ETAC
SERVICE & SUPPLY

800 MW-Class Natural Gas Power Plant Solution

Technical Proposal for AI Data Center Loads (60 Hz)

ETAC Service & Supply

1. Technical Architecture (Total: 800 MW)

The solution consists of four independent power generation units with mutual redundancy, enabling smooth load regulation for baseload operation and gradual power adjustment.

Modules A, B & C: Three Sets of “2-on-1” Combined Cycle Units (CCGT 2×1)

CONFIGURATION

2 × AE64.3A gas turbines

+

2 × HRSG heat recovery steam generators

+

1 × ST steam turbine

OUTPUT

Approximately 260 MW per set

+

Consisting of 160 MW from the gas turbines and an additional 100 MW from the steam turbine

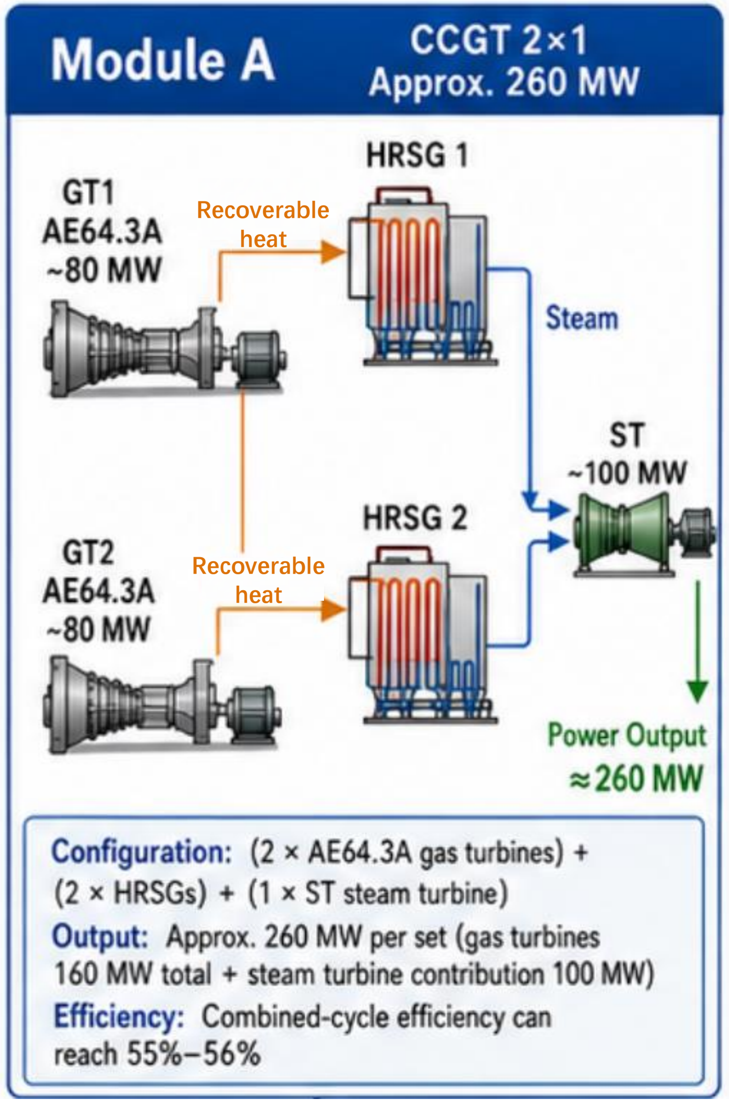
+

The three sets provide a total output of approximately 780 MW

CCGT EFFICIENCY

55%–56%

Combined-cycle efficiency basis to be verified



1. Technical Architecture (Total: 800 MW)

The solution consists of four independent power generation units with mutual redundancy, enabling smooth load regulation for baseload operation and gradual power adjustment.

Module D: One Simple Cycle (SC) Unit or Natural Gas Reciprocating Engine System

CONFIGURATION

1 × AE64.3A gas turbine

or

30 × 2.5 MWe natural gas reciprocating engines

OUTPUT

Option 1 Simple Cycle: Approximately 80 MW

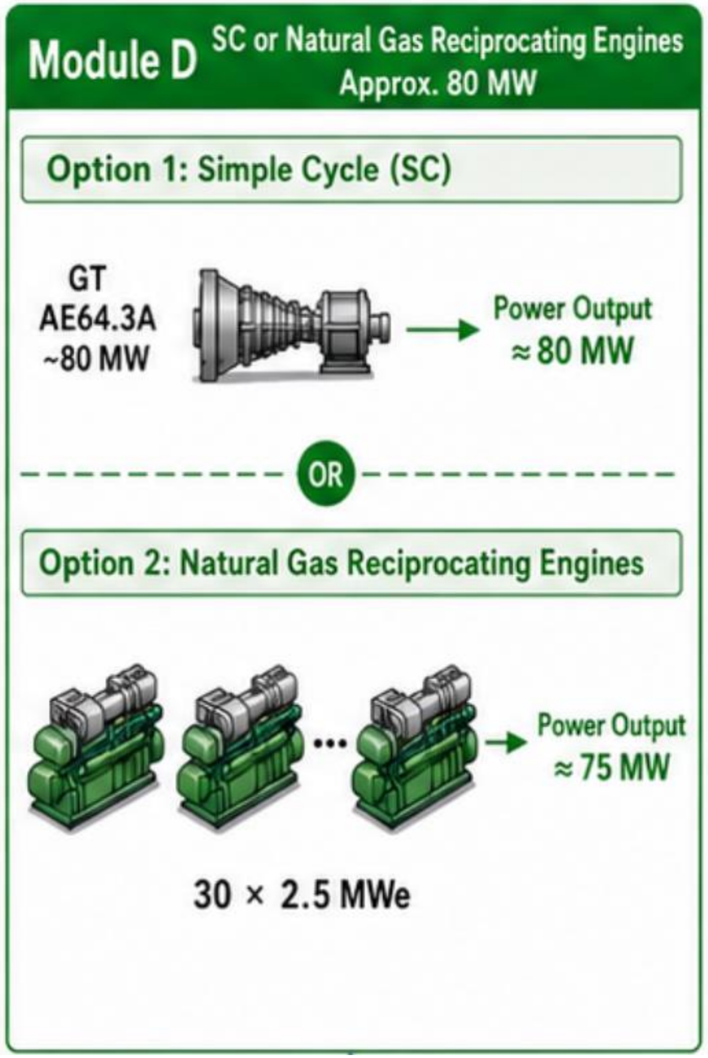
Option 2 Natural Gas Reciprocating Engine: Approximately 75 MW

FUNCTION

Serves as a “peak-load regulator” or emergency redundancy for data center operations

It can ramp from cold start to full load within approximately 15 minutes for the simple-cycle gas turbine

Or approximately 1 minute for the reciprocating engine system, to respond to sudden increases in computing demand.



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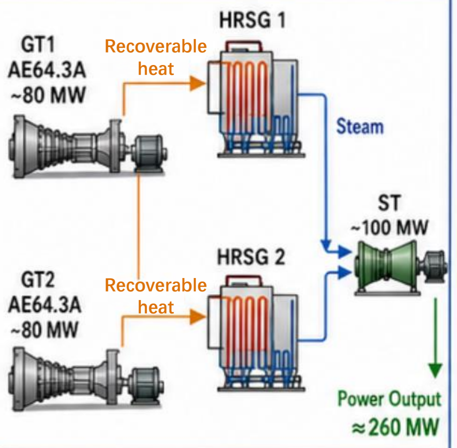
Technical Architecture (Total: 800 MW)

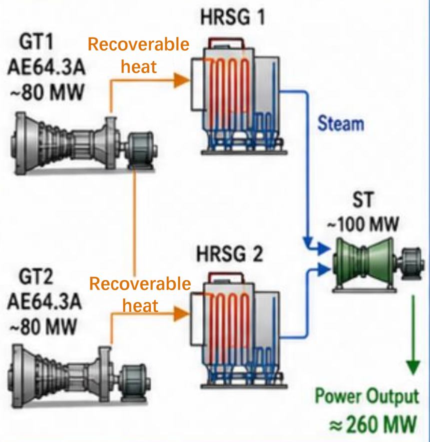
The solution consists of four independent power generation units with mutual redundancy, enabling smooth load regulation for baseload operation and gradual power adjustment.

Module A — CCGT 2×1, Approx. 260 MW



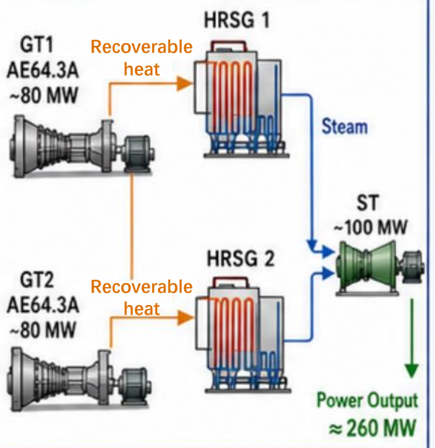
Configuration: (2 × AE64.3A gas turbines) + (2 × HRSGs) + (1 × ST steam turbine)
Output: Approx. 260 MW per set (gas turbines 160 MW total + steam turbine contribution 100 MW)
Efficiency: Combined-cycle efficiency can reach 55%–56%

Module B — CCGT 2×1, Approx. 260 MW



Configuration: (2 × AE64.3A gas turbines) + (2 × HRSGs) + (1 × ST steam turbine)
Output: Approx. 260 MW per set (gas turbines 160 MW total + steam turbine contribution 100 MW)
Efficiency: Combined-cycle efficiency can reach 55%–56%

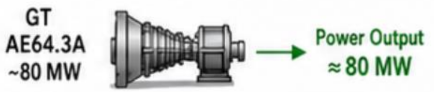
Module C — CCGT 2×1, Approx. 260 MW



Configuration: (2 × AE64.3A gas turbines) + (2 × HRSGs) + (1 × ST steam turbine)
Output: Approx. 260 MW per set (gas turbines 160 MW total + steam turbine contribution 100 MW)
Efficiency: Combined-cycle efficiency can reach 55%–56%

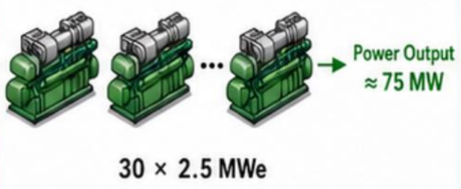
Module D — SC or Natural Gas Reciprocating Engines, Approx. 80 MW

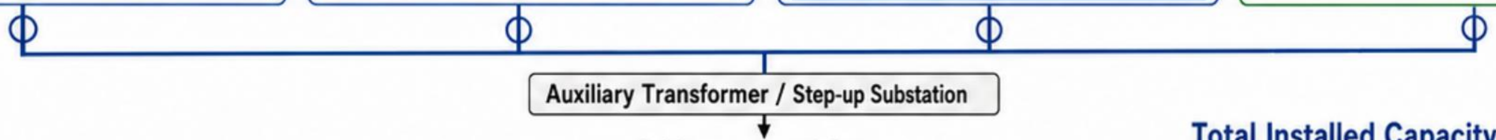
Option 1: Simple Cycle (SC)



OR

Option 2: Natural Gas Reciprocating Engines





Grid-connected Output

Module	A (CCGT 2×1)	B (CCGT 2×1)	C (CCGT 2×1)	D (SC or Reciprocating Engines)
Configuration	(2 × AE64.3A gas turbines) + (2 × HRSGs) + (1 × ST steam turbine)	(2 × AE64.3A gas turbines) + (2 × HRSGs) + (1 × ST steam turbine)	(2 × AE64.3A gas turbines) + (2 × HRSGs) + (1 × ST steam turbine)	(1 × AE64.3A gas turbine) or (30 × 2.5 MWe reciprocating engines)
Output per Set	Approx. 260 MW	Approx. 260 MW	Approx. 260 MW	Approx. 80 MW (SC) or Approx. 75 MW (Reciprocating Engines)
Quantity	1 Set	1 Set	1 Set	1 Set
Total Output	≈260 MW	≈260 MW	≈260 MW	≈800 MW

Total Installed Capacity
Total: 800 MW

Overview

- ✓ Four independent power generation units with mutual redundancy
- ✓ Three combined-cycle units (CCGT 2×1) provide stable, high-efficiency baseload power
- ✓ Module D provides flexible regulation capability, supporting gradual ramping and load following
- ✓ Total installed capacity: 800 MW
- ✓ Combined-cycle efficiency: 55%–56%

2. Key Characteristics of AI Computing Load Profiles

AI computing loads require both stable baseload supply and fast, accurate response to short-duration demand spikes, especially under inference-dominant workloads.

Peak-to-Average Ratio: Indicates how high the peak demand can rise compared with the average load

Training-Dominant Load

High Baseload | Low Fluctuation

Training workloads are predictable and schedulable, although load impacts can be significant.

Inference-Dominant Load

High Volatility | High Peak Demand

- Random and sudden load spikes:

  Driven by user requests and difficult to predict in advance.

- High-frequency small-step changes:

  Each inference batch start/stop creates a small load impact, often at millisecond-level frequency due to GPU batch switching.

Short peak duration:

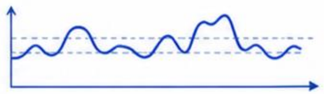
Peak loads usually last from seconds to minutes, unlike training workloads that may continue for hours

Typical PAR: 1.5x-2.5x
Extreme cases up to 3x

Mixed Training + Inference

Combined Load Pattern

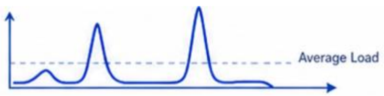
This mode combines sustained training demand with dynamic inference-driven fluctuations.



High PAR Load

PAR > 1.5 | Precise Response Required

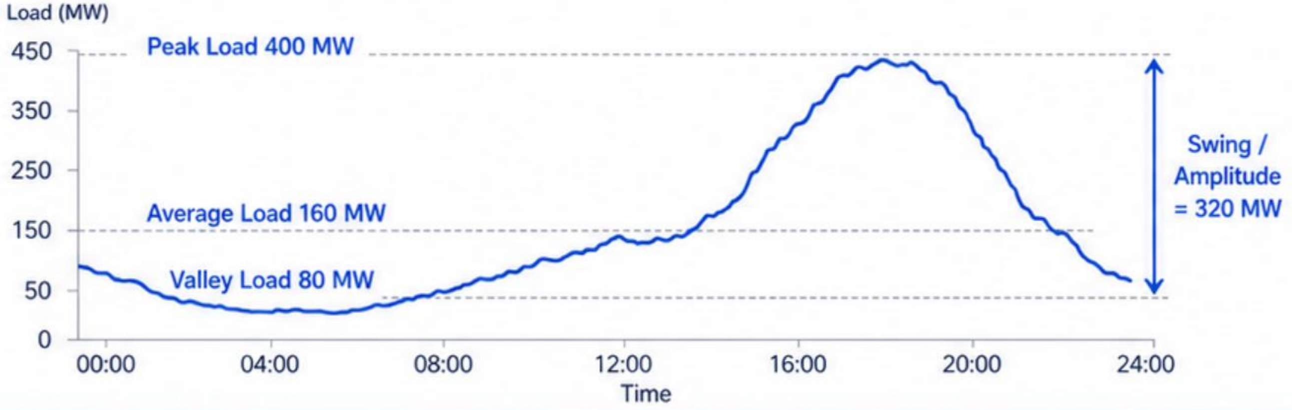
Fast and accurate power response is required to support stable load following.



3. Example Load Profile and Dispatch Strategy

The proposed configuration can effectively manage a 320 MW load swing by combining high-efficiency baseload generation with flexible dispatch capability.

Example Load Profile



Average Load
160 MW

Valley Load
80 MW

Peak Load
400 MW

Swing / Amplitude
320 MW

Valley-Load Operation — 80 MW

One gas turbine may operate in simple-cycle mode, or one combined-cycle unit may remain online at very low load, subject to OEM operating limits.

Average-Load Operation — 160 MW

One 2-on-1 combined-cycle unit can operate at partial load to support the average demand level.

Peak-Load Response — 400 MW

Two 2-on-1 combined-cycle units are online simultaneously, providing approximateely 520 MW of available output for peak response and load-following.

Dispatch Basis
2 x CCGT 2x1 +1 x Simple Cycle

Installed Capacity
Approx. 600 MW

Reserve Capacity at Peak Load
Approx. 200 MW

4. System Stability Under Valley-Load Operation

When gas turbine unit size is relatively large, deep valley-load operation in an islanded system may significantly reduce online synchronous inertia. Although BESS can provide instantaneous full-power support, its energy capacity is limited; therefore, a synchronous condenser may be required to improve frequency stability under high-RoCoF conditions.

Stability Risk Mechanism

1. **Deep Valley Load** — Low system demand and reduced online generation
2. **Reduced System Inertia** — Inertia may fall to ~1/4 of peak-load level
3. **High RoCoF** — Disturbances can trigger a rapid frequency change
4. **Frequency Stability Risk** — Risk of instability or frequency collapse

BESS Response

BESS can provide instantaneous full-power support, but its energy capacity is limited.

Stability Concern

Under islanded valley-load operation, frequency stability becomes fragile because system inertia is significantly reduced.

Engineering Implication

Under high RoCoF conditions, BESS alone may not be sufficient to maintain system stability.

Recommended Engineering Option

A synchronous condenser may be an engineering-feasible solution to address insufficient system inertia during valley-load operation.

It can enhance inertia support and improve frequency stability margin in islanded low-load operation.

Low Inertia → High RoCoF → Synchronous Condenser

5. Generator Budgetary Quote

The proposed 800 MW-class solution consists of four independent power generation plants, with an estimated equipment budget of USD 635–650 million and an indicative delivery period of 8–20 months.

Plant A – CCGT 2x1

Capacity	Approx. 260 MW
Configuration	2 x AE64.3A GT + 2 x HRSG + 1 x ST
Equipment Quote	USD 185M
Delivery	Phase 2 / 12-14 months

Plant B – CCGT 2x1

Capacity	Approx. 260 MW
Configuration	2 x AE64.3A GT + 2 x HRSG + 1 x ST
Equipment Quote	USD 185M
Delivery	Phase 3 / 16-18 months

Plant C – CCGT 2x1

Capacity	Approx. 260 MW
Configuration	2 x AE64.3A GT + 2 x HRSG + 1 x ST
Equipment Quote	USD 185M
Delivery	Phase 4 / 18-20 months

Plant D – Flexible Regulating Unit

Capacity	Approx. 80 MW
Configuration	1 x AE64.3A GT OR 30 x 2.5 MW gas engines
Equipment Quote	USD 60-80M
Delivery	Phase 1 / 8-10 months

Total Installed Capacity
Approx. 860 MW

Designed Supply Level
800 MW-class

Equipment Budget
USD 635-650M

Indicative Delivery
8-20 months

Important Notes

- Budgetary quote only; final pricing is subject to change.
- The solution consists of four independent power generation resources: Plants A, B, C, and D.
- Plant D provides approximately 80 MW of flexible regulating capacity.
- HRSG, gas pressure compressor, grid substation, and labor costs are not included / TBD.
- A 230 kV substation is suggested for the 800 MW-class solution.
- High-pressure gas supply may require additional gas pressure equipment.
- The configuration supports multiple operating capacity levels, subject to unit commitment and load demand (260, 340, 520, 600, 780, and 860 MW).
- Indicative EPC cost may be approximately double the equipment cost, subject to scope.