



ELSEVIER

Contents lists available at ScienceDirect

Data in Brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Carbon (CI) and energy intensity (EI) dataset for retail stores



Ana Ferreira^{a,*}, Manuel Duarte Pinheiro^a, Jorge de Brito^a,
Ricardo Mateus^b

^a CERIS, Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal

^b CTAC, University of Minho, Department of Civil Engineering, Campus de Azurém, 4800-058 Guimarães, Portugal

ARTICLE INFO

Article history:

Received 8 October 2018

Received in revised form

19 October 2018

Accepted 23 October 2018

Available online 2 November 2018

ABSTRACT

This data article presents data collected from the 250 highest revenue retailers around the world, assessed according to publicly available data from the fiscal year 2016, in order to determine retailer's overall carbon intensity (CI) and energy intensity (EI). Data collection included additional variables such as retailers' revenue rank, operational typology, number of stores, store sales area and number of workers. Based on this dataset, CI and EI benchmarks were calculated for food and non-food retailers, applying the statistic function first quartile (Q1) for the best practice, second (Q2) and third (Q3) quartiles for conventional practice and fourth quartile (Q4) for worst practice and correlations were tested between the variables "EI", "CI" and "retailer revenue", applying the statistic function CORREL (Ferreira et al., In press) [1]. Finally, a cluster analysis was performed for food and non-food retailers, to identify possible segmentation patterns between the variables "EI", "CI" and "retailer revenue". The information provided in this data article is useful for furthering research developments on the influence of isolated variables on retail EI and CI and in assisting retailers, architects, engineers, and policy makers in establishing optimal energy performance goals for the design and operation of retail stores. For further data interpretation and discussion, see the article "Combined carbon and energy intensity benchmarks for sustainable retail stores" (Ferreira et al., In press), of the same authors.

DOI of original article: <https://doi.org/10.1016/j.energy.2018.10.020>

* Corresponding author.

E-mail addresses: anaferreiraleonardo@tecnico.ulisboa.pt (A. Ferreira), manuel.pinheiro@tecnico.ulisboa.pt (M.D. Pinheiro), jb@civil.ist.utl.pt (J. de Brito), ricardomateus@civil.uminho.pt (R. Mateus).

<https://doi.org/10.1016/j.dib.2018.10.080>

2352-3409/© 2018 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Specifications table

| | |
|----------------------------|--|
| Subject area | <i>Energy and Environment</i> |
| More specific subject area | <i>Energy and Carbon intensity</i> |
| Type of data | <i>Tables</i> |
| How data was acquired | <i>Online desk research, using software Microsoft Edge HTML 17.17134. For the statistic treatment of the data, software Microsoft Excel for Office 365 MSO was used.</i> |
| Data format | <i>Raw, analyzed</i> |
| Experimental factors | <i>To verify the relation between CI, EI and retailer revenue, data was collected from sustainability/CSR reports of the top 250 highest revenue retailers.</i> |
| Experimental features | <i>A regional analysis of the provenance of retailers was conducted, as well as a segmentation analysis of the way retailers presented EI and CI data. EI and CI benchmarks were calculated for food and non-food retailers, applying the statistic function first quartile (Q1) for the best practice, second (Q2) and third (Q3) quartiles for conventional practice and fourth quartile (Q4) for worst practice. Correlations were tested between the variables "EI", "CI" and "retailer revenue", applying the statistic function CORREL. In addition, a cluster analysis was performed for food and non-food retailers, to identify possible segmentation patterns between the variables "EI", "CI" and "retailer revenue".</i> |
| Data source location | <i>Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal</i> |
| Data accessibility | <i>Data is with this article and in the public repository "Mendley data" under the data identification reference: Santos Ferreira, Ana Sofia (2018), "Combined carbon and energy intensity benchmarks for sustainable retail stores", Mendeley Data, v1 http://dx.doi.org/10.17632/www29xrsv56.1</i> |
| Related research article | <i>A. Ferreira, M.D. Pinheiro, J. de Brito, R. Mateus, Combined carbon and energy intensity benchmarks for sustainable retail stores, In press. (2018) [2].</i> |

Value of the data

- Data can be of use to both international or local retailers in terms of energy and GHG emissions' management.
- It can be of use to architects and engineers when designing new or refurbished retail, providing key indicators for the design or operation performance of retail stores in terms of EI and CI.
- It may also be of interest for green building tools, as EI and CI "best practice" threshold values, coupled with life-cycle assessments, are also fundamental to perform sustainability assessments.
- Benchmarks may be used for other researchers, as further investigation is needed to identify the influence of isolated variables on retail EI and CI, like location, retail sub-type, energy source, building size or building technologies.

1. Data

Supplementary Table 1 ranks the 250 highest revenue retailers around the world. In this table, data collected from each retailer was compiled according to publicly available data [2], under the categories: “Dominant operational category”, “Store typology”, “Number of countries of operation” and “FY2015 retail revenue (US\$M)”. Additional data was gathered from retailers’ sustainability/CSR reports [3–51] for the categories “Number of stores”, “Average store sales area in m²”, “Total store sales area in m²”, “Energy intensity in kWh/m²/y”, “Carbon Intensity in kgCO₂eq/m²/y”, “Average number of workers per store”, “Total number of workers” and “Revenue per store sales area in \$/m²/y”. Based on this dataset, benchmarks for “best”, conventional” and “worst” practice in terms of EI and CI were established, as well as correlations tested between the variables “EI”, “CI” and “retailer revenue”.

Supplementary Tables 2–7 present the cluster analysis’ segmentation output performed for the variables “CI”, “EI” and “retailer revenue” for food and non-food retailers.

2. Experimental design, materials and methods

A qualitative comparison was made on the energy intensity (EI) and carbon intensity (CI) patterns of retail stores, according to the methodology described by Ferreira et al. (2018) [1].

Data retrieved from retailers was organized in a table that included the variables “Dominant operational category”, “Store typology”, “Number of countries of operation”, “FY2015 retail revenue (US\$M)”, “Number of stores”, “Average store sales area in m²”, “Total store sales area in m²”, “Energy intensity in kWh/m²/y”, “Carbon Intensity in kgCO₂eq/m²/y”, “Average number of workers per store”, “Total number of workers” and “Revenue per store sales area in \$/m²/y” (Table 1). EI and CI of each retailer were analysed or calculated, normalizing total energy consumption/GHG emissions by total sales floor area per year.

Based on this dataset, CI and EI benchmarks were calculated for food and non-food retailers applying the statistical operation median for “conventional practice” and first quartile (Q1) for “best practice”. The “best practice” was defined as the upper limit of the first quartile, corresponding to the boundary of the 25% lowest values. The “worst practice” was defined as the lower limit of the third quartile (Q3), corresponding to the boundary of the 75% highest values (Ferreira et al., In press) [1]. Additionally, correlations were tested between the variables “CI”, “EI” and “retailer revenue” for food and non-food retailers, applying the statistic function CORREL.

Cluster analysis were performed for food and non-food retailers to identify possible segmentation patterns between the variables “EI”, “CI” and “retailer revenue”. The cluster analysis was based in the Sum of the Squared Differences (SSE) between each observation and its group’s mean (non-hierarchical or k-means cluster analysis). The number of segments was chosen when the SSE of all cases within the cluster dropped significantly, being closer to 0 than with any other segmentation arrangement (Supplementary Tables 2–7).

Acknowledgements

This work was supported by FCT - Fundação para a Ciência e Tecnologia [grant number PD/BD/127852/2016] under the Doctoral Program EcoCoRe - Eco-Construction and Rehabilitation.

Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at <https://doi.org/10.1016/j.dib.2018.10.080>.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at <https://doi.org/10.1016/j.dib.2018.10.080>.

References

- [1] A. Ferreira, M.D. Pinheiro, J. de Brito, R. Mateus, Combined carbon and energy intensity benchmarks for sustainable retail stores, In press, 2018.
- [2] Deloitte, Global Powers of Retailing 2017: The art and science of customers, 2017. (<https://www2.deloitte.com/content/dam/Deloitte/global/Documents/consumer-industrial-products/gx-cip-2017-global-powers-of-retailing.pdf>) (accessed 11 September 2018).
- [3] US Department of Energy, Walmart Better Buildings Initiative, 2016. ([https://betterbuildingsolutioncenter.energy.gov/energy-data/Wal-MartStores\), Inc., \(accessed 30 January 2017\), 2016](https://betterbuildingsolutioncenter.energy.gov/energy-data/Wal-MartStores), Inc., (accessed 30 January 2017), 2016)).
- [4] Walmart, Walmart Global Responsibility Report (<https://cdn.corporate.walmart.com/c0/24/2383f0674d27823dcf7083e6fbc6/2015-global-responsibility-report.pdf>) (accessed 21 October 2016), 2015.
- [5] Costco, Costco – Corporate Sustainability, Energy and Animal Welfare (<http://phx.corporate-ir.net/phoenix.zhtml?C=83830&p=irol-sustainability>) (accessed 11 November 2016), 2015.
- [6] Kroger, Kroger Sustainability Report (<http://sustainability.kroger.com/>) (accessed 11 November 2016), 2016.
- [7] Lidl, Rapports de durabilité (https://www.enrouteversdemain-lidl.be/introduction/rapports-de-durabilite/?_ga=2.152622129.923055288.1536665554-1973559847.1536665554) (accessed 11 September 2018), 2015.
- [8] Red Engineering Design Ltd, Sustainability/Green Credentials Report Lidl UK (<http://www.lidworchester.co.uk/wp-content/uploads/2014/08/Sustainability-Report-Lidl-Worcester-Clubhouse.pdf>) (accessed 30 January 2017), 2014.
- [9] JS Lewis LTD, Sustainability and Energy Statement (<http://www.lidl-in-warlingham.co.uk/wp-content/uploads/2016/04/P234-R-001-Energy-and-Sustainability-Strategy-FINAL.pdf>) (accessed 30 January 2017), 2016.
- [10] US Department of Energy, Walgreens Better Buildings Initiative ([https://betterbuildingsolutioncenter.energy.gov/energy-data/Walgreens Co.](https://betterbuildingsolutioncenter.energy.gov/energy-data/Walgreens%20Co.)) (accessed 30 January 2017), 2016.
- [11] Walgreens, Corporate Social Responsibility Report 2016 (http://www.walgreensbootsalliance.com/content/1110/files/WBA_CSR-Report-2016.pdf) (accessed 11 September 2018), 2016.
- [12] Home Depot, The Home Depot Sustainability Report (https://corporate.homedepot.com/sites/default/files/THD_0039_2015_Sustainability_Report_Online_Nov_10.pdf) (accessed 21 October 2016), 2015.
- [13] Carrefour, Carrefour Sustainability Report (http://www.carrefour.com/sites/default/files/carrefour_-_2015_annual_activity_and_responsible_commitment_report.pdf) (accessed 02 November 2016), 2015.
- [14] Aldi, Aldi North Group Sustainability Report (http://www.aldi.pt/print/responsabilidade/ALDI_North_Group_Sustainability_Report_2015_EN.pdf) (accessed 11 November 2016), 2015.
- [15] Tesco, Tesco and Society Report (https://www.tescopl.com/media/1184/tesco_and_society_review_2014.pdf) (accessed 02 November 2016), 2014.
- [16] Target, Target Corporate Social Responsibility Report (https://corporate.target.com/_media/TargetCorp/csr/pdf/2014-corporate-responsibility-report.pdf) (accessed 21 October 2016), 2014.
- [17] US Department of Energy, Target Improves Efficiency in New Construction (<http://www.nrel.gov/docs/fy14osti/57266.pdf>) (accessed 30 November 2016), 2004.
- [18] CVS Health Corporation, CVS CSR Report 2015, (n.d.) (<https://cvshhealth.com/social-responsibility/corporate-social-responsibility/2015-corporate-social-responsibility/about-this-report>) (accessed 25 November 2016).
- [19] Metro, Metro Group Corporate Responsibility Report 2013/14 (<http://reports.metrogroup.de/2013-2014/corporate-responsibility-report/>) (accessed 11 November 2016), 2014.
- [20] Lowes, Lowe's Social Responsibility Report (<http://responsibility.lowes.com/2016/wp-content/uploads/2016/04/lowes-2015-social-responsibility.pdf>) (accessed 21 October 2016), 2015.
- [21] Auchan, Auchan Activity and Sustainable Development Report 2015 (<http://asp.zone-secure.net/v2/index.jsp?Id=198/2213/64199&Ing=en>) (accessed 11 November 2016), 2015.
- [22] Edeka, Edeka Progress Report (http://www.edeka-verbund.de/Unternehmen/media/edeka_gruppe/verantwortung/partnerschaft_wwf/partnerschaft_wwf_1/Fortschrittsbericht_2015_english.pdf) (accessed 21 October 2016), 2015.
- [23] Casino, Casino Annual and Corporate Social Responsibility Performance Report (https://www.groupe-casino.fr/en/wp-content/uploads/sites/2/2015/05/Annual-Report-Groupe-Casino-2014_EN.pdf) (accessed 11 November 2016), 2014.
- [24] Seven & i Holdings Co, Seven & i Holdings Co CSR (<https://www.7andi.com/en/csr/csrreport/2015.html>) (accessed 21 November 2016), 2015.
- [25] Wesfarmers, Wesfarmers Sustainability Report (<http://sustainability.wesfarmers.com.au/>) (accessed 21 November 2016), 2016.
- [26] Rewe, Rewe Sustainability Report (<http://www.rewe-group.com/en/nachhaltigkeit>) (accessed 21 November 2016), 2015.
- [27] A. Delhaize, Ahold Delhaize Sustainable retailing (<https://www.aholddelhaize.com/en/sustainable-retailing/>) (accessed 21 November 2016), 2016.
- [28] Woolworths, Woolworths Corporate Responsibility Report, (2015). (http://woolworthslimited2015.csr-report.com.au/files/Woolworths_CSR_2015.pdf) (accessed 21 October 2016).
- [29] US Department of Energy, Best Buy Better Buildings Initiative (<https://betterbuildingsolutioncenter.energy.gov/energy-data/BestBuy>) (accessed 30 January 2017), 2016.
- [30] Best Buy, Best Buy Corporate Responsibility and Sustainability (<https://corporate.bestbuy.com/sustainability/>) (accessed 21 November 2016), 2015.

- [31] IKEA, Sustainability Report FY16 (http://www.ikea.com/ms/en_US/img/ad_content/IKEA_Group_Sustainability_Report_FY16.pdf) (accessed 09 February 2017), 2016.
- [32] Intermarché, Intermarché - Rapport développement durable (http://presse.mousquetaires.com/wp-content/uploads/2015/06/rapportrse_2015_flipbook_complet.pdf) (accessed 02 November 2016), 2015.
- [33] A. Delhaize, Supplementary report on Sustainable Retailing performance (<https://www.aholddelhaize.com/media/3984/supplementary-report-on-sustainable-retailing-performance-2016.pdf>) (accessed 12 May 2017), 2016.
- [34] Sustainability, (<https://www.riteaid.com/corporate/sustainability>) (accessed 12 May 2017), 2017.
- [35] Sears Holding Corporation, Corporate Responsibility and Sustainability Report (<http://sustainability-reporting.searsholdings.com/>) (accessed 12 May 2017), 2015.
- [36] Migros, Sustainability Management (<https://report.migros.ch/2015/en/overview-of-migros/context-engagement/sustainability-management/>) (accessed 12 May 2017), 2015.
- [37] L. Shopping, Sustainability Report (http://www.lotteshoppingir.com/eng/company/company_03_3.jsp) (accessed 12 May 2017), 2015.
- [38] Coop Group, Sustainability Report (http://www.coop.ch/pb/site/common/get/documents/coop_main/elements/ueber/geschaeftsbericht/2016/_pdf/COOP_NHB_2015_e_low.pdf) (accessed 12 May 2017), 2015.
- [39] H&M, Conscious Actions Sustainability Report (http://sustainability.hm.com/content/dam/hm/about/documents/en/CSR/2015_Sustainability_report/HM_SustainabilityReport_2015_final_FullReport_en.pdf) (accessed 12 May 2017), 2015.
- [40] Kohl's Corporation, Corporate Social Responsibility Report (<http://www.kohlsgreen.com/media/pdfs/2015CSRReport-Kohls.pdf>) (accessed 23 February 2017), 2015.
- [41] Kingfisher, Sustainability Report (http://www.kingfisher.com/sustainability/files/reports/cr_report_2016/2016_Sustainability_Report.pdf#ref_sustainabilityreport) (accessed 12 May 2017), 2016.
- [42] ICA Gruppen, Annual Report (<http://www.icagruppen.se/en/rapportportal/annual-report-2015/>) (accessed 12 May 2017), 2015.
- [43] Staples Inc., Global Sustainability Policy (http://www.staples.com/sbd/cre/marketing/about_us/documents/staples-global-sustainability-policy-2015-09-30.pdf) (accessed 12 May 2017), 2015.
- [44] Decathlon, Sustainability Report (http://sustainability.decathlon.com/wp-content/uploads/2016/11/Decathlon-SD-report-2015_vEN.pdf) (accessed 12 May 2017), 2015.
- [45] Spar Group, Integrated Report file:///C:/Users/Mauro/Dropbox/Sustainable strategies in retail/Artigo_3_Frontrunner store models/Q1/spar group limited anual report 2015.pdf (accessed 23 February 2017), 2016.
- [46] Dia, Annual Report (<http://memoriaanual2015.diacorporate.com/?Culture=en-GB>) (accessed 12 May 2017), 2015.
- [47] Norgesgruppen, Annual Review (http://www.norgesgruppen.no/globalassets/finansuell-informasjon/rapportering/ng_eng_summary_annual_review_2015.pdf) (accessed 12 May 2017), 2015.
- [48] Shoprite Holdings, Sustainability Report (https://www.shopriteholdings.co.za/content/dam/MediaPortal/documents/shoprite-holdings/Sustainability-Report/Shoprite_Sustainability_2016.pdf) (accessed 12 May 2017), 2016.
- [49] Dansk Supermarked, CSR Report (<https://dscomprodstorage.blob.core.windows.net/media/29976/csr-report-2016.pdf>) (accessed 12 May 2017), 2016.
- [50] Lojas Americanas, Annual and Sustainability Report (<http://hotsites.lasa.com.br/relatorioanual2015/english-version/annual-and-sustainability-report-2015.pdf>) (accessed 12 May 2017), 2015.
- [51] Fnac Darty, Rapport RSE (<http://www.fnacdarty.com/publication/rapport-rse-2015/>) (accessed 12 May 2017), 2015.