STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

VERIFIED PETITION OF INDIANAPOLIS POWER & LIGHT COMPANY D/B/A AES INDIANA FOR COMMISSION APPROVAL OF AN ELECTRIC VEHICLE PORTFOLIO, INCLUDING: (1) A PUBLIC USE ELECTRIC VEHICLE PILOT PROGRAM PURSUANT TO IND. CODE CH. 8-1-43; AND (2) TIME-VARYING AND OTHER ALTERNATIVE PRICING STRUCTURES AND TARIFFS PURSUANT TO IND. CODE § 8-1-2.5-6(3); AND FOR APPROVAL OF ASSOCIATED ACCOUNTING AND RATEMAKING	)	**CAUSE NO. 45843**

PETITIONER'S SUBMISSION OF DIRECT TESTIMONY OF
EDWARD J. SCHMIDT

Indianapolis Power & Light Company d/b/a AES Indiana ("AES Indiana" or "Petitioner"), by counsel, hereby submits the direct testimony and attachments of Edward J. Schmidt.

Respectfully submitted,

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<u>CERTIFICATE OF SERVICE</u>

The undersigned certifies that a copy of the foregoing was served this 27th day of January 2023, by electronic transmission or United States Mail, first class, postage prepaid on:

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DMS 24233092v1

Petitioner's Exhibit 3

VERIFIED DIRECT TESTIMONY

OF

EDWARD J. SCHMIDT JR

ON BEHALF OF

INDIANAPOLIS POWER & LIGHT COMPANY D/B/A AES INDIANA

SPONSORING PETITIONER'S ATTACHMENTS EJS-1 – EJS-5

VERIFIED DIRECT TESTIMONY OF EDWARD J. SCHMIDT

Q1. Please state your name and affiliation.

A1. My name is Edward J. Schmidt, Jr. and I am a director in the energy efficiency practice for MCR Performance Solutions, LLC ("MCR"), 155 N. Pfingsten Road, Suite 155, Deerfield, IL 60015.

Q2. What are your academic and professional qualifications?

A2. I have bachelor and master's degrees in economics. I have worked in rates, resource planning, and energy efficiency for utilities in Connecticut, Massachusetts, and New York. In addition, I led the utility-facing business unit of a regional energy efficiency non-profit. For the last 12 years I have been employed by MCR, a management consulting firm serving exclusively the utility and public power sectors. I began my career in and around utilities in 1989 and have over 30 years of experience, including prior work on energy efficiency database design and forecasting of electric vehicle ("EV") and behind the meter solar photovoltaic ("PV") system adoption and load impacts for Indainapolis Power & Light Company d/b/a AES Indiana ("AES Indiana" or "Company").

Q3. Have you testified before this Commission previously?

A3. No, I have not. I currently have testimony pending before the Public Utilities Commission of Ohio in Case Numbers 22-0900-EL-SSO, 22-0901-EL-ATA, and 22-0902-EL-AAM. Otherwise, my experience as a witness has been before the Connecticut Public Utilities Regulatory Authority and the Massachusetts Department of Public Utilities.

Q4. What is the purpose of this testimony?

A4. The purpose of this testimony is to provide the input data, methodology, and results of cost effectiveness modeling for the programs proposed in the AES Indiana EV Portfolio, including both vehicles and electric vehicle supply equipment ("EVSE"). These proposed programs are for customers in the residential and commercial & industrial ("C&I") sectors, including disadvantaged communities. My discussion will focus on the portions of the EV Portfolio planning that are relevant to the modeling process. The testimony of AES Indiana witness Elliot will provide additional details on each of the proposed programs.

Q5. What were the results of your cost effectiveness modeling?

A5. The modeling developed the the Rate Impact Measure ("RIM") test, the Total Resource Cost Test ("TRC"), the Participant Cost Test ("PCT"), and the Societal Cost Test ("SCT"). The benefit-to-cost ratios ("BCRs") and associated net benefits (in dollars) for the second year of the program, assumed to be 2025, are provided below and described at the end of my testimony.

Table 1. Cost Effectiveness Testing Results

Program	RIM	RIM Net Benefits	TRC	TRC Net Benefits	PCT	PCT Net Benefits	SCT	SCT Net Benefits
Residential Managed Charging	1.00	$1,840	2.77	$4,737,504	2.11	$5,417,746	3.78	$7,413,901
Off-Peak Incentive	1.00	$1,840	2.77	$4,737,504	2.11	$5,417,746	3.78	$7,413,901
EVSE Rebate and C&I Managed Charging	1.99	$8,219.467	8.20	$51,970,290	2.78	$49,232,777	11.32	$74,460,180
EVSE Rebates for Disadvantaged Communities	0.29	($1,196,282)	0.98	($16,561)	2.08	$1,316,137	1.53	$445,477
Fleet Solutions	1.06	$672,272	3.51	$35,456,415	2.26	$39,773,669	4.90	$54,975,752
Bi-directional Charging Pilot	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total (1)	1.25	$6,689,136	4.36	$95,875,152	2.44	$101,158,075	6.04	$143,699,211
Tariff EVSE	1.02	$54,970	1.36	$2,453,693	1.30	$3,296,628	1.91	$6,295,574

(1) Total includes $400,000 of portfolio administration, education, and outreach thus is greater than the sums of the individual programs.

In particular, please note that the portfolio as a whole has a RIM greater than one, meaning that non-participating customers actually save money as a result of the programs. That savings occurs because increased EV adoption leads to an increase in the usage of electricity by participating customers; since costs are allocated over a higher level of usage, electric rates can be expected to go down, which benefits non-participating customers.

Q6. Have you prepared any attachments to accompany this testimony?

A6. Yes. Five attachments have been prepared and are labeled as Petitioner's Attachments EJS-1 through EJS-5. The five attachments are as follows:

- Petitioner's Attachment EJS-1 provides four tables, Tables EJS-1.1 through EJS-1.4. The contents identify the input data used by MCR in the cost effectiveness modeling. The tables are structured to provide the general topic area, specific term or modeling parameter, value, and source of the data used in the model. Each of the four tables presents the general category of data as follows:
    - Table EJS-1.1 provides the economic inputs modeled, including inflators and interest rates, AES Indiana line loss rates, estimated useful life of the EVs and EVSE, and infrastructure cost share.
    - Table EJS-1.2 provides fuel and emissions inputs, including fuel rates or prices, heat contents, and carbon dioxide (CO_2) emissions rates.
    - Table EJS-1.3 provides vehicle-related inputs, including costs, tax credits, miles driven per year, and fuel efficiencies.

   - Table EJS-1.4 provides EV charger and charging inputs, including charger costs, efficiencies, kW capacities, charging ports per charger, and number of vehicles charged per port.
- Petitioner's Attachment EJS-2 provides the AES Indiana avoided electricity supply costs used in the modeling. It includes avoided energy (kWh) costs for the summer, winter, and shoulder season during the on- and off-peak periods as well as the avoided demand (kW) costs associated with transmission and distribution along with generation capacity.
- Petitioner's Attachment EJS-3 provides mathematical equations for the specific cost effectiveness tests conducted in the modeling process.
- Petitioner's Attachment EJS-4 provides a table identifying the costs and benefits that are modeled in each of the cost effectiveness tests.
- Petitioner's Attachment EJS-5 summarizes the results of the work, showing the program costs, participation levels, kW and kWh impacts, BCRs, and net benefits for each individual program, and then the portfolio as a whole. Proposed Tariff EVSE is shown alone since it will be fully funded only by participants via a separate tariff.

Q7. Describe MCR's role in support of the AES Indiana EV Portfolio.

A7. MCR performed cost effectiveness modeling and interpretation of the results to support the programs proposed in the AES Indiana EV Portfolio. MCR's modeling effort in support of this filing utilized the Beneficial Electrification variant of our Local Energy Efficiency Planning ("LEEP-BE") model. MCR developed four of the five tests detailed by the industry standard guide to cost effectiveness testing, the 2001 edition of the California Standard Practice Manual for Economic Analysis of Demand-Side Programs and Projects ("CSPM"): the Rate Impact Measure or non-participant test, Total Resource Cost Test, Participant Cost Test, and Societal Cost Test.[1] LEEP-BE is a complex, proprietary spreadsheet tool that mathematically develops the CSPM tests based upon scores of inputs. Petitioner's Attachments EJS-1 and EJS-2, described above, provide these inputs as well as their sources.

Q8. Please describe the Rate Impact Measure Test.

A8. The Rate Impact Measure, or RIM, test is also known as the "non-participants" test because it quantifies the costs and benefits of a utility energy efficiency, demand response, or fuel substitution intervention (i.e., program) from the perspective of utility customers who do not participate in the program ("non-participants"). The CSPM identifies the RIM as a measure of "what happens to customer bills or rates due to changes in utility revenues and operating costs caused by the program" (p. 13). Petitioner's Attachment EJS-3 provides specific mathematical equations for calculating the RIM and Petitioner's Attachment EJS-4 describes the components of the benefit (numerator) and cost (denominator) terms of the RIM benefit-to-cost ratio.

Q9. Please describe the Total Resource Cost Test.

A9. The Total Resource Cost Test, or TRC, quantifies the costs and benefits of utility energy efficiency, demand response, or fuel substitution interventions (i.e., programs). When applied to a fuel substitution program such as those supporting adoption of EV, the CSPM identifies the TRC as follows: "the test measures the net effect of the impacts

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[1] The fifth test, the Program Administrator Cost Test ("PAC"), historically and still commonly known as the Utility Cost Test ("UCT") is not presented because it is intended for traditional energy efficiency load reduction programs and does not contemplate fuel substitution activities such as vehicle electrification.

from the fuel not chosen versus the impacts from the fuel that is chosen as a result of the program." (p. 18). Petitioner's Attachment EJS-3 provides specific mathematical equations for calculating the TRC and Petitioner's Attachment EJS-4 describes the components of the benefit (numerator) and cost (denominator) terms of the TRC benefit-to-cost ratio.

Q10. Please describe the Participant Cost Test.

A10. The Participant Cost Test, or PCT, quantifies the costs and benefits of a utility energy efficiency, demand response, or fuel substitution intervention (i.e., program) from the perspective of utility customers who participate in the program ("participants"). The CSPM identifies the PCT as "a measure of the quantifiable benefits and costs to the customer due to participation in a program" (p. 8) while cautioning that it only addresses quantifiable factors, but consumers make decisions in large part on non-quantifiable ones. Petitioner's Attachment EJS-3 provides specific mathematical equations for calculating the PCT and Petitioner's Attachment EJS-4 describes the components of the benefit (numerator) and cost (denominator) terms of the PCT benefit-to-cost ratio.

Q11. Please describe the Societal Cost Test.

A11. The Societal Cost test, or SCT, quantifies the costs and benefits of a utility energy efficiency, demand response, or fuel substitution intervention (i.e., program) from the perspective of society as a whole. The CSPM identifies the SCT as "a measure of the economic efficiency implications of the total energy supply system" (p. 18). It is often recognized as a variant of the Total Resource Cost test that adds to that test monetized non-energy impacts and applies a different, lower, discount rate to present value calculations. Peitioner's Attachment EJS-3 provides specific mathematical equations for calculating the SCT and EJS-4 describes the components of the benefit (numerator) and cost (denominator) terms of the SCT benefit-to-cost ratio.

Q12. Briefly, how does the LEEP-BE model work?

A12. The LEEP-BE model applies various mathematical operations to the input data described in Petitioner's Attachments EJS-1 and EJS-2 to generate the various terms of the equations shown in Petitioner's Attachment EJS-3, which represent the costs and benefits as described at a high-level in Petitioner's Attachment EJS-4. MCR conducted its cost effectiveness modeling at the program level for the second year of program implementation, assumed to be 2025. We modeled the second year since it represents the first steady-state year of implementation, noting that the first year of implementation, or ramp-up year, typically has a higher than steady-state level of administrative costs and a lower level of participation as program operations begin. The following provides in summary form the details as performed in the operation of the model:

1. Quantify the number and type of participating EVs, the number and type of EV chargers and the number of charger ports, along with the associated kWh and kW consumed, the equipment and installation costs of the chargers in the post-participation EV state, and the purchase and non-fuel O&M costs of the Internal Combustion Engine ("ICE") and EV vehicles, all based on the planning assumptions provided by AES Indiana.
2. Quantify the rebate, incentive, and administrative and other costs of the programs based on the planning assumptions provided by AES Indiana.

3. Calculate the CO_2 emissions associated with the ICE vehicle state and the post-participation EV state.
4. Calculate the first year and present value of life-cycle fuel bills of participants in the ICE vehicle state and the first year and life-cycle electric bills of participants in the post-participation EV state.
5. Assign load profiles to the pre-participation and post-participation EV states.
6. Develop the avoided or incremental supply costs associated with the various sets of data.
7. Calculate the cost effectiveness results, the BCRs and net benefits, under each of the CSPM tests performed.

Q13. What programs were modeled and run through MCR's cost effectiveness testing?

A13. As described in more detail in AES Indiana witness Elliot's testimony, the following eight programs are being proposed in the AES Indiana EV Portfolio:

Residential Programs:

1. Residential Managed Charging
2. Off-Peak Incentive

C&I Programs:

3. C&I Managed Charging
4. EVSE Rebates
5. EVSE Rebates for Disadvantaged Communities
6. Fleet Solutions
7. Bi-directional Charging Pilot

8. Tariff EVSE

Although AES Indiana expects and looks forward to quantifying impacts from the Bi-directional Charging Pilot, such initiatives are at such a very early stage in their development, with little, if any, reliable data on costs and charge/discharge energy and demand, I did not attempt to develop cost effectiveness tests for the Bi-directional Charging Pilot. The costs associated with this pilot are, however, included in the overall portfolio cost effectiveness testing to ensure that execution of the pilot does not cause the overall AES Indiana EV Portfolio to become non-cost effective. Please see the testimony of AES Indiana witness Elliot for detail on the planned Bi-directional Charging Pilot.

Q14. AES Indiana's proposed EV Portfolio also includes Rate EVP and Rate DCFC. Why are those not included in your cost and benefit analysis?

A14. These two rates proposed by AES Indiana do not have associated program operating costs. Therefore, results from the benefit cost tests I described previously in testimony would be undefined.

Q15. Please describe the Residential Managed Charging program planning design as it relates to the modeling effort.

A15. AES Indiana provided the following program design information for MCR to utilize in its modeling: The Residential Managed Charging program projects 300 participants coming into the program the second year, which is 2025. 150 of the customers are projected to initially have unmanaged Level 1 chargers were it not for the program. The program provides rebates for Level 2 chargers that are managed by AES Indiana in exchange for a recurring participation incentive per kW curtailed. The other 150 participants are projected to come into the program with unmanaged Level 2 chargers and receive an enrollment incentive to allow AES Indiana to manage the chargers in exchange for a recurring participation incentive per kW curtailed. The incremental electricity sales measured are the full load for the managed chargers. Backing out recurring costs from 2024 program activity, and using AES Indiana provided budget and savings detail, MCR derived the following 2025 incremental budget and participation:

Table 2. 2025 Residential Managed Charging

	2025
Projected Participation	300
Projected Enrollment Incentive Budget	$60,000
Projected Incentive Budget	$15,000
Projected Admin Budget	$75,000
Total Budget	$150,000
Projected Savings (kW)	150

Q16. Please describe the Off-Peak Incentive program planning design as it relates to the modeling effort.

A16. AES Indiana provided the following program design information for MCR to utilize in its modeling: The Off-Peak Incentive program projects 300 participants coming into the program the second year, which is 2025. 150 of the customers are projected to initially have Level 1 chargers were it not for the program. The program provides rebates to these participants for Level 2 chargers. The other 150 participants are projected to come into the program with Level 2 chargers and receive an enrollment incentive to participate in the Off-peak Incentive program. All participants will self-manage their chargers in exchange for a recurring performance-based (i.e., self-executed curtailment) participation based on their performance (i.e., charging behavior and kWh consumption). Incremental electricity sales will again be measured for the full load for the managed chargers. Backing out recurring costs from 2024 program activity, and using AES Indiana provided budget and savings detail, MCR derived the following 2025 incremental budget and participation:

Table 3. 2025 Off-Peak Incentive

	2025
Projected Participation	300
Projected Rebate Budget	$60,000
Projected Incentive Budget	$15,000
Projected Admin Budget	$75,000
Total Budget	$150,000
Projected Savings (kW)	150

Q17. Turning to the C&I sector and before describing the programs, what is the relationship between the EVSE Rebates program and the C&I Managed Charging program?

A17. The EVSE Rebates program and C&I Managed Charging program are closely related. The design assumptions provided by AES Indiana for the EVSE Rebates program indicate that 75 ports of Level 1 EV chargers will be rebated to induce upgrade to Level 2 EV chargers, and 25 ports of Level 2 EV chargers will be rebated to induce upgrade to 25 ports of Level 3 (high voltage direct current ("HVDC")) EV chargers. The design assumptions provided by AES Indiana for the C&I Managed Charging program indicate that 150 Level 2 EV chargers and 50 Level 3 (HVDC) EV chargers will be enrolled in a program through which AES Indiana actively manages the EV chargers to minimize peak impacts of EV charging. Although the programs are independent and there may or may not be one-to-one correspondence between the EV chargers rebated and those among the participants in managed charging, I report modeling results that reflect the two programs combined. This is logically necessary since upgrading EV chargers from Level 1 to Level 2 and from Level 2 to Level 3, by definition, means that although less energy (kWh) will be consumed, more demand (kW) will be required and thus benefit-to-cost ratio results would be confounded if reported separately.

Q18. Please describe the EVSE Rebates program planning design as it relates to the modeling effort.

A18. AES Indiana provided the following program design information for MCR to utilize in its modeling: The EVSE Rebates program projects 75 participating unmanaged Level 1 chargers (and ports) will be rebated to 75 Level 2 chargers (and ports), and 25 participating unmanaged Level 2 EV charging ports will be rebated to upgrade to 25 Level 3 (Direct Current Fast Charging ("DCFC")) ports in the second year, which is 2025. Backing out recurring costs from 2024 program activity, and using AES Indiana provided budget and savings detail, MCR derived the following 2025 incremental budget and participation:

Table 4. 2025 EVSE Rebates

	2025
Projected Participation (ports)	25
Projected Rebate Budget	$1,700,000
Projected Admin Budget	$100,000
Total Budget	$1,800,000
Projected Savings (kWh)	60,750

Q19. Please describe the C&I Managed Charging program planning design as it relates to the modeling effort.

A19. AES Indiana provided the following program design information for MCR to utilize in its modeling: The C&I Managed Charging program projects 150 participating Level 2 EV charging ports and 50 participating Level 3 (DCFC) ports in the second year, which is 2025. Participating customers receive a recurring participation incentive per participating EV charging port in exchange for allowing AES Indiana to manage the chargers during peak periods. Incremental electricity sales will be measured for the full load for the managed chargers. Backing out recurring costs from 2024 program activity, and using AES Indiana provided budget and savings detail, MCR derived the following 2025 incremental budget and participation:

Table 5. 2025 C&I Managed Charging

	2025
Projected Participation (ports)	200
Projected Incentive Budget	$10,000
Projected Admin Budget	$100,000
Total Budget	$110,000
Projected Savings (kW)	300

Q20. Please describe the EVSE Rebates for Disadvantaged Communities program planning design as it relates to the modeling effort.

A20. AES Indiana provided the following program design information for MCR to utilize in its modeling: Participants in the EVSE Rebates for Disadvantaged Communities program come into the program with ICE vehicles. For the second year, the participation is projected to be 23 Level 2 EV charging ports and seven (7) Level 3 (HVDC) charging ports. Participants receive a rebate to encourage the purchase and installation of the charging equipment. The participating customers are C&I customers who meet the criteria described in the testimony of AES Indiana witness Elliot. As C&I customers, all charging, including charging by the public, is billed to the host customer at regular C&I rates (unmanaged charging since it is available to the public). Incremental electricity sales will be measured for the full load for the managed chargers. AES Indiana provided the following budget and savings detail:

Table 6. 2025 EVSE Rebates for Disadvantaged Communties

	2025
Projected Participation	30
Projected Rebate Budget	$510,000
Projected Admin Budget	$100,000
Total Budget	$610,000

Q21. Please describe the Fleet Solutions program planning design as it relates to the modeling effort.

A21. AES Indiana provided the following program design information for MCR to utilize in its modeling: for the second year, participation is projected to include 20 customers, 16 of whom decide to purchase EVs and 400 ports of Level 2 chargers as a result of the support, including fleet electrification reports, provided by the program and four (4) of whom decide to purchase EVs and 100 ports of Level 3 chargers. Charging is assumed not to be managed, rather customers charge the EV as their business needs dictate and they are billed at their regular C&I electricity rates. Incremental electricity sales will again be measured for the full load of the participating chargers. AES Indiana provided the following budget and savings detail:

Table 7. 2025 Fleet Solutions

	2025
Projected Participation (# of customers)	20
Projected Participation (# ports)	500
Projected SaaS Costs	$100,000
Projected Report Costs	$1,000,000
Projected Implementation Costs	$200,000
Total Budget	$1,300,000

Q22. Please describe the Tariff EVSE program planning design as it relates to the modeling effort.

A22. AES Indiana provided the following program design information for MCR to utilize in its modeling: For the second year, the participation is projected to be 75 AES Indiana-managed Level 2 charging ports and 25 AES Indiana-managed Level 3 charging ports that are installed through the program and paid for under a C&I EVSE Tariff (i.e., fully funded via the tariff by participants only). Incremental electricity sales will again be the full load of the chargers. AES Indiana provided the following budget and savings detail:

Table 8. 2025 Tariff EVSE

	2025
Projected Participation	100
Projected Equip Budget	$1,700,000
Projected Install Budget	$1,700,000
Projected Admin Budget	$100,000
Total Budget	$3,500,000

Q23. Did AES Indiana consider provisions recent federal legislation in its cost effectiveness modeling?

A23. Yes, the provisions of the Infrastructure Investment and Jobs Act were incorporated into assumptions and inputs. Given the continuously evolving status of implementation of the Inflation Reduction Act, provisions of this legislation were not incorporated into inputs and assumptions.

Q24. Are there any other elements of the AES Indiana EV Plan programs that were considered in the MCR modeling?

A24. Yes, AES Indiana planning assumptions included a $150,000 budget for outreach and education in 2025 and a $250,000 budget for marketing, labor, and evaluation in 2025. Because these costs are applicable to the portfolio as a whole, MCR excluded the costs from the cost effectiveness calculations for each individual program and, instead, added these costs into the cost effectiveness calculations for the portfolio in total.

Q25. Please summarize the results of MCR's modeling.

A25. Petitioner's Attachment EJS-5 tabulates the full results of the cost effectiveness modeling. All of the programs achieve Participant Cost Test and Societal Cost Test BCRs of greater than 1, meaning the benefits to participants exceed the costs. All programs except the EVSE Rebates for Disadvantaged Communities also yield Rate Impact Measure Test and Total Resource Cost Test BCRs of greater than 1. For the EVSE Rebates for Disadvantaged Communities program, the BCRs for these two tests are less than 1, however BCRs for the portfolio as whole, are greater than 1, meaning the programs actually lower the costs to non-participants. Results for all four tests (RIM, TRC, PCT, and SCT) for Tariff EVSE, which I show separate from the other programs, are all greater than 1.

Q26. Can you explain how the programs could lower costs to persons who do not participate in them?

A26. Yes. The customers that adopt EVs through the programs are projected to use more electricity than the non-participants. The increased electricity usage by those customers can be expected to lead to lower overall electric rates because costs are allocated based upon usage. The RIM test results suggest that, for non-participating customers, the benefit of increased sales revenue exceeds the cost of the programs.

Q27. Can you comment on the fact that the EVSE Rebates for Disadvantaged Communities program has Rate Impact Measure Test and Total Resource Cost Test BCRs less than one?

A27. In MCR's experience, it is not uncommon to see programs serving low-to-moderate income customers and disadvantaged communities carry BCRs of less than one since these populations typically require more support from their utilities than other customers.

Q28. How is Tariff EVSE addressed in your analysis?

A28. AES Indiana proposes to offer this tariff as a voluntary (opt-in) opportunity for C&I customers who choose for whatever reason to procure and finance their EV charging equipment through AES Indiana. Participating customers will fully fund this program via a separate tariff, the costs of which are entirely borne by them. Therefore, I show the Tariff EVSE as a standalone line item.

Q29. Does this conclude your testimony?

A29. Yes, at this time it does.

VERIFICATION

I, Edward J. Schmidt, Jr., Director for MCR Performance Solutions, LLC, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.

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Edward J. Schmidt Jr.
Dated: January 27, 2023

Cost Effectiveness Modeling Input Data

Table EJS 1.1 Economic Inputs

Topic	Term	Value	Source
AESI Line Loss Rates	Combined Energy (kWh) and Demand (kW)	5.40%	AES 2022 IRP data
Inflators/Deflators	Inflation	2.16%	AES 2022 IRP data (2024-2028 average)
	AES Weight Average Cost of Capital	6.65%	AES 2022 IRP data
	Societal Discount Rate	3.43%	August - October 2022 10-Year T-Bill average
Infrastructure Cost Share	C&I Customer Share	40%	CIAC for C&I customers
Peak kW coincidence	Percent of rated kW occurring in the peak billing period	62.50%	Based on Pennsylvania TRM Table 3-209 of Section 3.11.1
Estimated Useful Life (yrs)	Averaging vehicle and charger	12	Typical industry standard value

Table EJS 1.2 Fuel and Emissions Inputs

Topic	Term	Value	Source
AESI Retail Rates	Average Residential $/kWh	$0.1249	AES YTD 2022 residential sales and revenue data
	Average C&I $/kWh	$0.1315	AES YTD 2022 small C&I sales and revenue data
Fossil Fuel Rates	Gasoline - retail	$3.81	10/30//22 - https://gasprices.aaa.com/?state=IN (drill to Indy metro)
	Diesel - retail	$5.51	10/30//22 - https://gasprices.aaa.com/?state=IN (drill to Indy metro)
	Avoidable percent of retail	92.00%	Derived from federal data reported at: https://auto.howstuffworks.com/fuel-efficiency/fuel-consumption/gas-price.htm
Heat Content of Fuel	Gasoline BTU/gallon	120,286	https://www.eia.gov/energyexplained/units-and-calculators/british-thermal-units.php
	Diesel BTU/gallon	137,381	https://www.eia.gov/energyexplained/units-and-calculators/british-thermal-units.php
	Electricity BTU/kWh	3,412	https://www.eia.gov/energyexplained/units-and-calculators/british-thermal-units.php
Carbon (CO_2)	Gasoline lbs/gallon	19.37	https://www.eia.gov/environment/emissions/co2_vol_mass.php
	Diesel lbs/gallon	22.46	https://www.eia.gov/environment/emissions/co2_vol_mass.php
	Electric Vehicle lbs/mile	0.4851	https://afdc.energy.gov/vehicles/electric_emissions.html (derivation: 5736 pounds at 11,824 miles)
	Social Cost of Carbon $/ton	$51.00	Multiple federal agencies/entities (e.g., EPA, DOE)

Cost Effectiveness Modeling Input Data

Table EJS 1.3 Vehicle-Related Inputs

Topic	Term	Value	Source
Vehicle Cost	Light Duty Fossil	$46,329	AES data based on average Kelly Blue Book price
	Light Duty Electric	$55,600	AES data based on average Kelly Blue Book price
	Medium Duty Fossil	$50,000	www.aceee.org/research-report/t2102
	Heavy Duty Fossil	$130,000	www.aceee.org/research-report/t2102
	Bus Fossil	$85,000	www.aceee.org/research-report/t2102
	Medium Duty Electric	$67,000	www.aceee.org/research-report/t2102
	Heavy Duty Electric	$220,000	www.aceee.org/research-report/t2102
	Bus Electric	$125,000	www.aceee.org/research-report/t2102
Federal Tax Credit	Residential Electric Vehicle	$1,567	AES calculation based on 7500 maximum and current experience
	Commercial Electric Vehicle	30.00%	Consistent with federal "Build Back Better" and National Electric Vehicle Infrastructure levels, capped at net price parity with fossil vehicles
Vehicle Miles	Light Duty miles/year	14,278	Federal Highway Administration data for Ohio
	Medium Duty miles/year	23,725	www.aceee.org/research-report/t2102
	Heavy Duty miles/year	80,550	www.aceee.org/research-report/t2102
	Bus miles/year	43,800	www.aceee.org/research-report/t2102
Vehicle Efficiency	Light Duty Fossil miles/gallon	24	www.chooseev.com for Ohio
	Light Duty Electric kWh/mile	0.3260	https://afdc.energy.gov/vehicles/electric_emissions_sources.html
	Medium Duty Fossil miles/gallon	13	www.aceee.org/research-report/t2102
	Medium Duty Electric kWh/mile	0.5000	www.aceee.org/research-report/t2102
	Heavy Duty Fossil miles/gallon	9	www.aceee.org/research-report/t2102
	Heay Duty Electric kWh/mile	1.2500	www.aceee.org/research-report/t2102
	Fossil Bus miles/gallon	7	www.aceee.org/research-report/t2102
	Electric Bus kWh/mile	1.6700	www.aceee.org/research-report/t2102
Vehicle Operations & Maintenance Costs	Light Duty Fossil cost/mile	$0.0610	https://betterenergy.org/blog/consumer-reports-study-finds-electric-vehicle-maintenance-costs-are-50-less-than-gas-powered-cars/
(excludes tires)	Light Duty Electric cost/mile	$0.0310	https://betterenergy.org/blog/consumer-reports-study-finds-electric-vehicle-maintenance-costs-are-50-less-than-gas-powered-cars/
	Commercial Fossil cost/mile	$0.1700	https://sonar.freightwaves.com/freight-market-blog/operating-a-truck-infographic
	Commercial Electric cost/mile	$0.1200	https://cleantechnica.com/2021/11/02/ev-maintenance-costs-are-30-lower-than-gas-vehicles - (30% less than ICE) at-3-years-new-study-finds/

Cost Effectiveness Modeling Input Data

Table EJS 1.4 Charger and Charging Inputs

Topic	Term	Value	Source
Charger Costs	Level 1 - equipment	$300	AES Indiana program experience
	Level 1 - installation	$0	AES Indiana program experience
	Level 2 (Res.) - equipment	$700	AES Indiana program experience
	Level 2 (Res.) - installation	$1,500	AES Indiana program experience
	Level 2 (C&I) - equipment	$6,000	AES Indiana program experience
	Level 2 (C&I) - installation per port	$4,000	AES Indiana program experience
	Level 3 - equipment per port	$50,000	AES Indiana program experience
	Level 3 - installation per port	$50,000	AES Indiana program experience
Charger Efficiecy	Level 1	85.00%	Car & Driver 4/10/21
	Level 2	95.00%	Car & Driver 4/10/21
	Level 3	99.00%	Texas Instruments 2020 white paper
Charger kW/port	Level 1	1.80	SAE 2017
	Level 2	7.20	SAE 2017
	Level 3	150.00	NEVI 2022
Ports per Charger	Level 1	1	MCR experience
	Level 2 - Residential	1	MCR experience
	Level 2 - C&I	2	MCR experience
	Level 3	4	MCR experience
Vehicles Served per Port	Level 1	1	MCR/AES estimate
	Level 2 - Residential	1	MCR/AES estimate
	Level 2 - C&I	2	MCR/AES estimate
	Level 3	2	MCR/AES estimate

Annual Seasonal/Time of Use Avoided Energy Costs - Raw, Excl. Line Losses

	$/MWh						T&D	Capacity
Year	Summer On-Peak	Summer Off-Peak	Winter On-Peak	Winter Off-Peak	Shoulder On-Peak	Shoulder Off-Peak	$/kW-year	$/kW-year
1	$49.33	$34.98	$57.05	$44.29	$43.05	$34.21	$25.54	$93.00
2	$48.01	$35.35	$51.00	$41.55	$41.43	$34.21	$26.18	$94.96
3	$50.25	$36.04	$50.59	$42.23	$40.86	$34.37	$26.83	$97.04
4	$53.41	$40.18	$52.50	$44.58	$43.30	$37.20	$27.50	$99.08
5	$54.08	$41.57	$53.32	$46.30	$42.74	$37.48	$28.19	$101.06
6	$53.47	$42.42	$52.53	$47.03	$41.36	$37.50	$28.89	$103.09
7	$51.36	$42.35	$49.01	$44.83	$38.77	$36.19	$29.62	$105.04
8	$52.19	$43.61	$50.69	$45.85	$39.89	$37.34	$30.36	$107.04
9	$52.35	$44.25	$50.70	$46.59	$39.54	$37.41	$31.12	$109.18
10	$53.11	$44.98	$50.92	$46.35	$39.56	$37.64	$31.89	$111.36
11	$53.10	$45.26	$51.09	$46.73	$39.81	$37.77	$32.69	$113.59
12	$54.28	$46.29	$49.99	$46.74	$40.20	$38.65	$33.51	$115.86
13	$53.41	$47.05	$51.51	$48.24	$39.51	$38.89	$34.35	$118.30
14	$54.80	$48.30	$52.31	$50.08	$39.90	$39.66	$35.20	$120.78
15	$54.77	$48.65	$52.63	$49.56	$39.36	$39.73	$36.08	$123.44
16	$54.71	$49.10	$51.73	$48.35	$39.77	$39.59	$36.99	$125.91
17	$54.99	$49.56	$51.30	$48.64	$39.25	$39.53	$37.91	$128.42
18	$56.61	$50.30	$51.68	$48.92	$39.57	$40.09	$38.86	$130.99
19	$56.55	$50.76	$50.80	$47.74	$40.01	$39.96	$39.83	$133.61

Bases

Energy	AES blended MISO Indiana Hub settlement prices 5/31/22 and Horizons Energy fundamentals report for MISO Indiana Hub
Demand	AES T&D function data

Referencing the 2001 edition of the California Standard Practice Manual for Economic Analysis of Demand-Side Progarms and Projects (CSPM)

Total Resource Cost Test

TRC Benefit-Cost Ratio = BTRC/CTRC

$$BTRC = \sum_{t=1}^{N} \frac{UAC_t + TC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}}$$

$$CTRC = \sum_{t=1}^{N} \frac{PRC_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

Rate Impact Measure Test

RIM Benefit-Cost Ratio = BRIM/CRIM

$$B_{RIM} \sum_{t=1}^{N} \frac{UAC_t + RG_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at}}{(1+d)^{t-1}}$$

$$C_{RIM} \sum_{t=1}^{N} \frac{UIC_t + RL_t + PRC_t + INC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{RL_{at}}{(1+d)^{t-1}}$$

Societal Test

SCT Benefit-Cost Ratio = BTRC/CTRC, with externalities included

$$BTRC = \sum_{t=1}^{N} \frac{UAC_t + TC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}}$$

$$CTRC = \sum_{t=1}^{N} \frac{PRC_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

Participant Cost Test

Participant Cost Test Benefit-Cost Ratio = BP/CP

$$BP = \sum_{t=1}^{N} \frac{BR_t + TC_t + INC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{AB_{at} + PA_{at}}{(1+d)^{t-1}}$$

$$C = \sum_{t=1}^{N} \frac{PC_t + BI_t}{(1+d)^{t-1}}$$

Terms

(1 + d)	(1 + d) terms reflect the fact that the tests all consider present values over the estimated useful life of the measures at a discount rate of d
Subscript t	References the time period
Subscript at	References the alternate fuel
BR	Bill reductions experienced by the participant
TC	Tax credits received by the participant
INC	Incentives paid to participants
AB	Avoided bills experienced by participants related to alternate fuels
PA	Participant avoided costs associated with measures not chosen
PAC	Participant avoided costs for the fuels not chosen
PC	Participant costs
BI	Bill increases experienced by the participant
UAC	Utility avoided supply costs
UIC	Utility incremental supply costs
RG	Revenue gain to the utility from increased sales
RL	Revenue loss to the utility from decreased sales
PRC	Program costs to the program administrator
PCN	Net participant cost

Costs and Benefits Modeled

Recognizing that the equations can create a language barrier that inhibits comprehension of what these tests are doing, and drawing in part from the National Action Plan for Energy Efficiency, a federal initiativee from the first decade of the 2000s that has largely been absorbed into the work of the State and Local Energy Efficiency Action Network (SEE Action) facilitated by the DOE, a simplified, tabular view of the CSPM tests considered here is:

Element	PCT	RIM	TRC	SCT
Avoided supply costs (+ / -)		Benefit	Benefit	Benefit
Other resource savings (water, secondary fuel)			Benefit	Benefit
Non-energy benefits				Benefit
Equipment and installation costs	Cost		Cost	Cost
Program overhead costs		Cost	Cost	Cost
Incentive payments	Benefit	Cost		
Revenue (+ / -)	Benefit			

Benefit

Cost

Results Summary

Table EJS 5.1 Standard Cost Effectiveness Modeling Outputs (2025 Incremental)

Program	AES Program Cost	Participating EVSE Ports	Participating EV	Program kWh	Program Peak kW	Rate Impact BCR	Rate Impact Net Benefit	Participant BCR	Participant Net Benefit	Total Resource BCR	Total Resource Net Benefit	Societal BCR	Societal Net Benefit
Residential Managed Charging	$254,203.82	300	300	1,469,883	1,200.00	1.00	$1,840	2.11	$5,417,746	2.77	$4,737,504	3.78	$7,413,901
Off-Peak Incentive	$254,203.82	300	300	1,469,883	1,200.00	1.00	$1,840	2.11	$5,417,746	2.77	$4,737,504	3.78	$7,413,901
EVSE Rebates and C&I Managed Charging	$1,979,469.21	200	400	9,938,450	5,062.50	1.99	$8,219,467	2.78	$49,232,777	8.20	$51,970,290	11.32	$74,460,180
EVSE Rebates for Disadvantaged Communities	$610,000.00	30	60	291,205	759.75	0.29	($1,196,282)	2.08	$1,316,137	0.98	($16,561)	1.53	$445,477
Fleet Solutions	$1,300,000.00	500	1,000	7,344,200	11,175.00	1.06	$672,272	2.26	$39,773,669	3.51	$35,456,415	4.90	$54,975,752
Bi-directional Charging Pilot	$610,000.00												
Portfolio Admininistration, Outreach and Education	$400,000.00												
AES Indiana Portfolio	$5,407,876.84	1,330	2,060	20,513,620	19,397	1.25	$6,689,136	2.44	$101,158,075	4.36	$95,875,152	6.04	$143,699,211
Tariff EVSE	$3,500,000.00	100	200	1,465,850	2,681.25	1.02	$54,970	1.30	$3,296,628	1.36	$2,453,693	1.91	$6,295,574