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ICAO Environmental
Symposium 2019

DESTINATION GREEN: THE NEXT CHAPTER

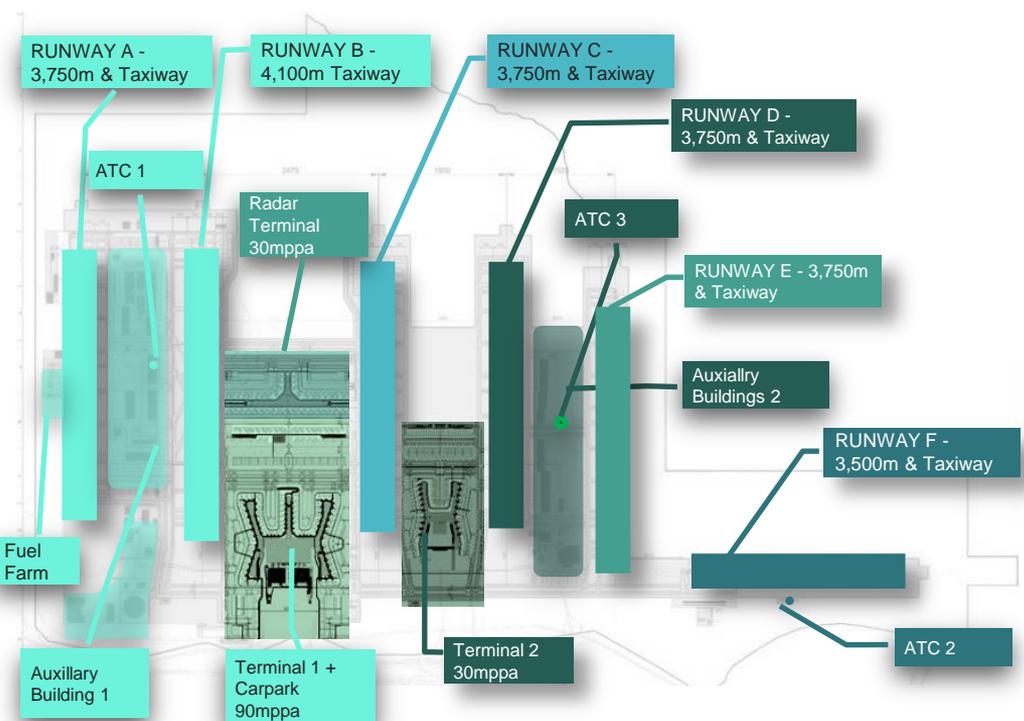


Climate Change Adaptation Plan and Sustainability Approach at Istanbul Airport

Ülkü ÖZEREN

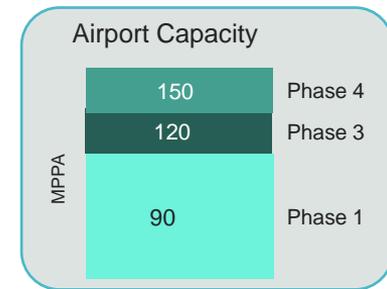
Director of Environment and Sustainability Department /
Environmental Engineer, MSc / İGA – İstanbul Airport





- Phase-1a
- Phase -1b
- Phase -2
- Phase -3
- Phase -4

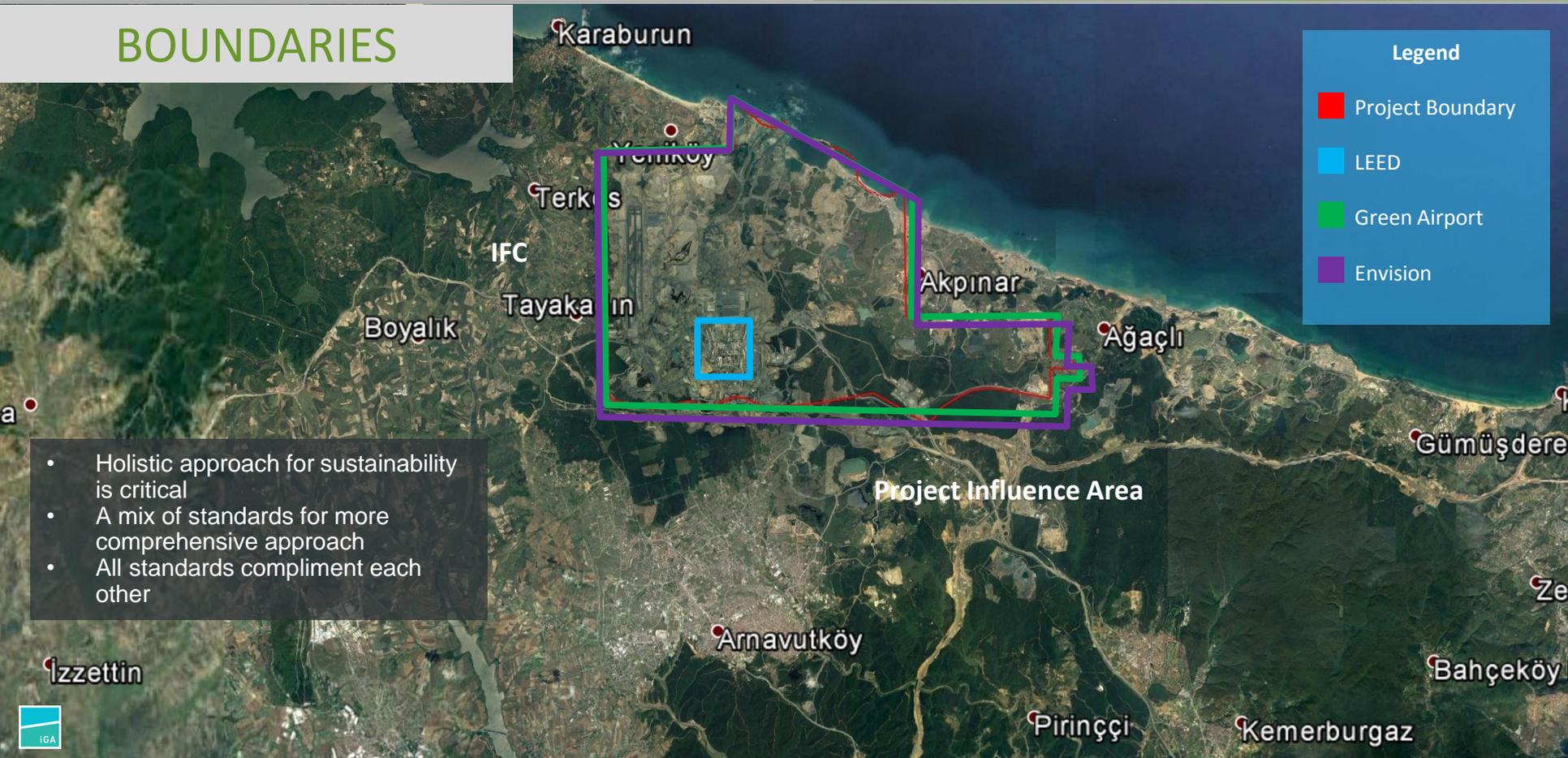
| Project Description (World HUB) | |
|---------------------------------|-------------------------------------|
| 7600 Ha | Project Area (7600 Football Fields) |
| 1.3 M m ² | Terminal 1 Area |
| 6 | Runways |
| 3 | Terminals |
| 60+ | Flights to Capital Destinations |
| 250 | International Line |
| 120 | Countries |



Briefly Istanbul New Airport



BOUNDARIES



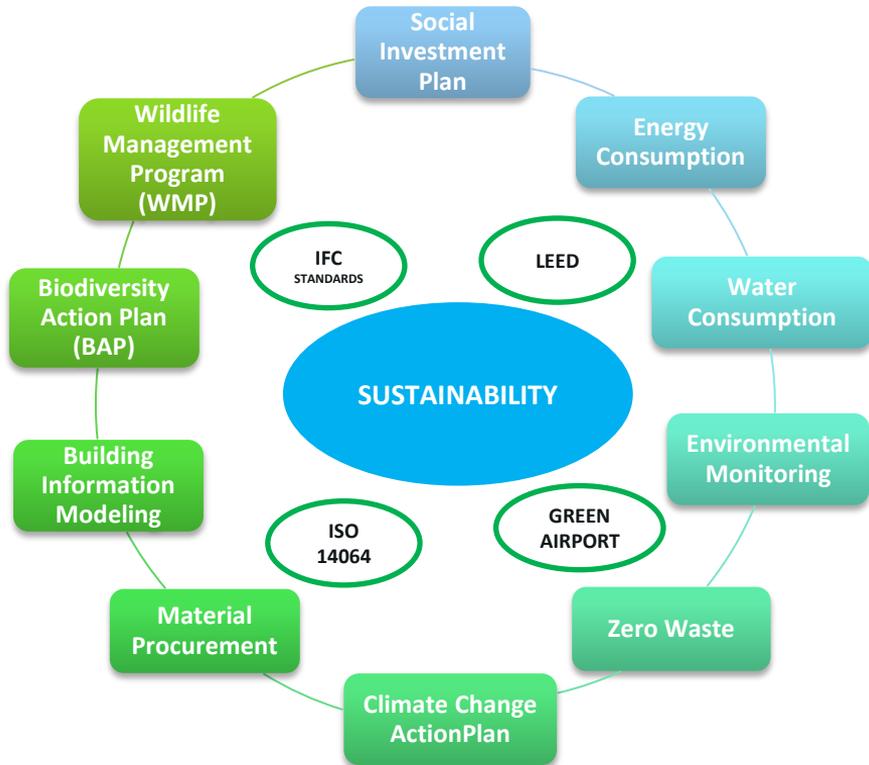
Legend

- Project Boundary
- LEED
- Green Airport
- Envision

- Holistic approach for sustainability is critical
- A mix of standards for more comprehensive approach
- All standards compliment each other

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Holistic Sustainability Approach - As We Understand It



Holistic Sustainability Approach and Framework for Infrastructure and Superstructures

Sustainability:

BIM: Design beyond conventional sustainability practices and knowledge

LEED: %21 Energy & %40 Water efficiency

Regular site surveys for environmental monitoring and NCRs

Zero Waste Program; waste management by maximum recycling

Climate Change Action Plan

Green and Local Material Procurement

Ecology; BAP: conservation actions, offsetting, long-term monitoring, 5000ha afforestation commitment.

Wildlife; WMP: risk assessment, wildlife proof design for flight safety, habitat management, establishment of wildlife unit and wildlife management program, avian radar system

Social Issues:

Grievance Mechanism

Social Investment Program

- Quick Impact Projects
- Sustainable Development Program



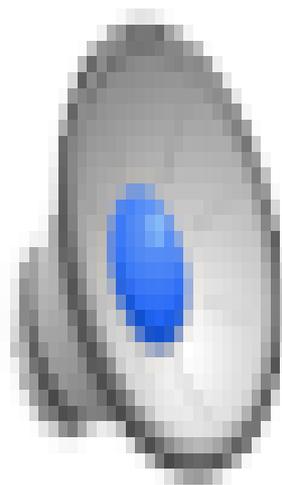
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27th of July, 2017;
Istanbul





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24th of Jan, 2018;
Antalya

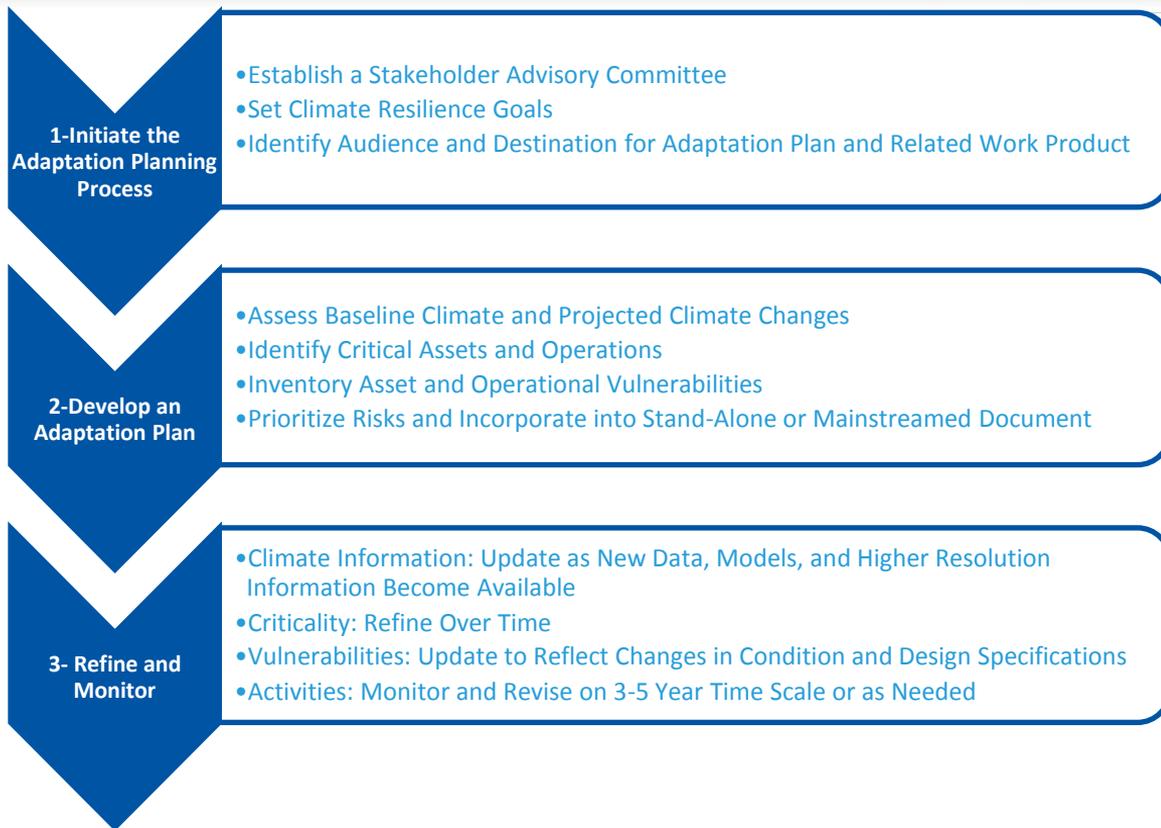




Airport CCA and Resilience

Main motivations for IGA:

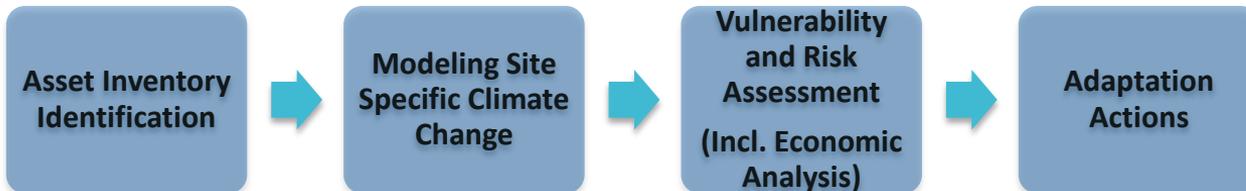
- IGA is a private company and has a BOT contract for 25 years for Istanbul Airport,
- Climate Change is a business continuity issue,
- Climate change is not an phenomena for the future but already in place,
- Registered in 2017, IGA has started Envision certification process, one of the credits for Envision was Climate Change Adaptation.



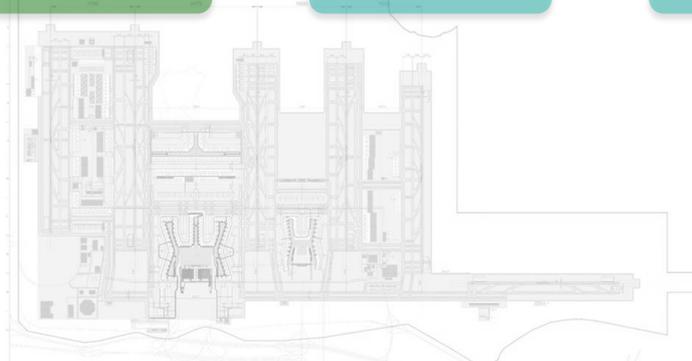
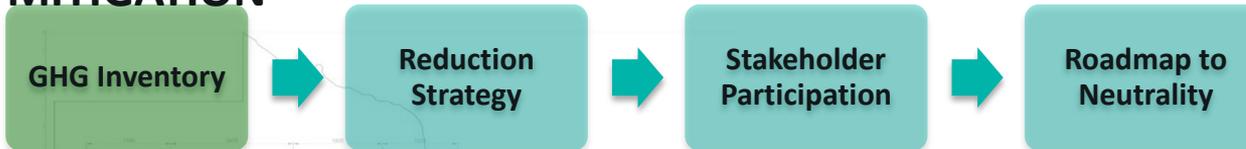


Methodology and Outline

ADAPTATION



MITIGATION



| | |
|-------------------|------------------------------------|
| 7600 ha | Project Area |
| 2 | Terminal Buildings |
| 6 | Runways |
| 3 | ATC Towers |
| 200 | MPPA |
| 1 | Fuel Jetty |
| 56 km | Phase 1 Stormwater Channel |
| 3M m ² | Phase 1 Building Construction Area |



CLIMATE CHANGE ACTION PLAN

Task 1. Climate Change Adaptation Plan

Task 2. ISO 14064 Greenhouse Gas Inventory



1- Adaptation Planning Process

Creating Stakeholder Advisory Committee

Determination of Climate Flexibility Targets

Identification of reader volume and Adaptation Plan and Related Business Product Targets



2-Development of Adaptation Plan

Assessment of Basic Climate and Estimated Climate Changes

Identifying Critical Assets and Transactions

Inventory Presence and Functional Vulnerability - Vulnerability

Prioritize Risks and Incorporate into Stand-Alone or Mainstreamed Document



3- Correction and Monitoring

Climate Information: Update as New Data, Models, and Higher Resolution Information Become Available

Criticality: Refine Over Time

Vulnerabilities: Update to Reflect Changes in Condition and Design Specifications

Activities: Monitor and Revise on 3-5 Year Time Scale or as Needed

Extreme

Precipitation



Wind



Temperature



Fog



Current Design

Modelling Physical Change



Changing Climate Change Conditions

2030

2050

2080



IGA Infrastructure Vulnerability and Risk Assessment

| Impact Parameter | Vulnerability | Adaptation |
|------------------|----------------------|------------------------|
| PRECIPITATION | Reduction in sight | Early warning systems |
| | Flood damage | Barriers |
| WIND | Sea level rise | Routine maintenance |
| | Disconnection | Anchoring |
| HUMIDITY | Collapse | Portable pumps |
| | Rupture of equipment | Insulation |
| TEMPERATURE | Insulation damage | Equipment replacement |
| | Operational delay | Extra air conditioning |

Air Navigation and Service Buildings

VIP Terminals

Transportation

Admin Buildings

Air Navigation and Service Buildings

Operational Buildings

Infrastructure (Sewerage, ICT Network, Energy Transfer)

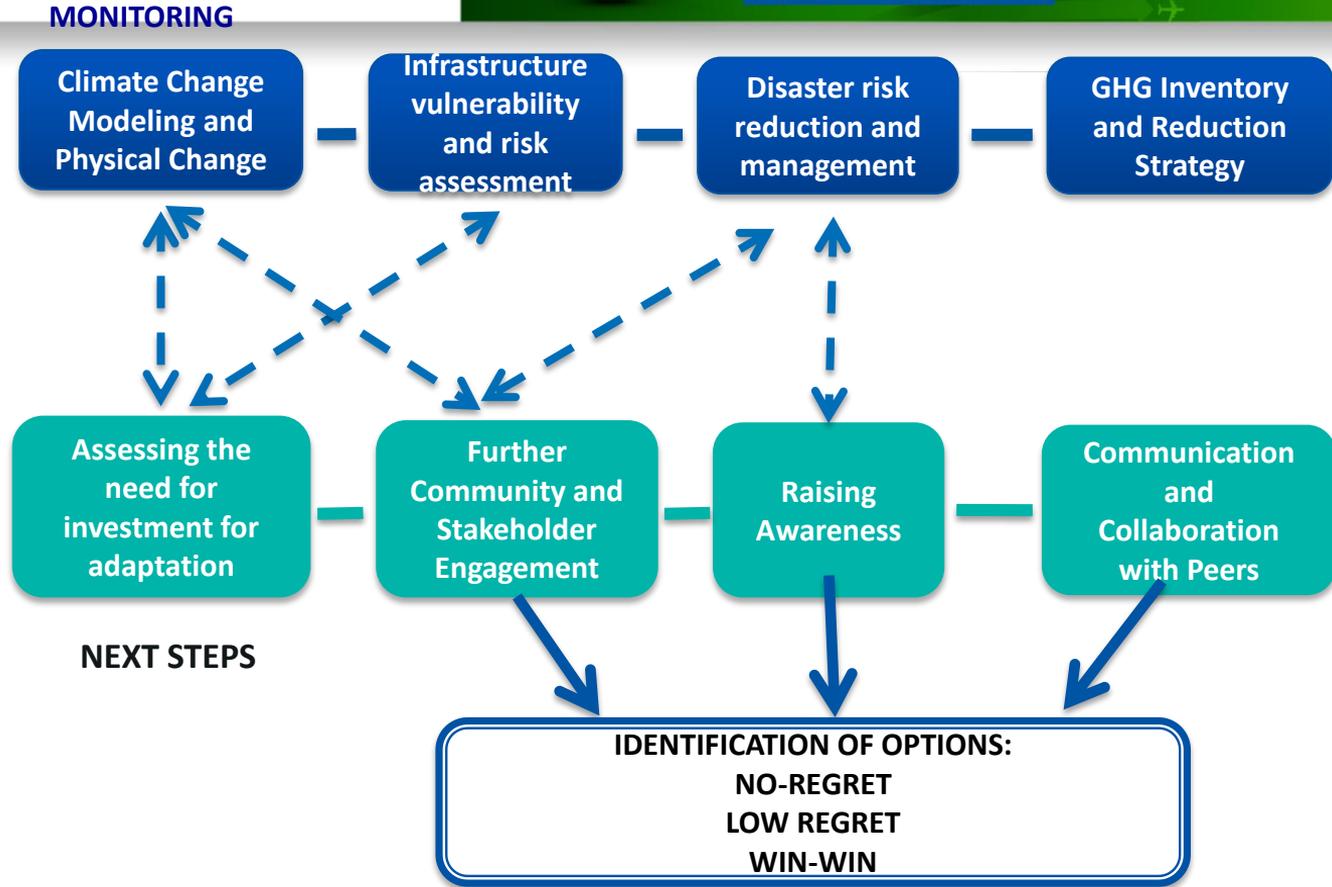
Fuel Farm and Jetty

Monitoring Plan and Next Steps

Dynamic planning is important to adapt the changes during time as per needs or chaotic structure of climate system:

- Vulnerability can change over time,
- Impact can change during time.

Therefore 3-5 year period monitoring is required!





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CLIMATE PROOF INFRASTRUCTURE AND PLANNING FROM THE BEGINNING

Infrastructure Design

During design of the infrastructure components for all landside and airside, Q_{100} flows have been considered in the calculations to meet extreme flood events though Turkish regulation states Q_{25} for such large catchment areas.

Superstructure Design

- **Wind:** Wind loads have been calculated by carrying out wind tunnel tests for terminal building and have been taken as 225kg/m^2 which is two times higher than regulatory standard.
- **Snow:** Snow load has been calculated using historical meteorological data. Although, snow load for Istanbul is known as 75 kg/m^2 , 125 kg/m^2 has been taken for terminal building.
- **Temperature:** Temperature variance has been taken between -24°C and $+24^\circ\text{C}$ for the heat effect.

Operational considerations

Early Alarm Systems

Three main systems will be installed at the airport to get early information and communicate with the airline operators and air navigation systems.

- LIDAR (Light Detection and Ranging; Laser Imaging Detection and Ranging)
- LLWAS (Low Level Wind Alert System) ;
- C-band Radar:

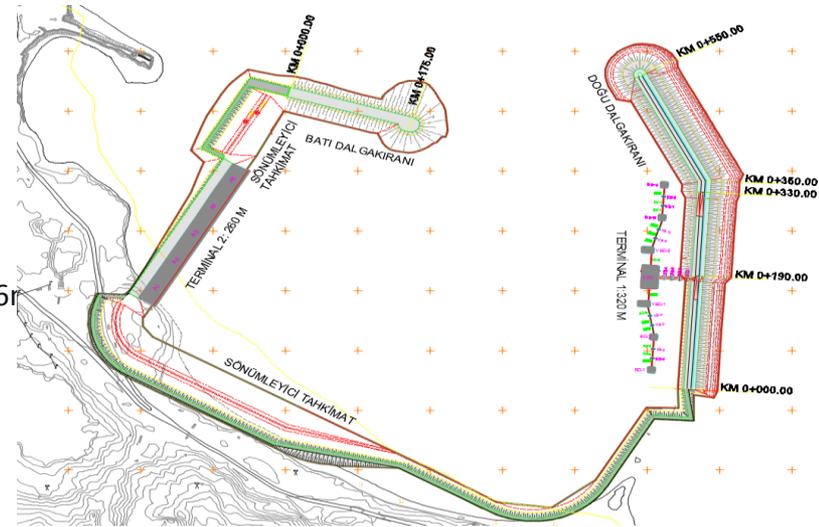


Fuel Jetty and pipelines:

Designed by considering meteorological data of 100 years return period and also expected global sea level rise, which is 110cm for year 2100. This cumulative 110cm rise reflects seasonal change, tidal effect, atmospheric pressure and coriolis effect, storm surge, wave surge, and global sea level rise due to climate change. Of this 110 cm sea level rise, 50-60 cm is assumed to happen due to climate change impact. The overload test was done with 120% wave height at laboratory conditions.

According to the laboratory test result:

- Main breakwater has been widened,
- Crest level has been increased from 9,5m to 10,5 m
- The length of main mole has been increased from 550 m to 650 m.
- Additional armour layers were installed to the round part of secondary mole. Volume of round X Block was increased from 12m³ to 16m³. For Istanbul Airport fuel jetty, the world largest x-Block armour layer (16m³) has been used.





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BUT;

- Though the infrastructure is climate proof at macro scale, micro impacts over each asset and operation are critical.
- Vulnerability of each asset and operation can interrupt the operation.
- Not only business risks but also security and financial risks if not managed properly.

SO;

- We know the priorities,
- For detailed analysis, we will start to collaborate with State Meteorological Office and start Stage 2 Study for CCAP,
- We will adapt outputs to MP,
- We will be monitored once in 5 years.



Climate Change Mitigation Plan





SUSTAINABILITY FIGURES

Energy Efficiency

- 230 GWh/year to 180 GWh/year
- %21 Efficiency
- 30,700 CO₂(eq) tons/year

«Energy consumption in 1 year of 3,700 households »

Water Efficiency

- 5 Million m³/year to 3 Million m³/year
- %40 Efficiency
- Greywater, Rainwater

«Water Consumption in 1 year of 6,750 households»

Climate Change

- Climate Change Action Plan
- Resilient buildings for future
- Air Quality (Greenhouse Gas Management)

«Adaptation to Climate Change Effects»

'Zero Waste Target for 2023': Waste and Materials Management

- Waste Management for Low Carbon Footprint (Reduce and Recycling)
- Material Sourcing for Low Carbon Footprint

«Waste to Art Project» Upcycling



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LEED CERTIFICATION

iGA

22 LEED Buildings
2.000.000 m²

LEED Certified ATC Tower

- %20.5 Energy Efficiency
- %30 Water Efficiency

LEED Certified Presidential Guest House

- %21 Energy Efficiency
- %30 Water Efficiency

LEED Certified 3rd Party Buildings

- THY - 10
- Çelebi - 2
- Havaş - 2
- UPS - 1
- DHL - 1
- Sistem Logistic - 1
- Gözen Security - 1

LEED Certified Mosque

- %24 Energy Efficiency
- %30 Water Efficiency

LEED Certified Terminal and Carpark

- %21 Energy Efficiency
- %40 Water Efficiency

ENERGY MANAGEMENT:

- BIM
- Automation Systems (SCADA, BMS, SAP, Lightning, Free Cooling)
- ISO 50001
- ISO 55001
- ISO 14064



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THANK YOU