Awesome challenge. Here’s a clear, step-by-step plan you can execute to produce a credible, data-driven entry—complete with methods, algorithms, datasets, ethics, and an example deliverable you can demo.

**1) Outcome you’ll deliver**

**A decision toolkit** that helps governments and investors:

1. **Pick sites** for new data centres (DCs) using a transparent, multi-criteria location score.
2. **Run them efficiently** with an ops optimiser that shifts compute to cheaper/greener hours and plans connectivity diversity.

It includes:

* A **geospatial scoring app** (web map) that stacks government datasets and ranks 1-km grid cells.
* An **ops dashboard** (price & emissions-aware scheduling and grid-friendly strategies).
* A short **presentation** explaining the method, results, and how to scale nationally.

**2) Data you’ll use (all Australian government or public authorities)**

* **Power & grid:** AEMO NEM data (prices, demand, MLFs, constraints) and 2024 ISP/REZ layers for future-proofing. ([aemo.com.au](https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/market-data-nemweb?utm_source=chatgpt.com), [visualisations.aemo.com.au](https://visualisations.aemo.com.au/aemo/nemweb/index.html?utm_source=chatgpt.com))
* **Electricity network topology:** National transmission lines & substations (Digital Atlas / GA + data.gov.au MapServer). ([Digital Atlas of Australia](https://digital.atlas.gov.au/datasets/electricity-transmission-lines-1/about?utm_source=chatgpt.com), [data.gov.au](https://data.gov.au/dataset/ds-ga-ea0d6225-312b-4ad2-a01c-72b8494f7029?utm_source=chatgpt.com))
* **Telecoms & international reach:** ACMA submarine cables & protection zones; national NBN coverage/POI context. ([ACMA](https://www.acma.gov.au/international-submarine-cables-landing-australia?utm_source=chatgpt.com), [data.gov.au](https://data.gov.au/data/dataset/maritime-cables?utm_source=chatgpt.com))
* **Hazards & climate (cooling/water risk):** GA flood/bushfire/earthquake resources; BoM AGCD & Climate Data Online; CSIRO AWAP for hydro-climate context. ([Geoscience Australia](https://www.ga.gov.au/scientific-topics/community-safety/data-and-products/afrip?utm_source=chatgpt.com), [Digital Atlas of Australia](https://digital.atlas.gov.au/maps/8b28109ce26b43b8968a3c9baa608f43/about?utm_source=chatgpt.com), [Bureau of Meteorology](https://www.bom.gov.au/climate/data/?utm_source=chatgpt.com), [eo-data.csiro.au](https://eo-data.csiro.au/projects/awap/?utm_source=chatgpt.com))
* **Population, logistics & land-use context:** Digital Atlas (ABS layers), Infrastructure Dept. Regional Data Hub & Freight datasets (ports/airports/road/rail). ([maps.abs.gov.au](https://maps.abs.gov.au/?utm_source=chatgpt.com), [Regional Data Hub](https://www.regionaldatahub.gov.au/home?utm_source=chatgpt.com), [catalogue.data.infrastructure.gov.au](https://catalogue.data.infrastructure.gov.au/dataset/?res_format=GeoJSON&utm_source=chatgpt.com))
* **Policy & standards (for constraints/eligibility):** Net Zero in Government Operations (NABERS **5-Star or PUE≤1.4** requirement from 1 Jul 2025 for federal workloads). ([Department of Finance](https://www.finance.gov.au/sites/default/files/2023-11/APS_Net_Zero_Roadmap.pdf?utm_source=chatgpt.com))  
  *(Context signals to mention in your slides: Scott Farquhar’s “digital embassies” pitch; AWS AU$20B 2025-29 investment momentum; CBA–OpenAI partnership.)* ([InnovationAus.com](https://www.innovationaus.com/digital-embassies-farquhars-radical-pitch-for-a-data-centre-boom/?utm_source=chatgpt.com), [Prime Minister of Australia](https://www.pm.gov.au/media/amazon-data-centre-investment-australia?utm_source=chatgpt.com), [About Amazon](https://www.aboutamazon.com/news/aws/amazon-data-center-investment-in-australia?utm_source=chatgpt.com), [CommBank](https://www.commbank.com.au/articles/newsroom/2025/08/tech-ai-partnership.html?utm_source=chatgpt.com))

**3) Location scoring model (transparent & tunable)**

**3.1 Create a national 1-km grid and compute a score per cell**

**Score =** weighted sum of normalised factors (all 0–1, where 1 is “best”):

**Power & efficiency (45%)**

* **Proximity to HV substation/line** (≤10 km best), **available capacity proxy** (substation class), **marginal loss factor** (prefer ≥1.0), **ISP ‘Optimal Development Path’ proximity** (future-proof). ([Product Catalogue](https://ecat.ga.gov.au/geonetwork/srv/api/records/3844c10c-ecfd-44a9-94f5-29222bb6d36d?utm_source=chatgpt.com), [aemo.com.au](https://aemo.com.au/-/media/files/electricity/nem/security_and_reliability/loss_factors_and_regional_boundaries/2024-25-financial-year/mlfs-for-the-2024-25-financial-year.pdf?utm_source=chatgpt.com))
* **Cooling advantage** (lower 95th-percentile dry-bulb/wet-bulb) from BoM AGCD; penalise extreme heat/humidity projections to 2040–2060. ([Bureau of Meteorology](https://www.bom.gov.au/research/publications/researchreports/BRR-101.pdf?utm_source=chatgpt.com))

**Connectivity (25%)**

* **Distance to two independent fibre routes** and **to an international cable landing** (tiered: <20 km, 20–50 km, >50 km).
* Diversity bonus if **two landing stations** are reachable within 200 km (e.g., Perth + Sydney routes). ([ACMA](https://www.acma.gov.au/international-submarine-cables-landing-australia?utm_source=chatgpt.com), [data.gov.au](https://data.gov.au/data/dataset/maritime-cables?utm_source=chatgpt.com))

**Risk & permitting (20%)**

* Multi-hazard penalty: flood-study footprints, bushfire boundaries (historic & near-real-time), seismic hazard (NSHA). Prefer industrial zones near logistics hubs. ([Geoscience Australia](https://www.ga.gov.au/scientific-topics/community-safety/data-and-products/afrip?utm_source=chatgpt.com), [Digital Atlas of Australia](https://digital.atlas.gov.au/maps/8b28109ce26b43b8968a3c9baa608f43/about?utm_source=chatgpt.com), [Geoscience Australia](https://services.ga.gov.au/gis/rest/services/National_Seismic_Hazard_Assessment_2018/MapServer?utm_source=chatgpt.com))

**Market access & workforce (10%)**

* Distance to major metros/airports/ports + labour catchments (ABS/Infrastructure datasets). ([catalogue.data.infrastructure.gov.au](https://catalogue.data.infrastructure.gov.au/dataset/?res_format=GeoJSON&utm_source=chatgpt.com))

Implementation tip (PostGIS/GeoPandas): buffer vector layers, compute distances & intersects; z-score or min-max normalise each factor; expose **weights** as sliders in the app.

**3.2 Shortlist & due-diligence checks**

For the top 50 cells, auto-generate a **factsheet**: nearest substations/lines, cable landings, ISP projects, hazards, NABERS pathway, planning overlays, and indicative renewable PPAs in region.

**4) Operational strategy optimiser (for the shortlisted sites)**

**Goal:** lower cost & emissions while meeting SLAs for AI/cloud workloads.

**Inputs:** 5-min/30-min **spot price**, renewable share proxies, curtailment/congestion signals, WDR opportunities; on-site battery/thermal storage constraints; workload classes (shiftable training vs latency-sensitive inference). ([visualisations.aemo.com.au](https://visualisations.aemo.com.au/aemo/nemweb/index.html?utm_source=chatgpt.com), [aemo.com.au](https://aemo.com.au/-/media/files/initiatives/wdr/2025-wdr-annual-report.pdf?utm_source=chatgpt.com))

**Decisions:**

* **When to run AI training** (batch) vs inference (real-time).
* **Charge/discharge BESS** to arbitrage price & provide FCAS (if applicable).
* **Cooling mode switching** (free-air vs mechanical vs liquid) based on forecast wet-bulb.
* **Demand response bids** (WDR) during peak or constraint periods. ([aemo.com.au](https://aemo.com.au/initiatives/trials-and-initiatives/past-trials-and-initiatives/wholesale-demand-response-mechanism?utm_source=chatgpt.com))

**Outputs:** daily schedule (MW, MWh, MVAR), **expected PUE trajectory**, cost and tCO₂e, grid-friendliness metrics (ramp rates, coincidence with peaks).

**5) Build it (2–3 sprints)**

**Sprint A — Data plumbing**

* Stand up a **PostGIS** DB; ingest GA/Digital Atlas & data.gov.au feature services (transmission, substations, hazards); BoM AGCD grids; ACMA cable layers; ABS regions. ([data.gov.au](https://data.gov.au/dataset/ds-ga-ea0d6225-312b-4ad2-a01c-72b8494f7029?utm_source=chatgpt.com), [Digital Atlas of Australia](https://digital.atlas.gov.au/datasets/electricity-transmission-lines-1/about?utm_source=chatgpt.com))
* Automate **AEMO NEMWeb** downloads (prices, MLFs, constraints). ([aemo.com.au](https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/market-data-nemweb?utm_source=chatgpt.com))

**Sprint B — Scoring app (web)**

* deck.gl/kepler.gl or MapLibre + FastAPI.
* UI: weight sliders, constraint toggles (e.g., “exclude flood 1% AEP”), export **Top-N sites** CSV + factsheets.

**Sprint C — Ops optimiser**

* Linear/MILP model (Pyomo/OR-Tools): objective = minimise **(energy\_cost − DR\_revenue) + emissions\_cost + SLA\_penalty**.
* Include **NABERS 5-Star/PUE≤1.4** compliance guardrails and show how scheduling improves PUE. ([Department of Finance](https://www.finance.gov.au/sites/default/files/2023-11/APS_Net_Zero_Roadmap.pdf?utm_source=chatgpt.com))

**6) Example: what you’ll be able to show in the demo**

* **Scenario 1 (AI campus)**: weights favour cool climate + HV proximity + dual cable diversity → shortlist cells around **Greater Geelong / Western Melbourne fringes** and **North of Perth** (near cable landings), with hazard filters removing floodplains/bushfire corridors. (Method grounded in network & cable datasets; exact outputs depend on your chosen weights.) ([Digital Atlas of Australia](https://digital.atlas.gov.au/datasets/electricity-transmission-lines-1/about?utm_source=chatgpt.com), [ACMA](https://www.acma.gov.au/international-submarine-cables-landing-australia?utm_source=chatgpt.com))
* **Scenario 2 (edge DC)**: weights favour metro proximity/low latency and existing substations; the ops tool shows **20–35% time-shifting of AI training** to negative/low-price intervals using AEMO data, cutting cost and emissions. ([visualisations.aemo.com.au](https://visualisations.aemo.com.au/aemo/nemweb/index.html?utm_source=chatgpt.com))

**7) Ethics, trust & regulation (baked-in)**

* **NABERS & Net Zero in Government Operations**: design to meet **5-Star** from day one; show pathway to 6-Star via liquid cooling & heat reuse. ([Department of Finance](https://www.finance.gov.au/sites/default/files/2023-11/APS_Net_Zero_Roadmap.pdf?utm_source=chatgpt.com))
* **Community & environment:** exclude critical habitats; water-use guardrails (prefer air/adiabatic or seawater with discharge controls).
* **Resilience:** require **two diverse fibre paths** + two HV feeders; avoid single-point hazards; consider ISP-flagged future lines. ([aemo.com.au](https://aemo.com.au/energy-systems/major-publications/integrated-system-plan-isp/2024-integrated-system-plan-isp?utm_source=chatgpt.com))
* **Transparency:** publish factor weights & site factsheets so decisions are explainable to councils and communities.

**8) Scaling to every state/territory**

Your data stack is **national** (AEMO/GA/ACMA/ABS). As states release more planning layers (e.g., renewable zones, corridor easements), just add them as new factors. The model generalises to Darwin, Perth, Adelaide, Hobart, Brisbane, Sydney & regional hubs.

**9) What to put in your slide deck (10–12 slides)**

1. Vision & context (Farquhar’s “data centre capital”; AWS AU$20B). ([InnovationAus.com](https://www.innovationaus.com/digital-embassies-farquhars-radical-pitch-for-a-data-centre-boom/?utm_source=chatgpt.com), [Prime Minister of Australia](https://www.pm.gov.au/media/amazon-data-centre-investment-australia?utm_source=chatgpt.com))
2. Problem: fragmented data → sub-optimal siting & ops.
3. Our tool: **Location Scorer + Ops Optimiser**.
4. Datasets used (logos): AEMO, GA/Digital Atlas, ACMA, BoM, ABS, Infrastructure Dept. ([aemo.com.au](https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/market-data-nemweb?utm_source=chatgpt.com), [Digital Atlas of Australia](https://digital.atlas.gov.au/datasets/electricity-transmission-lines-1/about?utm_source=chatgpt.com), [ACMA](https://www.acma.gov.au/international-submarine-cables-landing-australia?utm_source=chatgpt.com), [Bureau of Meteorology](https://www.bom.gov.au/climate/data/?utm_source=chatgpt.com), [maps.abs.gov.au](https://maps.abs.gov.au/?utm_source=chatgpt.com), [catalogue.data.infrastructure.gov.au](https://catalogue.data.infrastructure.gov.au/dataset/?res_format=GeoJSON&utm_source=chatgpt.com))
5. Method: factors, weights, formula.
6. Map screenshots: top-rank cells under two scenarios.
7. Ops optimiser: sample day schedule vs price/renewables (AEMO). ([visualisations.aemo.com.au](https://visualisations.aemo.com.au/aemo/nemweb/index.html?utm_source=chatgpt.com))
8. Compliance: NABERS 5-Star/PUE≤1.4 pathway. ([Department of Finance](https://www.finance.gov.au/sites/default/files/2023-11/APS_Net_Zero_Roadmap.pdf?utm_source=chatgpt.com))
9. Risks & mitigations: hazards, grid, telecom diversity.
10. Implementation plan & benefits (jobs, resilience, emissions).

**Notes you can reuse verbatim in your submission**

* *Government dataset requirement:* Your tool directly uses **AEMO grid data**, **GA/Digital Atlas electricity & hazard layers**, **ACMA submarine cable maps**, **BoM climate grids**, and **ABS/Infrastructure spatial layers** to inform siting & operations. ([aemo.com.au](https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/data-nem/market-data-nemweb?utm_source=chatgpt.com), [data.gov.au](https://data.gov.au/dataset/ds-ga-ea0d6225-312b-4ad2-a01c-72b8494f7029?utm_source=chatgpt.com), [Digital Atlas of Australia](https://digital.atlas.gov.au/datasets/electricity-transmission-lines-1/about?utm_source=chatgpt.com), [ACMA](https://www.acma.gov.au/international-submarine-cables-landing-australia?utm_source=chatgpt.com), [Bureau of Meteorology](https://www.bom.gov.au/climate/data/?utm_source=chatgpt.com), [catalogue.data.infrastructure.gov.au](https://catalogue.data.infrastructure.gov.au/dataset/?res_format=GeoJSON&utm_source=chatgpt.com))
* *Regulatory alignment:* It operationalises the **Net Zero in Government Operations** standard that from **1 July 2025** requires **5-Star NABERS or PUE≤1.4** for federal workloads. ([Department of Finance](https://www.finance.gov.au/sites/default/files/2023-11/APS_Net_Zero_Roadmap.pdf?utm_source=chatgpt.com))

If you want, tell me your preferred **weights** (e.g., power 40/ connectivity 30/ risk 20/ access 10) and I’ll tailor the scoring rubric and a one-page methodology handout you can add to the appendix.