NZ GREEN Grid project: Research data overview

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Table of Contents

# About

## Report circulation:

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

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## Citation

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

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XX replace with UKDA DOI when available XX

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## History

Code history is generally tracked via our github [repo](https://github.com/dataknut/nzGREENGridDataR):

* [Report history](https://github.com/dataknut/nzGREENGridDataR/commits/master/docs/ggOverviewReport.Rmd)
* [General issues](https://github.com/dataknut/nzGREENGridDataR/issues)

## Requirements:

This report uses:

* safe versions of the project research data and associated data quality statistics produced during processing of the original data.

## Support

This work was supported by:

* The [University of Otago](https://www.otago.ac.nz/);
* The [University of Southampton](https://www.southampton.ac.uk/);
* The New Zealand [Ministry of Business, Innovation and Employment (MBIE)](http://www.mbie.govt.nz/) through the [NZ GREEN Grid](https://www.otago.ac.nz/centre-sustainability/research/energy/otago050285.html) project;
* [SPATIALEC](http://www.energy.soton.ac.uk/tag/spatialec/) - a [Marie Skłodowska-Curie Global Fellowship](http://ec.europa.eu/research/mariecurieactions/about-msca/actions/if/index_en.htm) based at the University of Otago’s [Centre for Sustainability](http://www.otago.ac.nz/centre-sustainability/staff/otago673896.html) (2017-2019) & the University of Southampton’s Sustainable Energy Research Group (2019-202).

# Introduction

The NZ GREEN Grid project recruited a sample of [c 25 households in each of two regions of New Zealand](ggOverviewReport.html) (Stephenson et al. 2017). 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](https://gridspy.com/) monitors on each power circuit (and the incoming power). The power values represent mean(W) over the minute preceeding the observation timestamp. See - [gridSpy1mProcessingReport](gridSpy1mProcessingReport.html);
* Dwelling & appliance surveys. See - [surveyProcessingReport](surveyProcessingReport.html);
* Occupant time-use diaries (focused on energy use).

This report provides an overview of the GREEN Grid project (Stephenson et al. 2017) research data. The most recent version of this report can be found at <https://dataknut.github.io/nzGREENGridDataR/>.

# Study recruitment

The project research sample comprises 44 households who were recruited in two batches, one starting in May 2014 and the second starting in November 2014 via two local lines companies (Powerco and Unison).

Recruitment was via a non-random sampling method and a number of households were intentionally selected for their ‘complex’ electricity consumption (and embedded generation) patterns and appliances (Stephenson et al. 2017, M. W. Jack et al. (2018), K. Suomalainen et al. (2017)). As a result the sample cannot be assumed to represent the population of customers of either company, nor of the populations in each location (Stephenson et al. 2017).

Table 1 shows the number in each sample and the dates from which Grid Spy data was collected. As can be seen data is still being collected on some households.

Table 1 Sample location

Location

sample

nHouseholds

Hawkes Bay

Unison

20

New Plymouth

Powerco

24

Table 2 shows key attributes for the recruited sample. Note that two grid spy monitors were re-used and so require new hhIDs to be set from the dates given. This has already been done in the [clean grid spy data](gridSpy1mProcessingReport.html#41_recoding_re-allocated_grid_spy_units) for the relevant households. Linkage between the survey and grid spy data should always use linkID to avoid errors.

Table 2 Sample details

sample

hhID

linkID

Location

notes

r\_stopDate

Powerco

rf\_06

rf\_06

New Plymouth

NA

NA

Powerco

rf\_07

rf\_07

New Plymouth

NA

NA

Powerco

rf\_08

rf\_08

New Plymouth

NA

NA

Powerco

rf\_09

rf\_09

New Plymouth

NA

NA

Powerco

rf\_10

rf\_10

New Plymouth

NA

NA

Powerco

rf\_11

rf\_11

New Plymouth

NA

NA

Powerco

rf\_12

rf\_12

New Plymouth

NA

NA

Powerco

rf\_13

rf\_13

New Plymouth

NA

NA

Powerco

rf\_14

rf\_14

New Plymouth

NA

NA

Powerco

rf\_15

rf\_15a

New Plymouth

Disconnected 15/01/2015. Re-used

2015-01-15

Powerco

rf\_15

rf\_15b

New Plymouth

Re-user. Then disconnected 02/04/2016

2016-04-02

Powerco

rf\_16

rf\_16

New Plymouth

NA

NA

Powerco

rf\_17

rf\_17a

New Plymouth

Unusual & specialist energy tech configuration. Disconnected 28/03/2016. Re-used.

2016-03-28

Powerco

rf\_17

rf\_17b

New Plymouth

Re-user

NA

Powerco

rf\_18

rf\_18

New Plymouth

NA

NA

Powerco

rf\_19

rf\_19

New Plymouth

NA

NA

Powerco

rf\_20

rf\_20

New Plymouth

NA

NA

Powerco

rf\_21

rf\_21

New Plymouth

NA

NA

Powerco

rf\_22

rf\_22

New Plymouth

NA

NA

Powerco

rf\_23

rf\_23

New Plymouth

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Powerco

rf\_24

rf\_24

New Plymouth

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NA

Powerco

rf\_25

rf\_25

New Plymouth

NA

NA

Powerco

rf\_26

rf\_26

New Plymouth

NA

NA

Powerco

rf\_27

rf\_27

New Plymouth

NA

NA

Unison

rf\_28

rf\_28

Hawkes Bay

NA

NA

Unison

rf\_29

rf\_29

Hawkes Bay

NA

NA

Unison

rf\_30

rf\_30

Hawkes Bay

NA

NA

Unison

rf\_31

rf\_31

Hawkes Bay

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Unison

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rf\_32

Hawkes Bay

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Hawkes Bay

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Hawkes Bay

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Hawkes Bay

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Hawkes Bay

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Hawkes Bay

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rf\_39

rf\_39

Hawkes Bay

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NA

Unison

rf\_40

rf\_40

Hawkes Bay

NA

NA

Unison

rf\_41

rf\_41

Hawkes Bay

NA

NA

Unison

rf\_42

rf\_42

Hawkes Bay

NA

NA

Unison

rf\_43

rf\_43

Hawkes Bay

NA

NA

Unison

rf\_44

rf\_44

Hawkes Bay

NA

NA

Unison

rf\_45

rf\_45

Hawkes Bay

NA

NA

Unison

rf\_46

rf\_46

Hawkes Bay

very large number of circuits

NA

Unison

rf\_47

rf\_47

Hawkes Bay

NA

NA

The households labeled ‘NA’ were initial pilot/test households who did not form part of the sample and for whom no survey data is available. They should be excluded from any data analysis.

# Data collection duration

Figure 1 shows the total number of households for whom grid spy data exists on a given date by sample and indicates that for analytic purposes the period from April 2015 to March 2016 (indicated) would offer the maximum number of households.

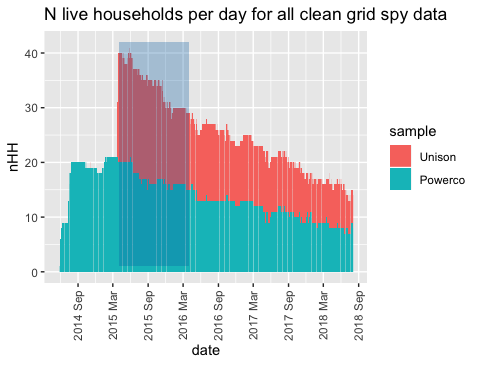


Figure 1 Sample size over time

# Runtime

Analysis completed in 3.87 seconds ( 0.06 minutes) using [knitr](https://cran.r-project.org/package=knitr) in [RStudio](http://www.rstudio.com) with R version 3.5.0 (2018-04-23) running on x86\_64-apple-darwin15.6.0.

# 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)
* dplyr - for select and contains (Wickham and Francois 2016)
* progress - for progress bars (Csárdi and FitzJohn 2016)
* knitr - to create this document & neat tables (Xie 2016)
* kableExtra - for extra neat tables (Zhu 2018)
* 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] kableExtra\_0.9.0 stringr\_1.3.1 knitr\_1.20   
## [4] lubridate\_1.7.4 readr\_1.1.1 ggplot2\_3.0.0   
## [7] 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\_0.3 reshape2\_1.4.3 purrr\_0.2.5   
## [7] lattice\_0.20-35 colorspace\_1.3-2 viridisLite\_0.3.0  
## [10] htmltools\_0.3.6 yaml\_2.2.0 rlang\_0.2.1   
## [13] pillar\_1.3.0 glue\_1.3.0 withr\_2.1.2   
## [16] sp\_1.3-1 readxl\_1.1.0 bindrcpp\_0.2.2   
## [19] jpeg\_0.1-8 bindr\_0.1.1 plyr\_1.8.4   
## [22] munsell\_0.5.0 gtable\_0.2.0 cellranger\_1.1.0   
## [25] rvest\_0.3.2 RgoogleMaps\_1.4.2 mapproj\_1.2.6   
## [28] evaluate\_0.11 labeling\_0.3 highr\_0.7   
## [31] proto\_1.0.0 Rcpp\_0.12.18 geosphere\_1.5-7   
## [34] openssl\_1.0.2 backports\_1.1.2 scales\_0.5.0   
## [37] rjson\_0.2.20 hms\_0.4.2 png\_0.1-7   
## [40] digest\_0.6.15 stringi\_1.2.4 bookdown\_0.7   
## [43] dplyr\_0.7.6 rprojroot\_1.3-2 grid\_3.5.0   
## [46] tools\_3.5.0 magrittr\_1.5 maps\_3.3.0   
## [49] lazyeval\_0.2.1 tibble\_1.4.2 crayon\_1.3.4   
## [52] pkgconfig\_2.0.1 xml2\_1.2.0 prettyunits\_1.0.2  
## [55] httr\_1.3.1 rstudioapi\_0.7 assertthat\_0.2.0   
## [58] rmarkdown\_1.10 R6\_2.2.2 ggmap\_2.6.1   
## [61] compiler\_3.5.0

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