



Bina Tenaga Energy
your power factor solution



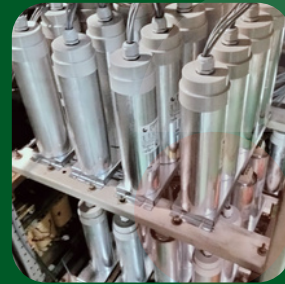
Executive Summary

Introduction

Bina Tenaga Energy Sdn Bhd, established in 2006, is a Malaysian system-efficiency solutions provider specialising in Power Factor Correction Systems (PFCS), Capacitor Bank Retrofit and electrical system optimisation. The company supports industrial, commercial and institutional clients in reducing their expenditure including utility costs Opex and Capex, improving power system reliability, and meeting ESG requirement.

Problem Statement

Many facilities in Malaysia is facing power factor issue due to the aging capacitor bank systems, inefficient and sustainable electrical distribution. These issues lead to unnecessary penalties, operational downtime, and reduced equipment lifespan which not only rising in TNB bills but increase in Opex & Capex.

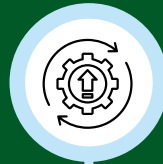


Core Services & Solutions



Power Factor Correction System / Detuned APFCS (Macro-Micro Integrated)

- Design and engineering of PFCS
- Supply and fabrication of capacitor bank panels
- Installation, testing, and commissioning
- Power factor surcharge mitigation



System Upgrade, Restoration & Retrofitting

- Replacement of ageing or faulty capacitor bank components
- Upgrading of relays, capacitors, and protection systems
- Restoration of underperforming systems
- Retrofitting existing installations to improve efficiency
- Harmonic distortion mitigation



Engineering & Technical Support

- Site inspection and system assessment
- Load analysis and system recommendations
- Troubleshooting and corrective works
- Preventive maintenance support



Industries Served

- Commercial buildings
- Industrial and manufacturing facilities
- Public and institutional buildings
- Religious facilities and community buildings



OUR JOURNEY OF INNOVATION & IMPACT

From Solving Industry Pain Points to Creating
Malaysia's First Macro-Micro Integrated
Power Factor Correction System



BINA TENAGA
ENERGY SDN BHD

your power factor solution

OUR MILESTONES

2006



COMPANY ESTABLISHED

- Binenaga Energy Management established as an Enterprise.
- Focused on Power Factor Correction System (PFCS) and electrical efficiency solutions.

INNOVATION DEVELOPMENT & INDUSTRY VALIDATION

Innovation idea comes from the weaknesses of existing systems:

- ✓ Frequent failures
- ✓ Short lifespan
- ✓ High maintenance cost
- ✓ Losses effective with varying loads

Developed the concept of Macro-Micro Integrated Power Factor Correction System.

Tested & proven in various industries, successfully delivering real savings and operational reliability.

2006 – 2021



2021



CORPORATE TRANSFORMATION

- Incorporated as Bina Tenaga Energy Sdn Bhd.
- Strengthened business structure for technology commercialization and growth.

SIRIM CERTIFICATION

Safety and Performance Test Certification obtained for PQS-BINATENAGA (Star Connection).

JAN 2022



DEC 2022



MYHIJAU CERTIFICATION

Certified under Malaysia's Green Technology Programme.

MYSTI RECOGNITION

PQS-BINATENAGA recognized as an outstanding Malaysian-developed technology and innovation product.

JULY 2024



SEPT 2024



PRESENTED TO JKR MALAYSIA

Successfully presented PQS-BINATENAGA innovation to JKR Malaysia (Design, Electrical & Mechanical Division) to present the product.



COMMERCIALISATION LAUNCH

- Official commercialisation of PQS-BINATENAGA (Star Connection).
- Market introduction of Malaysia's first Macro-Micro Integrated PQS platform.

MID 2025



2026



PRODUCT PORTFOLIO EXPANSION

- Expansion into next-generation power quality and energy efficiency solutions.
- Development of complementary products based on the Macro-Micro platform.

WHY WE INNOVATED

Conventional systems are installed at the incoming point (central) using Delta connection, which fails to respond and remains ineffective with varying loads.

Our solution is to rectify the problem at the micro level (closer to the load) with a Macro-Micro Integrated system using Star Connection, precisely designed phase by phase.



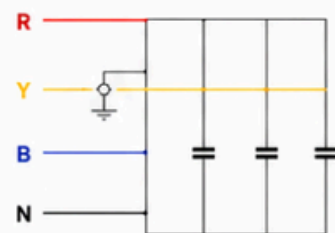
CONVENTIONAL SYSTEM (DELTA)



- ✗ Delta connected capacitor bank
- ✗ Centralised correction at incoming point
- ✗ Less responsive to individual phase loading
- ✗ Higher maintenance requirement
- ✗ Smarter lifespan & higher failure rate
- ✗ Less efficient power factor improvement



PQS-BINATENAGA SYSTEM (STAR CONNECTION)



OUR COMMITMENT.
Your Power Quality Partner.



Improve
Power Factor



Reduce
Energy Cost



Enhance
Reliability



Mitigate
Harmonics



Support
Sustainability



BINA TENAGA
ENERGY SDN BHD
your power factor solution

BINATENAGA PRODUCT MASTER MATRIX

COMPLETE POWER QUALITY &
EFFICIENCY SOLUTIONS



1 Binatenaga Auto-PFCS (Macro)

EXISTING PRODUCT



Installation Location:
Main Incoming Intake /
Main Switchboard (MSB) /
Substation

Function:
Automatically monitors and
controls capacitor banks at
the central intake point to
maintain Power Factor close
to 1.0.

Solar Mitigation:
Counters the reduction in
grid-supplied active power
during peak solar generation,
preventing excessive reactive
energy billing caused by an
increased reactive-to-active
power ratio.

Target Sectors:

- Large Manufacturing Factories
- Logistics Warehouses
- SME Plants
- Centralized Power Rooms

2 Binatenaga Phase-Star APFCS (Micro)

EXISTING PRODUCT



Installation Location:
Sub-Distribution Boards /
Localized Panels /
Point-of-Load

Function:
Utilizes an advanced phase-
specific, star-connected
topology to independently
correct each phase, reducing
voltage imbalance and high
neutral currents at the source.

Solar Mitigation:
Corrects localized voltage rise
and severe single-phase
imbalances caused by uneven
single-phase solar generation.

Target Sectors:

- Corporate Towers
- Office Buildings
- Shopping Malls
- Distributed Retail Outlets
- HVAC & AHU Systems

3 Binatenaga Detune-PFCS (Macro/Micro)

NEW PRODUCT



**Detuned Reactor
(7% Reactor)**



Capacitor Bank



Installation Location:
Main Switchboard or
Major Sub-Switchboards

Function:
Provides Power Factor
Correction together with
detuned reactors to prevent
harmonic resonance between
capacitor banks and
transformers.

Solar Mitigation:
Prevents capacitor banks
from resonating with high-
frequency switching
harmonics generated by
grid-tied solar inverters.

Target Sectors:

- Modern Commercial Buildings
- Shopping Malls
- Hypermarkets
- SME Manufacturing Plants
- Solar Farms

4 Binatenaga LineReact-AC (Micro)

NEW PRODUCT



Installation Location:
Input side of machinery,
drives, VFDs, and inverters

Function:
Acts as an inductive buffer
to limit harmonic currents,
absorb transient surges, and
dampen voltage spikes.

Solar Mitigation:
Reduces voltage fluctuations
and transient disturbances
caused by rapid solar
generation changes due
to cloud movement.

Target Sectors:

- Heavy Industrial Factories
- VFD Applications
- Motor Control Systems
- Heavy Machinery
- Automated Conveyor Systems

5 Binatenaga TuneFil-Passive (Macro/Micro)

NEW PRODUCT



Capacitor Bank



+

**Passive Filter Reactor
(Tuned Reactor)
(4.2% / 4.7% Reactor)**



Installation Location:
Main Switchboard or
Localized Sub-Panels

Function:
Provides a low-impedance path
to trap and filter dominant
harmonic frequencies such as
the 5th, 7th, and 11th harmonics.

Solar Mitigation:
Absorbs and isolates harmonic
pollution generated by large-
scale solar inverters, protecting
sensitive equipment and
maintaining grid stability.

Target Sectors:

- Plastic Injection Moulding Factories
- Heavy Foundries
- Automated Manufacturing Plants
- Facilities with Severe Harmonic Distortion
- Data Centres

THE BINATENAGA ADVANTAGE



IMPROVE POWER FACTOR
Maintain PF close to 1.0
to avoid surcharge &
maximize system capacity.



REDUCE ENERGY COST
Lower reactive energy
charges and improve
overall efficiency.



PROTECT EQUIPMENT
Reduce voltage stress,
harmonics, and overheating
on critical equipment.



MITIGATE HARMONICS
Suppress harmonics and
prevent resonance for
stable operations.



SUPPORT SUSTAINABILITY
Enhance energy efficiency
and support greener,
cleaner operations.

Technology Matrix



MACRO-MICRO INTEGRATED SYSTEM

MACRO REMEDIATION

- Bulk Reactive Power (kVar)
- Main Switchboard Compliance
- Eliminating PF Penalties
- Liberating Transformer Capacity

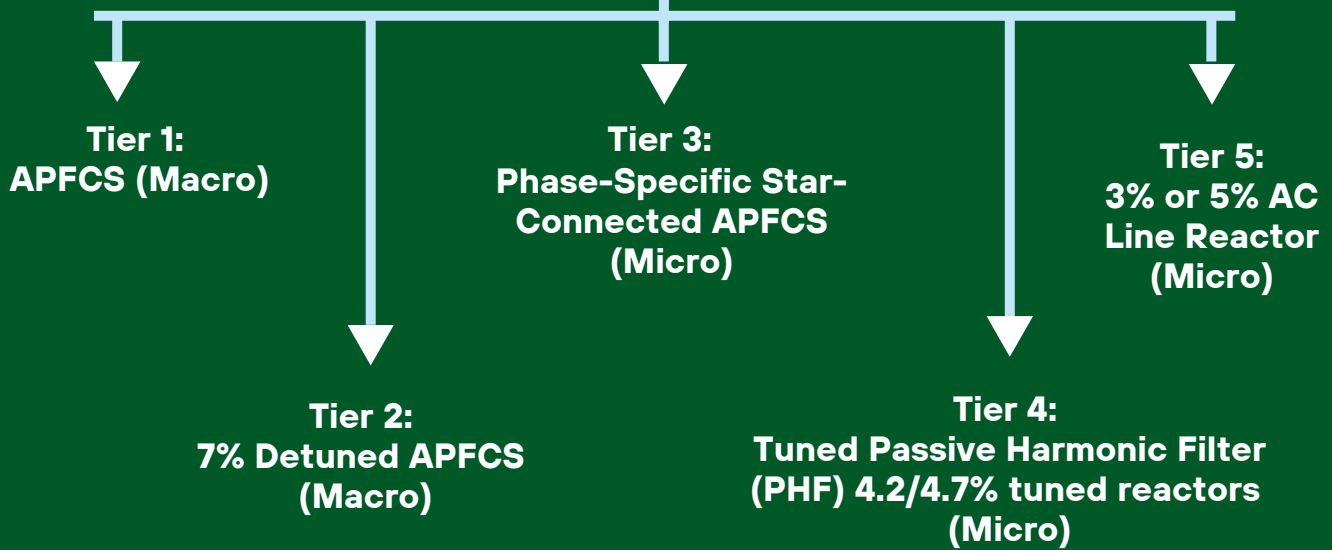
MICRO REMEDIATION

- Localize Tuning
- Absorption of 5th / 7th Harmonics
- Preventing Resonance/Cap Overheat
- Dampening Minor Voltage Fluctuations

PRODUCT ALIGNMENT MATRIX

Technology	Core Technical Focus	Best Suited For	The "Macro" Benefit	The "Micro" Benefit
APFCS (Conventional) / Phase-Specific Star-Connected APFCS)	Linear Load Compensation	Facilities with standard motors, pump, and minimal automation	Instantly achieves > 0.85-0.90 PF , permanently wiping out penalty charges	Reduces thermal stress on the main breaker and local cables
7% Detuned APFCS (189Hz with over voltage capacitor)- System Protection for PFCS	Non-Linear / Harmonic Load Protection	Facilities heavily reliant on VFDs, LED lighting, and automation	Corrects bulk power factor while safely isolating the capacitor banks from grid resonance	Prevents premature capacitor blow out
Tuned Passive Harmonic Filter (PHF) 4.2/4.7% tuned reactors	Trap and clean harmonic distortion	Heavy industrial site with fixed, unchanging load profile and low-cost THD reduction	Alternative to expensive active harmonic filters, reduced copper loss accross the plant main transformers	Attenuates incoming 5 th & 7 th harmonics
3% or 5% AC Line Reactor	Attenuates harmonic distortion	Load level solution. Install directly at VSD inputs to shield the system at the source	Extended asset lifespan for expensive VSDs/VFDs. Helps lower the factories total demand distortion (TDD) align with utility compliance (IEEE519)	Absorbed voltage surges / smooth VFD current spike from roughly 80% down to 30%

MACRO-MICRO INTEGRATED ARCHITECTURE *Premium Tier Product Line*



“

At Binatenaga, we don't sell generic capacitor boxes. Our Macro-Micro Integrated System is engineered specifically for Malaysian industrial grids. Our Detuned APFCS fixes your bulk power factor at the macro level to eliminate surcharge penalties, while micro-tuning your system to absorb damaging harmonics and protect your plant automation from resonance.

”

“

Our Macro-Micro Integrated (Phase-Specific Star - Connected APFC) does not just fix your power factor; it stabilizes your local voltage. By eliminating heavy reactive current on a phase-by-phase basis, we reduce the internal voltage drops across your cables. This keeps your local voltage flat and stable during heavy machine start-ups, while freeing up critical transformer capacity—effectively enlarging your system's electrical headroom without expensive infrastructure upgrades.

”

Technology Benefits



Increase facility's efficiency

1

Cuts reliance on costly grid supply

More equipment can run on solar, cutting reliance on expensive grid supply.

2

To add more solar

Pfcs promotes higher facility efficiency by optimising distribution systems, smoothen active solar power flow

2

More solar power at cheapest rate

1

Less grid power at highest rate

3

Reduce OPEX & CAPEX

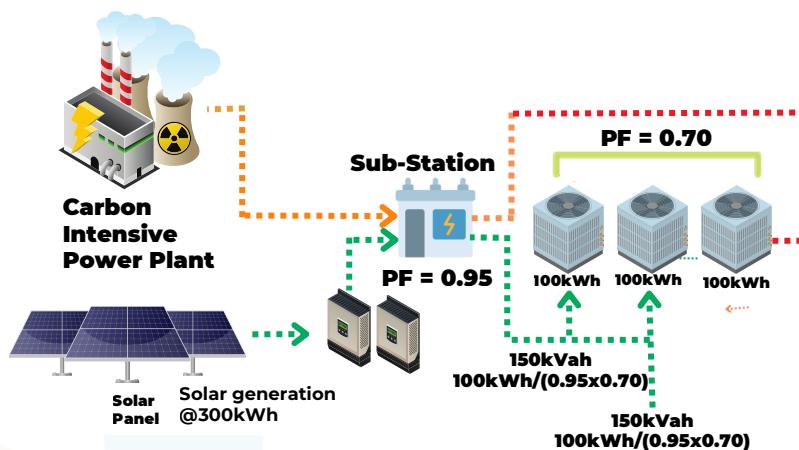
Threefold Savings Impact

3

Stable & sustainable power line

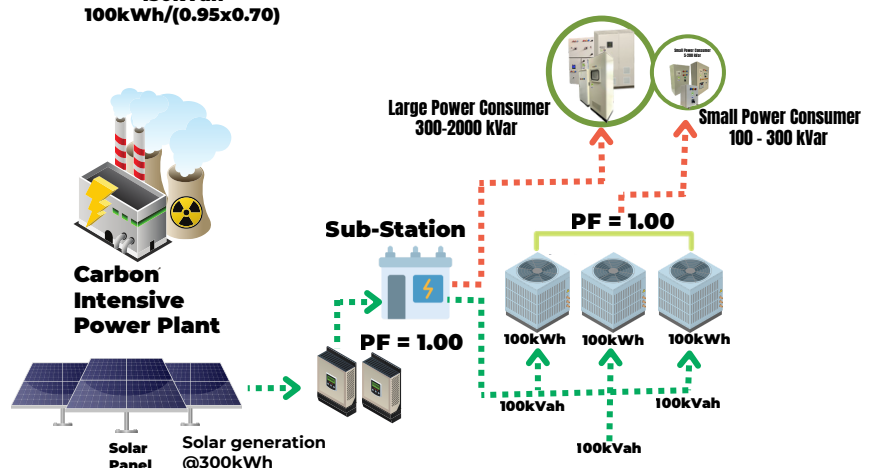
Reliable technology ensures stable active power delivery, reducing the risk of higher power factor surcharges as tariffs rise.

Illustration:



With PFCS

PFCS being equipped in each of 100kW AHU out going panel. This will increase a distribution capacity by 100%. Therefore, no supply from grid (TNB) is needed



Mitigating power quality issues



PFCS-Binatenaga / Detuned APFCS (Macro Micro Integrated)

- Provide additional compensation
 - Inverter can be set at unity
 - Optimize solar active power distribution
 - Minimize PQ issues (HFL, Voltage Swing & Low PF)

IEC 61727:2004

- Pf at feed-in point must be 0.95 (lagging or leading)

IEEE 1547-2018

- Allow Flexible inverter Power Factor below unity

Grid Stability & Compliance

- Lowering total demand distortion (TDD)-utility compliance (IEEE519)
- Steady voltage profile
- Reliable PV integration
- Optimised efficiency

How The Technology (Incoming-Outgoing Integrated) Fits In

- **Maximises Solar Output** – Sustains optimal power factor long-term, whether the inverter operates in flexible mode or unity PF, ensuring maximum active power injection from solar PV.
- **Maintains Power Quality** – Preserves voltage and frequency stability at the feed-in point, even during high PV penetration.
- **Prevents Voltage Fluctuations** – Supplies adequate reactive power at both incoming and outgoing points for steady, reliable operation.
- **Enhances Protection & Stability** – Incorporates a line reactor in the PFCS panel to limit fault current, protect transformers, circuit breakers, and sensitive equipment from thermal and mechanical stress, and improve system stability by reducing voltage dips and disturbances.
- **Essential Beyond Inverter Features** – Even the inverters with built-in capacitors and reactors are intended solely to manage the solar PV's internal DC-AC system, they do not address the overall premises network performance. **PFCS-Binatenaga Technology, through its integrated incoming and outgoing compensation, is critical to overcoming persistent issues such as power factor drop, voltage fluctuations, and high fault levels across the entire facility.**

SMART REACTIVE POWER COMPENSATION FOR LARGE-SCALE SOLAR (LSS) PLANTS

Maximise exportable energy, ensure grid compliance, protect assets and improve long-term profitability.



THE CHALLENGES IN LSS PLANTS



INVERTER CAPACITY LIMITATION

During peak operation, inverters may ride varsive power (kVAR) required by the grid, reducing available capacity for active power (kW) export.



INTERNAL ELECTRICAL LOSSES

Reactive current flowing through long cables and transformers increases I²R losses and lowers overall efficiency.



EQUIPMENT STRESS & HEAT

High reactive current causes transformer overloading, higher temperature and accelerated ageing.



RISK OF VOLTAGE INSTABILITY & TRIPS

Rapid voltage or surge generation can cause voltage fluctuations, leading to protection trips and lost generation.

BINATENAGA RANGE OF PRODUCTS

AUTO-PFCS (MACRO) CENTRALISED POWER FACTOR CORRECTION SYSTEM



- ✓ Installed at Main Incomer / MSB
- ✓ Automatically maintains target power factor based on real-time power factor
- ✓ Maintains overall PF close to 1.00 at the point of interconnection
- ✓ Reduces reactive power drawn from the grid
- ✓ Improves system efficiency and overall system efficiency
- ✓ Ideal for large capacity systems and wide substation compensation

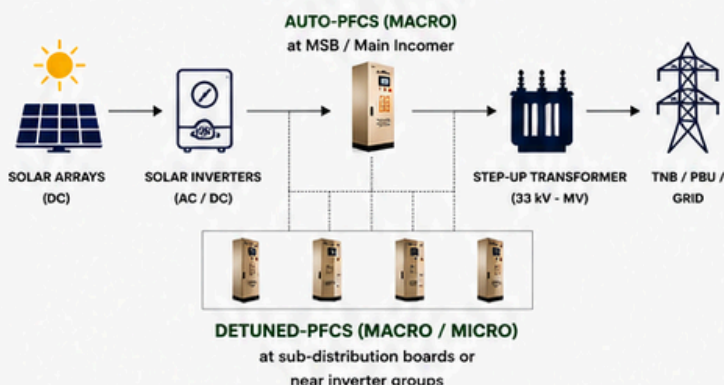
DETUNED-PFCS (MACRO / MICRO) DETUNED REACTIVE POWER COMPENSATION SYSTEM



- ✓ Installed at sub-distribution boards located near heavy non-linear / process (loads)
- ✓ Detuned with 2.7% to 14% reactors to mitigate harmonics
- ✓ Reduces resonance current flow in the network
- ✓ Improves voltage profile and power quality
- ✓ Scalable solution for both new projects and retrofits

WHERE OUR SOLUTIONS ARE INSTALLED

Both solutions work together to optimise reactive power across the entire electrical network.



KEY BENEFITS TO LSS DEVELOPERS & OWNERS



MAXIMIZE EXPORTABLE ENERGY

More active power available for grid export, higher PPA revenue.



REDUCE LOSSES & IMPROVE EFFICIENCY

Lower I²R losses, cooler operation, longer asset life.



INVERTER PROTECTION

Lower loading and less tripping, higher availability.



LOWER O&M COSTS

Fewer interventions, less downtime, better returns.



ENSURE GRID COMPLIANCE

Support grid code requirements and avoid penalties.



HIGHER ROI & BANKABILITY

Better system performance ensures better bankability.

POTENTIAL IMPACT (EXAMPLE SCENARIO*)

PLANT SIZE (MWp)	POTENTIAL EXTRA ENERGY** (kWh/Year)	POTENTIAL EXTRA INCOME** @ RM 0.20/kWh (= 8% MORE EARNING)	POTENTIAL EXTRA ROI*** (15 YEARS) (= 8% MORE EARNING)
10 MWp	~ 450,000 – 900,000	RM 90,000 – 180,000	RM 2,700,000 – 5,400,000
30 MWp	~ 1,200,000 – 1,500,000	RM 270,000 – 360,000	RM 8,100,000 – 10,800,000
50 MWp	~ 2,000,000 – 2,500,000	RM 450,000 – 576,000	RM 13,500,000 – 17,280,000

* Assumes 8% annual export improvement through better PF, lower losses & higher inverter availability.

** Based on electricity selling price RM 0.20/kWh (reference only).

*** ROI calculation based on capex saving from improved generation over 15 years without O&M.

Actual results vary based on site condition, PPA, irradiance and system design.

WHY MACRO-MICRO COMPENSATION?

Instead of compensating only at the main switchboard, Binatenaga deploys a coordinated macro + micro strategy to manage both bulk PF at the substation and distribution reactive issues.

- ✓ Reduce electrical current throughout the network
- ✓ Lower overall I²R losses & heat
- ✓ Better voltage regulation near inverter clusters
- ✓ Higher system and inverter availability
- ✓ Scalable for future solar expansion
- ✓ Optimised system efficiency & bankability



COMPLIANT & FUTURE READY

Our solutions are designed to support:

- ✓ Malaysian Grid Code (GCC) requirements
- ✓ Sustainable energy & technical standards
- ✓ Dynamic PF & voltage regulation
- ✓ Banking grid reliability and power quality goals

Ensure a compliant and sustainable adapt to future grid code changes.



ENGINEERED FOR RELIABILITY

Built with high quality components, advanced protection and intelligent control for safe, continuous and reliable operation.



PROVEN SOLUTION

Trusted by industries and projects across the globe for performance and reliability.



LOCAL SUPPORT

Local engineering support, fast response, after-sales service.

LET'S MAXIMIZE YOUR SOLAR INVESTMENT

Contact us for a site assessment and customised proposal.

07-6962525



www.binatenaga.com.my



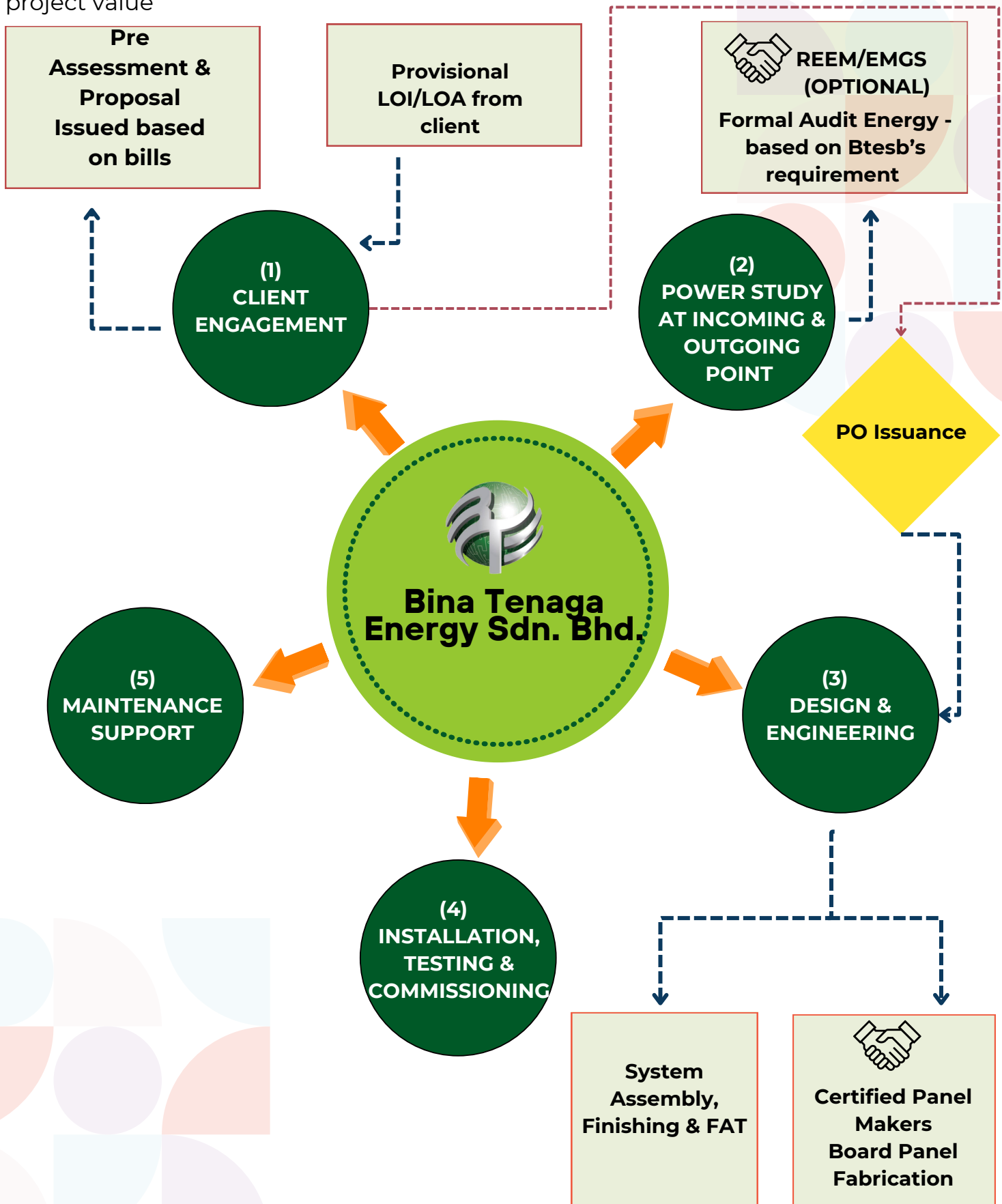
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End-to-End Process Flow



Bina Tenaga operates using a hybrid model which engineering and project management handled internally, while fabrication and specialised audits are executed by certified partners. This approach reduces capital investment, increases flexibility, ensures certified quality, and enables us to scale efficiently while sharing project value



Business Model

Revenue is generated through:

- PFCS turnkey projects
- Retrofit & upgrade works
- Energy audit services
- Maintenance and after-sales support

Competitive Advantage

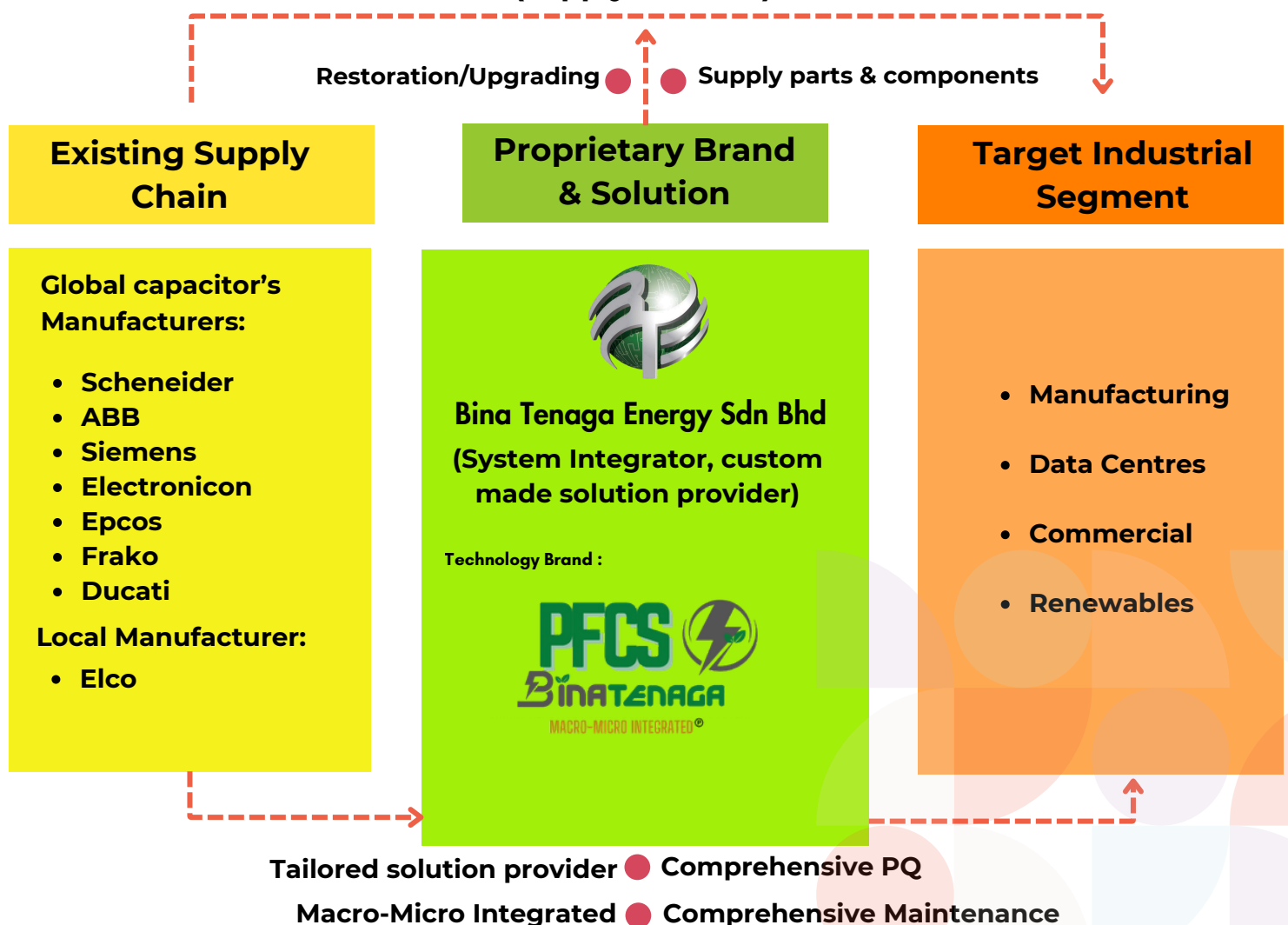
- 18+ years in the industry
- Proven system improvement track record
- In-house technical team
- National green technology certifications
- End-to-end delivery (site audit → design → fabrication → installation → testing)

Market Opportunity

The Malaysian energy-efficiency market is expanding due to:

- Rising TNB electricity tariffs
- Increasing enforcement of power factor penalties
- ESG and sustainability requirements
- Growth of industrial and commercial facilities requiring electrical optimisation
- PFCS and related services are projected to grow annually as more facilities seek to reduce operational cost and carbon footprint.

Conventional System (supply & Install)



Procument Enabler



Our certification are consider as procurement facilitators, pre qualified vendor status, trusted procuremant set, and local technology endorsement.



SIRIM QAS International Sdn Bhd -(MITI)

To ensures our products meet Malaysia's highest standards for safety, reliability, and performance, guaranteeing compliance with national and international regulations.

✓ Certified (2022)

Performance

IEC/EN 60252-1

Star Capacitor
Performance

IEC/EN 60831-1/2: 2014

Delta Capacitor
Performance

Safety

IEC/EN 61921

Enclosure & System
Safety For Custom
Made Panel

IEC/EN 60529

Resistance to dust,
liquids, and accidental
contact.

IEC/EN 60670-1: 2015

Enclosure & System
Safety For Ready Made
Panel

Reactor included to limit the short-circuit current, stabilised volatge level by reducing the possibilty of voltage spike or transients besides to limit the higher harmonic in the power grids

Based on power assessment report before solar installation to mitigate premises's power issues



Malaysia Green Technology and Climate Change Corporation (MGTC) - (NRES)

Recognized as part of Malaysia's official green certification program, our products contribute to energy efficiency and carbon neutrality, supporting a more sustainable future.

✓ Certified (2022)

Enviromental Claim :
Conserve the use of
energy , reduce GHG
emission



Ministry of Science, Technology and Innovation (MOSTI)

Acknowledged for our efforts in research, development, and technological innovation, aligning with Malaysia's vision for advancing science and green technology.

A reference point for the implementation of Government procurement programmes involving goods and services resulting from local R&D.

Products & services with MYSTI logo & certificate are prioritized in government procurement process. Additional merit point to the government's tender

MySTI Implementation by MOF



01

MySTI refers to locally developed products or services resulting from research and development (R&D) activities, certified with the official MySTI logo by MOSTI.

02

Each Ministry is required to achieve an annual KPI of at least 5% of its total mapped procurement value from MySTI-certified products or services.

03

Possession of a MySTI certification provides a 10% additional score in the financial evaluation stage of tenders, offering a significant competitive advantage.

04

Prototype MySTI products may be procured through direct negotiation under specific conditions approved by the relevant authorities, facilitating faster adoption of innovative local solutions.

Pindaan PK1.4
Dasar Bahan,
Barangan dan
Perkhidmatan
Tempatan dalam
Perolehan
Kerajaan

Track Record



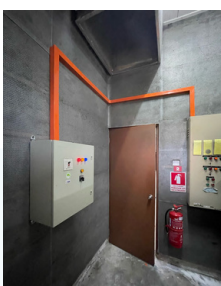
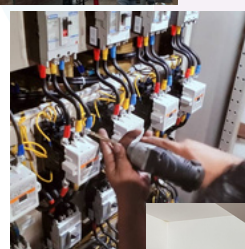
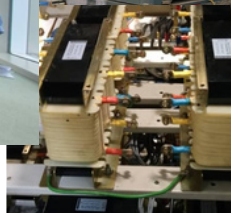
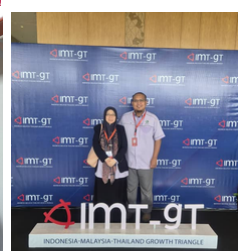
Bina Tenaga Energy Sdn Bhd (BTE) is a Malaysian engineering company with more than a decade of experience specialising in Power Factor Correction Systems (PFCS) and electrical system optimisation for TNB Non-Domestic consumers across Malaysia.

BTE has successfully delivered projects for Commercial, Industrial, Institutional, Religious, and Utility sectors including factories, manufacturing plants, office buildings, universities, hospitals, mosques, commercial shophots, and utility facilities. Our experience enables us to provide practical and reliable solutions tailored to various operational and electrical requirements.

We specialise in the design, installation, retrofitting, restoration, testing, commissioning, and upgrading of PFCS-Binatenaga capacitor bank panels and electrical optimisation systems aimed at improving power quality, reducing TNB surcharge penalties, enhancing voltage stability, and increasing overall system efficiency and reliability.

Through proven engineering practices and customised optimisation strategies, BTE consistently achieves sustainable power factor improvements ranging from 0.96 to 1.00, helping clients reduce operational losses and improve energy efficiency.

Supported by recognised certifications including SIRIM, MyHIJAU, and MySTI, BTE continues to demonstrate strong technical capability, local technology expertise, and commitment towards reliable and sustainable energy-saving solutions throughout Malaysia.



POWER QUALITY IMPROVEMENT & POWER FACTOR CORRECTION FOR INDUSTRIAL WATER OPERATIONS



- SAMB is a reputable water utility company operating heavy industrial motors ranging from 150kW to 500kW in its water treatment and distribution systems. These motors are typically connected to 600A to 2000A MCCB breakers.
- Our project focuses on improving power quality across these motor systems by addressing power factor issues and optimizing electrical performance within the internal power distribution network.

CORE SERVICES

1. Power Logging & Assessment

- Detailed power quality analysis for each individual motor
- Monitoring active power, reactive power, and load characteristics
- Identifying inefficiencies and power factor issues



2. Custom PFC Panel Design & Fabrication

- Engineering and designing tailored Power Factor Correction (PFC) panels
- Fabrication based on specific motor operational requirements
- Integration with existing industrial electrical infrastructure



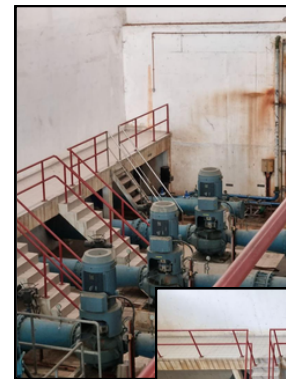
3. Installation, Termination & Commissioning

- On-site installation of PFC systems
- Electrical termination works
- Full system testing and commissioning



TECHNOLOGY APPLICATION

- Power quality analyzers and data logging systems
- Custom capacitor bank / PFC systems
- MCCB integration for large motor applications
- Reactive power compensation technology
- Solar power optimization through improved internal grid efficiency



PROJECT OBJECTIVES

- Improve overall energy efficiency of water operations
- Smooth active power flow across internal distribution grids
- Reduce harmful reactive power that can damage equipment
- Enhance solar energy absorption and utilization
- Decrease dependence on external grid power
- Lower operational energy costs
- Reduce carbon emissions through cleaner energy integration



PFC RETROFITTING, RESTORATION & UPGRADING WORKS

- Restoration and upgrading of 33 kV capacitor banks with 16 compartments
- Fabrication of panels and busbars
- Installation and retrofitting of MCCBs, PFRs, line reactors, and contactors
- Restoration of protective devices (earth fault relays, transformer coils, shunt trips)

Impact

- Restored operational reliability of 33 kV capacitor bank system (16 compartments functioning optimally)
- Improved power factor stability, reducing kVar losses and energy inefficiencies
- Enhanced electrical safety with renewed protective devices and control components
- Extended system lifespan through retrofitting instead of full replacement
- Reduced maintenance downtime and long-term operational costs



Results:

- PFCS compensation at low voltage outgoing level improved high voltage incomer PF from 0.914 to 0.945 within 7 weeks after upgrading 4 panels out of 16 panels.



Replacement
Upgrading
Capasitor Bank



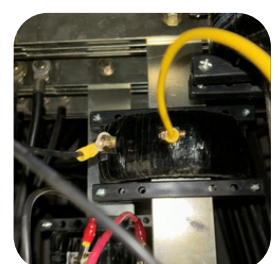
Replacement of
Contactor



Replacement of
Reactor



Rewiring Panel



Instal Protection
Relay



Replacement
Contactor &
MCCB



Thermal Infared
test



Megger Test



Protection
Relay Test



Result: PF increase to
optimum level @0.99

BINATENAGA PHASE-STAR Auto PFCS installation new panel

- Installed Power Factor Correction System (PFCS – Binatenaga) at a 34-storey commercial tower (Menara BIMB)



Impact

- Improved energy efficiency by stabilising power factor
- Reduced electrical losses and reactive power demand
- Optimised blower system performance and enhanced overall building load quality
- Contributed to long-term operational cost reduction for the commercial building



- Summary of Saving by Year**
 - Baseline Year - 2023
 - Baseline Consumption 2023 = 4,049,166 kWh

Year	Total Saving in kWh	% savings (12 months)	% saving (saving monthly only)	Total Saving in RM	% savings (12 months)	% saving (saving monthly only)
2024	109,527	2.65%	3.98%	83,266	3.00%	3.6%
2025	213,378	5.11%	6.82%	151,609	5.4%	5.9%
2026	73,209	7.24%	10.86%	51,585	7.43%	11.14%
Total Saving	396,114	4.52%	6.15%	286,461	4.84%	5.46%

COMPREHENSIVE POWER QUALITY STUDY, TESTING & INSPECTION CAPASITOR BANK PANEL

- The assessment focused on 2 Low Voltage capacitor bank compartments, performing Power Analyzer, Insulation & Megger to assess efficiency, system condition, and integration potential with the HT Incoming supply.



Impact

- Improved understanding of capacitor bank performance and efficiency
- Enabled optimisation of LV systems and integration with HT Incoming supply
- Provided data for energy management decisions and reduced operational risks

Data Logger Assessment



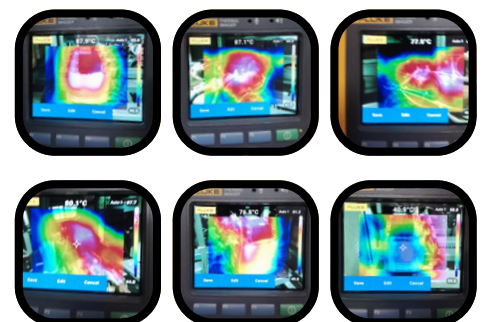
Insulation Resistance Assessment



Current Measurement Assessment



Infrared Thermography Inspection



Comprehensive Capacitor Bank Assessment

Comprehensive Report

REPORT

Installation of 4 Units BINATENAGA PHASE-STAR Auto PFCS, RETROFITTING & REPLACEMENT PARTS COMPONENTS for existing main capacitor bank



- Existing capacitor bank failed, causing PF surcharge penalties and PF worsened after solar PV installation.
- Installed 4 Units PFCS Panels at AHU outgoing panels and MSB 800A.
- Retrofitting and replacement of capacitor bank components completed.
- Implemented using Macro-Micro Integrated PFCS Technology.



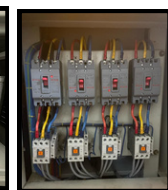
Unit 1-Ahu Room



Unit 2-Msb 800A

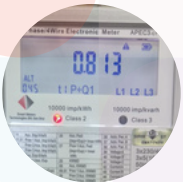


Unit 3 & 4 - Main Switch Room



Replacement Parts & Components of Existing Capacitor Bank

Results:



PF Overall increased from 0.813 to 0.999

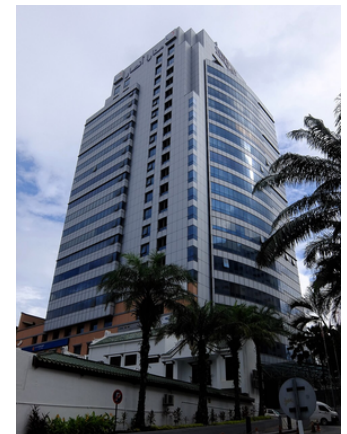


Menara Ansar, Waqaf Annur

Installation of 44 Units BINATENAGA PHASE-STAR Auto PFC Panels at AHU units 30HP & 50 HP

Purpose & Benefits:

- Corrects reactive power directly at the source (AHU motor)
- Reduces unnecessary current flow in cables
- Minimises power loss and cable heating
- Improves voltage stability for AHU operation
- Increases existing electrical distribution capacity
- Reduces overall building current demand
- Improves energy efficiency and motor performance
- Easier maintenance and troubleshooting



Results:

- Short ROI - 9 Months
- Power Factor (PF) improved from 0.95 to 0.98
- Stable and sustainable long-term PF performance



Installation of 19 Units BINATENAGA Auto PFC Panels at Solar Feed-In Points, Kem Lumut, Perak

Installed at various MSB points serving:

- Camps
- Sports complexes
- Administration buildings
- Mosques
- Schools
- Airforce buildings
- Other facilities



Purpose & Benefits:

- Mitigate power quality issues due to solar active power penetration
- Improve overall power factor performance
- Reduce High Fault Level (HFL)
- Minimise voltage swing and harmonics
- Reduce low power factor surcharge
- Protect equipment and facilities from excessive reactive power
- Improve overall electrical system stability and reliability

Chronology:

Presentation PFCS-
Binatenaga to Bahagian
Khidmat Pengurusan, &
Kewangan. Wisma
Pertahanan



“PFCS with MySTI
certification included in
MINDEF solar tender
requirements.”

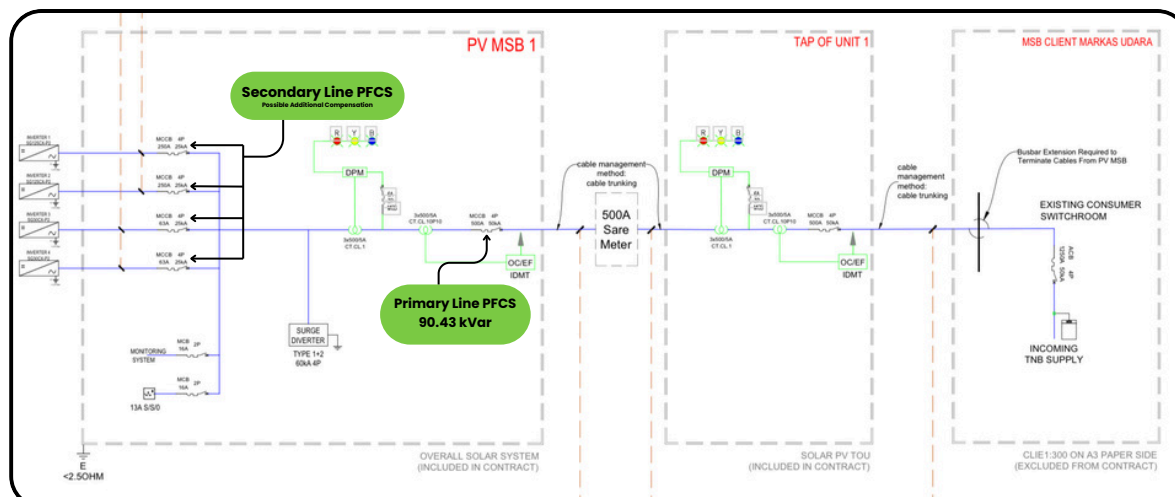


Being awarded through
the solar company under
MINDEF solar tender



(29 Nov 2023 & 8 Nov 2024)

- Retrofitting and upgrading works existing for capasitor bank panel
- Instalng new panel PFCS at secondary line



- Feed in point at Markas Udara - 426kwp
- Repair existing PFC Panel at Primary Line
- New panel PFCS- Binatenaga being install at secondary line

Markas Udara - 426 kwp. Total Capacity Solar 9883.01 kWh

BINATENAGA PHASE-STAR Auto PFCS & BINATENAGA Auto PFCS **Installation new panel**

- Installed 3 units Power Factor Correction System (PFCS) at outgoing point.
- Set operational timers to match mosque daily activities (early morning to night).
- Performed data logging and bill analysis to measure improvement.



Impact

- Eliminated power factor penalties helps the mosque maintain a healthier long-term budget
- Reduced unnecessary energy wastage, allowing the mosque to operate more efficiently throughout the day.
- Better optimisation of solar energy supports the mosque's effort toward sustainability and environmental responsibility.
- The mosque benefits from a more reliable, cost-saving, and sustainable energy setup.

Koito Malaysia Sdn Bhd

BINATENAGA PHASE-STAR Auto PFCS & BINATENAGA Auto PFCS **Installation new panel**

- PFCS Bina Tenaga has been installed at 5 outgoing units ranging between 250A-1000A (Air Compressor 1, Air Compressor 2, SSB-K1, SSB-K2 and CP-CA)



Impact

- PF increase from 0.96 to 0.98 (incoming & outgoing)
- Solar inverter set at 1.00
- The highest solar export in 10 month - 20,963 kWh
- Reactive demand falls to 24%
- The lowest kW recorded in 10 month - 1,100 kW

PFCS-Binatenaga Technology Impact at Robotic Machinery with Pneumatic System at 1000A outgoing level@ KOITO

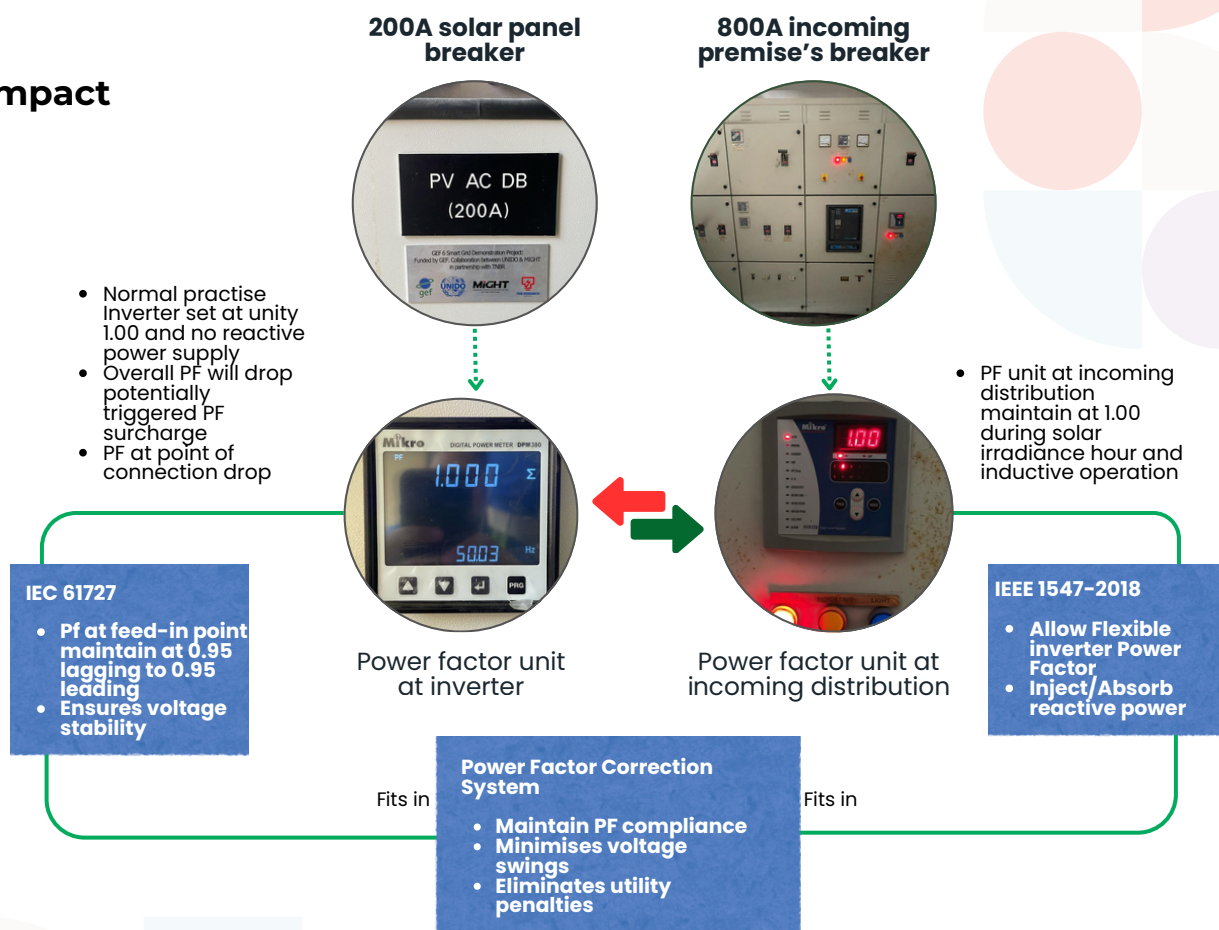


BINATENAGA PHASE-STAR Auto PFCS Installation new panel

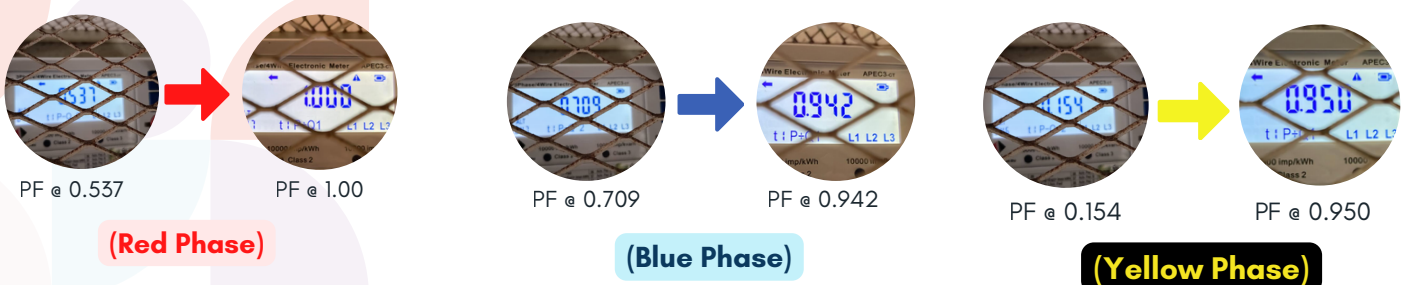


- Installed 4 units of Power Factor Correction System (PFCS) at outgoing points.
- Adjusted operational time settings to match college operating hours.
- System activated during weekdays and automatically switched off during weekends.

• Impact



- BTE's specialised PFCS technology improves individual phase stability and overall system power factor performance.





Bina Tenaga Energy
your power factor solution

Company Information

Company Name:

Bina Tenaga Energy Sdn Bhd

Founder:

Ts Muhammad Alamin Bin Muhamad

Nature of Business:

System Efficiency Technology Provider & System Integrator

Core Offering:

Power Factor Correction Systems (PFCS-Binatenaga)

Contact Information:

Office & Technology Centre:

No. 23 Jalan Silc 2/3, Kawasan Perindustrian Silc,

79200 Iskandar Puteri, Johor

Email: info@binatenaga.com.my

Tel: 07-6962525



Thank you

Certifications

SIRIM QAS INTERNATIONAL SDN BHD



SIRIM QAS International Sdn. Bhd.
(Company No.: 199601037981 (410334-X))
No. 1, Persiaran Dato' Menteri, P.O. BOX 7035, Section 2,
40700 Shah Alam, Selangor Darul Ehsan, Malaysia
Tel: 03-55446259
Fax: 03-55446272
www.sirim-qas.com.my

TEST REPORT

REPORT NO : 2022EA1665PAGE : 1 OF 29

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THIS TEST REPORT IS ISSUED IN SECURED PDF SOFTCOPY

Applicant : BINA TENAGA ENERGY SDN. BHD.
No. 27, Jalan SILC 2/1,
Kawasan Perindustrian SILC,
79200 Iskandar Puteri, Johor, MALAYSIA.

Manufacturer : Same as above.

Product : POWER FACTOR CORRECTION SYSTEM PANEL

Reference Standard / Method of Test : IEC 60670-1:2015

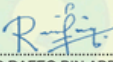
Description of sample : Brand: PFCS BINA TENAGA
Model / Type: PFCS-LCE-IC-2022-M
Rating: 3 phase 415 V, 300k VAR
IP: IP30

Job No. : J20221421459

Description of Test Results : COMPLIED (See page 2 for details)

Issued Date : 30 November 2022

Approved Signatory;



(HASBAR RAFAQ BIN ABD RAHMAN)
Testing Executive



(M.ZAMRI BIN MUSTAFFA)
Head
Electrical & Electronics 1 Section
Testing Services Department

Safety Test



SIRIM QAS International Sdn. Bhd.
(Company No.: 199601037981 (410334-X))
No. 1, Persiaran Dato' Menteri, P.O. BOX 7035, Section 2,
40700 Shah Alam, Selangor Darul Ehsan, Malaysia
Tel. no: 03-55446253 / 55446251
Fax. no: 03-55446272
www.sirim-qas.com.my

TEST REPORT

REPORT NO.: 2022EA0304PAGE : 1 OF 15

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THIS TEST REPORT IS ISSUED IN SECURED PDF SOFTCOPY

Applicant : BINA TENAGA ENERGY SDN. BHD.,
NO. 27, JALAN SILC 2/1,
KAWASAN PERINDUSTRIAN SILC,
79200, ISKANDAR PUTERI,
JOHOR, MALAYSIA.

Manufacturer : BINA TENAGA ENERGY SDN. BHD.,
NO. 27, JALAN SILC 2/1,
KAWASAN PERINDUSTRIAN SILC,
79200, ISKANDAR PUTERI,
JOHOR, MALAYSIA.

Product : POWER FACTOR CORRECTION SYSTEM

Reference Standard/ Method of test : Manufacturer Specification

Description of sample: Brand Name : PFCS Binatenaga
Model / Type : PFCS-LCE-IC-2022-M
Rating : 60A

Date received : 21 JANUARY 2022

Job No. : J20221420155

Overall test result : See page 2 for details

Issued date : 07 MARCH 2022

Approved Signatories :



(MOHAMAD ASNAN BIN AHMAD)
Senior Testing Executive



(M.ZAMRI BIN MUSTAFFA)
Head
Electrical & Electronic 1 Section
Testing Services Department

Performance Test

This certificate is issued for the Bina Tenaga Phase-Star APFCS (Micro) Power Factor Correction System.



KEMENTERIAN SAINS, TEKNOLOGI DAN INOVASI
MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

SIJIL MySTI
MySTI CERTIFICATE

adalah dengan ini diperakukan :
it is hereby certified that :

PFCS-Binatenaga Single Phase (Power Factor Correction System)

yang dikeluarkan / diedarkan / diuruskan oleh :
manufactured / distributed / managed by :

BINA TENAGA ENERGY SDN BHD

memenuhi syarat-syarat pensijilan barangan dan perkhidmatan
hasil penyelidikan dan pembangunan (r&d) tempatan.
**fulfils the terms and conditions for certification of
local research and development (r&d) products and services.**

Tarikh dikeluarkan / **Issuance date** : 02-July-2024
Sah sehingga / **Valid until** : 02-July-2027
No. siri / **Serial no** : MOSTI/2024/STI202400584



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This certificate is issued for the Bina Tenaga Phase-Star APFCS (Micro) Power Factor Correction System.



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MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

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MySTI CERTIFICATE

adalah dengan ini diperakukan :
it is hereby certified that :

PFCS-Binatenaga 3 Phase (Power Factor Correction System)

yang dikeluarkan / diedarkan / diuruskan oleh :
manufactured / distributed / managed by :

BINA TENAGA ENERGY SDN BHD

memenuhi syarat-syarat pensijilan barangan dan perkhidmatan
hasil penyelidikan dan pembangunan (r&d) tempatan.
***fulfils the terms and conditions for certification of
local research and development (r&d) products and services.***

Tarikh dikeluarkan / ***Issuance date*** : 02-July-2024
Sah sehingga / ***Valid until*** : 02-July-2027
No. siri / ***Serial no*** : MOSTI/2024/STI202400581

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This certificate is issued for the Bina Tenaga Phase-Star APFCS (Micro) Power Factor Correction System.



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it is hereby certified that :

PFCS-Binatenaga 3 Phase with PFR (Power Factor Correction System)

yang dikeluarkan / diedarkan / diuruskan oleh :
manufactured / distributed / managed by :

BINA TENAGA ENERGY SDN BHD

memenuhi syarat-syarat pensijilan barangan dan perkhidmatan
hasil penyelidikan dan pembangunan (r&d) tempatan.
**fulfils the terms and conditions for certification of
local research and development (r&d) products and services.**

Tarikh dikeluarkan / **Issuance date** : 02-July-2024
Sah sehingga / **Valid until** : 02-July-2027
No. siri / **Serial no** : MOSTI/2024/STI202400582

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This certificate is issued for the Bina Tenaga Phase-Star APFCS (Micro) Power Factor Correction System.