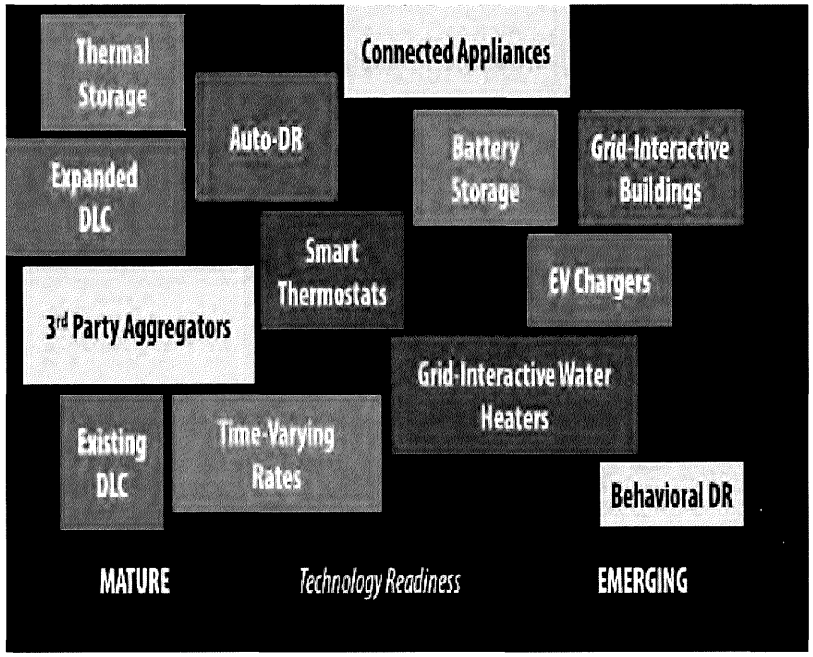
I&M Market Potential Study for End-Use Resources

INDIANA MICHIGAN POWER
An AEP Company

As an example, demand response (DR) will be assessed for potential using the following:

- System impacts (e.g. generation, transmission, and distribution savings)
- Saturation/applicability
- Effective useful life (EUL)
- Participant Costs (Equipment and Labor)
- Participant Incentives (e.g. per device, per kW, per year)
- Utility Costs (Equipment and Labor)
- Savings (e.g. per device, per premise)
- Program Costs (e.g. development, administration, marketing, consulting, evaluation)



I&M Market Potential Study for End-Use Resources

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The MPS is well underway and is in the potential development phase, with (3) stakeholder engagement meetings held to-date.

Current Stage:

MPS Task 5 Deliverables: Fully transparent Excel models demonstrating technical, economic, and achievable potentials by sector.

Final MPS Deliverable for all resources studied:

Task 15: Produce 8,760 hourly inputs that reflect time-differentiated savings for the input into the IRP.

INTRODUCTION TO THE GDS TEAM

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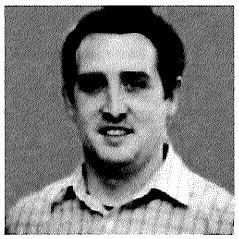
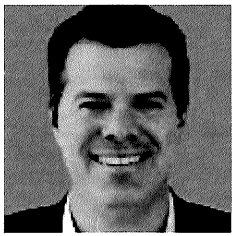
GDS Associates, Inc.
ENGINEERS & CONSULTANTS

GDS will serve as the prime contractor for these studies. GDS is a privately-held multi-service engineering and consulting firm, with more than 175 employees. Our broad range of expertise focuses on clients associated with, or affected by electric, natural gas, water and wastewater utilities. GDS has completed over 75 energy efficiency and demand response potential studies over the last two decades. GDS also has significant experience in: Statistical & Market Research Services, Integrated Resource Planning, Load Forecasting Services, and Regulatory Support Services.



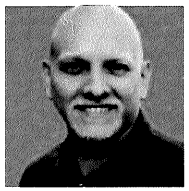
JEFFREY HUBER
Overall Project Manager
GDS Associates



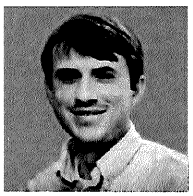
PATRICK BURNS
Brightline Group Lead & Regulatory Compliance/IRP Support
Brightline Group

brightline
GROUP

Woman-owned collective of industry experts in DSM program planning and evaluation, with over 60 years of combined experience in the energy efficiency and engineering industry. Members of the Brightline Group has previously worked for GDS on Ameren Missouri, California POU, and Pennsylvania PUC evaluation and market research projects.



JACOB THOMAS
Load Forecast & Segmentation Lead
GDS Associates



WARREN HIRONS
Residential Sector EE & Reporting Lead
GDS Associates

MARY HALL-JOHNSON
Demand Response/ CVR Lead
Brightline Group

WYLEY HODGSON
Distributed Energy Resources Lead
Brightline Group

PRIOR POTENTIAL STUDY EXPERIENCE

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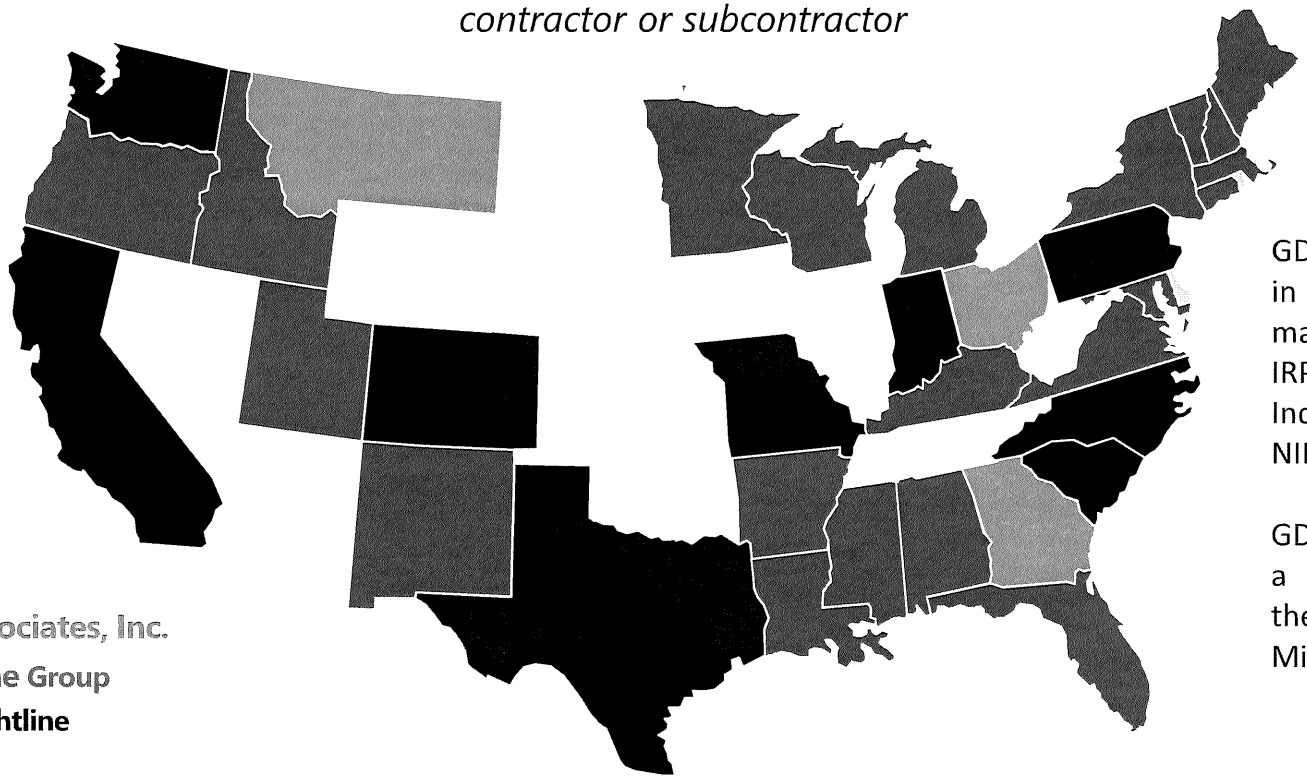
GDS Team members have completed over 85 potential studies completed as either the prime contractor or subcontractor



GDS Associates, Inc.
Brightline Group
GDS/Brightline

GDS has recently completed or in the process of completing market potential studies and IRP support for Centerpoint, Indianapolis Power & Light, and NIPSCO.

GDS also previously completed a market potential study for the Lower Peninsula in Michigan.

WHAT IS A MARKET POTENTIAL STUDY (MPS)?

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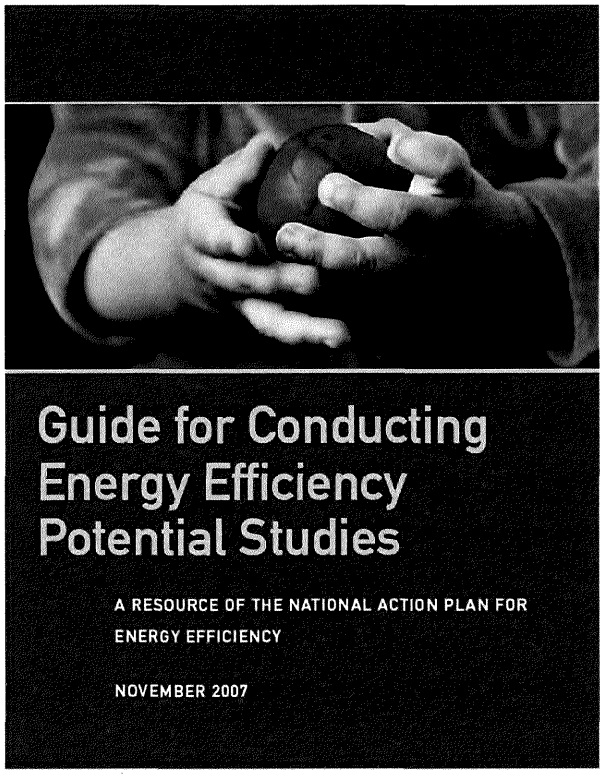
Simply put, a potential study is a quantitative analysis of the amount of energy savings that either exists, is cost-effective, or could be realized through the implementation of energy efficiency programs and policies.



I&M MARKET POTENTIAL STUDY TASKS

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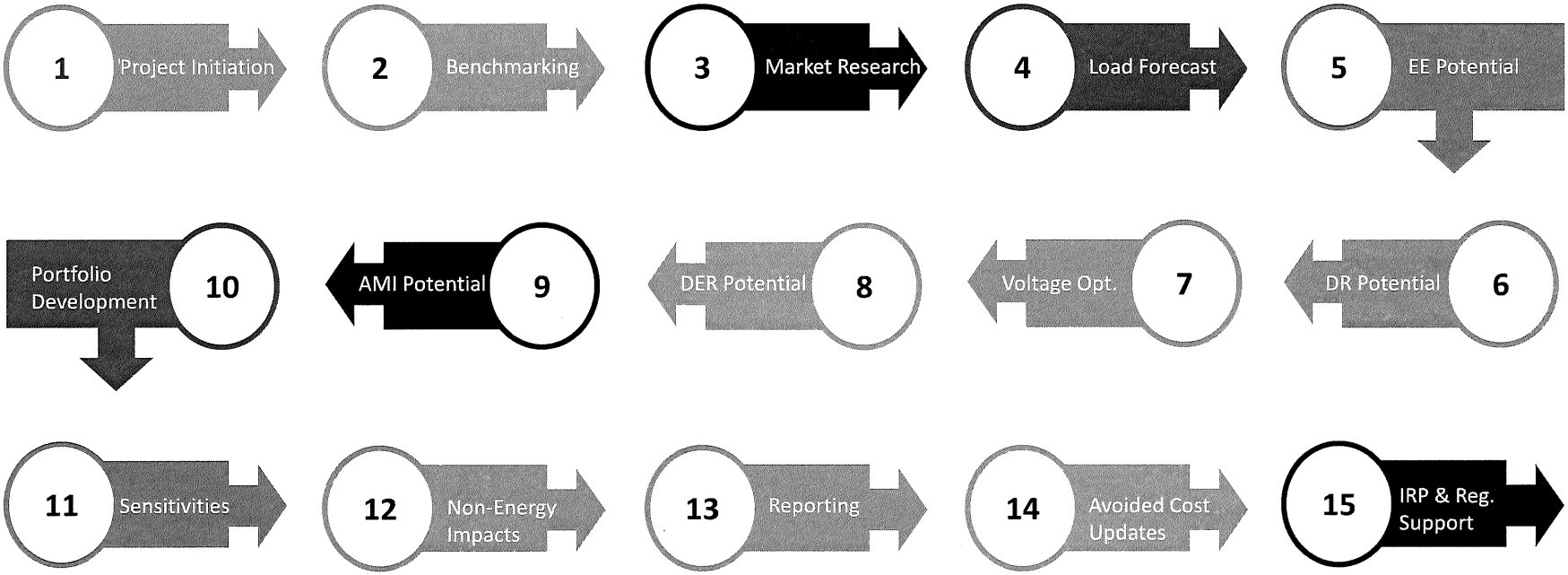

I&M MARKET POTENTIAL STUDY KEY CONSIDERATIONS

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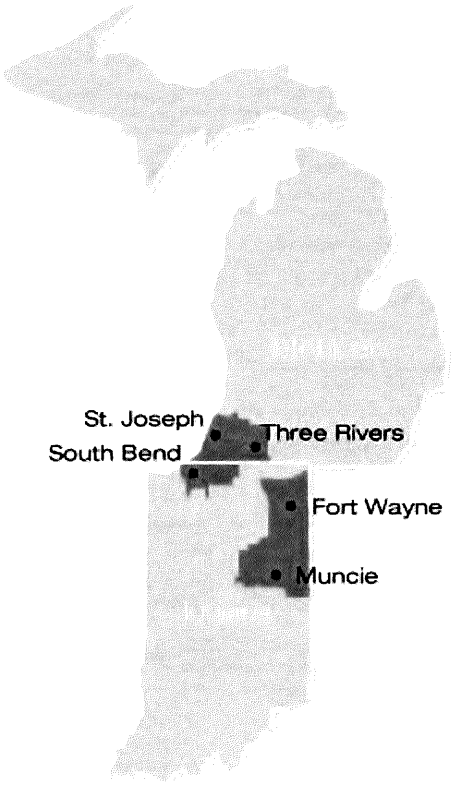
- The assessments of potential for I&M's separate jurisdictions will be customized and tailor-made to each jurisdiction to the extent possible, though the study will culminate in an overall assessment for I&M that will yield results which can be used in subsequent IRP planning.

- Key differentiating factors across the jurisdictions are expected to include:
  - Unique measure-level savings assumptions as applicable (i.e. weather-sensitive savings estimates)
  - Unique measure-level saturation estimates
  - Incorporation of jurisdictionally separate sales and customer forecasts
  - Recognition of any state-specific regulatory requirements or other Stakeholder concerns



MARKET RESEARCH PERFORMED FOR MPS

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An AEP Company

Baseline & Willingness to Participate

Energy Efficiency	Demand Response	Distributed Energy Resources
HVAC	Central AC	Solar – Leased / Purchased
Lighting	Water Heating	CHP
Controls	Time of Day	
Water Heating	Critical Peak Pricing	
Refrigeration	Electric Vehicles	
Smart Power Strips		
Envelope		
Major Appliances		

=business survey =residential survey =both

Purpose: Assemble baseline data and information to inform technology adoption curves.

Topics:

- Willingness to participate
- Baseline / Saturation data
- Program awareness
- Barriers
- Limited demographic / firmographic information

Audiences:

- Business customers
- Residential customers
- Residential rental property owners / managers

Format: Web survey with recruitment via email.

Timing: Surveys fielded January 26 – February 19

EQUIPMENT CHARACTERISTICS FROM MARKET RESEARCH

(Draft Results)

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- Data collection elements limited to items that may be answered accurately
- Nonresidential survey focused on key electric end-uses
  - Ex: Lighting, Cooling, Heating, Ventilation, Water Heating, Refrigeration
  - Key Equipment Penetration
  - Limited Efficiency Saturation Characteristics

- Residential survey collected limited saturation characteristics as well, but most saturation data will come from the most recent Residential Appliance Saturation Survey (RASS)

NONRESIDENTIAL EQUIPMENT CHARACTERISTICS	TOTAL	IN	MI
% of Lighting			
LED Linear	23%	22%	26%
LED Nonlinear	17%	15%	22%
Linear Fluorescent	38%	40%	31%
Incandescent/Halogen	10%	10%	10%
CFL	6%	5%	6%
HID	4%	4%	4%
Lighting Controls (% of all lighting)			
Occupancy Sensors	15%	16%	15%
Daylight Dimming	5%	5%	7%
Timing Controls	11%	11%	10%
Advanced Networked Controls	4%	2%	7%
Exterior Lighting			
LED (% of all Mounted Lighting)	45%	46%	42%
LED (% of all Site Lighting)	40%	41%	40%

RESIDENTIAL WILLINGNESS TO PARTICIPATE (WTP) DATA
(Draft Results)

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- Residential WTP Survey Data is used to help estimate the long-term adoption rates that might be expected across various end-uses and technologies.
- Residential consumers were asked about their likelihood to purchase and install measures given a range of incentive scenarios.
- Awareness Adjustment is also applied to reflect non-financial barrier to participation. Based on JD Power survey research, awareness adjustment is estimated at 74%. *(i.e. WTP Factor * Awareness Adjustment = Long Term Adoption Rate)*

EE/EWR/DER End-Use /Technology	Incentive Level				
	0%	25%	50%	75%	100%
Appliances	19%	27%	41%	56%	73%
Water Heating	20%	30%	43%	56%	75%
HVAC Equipment	32%	42%	55%	67%	81%
HVAC Shell					
Solar Panels	6%	14%	28%	45%	72%
Electric Vehicles	5%	12%	24%	36%	56%

Demand Response – Load Control	Incentive Level				
	$0	$15	$25	$35	$50
DR- Central AC	25%	35%	40%	44%	57%
DR- WH	17%	24%	28%	33%	44%

Demand Response – Rate Option	Off Peak Rate ($/kWh)			
	$0.08	$0.06	$0.04	$0.03
Time of Use Rate	26%	31%	40%	49%

NONRESIDENTIAL WILLINGNESS TO PARTICIPATE (WTP) DATA
(Draft Results)

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- Similar WTP questions were also posed to nonresidential survey participants to understand their likelihood to purchase and intall energy efficiency equipment and/or DER technologies, as well as participate in demand response programs.
- For nonresidential participants, WTP were typically structured to around measure payback periods in lieu of overall incentive levels.

EE/EWR/DER End-Use /Technology	Payback Period				
	10 yrs	5 yrs	3 yrs	1 yrs	0 yrs
HVAC	43%	53%	62%	70%	76%
Lighting	34%	41%	49%	58%	64%
Refrigeration	46%	56%	67%	48%	83%
Water Heating	40%	49%	57%	68%	73%
Purchased Solar	n/a	37%	50%	65%	71%

DER	Incentive Level				
	$0	MIN	LOW	HIGH	MAX
Leased Solar	16%	24%	33%	42%	49%

Demand Response – Load Control	Incentive Level				
	$0	$15	$25	$35	$50
Leased Solar	29%	33%	37%	40%	46%

Demand Response – Rate Option	On Peak 5X Higher, but Off Peak Rate (% Lower)			
	5%	10%	20%	40%
Critical Peak Pricing	25%	31%	42%	55%

MARKET SEGMENTATION

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- Market segmentation is conducted to better understand the make-up of the I&M service area and quantify remaining efficiency opportunities for future programs.
- Market segmentation relies on data underlying I&Ms load forecast and other supporting market data

- ***Residential market segmentation includes analysis by:***
  - Housing Type
  - Income Type
  - End Use
- ***Nonresidential market segmentation includes analysis by:***
  - Building/Industry Type
  - End Use

Residential Segmentation

Housing Type	Indiana	Michigan
Single Family (SF)	84.5%	94.2%
Multifamily (MF)	15.5%	5.8%

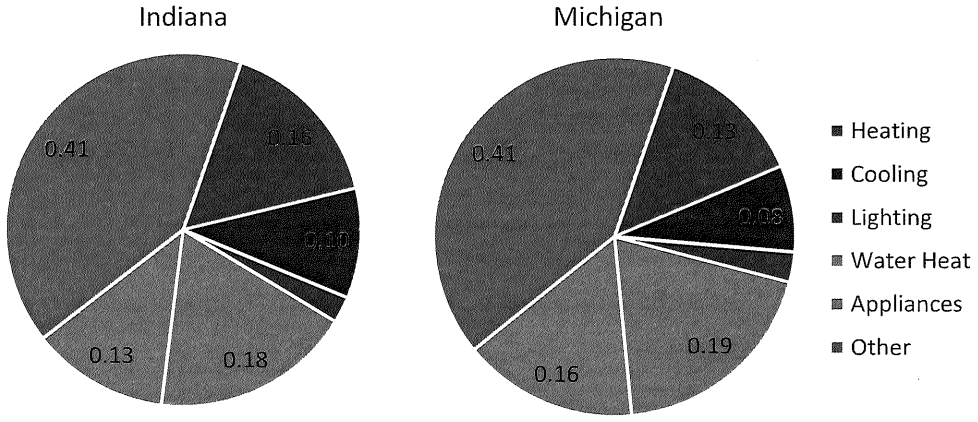
** From I&M Residential Appliance Saturation Survey*

Housing/Income Type	Indiana	Michigan
SF IQ	20.9%	23.8%
SF MR	63.6%	70.4%
MF IQ	7.7%	3.1%
MF MR	7.8%	2.7%

IQ: Income Qualified
MR: Market Rate

** 2019 5-YR American Community Survey + I&M RASS*

2041 Sales Breakdown by End-Use
(primarily derived from I&M long-term sales forecast data)



COMMERCIAL SECTOR SEGMENTATION

(Percent of Commercial Sales by Building Type)

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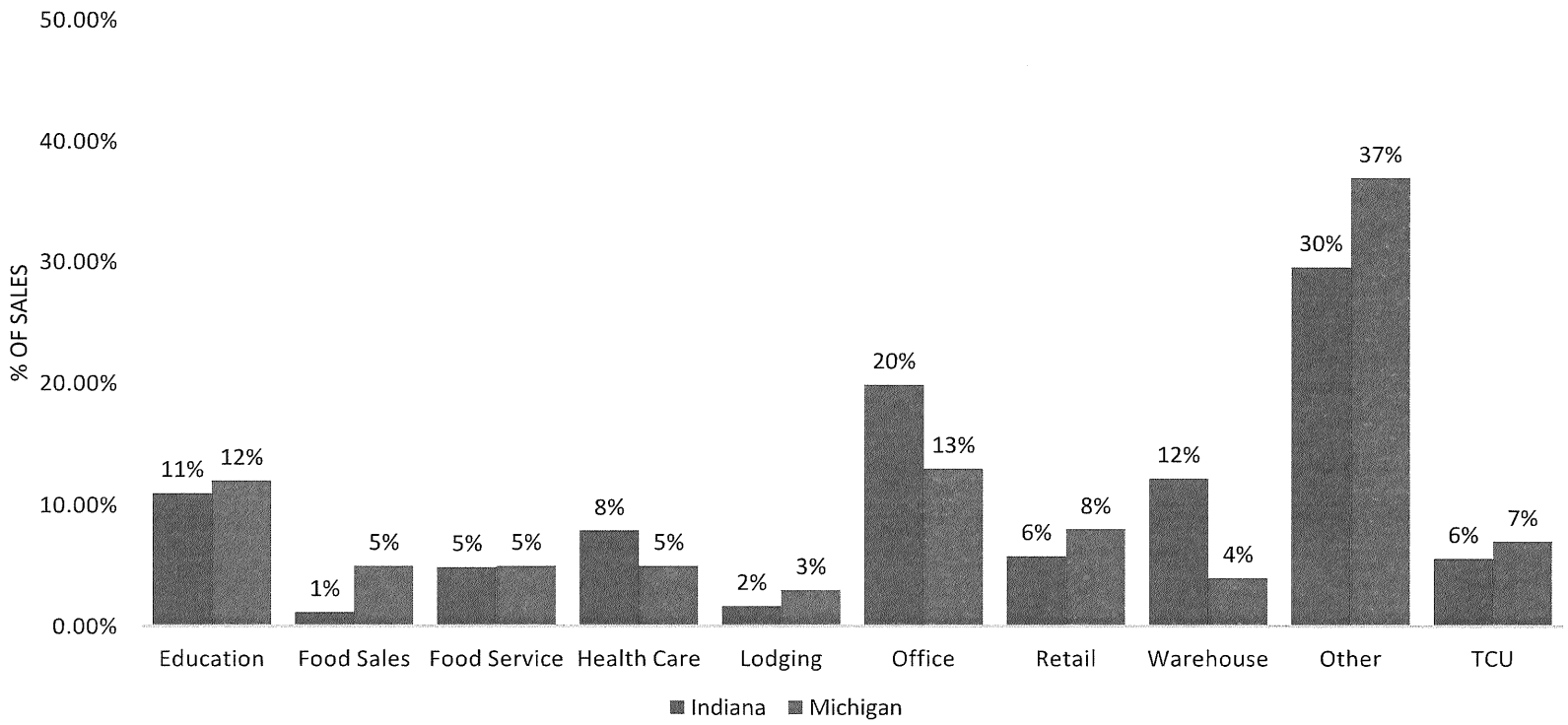

** Commercial segmentation for Indiana excludes current opt-out customers*

INDUSTRIAL MARKET SEGMENTATION

(Percent of Industrial Manuf. Vs. Non-Manuf. Sales)

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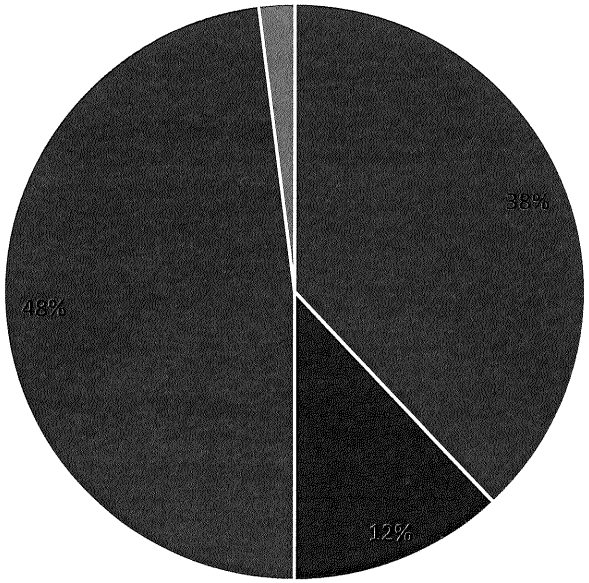
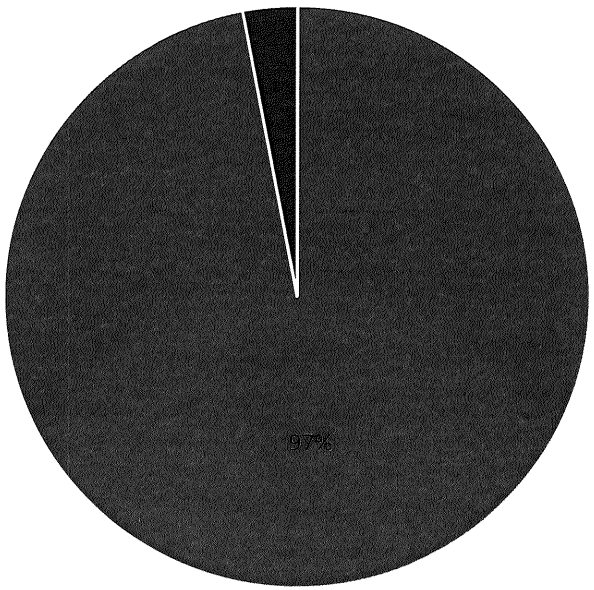
Indiana



■ Eligible Manufacturing ■ Eligible Non-Manufacturing
■ Opt-Out Manufacturing ■ Opt-Out Non-Manufacturing

** Eligible refers to industrial load that currently is eligible to participate in I&M's energy efficiency programs*

Michigan



■ Manufacturing ■ Non-Manufacturing

MEASURE CHARACTERIZATION

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- 264 EE/EWR measures will be considered (91 residential, 173 C/I)
- Draft list was shared with I&M, the Indiana Oversight Board, and MPSC Staff
- Key measure data inputs: kWh and savings, incremental and full cost estimates, measure useful life – all of these data will allow for measure-level cost-effectiveness and potential to be calculated
- Measure market data inputs: estimates of baseline saturation and energy efficiency saturation to identify remaining opportunities
- Key data sources: I&M DSM/EWR Filings, I&M EM&V reports, Michigan Energy Measures Database (MEMD), Illinois TRM, and Indiana TRM, market research baseline / saturation data