

ADS ECO Eco-Industrial Complex

Integrated Master Plan

Strategic Circular Economy Infrastructure Platform Armenia

1. Master Plan Overview

The ADS ECO Eco-Industrial Complex is a next-generation integrated circular economy infrastructure platform designed to transform municipal and industrial waste into renewable energy, industrial raw materials, recyclable products, and agricultural outputs.

The Project combines:

- Advanced waste processing systems
- AI-powered material recovery
- Renewable energy infrastructure
- Recycling and manufacturing zones
- Circular agriculture systems
- Smart industrial management systems
- ESG and environmental monitoring infrastructure

ADS ECO is structured as a scalable eco-industrial ecosystem capable of long-term expansion and regional replication.

2. Strategic Master Plan Objectives

Core Objectives

Environmental Objectives

- Reduce landfill dependency
- Achieve $\geq 90\text{--}95\%$ landfill diversion
- Reduce greenhouse gas emissions
- Improve environmental protection systems
- Support Armenia's climate objectives

Industrial Objectives

- Establish circular industrial infrastructure
- Create secondary raw material supply chains
- Develop industrial recovery ecosystems
- Integrate renewable energy systems
- Enable modular industrial expansion

Economic Objectives

- Create long-term infrastructure cash flows
- Support industrial import substitution
- Create regional employment
- Develop sustainable infrastructure investment platform
- Enable institutional financing readiness

Technological Objectives

- Deploy AI and robotics systems
- Implement smart SCADA infrastructure
- Establish real-time operational monitoring
- Integrate smart energy systems
- Enable digital ESG reporting architecture

3. Site Planning Philosophy

ADS ECO is designed as a modular eco-industrial platform organized through interconnected operational zones.

The planning structure prioritizes:

- Operational efficiency
- Environmental safety
- Industrial scalability
- Internal logistics optimization
- Energy integration
- Smart infrastructure management
- Long-term expansion capability

The Master Plan integrates industrial flows from waste intake to material recovery, energy generation, and final product output.

4. Site Infrastructure Structure

Main Functional Zones

Zone	Function
Zone 1	Waste Reception & Logistics
Zone 2	AI Sorting & Material Recovery
Zone 3	Recycling & Industrial Processing
Zone 4	Waste-to-Energy & Thermal Conversion
Zone 5	Renewable Energy Systems

Zone 6	Agricultural & Greenhouse Zone
Zone 7	Administrative & Control Infrastructure
Zone 8	Utility & Support Infrastructure

5. Zone 1 — Waste Reception & Logistics Zone

Purpose

The Waste Reception & Logistics Zone serves as the primary intake and control point for incoming waste streams.

Main Infrastructure Components

Logistics Infrastructure

- Waste entry control point
- Truck weighing stations
- Rail-connected unloading infrastructure
- Wagon maneuvering systems
- Internal logistics circulation roads
- Heavy vehicle service area

Safety & Inspection Systems

- Radiation detection systems
- Gas monitoring systems
- Hazardous material inspection
- Security monitoring systems
- Automated checkpoint controls

Waste Handling Infrastructure

- Waste unloading bunker platforms
- Open unloading areas
- Waste staging zones
- Pre-sorting logistics systems
- Initial quality assessment laboratory

Support Facilities

- Truck washing stations
 - Driver service infrastructure
 - Logistics parking zones
 - Equipment maintenance access
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6. Zone 2 — AI Sorting & Material Recovery Facility (MRF)

Purpose

The Material Recovery Facility is the technological core of ADS ECO.

It is designed to maximize resource recovery through advanced sorting systems and industrial material separation technologies.

Main Systems

AI Sorting Systems

- AI/NIR/VIS optical sorting systems
- Smart sensor arrays
- Automated conveyor systems
- Industrial robotics integration
- Smart classification systems

Material Recovery Infrastructure

- Plastic separation systems
- Metal recovery systems
- Paper & cardboard sorting lines
- Glass separation systems
- RDF fuel preparation systems

Storage & Logistics

- Recyclable material storage
- Internal loading platforms
- Baling systems
- Material dispatch infrastructure

Operational Features

- SCADA-linked operational monitoring
- Real-time recovery analytics
- Automated quality control systems
- Smart recovery optimization

7. Zone 3 — Recycling & Industrial Manufacturing Zone

Purpose

The Recycling & Industrial Zone converts recovered materials into reusable industrial products and secondary raw materials.

Industrial Processing Facilities

Plastic Recycling Plant

Functions:

- Plastic washing
- Plastic shredding
- Pelletizing systems
- Industrial raw material production

Paper & Cardboard Recycling Plant

Functions:

- Fiber recovery
- Industrial paper processing
- Recycled cardboard manufacturing

Glass Recycling Plant

Functions:

- Glass crushing systems
- Glass purification
- Secondary glass material production

Metal Recycling Facility

Functions:

- Ferrous separation
- Non-ferrous separation
- Metal preparation systems
- Industrial scrap processing

Additional Circular Manufacturing Units

- Textile recovery systems
- Tire & rubber processing
- Wood processing systems
- Construction material recovery

8. Zone 4 — Waste-to-Energy & Advanced Thermal Conversion Zone

Purpose

This zone converts non-recyclable fractions into renewable energy and industrial energy carriers.

Main Energy Infrastructure

Pyrolysis Systems

Functions:

- Thermal conversion of waste fractions
- Syngas production
- Oil and carbon recovery
- Energy feedstock generation

Plasma Reactor Systems

Functions:

- High-temperature waste conversion
- Hazardous fraction stabilization
- Advanced thermal destruction
- High-efficiency material conversion

Syngas Infrastructure

Includes:

- Syngas cooling systems
- Gas cleaning systems
- High-pressure gas storage
- Gas preparation systems

Energy Generation Infrastructure

Includes:

- Gas turbine systems
- ORC secondary turbines
- Smart power management systems
- Grid integration systems

Hydrogen Production Modules

Potential integration for:

- Future hydrogen economy positioning
- Industrial gas applications
- Long-term energy diversification

9. Zone 5 — Renewable Energy & Smart Grid Infrastructure

Purpose

To provide integrated renewable energy generation and energy optimization.

Main Infrastructure

Solar Power Systems

- 5–6 MW solar infrastructure
- Smart inverter systems
- Renewable grid integration

BESS Energy Storage

Includes:

- Battery energy storage systems
- Load balancing systems
- Grid stabilization systems
- Emergency backup systems

Smart Grid Systems

- MV/HV substations
- Energy management systems (EMS)
- Smart SCADA infrastructure
- Load optimization systems

10. Zone 6 — Agricultural & Circular Agro-Industrial Zone

Purpose

To integrate organic recovery streams into circular agricultural production systems.

Main Infrastructure

Composting Systems

Functions:

- Organic waste stabilization
- Compost production
- Soil enhancement products

Greenhouse Infrastructure

Potential outputs:

- Controlled agricultural production
- Circular agriculture systems
- Heat integration utilization
- Water reuse integration

Water Reuse Systems

- Treated water circulation
- Irrigation integration
- Closed-loop water systems

11. Zone 7 — Administrative & Digital Control Center

Purpose

Centralized management and digital operational oversight.

Main Infrastructure

Administrative Building

Includes:

- Executive offices
- Operational management center
- ESG reporting center
- Investor and stakeholder facilities

SCADA + EMS + MOCC Control Center

Functions:

- Centralized operations monitoring

- Energy system control
- Environmental monitoring
- Real-time analytics
- Operational optimization
- Security management systems

Laboratory Infrastructure

Includes:

- Environmental testing
- Material quality testing
- Waste characterization systems
- Industrial process monitoring

12. Zone 8 — Utility & Support Infrastructure

Main Infrastructure Components

Utilities

- Wastewater treatment plant (WWTP)
- Pumping stations
- Industrial water systems
- Fire protection systems
- Utility corridors

Maintenance & Technical Support

- Mechanical workshop
- Equipment maintenance buildings
- Vehicle fleet facilities
- Spare parts storage

Employee Infrastructure

- Staff dining facilities
- Locker rooms
- Medical center
- Staff service areas

13. Internal Logistics & Transport Integration

The Master Plan prioritizes efficient internal logistics.

Logistics Systems

- Rail-connected transport integration
- Internal heavy-duty circulation roads
- Industrial loading/unloading zones
- Smart logistics management systems
- Vehicle maneuvering platforms
- Heavy equipment operational corridors

The internal flow structure minimizes operational conflicts between waste intake, industrial production, and outgoing product logistics.

14. Digital Infrastructure & Smart Systems

ADS ECO integrates advanced digital infrastructure.

Smart Infrastructure Components

- SCADA systems
- Smart operational analytics
- AI-based process optimization
- ESG digital monitoring
- Energy management systems
- Real-time KPI dashboards
- Smart environmental control systems

Digital systems improve:

- Operational transparency
 - Recovery efficiency
 - Energy optimization
 - ESG accountability
 - Institutional reporting capability
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15. Environmental Protection Infrastructure

Environmental Systems

Air Protection

- Emissions filtration systems
- Gas purification systems
- Air quality monitoring
- Odor control systems

Water Protection

- Wastewater treatment systems
- Water reuse integration
- Surface runoff management
- Groundwater protection systems

Safety & Environmental Monitoring

- Radiation monitoring
- Hazardous material controls
- Fire safety systems
- Environmental containment systems

16. ESG Integration Within Master Plan

The Master Plan incorporates ESG principles into infrastructure design.

ESG Design Priorities

Environmental

- Low landfill dependency
- Renewable energy integration
- Circular material flows
- Climate mitigation infrastructure

Social

- Safe industrial environment
- Workforce infrastructure
- Regional economic development
- Community environmental benefits

Governance

- Centralized monitoring systems

- Institutional reporting systems
 - Digital transparency architecture
 - Operational accountability systems
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17. Expansion & Scalability Strategy

ADS ECO is designed as a modular scalable infrastructure platform.

Scalability Features

- Expandable MRF modules
- Additional energy blocks
- Modular recycling plants
- Expandable greenhouse clusters
- Flexible utility integration
- Replicable infrastructure architecture

Future Regional Replication

Potential replication regions:

- Lori
- Armavir
- Kotayk

The modular architecture enables phased national infrastructure expansion.

18. Institutional Infrastructure Positioning

ADS ECO is positioned as:

- Circular economy infrastructure
- Renewable energy infrastructure
- Sustainable industrial platform
- Climate-aligned infrastructure asset
- ESG investment platform
- Institutional-grade infrastructure ecosystem

The Project is structured to support:

- Infrastructure funds
- ESG investors

- Climate finance institutions
 - Development finance entities
 - PPP infrastructure partnerships
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19. Strategic Master Plan Conclusion

The ADS ECO Master Plan represents a transformational eco-industrial infrastructure ecosystem for Armenia.

The platform integrates:

- Waste management modernization
- Circular industrial production
- Renewable energy generation
- Environmental protection systems
- Smart industrial infrastructure
- ESG governance integration
- Long-term scalable infrastructure economics

ADS ECO establishes the foundation for a new generation of sustainable industrial infrastructure within Armenia and the wider region.

The Project is designed to evolve from a single-site industrial platform into a nationally scalable circular economy infrastructure network.

Contact Information

ADS-ECO SPV

Yerevan, Republic of Armenia

Tel: +374 93 941111

Email: info@ads-eco.com; investors@ads-eco.com

Website: www.ads-eco.com
