

Downstream Development: Strategic National Priority



Dr. Berkah Hani, S.T., M.T

Lecturer, Petroleum Engineering Program

Faculty of Engineering



Universitas Bhayangkara Jakarta Raya
February 2026



K1.1

Made with GAMMA

National Context: Downstream as Indonesia's Future

Government Vision

Downstream development recognized as the foundation of Indonesia's economic future, driving value addition

Strategic Imperative

The government's commitment to downstream development transcends mere policy—it represents a fundamental shift in how Indonesia positions itself in global energy markets. By transforming raw resources into refined products domestically, we create jobs, retain value, and build technological capabilities.

- *Enhanced economic value retention*
- *Increased investment opportunities*
- *Technology transfer and capability building*
- *Reduced dependency on imports*

Hilirisasi Industri Di Indonesia Untuk Membangun Nilai Tambah Ekonomi Dan Lapangan Kerja



Muhammad Rizki - Selasa, 6 Agustus 2024 | 16:06 WIB



Hilirisasi Industri Di Indonesia Untuk Membangun Nilai Tambah Ekonomi Dan Lapangan Kerja

Hilirisasi industri merupakan strategi penting untuk meningkatkan nilai tambah ekonomi Indonesia dan menciptakan Lapangan Kerja. Dengan memanfaatkan kekayaan sumber daya alam yang dimiliki, Indonesia dapat mengurangi ketergantungan pada ekspor bahan mentah dan mendorong pertumbuhan ekonomi yang lebih berkelanjutan. **Hilirisasi bertujuan untuk meningkatkan nilai ekonomi, menciptakan lapangan kerja, mengurangi ketergantungan pada ekspor bahan mentah, dan mendorong pertumbuhan ekonomi yang berkelanjutan**

Field Reality: Downstream Development Challenges

Indonesia has identified 21 strategic downstream projects spanning the oil and gas sector. While the scale is ambitious, success depends on effective implementation, coordinated execution, and overcoming significant technical and operational hurdles.

21 Strategic Projects

Major downstream initiatives across the oil and gas value chain

Accelerated Timeline

Government pushing for rapid project completion

Implementation Focus

Moving from planning to operational execution

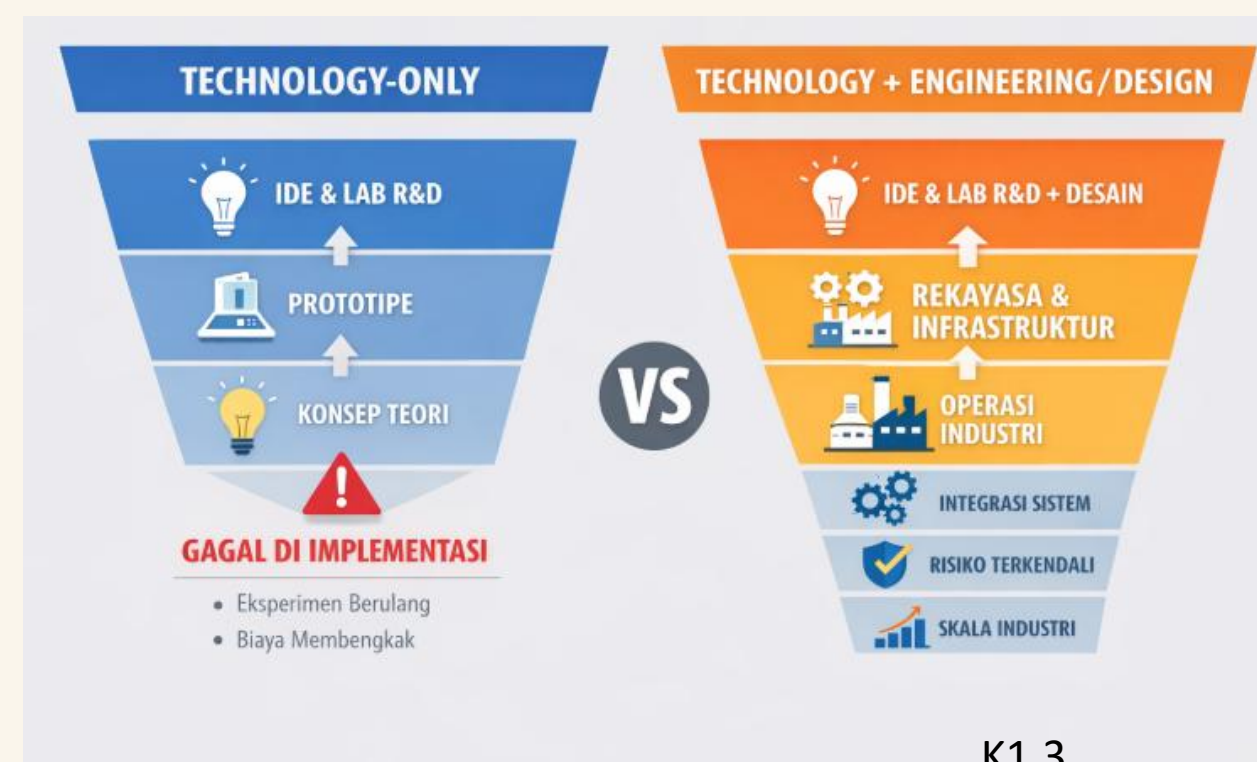


HomeProfile ▾Echelon I ▾Bureaucratic Reform

Dorong Pembangunan Kapasitas Nasional Hulu Migas, Kementerian ESDM Gelar FGD bersama Stakeholder

Untuk mendorong pembangunan kapasitas nasional melalui partisipasi dan kontribusi lokal pada industri hulu minyak dan gas bumi (migas), Kementerian Energi dan Sumber Daya Mineral (ESDM) Focus Group Discussion (FGD) Penggunaan Oil Country Tubular Goods (OCTG) Dalam Negeri. Saat ini, industri migas hulu merupakan salah satu pilar utama ekonomi Nasional, perannya tidak hanya menjadi sumber energi yang vital bagi pertumbuhan industri, tetapi juga berkontribusi signifikan terhadap penerimaan negara dan pembangunan infrastruktur. Oleh karena itu, keberlanjutan dan daya saing industri ini menjadi hal yang sangat penting.

Hal tersebut disampaikan oleh Koordinator Pokja Pemberdayaan Potensi Dalam Negeri Migas Heru Windiarto, mewakili Direktur Pembinaan Program Minyak dan Gas Bumi Mirza Mahendra. Heru menambahkan, di tengah tantangan global yang semakin kompleks, termasuk volatilitas harga minyak, perubahan iklim, dan perkembangan teknologi yang pesat, Indonesia harus terus berinovasi dan memperkuat kapasitas Nasional di sektor ini.



Root Cause: Research-to-Industry Gap

The Translation Challenge

The primary barrier isn't lack of technology or research—it's the inability to translate laboratory success into industrial-scale implementation. This gap between research and deployment creates delays, cost overruns, and failed projects.

Downstream investment has increased significantly, yet many projects struggle to move beyond pilot phases. The issue lies in bridging theoretical knowledge with practical engineering deployment.



The screenshot shows the top of a news article on The Jakarta Post website. The header includes the site's logo, a search icon, and navigation links for various sections like Indonesia, Business, World, Opinion, Culture, Deep Dive, Front Row, The Weekender, and E-Post. A red 'SUBSCRIBE' button and a 'NEW' tag are also visible. The article's category is 'BUSINESS • COMPANIES'. The title is 'SKK Migas urges INPEX to speed up Masela LNG development'. The sub-headline reads: 'Indonesia's SKK Migas is pushing Japan's INPEX to accelerate development of the Masela Abadi LNG project so it goes onstream as scheduled in late 2029, if not earlier, following decades of delays since the initial contract was inked in 2011.' The author is 'Aditya Hadi (The Jakarta Post)' and the article is marked as 'PREMIUM'. The location and date are 'Jakarta • Thu, December 28, 2023'.

☰ 🔍

TheJakartaPost

SUBSCRIBE NEW

INDONESIA BUSINESS WORLD OPINION CULTURE DEEPDIVE FRONT ROW THE WEEKENDER E-POST

BUSINESS • COMPANIES

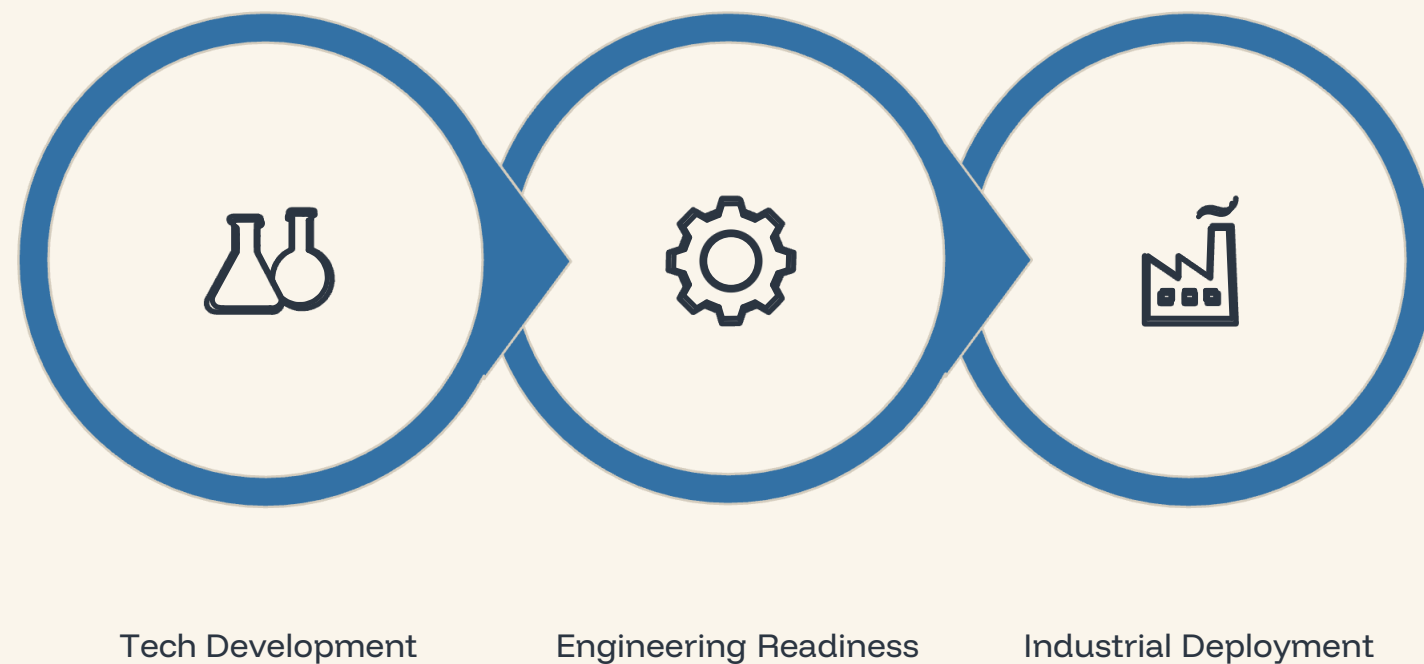
SKK Migas urges INPEX to speed up Masela LNG development

Indonesia's SKK Migas is pushing Japan's INPEX to accelerate development of the Masela Abadi LNG project so it goes onstream as scheduled in late 2029, if not earlier, following decades of delays since the initial contract was inked in 2011.

Aditya Hadi (The Jakarta Post)

PREMIUM Jakarta • Thu, December 28, 2023

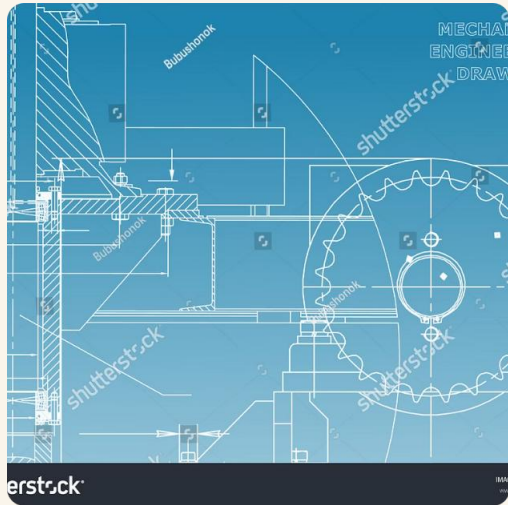
Paradigm Shift: From Technology to Engineering Readiness



Successful downstream development requires more than technological capability—it demands engineering readiness. The recent launch of Cisem II gas pipeline demonstrates this principle: infrastructure must be deployment-ready, not just theoretically viable.

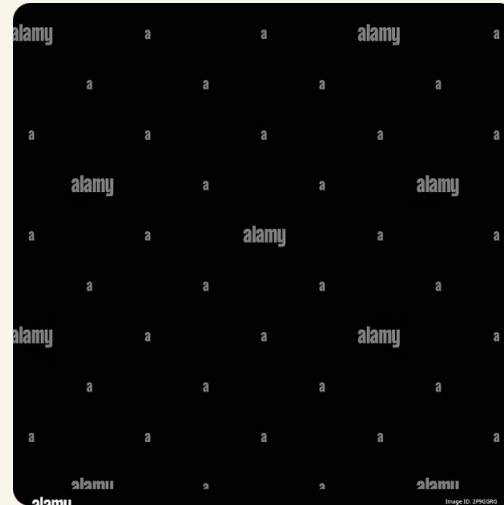
"Engineering readiness transforms technology from concept to operational reality. It's the difference between knowing something works and making it work at scale."

What is Technology Engineering?



Systems Integration

Connecting technologies into cohesive operational systems that function reliably at industrial scale



Process Optimization

Refining workflows and procedures to maximize efficiency, safety, and economic viability



Deployment Enablement

Creating the conditions—skills, infrastructure, protocols—for successful industrial implementation

Technology engineering serves as the critical enabler for downstream development, exemplified by Pertamina's upstream collaboration focusing on efficient technology application for oil and gas production.

The Role of Design in Oil & Gas Industry



Design: The Differentiator

System design represents the critical distinction between "technology exists" and "technology is deployment-ready." It's the architecture that transforms individual components into integrated, functional industrial systems.

Indosat's AI-based technology for upstream oil and gas operations demonstrates how advanced design thinking revolutionizes industrial capabilities.

1

Component Selection

Choosing optimal technologies

2

System Integration

Creating functional workflows

3

Operational Reality

Delivering industrial results

K1.7

Made with GAMMA

Strategic Role #1: Accelerating Transition

From Modular Pilots to Scaled Downstream Operations

Modular design and pilot-scale testing enable rapid scaling of downstream oil and gas facilities. This approach reduces time-to-market, minimizes technical risks, and allows for iterative improvements before full-scale deployment.

- 1** — Pilot Development
Small-scale proof of concept
- 2** — Modular Scale-Up
Incremental capacity expansion
- 3** — Full Production
Industrial-scale operations

The RDMP Balikpapan refinery, designed to become Indonesia's largest, exemplifies this accelerated transition approach, strengthening national downstream capabilities through strategic engineering design.

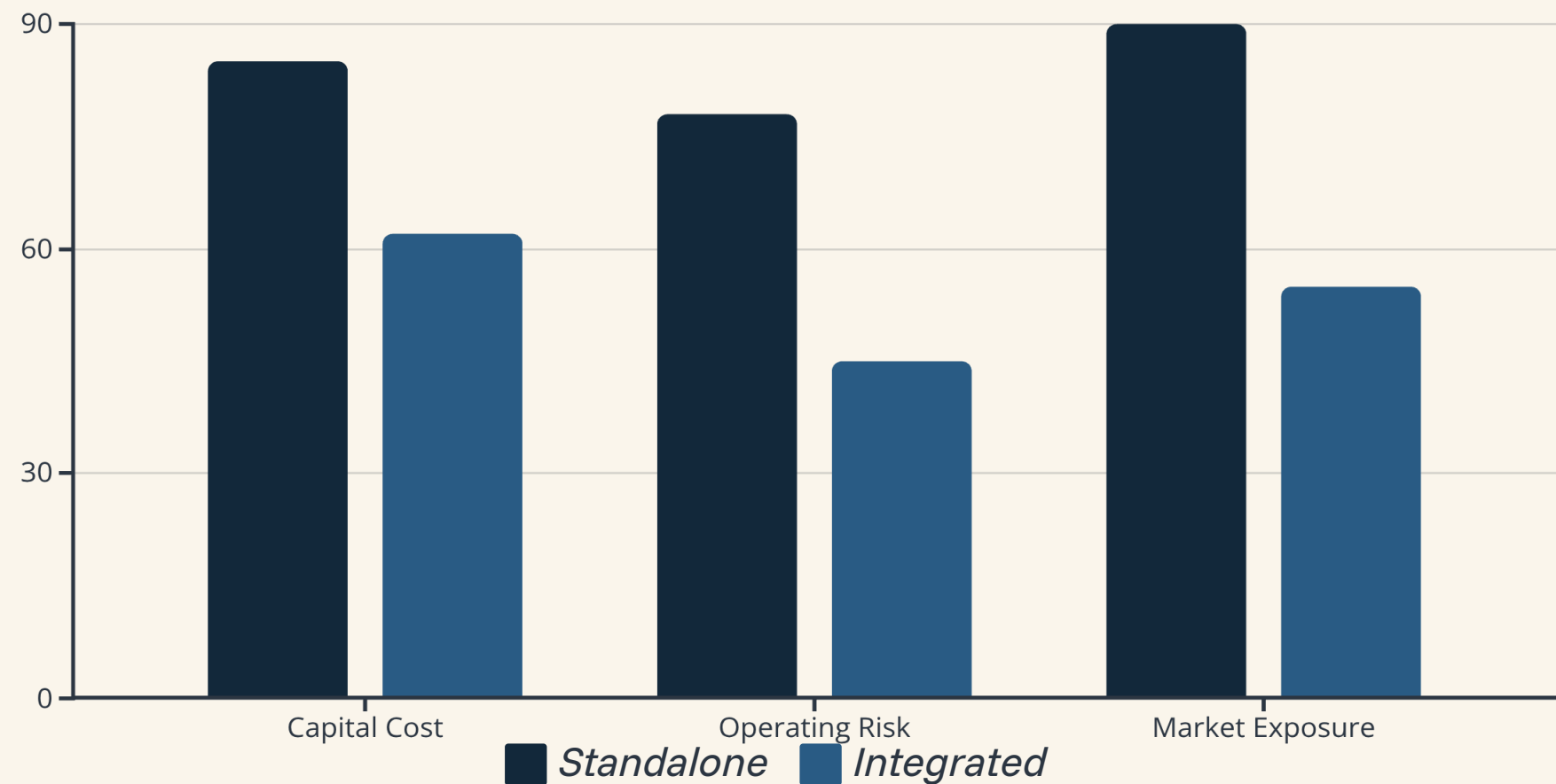


Strategic Role #2: Reducing Investment Risk

Petrochemical Integration & Downstream Synergy

Integrated design reduces investment risk by creating synergies across the downstream value chain. When facilities share infrastructure, feedstocks, and utilities, capital efficiency improves dramatically.

Pertamina Group's synergy in strengthening propylene supply for national petrochemicals demonstrates how strategic integration de-risks major investments while enhancing competitiveness.



Strategic Role #3: National Competitiveness

Downstream Development Drives National Transformation

Oil and gas downstream development represents more than industrial capacity—it's a fundamental component of national economic transformation and competitive positioning in global markets.

21

Strategic Projects
Transforming Indonesia's downstream landscape

2026

Energy Independence Target
Achieving self-sufficiency through downstream strength

100%

Value Retention
Keeping economic benefits within Indonesia

By driving economic growth, creating jobs, building infrastructure, and retaining value domestically, downstream development positions Indonesia as a regional energy leader and manufacturing powerhouse.



BERANDA PROFIL PUBLIKASI INFORMASI & LAYANAN PUBLIK PEMERINTAH

SEKRETARIAT KABINET
REPUBLIK INDONESIA

ID

Indonesia, Jakarta, pada Senin, 5 Maret 2023, disepakati 21 proyek hilirisasi tahap pertama dengan total investasi mencapai USD40 miliar.

Menteri Energi dan Sumber Daya Mineral (ESDM), Bahlil Lahadalia, menjelaskan bahwa proyek-proyek ini mencakup berbagai sektor strategis, termasuk minyak dan gas, pertambangan, pertanian, hingga kelautan. “Kami telah memutuskan tahap pertama hilirisasi yang ditargetkan kurang lebih sekitar USD618 miliar, untuk di tahun 2025 yang tadi kami paparkan kurang lebih sekitar 21 proyek pada tahap pertama yang total investasinya kurang lebih sekitar USD40 miliar dan tadi kita sudah melakukan pembahasan secara detail termasuk di dalamnya adalah nama-nama proyek investasi apa saja yang akan kita lakukan,” ujar Bahlil dalam keterangan pers usai pertemuan.

Salah satu proyek utama adalah pembangunan storage proyek minyak di Pulau Nipah guna meningkatkan ketahanan energi nasional. Penyimpanan minyak ini ditargetkan dapat memenuhi kebutuhan nasional selama 30 hari sesuai dengan amanat Peraturan Presiden.

Selain itu, pemerintah juga akan membangun refinery berkapasitas 500 ribu barel per hari yang akan menjadi salah satu fasilitas pengolahan minyak terbesar di Indonesia. Proyek ini bertujuan untuk memastikan pasokan energi dalam negeri lebih stabil dan mengurangi ketergantungan impor.

Indonesia's Upstream Oil & Gas: Driving Sustainability & Efficiency

Strategic Role #4: Sustainability & Efficiency

The upstream oil and gas industry plays a pivotal role in Indonesia's transition towards cleaner energy systems. As global pressure mounts to reduce carbon emissions and adopt environmentally responsible practices, the sector is positioned to lead technological innovation whilst maintaining energy security. This transformation represents not merely compliance with environmental regulations, but a strategic opportunity to enhance operational efficiency, reduce costs, and create new revenue streams through carbon capture and storage technologies.

The adaptation to clean technology within the upstream sector encompasses multiple dimensions of operational excellence. Carbon capture and storage (CCS) systems represent one of the most promising pathways, enabling the sequestration of CO₂ emissions from production facilities whilst simultaneously enhancing oil recovery rates. Advanced drilling technologies, including automated rig systems and real-time monitoring platforms, significantly reduce environmental footprints whilst improving extraction efficiency. Furthermore, the integration of renewable energy sources into offshore platforms and onshore facilities demonstrates the industry's commitment to hybrid energy solutions that balance traditional hydrocarbon production with sustainable power generation.



Carbon Capture & Storage

Implementation of CCS technology to sequester emissions whilst enhancing oil recovery from mature fields.



Renewable Integration

Hybrid power systems combining solar and wind energy with conventional production facilities.



Digital Transformation

AI-powered monitoring and automated systems reducing operational emissions and improving efficiency.

Beyond technological adoption, the sustainability imperative drives fundamental shifts in industry practices and investment priorities. Environmental impact assessments now form integral components of project planning, ensuring that new developments meet stringent ecological standards whilst supporting biodiversity conservation. Methane emission reduction programmes, flaring minimisation initiatives, and water management systems demonstrate comprehensive approaches to environmental stewardship. These measures not only reduce the industry's carbon footprint but also create competitive advantages in increasingly environmentally conscious capital markets.

The strategic importance of upstream sustainability extends to Indonesia's broader climate commitments and international positioning. As a nation balancing economic development with environmental responsibility, Indonesia's oil and gas sector serves as a critical test case for developing economies seeking to transition towards cleaner energy whilst maintaining hydrocarbon production. Collaborative research programmes, technology transfer initiatives, and international partnerships position Indonesian operators at the forefront of clean technology adoption, creating export opportunities for domestically developed solutions whilst attracting foreign direct investment in green technology sectors.

Petrochemicals & Refining: A Pillar of Downstream Integration

Case Study 1: Petrochemicals & Refining



Petrochemical complexes exemplify the transformative potential of downstream integration within Indonesia's oil and gas sector. By converting crude oil and natural gas into polymers, resins, and specialty chemicals, these facilities multiply the economic value of hydrocarbon resources whilst creating diverse employment opportunities across manufacturing, research, and logistics sectors. The strategic importance of petrochemical development extends beyond mere economic metrics, establishing foundational industries that support automotive, packaging, construction, and consumer goods manufacturing throughout the archipelago.

PT Polytama Propindo stands as a flagship example of successful petrochemical development, operating one of Southeast Asia's most advanced polypropylene production facilities. With annual capacity exceeding 200,000 tonnes, the plant processes propylene feedstock into polymer grades serving diverse industrial applications. The facility's strategic location near major shipping routes enables efficient export to Asian markets whilst supplying domestic manufacturers. Investment in Polytama demonstrates the government's commitment to value-added processing, with the project creating thousands of direct and indirect employment opportunities across engineering, operations, and supply chain management disciplines.

Value-Added Processing

Petrochemical manufacturing represents the pinnacle of downstream integration, transforming crude oil and natural gas into high-value chemical products essential for modern manufacturing and consumer goods.

1

Crude Processing

Refining crude oil into naphtha and other feedstock components.

2

Cracking Operations

Steam cracking facilities converting feedstock into ethylene and propylene.

3

Polymerisation

Processes that transform monomers into high-value polymers.

4

Product Distribution

Efficient logistics and supply chains for delivering petrochemical products to market.

Energy Infrastructure: Powering Indonesia's Growth

Case Study 2: Energy Infrastructure Development

Natural gas pipeline networks serve as critical infrastructure enabling downstream industrial development across Indonesia's diverse regional economies. These extensive transportation systems connect gas fields to consumption centers, providing reliable energy supplies that power manufacturing facilities, electricity generation, and residential heating whilst simultaneously creating economic corridors stimulating industrial investment and job creation. The strategic importance of gas infrastructure extends beyond mere transportation, forming foundational elements of regional development programmes that attract manufacturing and processing industries to underserved areas.

The Cisem II Gas Pipeline represents a flagship infrastructure project demonstrating the transformative impact of integrated energy networks on regional industrial development. Spanning hundreds of kilometres across Java, the pipeline connects offshore gas fields in the North Java Sea to industrial consumers throughout the island's manufacturing heartland. Strategic routing passes through multiple industrial zones, enabling direct connections to automotive plants, textile mills, chemical facilities, and power generation stations. The project's phased implementation allows incremental capacity expansion aligned with industrial demand growth, ensuring optimal capital utilisation whilst minimising construction disruption.



Industrial Impact

- Attracts manufacturing investment to pipeline corridors
- Reduces energy costs for industrial consumers
- Enables transition from coal to cleaner natural gas
- Creates ancillary service industries
- Stimulates regional economic development programmes

Beyond direct industrial applications, gas pipeline infrastructure catalyses broader economic development through multiple channels. Manufacturing facilities powered by natural gas benefit from stable, predictable energy costs compared to volatile coal or diesel alternatives, improving competitiveness in export markets. Environmental regulations increasingly favour gas-fired operations over coal combustion, positioning pipeline-serviced facilities favourably in regulatory frameworks. The presence of reliable gas infrastructure also attracts investment from multinational corporations with sustainability commitments, creating technology transfer opportunities and high-value employment positions throughout regional economies.

Indonesia's Downstream Integration: A Visionary Roadmap

Roadmap to the Future

Indonesia's downstream integration strategy encompasses an ambitious portfolio of projects spanning refining, petrochemicals, gas processing, and renewable energy integration. This comprehensive roadmap reflects the government's determination to maximise value from hydrocarbon resources whilst positioning the nation as a regional energy processing hub. Strategic project selection balances immediate economic returns with long-term industrial capability development, ensuring that downstream investments create sustainable competitive advantages extending beyond commodity price cycles. The scale and diversity of planned projects demonstrate confidence in Indonesia's position as a manufacturing and processing centre for Southeast Asian markets.



Refinery Expansion

Multiple greenfield and brownfield refinery projects increasing processing capacity to 2+ million barrels per day.



Petrochemical Complexes

Integrated facilities producing polymers, fertilisers, and specialty chemicals throughout industrial zones.



Gas Infrastructure

Extensive pipeline networks connecting fields to consumption centers across multiple islands.



Energy Integration

Hybrid systems combining conventional hydrocarbons with renewable energy sources for sustainable operations.

The government's project pipeline includes dozens of major initiatives representing tens of billions of dollars in investment commitments. Refinery expansion programmes target both existing facilities requiring modernisation and new integrated complexes serving specific regional markets. Petrochemical development emphasises value-added processing chains, from basic olefins and aromatics through specialty polymers and engineering plastics. Gas processing infrastructure prioritises connections between offshore fields and industrial demand centres, with strategic storage facilities enabling supply security during demand peaks. Renewable energy integration projects demonstrate commitment to environmental sustainability whilst reducing operational costs for energy-intensive processing facilities.

Investment Priorities

Government incentives and regulatory streamlining target projects with highest value-add ratios and local content requirements.

\$50B

Planned Investment

Total capital commitment across downstream integration projects through 2030.

Technology Partnerships

International collaborations ensuring access to cutting-edge processing technologies and operational expertise.

45+

Major Projects

Refineries, petrochemical plants, and gas infrastructure initiatives in development pipeline.

Skills Development

Training programmes building domestic capabilities for operating sophisticated downstream facilities.

300K

Employment Creation

Direct and indirect jobs generated by downstream integration investments.

Made with GAMMA

Menutup Kesenjangan, Menggerakkan Hilirisasi

- Tantangan migas bukan hanya cadangan, tapi eksekusi
 - Rekayasa & desain adalah jembatan menuju nilai tambah
 - Saatnya riset turun ke industri, bukan berhenti di laporan
- *“Execution is the new competitive advantage in energy transition.”*

Terima kasih atas perhatian Bapak dan Ibu sekalian