DIAGEO

Spirit of Progress 2030 Hackathon

Competitor Deck

HERIOT WATT UNIVERSITY

8th February 2025

THE CHALLENGE

Diageo is on a mission to power its global operations with **100% renewable energy** by 2030 — an ambitious goal that spans our distilleries, brewing facilities, and offices worldwide. To drive this transformation, we're challenging you to **innovate, ideate, and prototype** solutions that can fast-track our journey to net-zero carbon emissions for Scope 1 and 2.

Throughout this hackathon, you'll work with a curated synthetic dataset inspired by real Diageo production and environmental metrics. By exploring how we currently source and consume energy, you'll identify creative ways to optimise usage, integrate renewables, and reduce our reliance on fossil fuels. This is your chance to help shape **the future of sustainable spirits**, harnessing data-driven insights to make a genuine impact on Diageo's global footprint.

So, let's look at the question.

THE QUESTION

How might Diageo develop innovative solutions that enable us to rapidly transition to 100% renewable energy for our Scope 1 and 2 operations, optimising energy sourcing, usage, and monitoring in a cost-effective, reliable, and scalable way?"

THE DATA

Data Description

Column Name	Data Type	Description
Timestamp	*datetime*	The date for each recorded observation (daily frequency).
Site	*string*	The name of the distillery (Cameronbridge, Blackgrange, Glenkinchie)
Total_Energy_Consumption_MWh	*float*	Total energy consumed by the distillery in megawatt-hours (MWh).
Energy_Intensity_kWh_per_liter	*float*	Energy usage per liter of alcohol produced, measured in kilowatt-hours per liter.
Scope_1_Emissions_tonnes_CO2e	*float*	Direct greenhouse gas (GHG) emissions from on-site fuel combustion, measured in tonnes of CO_2 equivalent (CO_2e).
Scope_2_Emissions_tonnes_CO2e	*float*	Indirect GHG emissions from purchased electricity, measured in tonnes of CO_2e.
Carbon_Intensity_kgCO2e_per_liter	*float*	Carbon footprint per unit of alcohol produced, measured in kilograms of CO_2 equivalent per liter.
On_Site_Renewable_Energy_Percentage	*float*	Percentage of total energy consumption that comes from on-site renewable sources (e.g., wind, solar, biogas).
Boiler_Efficiency_Percentage	*float*	The efficiency of the distillery's boiler systems in percentage terms (higher efficiency reduces fuel wastage).
Water_Consumption_liters_per_liter	*float*	Water usage per liter of alcohol produced, measured in liters per liter.
Waste_Heat_Recovery_Efficiency_Percentage	*float*	Percentage of waste heat recovered and reused in production processes.
Fuel_Type_Gas_Usage_GJ	*float*	Total fuel consumption from gas sources, measured in gigajoules (GJ).
Logistics_Carbon_Footprint_kgCO2e_per_km	*float*	Carbon emissions from transportation and logistics, measured in kilograms of CO_2 equivalent per kilometer traveled.

The dataset contains 1 year of data from 3 of our sites across Scotland, measuring 10 environmental metrics.

Data Example

Timestamp	Site	Total_Ene	Energy_In	Scope_1_I	Scope_2_I	Carbon_Ir	
01/01/2024	Cameronbridge	1200	50.55155	620	744	24.13507	…
02/01/2024	Cameronbridge	1220.337	52.79598	630.1684	754.1684	24.73704	…
03/01/2024	Cameronbridge	1237.157	53.82744	638.5786	762.5786	22.84958	
01/01/2024	Blackgrange	850	51.95208	400	480	22.51507	
02/01/2024	Blackgrange	870.3368	54.90469	410.1684	490.1684	22.2679	
03/01/2024	Blackgrange	887.1572	53.15296	418.5786	498.5786	23.8214	
01/01/2024	Glenkinchie	750	54.88111	360	432	23.70165	
02/01/2024	Glenkinchie	770.3368	54.91157	370.1684	442.1684	23.69041	
03/01/2024	Glenkinchie	787.1572	53.17026	378.5786	450.5786	23.94829	

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THE PROCESS

Teams are recommended to focus on 3 high-level objectives...

1. Identify Key Opportunities for Renewable Integration: Use the provided data and insights to pinpoint areas in Diageo's operations where renewable energy adoption or load optimisation can make the biggest impact on reducing Scope 1 & 2 emissions.

2. Demonstrate Feasibility and Impact: Build a solution or proof-of-concept that showcases **both** technical viability and measurable benefits – whether in terms of carbon reduction, energy cost savings, or improved operational efficiency.

3. Outline a Scalable Implementation Roadmap: Propose a clear strategy for rolling out your idea across Diageo's global facilities. Consider the steps required (e.g., infrastructure, partnerships, policy alignment) to transition from a multi-site pilot to a company-wide initiative.

POTENTIAL IDEAS:

1. Energy Source Identification & Integration:

I. **Local Renewables:** How can Diageo sites adopt on-site or nearby wind, solar, or other clean energy sources (e.g., biomethane from waste)?
II. **Virtual Power Purchase Agreements (PPAs):** Tools or strategies that optimise PPAs, ensuring cost efficiency and consistent supply.
III. **Grid Transformation:** Solutions to handle intermittent renewable energy (e.g, battery storage, demand-side management).

2. Data-Driven Monitoring & Optimisation:

I. **Real-Time Tracking:** Platforms or dashboards that monitor energy use and emissions at each site, identifying inefficiencies.
II. **AI & Predictive Analytics:** Forecasting energy demand and supply fluctuations, optimising production schedules to reduce peak loads.
III. **Reporting & Verification:** Automated systems for accurate Scope 1 & 2 reporting, ensuring transparency and compliance with ESG standards.

3. Scalability & Collaboration:

I. **Partnership Models:** Exploring collaboration with local communities, utilities, or technology providers to invest in shared renewable infrastructure.
II. **Implementation Roadmap:** Toolkits for site managers to plan, execute, and scale renewable projects – accounting for different regional policies, climates and grid constraints.
III. **Behavioural & Cultural Change:** Internal engagement strategies (gamification, training, recognition) to encourage employees to adopt energy-efficient habits.

OTHER POTENTIAL DATA SOURCES:

1. National Grid & Renewable Mix Data (UK):

I. **Source:** Elexon, National Grid ESO, or Carbon Intensity API (UK)
II. **What's in it:** Hourly or half-hourly snapshots of electricity supply, breaking down the grid mix (wind, solar, nuclear, gas, etc) and carbon intensity across Scotland or the UK.
III. **Relevance:** You can see how often renewables are available or how "clean" the grid is at certain times of the day or year, which is crucial for deciding when to run certain energy-intensive processes.

2. Weather and Renewables Potential:

I. **Source:** Met Office (UK), NASA POWER, or other open weather APIs.
II. **What's in it:** Hourly wind speeds, solar irradiance, temperature data for a specific Scottish region (or multiple regions).
III. **Relevance:** Can help teams estimate on-site renewable energy generation potential (like how much power a wind turbine or solar array might produce) and incorporate weather-related insights into scheduling or forecasting).

3. Cost & Emissions Factors:

I. **Source:** Publicly available average costs of different energy sources (grid electricity vs. local renewables) and standard greenhouse gas emission factors (e.g., UK Gov GHG Conversion Factors).
II. **What's in it:**
    I. **Cost per kWh** from the grid vs. wind/solar/biomass
    II. **Emissions (CO2e) per kWh** for grid electricity vs. renewables
III. **Relevance:** Can be used to do quick ROI or payback calculations, and can see the economic and environmental trade-offs between different energy sources and usage patterns.

Alignment with 2030 Goals

How effectively does the solution support Diageo's objective of 100% renewable Scope 1 and 2 emissions?

Innovation

Is the approach genuinely novel while being realistic enough for near-future trials?

Scalability & Global Applicability

Can it be applied or adapted across different sites, regions or production lines?

Technical Execution & Feasibility

Does the prototype or model effectively demonstrate core functionality or proof of concept?

Business & Environmental Value

Do potential cost savings, carbon reductions, and operational benefits outweigh the implementation hurdles?