GEODYN SOLUTIONS™

PROPOSAL FOR A 100,000 MT/ DAY SEAWATER DESALINATION PLANT IN INDONESIA

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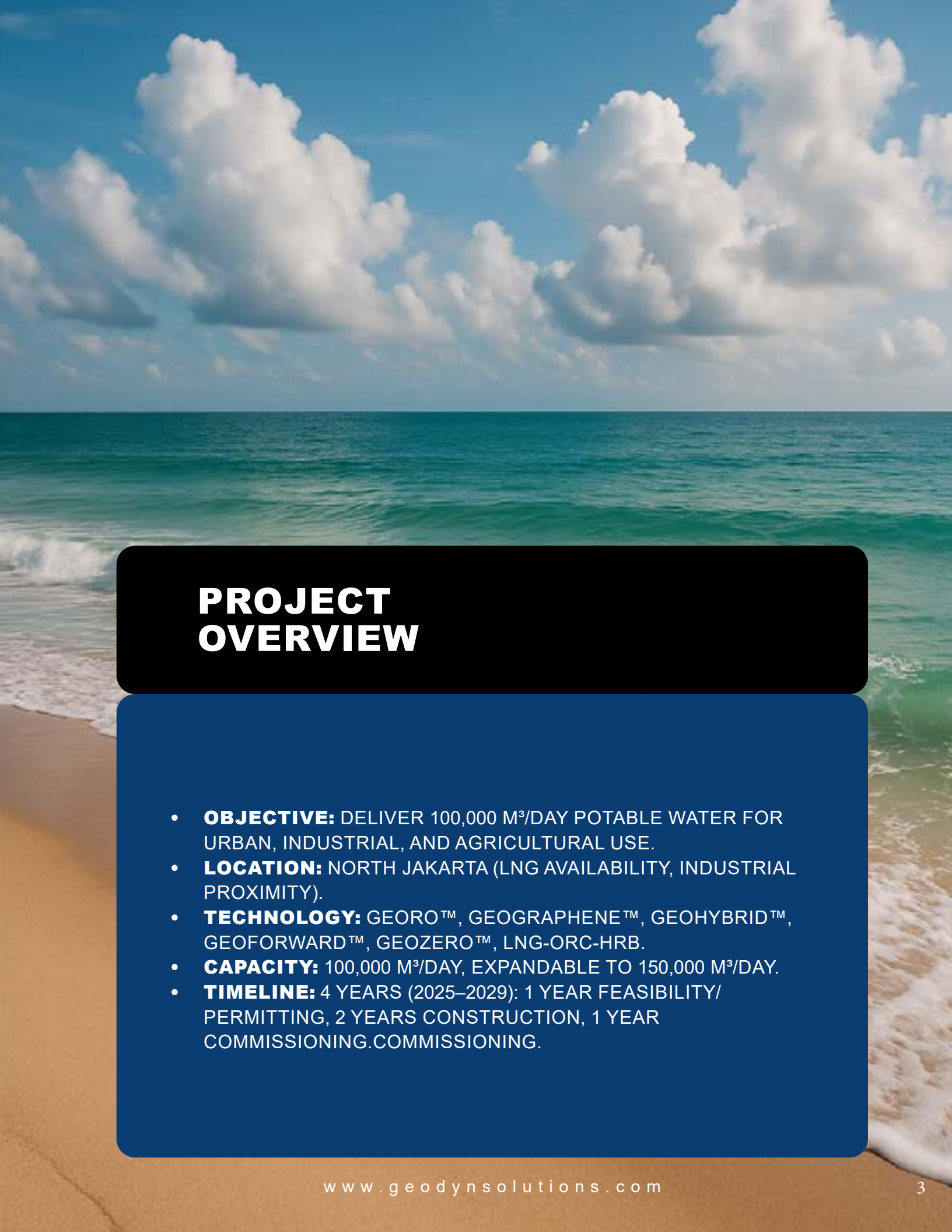
EXECUTIVE SUMMARY

Geodyn Solutions proposes a 100,000 Mt/day (100,000 m³/day) seawater desalination plant in North Jakarta, Indonesia, powered by a self-reliant 40 MW LNG plant with Organic Rank-ine Cycle (ORC) and Heat Recovery Boiler (HRB). Using enhanced GeoRO™, GeoGraphene™, GeoHybrid™, GeoForward™, and GeoZero™ technologies, the plant maximizes efficiency and sustainability. GeoZero™ recovers 1,500 tons/day of salts for fertilizers and commodities, gen-erating $64.20M/year net profit. With a 30% contingency, 0% Bappenas loans, World Bank grants, and BKPM tax incentives, it achieves a 10-year ROI of 141.40 %, creates 880–1,180 jobs, and aligns with Indonesia's water security goals.



PROJECT OVERVIEW

- **OBJECTIVE:** DELIVER 100,000 M³/DAY POTABLE WATER FOR URBAN, INDUSTRIAL, AND AGRICULTURAL USE.
- **LOCATION:** NORTH JAKARTA (LNG AVAILABILITY, INDUSTRIAL PROXIMITY).
- **TECHNOLOGY:** GEORO™, GEOGRAPHENE™, GEOHYBRID™, GEOFORWARD™, GEOZERO™, LNG-ORC-HRB.
- **CAPACITY:** 100,000 M³/DAY, EXPANDABLE TO 150,000 M³/DAY.
- **TIMELINE:** 4 YEARS (2025–2029): 1 YEAR FEASIBILITY/ PERMITTING, 2 YEARS CONSTRUCTION, 1 YEAR COMMISSIONING.COMMISSIONING.

TECHNICAL DESIGN

The plant uses optimized Geodyn technologies:

- **Pre-treatment:** GeoClean™ Ultrafiltration and Dissolved Air Flotation for GeoGraphene™ membranes.
- **Core Desalination:** GeoRO™ with enhanced ERDs (1.8 kW h m−3 to 2.3 kW h m−3) and Ge- oGraphene™ with graphene oxide coatings (99.8 % salt rejection, 25 % less energy).
- **Energy:** GeoSolar™ 50 MW perovskite photovoltaic ($0.07 kW−1 h) with grid backup ($0.12 kW−1 h), cutting costs by 42 %.
- **Post-treatment:** GeoPure™ for WHO-compliant water (<500 mg/L TDS).
- **Brine Management:** GeoZero™ recovers 1,500 tons/day salts (NaCl, KCl, $MgCl_2$/$MgSO_2$, $CaCO_2$).
- **Automation:** GeoSmart™ AI reduces OPEX by 15 %.

TECHNOLOGIES FOR PROFITABILITY

OPTIMIZED TECHNOLOGIES ENHANCE ROI:

1. GEOGRAPHENE™: CUTS ENERGY USE BY 25 % (~1.8 KW H M−3), EXTENDS MEMBRANE LIFE TO 12 YEARS.

2. GEOSOLAR™: REDUCES ENERGY COSTS TO $0.07 KW−1 H.

3. GEOFORWARD™: LOWERS GEOZERO™ ENERGY COSTS BY 20 %.

4. GEOSMART™: CUTS MAINTENANCE COSTS BY 15 %.

5. GEOZERO™: GENERATES $64.20 NET PROFIT, OFFSETTING OPEX BY 35 %.

MOST EFFICIENT TECHNOLOGIES FOR ROI

1. GEORO™ WITH ERDS:
1.8 KW H M^{-3} TO 2.3 KW H M^{-3},
\$0.24 M^{-3} TO 0.75 M^{-3}, SCALABLE.

2. GEOHYBRID™ RO-MED:
USES WASTE HEAT, CUTTING ENERGY COSTS BY 25 %.

3. GEOSOLAR™:
REDUCES ENERGY COSTS BY 35 % TO 42 %.

4. GEOZERO™:
ADDS BRINE BYPRODUCT REVENUE.

BRINE VALORIZATION: FERTILIZER AND COMMODITY PRODUCTION

GeoZero™ recovers 1,500 tons/day (547,500 tons/year) from 15,400 m^3/day brine (100–120 g/L TDS):

FERTILIZERS:
– KCl (82,125 tons, $300 to 400): $24.64 to 32.85 .
– $MgSO_4$ (54,750 tons, $200 to 300): $10.95 to 16.43 .
– $CaCO_3$ (27,375 tons, $100 to 150): $2.74 to 4.11 .

COMMODITIES:
– NaCl (383,250 tons, $50 to 100): $19.16 to 38.33 .
– $MgCl_2$ (54,750 tons, $200 to 300): $10.95 to 16.43 .

PROCESS: 15 nanofiltration trains, high-efficiency electrochemical cells, multi-effect evapora- tors using GeoHybrid™/GeoSolar™ waste heat yield 70 % NaCl, 15 % KCl, 10 % $MgCl_2$/$MgSO_4$, 5 % $CaCO_3$.

OUTPUT: Revenue $57.51 to 91.71 (midpoint $74.61), net profit $64.20 after $10.41 costs ($0.30 m^{-3}).

FEASIBILITY: Indonesia's agriculture (13 % GDP, 7.5) and industry (4) ensure demand, with ASEAN exports.

ENVIRONMENTAL BENEFITS: Maintains near-zero discharge, supports sustainable agriculture.

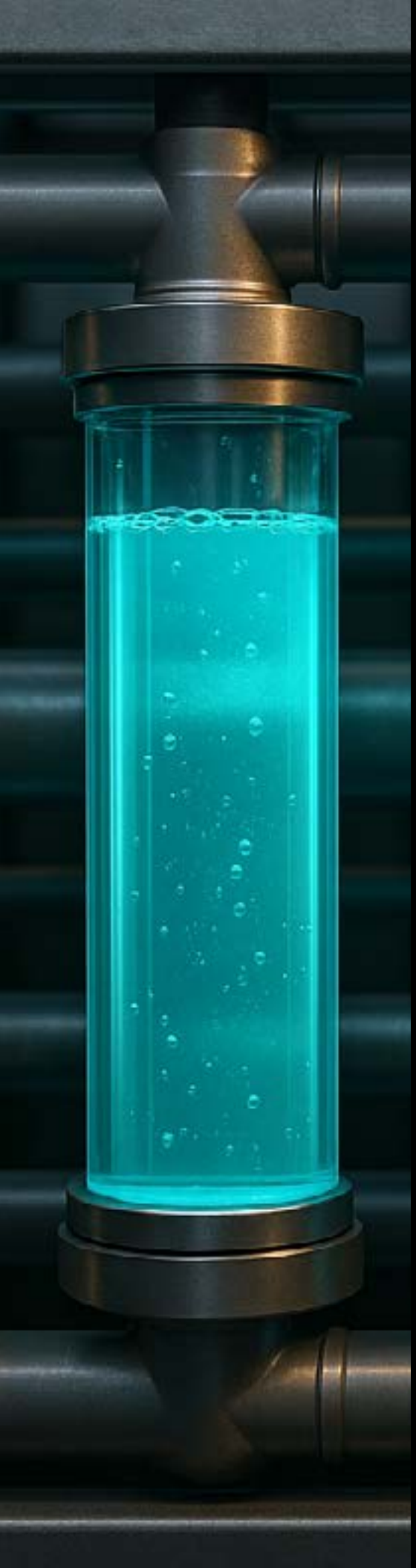
FEASIBILITY STUDIES

WATER DEMAND
20 % SHORTFALL BY 2035, JAKARTA SUBSIDENCE (10 CM/YEAR).

SITE SELECTION
NORTH JAKARTA MINIMIZES DISTRIBUTION COSTS, EIAS ASSESS MARINE IMPACTS.

TECHNICAL FEASIBILITY
GEORO™/GEOGRAPHENE™ MATCH SINGAPORE'S JURONG ISLAND (3.5 KW H M^{-3}, TARGETING 1.3 KW H M^{-3}).

REGULATORY FRAMEWORK
REQUIRES EIAS, BRINE MONITORING, COMMUNITY ENGAGEMENT.



CAPITAL EXPENDITURE (CAPEX)

TOTAL CAPEX: $343.75, REDUCED TO $334.75 WITH TAX INCENTIVES, VALIDATED AGAINST CARLSBAD ($250 FOR 35 MGD):

DIRECT COSTS (58.2 %, $200):
– GEORO™/GEOGRAPHENE™ (ENHANCED): $68
– GEOSOLAR™ 50 MW (PEROVSKITE): $55
– PIPING/INFRASTRUCTURE: $20
– SITE DEVELOPMENT: $11
– GEOZERO™ EXPANSION: $35
– GEOFORWARD™/GEOHYBRID™ UPGRADES: $11

INDIRECT COSTS (5.8 %, $20):
– ENGINEERING/DESIGN: $9
– PERMITTING/EIAS: $8
– FINANCING/LEGAL: $3

CONTINGENCY (25 %): $68.75

TAX INCENTIVES: $9 VIA BKPM EXEMPTIONS.

OPERATIONAL EXPENDITURE (OPEX)

ANNUAL OPEX: $29.77 ($0.86 M−3), 95 % AVAILABILITY (34,675,000 M³/YEAR):

- **ENERGY (21 %): $6.25 (1.8 KW H M−3, $0.07 KW−1 H).**
- **LABOR (3 %): $0.90.**
- **GEOGRAPHENE™ REPLACEMENT (2 %): $0.72 (12 YEARS).**
- **MAINTENANCE (4 %): $1.15.**
- **CONSUMABLES (2 %): $0.49.**
- **GEOZERO™ PROCESSING (35 %): $10.41 ($0.30 M−3).**
- **FIXED COSTS (33 %): $9.85.**

EMPLOYMENT COSTS

- **Construction (2 years):** 630–830 jobs, $8.2 : 200 engineers ($25.000, $5), 400 workers ($7.000 , $2.8), 80 managers ($25.000 , $0.4).
- **Operational:** 60 jobs, $0.90 (3 % escalation): 20 technicians ($18.000 , $0.36), 10 engineers ($25.000 , $0.25), 30 support ($6.300 , $0.29).
- **Indirect Jobs:** 200–300 in supply chains/services.
- **Training:** $0.1 with universities.

WATER PRICING

PRICE:

$0.80 M^{-3}, COMPETITIVE ($0.60 M^{-3} TO 1.20 M^{-3}), 7 % MARGIN OVER OPEX ($0.86 M^{-3}). SUB- SIDIES MAY LOWER TO $0.55 M^{-3}.

REVENUE:

34,675,000 M^3/YEAR × $0.80 M^{-3} = $27.74 , PLUS $64.20 GEOZERO™, TOTALING $91.94

GOVERNMENT SUPPORT AND INCENTIVES

- **0% Loan:** Bappenas 0% interest loan for 50 % CAPEX ($171.875, 30 years).
- **World Bank:** Grants of $10 to 30 for sustainable water projects.
- **Tax Incentives:** BKPM tax holidays/import duty exemptions, $9 CAPEX reduction.
- **Impact:** Reduces CAPEX to $334.75, boosts ROI.

RETURN ON INVESTMENT (ROI)

ASSUMPTIONS:

– **Revenue:** $91.94

– **OPEX:** $29.77

– **CAPEX repayment:** $11.16 (30-year, 0% for $171.875, 5 % for $162.875, 5-year interest-only)

– **Net Cash Flow:**

$91.94 - $29.77 - $8.14 (Years 1–5) = $54.03; $91.94 - $29.77 - $11.16 (Years 6–10) = $51.01

– **Total 10-Year Cash Flow:** ($54.03 × 5) + ($51.01 × 5) = $525.20

– **ROI:** ($525.20 / $334.75) × 100 % = 159.26 %

– **Break-even:** ~3

10-YEAR RETURN TABLE

10-YEAR ROI GRAPH

ENVIRONMENTAL IMPACT

- **GeoZero™:** Recovers 1,500 tons/day salts, maintaining near-zero discharge.
- **Marine Ecosystem:** GeoIntake™ low-velocity systems, EIAs ensure compliance.
- **Carbon Footprint:** GeoSolar™ cuts emissions by ~35.000 .
- **Community:** Consultations address concerns; fertilizers aid agriculture.

Year	Revenue ($M)	OPEX ($M)	CAPEX Repayment ($M)	Net Cash Flow ($M)	Cum. Cash Flow ($M)
1	91.94	29.77	8.14 (interest)	54.03	54.03
2	91.94	29.77	8.14	54.03	108.06
3	91.94	29.77	8.14	54.03	162.09
4	91.94	29.77	8.14	54.03	216.12
5	91.94	29.77	8.14	54.03	270.15
6	91.94	29.77	11.16	51.01	321.16
7	91.94	29.77	11.16	51.01	372.17
8	91.94	29.77	11.16	51.01	423.18
9	91.94	29.77	11.16	51.01	474.19
10	91.94	29.77	11.16	51.01	525.20

TABLE 1: 10-YEAR FINANCIAL PROJECTIONS WITH BRINE VALORIZATION

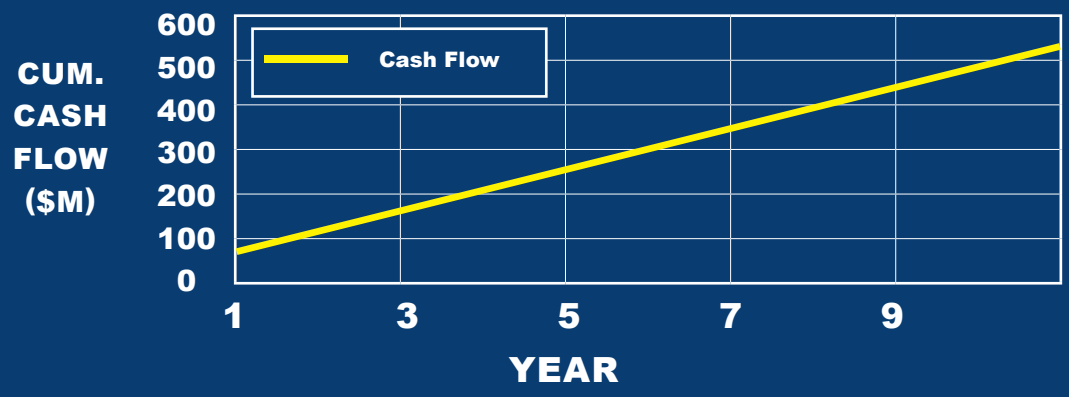
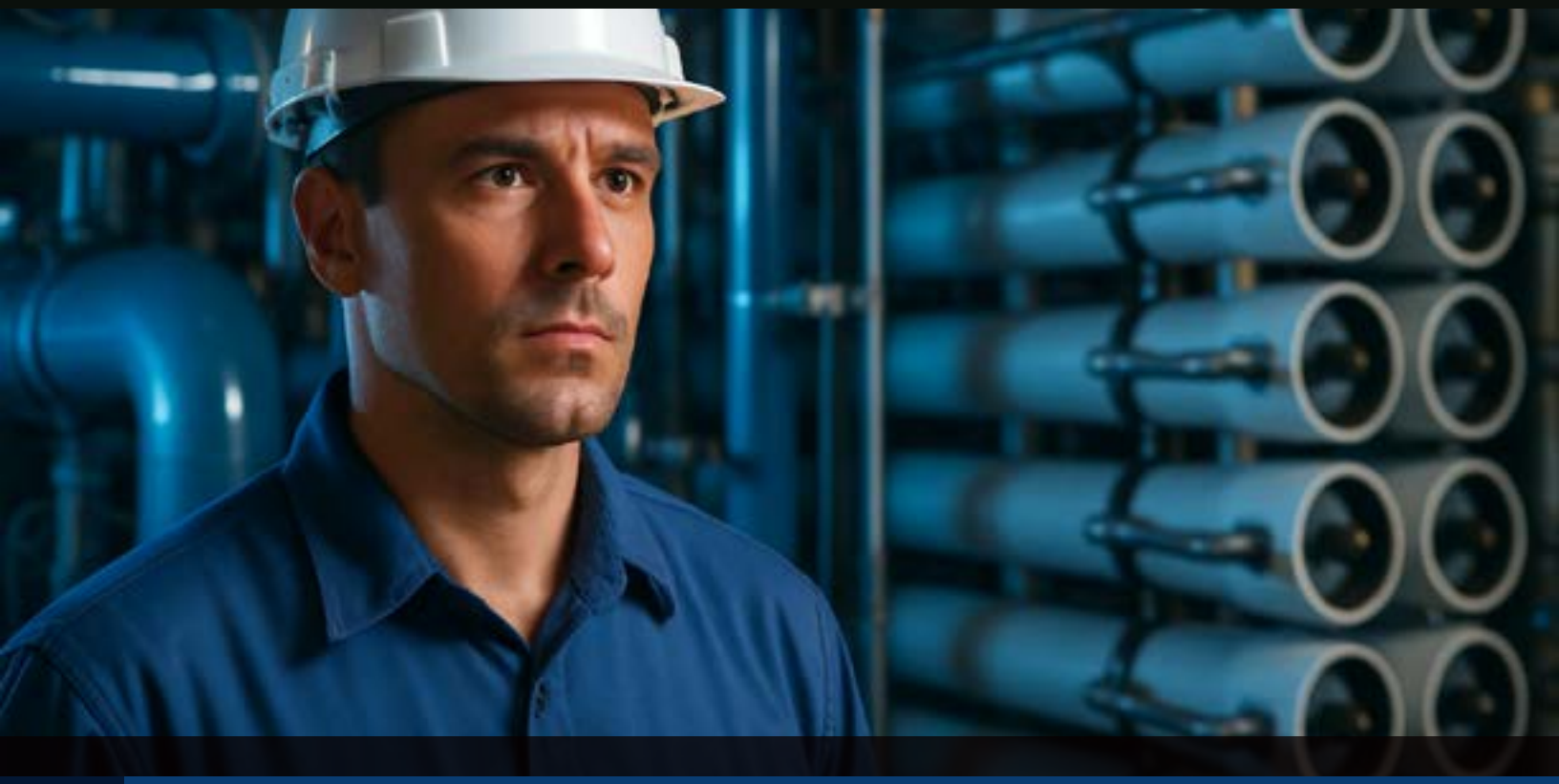


Figure 1: Cumulative cash flow rises from $54.03M to $525.20M, break-even ~3 .

ECONOMIC AND SOCIAL BENEFITS



WATER SECURITY:
SERVES 500,000–1,000,000 RESIDENTS/ INDUSTRIES.

JOB CREATION:
630–830 CONSTRUCTION, 60 PERMANENT, 200–300 INDIRECT JOBS.

ECONOMIC IMPACT:
BOOSTS GDP BY 0.5 % TO 1 %.

RISKS AND MITIGATION

COST OVERRUNS:
25 % CONTINGENCY ($68.75).
ENVIRONMENTAL:
EIAS, GEOZERO™ ENSURE COMPLIANCE.
ENERGY COSTS:
GEOSOLAR™ WITH GRID BACKUP.
MARKET SATURATION:
DIVERSIFIED PRODUCTS, ASEAN EXPORTS.
SOCIAL RESISTANCE:
COMMUNITY BENEFITS (TRAINING, INFRASTRUCTURE).

FINANCING STRATEGY

PPP MODEL:

PARTNERS WITH BAPPENAS, WORLD BANK, ASIAN DEVELOPMENT BANK.

LOAN:

50 % ($171.875) 0% VIA BAPPENAS, 50 % ($162.875) 5 %, 30-YEAR, 5-YEAR INTEREST-ONLY.

GRANTS/INCENTIVES:

WORLD BANK GRANTS ($10 TO 30), BKPM TAX EXEMPTIONS ($9).

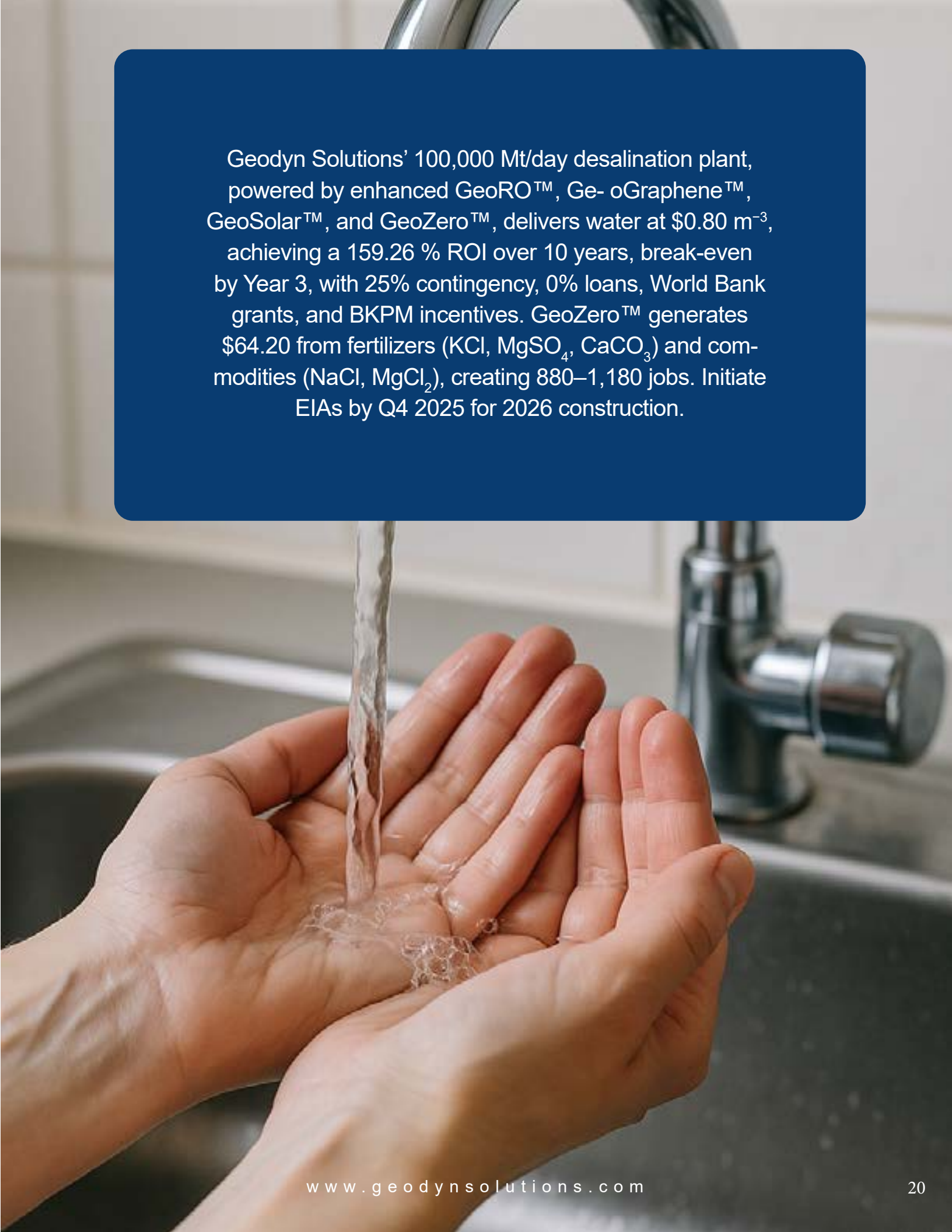
REVENUE:

$0.80 M^{-3} + $64.20 GEOZERO™.

SUMMARY OF TECHNOLOGIES AND ROI IMPACT

Technology	Efficiency (kWh/m³)	Cost ($/m³)	ROI Impact
GeoRO™	1.8–2.3	0.24–0.75	High: Scalable
GeoGraphene™	1.8	0.24–0.65	High: 25 % energy savings
GeoSolar™	1.8–2.3	0.24–0.55	High: 35 % to 42 % cost cut
GeoHybrid™	2.8–4.5	0.45–0.75	Moderate: Waste heat
GeoForward™	1.6–2.0	0.35–0.75	Moderate: Brine recovery
GeoZero™	N/A	0.30	High: $64.20

Table 2: Summary of Proprietary Technologies



Geodyn Solutions' 100,000 Mt/day desalination plant, powered by enhanced GeoRO™, Ge- oGraphene™, GeoSolar™, and GeoZero™, delivers water at \$0.80 m^{-3}, achieving a 159.26 % ROI over 10 years, break-even by Year 3, with 25% contingency, 0% loans, World Bank grants, and BKPM incentives. GeoZero™ generates \$64.20 from fertilizers (KCl, $MgSO_4$, $CaCO_3$) and commodities (NaCl, $MgCl_2$), creating 880–1,180 jobs. Initiate EIAs by Q4 2025 for 2026 construction.

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