

Store of The Future?

An opinion piece
based on available
technology





Introduction

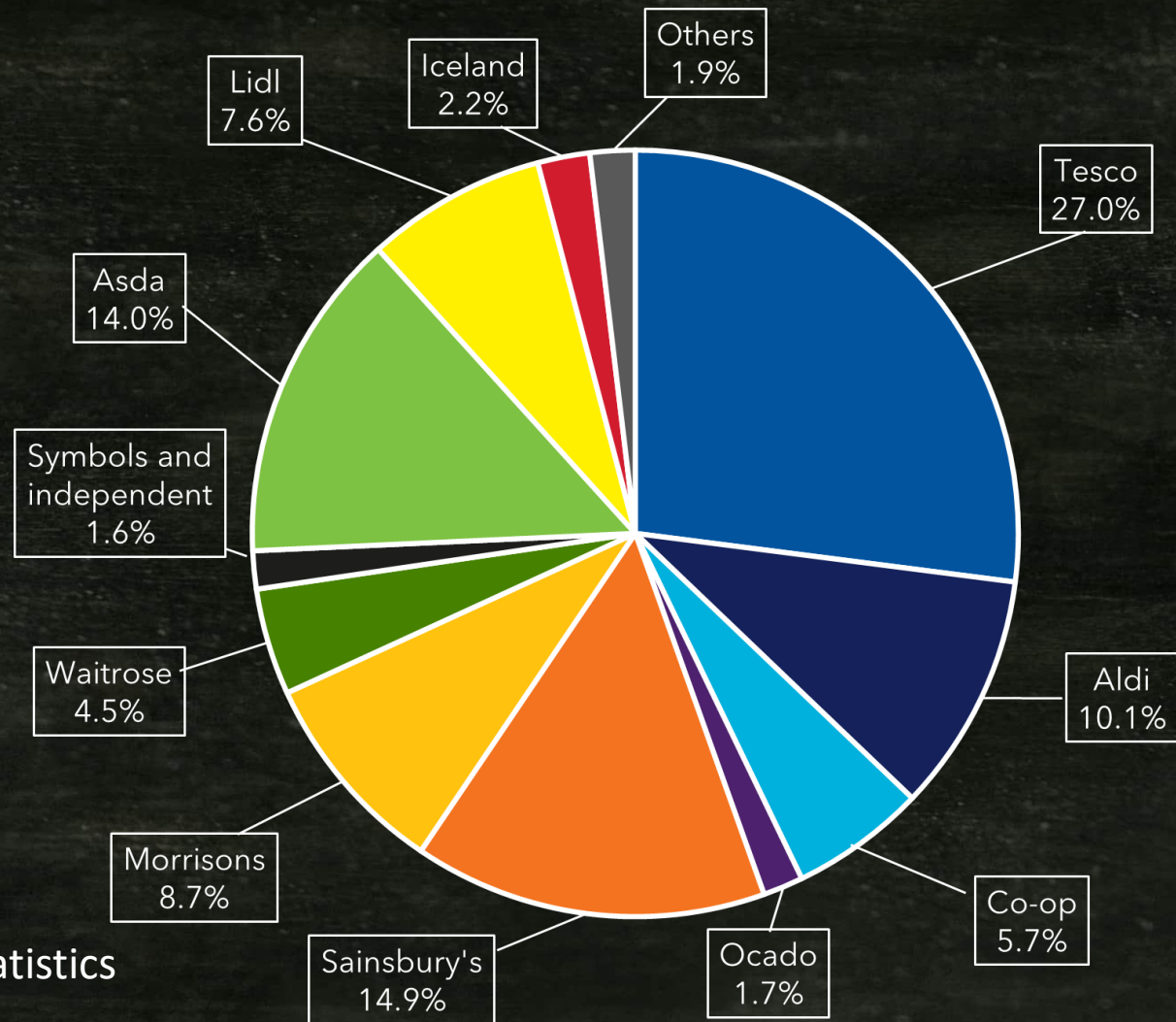
Aim: Illustrate a vision for future retail stores based on our understanding of current technology.

Content

- Evolutionary Challenges Faced by Retailers
- National Challenges Shaping The Playing Field
- Stakeholder Needs
- The Store
- Conclusion

Setting The Scene

UK Grocery Retailers Market Share



Source: Office of National Statistics

Evolving Challenges

Status: This is the original version (as it was originally made). This item of legislation is currently only available in its original format.

STATUTORY INSTRUMENTS

2019 No. 1056

CLIMATE CHANGE

The Climate Change Act 2008 (2050
Target Amendment) Order 2019

Made - - - -
Coming into force in accordance with a

No. 26369

MULTILATERAL

Montreal Protocol on Substances that Deplete the Ozone Layer (with annex). Concluded at Montreal on 16 September 1987

*Authentic texts: Arabic, Chinese, English, French, Russian and Spanish.
Registered ex officio on 1 January 1989.*

MULTILATÉRAL

Protocole de Montréal relatif à des substances qui appauvrissent la couche d'ozone (avec annexe). Conclu à Montréal le 16 septembre 1987

*Textes authentiques : arabe, chinois, anglais, français, russe et espagnol.
Enregistré d'office le 1^{er} janvier 1989.*

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UNITED NATIONS  NATIONS UNIES

POSTAL ADDRESS—ADRESSE POSTALE UNITED NATIONS, N. Y. 10017
CABLE ADDRESS—ADRESSE TELEGRAPHIQUE UNITED NATIONS NEW YORK

Reference: C.N.872.2016.TREATIES-XXVII.2.f (Depositary Notification)

MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER, MONTREAL, 16 SEPTEMBER 1987

AMENDMENT TO THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER
KIGALI, 15 OCTOBER 2016

ADOPTION OF AMENDMENT

The Secretary-General of the United Nations, acting in his capacity as depositary, communicates the following:

At the Twenty-Eighth Meeting of the Parties to the above Protocol, held in Kigali from 10 to 15 October 2016, the Parties adopted, in accordance with the procedure laid down in paragraph 4 of article 9 of the 1985 Vienna Convention for the Protection of the Ozone Layer, a further amendment to the Montreal Protocol as set out in Annex I to the report of the Twenty-Eighth Meeting of the Parties (Decision XXVIII/1).

The text of the above Amendment, in the six authentic languages, is attached as an Annex to this notification.

In accordance with its article IV, paragraph 1, the Amendment shall enter into force on 1 January 2019, provided that at least twenty instruments of ratification, acceptance or approval of the Amendment have been deposited by States or regional economic integration organizations that are Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer. In the event that this condition has not been fulfilled by that date, the Amendment shall enter into force on the ninetieth day following the date on which it has been fulfilled.

After its entry into force, the Amendment, in accordance with its article IV, paragraph 4, shall enter into force for any other Party to the Protocol on the ninetieth day following the date of deposit of its instrument of ratification, acceptance or approval.

23 November 2016



Attention: Treaty Services of Ministries of Foreign Affairs and of international organizations concerned. Depositary notifications are issued in electronic format only. Depositary notifications are made available to the Permanent Missions to the United Nations in the United Nations Treaty Collection at <https://treaties.un.org>, under "Depositary Notifications (CNs)". In addition, the Permanent Missions, as well as other interested individuals, can subscribe to receive depositary notifications by e-mail through the Treaty Section's "Automated Subscription Services", which is also available at <https://treaties.un.org/Pages/Login.aspx?lang=en>.

National Challenges

- Ambitious emission targets
- Removal of Direct Emission Natural Gas
- National Grid Infrastructure
- Energy Security
- Renewable technology direction

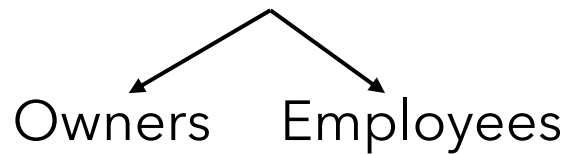


Stakeholders

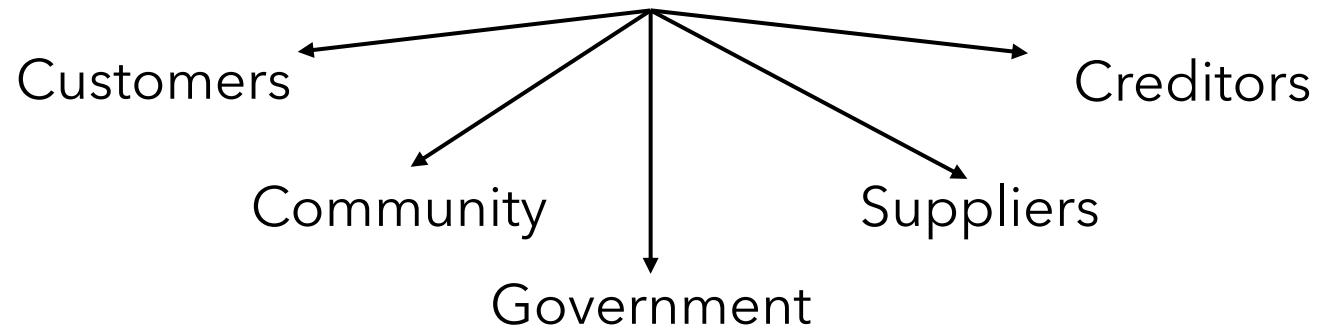
Stakeholder, a person, group or organization with a vested interest, or stake, in the decision-making and activities of a business, organization or project.



Internal

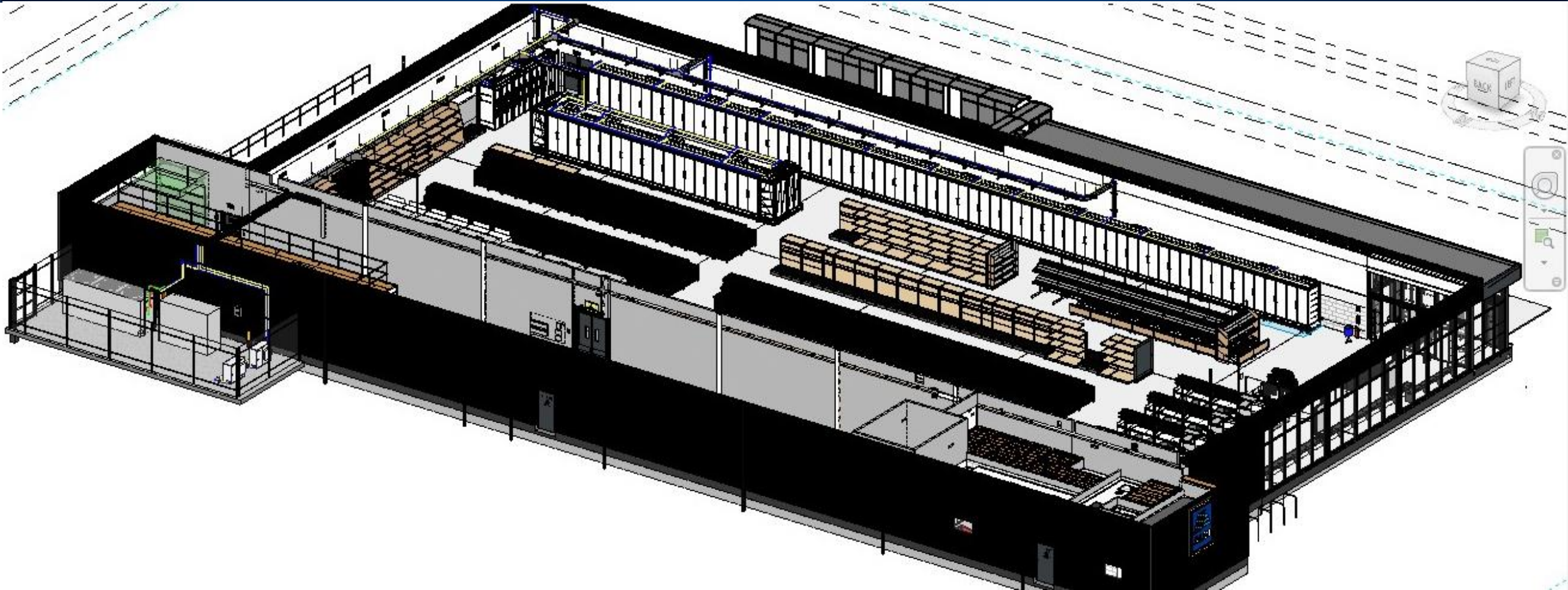


External



A Store

- Chilled cabinets with doors
- Frozen Food Integral cabinets
- Chilled Cold room
- Frozen Food Cold Room
- 1 x Chill temperature only CO₂ pack
- 1 x Low temperature condensing unit
- 1 x Chill temperature condensing unit
- Under floor heating
- 2 x Natural refrigerant air to water heat pumps



Minimise Energy Requirement/Use

- Efficient cabinets designed to have doors
- Linked cold rooms
- Cold room curtains
- Air curtains on store entrances
- EC fans
- LED auto dimming and PIR lights
- Maintenance

Solar Power

Assumptions

- Install cost: £350/m²
- Purchase value of electricity: 37 p/kWh
- Solar panel efficiency: 20%

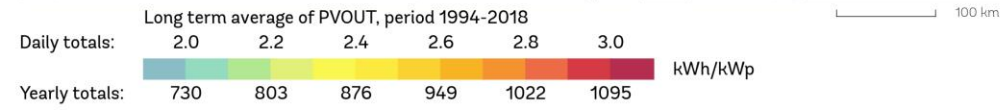
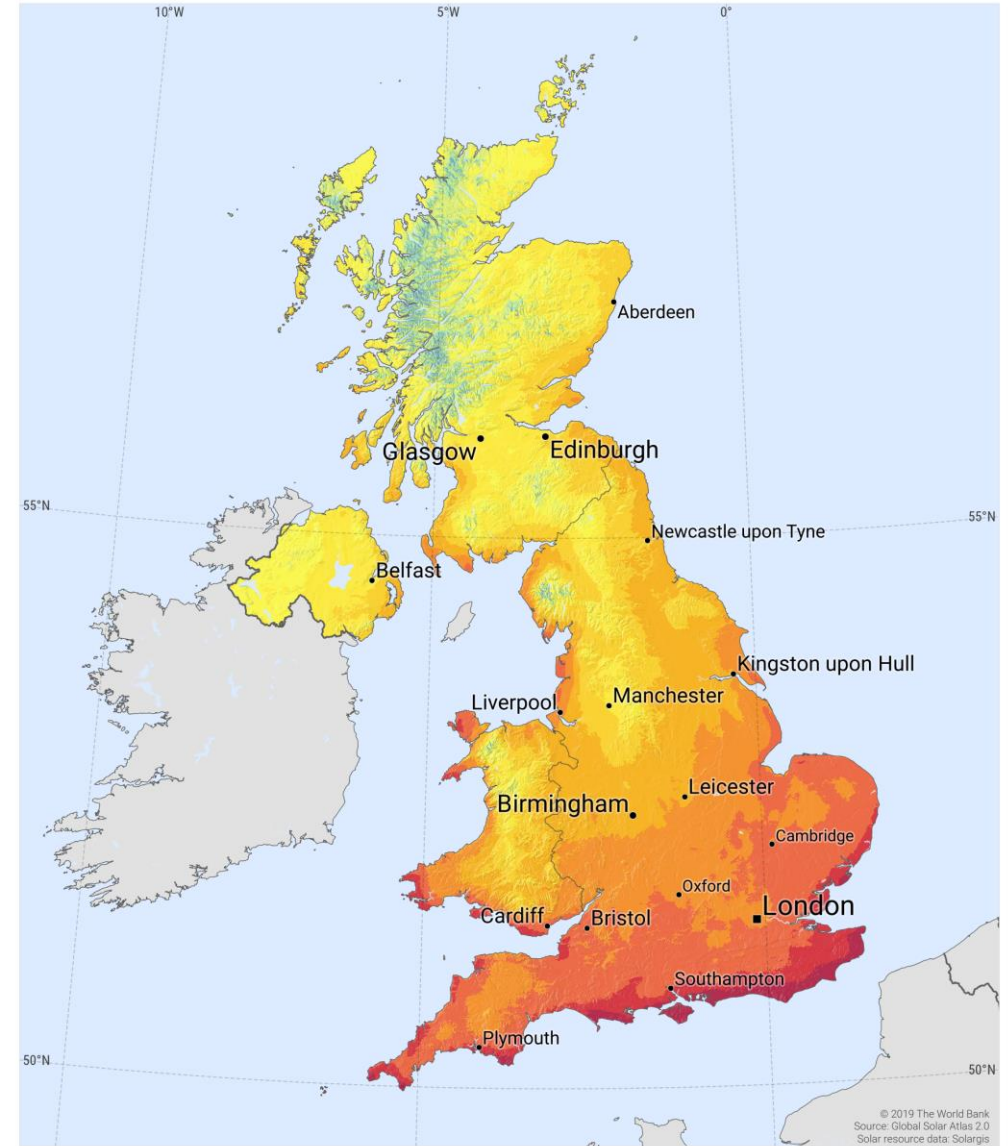
Example figures for a 40 m² solar array installation

Location	Annual Solar Irradiation [kWh/m ²]	Annual Energy Production [kWh/m ²]	Basic Payback [Years]
North Scotland	800	160	5.9
South Coast	1100	220	4.3

SOLAR RESOURCE MAP

PHOTOVOLTAIC POWER POTENTIAL

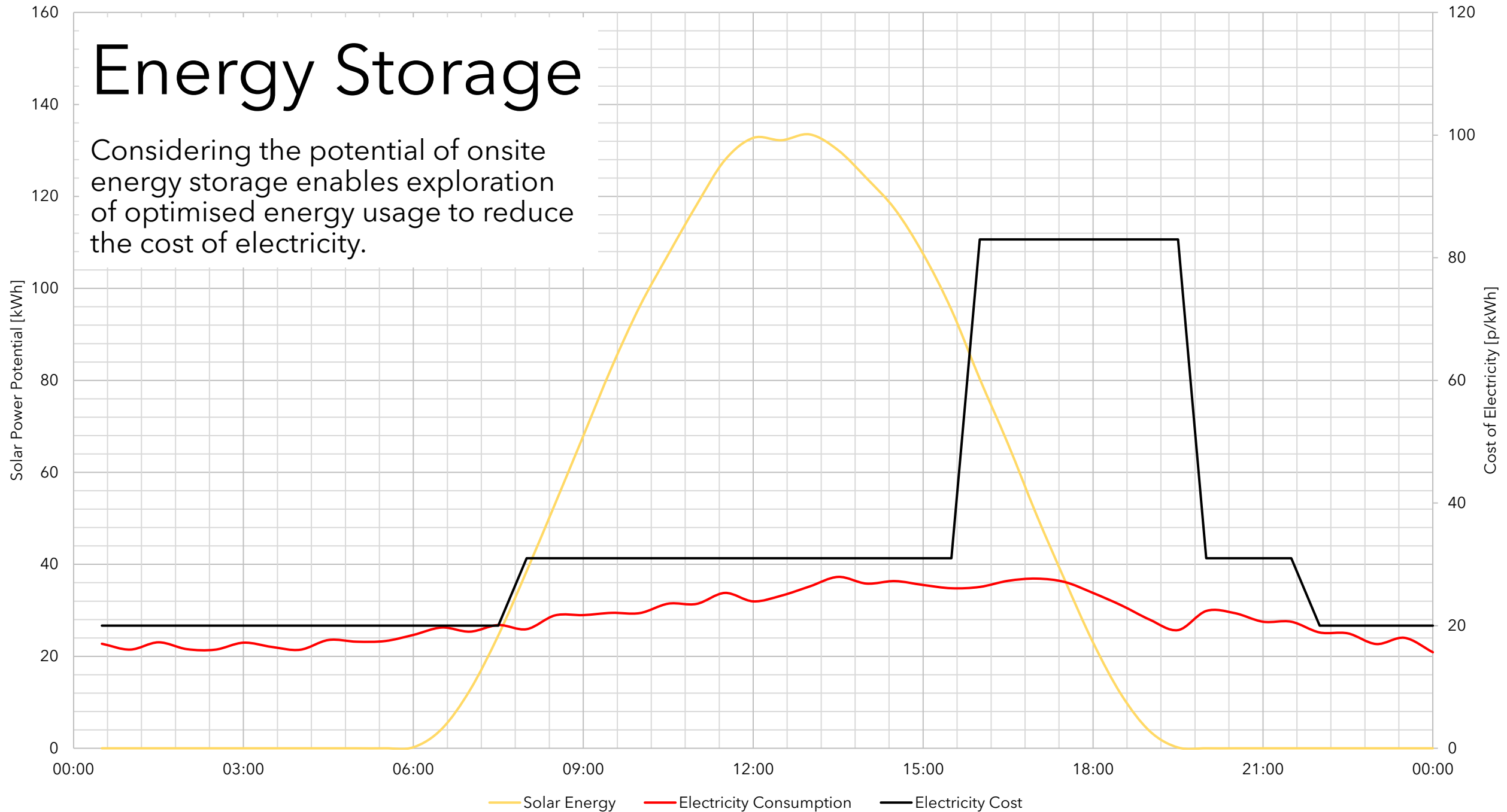
UNITED KINGDOM



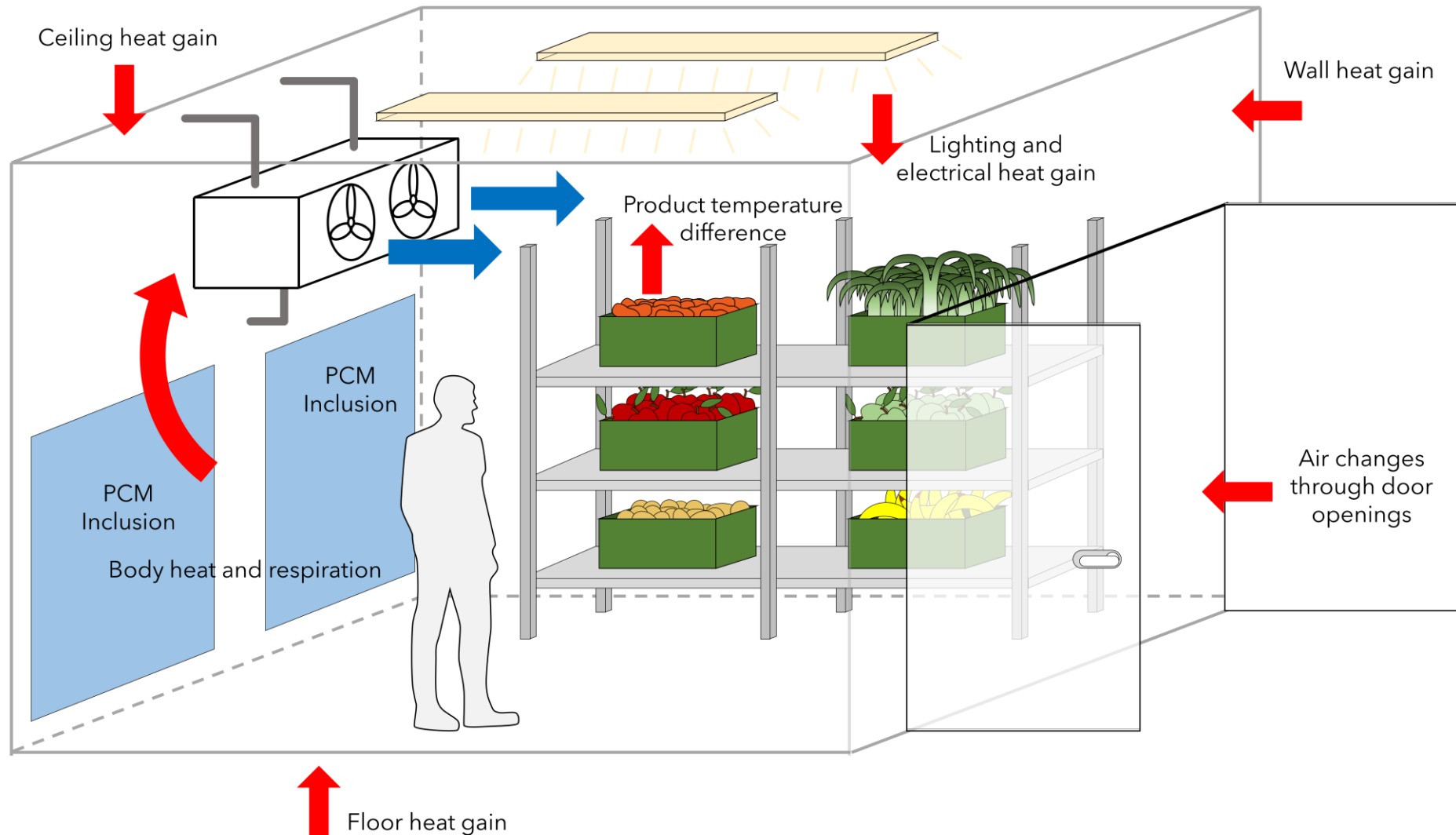
This map is published by the World Bank Group, funded by ESMAP, and prepared by Solargis. For more information and terms of use, please visit <http://globalsolaratlas.info>.

Energy Storage

Considering the potential of onsite energy storage enables exploration of optimised energy usage to reduce the cost of electricity.



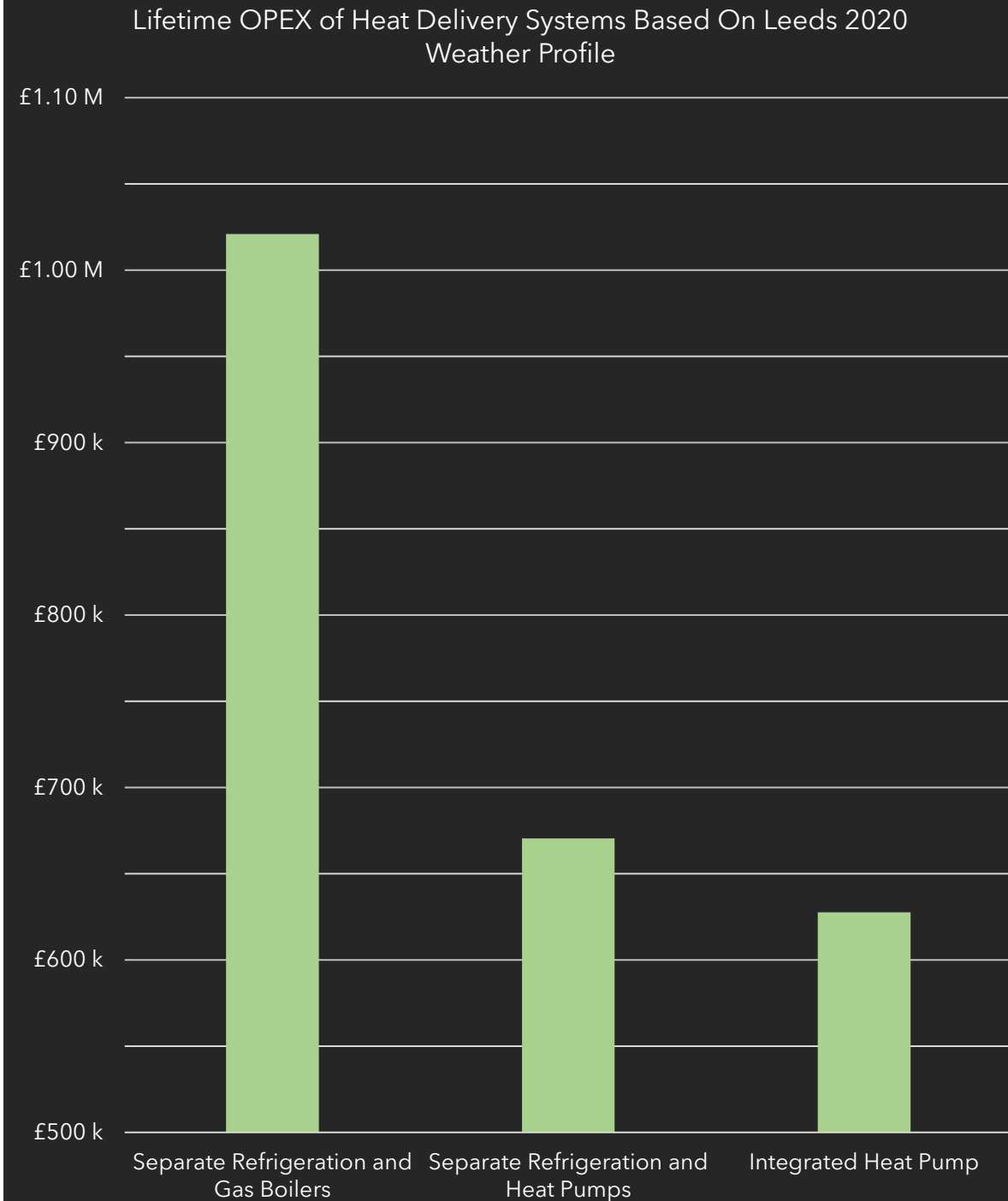
PCMs Thermal Storage



Integrated Thermal Systems

Capture and use otherwise wasted thermal energy for heating and hot water.

Example chart:
IT Duty 120 kW
LT Duty 24 kW
Thermal Duty 250 kW



Conclusion - Technology advancement will continue

- Stakeholders
- Reducing Energy Consumption
- Integration
- Energy Efficiency
- Built to be integrated
- Necessary Complexity
- Engineer training – design
- Engineer training – installation & maintenance

THIRD WAVE
Henry Ford's Model T introduced the assembly line, revolutionizing the automotive industry.



FOURTH WAVE

Aviation gains mass adoption on a global scale, providing a lever to economic integration.

Source: OECD

FIFTH WAVE

In 1990, 2.3M used the internet—by 2016 this reached 3.4B.

Source: World Bank



SIXTH WAVE

As climate challenges intensify, clean tech may reshape business models and consumption patterns.

Contact



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wave

an employee owned company