

Bio-Tech Company Injects Life Into Their Energy Efficiency

Canonical:

<https://northmoregordon.com/case-studies/bio-tech-company-injects-life-into-their-energy-efficiency-singapore/>

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Case-study summary

This historical case study records the project, delivery approach and reported results behind Bio-Tech Company Injects Life Into Their Energy Efficiency . It has been reorganised for clearer reading and linked to current Northmore Gordon guidance so the project evidence can be used without treating an earlier result as a present-day quote.

Evidence note: The source page is dated January 1, 2023. Figures, scheme names, equipment assumptions and client circumstances belong to that project period. Opportunities, targets and forecasts remain distinct from implemented or verified outcomes, and current eligibility should be checked before using the case as a new-project benchmark.

Project record

Northmore Gordon worked closely with a Singapore- based manufacturer of precision equipment over 2021 to complete an Energy Efficiency Opportunities Assessment for New Ventures (EEOA-NV) as required by Singapore's National Environment Agency (NEA). The complex requirements of the Program were fully met and the report submitted so our customer would receive Development Consent. In addition, NG identified practical energy saving opportunities that are now being implemented as part of the new-build.

The Client

The Client has been established in Singapore for many years, with manufacturing operations. The operation involves creation of precision, high quality parts in

a clean-room environment for a specific end-use. It is supported by utilities including compressed air, boiler, air conditioning and chiller systems, centralised extraction systems, and cooling towers.

The Project

To meet the requirements of the Energy Conservation Act, potential new ventures or major expansion of sites in Singapore that use over 54 TJ per annum need to undergo an Energy Efficiency Opportunity Assessment on the design.

The upgrades proposed and included in the final design included high efficiency motors for compressors, an improved clean room control strategy, high efficiency motors for fans in MAUs/exhausts/ovens, CO2 sensor controls, high efficiency chillers, lighting controls, and solar PV

Key Facts

EEOA completed in line with regulation

Annual Savings Estimates compared to the Base Design

Energy: 5,660 GJ A joule is a measure of the energy required to send an electrical current of one ampere through a resistance of one ohm for one second. One GJ is equal to 277.8 kilowatt hours (kWh), 1.055 million British thermal units (Btu) or 0.17 barrels of oil./annum

Carbon Abatement: 641 tCO₂e

OPEX: ~\$236,000

Project Details

CAPEX: ~\$343,000

Payback: ~1.5 years

Challenges

Competitive pressures to provide high quality services with strict quality controls whilst minimising operating costs

Energy bills represent a substantial cost the operations

New equipment proposed needs to gain approval from their international parent company prior to being used.

Additional Benefits

Lower running costs when the new facility is built

Optimised ventilation rates

Our Role

Northmore Gordon worked very hard to complete the work to the standard required by the NEA in the line with the development timeframe. This included working with the design team, architects, and M&E; contractors through the difficulties of restrictions that occurred in 2020 due to Covid lockdowns. The work included a detailed base case energy balance, detailed analysis of the design, identification of energy efficiency opportunities in conjunction with the Client, completion of the NEA's report template, and achieving sign-off by the Client stakeholders and the NEA.

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Using the results for a new project

Start with the site's current operating profile, asset condition and business objective. Define the baseline, project boundary, variables that affect energy use and the evidence available before selecting a technology or incentive pathway. This makes the comparison auditable and keeps physical savings separate from grants, certificate revenue and other financial benefits.

For a comparable project, confirm current program rules and product requirements, document installation and commissioning, and plan post-project measurement early. Historical results can show what was possible in one setting, but they do not establish current eligibility, pricing, payback or emissions outcomes.

Related guidance

Energy audits

Environmental certificates

Government schemes

Carbon advisory

Solar PV

Commercial lighting

Boiler upgrades

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What regulatory requirement triggered this energy efficiency project in Singapore?

Under Singapore's Energy Conservation Act, new ventures or major expansions using over 54 TJ annually must complete an Energy Efficiency Opportunities Assessment (EEOA-NV) on the design stage. This bio-tech company's new facility met this threshold, requiring Northmore Gordon to conduct a detailed assessment to NEA standards before Development Consent could be granted. The assessment identified a practical baseline design and evaluated efficiency improvements, enabling the client to meet regulatory obligations while optimizing long-term operating costs.

How did Northmore Gordon approach the energy assessment during design stage?

We completed the assessment within the development timeline by collaborating with the design team, architects, and M&E; contractors. The work included developing a detailed base-case energy balance, analyzing the proposed design, identifying energy efficiency opportunities with the client's input, completing NEA's required report template, and achieving sign-off from both client stakeholders and the NEA. This design-stage approach ensured efficiency improvements could be incorporated before construction, avoiding costly retrofit work.

What energy efficiency measures were recommended for the facility's key systems?

Recommendations targeted the facility's main utility demands: high-efficiency motors for compressed-air compressors and ventilation fans, improved clean-room control strategies using CO₂ sensors, high-efficiency chillers, automated lighting controls, and solar PV generation. These measures addressed the critical systems supporting precision manufacturing in a controlled environment—compressed air, cooling, ventilation, and lighting—while respecting the strict quality-control requirements that define clean-room operations.

What were the financial and environmental outcomes of the recommended improvements?

Compared to the base design, the recommended upgrades delivered estimated annual energy savings of 5,660 GJ, carbon abatement of 641 tonnes CO₂-equivalent, and approximately \$236,000 in annual operating-cost savings. The estimated capital expenditure of \$343,000 supported a payback period of approximately 1.5 years. These outcomes demonstrate how design-stage efficiency improvements can create strong business cases while supporting the client's sustainability goals.

How did the client's operational constraints affect the project approach?

The bio-tech company faced three key pressures: the need to maintain high-quality precision manufacturing with strict controls, substantial energy costs affecting competitiveness, and approval requirements from an international parent company before adopting new equipment. Our assessment addressed these by working through the existing design and equipment-approval processes, identifying improvements compatible with quality standards, and presenting the business case clearly to support parent-company authorization—ensuring recommendations were both technically sound and operationally acceptable.

What advantages did completing the assessment at the design stage provide?

Design-stage assessment allowed efficiency improvements to be incorporated before construction, avoiding expensive retrofitting and ensuring optimal integration with other systems. The client could secure NEA approval, achieve Development Consent, and implement energy savings as part of the planned build. This approach also strengthened the business case by demonstrating lower operating costs from the facility's opening, improving the investment's economic attractiveness and supporting long-term competitive positioning in a cost-conscious sector.

How does Singapore's regulatory framework differ from assessment approaches in other jurisdictions?

Singapore's Energy Conservation Act establishes specific thresholds (54 TJ annually) and requires formal assessment at design stage for new ventures and major expansions, administered by the National Environment Agency. This differs from Australian schemes like Victorian Energy Upgrades or NSW ESS, which typically address existing facilities or operate post-installation. Singapore's approach embeds efficiency into initial design, enabling more cost-effective improvements. We provide dedicated Singapore energy-efficiency assessments to help facilities meet these distinct regulatory requirements and development-consent processes.

What role did clean-room requirements play in shaping efficiency recommendations?

Clean-room operations demand controlled temperature, humidity, air quality, and extraction systems—creating substantial energy demands that shaped the assessment. Recommendations balanced efficiency with operational necessity: improved control strategies reduced unnecessary conditioning, CO2 sensors optimized ventilation rates, and high-efficiency chillers and fans minimized energy use while maintaining required conditions. This integrated approach demonstrates how sector-specific constraints can be accommodated within a rigorous efficiency framework, ensuring recommendations support both operational and business objectives.