AI PATHWAYS FOR CLIMATE CHANGE ACTION

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Why Digital Constraints Must Work Under Real World Constraints

ESCAP has delivered a number of capacity development workshops on addressing multiple dimensions of infrastructure development (i.e. ICT, transport and energy). Policymakers of Kazakhstan(1), Kyrgyzstan(2) and Mongolia(3) were equipped with tools and knowledge products in their national context, which enabled them to identify opportunities and challenges of infrastructure connectivity, as well as to propose feasible mechanisms to address connectivity deficits in a sustainable manner. Holistic approaches were utilized to explore synergistic opportunities across infrastructure sectors through co-deployment and through methodological and policymaking and planning tools to build climate and disaster resilient infrastructure.

Asia-Pacific countries need to empower local governments and community groups to deliver against the sustainable development goals in an inclusive, participatory and integrated fashion. It has been estimated that 65% of the total SDG targets need to be delivered by local authorities and actors, but this is not matched with requisite decision-making authority. Effective decentralization including for taxation and expenditures ensures that local governments have the appropriate responsibility, authority and capacity to take action.

Source: Economic and Social Commission for Asia and the Pacific, United Nations

Edge AI as a Design Approach for Real-World Constraints

- Local AI Execution
- Low-Power Operation under Intermittent Electricity
- Offline and Low-Connectivity Functionality
- Minimal Data Transmission for Data Sovereignty
- Designed for Local and Field-Level Operations

Core Capabilities Enabled by the Edge AI Infrastructure (NOTAL)

- **Multilingual Disaster Information Delivery**
  - Ensuring timely and understandable alerts for diverse and linguistically vulnerable populations

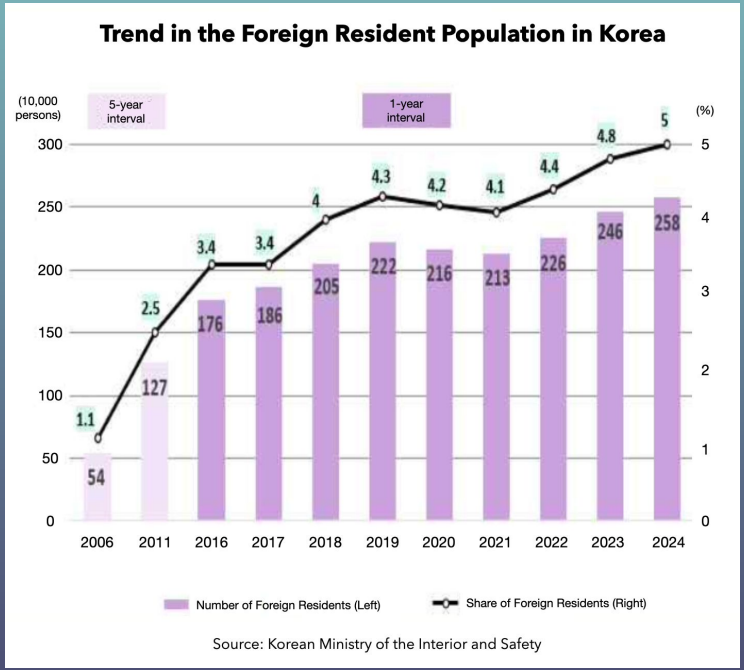
- **Environmental and Energy Data Disclosure**
  - Monitoring and processing local environmental and energy data for transparency and accountability

01

Disaster Response (SDG-13)

Growing Linguistically Diverse Population

Example: Republic of Korea



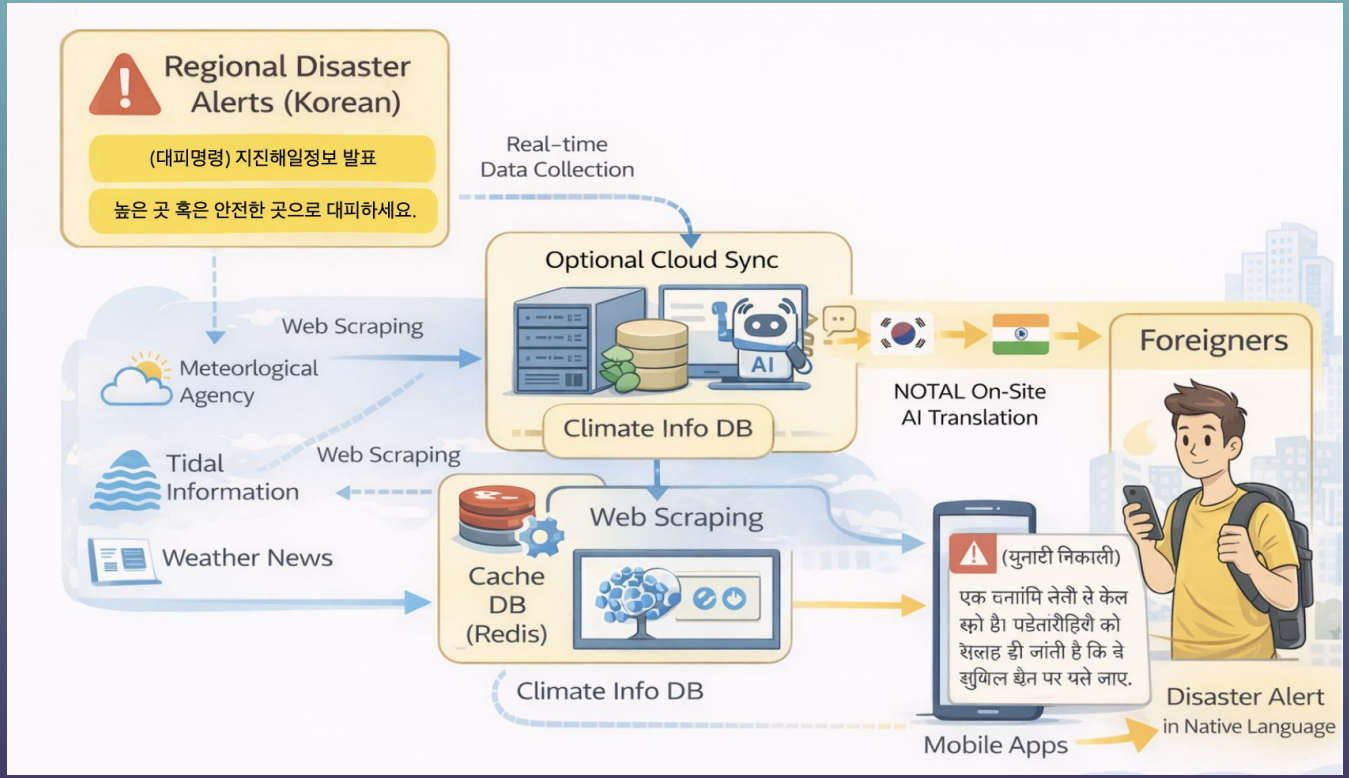
Source: Korean Ministry of the Interior and Safety

This reflects a broader Asia-Pacific trend of increasing cross-border mobility and multilingual communities.

Problem: Alerts Fail Without Comprehension

- Climate-driven disasters such as heatwaves, floods, and typhoons are increasing
- Even when alerts are delivered, disaster response fails when…
  - If they are not understood,
  - If they do not lead to action
- International disaster frameworks emphasize that risk communication is a core component of effective early warning systems
- Research shows that populations with limited language proficiency:
  - Are less likely to receive or correctly interpret alerts
  - Experience delayed or inappropriate responses during disasters

Real-Time Multilingual Disaster Info System



NOTAL in Multilingual Disaster Info System

- **On-site AI Translation Server**
  - Local translation even when connectivity is limited
- **sLM Execution Layer**
  - Low-power inference on edge devices
- **STT (Speech-to-Text) & TTS (Text-to-Speech) Implementation**
  - Voice alerts for low literacy / hands-free situations

Expected Outcome

Faster comprehension

Faster Evacuation / Protective Actions

Reduced Misinterpretation & Delayed Response

02

ESG / Environmental Data

Why ESG Matters in Asia-Pacific?

- Climate action is not only about emergency response, but about preventing risk and reducing vulnerability.
- Environmental and energy data is the first missing layer of climate action.
- ESG provides a practical framework to make climate risks visible, measurable, and actionable.

Problem: ESG Remains Challenging Where Climate Data is Most Limited

- In many Asia-Pacific regions, climate action is constrained not by intent, but by the absence of basic environmental and energy data.

- This data gap appears most clearly at…
    - SME and local organization level,
    - Resources, expertise, and monitoring systems are limited

- As a result, ESG does not fail at the strategy level, but at the starting point: Collecting and structuring reliable climate-related data.

Edge-AI & On-Device AI based ESG Response System

ESG Q&A Service

(RAG: ESG Regulations / Document Q&A)

- Frontend UI
- FastAPI Core (API Gateway & Core Engine)
- Data Storage (structured ESG docs)
- Vector Store (semantic search index)
- Background Services (ingestion, preprocessing, indexing, monitoring)

ESG Assessment Service

(Self-Assessment & Gap Analysis)

- Evaluation Logic
  - Quantitative: rule-based scoring (Yes/No & numeric inputs) — no AI
  - Qualitative: narrative ESG responses — prompt-based inference using SLM
  - No RAG / no vector search for qualitative evaluation

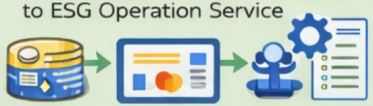
NOTAL EdgeAI Server | SLM

Shared small language model infrastructure

AI-based Logic Generation

(PRD-driven: Regulation / Formula / Sample I/O)

- PRD Input: rules, formulas, sample input/output
- AI-based code generation
- Automated testing & validation
- Verified logic modules deployed to ESG Operation Service



ESG Operation Service

(Rule-based ESG Calculation & Reporting)

- **Core Platform Modules**
  - Topic Standards Modules
    - GRI 300 (Environmental),
    - GRI 400 (Social)
  - Data Validation & Consistency
    - Ensure data quality before calculations
  - Disclosure Mapping & Report Assembly Modules. Inserts results into GRI-based disclosures

NOTAL in ESG Response System

- **sLM Execution Layer**
  - Low-resource inference for ESG interpretation and reporting tasks
- **RAG-Based Knowledge-Grounded Generation**
  - Context-aware interpretation of ESG standards using verified documents
- **End-to-End ESG Process Generation**
  - Automated workflow from data input to disclosure-ready ESG outputs

Expected Outcome

Improved Accessibility of ESG Reporting

Reliable and Evidence-Based ESG Disclosure

THANK YOU

Do you have any questions?