NZ GREEN Grid project example:

Testing power demand: rf_06

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Last run at: 2018-07-27 17:18:55

Contents

1 About

1.1 Report circulation:

- Public - this report is intended to accompany the data release.

1.2 License

1.3 Notices:

1.4 Citation

If you wish to use any of the material from this report please cite as:

- Anderson, B. (2018) NZ GREEN Grid project example: Testing power demand: rf_06 Centre for Sustainability, University of Otago: Dunedin.

1.5 History

Code history is generally tracked via our github repo:

- Report history
- General issues

1.6 Requirements:

This report uses the safe version of the grid spy 1 minute data which has been processed using https://github.com/dataknut/nzGREENGridDataR/blob/master/dataProcessing/gridSpy/processGridSpy1mData.R.

1.7 Support

This work was supported by:

- The University of Otago;
- The University of Southampton;
- The New Zealand Ministry of Business, Innovation and Employment (MBIE) through the NZ GREEN Grid project;
- SPATIALEC - a Marie Skłodowska-Curie Global Fellowship based at the University of Otago's Centre for Sustainability (2017-2019) & the University of Southampton's Sustainable Energy Research Group (2019-202).

2 Introduction

The NZ GREEN Grid project recruited a sample of c 25 households in each of two regions of New Zealand. The first sample was recruited in early 2014 and the second in early 2015. Research data includes:

- 1 minute electricity power (W) data was collected for each dwelling circuit using gridSpy monitors on each power circuit (and the incoming power). The power values represent mean(W) over the minute preceeding the observation timestamp.
- Occupant time-use diaries (focused on energy use)
- Dwelling & appliance surveys

We are working towards releasing 'clean' (anonymised) versions of this research data for re-use.

This report provides summary analysis of one household as an example.

3 Load rf_06 data

The data used to generate this report is:

- /Volumes/hum-csafe/Research Projects/GREEN Grid/Clean_data/safe/gridSpy/1min/data/rf_06_all_1min_data.csv.g
- /Volumes/hum-csafe/Research Projects/GREEN Grid/Clean_data/safe/survey/ggHouseholdAttributes.csv

```
## Parsed with column specification:
## cols(
##   sample = col_character(),
##   hhID = col_character(),
##   newID = col_character(),
##   Location = col_character(),
##   nAdults = col_integer(),
##   nChildren0_12 = col_integer(),
##   nTeenagers13_18 = col_integer(),
##   notes = col_character(),
##   r_stopDate = col_date(format = "")
## )
```

sample	hhID	newID	Location	nAdults	nChildren0_12	nTeenagers13_18	notes	r_stopDate
Powerco	rf_06	rf_06	New Plymouth	2	0	0	NA	NA

hhID	dateTime_orig	TZ_orig	r_dateTime	circuit	powerW
Length:11359339	Length:11359339	Length:11359339	Min. :2014-06-08 22:17:00	Length:11359339	Min. :-1436.21
Class :character	Class :character	Class :character	1st Qu.:2015-08-08 18:56:00	Class :character	1st Qu.: 0.00
Mode :character	Mode :character	Mode :character	Median :2016-07-04 03:34:00	Mode :character	Median : 42.73
NA	NA	NA	Mean :2016-07-24 06:36:12	NA	Mean : 236.83
NA	NA	NA	3rd Qu.:2017-08-30 14:23:00	NA	3rd Qu.: 264.13
NA	NA	NA	Max. :2018-07-26 11:59:00	NA	Max. : 8948.78

The first table shows household attributes such as how many people live in this household.

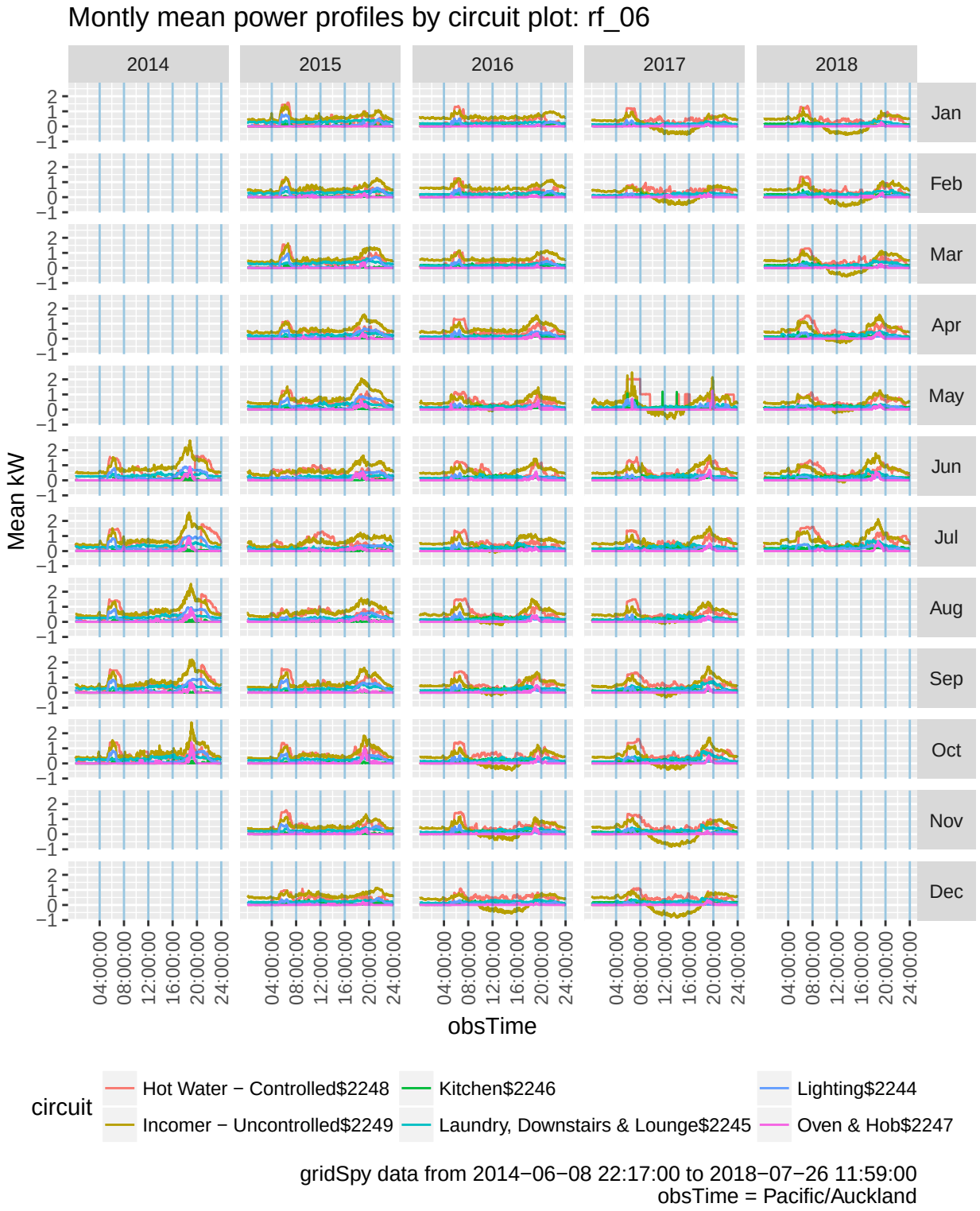
The second table shows a summary of the grid spy 1 minute power data. Note that:

- the original dataTime (`dateTime_orig`) and TZ (`TZ_orig`) have been retained so that the user can check for parsing errors (see https://github.com/dataknut/nzGREENGridDataR/issues/2) if required;
- r_datetime is the correct dateTime of each observation in UTC and will have loaded as your local timezone. If you are conducting this analysis outside NZ then you will get strange results until you use lubridate to tell R to use tz = "Pacific/Auckland" with this variable;

4 Plot monthly power profiles

This section plots overall mean power (W) per minute per month for each circuit to show:

- patterns of missing data (no lines)
- patterns of consumption
- possible dateTime issues (where consumption patterns seem to be stangely shifted in time)
- possible PV installation



5 Runtime

Analysis completed in 94.16 seconds (1.57 minutes) using knitr in RStudio with R version 3.5.0 (2018-04-23) running on x86_64-apple-darwin15.6.0.

6 R environment

R packages used:

- base R - for the basics (R Core Team 2016)
- data.table - for fast (big) data handling (Dowle et al. 2015)
- lubridate - date manipulation (Grolemund and Wickham 2011)
- ggplot2 - for slick graphics (Wickham 2009)
- readr - for csv reading/writing (Wickham, Hester, and Francois 2016)
- knitr - to create this document & neat tables (Xie 2016)
- nzGREENGridDataR - for local NZ GREEN Grid project utilities

Session info:

```
## R version 3.5.0 (2018-04-23)
## Platform: x86_64-apple-darwin15.6.0 (64-bit)
## Running under: macOS High Sierra 10.13.6
##
## Matrix products: default
## BLAS: /Library/Frameworks/R.framework/Versions/3.5/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/3.5/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_GB.UTF-8/en_GB.UTF-8/en_GB.UTF-8/C/en_GB.UTF-8/en_GB.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] knitr_1.20             readr_1.1.1            ggplot2_2.2.1
## [4] lubridate_1.7.4        data.table_1.11.4      nzGREENGridDataR_0.1.0
##
## loaded via a namespace (and not attached):
##  [1] nzGREENGrid_0.1.0 progress_1.2.0    tidyselect_0.2.4
##  [4] xfun_0.1          reshape2_1.4.3    purrr_0.2.5
##  [7] lattice_0.20-35   colorspace_1.3-2  htmltools_0.3.6
## [10] yaml_2.1.19       rlang_0.2.1       pillar_1.2.3
## [13] glue_1.2.0        sp_1.3-1          readxl_1.1.0
## [16] bindrcpp_0.2.2    jpeg_0.1-8        bindr_0.1.1
## [19] plyr_1.8.4        stringr_1.3.1     munsell_0.5.0
## [22] gtable_0.2.0      cellranger_1.1.0  RgoogleMaps_1.4.2
## [25] mapproj_1.2.6     evaluate_0.10.1   labeling_0.3
## [28] highr_0.7         proto_1.0.0       Rcpp_0.12.17
## [31] geosphere_1.5-7   openssl_1.0.1     backports_1.1.2
## [34] scales_0.5.0      rjson_0.2.20      hms_0.4.2
## [37] png_0.1-7         digest_0.6.15     stringi_1.2.3
## [40] bookdown_0.7      dplyr_0.7.5       rprojroot_1.3-2
## [43] grid_3.5.0        tools_3.5.0       magrittr_1.5
## [46] maps_3.3.0        lazyeval_0.2.1    tibble_1.4.2
## [49] crayon_1.3.4      pkgconfig_2.0.1   prettyunits_1.0.2
## [52] assertthat_0.2.0  rmarkdown_1.10    R6_2.2.2
## [55] ggmap_2.6.1       compiler_3.5.0
```

References

Dowle, M, A Srinivasan, T Short, S Lianoglou with contributions from R Saporta, and E Antonyan. 2015. *Data.table: Extension of Data.frame*. https://CRAN.R-project.org/package=data.table.

Grolemund, Garrett, and Hadley Wickham. 2011. "Dates and Times Made Easy with lubridate." *Journal of Statistical Software* 40 (3): 1–25. http://www.jstatsoft.org/v40/i03/.

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