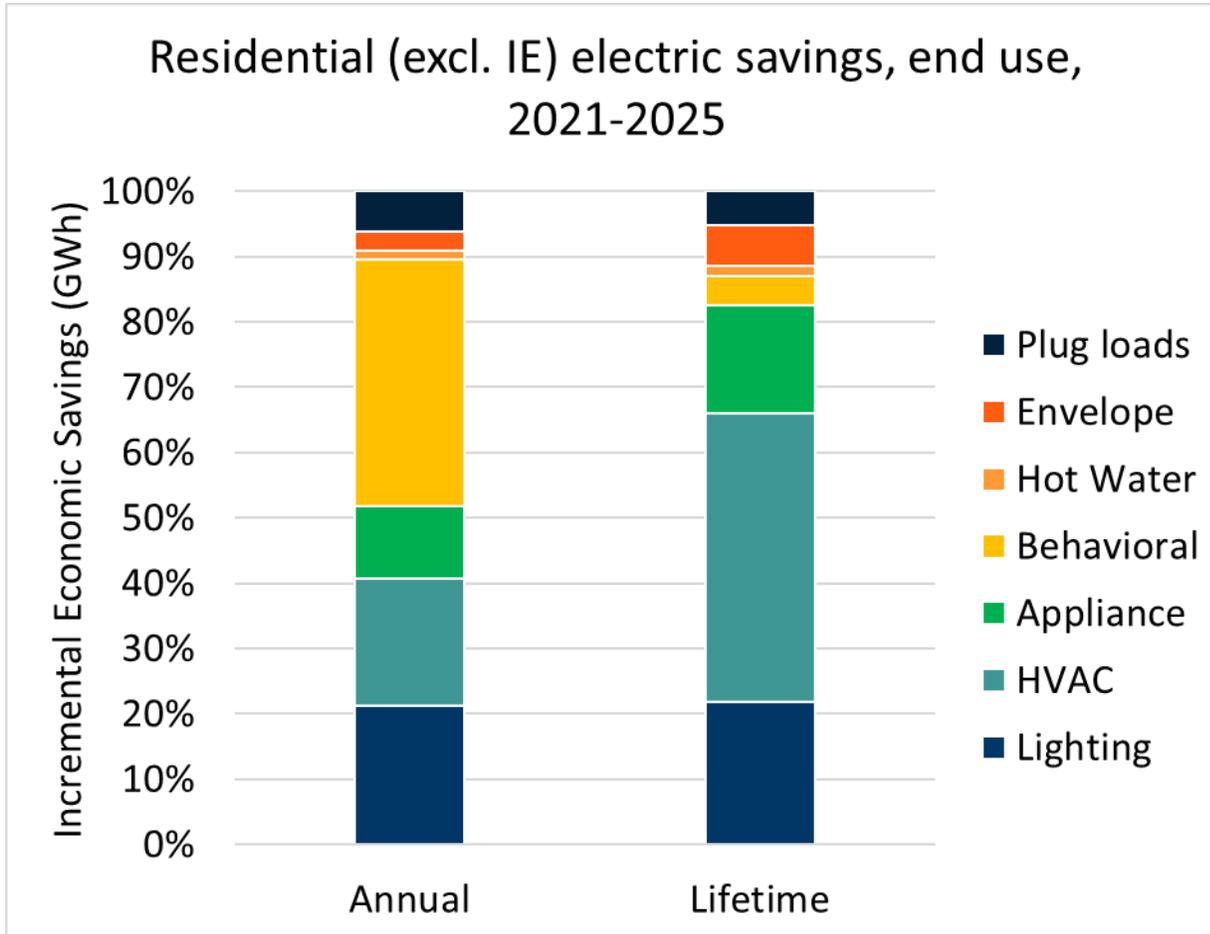
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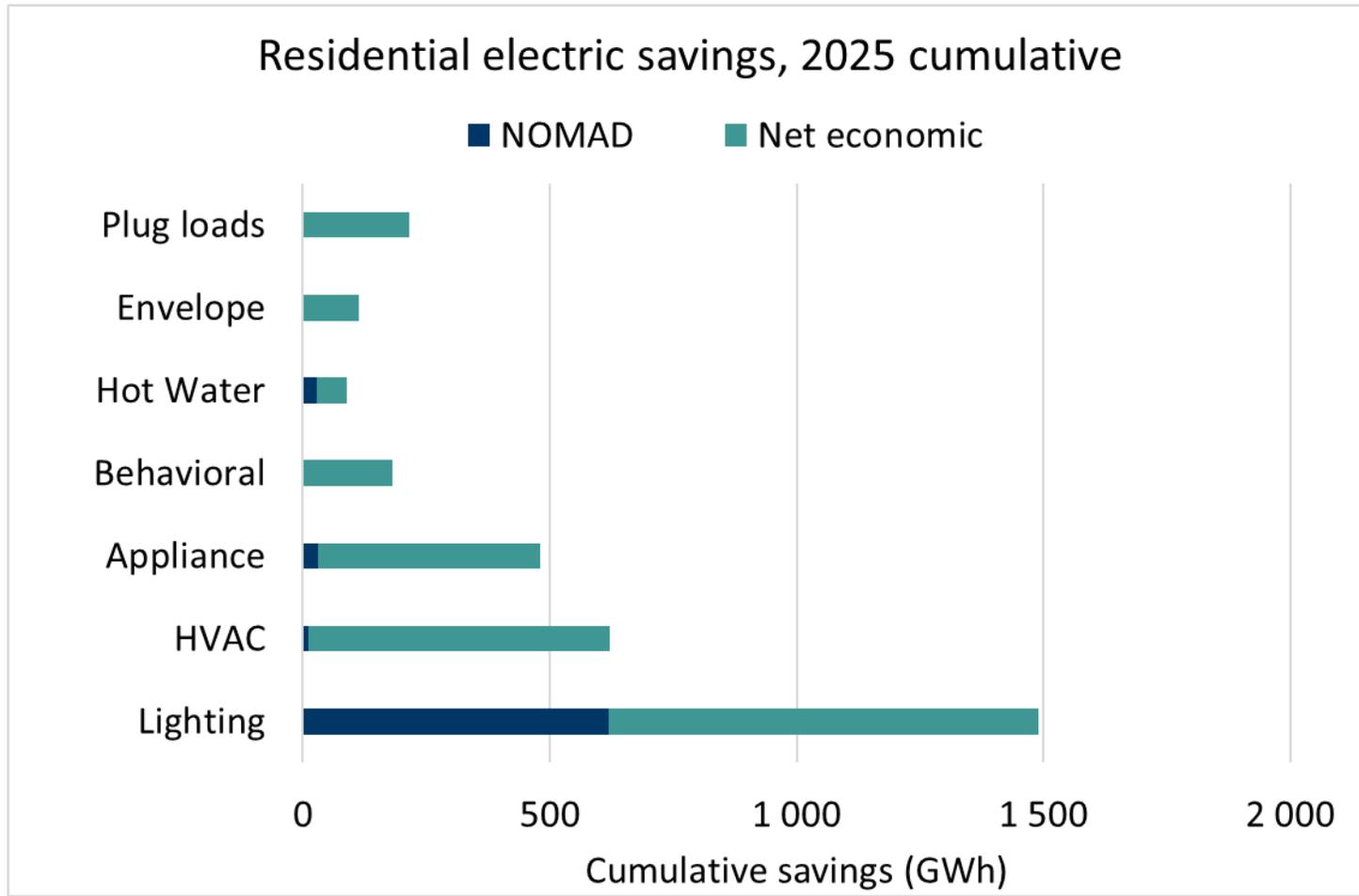
Residential Energy Efficiency Savings as Percent of Annual Electric Sales



- Technical and NOMAD are gross, Economic is net of free-riders
- NOMAD is all gross savings, based only on customer economics
- Around 70% of NOMAD would be counted in gross economic potential (i.e. TRC ≥ 1)



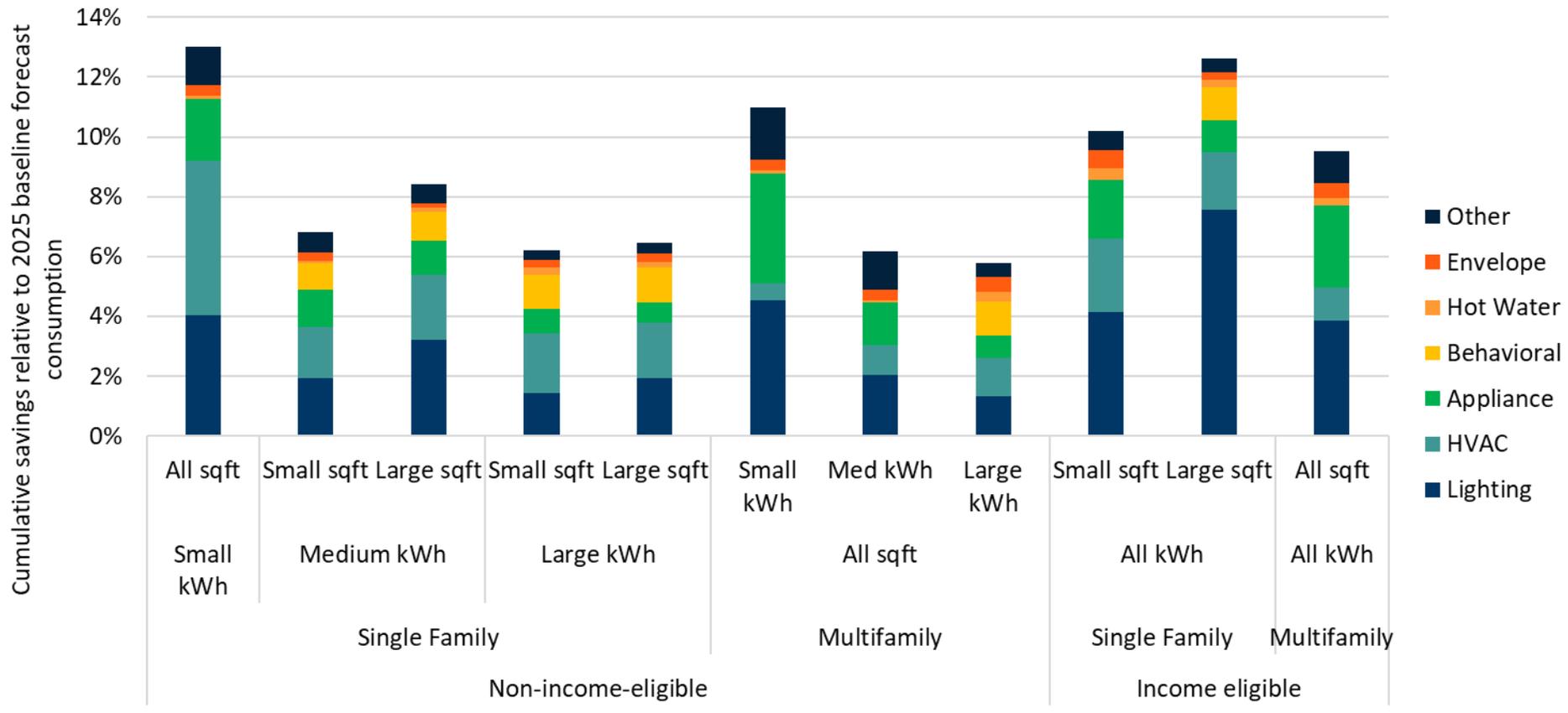
- HVAC and Envelope have longer EULs so lifetime savings portion grows relative to annual savings
- Includes Home Energy Report on up to 80% of homes renewed each year
- Lifetime savings lower due to declining persisting savings



- Lighting end-use offers most savings, but also has high natural adoption
- Other end-uses have minimal natural adoption, except for Hot Water

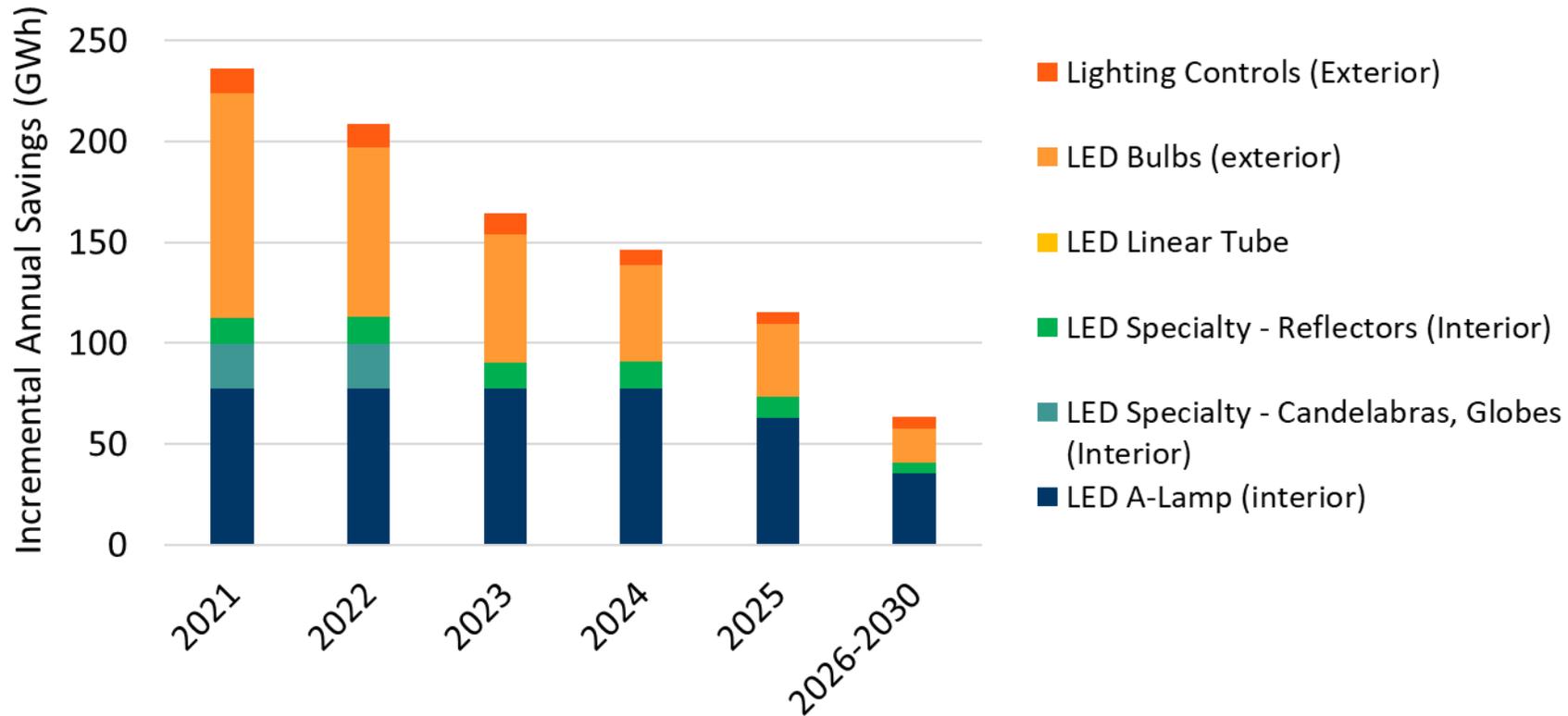
By segment Residential Cumulative 2025

Residential cumulative economic savings, end use, cumulative 2025



- In absolute terms, larger homes have more potential savings
- Small kWh home show high % savings due to high central AC opportunities (including whole house fans)
- Included HPs, but just for encouraging uptake of higher efficiency units. Also, includes conversion from electric resistance heating.

Residential lighting savings



- Lighting savings decline with time as markets saturate, and NTGs fall
- Applied all A-Lamp opportunities regardless of EISA enforcement
- Two key factors limit lighting savings
 - Low saturation of reflectors in baseline study
 - CFL saturation is high, but this is consistent with the 2017 baseline study

Top-10 measures cumulative economic potential (2025)



Residential		GWh
1	LED A-Lamp (interior)	197
2	Home Energy Report	172
3	LED Bulbs (exterior)	169
4	Thermostat Wi-Fi	147
5	Advanced Smart Strips	137
6	Whole House Fan	111
7	Central Air Conditioning (CAC)	106
8	Clothes Dryer	85
9	Clothes Washer	59
10	LED Specialty - Reflectors (Interior)	49

Income Eligible		GWh
	LED A-Lamp (interior)	176
	LED Bulbs (exterior)	174
	Thermostat Wi-Fi	82
	Advanced Smart Strips	71
	Clothes Dryer	60
	Clothes Washer	54
	Whole House Fan	37
	Freezer Recycle	33
	Central Air Conditioning (CAC)	32
	Refrigerator	20

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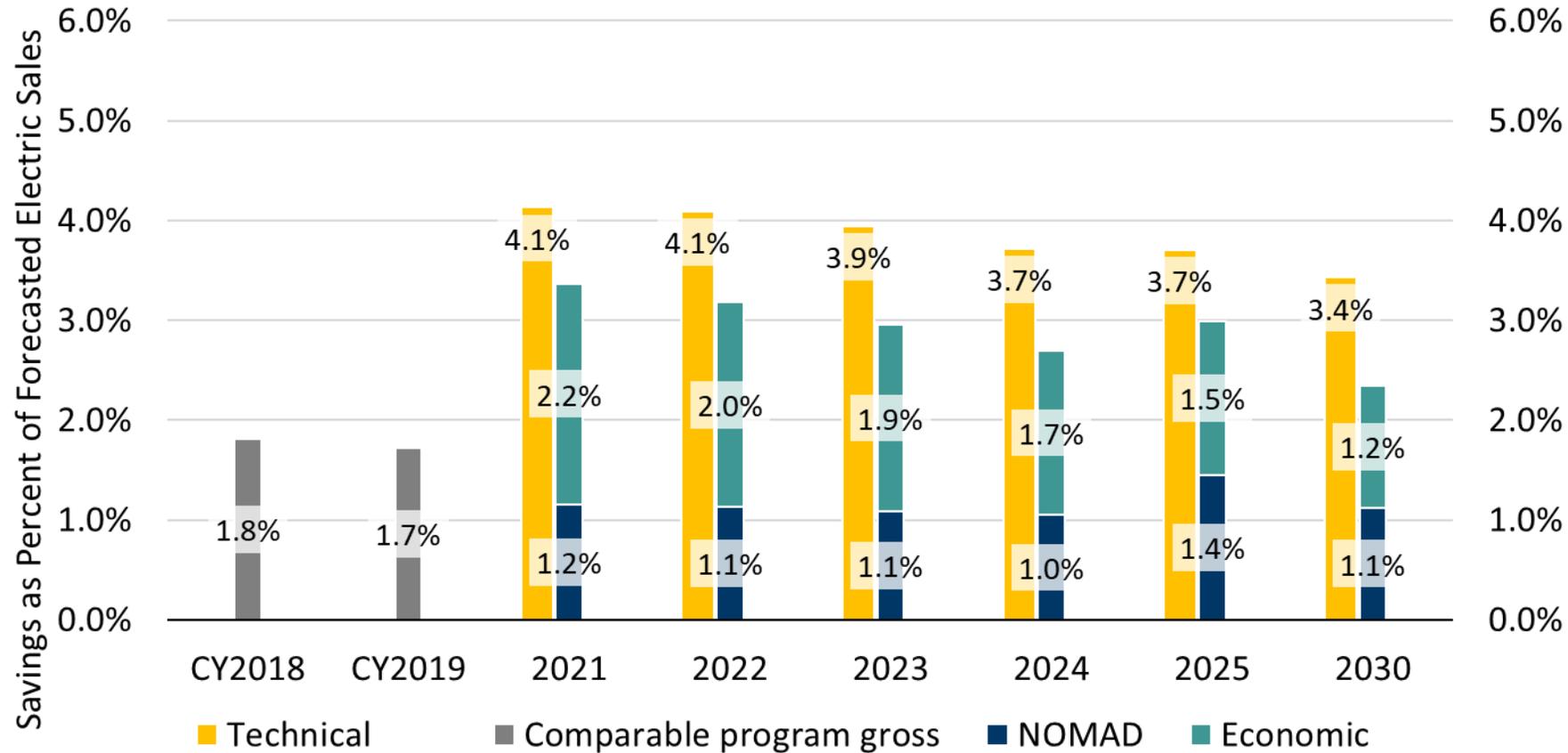
Across sectors
Residential market
Non-residential market

Commercial sector
Industrial sector

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Non-residential Energy Efficiency Savings as Percent of Annual Electric Sales



- Technical and NOMAD are gross, Economic is net of free-riders
- NOMAD is all gross savings, based only on customer economics
- Around 85% of NOMAD would be counted in gross economic potential (i.e. TRC \geq 1)

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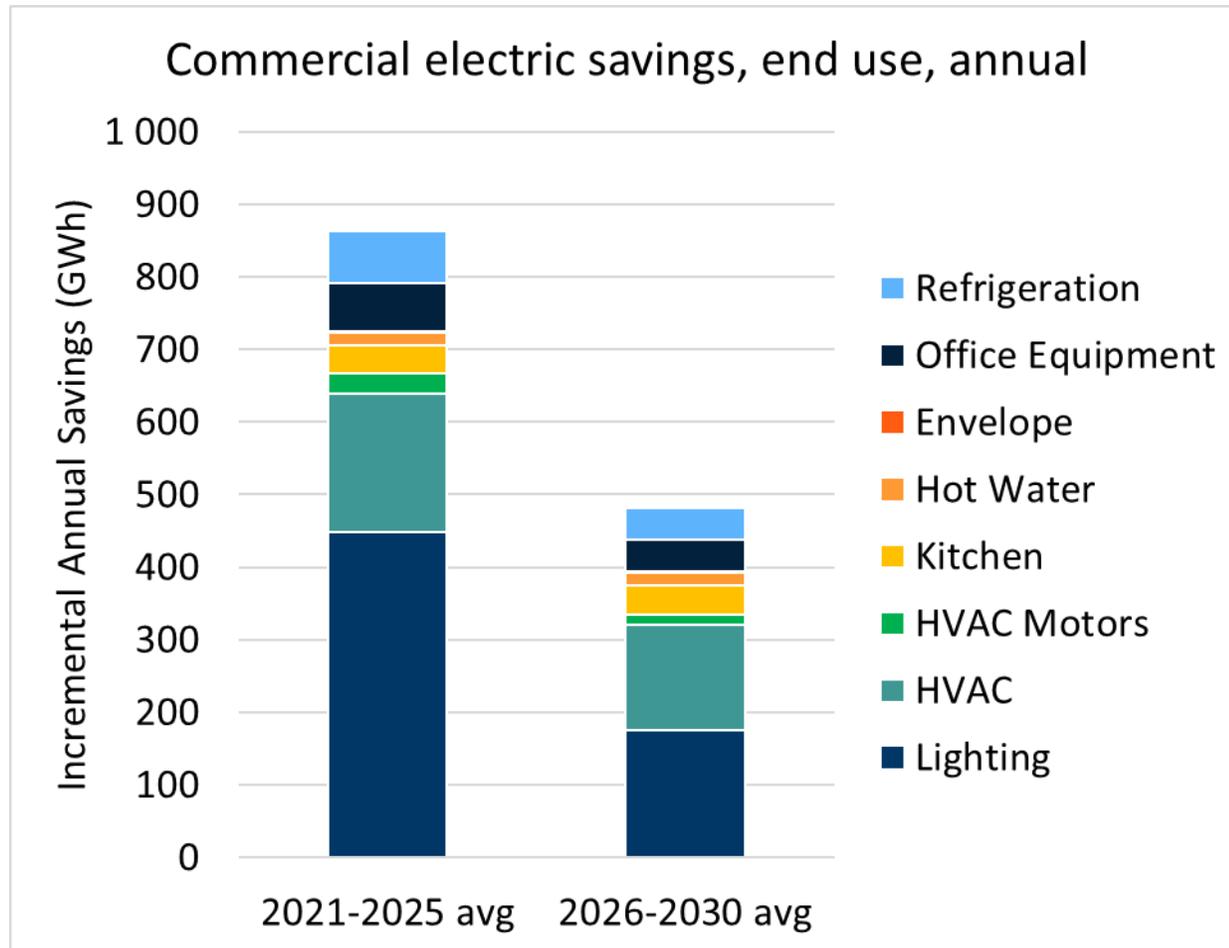
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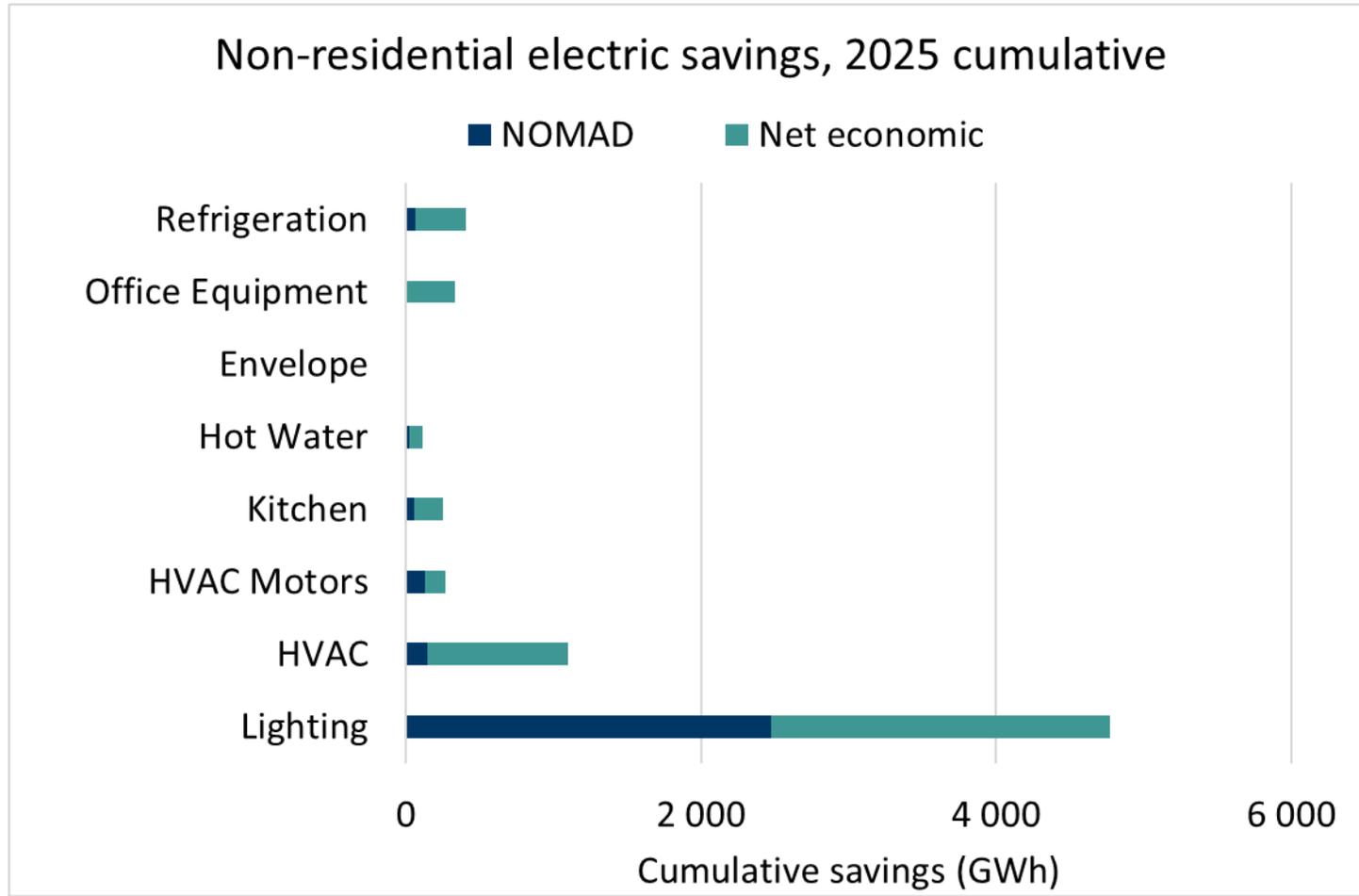
Commercial sector
Industrial sector

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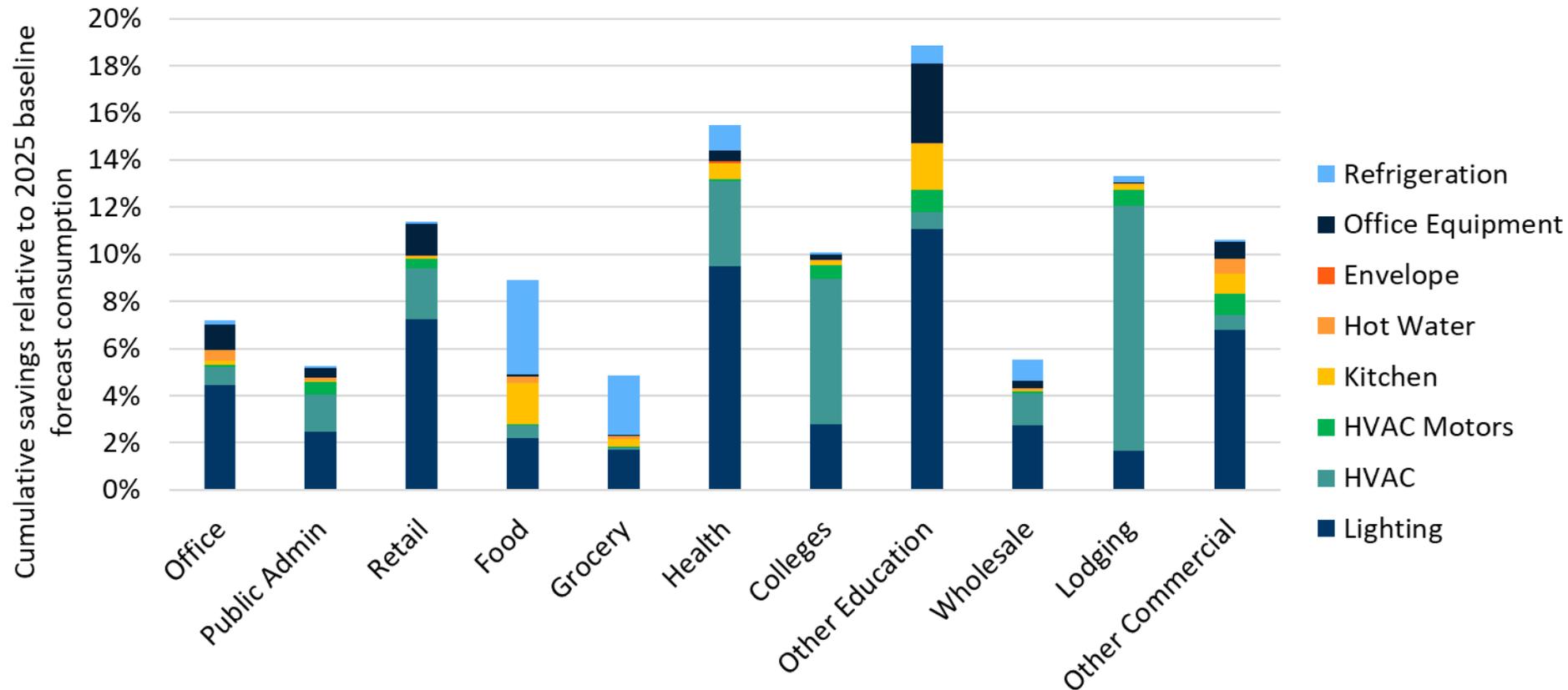
- TLED lighting shrinks with time as market saturates (despite new higher Eff. TLED being added in 2025)
- Annual and Lifetime breakdown almost identical for Commercial due to TLED's long EUL and no behavioral savings
- Kitchen savings significantly higher than in current programs



- Lighting end-use offers most savings, but also has high natural adoption
- Other end-uses have minimal natural adoption

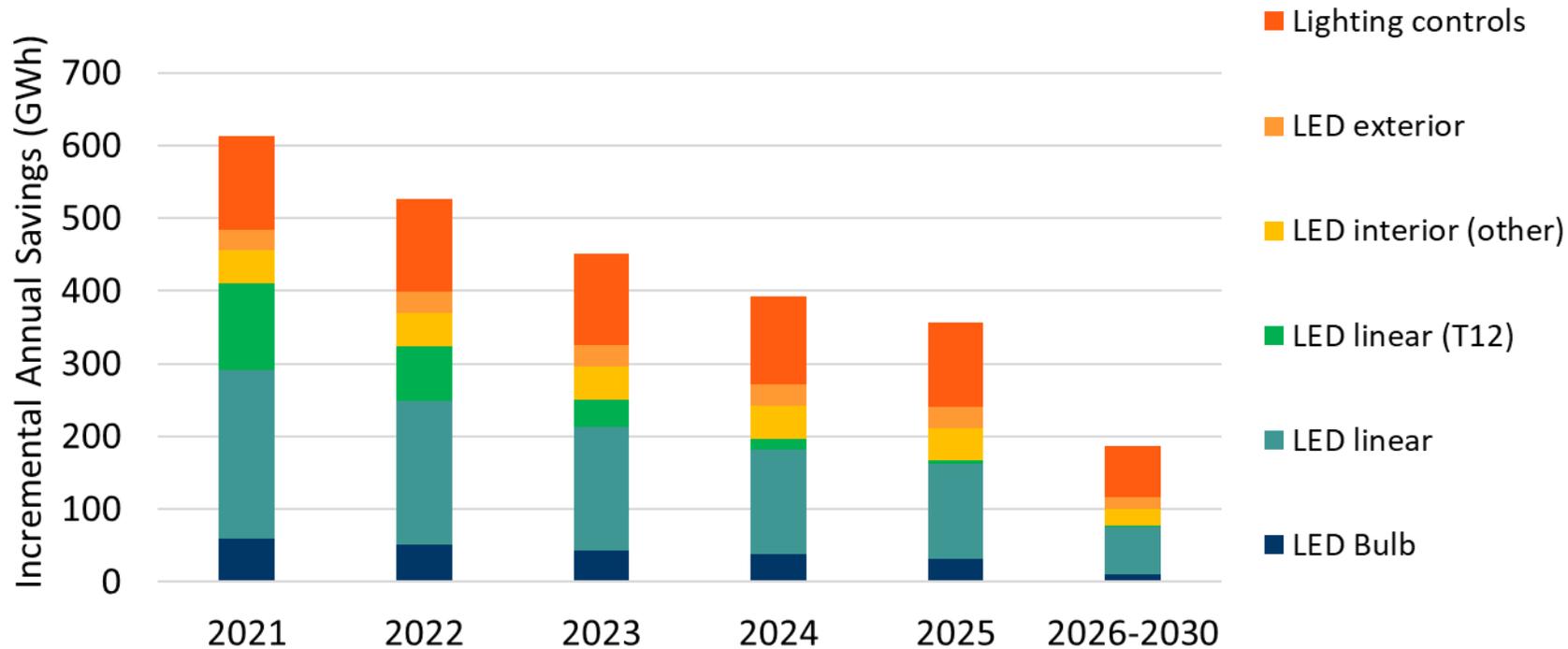
By segment Commercial Cumulative 2025

Commercial cumulative economic savings, end use, cumulative 2025



- Further refinements needed in some markets showing high lighting densities (Retail, Health, Other Education and Other Commercial)
- Lodging and Colleges offer high HVAC savings due to high electric heating penetrations in baseline study.

Non-residential lighting savings



- In general savings decline as market saturate and NTGs drop (15% per year for TLEDs and A-Lamps)
- Bump in lighting potential in 2025 when new high efficiency TLED measure introduced.

Top-10 measures 2025 cumulative savings

Commercial		GWh
1	LED Linear Luminaire	831
2	Retro-commissioning Strategic Energy Manager	415
3	Advanced Smart Strips	318
4	LED T12 Linear Luminaire	265
5	Lighting Controls (Daylighting)	235
6	Lighting Controls (Occupancy)	224
7	Refrigeration Economizers	219
8	Energy Management System (EMS)	165
9	LED Parking Garage (Exterior)	117
10	Air Source Heat Pumps (ASHP)	116

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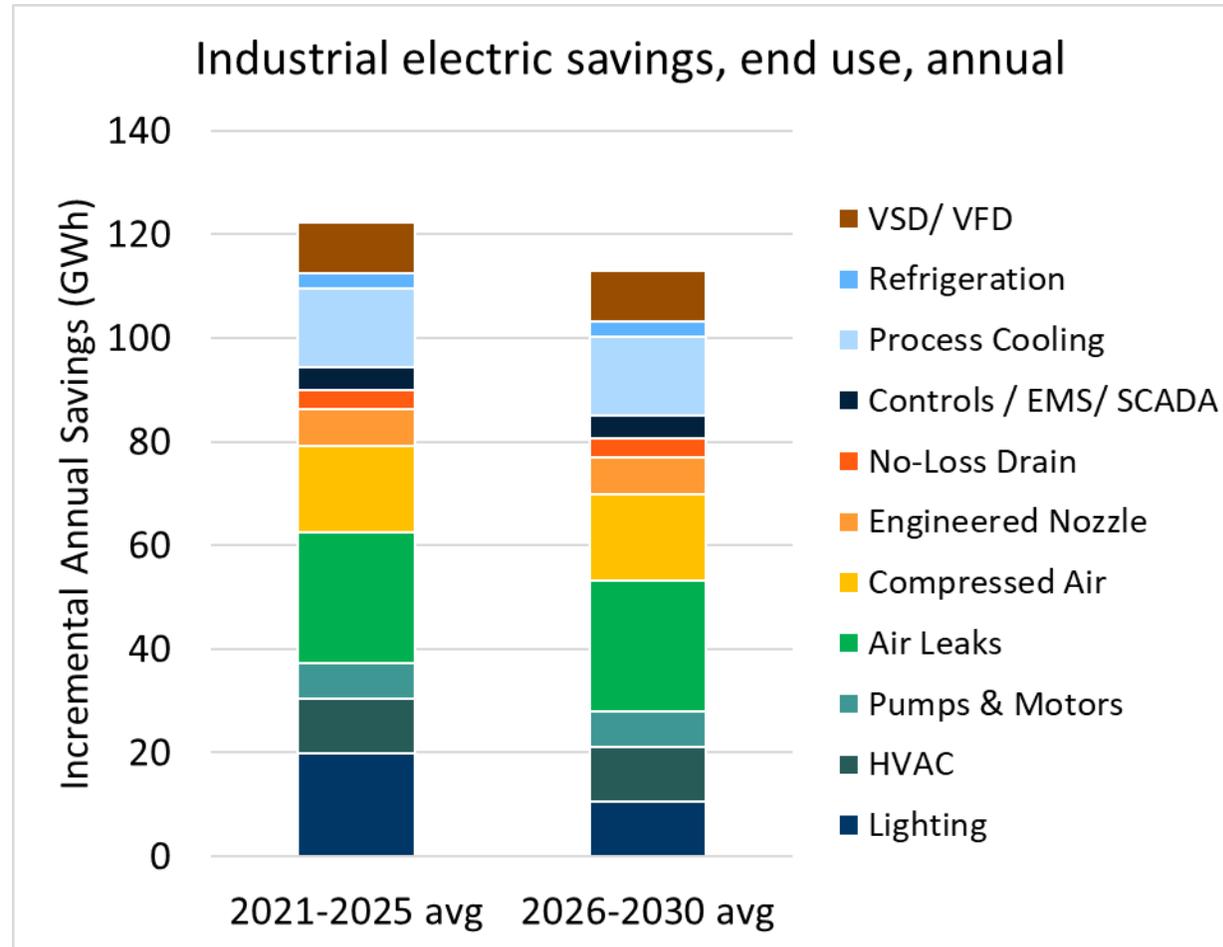
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Commercial sector
Industrial sector

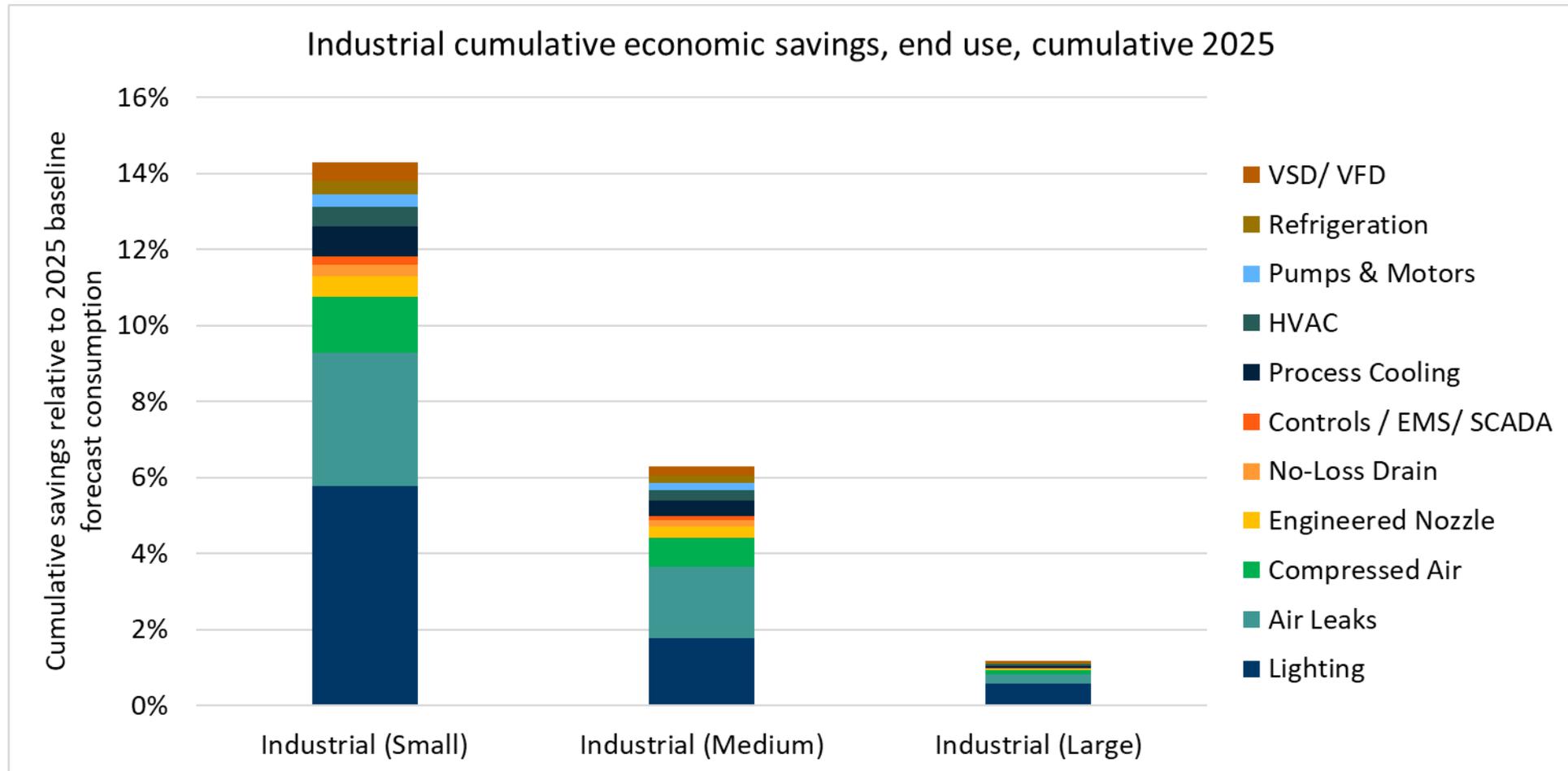
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- Industrial savings derived by Itron using top-down methodology (previously presented to IL SAG)
- Lighting savings treated in the DEEP model for bottom up potential assessment

By segment Industrial Cumulative 2025



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- **Review slide deck** – Provide questions and feedback on the results and key observations. Are there any further questions related to the economic potential that should be addressed? Feedback on key assumptions?
- **Slide deck is basis of reporting** – are there any presentations of the Economic potential that should be included in the reporting?

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