STRATEGY MEMORANDUM

INDONESIA EXPANSION

BASE THOUGHTS AND IDEAS

2026 – 2030

Natural Biogas, Bio-CNG & Industrial Chemicals Focus

Operating Entity: PT Citaglobal Capital International (CGIC)
Geographic Coverage: Java, Sumatra, Sulawesi

CONFIDENTIAL – FOR INTENDED AUDIENCE ONLY

EXECUTIVE SUMMARY

Indonesia stands at a pivotal moment in its economic and environmental trajectory. The country is experiencing a convergence of pressures and ambitions that creates an unprecedented opportunity for companies with the right capabilities, relationships, and strategic vision. Urban waste systems are overwhelmed, industrial energy demand is accelerating, and the government has declared its intention to fundamentally transform how the nation handles waste and produces clean energy.

This strategic memorandum positions Citaglobal's Indonesia expansion around **Natural Biogas, Bio-CNG, and Industrial Chemicals** as the primary output products—with **Perusahaan Gas Negara (PGN)** as the strategic gas offtaker. This approach aligns with Indonesia's national gas infrastructure development priorities and PGN's mandate to expand domestic gas utilisation.

The Danantara Programme

At the centre of this transformation is **Danantara Indonesia**, the newly established sovereign wealth fund tasked with mobilising capital for strategic national infrastructure. Danantara's flagship waste-to-energy (WtE) programme aims to develop up to **33 WtE plants across Indonesia**, with an estimated total investment requirement of **USD 5.5 billion**. At least seven to eight projects are targeted to break ground from 2026 onwards. Thought the main program is electric production, Biogas are also listes under the October 2025 latest presidential decree “Perintah Presiden” (PERPRES).

Under Citaglobal's biogas-focused model, relevance are potentially having plant sized to process approximately **1,000 tonnes of municipal solid waste per day**, producing an estimated **3–5 million Nm³/year of biogas** (upgradeable to biomethane/bio-CNG) and associated industrial chemicals including organic fertilisers, CO_2 for industrial use, and process chemicals. PGN serves as the primary gas offtaker, integrating biogas into Indonesia's national gas distribution network. Funding is being raised through "patriot bonds" subscribed by Indonesia's leading business families.

Rooftop Solar for C&I Electricity

The Ministry of Energy and Mineral Resources (MEMR) has established a formal **rooftop solar quota of 5,746 MW for 2024-2028**, structured as annual allocations rising from 901 MW in 2024 to 1,593 MW in 2028. This quota is aimed primarily at commercial and industrial (C&I) users generating on-site electricity. As of 2025, actual installed rooftop capacity remains far below these targets—representing a substantial untapped market for Citaglobal's solar business line.

ESG, SDG, and Carbon Market Momentum

Indonesia is simultaneously deepening its environmental, social, and governance (ESG) commitments and embedding sustainability into its economic framework:

- **Economic Value of Carbon (NEK) and ETS:** Indonesia has launched a mandatory emissions trading system for the power sector, initially covering coal plants of 25 MW and above, with an initial cap of approximately 256.8 $MtCO_2e$ in 2024. The national carbon

exchange, IDXCarbon, launched in 2023 and provides an emerging domestic reference price for carbon.
- **Green Bond and Green Sukuk Framework:** Established in 2018, this framework explicitly lists renewable energy, waste-to-energy, waste management, and landfill rehabilitation as eligible "green" project categories. Indonesia has already mobilised several billion US dollars under this framework.
- **International Carbon Trading:** Indonesia has resumed international carbon trade under its national framework in 2025, with plans to position itself as a major supplier of high-quality carbon credits, particularly in the lead-up to COP30 in 2025.

Corporate Momentum

Major Indonesian corporates are already moving, demonstrating real demand for the solutions Citaglobal offers:

- **Astra Agro Lestari:** Investing Rp 400 billion (approximately USD 24 million) in 10 methane capture facilities at its palm oil mills. Each facility is expected to reduce emissions by approximately 35,000 tCO_2e per year, with total potential reductions of 356,000 tCO_2e by 2030. The captured biogas replaces diesel and coal in operations, reducing emissions by 60-70% at some sites. *This biogas production aligns directly with PGN's bio-CNG offtake interest.*
- **Semen Indonesia Group (SIG):** Already using refuse-derived fuel (RDF) from municipal waste facilities in East Java—specifically from TPST Belahanrejo and TPST Ngipik (each processing approximately 200 tonnes per day)—as alternative fuel for its cement kilns in Tuban, replacing coal.
- **Indofood Sukses Makmur:** Commenced operation of a rooftop solar PV system at its Bogasari flour mill in Jakarta in November 2025, as part of its broader decarbonisation and cost-management initiative. Notably, energy audits of Indofood's facilities show that approximately 85% of energy consumption is thermal (steam and boilers), highlighting the massive opportunity for biomass-to-heat and biogas solutions.
- **Wilmar and SMART (Sinar Mas Agro Resources and Technology):** Both have implemented POME methane capture and are formalising biogas as a commercial product line—not just an internal waste treatment system. In May 2025, SMART notified shareholders of plans to add biogas production and sales as a formal business activity, *with potential PGN offtake integration under discussion.*
- **Unilever Indonesia and Nestlé Indonesia:** Both are installing rooftop solar at manufacturing facilities as part of their decarbonisation strategies, with Unilever's Green Building programme at Grha Unilever (BSD City) achieving renewable energy use of up to 8% of electricity and cutting consumption by 32%.
- **Cikarang Listrindo:** This major private utility serving industrial estates around Jakarta has commenced rooftop solar deployment and biomass co-firing for industrial estate clients, confirming that estate-level customers accept these technologies.

Citaglobal Four Business Lines

These trends align directly with Citaglobal's four proposed business lines, each of which is not merely theoretical but is anchored in demonstrable market demand:

1. **Industrial / Biomass Steam & Heat Solutions:** Steam, hot oil, and process heat for cement, food, paper, textiles, and chemicals—where thermal energy often represents 85% of facility energy consumption.
2. **Commercial & Industrial Rooftop Solar:** Zero-capex and power purchase solutions for factories, industrial parks, warehouses, and logistics centres (electricity output).

3. **Bioenergy, Biogas / Bio-CNG & Industrial Chemicals:** POME-to-biogas, biomethane upgrading, bio-CNG production, and industrial chemicals (organic fertilisers, CO_2) for palm estates and agro-processing clusters—**with PGN as the primary gas offtaker.**
4. **Municipal & Biomass Waste-to-Biogas/Chemicals (WtE):** Biogas-producing WtE plants with biomethane injection into PGN's gas network, plus waste-derived chemicals and RDF for industrial off-takers.

SDG Alignment

Citaglobal's Indonesia expansion directly advances multiple Sustainable Development Goals:

- **SDG 7 (Affordable and Clean Energy):** Through solar, biomass, biogas, and bio-CNG deployment.
- **SDG 11 (Sustainable Cities and Communities):** Through WtE and modern waste management systems.
- **SDG 12 (Responsible Consumption and Production):** Through waste minimisation, RDF production, industrial chemicals recovery, and circular economy approaches.
- **SDG 13 (Climate Action):** Through methane capture, carbon reductions, and potential carbon credit generation.

The Success Sequence

Success in Indonesia will not be a function of opportunity alone—Indonesia is full of opportunities that many companies fail to convert. The advantage lies in how Citaglobal sequences its actions, following a disciplined chain:

Opportunity → Focus → Relationship → Process → Capital → People

- **Opportunity:** Policy alignment (Danantara, RUPTL, rooftop quotas, PGN gas infrastructure expansion), capital mobilisation (patriot bonds, green sukuk), and corporate demand are visible today.
- **Focus:** Concentration on four well-defined business lines where Citaglobal has existing competence—avoiding dilution into unrelated utilities or speculative technologies.
- **Relationship:** Systematic engagement with municipalities, industrial groups, PGN, estates, and Danantara-linked entities—building long-term ties rather than chasing one-off projects.
- **Process:** Match least resistant business realization route project screening, structuring, and execution with clear stage gates for feasibility, MoU, and FID; standardised SPV structures and contracts.
- **Capital:** Alignment with green financing (Danantara, green sukuk, ESG lenders, climate funds, carbon credit buyers), blending Citaglobal's balance sheet with local and international capital sources.
- **People:** A blended Malaysia-Indonesia team supported by experienced regional guidance with deep understanding of both markets.

Why Acting Before 2030 Is Critical

The period up to 2030 represents a strategic window that will not remain open indefinitely:

- Many long-term waste concessions, gas supply agreements with PGN, and feedstock rights will be locked for 20-30 years once Danantara-backed projects, SOEs, and early private operators secure agreements.

- Most WtE, bioenergy, and industrial energy projects developed between now and the early 2030s will have 25-30 year lifetimes, taking them close to 2060—Indonesia's net-zero target.
- By the late 2030s, the major waste concessions, prime industrial energy contracts, PGN biogas supply slots, and best carbon project sites will likely be allocated to early movers.
- Global and domestic carbon credit markets are expected to be far more mature by then, with clearer price signals and tighter quality standards—benefitting projects that were structured correctly from the start.

Put simply: Before 2030-2035, Citaglobal can shape the market. By 2030, Citaglobal wants to be sitting on a mature, yielding portfolio of biogas, bio-CNG, chemicals, and solar assets—not still trying to enter as a newcomer.

1. CONTEXT: WHY INDONESIA, WHY NOW

Indonesia's energy and waste systems are under simultaneous and intensifying pressure. This creates a landscape of converging challenges—and opportunities—that is uniquely suited to Citaglobal's integrated capabilities.

1.1 The Energy Demand Trajectory

Indonesia is ASEAN's largest energy market, with electricity consumption growing at 4-6% annually. The country's population exceeds 275 million, and industrialisation continues to accelerate across Java, Sumatra, and Sulawesi. Over 60% of industrial load is concentrated in Java, where manufacturing hubs in Greater Jakarta, Bekasi, Karawang, Tangerang, Bandung, Semarang, and Surabaya create dense demand clusters.

Industrial estates are increasingly demanding renewable and alternative heat sources. Factories across sectors—food processing, textiles, chemicals, paper, and oleochemicals—rely heavily on thermal energy (steam, hot oil, process heat), often representing 85% or more of total facility energy consumption. This thermal load presents a natural fit for biomass, biogas, and hybrid energy solutions.

Critically, **Perusahaan Gas Negara (PGN)** is expanding its gas distribution network and actively seeking new biogas and biomethane supply sources to meet growing industrial gas demand and support Indonesia's energy transition. This creates a strategic alignment between Citaglobal's biogas production capabilities and PGN's offtake requirements.

1.2 The Waste Management Crisis

Indonesia generates approximately **35 million tonnes of waste annually**, with approximately **61% improperly managed**. Over 200 landfills across Java, Sumatra, and Sulawesi are nearing or have exceeded capacity. Cities including Jakarta, Bandung, Semarang, Surabaya, Makassar, and Medan face severe leachate problems, odour complaints, and uncontrolled dumping. Local governments are actively seeking credible WtE partners who combine engineering depth with environmental governance. The crisis has now become a priority for national action. Government mandates for WtE, provincial waste management targets, and capacity gaps create an environment where the demand for Citaglobal's biogas and chemicals solutions is not merely present—it is urgent and underserved.

1.3 Biomass Abundance

Indonesia is the global epicentre of palm oil production, with over **17 million hectares of palm plantations**. These operations generate enormous quantities of biomass: empty fruit bunches (EFB), palm fibres, shells, and palm oil mill effluent (POME). Much of this material remains untapped for energy generation, representing a vast opportunity for biogas, biomethane, bio-CNG, industrial chemicals, and industrial heat solutions. Industries across Sumatra, Kalimantan, and Sulawesi require high-pressure steam, thermal energy, and industrial gas—all of which can be supplied through biomass and biogas solutions with PGN integration for gas distribution.

1.4 Policy Alignment

Indonesia's policy frameworks now explicitly support renewable energy, bioenergy, and WtE:

- **National Energy Policy (KEN):** Commits Indonesia to 23% renewable energy in the primary energy mix by 2025 and at least 31% by 2050, with net-zero targeted by 2060.
- **National Energy Plan (RUEN):** Positions bioenergy, WtE, biogas, and solar PV as priority renewable resources.
- **RUPTL 2025-2034:** The Electricity Supply Business Plan targets approximately 453 MW of WtE capacity addition at an estimated cost of USD 2.7 billion, aligned with Danantara's programme. It also embeds the rooftop solar quota framework.
- **MEMR Regulation No. 2/2024:** Restructures rooftop solar through a quota system designed to accelerate deployment while protecting grid stability.
- **National biofuels trajectory:** Indonesia is preparing mandatory E10 bioethanol blending by 2027, requiring approximately 1.4 million kL of ethanol annually and pushing local production from sugarcane, cassava, and corn.
- **PGN Gas Infrastructure Expansion:** PGN is mandated to expand domestic gas utilisation and is actively seeking biogas/biomethane suppliers to integrate into national gas distribution—creating a structured offtake pathway for Citaglobal's gas production.

All four of Citaglobal's focus areas sit inside the official policy "lane"—Citaglobal is not pushing fringe technology but riding a funded, mandated wave of national transformation.

1.5 The Danantara Programme and PGN Integration

The creation of Danantara Indonesia—a Khazanah/Temasek-style sovereign fund managing state assets and raising "patriot bonds" from Indonesia's leading conglomerates—has unlocked a dedicated pool of capital for strategic infrastructure:

- **33 WtE plants planned nationwide**, with total investment estimated at USD 5.5 billion.
- At least **7-8 plants targeted to start construction in 2026** as the first wave, primarily in Jakarta, other Javanese cities, and Bali.
- Each plant sized at **approximately 1,000 t/day waste input**, producing **3–5 million Nm³/year of biogas** (upgradeable to biomethane for PGN injection), plus industrial chemicals including organic fertilisers and CO_2. Although Electricity took center stage, Biogas is recognised as national energy program.
- Estimated capex per plant of approximately **USD 180 million**.
- Funding through "patriot bonds" targeting approximately **Rp 50 trillion (approximately USD 3 billion)**, subscribed by Indonesia's business elite.
- **Open, competitive tender processes** coordinated with the Ministry of Energy and Mineral Resources.

This programme provides a structured, visible roadway to capture opportunities. Businesses and Municipalities are now actively welcoming companies who can combine engineering depth with environmental governance, and the procurement framework is becoming increasingly transparent.

2. FOUR BUSINESS LINES ANCHORED IN REAL DEMAND

Citaglobal's Indonesia strategy centres on four business lines. Each is not merely theoretically attractive—each is already visible in the behaviour and investment patterns of Indonesia's largest companies.

2.1 Industrial / Biomass Steam & Heat Solutions

The Opportunity

In many Indonesian factories, boilers, kilns, and thermal systems represent the bulk of energy consumption—often 85% or more. Food processing, cement, paper, textiles, chemicals, and oleochemicals all rely heavily on steam and high-temperature heat. This thermal load is where the greatest decarbonisation opportunity exists, and where biomass, RDF, biogas, and alternative fuels provide immediate value.

Concrete Demand Signals

- **Semen Indonesia Group (SIG):** Indonesia's largest cement producer has entered into formal cooperation with Gresik Regency Government to utilise RDF from two municipal waste management sites—TPST Belahanrejo and TPST Ngipik (each approximately 200 t/day)—as alternative fuel for its Tuban cement plant, displacing coal.
- **Solusi Bangun Indonesia (SBI):** Has begun receiving RDF from facilities like Sumenep to fuel its operations, demonstrating broader cement sector adoption.
- **Semen Padang and Semen Baturaja:** Both are systematically increasing alternative fuels (AFR) and biomass shares in their fuel mix to reduce coal dependence.
- **Semen Merah Putih:** Actively exploring alternative fuels including sludge oil, spent bleaching earth, and industrial waste to replace coal.
- **Cikarang Listrindo:** This private utility powering major industrial estates in West Java has implemented biomass co-firing in CFB boilers as part of its clean energy strategy.
- **Indofood:** Energy audits show that approximately 85% of plant energy use is thermal (steam/boilers) versus 15% electricity. Their decarbonisation strategy explicitly recognises that reducing fossil-based thermal energy is the key to emissions reduction.
-

Citaglobal's Proposition

- Offer biomass, RDF-based (to a lesser extend), and biogas-fuelled steam/heat contracts to cement and industrial clients.
- Combine feedstock sourcing, fuel processing, and boiler systems into long-term energy-as-a-service contracts.
- Tie offerings into ESG reporting and future carbon pricing—lower emissions intensity, potential eligibility for carbon credits, and compliance with future carbon tax/ETS regimes.
- Develop integrated packages where Citaglobal invests in boilers and fuel infrastructure while clients pay capacity and consumption tariffs.

2.2 Commercial & Industrial Rooftop Solar (Electricity)

The Opportunity

The rooftop solar landscape is defined by two key realities: strong policy support through a multi-GW quota framework, and persistently low penetration relative to targets. This gap between national ambition and actual deployment represents a substantial pipeline of untapped projects.

- **Quota framework:** MEMR's rooftop solar quota sets 5,746 MW for 2024-2028, with annual quotas: 901 MW (2024), 1,004 MW (2025), 1,065 MW (2026), 1,183 MW (2027), and 1,593 MW (2028).
- **Installed capacity gap:** As of end-2023, only approximately 140 MW was installed against a 3.6 GW target by 2025—a massive under-penetration that represents BD opportunity.

Concrete Demand Signals

- **Indofood:** Started operating rooftop solar PV at its Jakarta flour mill in November 2025, signalling genuine capex commitment.
- **Unilever Indonesia and Nestlé Indonesia:** Both referenced in decarbonisation reports as early adopters of factory rooftop solar. Unilever's Green Building programme achieves renewable energy use of up to 8% and 32% electricity reduction.
- **Cikarang Listrindo:** Moving into rooftop solar for industrial estate clients, confirming estate-level acceptance.
- **Sinar Mas Land:** Has installed solar panels across commercial buildings and BSD City township, planning expansion across its portfolio.

Citaglobal's Proposition

- Zero-capex power purchase agreements for factories, industrial parks, warehouses, and logistics centres.
- Solar + battery options for enhanced reliability.
- Hybrid energy contracts: solar + steam/heat packages for food processing, textiles, and other thermal-intensive industries.
- ESG and green financing alignment: rooftop solar projects are classic candidates for green loans, sustainability-linked loans, and green sukuk allocations.
- Future carbon pricing protection: displacing coal-based grid electricity reduces exposure to ETS/carbon tax costs.

Target regions: Java's industrial corridors (Greater Jakarta, Bekasi, Karawang, Tangerang, West Java, East Java), followed by selected Sumatra nodes (Medan, Batam, Palembang) and Sulawesi industrial clusters.

2.3 Bioenergy, Biogas / Bio-CNG & Industrial Chemicals

The Opportunity

Indonesia's bioenergy potential is anchored in its palm sector and agro-industrial base. Palm oil mills generate enormous quantities of POME, which—when properly captured—produces methane that can be converted to biogas, biomethane, or bio-CNG for industrial heat, transport fuel, or **injection into PGN's gas distribution network**. Additionally, the biogas upgrading process produces industrial chemicals including high-purity CO_2 and organic fertilisers. This is not a future opportunity; major players are already investing at scale.

Concrete Demand Signals

- **Astra Agro Lestari (AALI):** Committed to 30% emissions reduction by 2030, investing Rp 400 billion (approximately USD 24 million) in 10 methane capture facilities. Each unit targets approximately 35,000 tCO_2e reduction per year, with total potential reduction of 356,000 tCO_2e by 2030. Biogas replaces diesel and coal in operations, achieving 60-70% emissions reduction at some sites. *PGN offtake discussions are underway for biomethane integration.*

- **Wilmar:** Has long deployed methane capture from POME at mills in Indonesia and Malaysia, using recovered biogas for on-site applications and exploring grid injection.
- **SMART (Sinar Mas Agro Resources and Technology):** In May 2025, notified shareholders of plans to add biogas production and sales as a formal business activity—signalling a shift from "internal waste treatment" to "marketable energy product" *with PGN as potential anchor offtaker.*
- **Pekanbaru (Riau, Sumatra):** Recent techno-enviro-economic studies evaluate POME-derived bio-CNG for public transport and PGN network injection, demonstrating technical and economic viability.
- **National bioethanol trajectory:** Indonesia preparing mandatory E10 bioethanol blending by 2027, requiring 1.4 million kL/year of ethanol—pushing biomass-based liquid fuels as a major growth area.

Citaglobal's Proposition

- **POME Biogas and Biomethane Plants:** Design, EPC, and optimisation of biogas systems at mills; support upgrading to biomethane or bio-CNG for PGN network injection.
- **Industrial Chemicals Production:** Recover and market CO_2 (food-grade and industrial-grade), organic fertilisers, and process chemicals from biogas upgrading.
- **PGN Gas Supply Agreements:** Structure long-term biomethane/bio-CNG offtake agreements with PGN for network injection and distribution.
- **Bio-CNG for Transport and Industry:** Supply compressed biogas for industrial boilers, vehicle fleets, municipal bus systems, or industrial clusters.
- **Carbon and Green Finance Integration:** Link projects to carbon markets (potential for certified emissions reductions) and green financing (eligibility for green sukuk/green bond capital).
- **Hybrid Solutions:** Combine solar, biogas, and biomass to serve industrial estates and agro-processing zones with integrated energy packages.

Target regions: Sumatra (Riau, North Sumatra, South Sumatra—dense palm operations) and Sulawesi (palm and agro-industrial clusters).

2.4 Municipal & Biomass Waste-to-Biogas/Chemicals (WtE)

The Opportunity

Municipal WtE has moved from experimental pilots to national strategic priority. The Danantara programme provides a visible, bankable pipeline of projects with structured offtake through PGN and sovereign co-investment.

- **33 WtE plants planned nationwide** under Danantara, estimated investment of USD 5.5 billion.
- **First wave: at least 7-8 projects in Jakarta and other Javanese/Bali cities**, with open competitive tender processes and **PGN as primary gas offtaker**.
- **Each plant: approximately 1,000 t/day of waste input**, producing **3–5 million Nm³/year of biogas** (upgradeable to biomethane) plus industrial chemicals, estimated capex approximately USD 180 million per plant.
- Indonesia generates approximately 35 million tonnes of waste annually, with 61% improperly managed—providing strong environmental and public health justification.
-

Output Products

Under Citaglobal's biogas-focused WtE model, primary outputs include:

- **Biomethane/Bio-CNG:** Upgraded biogas meeting PGN pipeline specifications for network injection and distribution to industrial and commercial users.
- **Industrial CO_2:** High-purity carbon dioxide for food & beverage, welding, chemicals, and agricultural applications.
- **Organic Fertilisers:** Digestate and compost products for agricultural markets.
- **RDF (Refuse-Derived Fuel):** For sale to cement and industrial clients as alternative fuel.

The Waste-to-Fuel Parallel Opportunity

Beyond biogas-focused WtE, there is an established "waste-to-fuel" segment where RDF is sold directly to industrial clients:

- **SIG's Gresik-Tuban model:** Municipal TPST facilities produce RDF that is purchased directly by cement plants as alternative fuel.
- **Solusi Bangun Indonesia:** Receiving RDF from Sumenep to fuel its Tuban plant.
- **Industry associations:** Have visited Indonesia's first large-scale RDF facilities as showcases for wider rollout.

This creates **multiple revenue models for WtE: selling biogas/biomethane to PGN, selling industrial chemicals to commercial buyers, and/or selling RDF to industrial off-takers.**

Strategic Feedstock Considerations

WtE is not only a gas or chemicals business—it is fundamentally about strategic feedstock control and future carbon positioning:

- **Waste feedstock is finite in each city.** Once Danantara-backed projects, SOEs, and early private operators lock in long-term concession agreements (often 20-30 years), the ability to structure new WtE or waste-to-fuel projects with robust feedstock becomes much more limited.
- **Acting now** allows Citaglobal to secure priority access to landfill sites and waste streams in selected cities, integrate feedstock agreements into SPVs from the start, and position as the anchor operator rather than a second-tier off-taker.
- WtE plants contribute to GHG reductions by avoiding methane from landfills, positioning projects for compliance or voluntary carbon credits and green financing.

Citaglobal's Proposition

- **Biogas-Focused WtE Plants:** Integrated with PGN for gas offtake and Danantara for project development, using proven technologies (LAWI systems, SUS integrated WtE).
- **Chemicals Production Facilities:** Co-located industrial chemicals production (CO_2, fertilisers) for additional revenue streams.
- **Waste-to-Fuel Facilities:** Converting MSW and biomass into RDF or similar fuels for sale to cement and other industrial clients.
- **Delivery models:** BOT, BOO, PPP structures with long-term concessions.
- **Carbon integration:** Design projects from the start to be MRV-ready for carbon markets.

Target regions: Java (Bandung, Surabaya, Jakarta, Semarang), Sumatra (Medan, Pekanbaru), Sulawesi (Makassar).

WASTE TO ENEREGY
WASTE TO FUEL
WASTE TO CHEMICAL

2.5 Potential Technology & Solution Offerings

The technologies form an integrated technology stack that covers the full waste-to-biogas-to-chemicals value chain aligned with PGN offtake and Citaglobal's four business lines.

#	Technology	Primary Output	Application
1	**Solar PV Systems** (Rooftop, Building Facade, Carport)	Electricity	C&I rooftop solar for factories, warehouses, industrial estates
2	**Battery Energy Storage Systems (BESS)**	Stored Electricity	Grid stability, peak shaving, solar intermittency management
3	**Thermal WtE – Moving Grate Combustion Systems**	Biogas/Steam/Heat	Municipal solid waste processing with multi-fuel flexibility (90%+ thermal efficiency)
4	**Non-Thermal WtE – Anaerobic Digestion (AD) Systems**	Biogas/Digestate	POME treatment, food waste, agricultural waste—produces raw biogas for upgrading
5	**Biogas Upgrading Systems** (PSA, Membrane Separation, Water Scrubbing, Amine Scrubbing)	Biomethane (97%+ CH_4)	Converting raw biogas to pipeline-quality gas for PGN injection
6	**Bio-LNG / Liquefied Biomethane Production**	Liquefied Biomethane	Long-distance transport, industrial fuel replacement, export
7	**Bio-CNG Compression & Dispensing Systems**	Compressed Biogas	Vehicle fuel (municipal fleets, trucks), industrial boiler fuel
8	**Industrial CO_2 Recovery & Purification**	Food-grade/Industrial CO_2	Beverages, welding, dry ice, urea production, greenhouse enrichment
9	**RDF Processing & Pelletization Systems**	Refuse-Derived Fuel	Alternative fuel for cement kilns, industrial boilers (SIG, SBI offtake)
10	**Composting & Organic Fertiliser Production**	Organic Fertiliser/Compost	Digestate processing, agricultural markets, circular economy

Existing Offering from partners ecosystem are:

- **Moving Grate Combustion** – Multi-fuel systems achieving 90%+ thermal efficiency, suitable for MSW and biomass
- **Anaerobic Digestion** – Large-scale systems producing 100,000+ m³/day biogas from organic waste
- **Bio-LNG Production** – Liquefied biomethane at 130 t/day scale for regional distribution
- **Smart Incineration** – Real-time carbon monitoring and AI-optimised combustion control
- **Eco-Industrial Park Integration** – Co-location of WtE, wastewater treatment, and materials recovery

Offtake Sell Chain are depicted in a simple from as below:

Feedstock → Anaerobic Digestion → Raw Biogas → Upgrading (PSA/Membrane/Scrubbing) → Biomethane → PGN Network

↓ ↓

CO_2 Recovery Bio-CNG/Bio-LNG

↓

Industrial Chemicals

3. REGIONAL OPPORTUNITY MAP: JAVA, SUMATRA, SULAWESI

Each target region presents distinct characteristics, demand patterns, and entry strategies. Citaglobal's regional approach is tailored to local market conditions.

3.1 Java — Grid, Industry, Biogas & WtE Anchors

Java is the industrial heartland of Indonesia, concentrating over 60% of the country's industrial load. It is also the epicentre of Indonesia's urban waste crisis and the primary focus of Danantara's first-wave WtE rollout, with PGN's most developed gas distribution infrastructure.

Key Characteristics:

- Major manufacturing demand in food, FMCG, textiles, chemicals, and logistics across Greater Jakarta, Bekasi, Karawang, Tangerang, Bandung, Semarang, and Surabaya.
- Multiple planned Danantara WtE plants in Jakarta, Bandung, Surabaya, and other cities—all with PGN gas offtake potential.
- Cement clusters (Tuban, Gresik, Cilacap, Sumenep) actively consuming RDF and alternative fuels.
- Under-utilised PLTS Atap quota with only approximately 140 MW installed against multi-GW targets.
- Well-developed PGN gas distribution network enabling biogas/biomethane injection.

Citaglobal's Java Play

- Bid into Danantara/municipal WtE tenders (Jakarta, Surabaya, Bandung, others) with biogas/chemicals output focus.
- Develop C&I rooftop solar portfolios for manufacturers and industrial estates.
- Supply RDF/biomass fuels and/or steam to cement and industrial utilities.
- Structure PGN gas supply agreements for biogas/biomethane from WtE plants.

3.2 Sumatra — Biomass and Palm-Led Bioenergy

Sumatra is Indonesia's biomass powerhouse, with dense palm oil operations generating enormous quantities of EFB, POME, and palm waste. It also hosts cement players actively transitioning to alternative fuels and PGN expansion into regional gas distribution.

Key Characteristics

- Dense palm oil operations in Riau, North Sumatra, and South Sumatra.
- Palm majors (Astra Agro, Wilmar, SMART) investing in methane capture and biogas production with PGN offtake interest.
- Cement players (Semen Padang, Semen Baturaja) actively exploring alternative fuels.
- Municipal interest in POME-based bio-CNG and energy solutions (Pekanbaru studies).

Citaglobal's Sumatra Play

- POME biogas/biomethane projects with agro-industrial players, structured for PGN offtake.
- Biomass and RDF supply contracts to cement and industrial clusters.
- Smaller, regionally targeted WtE or waste-to-fuel projects for provincial capitals (Medan, Pekanbaru, Palembang).

- C&I rooftop solar for agro-processing and manufacturing clusters.
- Industrial chemicals (CO_2, fertilisers) production from biogas upgrading.

3.3 Sulawesi — Emerging Bioenergy Cluster

Sulawesi represents a second-wave opportunity where models proven in Java and Sumatra can be replicated.

Key Characteristics

- Palm and agro-processing clusters requiring heat and gas (Astra Agro, London Sumatra operations).
- Opportunities for C&I solar and biomass steam in industrial estates.
- Early-stage bioenergy (biogas, bio-CNG) for local fleets and factories.

Citaglobal's Sulawesi Play

- Replicate Java/Sumatra biomass steam and bioenergy models.
- Develop C&I solar for agro-processing and manufacturing.
- Explore municipal WtE in Makassar as the region develops.
- Position for future PGN network expansion into the region.

4. B2B AND B2G SEGMENTS: WHO WE SERVE

Citaglobal's Indonesia strategy is intentionally two-sided, addressing both private industrial demand and public sector waste/energy needs.

4.1 Business-to-Business (B2B)

Target customers:

- **Cement producers:** Semen Indonesia Group, Solusi Bangun Indonesia, Semen Padang, Semen Baturaja, Semen Merah Putih
- **Food & FMCG manufacturers:** Indofood, Unilever Indonesia, Nestlé Indonesia, and their supplier networks
- **Palm & agro-industrial groups:** Astra Agro Lestari, Wilmar, SMART, London Sumatra, and their mill clusters
- **Industrial utilities and estate developers:** Cikarang Listrindo, industrial estate operators in Bekasi, Karawang, Tangerang, Batam
- **Logistics hubs and cold storage:** Warehouse operators, distribution centres, cold chain facilities
- **Gas utilities:** Perusahaan Gas Negara (PGN) as primary gas offtaker

Services offered:

- Rooftop solar with zero-capex power purchase agreements
- Biomass/steam and thermal energy contracts
- Biogas, biomethane, and bio-CNG supply (via PGN or direct)
- Industrial chemicals (CO_2, organic fertilisers)
- RDF and alternative fuel products
- Hybrid solutions that optimise both gas/thermal and electricity

4.2 Business-to-Government (B2G)

Target customers:

- Municipal governments (DKI Jakarta, Bandung, Surabaya, Semarang, Medan, Makassar)
- Provincial governments
- Region-level waste management units
- State-owned entities involved in waste and energy (including PGN)

Services offered:

- WtE plants (biogas-focused with PGN offtake or waste-to-fuel)
- Waste facility management
- Landfill rehabilitation and conversion projects
- RDF processing and materials recovery facilities
- Industrial chemicals production (CO_2, fertilisers)

This dual orientation increases resilience, broadens the project pipeline, and positions Citaglobal as a comprehensive solutions provider rather than a single-product vendor.

5. GO-TO-MARKET: FOUR GROWTH CHANNELS

To convert opportunity into assets, CGIC will deploy four complementary channels:

5.1 Business Development

- Direct, relationship-driven engagement with industrial and municipal decision-makers.
- Opportunity scouting in industrial clusters, industrial parks, and high-priority cities.
- Engagement with mayors, regents, BUMD companies, PGN regional offices, and industry associations (e.g., GAPKI for palm).
- Energy efficiency audits leading to solar + steam + biogas hybrid proposals.

5.2 Program Development

Province-by-province programmes that bundle multiple projects:

- "West Java Clean Energy, Biogas & Waste Program"
- "East Java Industrial Decarbonisation & Biogas Program"
- "North Sumatra Biomass, Biogas & Chemicals Program"
- "Central Java Industrial Steam & Bio-CNG Program"
- "Sulawesi Bioenergy & Chemicals Development Program"

Each programme brings solar + biomass + biogas + chemicals under one coherent regional strategy, creating operational efficiencies and relationship depth.

5.3 Project Buy-Out & Acquisition

- Acquisition of small existing solar EPCs for immediate market access.
- Buy-out of biomass/steam and biogas operators with established customer relationships.
- Acquisition of WtE project SPVs or feasibility rights.
- Take-over of waste facility operators to accelerate portfolio density.

5.4 Tender Participation

- Danantara and Ministry-backed tenders for WtE plants with PGN gas offtake.
- Municipal tenders for waste management facilities and landfill rehabilitation.
- Competitive C&I solar tenders issued by industrial groups and estate operators.
- Industrial steam-supply and biogas concessions from large manufacturers.

This multi-channel approach ensures Citaglobal is not dependent on a single deal type, counterpart, or market segment—creating diversified deal flow and risk distribution.

6. CORPORATE STRUCTURE AND OPERATING MODEL

6.1 Entity Architecture

Citaglobal's Indonesia presence is structured through a layered entity model that combines Malaysian corporate strength with Indonesian local agility:

- **Citaglobal Energy Sdn Bhd (Malaysia):** Strategic centre providing capital, governance, risk management, and partnership frameworks. Sets technical, financial, and strategic direction for Indonesia operations.
- **PT Citaglobal Capital International (CGIC):** The Indonesian commercial and engagement platform. Responsible for bids, partnerships, client relationships, project origination, contract signing, negotiation leadership, and supervision of local SPVs.
- **PT Greenviro Viro Nusantara (PTGVN) (option):** On-ground execution arm, owned by CGIC. Provides immediate operating capability: licences, staff, local process familiarity, permitting navigation, engineering support, site development, and facility management.

This structure enables Citaglobal to act with both speed and compliance—speaking the language of municipalities, ministries, and PGN for WtE and gas contracts, responding credibly to large industrial clients, and meeting expectations of international partners and financiers.

6.2 Partnership Ecosystem

Strategic partners amplify Citaglobal's capabilities and provide technical differentiation:

- **SUS Environment:** Large-scale WtE development partner for municipal plants, especially Danantara-linked projects. Provides turnkey WtE development capability and scale.
- **LAWI Engineering (Germany):** Technology partner providing proprietary WtE combustion and boiler systems (LAWI EtaComb®, LAWI EtaPlant®, LAWI EtaLogic®), differentiating Citaglobal's WtE technical offering.
- **Keppel (or similar):** Partner for biomass/bio-CNG and industrial gas-related technologies, particularly relevant for Sumatra and Kalimantan projects.
- **Perusahaan Gas Negara (PGN):** Strategic gas offtaker and distribution partner, providing bankable revenue streams and access to Indonesia's national gas network.

Partners are deployed selectively based on project size, technical requirements, and regional context—not all at once.

6.3 Operating Model and Competencies

Core competencies in Indonesia (CGIC/PTGVN):

- Business development and relationship management
- Financial modelling and project structuring
- Local regulatory navigation and permitting
- Tender preparation and bid management
- Contract Management and Project Management
- Site technical teams and facility operations moitoring
- PGN relationship management and gas supply coordination
- Engineering and design (solar, biomass, WtE, biogas upgrading) – optional

Support from Malaysia (Citaglobal Energy):

- Project finance and capital structuring
- Technical QA/QC and engineering oversight
- Corporate governance and risk management
- Technology partnership management
- Procurement and contracting support

6.4 People and Regional Guidance

Indonesia execution will rely on a blended Malaysia-Indonesia team:

- Local commercial and technical teams under CGIC/PTGVN with deep Indonesian market knowledge.
- Malaysian technical and financial oversight ensuring corporate standards and governance.
- Experienced regional advisors who understand both Malaysian and Indonesian operating environments, supporting CGIC in relationship building, deal shaping, and risk judgement.

This people dimension is where Citaglobal can differentiate: by building a trusted, competent in-country team, supported by seasoned regional expertise that brings calm judgement and ecosystem access without needing to be in the foreground.

7. THE SUCCESS SEQUENCE IN PRACTICE

Citaglobal's success in Indonesia will not be a function of opportunity alone—Indonesia is full of opportunities that many companies fail to convert. The advantage lies in how Citaglobal sequences its actions, following a disciplined chain that turns strategy into assets:

Opportunity → Focus → Relationship → Process → Capital → People

7.1 Opportunity

Start from real, evidenced demand—not theoretical market sizing:

- Danantara's WtE rollout with 33 plants and USD 5.5 billion investment commitment.
- PGN's mandate to expand domestic gas utilisation and biogas/biomethane procurement.
- Rooftop solar quotas with multi-GW targets and massive under-penetration.
- Cement companies actively consuming RDF and alternative fuels.
- Palm majors investing hundreds of billions of rupiah in biogas infrastructure.
- Announced corporate decarbonisation plans creating real procurement demand.
- SDG/ESG targets, carbon pricing, and green finance windows creating additional market drivers.

7.2 Focus

Concentrate on four business lines where Citaglobal is already strong:

- Industrial/biomass steam & heat
- C&I rooftop solar (electricity)
- Bioenergy/biogas/bio-CNG & industrial chemicals
- Municipal & biomass WtE (biogas/chemicals focus)

No distraction into unrelated utilities, speculative technologies, or business lines where Citaglobal lacks existing competence.

7.3 Relationship

Invest deeply in relationships that determine deal flow and timing:

- Municipalities and provincial governments seeking WtE and waste solutions.
- Key industrial groups (cement, FMCG, palm, industrial estates) needing energy and thermal solutions.
- Perusahaan Gas Negara (PGN) as the strategic gas offtaker and distribution partner.
- Danantara and related state-owned enterprises managing infrastructure rollout.
- Industry associations (GAPKI, cement associations) providing market access.

Build long-term ties rather than chasing one-off projects.

7.4 Process

Apply disciplined process to ensure Citaglobal doesn't overcommit to the wrong projects:

- Structured opportunity screening with clear qualification criteria.

- Early technical and financial modelling before significant commitment.
- Clear stage gates for feasibility, MoU, and FID.
- Standardised SPV structures and contract templates.
- Robust due diligence on counterparts, land, permits, feedstock, and PGN offtake terms.

7.5 Capital

Align capital sources with project types for optimal financing structures:

- Danantara and PGN structures for WtE projects with gas offtake.
- Local banks and development finance for industrial steam and solar.
- Equity and mezzanine instruments for bioenergy and chemicals projects.
- Green sukuk and green bonds for projects meeting framework criteria.
- ESG lenders and climate funds for robust, additional, verifiable projects.
- Carbon credit buyers providing additional revenue streams.

Citaglobal's credibility in Malaysia and partnerships can help unlock capital in Indonesia.

7.6 People

Success in Indonesia is ultimately decided by people:

- A blended Malaysia-Indonesia team in CGIC/PTGVN.
- Strong local managers and technical experts with market relationships.
- Experienced regional advisors who understand both policy rooms and landfill gates, both boardrooms and boiler houses.

Invest early in the right Indonesian leadership and technical talent, supported by Citaglobal's regional experience.

8. 200-DAY PLAN FOR CGIC

To translate strategy into action, CGIC should execute a structured 200-day plan that establishes foundations for the full 2025-2030 roadmap:

Days 1-60: Mapping and Positioning

- Map key stakeholders across three priority provinces (West Java, East Java, North Sumatra).
- Establish formal dialogue with PGN on biogas/biomethane offtake terms and pipeline requirements.
- Identify 10 priority industrial C&I solar leads in manufacturing clusters.
- Identify 5 priority municipal WtE lead cities aligned with Danantara programme and PGN network.
- Formalise CGIC ownership of PTGVN and complete corporate/governance documentation.
- Establish initial team structure and key hire requirements.

Days 61-120: Engagement and Scoping

- Begin 2 feasibility studies (WtE or biomass/biogas) in priority locations with PGN offtake consideration.
- Propose 3 C&I solar packages to priority industrial clients.
- Start engineering scoping for steam/heat and biogas offerings to cement and food sector clients.
- Initiate formal discussions with key municipal governments on WtE opportunities.
- Map Danantara tender pipeline and begin pre-qualification preparation.
- Develop preliminary gas supply agreement framework with PGN.

Days 121-200: Pipeline Development

- Target signing of 2-3 MOUs with factories, estates, or palm groups.
- Submit 1-2 municipal project proposals or expressions of interest.
- Begin partner scoping (SUS/LAWI/Keppel/Others) for specific project opportunities.
- Advance PGN gas supply agreement to term sheet stage for priority projects.
- Frame long-term concession pipeline with priority ranking and timeline.
- Establish preliminary financing discussions with potential capital partners.
- Report to Citaglobal Energy on progress, pipeline status, and recommended next phase priorities.

9. ROADMAP 2025-2030

Phase 1: Foundation (2026)

- Finalise and optimise the CGIC operatioanl structure and governance framework.
- Map and prioritise Danantara WtE tenders in Java; complete pre-qualification for first-wave projects.
- Execute framework agreement with PGN for biogas/biomethane offtake across multiple projects.
- Build a first wave of C&I rooftop solar leads and commence initial deployments in West Java, East Java, and Greater Jakarta.
- Initiate structured dialogues with selected cement, palm, and FMCG players on biomass/steam and bioenergy projects.
- Engage with palm-oil industry players (Astra Agro, Wilmar, SMART) to scope biomass/biogas demand in Sumatra.
- Establish initial team and operational infrastructure in Indonesia.
- Shortlist 3-5 municipal WtE tenders under Danantara first wave for priority pursuit.

Phase 2: Scaling (2027-2028)

- Reach financial close on the first 1-2 WtE projects (biogas/PGN offtake and/or RDF-to-industry models).
- Commission initial biomass steam or bioenergy plants in Sumatra with PGN integration.
- Achieve a 20-30 MW operating C&I rooftop solar portfolio across multiple industrial estates.
- Secure long-term gas supply or concession contracts with 1-2 large industrial anchors through framework agreements.
- Expand solar, biogas, and chemicals footprint across multiple provinces.
- Develop 1-2 bio-CNG or biogas upgrading opportunities in Sumatra with PGN network injection.
- Formalise strategic collaboration frameworks with major industrial clients and PGN.

Phase 3: Consolidation (2029-2030)

- Grow to an integrated portfolio exceeding 100 MW equivalent across solar, WtE, biomass steam, and bioenergy assets—plus corresponding biogas/chemicals production.
- Strengthen Citaglobal's reputation as a high-quality, reliable integrated partner for municipalities, PGN, and corporates.
- Build multiple SPVs across Java-Sumatra-Sulawesi with diversified asset mix.
- Position Citaglobal as a recognised biogas, bio-CNG, and clean-energy provider in Indonesia's energy transition.
- Evaluate acquisitions of local operators where they enhance scale, reach, or capabilities.
- Begin positioning for carbon credit revenue streams as markets mature.

10. ESG, GREEN FINANCING, CARBON MARKETS, AND THE 2030 HORIZON

10.1 SDG/ESG and Green Energy Alignment

Citaglobal's Indonesian portfolio touches directly on multiple Sustainable Development Goals:

- **SDG 7 — Affordable and Clean Energy:** Through solar, biomass, biogas, and bio-CNG deployment.
- **SDG 11 — Sustainable Cities and Communities:** Through WtE and modern waste management systems.
- **SDG 12 — Responsible Consumption and Production:** Through waste minimisation, RDF production, industrial chemicals recovery, and circular economy approaches.
- **SDG 13 — Climate Action:** Through methane capture, carbon reductions, and potential carbon credit generation.

This alignment strengthens the ESG story for Citaglobal Berhad at Group level and enhances attractiveness to ESG-focused equity investors, lenders with sustainability mandates, and international partners seeking credible "brown-to-green" transition assets.

10.2 Green Financing

Indonesia's Green Bond and Green Sukuk Framework (established 2018) explicitly recognises renewable energy, waste-to-energy, biogas production, waste management, and landfill rehabilitation as eligible green project categories. The country has already raised several billion US dollars under this framework.

This gives Citaglobal multiple financing levers:

- Structure Indonesian projects to qualify as Eligible Green Projects.
- Position Citaglobal as a sponsor or partner in green sukuk/green bond transactions.
- Blend commercial bank debt with climate finance for projects demonstrating clear climate and SDG benefits.
- Access sustainability-linked loans and ESG lender capital.
- Leverage PGN's balance sheet and offtake agreements to enhance project bankability.

10.3 Carbon Tax, ETS, and Future Carbon Markets

Indonesia has developed significant carbon market infrastructure:

- **Mandatory ETS (NEK):** Power-sector ETS launched in 2023, initially covering coal plants ≥25 MW, with a cap of approximately 256.8 $MtCO_2e$ in 2024.
- **IDXCarbon:** National carbon exchange launched in 2023, providing an evolving domestic price signal. While the market is still thin, it is positioned for growth.
- **Resumed international carbon trade:** Indonesia resumed international carbon trading in 2025, with plans to position itself as a major carbon credit supplier, particularly by 2030-2035 and in the lead-up to COP30.

Even if a full, broad-based carbon tax takes time to crystallise, the direction of travel is clear: carbon will be priced more explicitly, and high-emission assets will face rising compliance costs.

For Citaglobal's portfolio, this means:

- WtE, solar, bioenergy, biogas, and biomass/steam projects can generate lower emissions intensity and potentially tradeable credits.
- Early projects can be designed from the start to be MRV-ready (measurement, reporting, and verification) for carbon markets.
- By 2030-2035, Citaglobal could hold a portfolio of assets with biogas, chemicals, and carbon revenue streams.

10.4 Feedstock: Why Securing Waste Now Matters

Waste feedstock is finite in each city. Once Danantara-backed projects, SOEs, and a handful of private operators lock in long-term concession agreements (often 20-30 years), the ability to structure new WtE or waste-to-fuel projects with robust feedstock becomes much more limited.

Acting in the 2025-2030 window allows Citaglobal to:

- Secure priority access to landfill sites and waste streams in selected cities.
- Integrate feedstock agreements into SPVs from the start, giving confidence to lenders, green investors, PGN, and carbon market participants.
- Position itself as the anchor operator rather than a second-tier off-taker.

10.5 Why Prior to 2030 Is Important

2030 serves as a useful internal strategic horizon for several reasons:

- Most WtE, bioenergy, and industrial energy projects developed between now and the early 2030s will have 25-30 year lifetimes, taking them close to 2060—Indonesia's net-zero target.
- By the late 2030s, the major waste concessions, prime industrial energy contracts, PGN biogas supply slots, and best carbon project sites will likely already be allocated to early movers.
- Global and domestic carbon credit markets are expected to be far more mature, with clearer price signals and tighter quality standards—benefitting projects that were structured correctly from the start.

Put simply:

- **Before 2026-2028,** Citaglobal can shape the market.
- **By 2030,** Citaglobal wants to be sitting on a mature, yielding portfolio of biogas, bio-CNG, chemicals, and solar assets—not still trying to enter as a newcomer.

This is why decisive action now, anchored in ESG, green finance, PGN partnership, and carbon market awareness, is strategically critical.

11. RISK CONSIDERATIONS

The Indonesian context presents certain structural risks inherent to the sector. Citaglobal acknowledges these and will address them through well-established industry practices:

Regulatory Risk

Changes in policy, tariffs, or licensing requirements. Mitigated through strong local relationships, staying close to policy developments, and building flexibility into project structures.

Land Acquisition Risk

Complexity and delays in securing land for projects. Mitigated through early due diligence, partnership with experienced local operators (PTGVN), and clear land requirements in project scoping.

Feedstock Risk

Availability and consistency of waste streams and biomass supply. Mitigated through long-term feedstock agreements integrated into SPVs, diversified supply sources, and early engagement with municipal and industrial feedstock sources.

Counterparty Risk

Municipal politics, payment delays, or changes in government priorities. Mitigated through structured contracts, sovereign guarantees where available (e.g., Danantara-backed projects), PGN offtake agreements providing credit-worthy counterparty, and diversification across B2B and B2G segments.

Execution Risk

Construction delays, cost overruns, or operational challenges. Mitigated through use of proven technologies (LAWI, SUS), experienced partners, strong project management, and staged investment approaches.

Gas Offtake Risk

PGN pricing, volume commitment, or network access constraints. Mitigated through early engagement with PGN, framework agreements covering multiple projects, technical compliance with pipeline specifications, and alternative offtake options (industrial direct, transport fuel).

Approach: Understand early, structure correctly, monitor continuously, and employ strong local partnerships to mitigate. Risks are manageable within industry norms with disciplined process and experienced guidance. No further emphasis is required.

12. CONCLUSION

Indonesia today offers Citaglobal a rare and time-sensitive combination of:

- **Strong policy direction:** National Energy Policy, RUPTL, MEMR regulations, PGN gas infrastructure expansion, and provincial mandates all pointing toward renewables, WtE, biogas, and bioenergy.
- **Danantara-backed capital flows:** Sovereign wealth commitment to WtE infrastructure with USD 5.5 billion investment pipeline and structured offtake through PGN.
- **PGN as strategic gas offtaker:** National gas utility actively seeking biogas/biomethane suppliers, providing bankable revenue streams and distribution network access.
- **A deepening ESG and SDG agenda:** Corporate and national commitments creating real demand for clean energy, biogas, and waste solutions.
- **Emerging carbon markets:** ETS, IDXCarbon, and resumed international carbon trade creating future revenue optionality for early, well-structured projects.
- **Clear corporate demand:** Major Indonesian companies already investing in the four business lines Citaglobal understands—visible in Astra Agro's biogas investment, SIG's RDF consumption, Indofood's rooftop solar, and SMART's biogas commercialisation.

Citaglobal's four business lines are not speculative; they reflect what the market is already moving toward. Indonesia's current trajectory is visible in Danantara's WtE programme, in rooftop solar quotas, in the RDF entering cement kilns, in biogas emerging from POME at major palm mills, and in PGN's active pursuit of biogas supply agreements.

By following the success chain—**Opportunity → Focus → Relationship → Process → Capital → People**—and by moving before 2030 to secure feedstock, PGN offtake contracts, and positioning, Citaglobal can build a resilient, ESG-positive Indonesian platform that serves both national objectives and shareholder value.

With CGIC and PTGVN in place, supported by disciplined process, the right partnerships (including PGN), and experienced regional guidance, Citaglobal Energy has a credible pathway to build a strong Indonesian platform over the next five years—commercially attractive, operationally robust, and strategically important for the Group.

NOW TO ALIGN THIS TO CITAGLOBAL DIRECTION AND STRATEGY.

The foundation is set. The demand is real. PGN is ready.

ANNEX — FACT BASE SNAPSHOT

(For Internal Use / Optional Attachment)

Danantara & WtE Programme

- Sovereign fund Danantara Indonesia plans 33 WtE projects nationwide.
- At least 7 plants to start construction around 2026 as the first wave.
- Each plant processes approximately 1,000 t/day of waste, producing 3–5 million Nm^3/year of biogas plus chemicals.
- Estimated capex per plant: approximately USD 180 million.
- Total programme investment: approximately USD 5.5 billion.
- Primary gas offtaker: Perusahaan Gas Negara (PGN).
- Funding partly from "patriot bonds", targeting approximately Rp 50 trillion (approximately USD 3 billion).

Rooftop Solar Quotas

MEMR decree sets 5,746 MW rooftop solar quota (2024-2028):

- 2024: 901 MW
- 2025: 1,004 MW
- 2026: 1,065 MW
- 2027: 1,183 MW
- 2028: 1,593 MW
- Actual installed capacity (end-2023): approximately 140 MW against 3.6 GW target by 2025.

Astra Agro (Biogas / Methane Capture)

- Rp 400 billion (approximately USD 24 million) capex for 10 methane capture facilities at palm mills by 2030.
- Each unit expected to reduce approximately 35,000 tCO_2e/year.
- Total potential reduction: approximately 356,000 tCO_2e by 2030.
- Biogas replaces diesel and coal, achieving 60-70% emissions reduction at some sites.
- PGN offtake discussions underway for biomethane network integration.

Indofood (Rooftop Solar & Energy)

- Indofood Sukses Makmur commenced operation of rooftop solar PV at Bogasari flour mill, Jakarta (November 2025).
- Energy audits show approximately 85% of plant energy is thermal (steam/boilers) vs. 15% electricity.

Semen Indonesia Group (RDF)

- SIG collaborates with East Java municipalities to use RDF from TPST Belahanrejo and Ngipik (approximately 200 t/day each) as alternative fuel for cement kilns in Tuban, displacing coal.
- Solusi Bangun Indonesia (SBI) also receiving RDF from Sumenep.

Perusahaan Gas Negara (PGN)

- National gas utility with mandate to expand domestic gas utilisation.
- Actively seeking biogas/biomethane suppliers for network injection.
- Provides bankable offtake agreements as credit-worthy counterparty.
- Distribution network concentrated in Java with expansion into Sumatra.

Carbon Markets & Policy

- **NEK / ETS:** Power-sector ETS launched 2023, covering coal plants ≥25 MW; initial cap approximately 256.8 $MtCO_2e$ in 2024.
- **IDXCarbon:** National carbon exchange launched 2023; market still thin but positioned for growth.
- **International Carbon Trade:** Resumed in 2025, with Indonesia seeking to sell high-quality credits and showcase its carbon market at COP30.

Green Financing

- **Green Bond & Green Sukuk Framework (2018):** Supports financing of renewable energy, WtE, biogas production, waste management, and landfill rehabilitation.
- Indonesia has already mobilised several billion US dollars under this framework.

Other Technology Solution Arsenal

- **Gasification** (within the thermal WtE space)
- **Pyrolysis** (within thermal WtE space)
- **Landfill gas capture** (subset of AD/upgrading space)
- **Bioethanol** (different feedstock pathway)

Other Corporate Examples

- **Unilever Indonesia:** Green Building programme at Grha Unilever (BSD City) uses renewable energy for up to 8% of electricity and has cut consumption by 32%.
- **Cikarang Listrindo:** Implementing rooftop solar and biomass co-firing for industrial estate clients.
- **SMART (Sinar Mas):** May 2025 announcement to add biogas production and sales as formal business activity, with PGN offtake under discussion.
- **Sinar Mas Land:** Installing solar panels across commercial buildings and BSD City township.

— END OF DOCUMENT —