

Appeal - NS Power Dispute Resolution Officer (DRO)

Reference Number: 250618001

Submitted on: Wednesday, June 18 2025 at 09:47:42 AM (ADT)

Contact Information

Name on account: Sherry Dennis

Account number: [REDACTED]

Business contact:

Account address:

Address 1: [REDACTED]

Address 2:

City: [REDACTED]

Province: Nova Scotia

Postal code: [REDACTED]

Country: Canada

Email Address: [REDACTED]

Mailing address:

Address 1:

Address 2:

City:

Province:

Postal code:

Country:

Telephone number: [REDACTED]

Alternate phone number: [REDACTED]

Complaint Information

DRO made decision on:	June 2, 2025
Type of complaint:	Billing Issues
Additional details:	My complaint is that the smart meters are flawed as well I believe the "Hackers" were in NS Power system long before they were detected. I have attached my rational as part of the docs submitted. I have also redacted my name down to SD and removed my address from the attached for confidentiality purposes.
How do they want the complaint resolved?	I want the remaining part of the bill I am challenging waived. I wanted NS Power to provide me with the daily meter readings for each billing cycle so I can cross reference the data with my monitoring system.
Supporting documents uploaded:	• DRO Report.pdf • Old Meter.pdf • New meter (b) Daily Usage - Meter 2553403.pdf • NS Power Ltr.pdf • NSP_2025_2-E-2025-03474_Results.pdf • NSP_2025_2-E-2025-03474-Letter.pdf • D9D0B0CE-962B-4026-95DA-7B1754A28038.jpeg • News Article Pg 1.PNG • News Article Pg 2.PNG • News Article Pg 3.PNG

Date March 18th, 2025

SD
DARTMOUTH NS
B2X 2N3

Dear **SD**:

Re: Account No. [REDACTED]

Meter No. 2056066

We are writing to confirm the results of your recent meter test. This test was conducted following your inquiry about electrical usage at your premises. Per our meter test process, NS Power requested your meter (noted above) be tested in NS Power's accredited (approved by Measurement Canada) testing facility.

Your meter has now been tested and the results indicate this meter is operating within prescribed accuracy limits.

Should you wish to further pursue this matter, you have the option to request a meter test by Measurement Canada within 6 months of the date of this letter. Please note, the current fee is \$46.00 for this additional testing.

The local office for Measurement Canada can be reached at 902-426-3831. Upon receipt of your request, they will formalize a written process of notification to both you and NS Power to obtain this meter for an official test. If the meter is found to be outside the allowable limits, Measurement Canada will provide details as to the level of inaccuracy for an account adjustment. Should this occur, the \$46.00 fee would be credited to your electrical account (noted above).

Should you wish to discuss this matter further, please do not hesitate to contact one of our Customer Care representatives by calling 1-800-428-6774 or emailing home@nspower.ca. Our representatives can also suggest tips to help reduce your energy usage or offer programs such as our Equal Billing program that make it easier to budget for your electricity bill throughout the year through equal monthly payments.

Yours truly,
Stanka Nikle
NS Power Customer Care team



Innovation, Sciences et
Développement économique Canada
Mesures Canada

Innovation, Science and
Economic Development Canada
Measurement Canada

50 Brown Avenue
Dartmouth, NS
B3B 1X8

Telephone: (902) 717-7174
Fax: (902) 426-1000

April 28, 2025

SD
DARTMOUTH NS
B2X 2N3

File Number: 2-E-2025-03474

**Re: Nova Scotia Power Acct
#2366958-3**

Dear SD,

This is to inform you that at your request, **Meter #2056066** was inspected as per the dispute test requirements on **April 25, 2025**. This meter was found to comply in all respects with the requirements of the *Electricity & Gas Inspection Act and Regulations* and was therefore accepted as having legal status.

The average official error of this meter was found to be **0.01%**. The tolerance permitted for dispute inspections is **+/- 3.0%**.

Your billing information has been examined and no errors in calculation were found. Therefore, there is no rebate or adjustment due to the consumer.

Yours truly,

Travis Tabor
Inspector
Measurement Canada

C: Gary Delaney, Meter Shop Supervisor, Nova Scotia Power Inc.
Colin Gardner, A/ Chief Regional Inspector, Measurement Canada



CERTIFICATE OF MEASUREMENT DISPUTE INVESTIGATIONS FINDINGS

GENERAL INFORMATION

Customer Name and Address SD DARTMOUTH NS B2X 2N3		Case Number 2-E-2025-03474
Account Number 2366958-3	Contact Name SD	Telephone Number (902)
Contractor Name and Address Nova Scotia Power Inc. P.O. Box 848 Halifax, NS B3J 2V7	Service Address (if different)	Complaint Date (YYYY-MM-DD) 2025-04-07 Complaint filed by ☒ Purchaser ☐ Contractor

METER DATA

Inspection Number 2056066	Serial Number 79369568	Declared Preference ☒ Yes ☐ No
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WITNESSING

SCHEDULED TEST

Place of Test 50 Brown Avenue Dartmouth, NS B3B 1X8	Date/Time of Test April 25 2025 / 1300	Was present ☐ Yes ☒ No
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METER OBSERVATIONS

Meter Reading 96324	Billing Multiplier 1	Seal Year 2019	Sealed by Itron	Seal Effective? ☒ Yes ☐ No
Meter Reading	Billing Multiplier	Seal Year	Sealed by	Seal Effective? ☐ Yes ☐ No

INVESTIGATION FINDINGS

Dispute Rating
☐ Founded ☒ Unfounded

FINDING PARTICULARS

An examination of the utility meter records and billing information related to the account was performed - no discrepancy was noted.

- On , 2024, meter #2056066 was inspected and the following observations were noted:
1. The verification seal was present and effective when the meter was presented for inspection.
 2. Average official error was 0.01%.

Based on this information, the full error, as determined by this investigation, is within the prescribed limits as per section 31 of the Electricity and Gas Inspection Regulations.

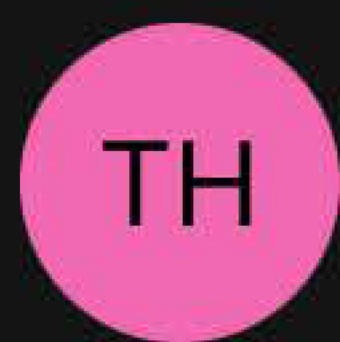
Travis Tabor Inspector's Name	 Inspector's Signature	2025-04-28 Issue Date of Certificate (YYYY-MM-DD)
If you wish to appeal the above findings, write within 30 days to: 50 Brown Ave., Dartmouth, NS, B3B 1X8		In order to maintain effective service, Measurement Canada welcomes any comments you wish to provide. Please write to: 9177 Langelier Blvd, Montréal QC H1P 3K9

2:37



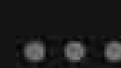
Take a Moment to Review Your Recent Purchase

 Inbox



The Home Depot
To You

May 24



Hi GUEST,

Thank you for shopping with us! We hope you'll write about your Vue Energy Monitor 16 sensors Gen 3 while it's still fresh on your mind. Click the stars to get started:



Vue Energy Monitor 16
sensors Gen 3



Start rating



Reply



Mail



Calendar



Apps

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2553403	4/24/2025 12:00:00 AM	1501.360		kWh Consumption
2553403	4/23/2025 12:00:00 AM	1479.345	22.015	kWh Consumption
2553403	4/22/2025 12:00:00 AM	1441.449	37.896	kWh Consumption
2553403	4/21/2025 12:00:00 AM	1407.351	34.098	kWh Consumption
2553403	4/20/2025 12:00:00 AM	1386.074	21.277	kWh Consumption
2553403	4/19/2025 12:00:00 AM	1354.785	31.289	kWh Consumption
2553403	4/18/2025 12:00:00 AM	1329.556	25.229	kWh Consumption
2553403	4/17/2025 12:00:00 AM	1314.185	15.371	kWh Consumption
2553403	4/16/2025 12:00:00 AM	1282.202	31.983	kWh Consumption
2553403	4/15/2025 12:00:00 AM	1259.045	23.157	kWh Consumption
2553403	4/14/2025 12:00:00 AM	1234.375	24.670	kWh Consumption
2553403	4/13/2025 12:00:00 AM	1207.179	27.196	kWh Consumption
2553403	4/12/2025 12:00:00 AM	1167.583	39.596	kWh Consumption
2553403	4/11/2025 12:00:00 AM	1144.982	22.601	kWh Consumption
2553403	4/10/2025 12:00:00 AM	1120.730	24.252	kWh Consumption
2553403	4/9/2025 12:00:00 AM	1091.941	28.789	kWh Consumption
2553403	4/8/2025 12:00:00 AM	1069.209	22.732	kWh Consumption
2553403	4/7/2025 12:00:00 AM	--	--	No AMI Read Available
2553403	4/6/2025 12:00:00 AM	1010.865	--	kWh Consumption
2553403	4/5/2025 12:00:00 AM	982.123	28.742	kWh Consumption
2553403	4/4/2025 12:00:00 AM	959.168	22.955	kWh Consumption
2553403	4/3/2025 12:00:00 AM	934.878	24.290	kWh Consumption
2553403	4/2/2025 12:00:00 AM	901.098	33.780	kWh Consumption
2553403	4/1/2025 12:00:00 AM	874.374	26.724	kWh Consumption
2553403	3/31/2025 12:00:00 AM	848.665	25.709	kWh Consumption
2553403	3/30/2025 12:00:00 AM	816.945	31.720	kWh Consumption
2553403	3/29/2025 12:00:00 AM	779.701	37.244	kWh Consumption
2553403	3/28/2025 12:00:00 AM	758.866	20.835	kWh Consumption
2553403	3/27/2025 12:00:00 AM	737.464	21.402	kWh Consumption
2553403	3/26/2025 12:00:00 AM	709.464	28.000	kWh Consumption
2553403	3/25/2025 12:00:00 AM	674.834	34.630	kWh Consumption
2553403	3/24/2025 12:00:00 AM	645.168	29.666	kWh Consumption
2553403	3/23/2025 12:00:00 AM	606.913	38.255	kWh Consumption
2553403	3/22/2025 12:00:00 AM	574.193	32.720	kWh Consumption
2553403	3/21/2025 12:00:00 AM	540.289	33.904	kWh Consumption
2553403	3/20/2025 12:00:00 AM	514.253	26.036	kWh Consumption
2553403	3/19/2025 12:00:00 AM	473.421	40.832	kWh Consumption
2553403	3/18/2025 12:00:00 AM	439.952	33.469	kWh Consumption
2553403	3/17/2025 12:00:00 AM	410.468	29.484	kWh Consumption
2553403	3/16/2025 12:00:00 AM	368.590	41.878	kWh Consumption
2553403	3/15/2025 12:00:00 AM	336.651	31.939	kWh Consumption
2553403	3/14/2025 12:00:00 AM	307.830	28.821	kWh Consumption
2553403	3/13/2025 12:00:00 AM	275.785	32.045	kWh Consumption

2553403	3/12/2025 12:00:00 AM	241.643	34.142	kWh Consumption
2553403	3/11/2025 12:00:00 AM	206.626	35.017	kWh Consumption
2553403	3/10/2025 12:00:00 AM	177.434	29.192	kWh Consumption
2553403	3/9/2025 12:00:00 AM	126.254	51.180	kWh Consumption
2553403	3/8/2025 12:00:00 AM	87.054	39.200	kWh Consumption
2553403	3/7/2025 12:00:00 AM	52.681	34.373	kWh Consumption
2553403	3/6/2025 12:00:00 AM	22.113	30.568	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	3/5/2025 12:00:00 AM	96320	Null	kWh Consumption
2056066	3/4/2025 12:00:00 AM	96260.41	59.590	kWh Consumption
2056066	3/3/2025 12:00:00 AM	96214.227	46.183	kWh Consumption
2056066	3/2/2025 12:00:00 AM	96186.305	27.922	kWh Consumption
2056066	3/1/2025 12:00:00 AM	96131.031	55.274	kWh Consumption
2056066	2/28/2025 12:00:00 AM	96088.875	42.156	kWh Consumption
2056066	2/27/2025 12:00:00 AM	96028.96	59.915	kWh Consumption
2056066	2/26/2025 12:00:00 AM	95965.834	63.126	kWh Consumption
2056066	2/25/2025 12:00:00 AM	95907.57	58.264	kWh Consumption
2056066	2/24/2025 12:00:00 AM	95840.207	67.363	kWh Consumption
2056066	2/23/2025 12:00:00 AM	95741.139	99.068	kWh Consumption
2056066	2/22/2025 12:00:00 AM	95628.23	112.909	kWh Consumption
2056066	2/21/2025 12:00:00 AM	95527.787	100.443	kWh Consumption
2056066	2/20/2025 12:00:00 AM	95445.682	82.105	kWh Consumption
2056066	2/19/2025 12:00:00 AM	95350.359	95.323	kWh Consumption
2056066	2/18/2025 12:00:00 AM	95222.647	127.712	kWh Consumption
2056066	2/17/2025 12:00:00 AM	95115.88	106.767	kWh Consumption
2056066	2/16/2025 12:00:00 AM	95017.491	98.389	kWh Consumption
2056066	2/15/2025 12:00:00 AM	94907.886	109.605	kWh Consumption
2056066	2/14/2025 12:00:00 AM	94818.591	89.295	kWh Consumption
2056066	2/13/2025 12:00:00 AM	94688.6	129.991	kWh Consumption
2056066	2/12/2025 12:00:00 AM	94591.212	97.388	kWh Consumption
2056066	2/11/2025 12:00:00 AM	94487.083	104.129	kWh Consumption
2056066	2/10/2025 12:00:00 AM	94386.317	100.766	kWh Consumption
2056066	2/9/2025 12:00:00 AM	94279.498	106.819	kWh Consumption
2056066	2/8/2025 12:00:00 AM	94183.763	95.735	kWh Consumption
2056066	2/7/2025 12:00:00 AM	94120.134	63.629	kWh Consumption
2056066	2/6/2025 12:00:00 AM	94026.575	93.559	kWh Consumption
2056066	2/5/2025 12:00:00 AM	93916.048	110.527	kWh Consumption
2056066	2/4/2025 12:00:00 AM	93845.139	70.909	kWh Consumption
2056066	2/3/2025 12:00:00 AM	93755.579	89.560	kWh Consumption
2056066	2/2/2025 12:00:00 AM	93616.527	139.052	kWh Consumption
2056066	2/1/2025 12:00:00 AM	93509.047	107.480	kWh Consumption
2056066	1/31/2025 12:00:00 AM	93425.162	83.885	kWh Consumption
2056066	1/30/2025 12:00:00 AM	93312.318	112.844	kWh Consumption
2056066	1/29/2025 12:00:00 AM	93229.838	82.480	kWh Consumption
2056066	1/28/2025 12:00:00 AM	93164.332	65.506	kWh Consumption
2056066	1/27/2025 12:00:00 AM	93083.029	81.303	kWh Consumption
2056066	1/26/2025 12:00:00 AM	93003.411	79.618	kWh Consumption
2056066	1/25/2025 12:00:00 AM	92932.21	71.201	kWh Consumption
2056066	1/24/2025 12:00:00 AM	92847.78	84.430	kWh Consumption
2056066	1/23/2025 12:00:00 AM	92751.53	96.250	kWh Consumption
2056066	1/22/2025 12:00:00 AM	92663.866	87.664	kWh Consumption
2056066	1/21/2025 12:00:00 AM	92589.178	74.688	kWh Consumption
2056066	1/20/2025 12:00:00 AM	92515.366	73.812	kWh Consumption
2056066	1/19/2025 12:00:00 AM	92454.983	60.383	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	1/18/2025 12:00:00 AM	92379.513	75.470	kWh Consumption
2056066	1/17/2025 12:00:00 AM	92291.113	88.400	kWh Consumption
2056066	1/16/2025 12:00:00 AM	92211.928	79.185	kWh Consumption
2056066	1/15/2025 12:00:00 AM	92138.92	73.008	kWh Consumption
2056066	1/14/2025 12:00:00 AM	92054.768	84.152	kWh Consumption
2056066	1/13/2025 12:00:00 AM	91971.369	83.399	kWh Consumption
2056066	1/12/2025 12:00:00 AM	91894.811	76.558	kWh Consumption
2056066	1/11/2025 12:00:00 AM	91826.364	68.447	kWh Consumption
2056066	1/10/2025 12:00:00 AM	91768.511	57.853	kWh Consumption
2056066	1/9/2025 12:00:00 AM	91707.007	61.504	kWh Consumption
2056066	1/8/2025 12:00:00 AM	91635.132	71.875	kWh Consumption
2056066	1/7/2025 12:00:00 AM	91547.539	87.593	kWh Consumption
2056066	1/6/2025 12:00:00 AM	91469.4	78.139	kWh Consumption
2056066	1/5/2025 12:00:00 AM	91384.383	85.017	kWh Consumption
2056066	1/4/2025 12:00:00 AM	91296.194	88.189	kWh Consumption
2056066	1/3/2025 12:00:00 AM	91232.977	63.217	kWh Consumption
2056066	1/2/2025 12:00:00 AM	91177.953	55.024	kWh Consumption
2056066	1/1/2025 12:00:00 AM	91115.038	62.915	kWh Consumption
2056066	12/31/2024 12:00:00 AM	91056.293	58.745	kWh Consumption
2056066	12/30/2024 12:00:00 AM	91005.72	50.573	kWh Consumption
2056066	12/29/2024 12:00:00 AM	90914.413	91.307	kWh Consumption
2056066	12/28/2024 12:00:00 AM	90805.609	108.804	kWh Consumption
2056066	12/27/2024 12:00:00 AM	90717.789	87.820	kWh Consumption
2056066	12/26/2024 12:00:00 AM	90633.52	84.269	kWh Consumption
2056066	12/25/2024 12:00:00 AM	90519.13	114.390	kWh Consumption
2056066	12/24/2024 12:00:00 AM	90404.972	114.158	kWh Consumption
2056066	12/23/2024 12:00:00 AM	90310.805	94.167	kWh Consumption
2056066	12/22/2024 12:00:00 AM	90192.526	118.279	kWh Consumption
2056066	12/21/2024 12:00:00 AM	90083.627	108.899	kWh Consumption
2056066	12/20/2024 12:00:00 AM	89987.908	95.719	kWh Consumption
2056066	12/19/2024 12:00:00 AM	89931.242	56.666	kWh Consumption
2056066	12/18/2024 12:00:00 AM	89878.604	52.638	kWh Consumption
2056066	12/17/2024 12:00:00 AM	89829.473	49.131	kWh Consumption
2056066	12/16/2024 12:00:00 AM	89747.916	81.557	kWh Consumption
2056066	12/15/2024 12:00:00 AM	89674.565	73.351	kWh Consumption
2056066	12/14/2024 12:00:00 AM	89592.214	82.351	kWh Consumption
2056066	12/13/2024 12:00:00 AM	89537.041	55.173	kWh Consumption
2056066	12/12/2024 12:00:00 AM	89497.388	39.653	kWh Consumption
2056066	12/11/2024 12:00:00 AM	89450.185	47.203	kWh Consumption
2056066	12/10/2024 12:00:00 AM	89400.403	49.782	kWh Consumption
2056066	12/9/2024 12:00:00 AM	89343.36	57.043	kWh Consumption
2056066	12/8/2024 12:00:00 AM	89257.752	85.608	kWh Consumption
2056066	12/7/2024 12:00:00 AM	89198.294	59.458	kWh Consumption
2056066	12/6/2024 12:00:00 AM	89141.205	57.089	kWh Consumption
2056066	12/5/2024 12:00:00 AM	89080.462	60.743	kWh Consumption
2056066	12/4/2024 12:00:00 AM	89016.695	63.767	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	12/3/2024 12:00:00 AM	88969.583	47.112	kWh Consumption
2056066	12/2/2024 12:00:00 AM	88912.831	56.752	kWh Consumption
2056066	12/1/2024 12:00:00 AM	88858.398	54.433	kWh Consumption
2056066	11/30/2024 12:00:00 AM	88810.34	48.058	kWh Consumption
2056066	11/29/2024 12:00:00 AM	88765.573	44.767	kWh Consumption
2056066	11/28/2024 12:00:00 AM	88724.892	40.681	kWh Consumption
2056066	11/27/2024 12:00:00 AM	88670.307	54.585	kWh Consumption
2056066	11/26/2024 12:00:00 AM	88627.038	43.269	kWh Consumption
2056066	11/25/2024 12:00:00 AM	88579.521	47.517	kWh Consumption
2056066	11/24/2024 12:00:00 AM	88535.492	44.029	kWh Consumption
2056066	11/23/2024 12:00:00 AM	88484.994	50.498	kWh Consumption
2056066	11/22/2024 12:00:00 AM	88439.073	45.921	kWh Consumption
2056066	11/21/2024 12:00:00 AM	88393.474	45.599	kWh Consumption
2056066	11/20/2024 12:00:00 AM	88328.762	64.712	kWh Consumption
2056066	11/19/2024 12:00:00 AM	88279.272	49.490	kWh Consumption
2056066	11/18/2024 12:00:00 AM	88229.267	50.005	kWh Consumption
2056066	11/17/2024 12:00:00 AM	88177.575	51.692	kWh Consumption
2056066	11/16/2024 12:00:00 AM	88121.854	55.721	kWh Consumption
2056066	11/15/2024 12:00:00 AM	88073.19	48.664	kWh Consumption
2056066	11/14/2024 12:00:00 AM	88020.24	52.950	kWh Consumption
2056066	11/13/2024 12:00:00 AM	87966.167	54.073	kWh Consumption
2056066	11/12/2024 12:00:00 AM	87925.383	40.784	kWh Consumption
2056066	11/11/2024 12:00:00 AM	87866.211	59.172	kWh Consumption
2056066	11/10/2024 12:00:00 AM	87815.83	50.381	kWh Consumption
2056066	11/9/2024 12:00:00 AM	87778.069	37.761	kWh Consumption
2056066	11/8/2024 12:00:00 AM	87740.089	37.980	kWh Consumption
2056066	11/7/2024 12:00:00 AM	87699.762	40.327	kWh Consumption
2056066	11/6/2024 12:00:00 AM	87669.66	30.102	kWh Consumption
2056066	11/5/2024 12:00:00 AM	87619.485	50.175	kWh Consumption
2056066	11/4/2024 12:00:00 AM	87570.893	48.592	kWh Consumption
2056066	11/3/2024 12:00:00 AM	87518.035	52.858	kWh Consumption
2056066	11/2/2024 12:00:00 AM	87479.575	38.460	kWh Consumption
2056066	11/1/2024 12:00:00 AM	87440.409	39.166	kWh Consumption
2056066	10/31/2024 12:00:00 AM	87412.231	28.178	kWh Consumption
2056066	10/30/2024 12:00:00 AM	87373.385	38.846	kWh Consumption
2056066	10/29/2024 12:00:00 AM	87329.299	44.086	kWh Consumption
2056066	10/28/2024 12:00:00 AM	87297.402	31.897	kWh Consumption
2056066	10/27/2024 12:00:00 AM	87266.187	31.215	kWh Consumption
2056066	10/26/2024 12:00:00 AM	87228.528	37.659	kWh Consumption
2056066	10/25/2024 12:00:00 AM	87205.098	23.430	kWh Consumption
2056066	10/24/2024 12:00:00 AM	87183.74	21.358	kWh Consumption
2056066	10/23/2024 12:00:00 AM	87155.533	28.207	kWh Consumption
2056066	10/22/2024 12:00:00 AM	87131.525	24.008	kWh Consumption
2056066	10/21/2024 12:00:00 AM	87110.039	21.486	kWh Consumption
2056066	10/20/2024 12:00:00 AM	87067.404	42.635	kWh Consumption
2056066	10/19/2024 12:00:00 AM	87020.489	46.915	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	10/18/2024 12:00:00 AM	86987.895	32.594	kWh Consumption
2056066	10/17/2024 12:00:00 AM	86948.433	39.462	kWh Consumption
2056066	10/16/2024 12:00:00 AM	86912.008	36.425	kWh Consumption
2056066	10/15/2024 12:00:00 AM	86882.891	29.117	kWh Consumption
2056066	10/14/2024 12:00:00 AM	86846.97	35.921	kWh Consumption
2056066	10/13/2024 12:00:00 AM	86808.766	38.204	kWh Consumption
2056066	10/12/2024 12:00:00 AM	86776.418	32.348	kWh Consumption
2056066	10/11/2024 12:00:00 AM	86733.698	42.720	kWh Consumption
2056066	10/10/2024 12:00:00 AM	--	--	No AMI Read Available
2056066	10/9/2024 12:00:00 AM	--	--	No AMI Read Available
2056066	10/8/2024 12:00:00 AM	--	--	No AMI Read Available
2056066	10/7/2024 12:00:00 AM	86630.525	--	kWh Consumption
2056066	10/6/2024 12:00:00 AM	86606.492	24.033	kWh Consumption
2056066	10/5/2024 12:00:00 AM	86581.753	24.739	kWh Consumption
2056066	10/4/2024 12:00:00 AM	86558.523	23.230	kWh Consumption
2056066	10/3/2024 12:00:00 AM	86539.39	19.133	kWh Consumption
2056066	10/2/2024 12:00:00 AM	86519.2	20.190	kWh Consumption
2056066	10/1/2024 12:00:00 AM	86500.435	18.765	kWh Consumption
2056066	9/30/2024 12:00:00 AM	86478.38	22.055	kWh Consumption
2056066	9/29/2024 12:00:00 AM	86458.267	20.113	kWh Consumption
2056066	9/28/2024 12:00:00 AM	86431.986	26.281	kWh Consumption
2056066	9/27/2024 12:00:00 AM	86411.567	20.419	kWh Consumption
2056066	9/26/2024 12:00:00 AM	86390.101	21.466	kWh Consumption
2056066	9/25/2024 12:00:00 AM	86367.205	22.896	kWh Consumption
2056066	9/24/2024 12:00:00 AM	86343.118	24.087	kWh Consumption
2056066	9/23/2024 12:00:00 AM	86321.478	21.640	kWh Consumption
2056066	9/22/2024 12:00:00 AM	86295.122	26.356	kWh Consumption
2056066	9/21/2024 12:00:00 AM	86272.498	22.624	kWh Consumption
2056066	9/20/2024 12:00:00 AM	86253.816	18.682	kWh Consumption
2056066	9/19/2024 12:00:00 AM	86234.736	19.080	kWh Consumption
2056066	9/18/2024 12:00:00 AM	86210.136	24.600	kWh Consumption
2056066	9/17/2024 12:00:00 AM	86190.299	19.837	kWh Consumption
2056066	9/16/2024 12:00:00 AM	86172.373	17.926	kWh Consumption
2056066	9/15/2024 12:00:00 AM	86150.84	21.533	kWh Consumption
2056066	9/14/2024 12:00:00 AM	86121.501	29.339	kWh Consumption
2056066	9/13/2024 12:00:00 AM	86105.157	16.344	kWh Consumption
2056066	9/12/2024 12:00:00 AM	86085.098	20.059	kWh Consumption
2056066	9/11/2024 12:00:00 AM	86063.671	21.427	kWh Consumption
2056066	9/10/2024 12:00:00 AM	86043.628	20.043	kWh Consumption
2056066	9/9/2024 12:00:00 AM	86015.113	28.515	kWh Consumption
2056066	9/8/2024 12:00:00 AM	85997.874	17.239	kWh Consumption
2056066	9/7/2024 12:00:00 AM	85970.688	27.186	kWh Consumption
2056066	9/6/2024 12:00:00 AM	85950.52	20.168	kWh Consumption
2056066	9/5/2024 12:00:00 AM	85933.532	16.988	kWh Consumption
2056066	9/4/2024 12:00:00 AM	85906.171	27.361	kWh Consumption
2056066	9/3/2024 12:00:00 AM	85890.683	15.488	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	9/2/2024 12:00:00 AM	85869.061	21.622	kWh Consumption
2056066	9/1/2024 12:00:00 AM	85827.129	41.932	kWh Consumption
2056066	8/31/2024 12:00:00 AM	85812.958	14.171	kWh Consumption
2056066	8/30/2024 12:00:00 AM	85800.487	12.471	kWh Consumption
2056066	8/29/2024 12:00:00 AM	85785.402	15.085	kWh Consumption
2056066	8/28/2024 12:00:00 AM	85768.566	16.836	kWh Consumption
2056066	8/27/2024 12:00:00 AM	85749.036	19.530	kWh Consumption
2056066	8/26/2024 12:00:00 AM	85727.232	21.804	kWh Consumption
2056066	8/25/2024 12:00:00 AM	85698.076	29.156	kWh Consumption
2056066	8/24/2024 12:00:00 AM	85678.548	19.528	kWh Consumption
2056066	8/23/2024 12:00:00 AM	85657.168	21.380	kWh Consumption
2056066	8/22/2024 12:00:00 AM	85638.463	18.705	kWh Consumption
2056066	8/21/2024 12:00:00 AM	85614.307	24.156	kWh Consumption
2056066	8/20/2024 12:00:00 AM	85588.099	26.208	kWh Consumption
2056066	8/19/2024 12:00:00 AM	85561.286	26.813	kWh Consumption
2056066	8/18/2024 12:00:00 AM	85538.171	23.115	kWh Consumption
2056066	8/17/2024 12:00:00 AM	85515.038	23.133	kWh Consumption
2056066	8/16/2024 12:00:00 AM	85494.203	20.835	kWh Consumption
2056066	8/15/2024 12:00:00 AM	85473.683	20.520	kWh Consumption
2056066	8/14/2024 12:00:00 AM	85454.044	19.639	kWh Consumption
2056066	8/13/2024 12:00:00 AM	85435.124	18.920	kWh Consumption
2056066	8/12/2024 12:00:00 AM	85403.215	31.909	kWh Consumption
2056066	8/11/2024 12:00:00 AM	85376.438	26.777	kWh Consumption
2056066	8/10/2024 12:00:00 AM	85358.58	17.858	kWh Consumption
2056066	8/9/2024 12:00:00 AM	85341.358	17.222	kWh Consumption
2056066	8/8/2024 12:00:00 AM	85318.617	22.741	kWh Consumption
2056066	8/7/2024 12:00:00 AM	85292.416	26.201	kWh Consumption
2056066	8/6/2024 12:00:00 AM	85273.05	19.366	kWh Consumption
2056066	8/5/2024 12:00:00 AM	85248.086	24.964	kWh Consumption
2056066	8/4/2024 12:00:00 AM	85221.097	26.989	kWh Consumption
2056066	8/3/2024 12:00:00 AM	85199.709	21.388	kWh Consumption
2056066	8/2/2024 12:00:00 AM	85166.203	33.506	kWh Consumption
2056066	8/1/2024 12:00:00 AM	85147.405	18.798	kWh Consumption
2056066	7/31/2024 12:00:00 AM	85126.432	20.973	kWh Consumption
2056066	7/30/2024 12:00:00 AM	85107.502	18.930	kWh Consumption
2056066	7/29/2024 12:00:00 AM	85085.838	21.664	kWh Consumption
2056066	7/28/2024 12:00:00 AM	85050.741	35.097	kWh Consumption
2056066	7/27/2024 12:00:00 AM	85027.703	23.038	kWh Consumption
2056066	7/26/2024 12:00:00 AM	85006.822	20.881	kWh Consumption
2056066	7/25/2024 12:00:00 AM	84985.562	21.260	kWh Consumption
2056066	7/24/2024 12:00:00 AM	84966.679	18.883	kWh Consumption
2056066	7/23/2024 12:00:00 AM	84947.958	18.721	kWh Consumption
2056066	7/22/2024 12:00:00 AM	84927.314	20.644	kWh Consumption
2056066	7/21/2024 12:00:00 AM	84901.944	25.370	kWh Consumption
2056066	7/20/2024 12:00:00 AM	84868.647	33.297	kWh Consumption
2056066	7/19/2024 12:00:00 AM	84851.371	17.276	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	7/18/2024 12:00:00 AM	84827.978	23.393	kWh Consumption
2056066	7/17/2024 12:00:00 AM	84808.935	19.043	kWh Consumption
2056066	7/16/2024 12:00:00 AM	84791.774	17.161	kWh Consumption
2056066	7/15/2024 12:00:00 AM	84759.521	32.253	kWh Consumption
2056066	7/14/2024 12:00:00 AM	84735.753	23.768	kWh Consumption
2056066	7/13/2024 12:00:00 AM	84704.255	31.498	kWh Consumption
2056066	7/12/2024 12:00:00 AM	84676.488	27.767	kWh Consumption
2056066	7/11/2024 12:00:00 AM	84662.088	14.400	kWh Consumption
2056066	7/10/2024 12:00:00 AM	84636.274	25.814	kWh Consumption
2056066	7/9/2024 12:00:00 AM	84616.328	19.946	kWh Consumption
2056066	7/8/2024 12:00:00 AM	84585.579	30.749	kWh Consumption
2056066	7/7/2024 12:00:00 AM	84548.853	36.726	kWh Consumption
2056066	7/6/2024 12:00:00 AM	84534.666	14.187	kWh Consumption
2056066	7/5/2024 12:00:00 AM	84515.646	19.020	kWh Consumption
2056066	7/4/2024 12:00:00 AM	84492.242	23.404	kWh Consumption
2056066	7/3/2024 12:00:00 AM	84473.29	18.952	kWh Consumption
2056066	7/2/2024 12:00:00 AM	84457.663	15.627	kWh Consumption
2056066	7/1/2024 12:00:00 AM	84435.056	22.607	kWh Consumption
2056066	6/30/2024 12:00:00 AM	84423.194	11.862	kWh Consumption
2056066	6/29/2024 12:00:00 AM	84399.52	23.674	kWh Consumption
2056066	6/28/2024 12:00:00 AM	84374.7	24.820	kWh Consumption
2056066	6/27/2024 12:00:00 AM	84350.334	24.366	kWh Consumption
2056066	6/26/2024 12:00:00 AM	84333.971	16.363	kWh Consumption
2056066	6/25/2024 12:00:00 AM	84316.658	17.313	kWh Consumption
2056066	6/24/2024 12:00:00 AM	84298.62	18.038	kWh Consumption
2056066	6/23/2024 12:00:00 AM	84280.685	17.935	kWh Consumption
2056066	6/22/2024 12:00:00 AM	84260.005	20.680	kWh Consumption
2056066	6/21/2024 12:00:00 AM	84238.771	21.234	kWh Consumption
2056066	6/20/2024 12:00:00 AM	84214.597	24.174	kWh Consumption
2056066	6/19/2024 12:00:00 AM	84189.542	25.055	kWh Consumption
2056066	6/18/2024 12:00:00 AM	84172.509	17.033	kWh Consumption
2056066	6/17/2024 12:00:00 AM	84158.263	14.246	kWh Consumption
2056066	6/16/2024 12:00:00 AM	84138.946	19.317	kWh Consumption
2056066	6/15/2024 12:00:00 AM	84112.824	26.122	kWh Consumption
2056066	6/14/2024 12:00:00 AM	84096.476	16.348	kWh Consumption
2056066	6/13/2024 12:00:00 AM	84070.757	25.719	kWh Consumption
2056066	6/12/2024 12:00:00 AM	84056.502	14.255	kWh Consumption
2056066	6/11/2024 12:00:00 AM	84035.811	20.691	kWh Consumption
2056066	6/10/2024 12:00:00 AM	84014.883	20.928	kWh Consumption
2056066	6/9/2024 12:00:00 AM	83996.079	18.804	kWh Consumption
2056066	6/8/2024 12:00:00 AM	83971.763	24.316	kWh Consumption
2056066	6/7/2024 12:00:00 AM	83953.504	18.259	kWh Consumption
2056066	6/6/2024 12:00:00 AM	83935.852	17.652	kWh Consumption
2056066	6/5/2024 12:00:00 AM	83916.765	19.087	kWh Consumption
2056066	6/4/2024 12:00:00 AM	83898.706	18.059	kWh Consumption
2056066	6/3/2024 12:00:00 AM	83876.102	22.604	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	6/2/2024 12:00:00 AM	83858.118	17.984	kWh Consumption
2056066	6/1/2024 12:00:00 AM	83834.323	23.795	kWh Consumption
2056066	5/31/2024 12:00:00 AM	83813.09	21.233	kWh Consumption
2056066	5/30/2024 12:00:00 AM	83793.277	19.813	kWh Consumption
2056066	5/29/2024 12:00:00 AM	83772.928	20.349	kWh Consumption
2056066	5/28/2024 12:00:00 AM	83744.446	28.482	kWh Consumption
2056066	5/27/2024 12:00:00 AM	83723.058	21.388	kWh Consumption
2056066	5/26/2024 12:00:00 AM	83700.267	22.791	kWh Consumption
2056066	5/25/2024 12:00:00 AM	83683.532	16.735	kWh Consumption
2056066	5/24/2024 12:00:00 AM	83659.681	23.851	kWh Consumption
2056066	5/23/2024 12:00:00 AM	83640.664	19.017	kWh Consumption
2056066	5/22/2024 12:00:00 AM	83621.392	19.272	kWh Consumption
2056066	5/21/2024 12:00:00 AM	83595.753	25.639	kWh Consumption
2056066	5/20/2024 12:00:00 AM	83569.351	26.402	kWh Consumption
2056066	5/19/2024 12:00:00 AM	83536.334	33.017	kWh Consumption
2056066	5/18/2024 12:00:00 AM	83506.969	29.365	kWh Consumption
2056066	5/17/2024 12:00:00 AM	83485.747	21.222	kWh Consumption
2056066	5/16/2024 12:00:00 AM	83464.358	21.389	kWh Consumption
2056066	5/15/2024 12:00:00 AM	83435.015	29.343	kWh Consumption
2056066	5/14/2024 12:00:00 AM	83411.376	23.639	kWh Consumption
2056066	5/13/2024 12:00:00 AM	83388.515	22.861	kWh Consumption
2056066	5/12/2024 12:00:00 AM	83349.237	39.278	kWh Consumption
2056066	5/11/2024 12:00:00 AM	83313.756	35.481	kWh Consumption
2056066	5/10/2024 12:00:00 AM	83270.429	43.327	kWh Consumption
2056066	5/9/2024 12:00:00 AM	83229.991	40.438	kWh Consumption
2056066	5/8/2024 12:00:00 AM	83191.027	38.964	kWh Consumption
2056066	5/7/2024 12:00:00 AM	83160.145	30.882	kWh Consumption
2056066	5/6/2024 12:00:00 AM	83122.027	38.118	kWh Consumption
2056066	5/5/2024 12:00:00 AM	83078.935	43.092	kWh Consumption
2056066	5/4/2024 12:00:00 AM	83020.871	58.064	kWh Consumption
2056066	5/3/2024 12:00:00 AM	82989.236	31.635	kWh Consumption
2056066	5/2/2024 12:00:00 AM	82949.873	39.363	kWh Consumption
2056066	5/1/2024 12:00:00 AM	82917.536	32.337	kWh Consumption
2056066	4/30/2024 12:00:00 AM	82872.801	44.735	kWh Consumption
2056066	4/29/2024 12:00:00 AM	82833.828	38.973	kWh Consumption
2056066	4/28/2024 12:00:00 AM	82798.452	35.376	kWh Consumption
2056066	4/27/2024 12:00:00 AM	82761.453	36.999	kWh Consumption
2056066	4/26/2024 12:00:00 AM	82721.38	40.073	kWh Consumption
2056066	4/25/2024 12:00:00 AM	82681.215	40.165	kWh Consumption
2056066	4/24/2024 12:00:00 AM	82638.322	42.893	kWh Consumption
2056066	4/23/2024 12:00:00 AM	82587.004	51.318	kWh Consumption
2056066	4/22/2024 12:00:00 AM	82554.206	32.798	kWh Consumption
2056066	4/21/2024 12:00:00 AM	82510.631	43.575	kWh Consumption
2056066	4/20/2024 12:00:00 AM	82466.499	44.132	kWh Consumption
2056066	4/19/2024 12:00:00 AM	82427.964	38.535	kWh Consumption
2056066	4/18/2024 12:00:00 AM	82385.702	42.262	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	4/17/2024 12:00:00 AM	82346.964	38.738	kWh Consumption
2056066	4/16/2024 12:00:00 AM	82316.917	30.047	kWh Consumption
2056066	4/15/2024 12:00:00 AM	82272.772	44.145	kWh Consumption
2056066	4/14/2024 12:00:00 AM	82235.496	37.276	kWh Consumption
2056066	4/13/2024 12:00:00 AM	82190.692	44.804	kWh Consumption
2056066	4/12/2024 12:00:00 AM	82155.128	35.564	kWh Consumption
2056066	4/11/2024 12:00:00 AM	82116.351	38.777	kWh Consumption
2056066	4/10/2024 12:00:00 AM	82080.869	35.482	kWh Consumption
2056066	4/9/2024 12:00:00 AM	82030.098	50.771	kWh Consumption
2056066	4/8/2024 12:00:00 AM	81992.067	38.031	kWh Consumption
2056066	4/7/2024 12:00:00 AM	81939.139	52.928	kWh Consumption
2056066	4/6/2024 12:00:00 AM	81892.934	46.205	kWh Consumption
2056066	4/5/2024 12:00:00 AM	81852.01	40.924	kWh Consumption
2056066	4/4/2024 12:00:00 AM	81790.647	61.363	kWh Consumption
2056066	4/3/2024 12:00:00 AM	81758.289	32.358	kWh Consumption
2056066	4/2/2024 12:00:00 AM	81729.754	28.535	kWh Consumption
2056066	4/1/2024 12:00:00 AM	81706.139	23.615	kWh Consumption
2056066	3/31/2024 12:00:00 AM	81665.587	40.552	kWh Consumption
2056066	3/30/2024 12:00:00 AM	81623.219	42.368	kWh Consumption
2056066	3/29/2024 12:00:00 AM	81593.108	30.111	kWh Consumption
2056066	3/28/2024 12:00:00 AM	81573.215	19.893	kWh Consumption
2056066	3/27/2024 12:00:00 AM	81549.731	23.484	kWh Consumption
2056066	3/26/2024 12:00:00 AM	81524.295	25.436	kWh Consumption
2056066	3/25/2024 12:00:00 AM	81497.839	26.456	kWh Consumption
2056066	3/24/2024 12:00:00 AM	81477.332	20.507	kWh Consumption
2056066	3/23/2024 12:00:00 AM	81451.523	25.809	kWh Consumption
2056066	3/22/2024 12:00:00 AM	81420.438	31.085	kWh Consumption
2056066	3/21/2024 12:00:00 AM	81401.591	18.847	kWh Consumption
2056066	3/20/2024 12:00:00 AM	81375.053	26.538	kWh Consumption
2056066	3/19/2024 12:00:00 AM	81343.832	31.221	kWh Consumption
2056066	3/18/2024 12:00:00 AM	81313.975	29.857	kWh Consumption
2056066	3/17/2024 12:00:00 AM	81289.095	24.880	kWh Consumption
2056066	3/16/2024 12:00:00 AM	81242.075	47.020	kWh Consumption
2056066	3/15/2024 12:00:00 AM	81214.01	28.065	kWh Consumption
2056066	3/14/2024 12:00:00 AM	81191.293	22.717	kWh Consumption
2056066	3/13/2024 12:00:00 AM	81172.178	19.115	kWh Consumption
2056066	3/12/2024 12:00:00 AM	81146.264	25.914	kWh Consumption
2056066	3/11/2024 12:00:00 AM	81120.997	25.267	kWh Consumption
2056066	3/10/2024 12:00:00 AM	81102.144	18.853	kWh Consumption
2056066	3/9/2024 12:00:00 AM	81076.249	25.895	kWh Consumption
2056066	3/8/2024 12:00:00 AM	81033.876	42.373	kWh Consumption
2056066	3/7/2024 12:00:00 AM	81003.03	30.846	kWh Consumption
2056066	3/6/2024 12:00:00 AM	80972.133	30.897	kWh Consumption
2056066	3/5/2024 12:00:00 AM	80939.914	32.219	kWh Consumption
2056066	3/4/2024 12:00:00 AM	80923.287	16.627	kWh Consumption
2056066	3/3/2024 12:00:00 AM	80893.828	29.459	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	3/2/2024 12:00:00 AM	80864.328	29.500	kWh Consumption
2056066	3/1/2024 12:00:00 AM	80839.742	24.586	kWh Consumption
2056066	2/29/2024 12:00:00 AM	80809.277	30.465	kWh Consumption
2056066	2/28/2024 12:00:00 AM	80783.052	26.225	kWh Consumption
2056066	2/27/2024 12:00:00 AM	80747.513	35.539	kWh Consumption
2056066	2/26/2024 12:00:00 AM	80717.012	30.501	kWh Consumption
2056066	2/25/2024 12:00:00 AM	80658.936	58.076	kWh Consumption
2056066	2/24/2024 12:00:00 AM	80618.444	40.492	kWh Consumption
2056066	2/23/2024 12:00:00 AM	80586.354	32.090	kWh Consumption
2056066	2/22/2024 12:00:00 AM	80545.565	40.789	kWh Consumption
2056066	2/21/2024 12:00:00 AM	80520.106	25.459	kWh Consumption
2056066	2/20/2024 12:00:00 AM	80493.472	26.634	kWh Consumption
2056066	2/19/2024 12:00:00 AM	80446.178	47.294	kWh Consumption
2056066	2/18/2024 12:00:00 AM	80407.949	38.229	kWh Consumption
2056066	2/17/2024 12:00:00 AM	80366.858	41.091	kWh Consumption
2056066	2/16/2024 12:00:00 AM	80326.802	40.056	kWh Consumption
2056066	2/15/2024 12:00:00 AM	80296.92	29.882	kWh Consumption
2056066	2/14/2024 12:00:00 AM	80256.839	40.081	kWh Consumption
2056066	2/13/2024 12:00:00 AM	80224.788	32.051	kWh Consumption
2056066	2/12/2024 12:00:00 AM	80203.411	21.377	kWh Consumption
2056066	2/11/2024 12:00:00 AM	80157.991	45.420	kWh Consumption
2056066	2/10/2024 12:00:00 AM	80112.948	45.043	kWh Consumption
2056066	2/9/2024 12:00:00 AM	80096.912	16.036	kWh Consumption
2056066	2/8/2024 12:00:00 AM	80058.814	38.098	kWh Consumption
2056066	2/7/2024 12:00:00 AM	80038.02	20.794	kWh Consumption
2056066	2/6/2024 12:00:00 AM	80013.106	24.914	kWh Consumption
2056066	2/5/2024 12:00:00 AM	79986.388	26.718	kWh Consumption
2056066	2/4/2024 12:00:00 AM	79940.794	45.594	kWh Consumption
2056066	2/3/2024 12:00:00 AM	79862.177	78.617	kWh Consumption
2056066	2/2/2024 12:00:00 AM	79797.947	64.230	kWh Consumption
2056066	2/1/2024 12:00:00 AM	79737.735	60.212	kWh Consumption
2056066	1/31/2024 12:00:00 AM	79674.293	63.442	kWh Consumption
2056066	1/30/2024 12:00:00 AM	79625.647	48.646	kWh Consumption
2056066	1/29/2024 12:00:00 AM	79567.585	58.062	kWh Consumption
2056066	1/28/2024 12:00:00 AM	79495.908	71.677	kWh Consumption
2056066	1/27/2024 12:00:00 AM	79440.655	55.253	kWh Consumption
2056066	1/26/2024 12:00:00 AM	79363.937	76.718	kWh Consumption
2056066	1/25/2024 12:00:00 AM	79309.306	54.631	kWh Consumption
2056066	1/24/2024 12:00:00 AM	79240.63	68.676	kWh Consumption
2056066	1/23/2024 12:00:00 AM	79187.95	52.680	kWh Consumption
2056066	1/22/2024 12:00:00 AM	79128.418	59.532	kWh Consumption
2056066	1/21/2024 12:00:00 AM	79070.507	57.911	kWh Consumption
2056066	1/20/2024 12:00:00 AM	79000.272	70.235	kWh Consumption
2056066	1/19/2024 12:00:00 AM	78931.541	68.731	kWh Consumption
2056066	1/18/2024 12:00:00 AM	78856.601	74.940	kWh Consumption
2056066	1/17/2024 12:00:00 AM	78796.97	59.631	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	1/16/2024 12:00:00 AM	78731.929	65.041	kWh Consumption
2056066	1/15/2024 12:00:00 AM	78658.689	73.240	kWh Consumption
2056066	1/14/2024 12:00:00 AM	78604.052	54.637	kWh Consumption
2056066	1/13/2024 12:00:00 AM	78537.386	66.666	kWh Consumption
2056066	1/12/2024 12:00:00 AM	78468.598	68.788	kWh Consumption
2056066	1/11/2024 12:00:00 AM	78420.343	48.255	kWh Consumption
2056066	1/10/2024 12:00:00 AM	78345.316	75.027	kWh Consumption
2056066	1/9/2024 12:00:00 AM	78277.651	67.665	kWh Consumption
2056066	1/8/2024 12:00:00 AM	78210.675	66.976	kWh Consumption
2056066	1/7/2024 12:00:00 AM	78130.069	80.606	kWh Consumption
2056066	1/6/2024 12:00:00 AM	78062.039	68.030	kWh Consumption
2056066	1/5/2024 12:00:00 AM	77999.164	62.875	kWh Consumption
2056066	1/4/2024 12:00:00 AM	77947.822	51.342	kWh Consumption
2056066	1/3/2024 12:00:00 AM	77888.288	59.534	kWh Consumption
2056066	1/2/2024 12:00:00 AM	77837.61	50.678	kWh Consumption
2056066	1/1/2024 12:00:00 AM	77762.739	74.871	kWh Consumption
2056066	12/31/2023 12:00:00 AM	77701.411	61.328	kWh Consumption
2056066	12/30/2023 12:00:00 AM	77652.404	49.007	kWh Consumption
2056066	12/29/2023 12:00:00 AM	77572.826	79.578	kWh Consumption
2056066	12/28/2023 12:00:00 AM	77518.852	53.974	kWh Consumption
2056066	12/27/2023 12:00:00 AM	77455.612	63.240	kWh Consumption
2056066	12/26/2023 12:00:00 AM	77391.134	64.478	kWh Consumption
2056066	12/25/2023 12:00:00 AM	77320.819	70.315	kWh Consumption
2056066	12/24/2023 12:00:00 AM	77246.697	74.122	kWh Consumption
2056066	12/23/2023 12:00:00 AM	77170.554	76.143	kWh Consumption
2056066	12/22/2023 12:00:00 AM	77114.339	56.215	kWh Consumption
2056066	12/21/2023 12:00:00 AM	77061.749	52.590	kWh Consumption
2056066	12/20/2023 12:00:00 AM	77007.813	53.936	kWh Consumption
2056066	12/19/2023 12:00:00 AM	76972.943	34.870	kWh Consumption
2056066	12/18/2023 12:00:00 AM	76904.552	68.391	kWh Consumption
2056066	12/17/2023 12:00:00 AM	76832.944	71.608	kWh Consumption
2056066	12/16/2023 12:00:00 AM	76767.968	64.976	kWh Consumption
2056066	12/15/2023 12:00:00 AM	76706.968	61.000	kWh Consumption
2056066	12/14/2023 12:00:00 AM	76636.32	70.648	kWh Consumption
2056066	12/13/2023 12:00:00 AM	76583.432	52.888	kWh Consumption
2056066	12/12/2023 12:00:00 AM	76534.035	49.397	kWh Consumption
2056066	12/11/2023 12:00:00 AM	76483.036	50.999	kWh Consumption
2056066	12/10/2023 12:00:00 AM	76416.737	66.299	kWh Consumption
2056066	12/9/2023 12:00:00 AM	76358.394	58.343	kWh Consumption
2056066	12/8/2023 12:00:00 AM	76299.056	59.338	kWh Consumption
2056066	12/7/2023 12:00:00 AM	76240.409	58.647	kWh Consumption
2056066	12/6/2023 12:00:00 AM	76180.7	59.709	kWh Consumption
2056066	12/5/2023 12:00:00 AM	76131.371	49.329	kWh Consumption
2056066	12/4/2023 12:00:00 AM	76066.531	64.840	kWh Consumption
2056066	12/3/2023 12:00:00 AM	76006.534	59.997	kWh Consumption
2056066	12/2/2023 12:00:00 AM	75947.795	58.739	kWh Consumption

Customer Read Extract for Scalar

Meter Number	Read Date	Meter Read	Meter Usage	Read Type
2056066	12/1/2023 12:00:00 AM	75900.903	46.892	kWh Consumption
2056066	11/30/2023 12:00:00 AM	75850.088	50.815	kWh Consumption
2056066	11/29/2023 12:00:00 AM	75775.643	74.445	kWh Consumption
2056066	11/28/2023 12:00:00 AM	75723.455	52.188	kWh Consumption
2056066	11/27/2023 12:00:00 AM	75676.799	46.656	kWh Consumption
2056066	11/26/2023 12:00:00 AM	75588.222	88.577	kWh Consumption
2056066	11/25/2023 12:00:00 AM	75528.971	59.251	kWh Consumption
2056066	11/24/2023 12:00:00 AM	75489.568	39.403	kWh Consumption
2056066	11/23/2023 12:00:00 AM	75445.805	43.763	kWh Consumption
2056066	11/22/2023 12:00:00 AM	75381.766	64.039	kWh Consumption
2056066	11/21/2023 12:00:00 AM	75337.436	44.330	kWh Consumption
2056066	11/20/2023 12:00:00 AM	75284.914	52.522	kWh Consumption
2056066	11/19/2023 12:00:00 AM	75237.342	47.572	kWh Consumption
2056066	11/18/2023 12:00:00 AM	75197.946	39.396	kWh Consumption
2056066	11/17/2023 12:00:00 AM	75161.635	36.311	kWh Consumption
2056066	11/16/2023 12:00:00 AM	75117.898	43.737	kWh Consumption
2056066	11/15/2023 12:00:00 AM	75082.119	35.779	kWh Consumption
2056066	11/14/2023 12:00:00 AM	75040.716	41.403	kWh Consumption
2056066	11/13/2023 12:00:00 AM	74998.903	41.813	kWh Consumption
2056066	11/12/2023 12:00:00 AM	74972.759	26.144	kWh Consumption
2056066	11/11/2023 12:00:00 AM	74930.364	42.395	kWh Consumption
2056066	11/10/2023 12:00:00 AM	74890.847	39.517	kWh Consumption
2056066	11/9/2023 12:00:00 AM	74856.903	33.944	kWh Consumption
2056066	11/8/2023 12:00:00 AM	74821.306	35.597	kWh Consumption
2056066	11/7/2023 12:00:00 AM	74788.566	32.740	kWh Consumption
2056066	11/6/2023 12:00:00 AM	74752.633	35.933	kWh Consumption
2056066	11/5/2023 12:00:00 AM	74720.877	31.756	kWh Consumption
2056066	11/4/2023 12:00:00 AM	74683.703	37.174	kWh Consumption
2056066	11/3/2023 12:00:00 AM	74643.033	40.670	kWh Consumption
2056066	11/2/2023 12:00:00 AM	74587.659	55.374	kWh Consumption
2056066	11/1/2023 12:00:00 AM	74538.249	49.410	kWh Consumption

Security and Privacy Concerns in Smart Metering: The Cyber-Physical Aspect

By Samet Tonyali

The ongoing Smart Grid (SG) initiative proposes several modifications to the existing power grid through several new applications. One of these applications is the Advanced Metering Infrastructure (AMI). AMI provides two-way communication between utility companies and the consumers' smart appliances, such as refrigerators, washers, thermostats, etc. through the deployment of smart meters and smart data collection techniques. Smart meters mainly measure the real-time electrical energy consumption of the consumers in addition to power quality and instantaneous electric measurements such as voltage and current at their connection points and periodically report them to the utilities. Thus, utilities can monitor and adjust power demands over short periods (demand response), provide more accurate billing and utilize dynamic pricing to facilitate the reduction of energy consumption in peak demand.

Smart meters are designed to improve efficiency and reduce costs. Therefore, government agencies require that utilities install smart meters for their customers. These efforts have resulted in more than a hundred million smart meters being installed around the world.

Besides noted benefits, smart meters add some vulnerability to the household security. Since they are main communication hub between utilities and smart home appliances, they attract malicious actors' (eavesdroppers and intruders) attention. From an attacker point of view, a smart meter is seen as a single point of failure. That is, once it is compromised, the attacker can both manipulate the utility by injecting fake consumption data and also take control of the home appliances by sending control commands like turn on and off.

Smart meters communicate their measurements to the utilities over wireless links and these fine-grained power consumption data and since most of the smart meters do not encrypt the data before transmission, this data can easily be obtained. The obtained fine-grained consumption data can be analyzed and used to make some inferences about household activities, which could lead to a privacy breach.

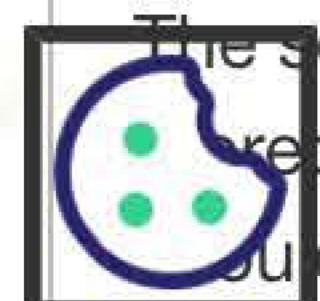
Security. The ways of attacking smart devices can be divided into two: physical attack (i.e., intrusion via tampering with hardware components of the device) and exploiting vulnerabilities in the communication protocols.

Smart meters are considered tamper-proof thanks to various protection mechanisms, so physical security of smart meters is typically strong. In an event that the meter case is opened in an unauthorized way and a physical change is made, the meter logs a tamper event and forwards it to the AMI center. However, it is still possible to attack in a semi-physical fashion in which some specific hardware is used while performing the attack. The billing fraud that took place in Puerto Rico is an exemplary incident to this kind of attacks. The attack resulted in a widespread billing fraud, which cost \$400 million to the Puerto Rican utility annually. A possible and reasonable precaution that can be taken by the utility company could be to authenticate the laptop/handheld device by a challenge-response mechanism along with a vendor specific data encryption.

Some of the smart meter vendors do not implement encrypted memory. Two supervisory control and data acquisition (SCADA) and industrial control system (ICS) security specialists took advantage of that and developed a toolkit that lets anyone access the memory of a smart meter and intercept the credentials used to administer it. Obviously, the best solution to overcome this problem is to install secure memory.

The security problems stem from outdated protocols, poor implementations, and weak design principles.

Moreover, some of the smart meter vendors use the same hardcoded credentials in their meters. Therefore, utilities should force smart meter vendors not to embed the same credentials on the devices. Also, the consumers should





Obviously, the best solution to overcome this problem is to install secure memory.

The security problems stem from outdated protocols, poor implementations, and weak design principles. Moreover, some of the smart meter vendors use the same hardcoded credentials in their meters. Therefore, utilities should force smart meter vendors not to embed the same credentials on the devices. Also, the consumers should be vigilant and change them as soon as they have the smart meter installed if the vendor implemented such an interface.

Wireless protocols that some meters use may also have some vulnerabilities that are exploited by attackers. Smart meter vendors tend to work with 3G and 4G networks which provide a wide bandwidth allowing additional consumer services, but most of today's smart metering infrastructure is part of the global system for mobile communications (GSM) network, and uses the general packet radio service (GPRS) data service and a low-cost 2G solution, to communicate with the utility company. Many electricity utility companies still have not implemented any form of encryption, despite being warned of the risks several years ago. Moreover, since the smart meters deployed by the same utility use the same credentials, it could be easy for the attackers to compromise all of the devices operated by that utility company. Such attacks can be thwarted if utility companies use proper encryption, segment the network instead of using one giant LAN and monitor their smart meter networks via an intrusion detection system (IDS).

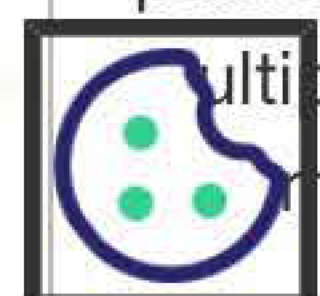
Smart meters use ZigBee or Z-Wave to communicate with smart home appliances. These standards have been poorly implemented in smart meters, so their communication is often insecure and unencrypted because the meter vendors skip including security checks to minimize the code as the meters have limited CPU power and memory resources. Utilities should compel the vendors to implement proper encryption algorithms defined for the standards in use.

There are some basic security considerations that should be taken into account when designing secure smart meters to limit the effect of common network attacks such as Denial-of-Service and Man-in-the-Middle attacks:

- The smart meter should be able to filter network packets
- The smart meter should have a static ARP cache
- Network traffic with high-speed rate targeting smart meters should be denied from reaching the kernel of the meters (Tarpitting)
- Smart meters should be equipped with encryption capabilities.
- Smart meters should be able to detect any intrusion attempt and report it to the utility company

Privacy. Eavesdroppers can monitor power usage and make inferences about what you are doing at home or whether you are at home or not, even when your home is vacant for long periods of time. They can predict with a high probability even what program is being shown on the TV by comparing fine-grained power consumption data with a fingerprint power consumption value for each individual frame.

It has been demonstrated that someone with network sniffing skills and equipment can perform a "man in the middle" attack to eavesdrop the data related to power consumption in a house. The collected data can be sold to advertisers without the consent of the consumers. Traditional encryption methods can protect consumer privacy against eavesdroppers, but utilities still can access actual meter readings. To prevent utilities or trusted third parties from accessing fine-grained consumption values, data obfuscation, homomorphic encryption, and secure multiparty computation schemes can be implemented in smart meters. These schemes enable to perform arithmetic operations on encrypted/concealed meter readings.



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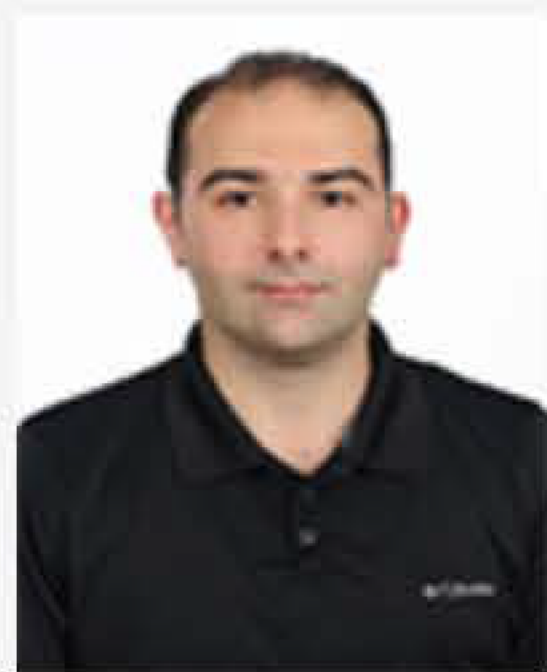
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To summarize, utility companies need to take several security and privacy considerations into account to realize a secure and privacy-preserving smart grid, including: protecting the integrity of the device(s) installed at the consumer side, proofing and protecting the integrity of data sent between the consumer premises and the utility, authenticating the identities of the parties in communication, concealing the data in transit between the consumer devices and the utility, ensuring authorized access to the consumer data stored at the utility side. All of these considerations can be handled using digital certificates. Public Key Infrastructure creates, manages, distributes, uses, stores, and revokes digital certificates. This enables secure communication between parties and provides security through authenticity, integrity, confidentiality, and non-repudiation.

This article was edited by Pardis Khayyer.

For a downloadable copy of the July 2018 eNewsletter which includes this article, please visit the IEEE Smart Grid Resource Center.

Contributors



Samet Tonyali received his PhD in electrical and computer engineering from Florida International University in 2018. He received his B.S. and M.S. degrees in computer engineering from Marmara University, Istanbul, Turkey in 2011 and 2013, respectively. He worked as a teaching assistant for 2 and a half years and as a graduate research assistant for 3 and a half years during his M.S. and PhD education. His interests are smart grid communications, cyberphysical systems, internet of things, and security and privacy.

