

# Smart Meter Reading

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## Introduction.

Smart Meters has been around for some time and with the increase in the use of Solar / Wind home usage many people find themselves with these meters.

If will not go into any discussions that these meters are harmful, they produce no more Radio Frequency radiation than a mobile phone and you do not walk around with one of these stuck to the side of your head.

The main benefit of these meters is that users of these meters can, on a daily basis, obtain a file containing the data for up to at least the last two years of operation.

There are two types of files streams in use.

1. A data stream containing 11 or so packets of information per line.
2. A NEM format file which contains 52 or more packets of information per line.

## Data Stream File.

As this is directed at AGL users I will use their Data Usage file as an example.

The first line in the file contains a header which explains the fields in use for all the lines below.

NMI	Device Number	Device Type	Register Code	Rate Type Description	Start Date	End Date	Profile Read Value	Register Read Value	Quality Flag
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20013969096,U260000657,COMMS4,00657#B1,Solar,28/04/2019 00:00,28/04/2019 00:29,0,0,A

- NMI: the is the National Metering Identifier, this is unique to every meter.
- Device Number: the device number within your meter (normally one only) for home users.
- Device Type: the communications port identifier.
- Register Code: Combination of the last six digits of Device type and your Meter Type (123456#B1)
- Rate Type Description: Text description of what your Register Code is.  
Common are General (Peak meter), Controlled (Off peak) and Solar
- Start Date: d/mm/yyyy hh:mm
- End Date: d/mm/yyyy hh:mm
- Profile Read Value: The value that really interests us. Usage in Kw to 3 decimal places or the amount returned to the grid. (1.234 for example)
- Register Read Value: Normally 0
- Quality Flag: Should be A (for Actual)

# NEM Format File

This is the industry standard and is defined in AEMO's *Meter Data File Format Specification NEM12 & NEM13*.

AEMO is the Australian Energy Market Operator and controls the Australian Power Market.

The file is a Detailed Report.

The detailed report contains the metering data in *blocks* of information:

There are normally 5 sets of records in A NEM file

- **200 record** that contains NMI data details.
- **300 record** that contains interval data.
- **400 record** that contains interval events.
- **900 record** only one record and that is to indicate the **End Of File**.

In every detailed report, there will be at least one 200 record. Your detailed report will include multiple 200 records if your NMI has multiple meters or your meter has multiple registers configured.

For each 200 record, there can be multiple 300 records - one for each day of the date range requested.

If a 300 record includes a mixture of actual and substituted meter readings, there will be associated 400 record(s). If a 300 record contains only actual or only substituted meter readings, a 400 record is not provided for that day.

The detailed report will contain one 900 report. This is the end of file marker.

Below is a NEM format file generated by the Author data stream supplied by AGL when you download it from your Login page.

Below is a sample 200 Record first as a spread sheet view

200	20013969096	B1E1E2	B1	B1		U260000657	KWH	30				AGLCSV	7060167751
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And now as a .csv view

200,20013969096,B1E1E2,B1,B1,,U260000657,KWH,30,,,,AGLCSV,7060167751,

- 200 is the record value
- 20013969096 is the NMI
- B1E1E2 is all the Meter Types listed in this NEM format file
- B1 is the Register ID that this record refers to.
- B1 is NMI suffix that this record refers to.
- "Blank" is the Data Stream Identifier or blank (as in this case)
- U260000657 is the device number
- KWH indicates that all readings are shown in Kilowatts Hours.
- 30 shows interval readings are every 30 minutes (can be 15)
- "Blank" can be Next Scheduled Read Date or Blank
- "Blank" extra column added by the Author (see reason below)
- "Blank" extra column added by the Author (see reason below)
- AGLCSV is a field added by Author to show his program created it
- Last field is the AGL account number added by the author

The additional fields are not in the standard but are useful for fault finding.

### 300 record

300 records are not complex but contain the data that is needed to make a compatible record to create a table of information.

300	20190429	0	0	0	0	0	0	0	0	0	0	0	0	0	0.058	0.389	0.684	1.127	1.46	1.76	0.287	0.405	0.003	1.942	1.784	1.856	1.782	0	A	2.01909E+1
300	20190430	0	0	0	0	0	0	0	0	0	0	0	0	0	0.014	0.049	0.256	0.516	0.921	1.114	0.08	0.046	0	1.33	1.228	1.463	1.413	0	A	2.01909E+1
300	20190501	0	0	0	0	0	0	0	0	0	0	0	0	0	0.015	0.249	0.621	1.124	1.165	0.96	0.126	0	0	1.26	1.261	0.91	1.264	0	A	2.01909E+1
300	20190502	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.002	0.252	0.799	0.659	0.361	0.065	0	1.802	0.284	0.04	0.19	0	A	2.01909E+1
300	20190503	0	0	0	0	0	0	0	0	0	0	0	0	0	0.151	0.691	0.871	1.488	1.666	0.397	0.047	0.002	1.265	0.961	0.722	0.537	0	A	2.01909E+1	

The first column contains the number 300

The Second column contains the date in the format YYYYmmdd (very handy as it is sortable)

There are either 48 or 96 columns between the Yellow. 48 for ½ hour and 96 for ¼ increments. (Remember the 200 line tells us that) then you have a Quality Method (normally A)

Then a reason code and a reason description, followed by an update time. There also may be a Load Date time.

My AGL2nem program sets the Load Date Time at the time you run it.

### 400 record

400 Records do not concern us as the data supplied by your Retailer or Supplier will have included any corrections into your data.

## Conclusion

Of the two streams Data and NEM, the most practical is the NEM format file.

Data has a single column of DATA (Profile Read Value)

AccountNumber	NMI	DeviceNumber	DeviceType	RegisterCode	RateTypeDescription	StartDate	EndDate	ProfileReadValue	RegisterR	QualityFlag
7060167751	20013969096	U260000657	COMMS4	00657#B1	Solar	28/04/2019 00:00	28/04/2019 00:29	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E1	Generalusage	28/04/2019 00:00	28/04/2019 00:29	0.445	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E2	Controlledload	28/04/2019 00:00	28/04/2019 00:29	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#B1	Solar	28/04/2019 00:30	28/04/2019 00:59	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E1	Generalusage	28/04/2019 00:30	28/04/2019 00:59	0.175	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E2	Controlledload	28/04/2019 00:30	28/04/2019 00:59	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#B1	Solar	28/04/2019 01:00	28/04/2019 01:29	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E1	Generalusage	28/04/2019 01:00	28/04/2019 01:29	0.191	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E2	Controlledload	28/04/2019 01:00	28/04/2019 01:29	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#B1	Solar	28/04/2019 01:30	28/04/2019 01:59	0	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E1	Generalusage	28/04/2019 01:30	28/04/2019 01:59	0.191	0	A
7060167751	20013969096	U260000657	COMMS4	00657#E2	Controlledload	28/04/2019 01:30	28/04/2019 01:59	0	0	A

Above is a view is from a SpreadSheet.

No SpreadSheet, then this is from Notepad

```
AccountNumber,NMI,DeviceNumber,DeviceType,RegisterCode,RateTypeDescription,StartDate,EndDate,ProfileReadValue,RegisterR,QualityFlag
7060167751,20013969096,U260000657,COMMS4,00657#B1,Solar,28/04/2019 00:00,28/04/2019 00:29,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E1,Generalusage,28/04/2019 00:00,28/04/2019 00:29,0.445,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E2,Controlledload,28/04/2019 00:00,28/04/2019 00:29,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#B1,Solar,28/04/2019 00:30,28/04/2019 00:59,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E1,Generalusage,28/04/2019 00:30,28/04/2019 00:59,0.175,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E2,Controlledload,28/04/2019 00:30,28/04/2019 00:59,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#B1,Solar,28/04/2019 01:00,28/04/2019 01:29,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E1,Generalusage,28/04/2019 01:00,28/04/2019 01:29,0.191,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E2,Controlledload,28/04/2019 01:00,28/04/2019 01:29,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#B1,Solar,28/04/2019 01:30,28/04/2019 01:59,0,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E1,Generalusage,28/04/2019 01:30,28/04/2019 01:59,0.191,0,A
7060167751,20013969096,U260000657,COMMS4,00657#E2,Controlledload,28/04/2019 01:30,28/04/2019 01:59,0,0,A
```

No wonder you are confused.

### NEM Format is different.

I cannot show you the data in a ScreenShot.

Yep I can, here it is all 52 rows



Ok so now is showing the lines from 00:30 to 08:00 on a spreadsheet

20190201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.043	0.3
----------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	-------	-----

Must be Solar dated 20190201 (1<sup>st</sup> Feb 2019)

# THE ANSWER

So how about if I had programs that allowed you to extract the data from either a NEM format file or a DATA Stream file.

DATA Stream files need to be converted to NEM format then we can manipulate the data into your requests.

**We can examine the whole file.**

**You can tell the program to only look between two dates.**

**You can also tell it to report usage in 6 hourly blocks or three hourly blocks**

**Or even up 10 periods (say 00:00 to 01:00, 01:00 to 02:00 etc)**

**Want to check your previous bills (using your Smart Meter) simply set a start date (first date on the bill) and an end date (last date on the bill)**

**Set the Smart Meter KW from the bill into the config file.**

**And run it.**

**No, it is not a Windows Program.**

**It is a program that will run on a Windows machine.**

**But you HAVE TO CONTROL IT by modifying a TEXT file as to how it will run.**

```
3 to use Meter Start Values and Offsets
2 to use Meter Start Values only (ie KW reading For meters)
1 to use Meter Offsets only only
Any other key to exit (no values used) b'2'

Press y/Y to run the /AF: function.
Any other key to exit.
```

Running is simple.

Select the option as what preset values are used

**2** is where you have set the Meter Readings from your last Bill.

**Y** will go to your download directory and get a NEM format file if one is available, otherwise it will use a NEM file from the MeterRead Directory

```
Today is 20190915 Version number is 1.20F

File Reported Data for New Interval Event Record 200 >> 3 times
File Reported Data for New Interval Event Record 300 >> 123 times
File Reported Data for New Interval Event Record 400 >> 54 times
File Reported Data for New Interval Event Record 900 >> 1 times

Used only Meter Start values listed in /ME: commands

DATE      TYPE      NMI      Last Data  Meter Read  Day Avg
20190910  Solar     B1       25,484    3853,530    15.715
20190910  General   E1       4.447    1231.138    4.782
20190910  Controlled E2       0.000     0.000     0.000

Version Number: 1.20F - MeterRead by Neil K Carter

Press any key to exit.
```

Shows the number of records it processed and what type.

The last data for all of your Meter Types.

In this case also my current meter readings for Midnight on the 10 September 2019

Plus you can tell the program to not show a meter (in my case I had my off peak or controlled load heater) disconnected.

I will show you the Result of the run from my Result.txt file below.

(The program also reports in a Report.csv that opens up in a spreadsheet)

NMI 2001396909 <-->		Meter #U260000657 <-->	NMI ID=B1		Interval Mins=30		
DATE	NMI	TYPE	D/Total	00:00>06:00	06:00>12:00	12:00>18:00	18:00>00:00
20190801	B1	Solar	6.721	0.000	3.323	3.398	0.000
20190802	B1	Solar	9.022	0.000	6.299	2.723	0.000
20190803	B1	Solar	5.379	0.000	3.169	2.210	0.000
20190804	B1	Solar	19.008	0.000	8.009	10.999	0.000
20190805	B1	Solar	21.810	0.000	9.588	12.222	0.000
20190806	B1	Solar	15.266	0.000	8.377	6.889	0.000
20190807	B1	Solar	6.313	0.000	3.018	3.295	0.000
20190808	B1	Solar	6.212	0.000	5.266	0.946	0.000
20190809	B1	Solar	14.869	0.000	7.579	7.290	0.000
20190810	B1	Solar	13.409	0.000	4.888	8.521	0.000
Rows Removed from here to make it all fit on one page							
20190830	B1	Solar	25.568	0.000	11.381	14.185	0.000
20190831	B1	Solar	23.581	0.000	11.296	12.285	0.000
20190901	B1	Solar	21.789	0.000	8.820	12.969	0.000
20190902	B1	Solar	16.150	0.000	10.105	6.045	0.000
20190903	B1	Solar	16.074	0.000	3.302	12.772	0.000
20190904	B1	Solar	5.629	0.000	2.848	2.781	0.000
20190905	B1	Solar	21.776	0.000	7.735	14.041	0.000
20190906	B1	Solar	14.228	0.000	5.949	8.279	0.000
20190907	B1	Solar	11.945	0.000	4.677	7.268	0.000
20190908	B1	Solar	15.769	0.000	7.581	8.188	0.000
20190909	B1	Solar	25.970	0.000	10.949	15.016	0.005
20190910	B1	Solar	25.484	0.000	12.210	13.274	0.000
TOTAL	B1	Solar	644.322	0.000	301.415	342.898	0.000

NMI 2001396909 <-->		Meter #U260000657 <-->	NMI ID=E1		Interval Mins=30		
DATE	NMI	TYPE	D/Total	00:00>06:00	06:00>12:00	12:00>18:00	18:00>00:00
20190801	E1	General	2.939	1.099	0.458	0.219	1.163
20190802	E1	General	4.075	0.980	0.391	0.203	2.501
20190803	E1	General	4.516	1.582	0.673	0.282	1.979
20190804	E1	General	6.758	1.685	0.673	0.423	3.977
20190805	E1	General	6.368	2.072	0.613	1.544	2.139
20190806	E1	General	4.327	1.231	0.635	0.180	2.281
20190807	E1	General	5.282	1.586	0.636	1.247	1.813
20190808	E1	General	5.340	1.257	0.614	1.335	2.134
20190809	E1	General	6.555	1.635	0.672	0.315	3.933
20190810	E1	General	4.803	1.496	0.371	0.974	1.962
Rows Removed from here to make it all fit on one page							
20190830	E1	General	4.514	1.524	0.365	0.001	2.624
20190831	E1	General	3.559	1.208	0.330	0.060	1.961
20190901	E1	General	4.080	1.726	0.444	0.054	1.856
20190902	E1	General	4.406	1.758	0.591	0.076	1.981
20190903	E1	General	4.686	1.543	0.590	0.000	2.553
20190904	E1	General	5.483	1.798	0.752	0.231	2.702
20190905	E1	General	3.943	1.917	0.710	0.010	1.306
20190906	E1	General	3.360	1.132	0.321	0.038	1.869
20190907	E1	General	5.093	1.785	0.711	0.096	2.501
20190908	E1	General	4.853	1.900	0.558	0.581	1.814
20190909	E1	General	3.595	1.301	0.506	0.000	1.788
20190910	E1	General	4.447	1.010	0.444	0.577	2.416
TOTAL	E1	General	192.790	63.870	23.668	16.303	88.949

I also removed the Controlled load listed as I do not have any controlled Load usage at this time. This can also be turned off in the configuration file

Used only Meter Start values listed in /ME: commands

DATE	TYPE	NMI	Last Data	Meter Read	Day Avg
20190910	Solar	B1	25.484	3853.530	15.715
20190910	General	E1	4.447	1231.138	4.702
20190910	Controlled	E2	0.000	0.000	0.000

If you are interested after you have read this. Just send **A LIKE**.

**Or PM me** as am looking for some Guinea Pigs to trial my programs.

**I AM NOT AN AGL EMPLOYEE, NOR EXPECTING ANY COMPENSATION FROM AGL OR YOU THE USER.**

I developed these programs so that I could do modelling, check my previous bills and get usage data so that I could work out my fortnightly usage and make fortnightly payments based on this.

I am unemployed (over qualified and too old get a job, but too young to retire), do volunteer work (for the dole) for at a Community Centre for over 55 years persons.

Cheers Neil.