



LOW-CARBON PATHWAY DEVELOPMENT OF THE  
CHEMICAL AND FERTILIZER SECTOR IN  
UZBEKISTAN

# Phase 2 Report

EBRD PROJECT NR. 22022.006169

DECEMBER 2023



Sustainability is our business

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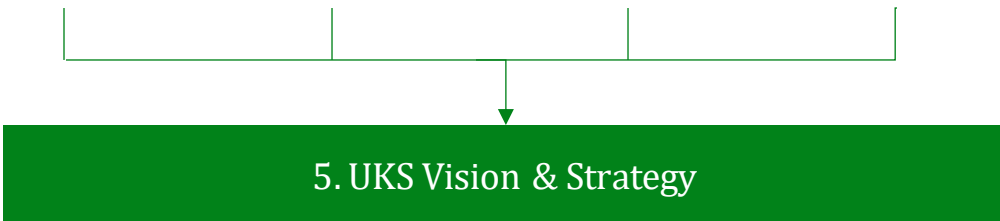
# Executive summary

- 1 **Executive summary**
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- 3 Climate-related Risks & Opportunities
- 4 Low Carbon Pathway
- 5 Action Plan
- 6 Disclosure Support
- 7 On-site Workshops
- 8 Conclusion

# High-level project overview

## Phase 1 [February – June 2023]

**Objective:** Vision and strategy development



## Phase 2 [July – October 2023]

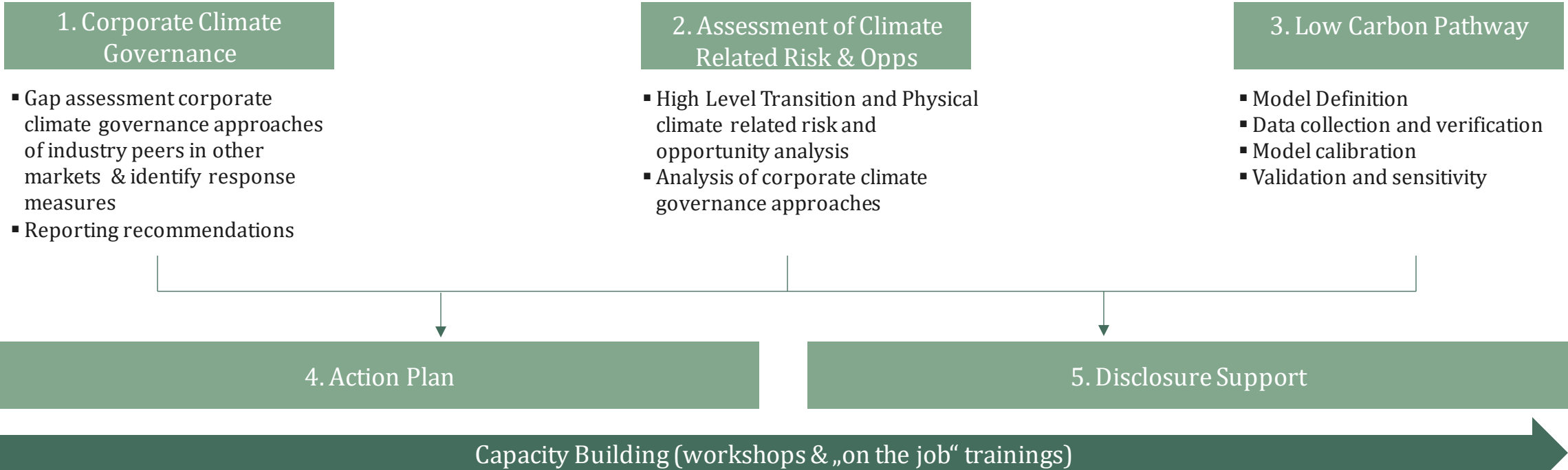
**Objective:** Action plan development for Navoiyazot



# Phase 2 overview

## Phase 2

**Objective:** Action plan development for Navoiyazot



# Executive summary

This report presents the outcomes achieved in Phase 2 of the “Low-carbon pathway development of the Chemical and Fertilizer Sector in Uzbekistan” project, reflecting the Navoiyazot’s existing strengths in climate integration while highlighting areas for further improvement in Corporate Climate Governance. It outlines the results of ERM’s assessment of Navoiyazot’s climate risks and opportunities and a Low Carbon Pathway for Navoiyazot, as well as an actionable plan for governance enhancement and technology implementation. It also presents the initiatives and support provided by ERM, such as disclosure support and Capacity Building Workshops. A summary of the results of each task can be found below, with detailed insights into these tasks being found in the referenced slides, offering a comprehensive overview of the project's results.

- **Corporate Climate Governance:** Navoiyazot has well established processes & management and risk management structures where climate topics can be easily integrated. Further actions are required for Navoiyazot to integrate Corporate Climate Governance. For more details, please refer to the slides 7-15.
- **Assessment of Climate Related Risk & Opps:** Navoiyazot faces low climate hazards but might suffer from specific ones like water stress, drought, wildfires, and extreme cold, recommending further assessment. Transition-related risks are balanced, tied to local/regional customers, but could shift with market expansions or policy changes in Uzbekistan. For more details, please refer to the slides 16-28.
- **Low Carbon Pathway:** The developed Low Carbon Pathway relies heavily on the use of renewable electricity in the short term and on carbon capture and storage (CCS) longer term. For more details, please refer to the slides 29-40.
- **Action Plan:** The Action Plan identifies action items for improving Corporate Climate Governance and for implementing abatement technologies. For more details, please refer to the slides 41-57.
- **Disclosure Support:** Disclosure material was developed for Navoiyazot to report on the Task Force on Climate-Related Financial Disclosures (TCFD). For more details, please refer to the slides 58-60.
- **Capacity Building:** A Capacity Building workshop and a Leadership Workshop were held to provide an overview of the project. The Capacity Building workshop focused on greenhouse gas emissions calculation and the decarbonization of Navoiyazot, as well as understanding and managing climate risks and opportunities. The leadership workshop focused on presenting the results of phase 2 as well as gathering the necessary input for the development of an action plan. For more details, please refer to the slides 61-63.

In the following three slides, a high-level project overview and an overview of Phase 2 key deliverables can be found, offering a comprehensive view of the project’s objective and progression, as well as the outcomes achieved.

# Резюме

В настоящем отчете представлены результаты, достигнутые в рамках Фазы 2 проекта «Развитие сектора химической промышленности и удобрений на низкоуглеродном пути в Узбекистане», отражающие существующие сильные стороны «Navoiyazot» в области климатической интеграции, а также области для дальнейшего совершенствования корпоративного управления климатом. В нем излагаются результаты оценки ERM климатических рисков и возможностей и Низкоуглеродного пути для Navoiyazot, а также практический план по совершенствованию управления и внедрению технологий. В нем также представлены поддержка раскрытия информации и семинары по наращиванию потенциала. Ниже приведена краткая информация о результатах выполнения каждой задачи, а подробные сведения об этих задачах можно найти на соответствующих слайдах.

**Корпоративное управление климатом:** «Navoiyazot» имеет хорошо отлаженные процессы и структуры управления рисками, в которые можно легко интегрировать климатические темы. Для интеграции корпоративного управления климатом, необходимы дальнейшие действия. Подробнее см. слайды 7-15.

**Оценка рисков, связанных с климатом:** «Navoiyazot» сталкивается с низкими климатическими опасностями, но может страдать от специфических опасностей, таких как нехватка воды, засуха, лесные пожары и экстремальные холода. Риски, связанные с переходным периодом, сбалансированы и привязаны к местным/региональным клиентам, но могут меняться в связи с расширением рынка или изменениями в политике Узбекистана. Подробнее см. слайды 16-28.

**Низкоуглеродный путь:** Разработанный низкоуглеродный путь в значительной степени зависит от использования возобновляемой электроэнергии в краткосрочной перспективе и от улавливания и хранения углерода (CCS) в долгосрочной перспективе. Подробнее см. слайды 29-40.

**План действий:** План действий определяет направления деятельности по совершенствованию корпоративного управления климатом и внедрению технологий по снижению выбросов. Подробнее см. слайды 41-57.

**Поддержка раскрытия информации:** Для «Navoiyazot» были подготовлены материалы для раскрытия информации по рекомендациям TCFD. Подробнее см. слайды 58-60.

**Наращивание потенциала:** Для ознакомления с проектом были проведены семинар по наращиванию потенциала и семинар по вопросам лидерства. Семинар по наращиванию потенциала был посвящен расчету выбросов парниковых газов и декарбонизации «Navoiyazot», а также пониманию и управлению климатическими рисками и возможностями. Семинар по лидерству был сосредоточен на представлении результатов фазы 2, а также на сборе необходимой информации для разработки плана действий. Подробнее см. слайды 61-63.

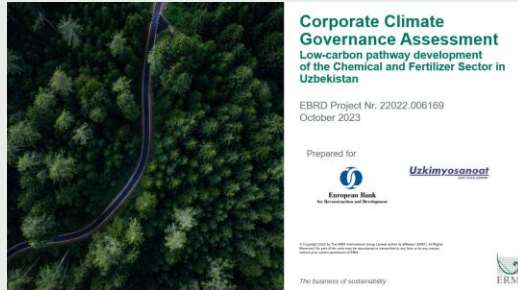
На следующих трех слайдах представлен общий обзор проекта и основные результаты Фазы 2, предлагающие всестороннее представление о цели и прогрессе проекта, а также о достигнутых результатах.

# Key Project Deliverables

Overview of tasks and milestones achieved during Phase 2

## 1. Corporate Climate Governance (M11)

Delivered on 30 October 2023



**Objective:** Understand the degree of alignment of Navoiyazot with industry standards regarding corporate climate governance and management practices.

## 2. Climate-Related Risks & Opportunities (M11)

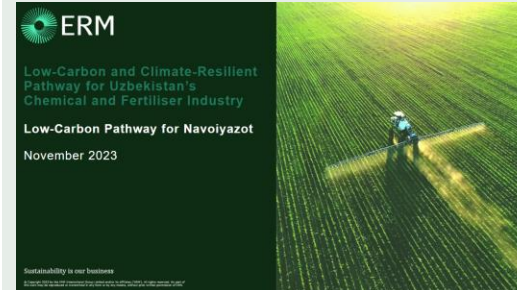
Delivered on 29 November 2023



**Objective:** Understand what processes, risk assessment policies and metrics and targets Navoiyazot has in place to evaluate the materiality of different risks and opportunities.

## 3. Low Carbon Pathway (M12)

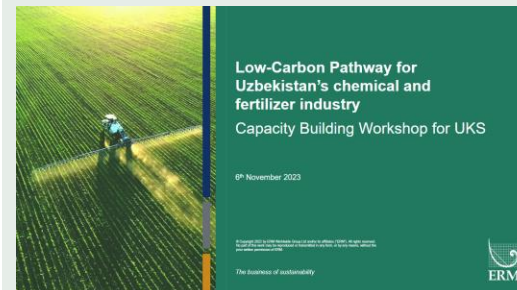
Delivered on 29 November 2023



**Objective:** Develop an analysis of emission reduction pathways for Navoiyazot based on agreed scenarios.

## 4. On-site Workshops (M13, M16)

Delivered on 6 and 7 November 2023



**Objective:** Enable UKS employees to understand how to apply learnings and outcomes from previous tasks and inform UKS's leadership team about project results and upcoming actions.

## 5. Action Plan for Navoiyazot (M14)

Delivered on 4 December 2023



**Objective:** Develop a clear, realistic and commonly agreed action plan that will support the development of Navoiyazot's decarbonization strategy, using the findings from previous deliverables.

## 6. Disclosure support (M15)

Delivered on 11 December 2023



**Objective:** Draft disclosure materials based on prior tasks, proficient for public disclosure in Navoiyazot's annual report and/or website.

# Corporate Climate Governance

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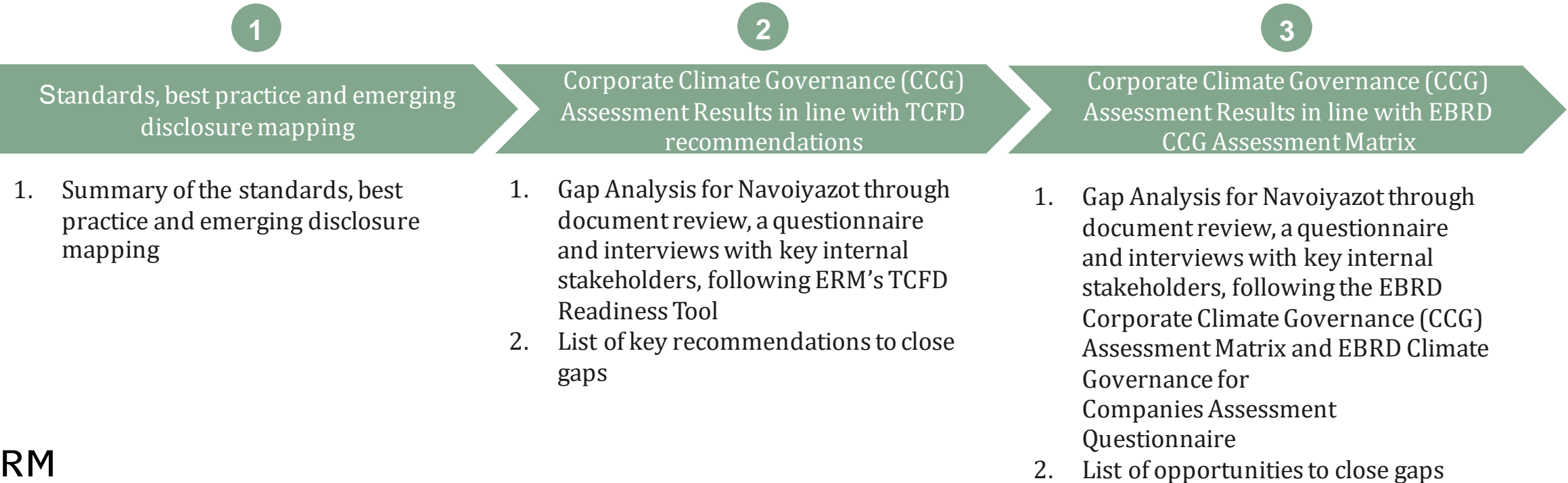
# Corporate Climate Governance

Provided below is an overview of the objective, key steps and deliverables of the task at hand. A dedicated report delivered on 30 October 2023 describes the methodology and results in more detail. The following slides provide a high-level overview of the corporate climate governance assessment.

**Objectives**

- Understand Uzbekistan’s climate change adaptation related policy framework
- Review peers’ disclosure practices regarding Corporate Climate Governance
- Get an overview of how TCFD aligns with best practice regulatory and voluntary disclosure frameworks to identify overlaps and potential gaps
- Understand the degree of alignment of Navoiyazot’s Corporate Climate Governance with TCFD and relevant requirements of EBRD’s Corporate Climate Governance Assessment Methodology
- Identify potential gaps in Navoiyazot’s Corporate Climate Governance
- Establish a list of recommendations for closing the identified gaps and improve Navoiyazot’s Corporate Climate Governance

**Steps and deliverables**



# 1 Climate change adaptation related policy framework in Uzbekistan

As a first step ERM analyzed Uzbekistan's climate change adaption related policy frameworks. An overview of the findings is presented below.



Considering **Uzbekistan ambitious development strategy** and the **need to comply with the Paris Agreement** while **addressing the vulnerability to climate change**, the country is **calling for more investment and international cooperation** in this space.



Since **adaptation is set as a priority issue by Uzbekistan's Nationally Determined Contributions**, disaster risk reduction and adaptation measures must be integrated into sectoral development planning and budgeting.



**To attract foreign investment, disclosing climate-related financial information is becoming more important**, not only because of the global climate goal, but due to Uzbekistan's green economy strategy and the sectoral reform aiming at introducing International Financial Reporting Standards.



Developed by financial markets, **TCFD is a good entry point** and is recommended as disclosure framework for climate-related financial information according to best practices.

## Development Strategy 2022 – 2026

### STRATEGY SNAPSHOT

**\$100bn/\$2,800**

GDP AND PER CAPITA INCOME TARGETS BY 2026 WITH THE AIM OF ACHIEVING UPPER MIDDLE-INCOME STATUS BY 2030

**\$70bn** FOREIGN INVESTMENT NEXT FIVE YEARS, INCL. \$14BN UNDER PPP FRAMEWORK

**\$30bn** UZBEKISTAN EXPORT TARGET BY 2026

**9m** NUMBER OF FOREIGN TOURISTS TO ATTRACT ANNUALLY, SUPPORTING 520,000 JOBS IN TOURISM SECTOR

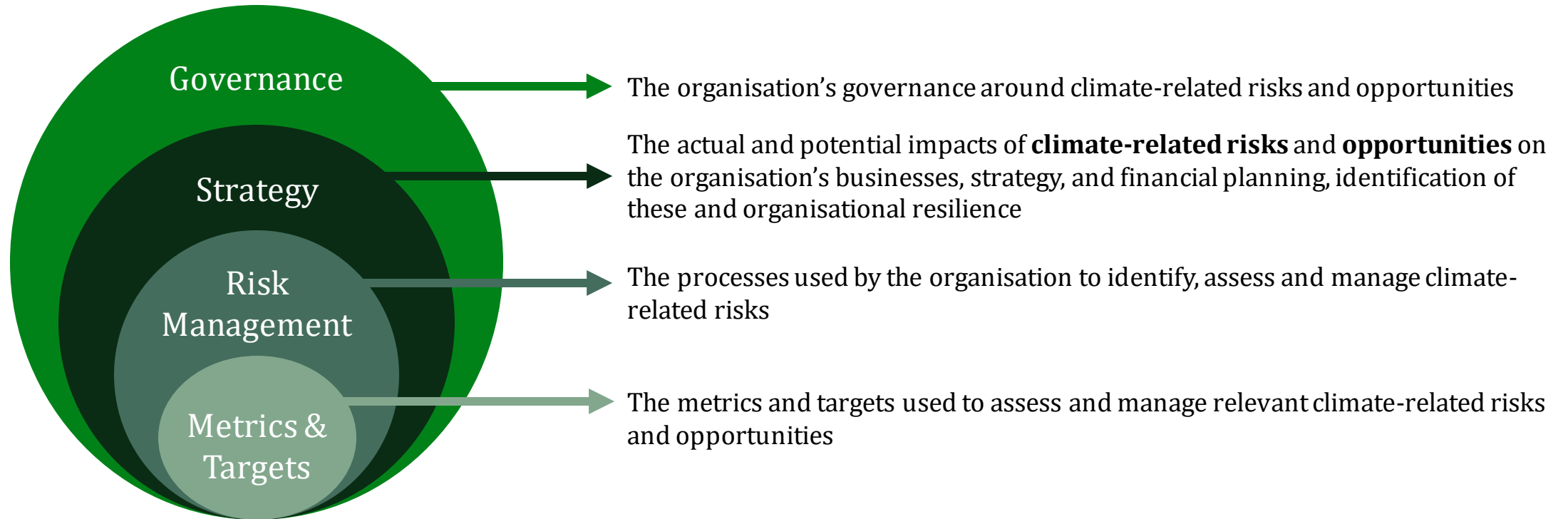
**20%** ENERGY EFFICIENCY TARGET FOR THE ECONOMY WHILE ACHIEVING 25% OF POWER FROM RENEWABLES

**7bn m<sup>3</sup>** OF WATER SAVED THROUGH EFFICIENT USAGE OF WATER RESOURCES IN AGRICULTURE AND INDUSTRY

**80%** COVERAGE OF KIDS WITH PRE-SCHOOL EDUCATION BY 2026

# 1 The TCFD recommendations are broken down into four pillars and eleven recommendations

To attract foreign investment, disclosing climate-related financial information is becoming more important. TCFD is a good entry point and recommended framework to disclose climate-related financial information. Provided below is an overview of the four pillars of TCFD.



Risk and opportunity assessment is part of best practice strategy

# 1 The ERBD Matrix

Additional, to TCFD, ERM has also included the ERBD (Corporate Climate Governance) matrix in its assessment.




The CCG Matrix is drawn from TCFD recommendations, status reports, good market practices reports and case studies, review of other voluntary disclosure standards (e.g., CDP, CDSB, PRI, SASB), EBRD study on CCG (2018) and Corporate Governance standards (OECD and others). These have been adapted to the needs of companies from emerging countries allowing for a different level of maturity and gradual development of climate governance practices for companies.

Column 1	Level 0 The corporate governance minimum requirements that needs to be in place to have CCG	Level 1 NO CCG PRACTICES	Level 2 IMPROVEMENTS TOWARDS GOOD CCG	Level 3 GOOD CCG PRACTICES	Level 4 ADVANCED CCG PRACTICES
A. Governance and Accountability					
B. Strategy					
C. Risk Management and Processes					
D. Reporting, Disclosure and Engagement					

# 1 Corporate Climate Governance (CCG) Assessment Results

ERM conducted a Gap Analysis for Navoiyazot through document review, a questionnaire and interviews with key internal stakeholders, following the EBRD Corporate Climate Governance (CCG) Assessment Matrix, EBRD Climate Governance for Companies Assessment Questionnaire and ERM’s TCFD Readiness Tool. This slide includes a brief explanation about the scoring methodology and Navoiyazot’s scoring results in each one of the four relevant areas (Governance, Strategy, Risk Management and Metrics & Targets).

## Methodology – in line with TCFD recommendations

Score	Description
	Meets all TCFD guidance, considered best-practice
	Meets some TCFD guidance
	Meets very few to no TCFD guidance

In line with TCFD recommendation, the assessment was conducted for each of the four TCFD pillars (Governance, Strategy, Risk Management and Metrics & Targets).

## Methodology - EBRD CCG Assessment Matrix





Score	Description
<b>Level 4</b>	Advanced CCG practices
<b>Level 3</b>	Good CCG practices
<b>Level 2</b>	Improvements towards good CCG
<b>Level 1</b>	No CCG practices
<b>Level 0</b>	No board, executive committee, no strategy and no risk functions, amongst others.

The CCG assessment matrix is drawn from TCFD recommendations, status reports, good market practices reports and case studies, review of other voluntary disclosure standards (e.g., CDP, CDSB, PRI, SASB), EBRD study on CCG (2018) and Corporate Governance standards (OECD and others). These have been adapted to the needs of companies from emerging countries allowing for a different level of maturity and gradual development of climate governance practices for companies.

## 2 Corporate Climate Governance Assessment Results (in line with TCFD recommendations)

This slide includes key findings in relation to the status quo assessment and recommendations. In depth results can be found in the separate Gap Analysis report.

### TCFD pillars

	1. GOVERNANCE 	2. STRATEGY 	3. RISK MANAGEMENT 	4. METRICS & TARGETS 
<b>Current status of Navoiyazot</b>	<ul style="list-style-type: none"> <li>Well established and comprehensive governance and reporting structures around broader set of risks and not yet specific to climate.</li> <li>Good awareness around climate change and Navoiyazot's role in reducing GHG emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Public mission statement including sustainability topics on the company's website.</li> <li>Strategic aims and objectives are defined in the framework of the policy of Navoiyazot in the Integrated Management System and include topics related to climate change (e.g. reduction of GHG emissions).</li> <li>Material climate-related risks and opportunities have been identified.</li> </ul>	<ul style="list-style-type: none"> <li>Robust risk management system and processes based on the Integrated Management System (IMS) in place.</li> <li>Several physical and transition risks included in risk register.</li> <li>Good communication between production level executives and IMS risk management department.</li> </ul>	<ul style="list-style-type: none"> <li>Some metrics and targets (e.g. around energy and water use, as well as air emission metrics) are in place.</li> </ul>
<b>Key recommendations</b>	<ul style="list-style-type: none"> <li><b>Include climate - related risk management topics in the agenda of Board meetings.</b></li> <li>Regular capacity building training for management and employees on ESG and climate.</li> <li>Prepare <b>internal climate policy with clearly allocated responsibilities and accountability</b> around climate change risk management signed by senior management.</li> </ul>	<ul style="list-style-type: none"> <li>Consider future climate risks (physical and transition) in the company's strategy for different time frames (short, medium, long-term).</li> <li>Conduct financial quantification for physical and transition risks.</li> <li>Conduct climate risk and opportunity assessment also the supply chain and future investment projects.</li> </ul>	<ul style="list-style-type: none"> <li>Add a full list of material climate risks (physical and transition) to the existing risk register, risk identification and management procedures.</li> <li>Develop risk mitigation and adaptation plans for assets and at company level.</li> </ul>	<ul style="list-style-type: none"> <li>Continue improving measurement of metrics like GHG Emissions, energy consumption and energy intensity.</li> <li>Based on the analysis of climate-related risks and opportunity and scenario analysis, define metrics which will be used to track and manage these identified risk (e.g. energy use, water use, GHG emissions, investments /expenditures for low carbon alternatives, etc.).</li> </ul>

ERM has found that Navoiyazot has well established processes & management and risk management structures where climate topics can be integrated.

# 3 Corporate Climate Governance (CCG) Assessment Results - EBRD CCG Assessment Matrix

## Section A 1. BOARD OVERSIGHT FOR CLIMATE

Question*	EBRD CCG Matrix answer	Maturity Level	Opportunity for improvement – Action Plan item	Short Term (2023-2025) / Long Term (2023-2050)
Q1, Q2	Q1. The company has a Supervisory board and a Management board. Q2.a The company has a board but no oversight or accountability of sustainability/ESG and climate-related risks and opportunities.	Level 1	<ul style="list-style-type: none"> <li>• Include climate change topics into the areas of responsibility of the Supervisory Board and Management Board and update the governing documents which describe responsibilities of the management bodies of Navoiyazot (such as for example Articles of Association).</li> <li>• Prepare an internal Climate Policy or a statement signed by a member of executive management (e.g. Chairperson of the Management Board), as best practice. The policy should include the vision, goals, actions, roles of different functions in climate change risk management.</li> </ul>	2023-2025  2023-2025
Q3	Q3.b The company's board and/or board committees are informed about climate-related issues on an ad hoc basis.	Level 2	<ul style="list-style-type: none"> <li>• Include climate change and ESG risk management topics to the agenda for the meetings of the Supervisory and Management Board meetings. Include climate change topics into the Management Board and Supervisory Board's discussions on strategy, business plans, annual budgets, performance objectives, capital expenditures, acquisitions and divestitures, risk management policies. Include climate-related topics in the agenda of the Navoiyazot's / UKS's ESG Working Group meetings.</li> <li>• Strengthen collaboration of the existing ESG working group with Management Board: introduce a process and frequency of reporting on climate change topics.</li> </ul>	2023-2025  2023-2025
Q4	Q4.b Accountability by senior executive management and operations is reflected by way of regular submission of reports and explanations to the board. This may include sustainability/ESG matters but does not explicitly cover climate-related risks and opportunities.	Level 2	<ul style="list-style-type: none"> <li>• Include climate-related topics in the agenda of the Navoiyazot's / UKS's ESG Working Group meetings.</li> <li>• Introduce a procedure on how the Management Board and Supervisory Board monitors and oversees progress against goals and targets for addressing climate related issues.</li> </ul>	2023-2025  2023-2050
Q5	Q5.b The board members possess some technical and regulatory knowledge and the company provides limited capacity building on sustainability/ ESG matters and climate-related issues on an ad hoc basis.	Level 2	<ul style="list-style-type: none"> <li>• Regular (recommended annually) capacity building training for management on ESG and climate topics (and comprehensive climate training for employees).</li> </ul>	2023-2025
Q6	Q6.c The company takes measures to develop and enhance the executive management's collective knowledge of and resources for climate-related risks and opportunities, including expanding the current executives' skills based on the skill matrix review.	Level 3	<ul style="list-style-type: none"> <li>• It is recommended to establish a formalized executive-level training program including ESG and climate risks.</li> </ul>	2023-2025
Q7, Q8	Q7. The company has a remuneration policy. Q8.a The company has a general remuneration policy but it does not yet link executive compensation to meeting sustainability/ ESG or climate-related KPIs.	Level 1	<ul style="list-style-type: none"> <li>• Introduce incentives related to climate targets, emissions reduction targets into the remuneration policy of the company.</li> </ul>	2023-2050

# 3 Corporate Climate Governance (CCG) Assessment Results - EBRD CCG Assessment Matrix

## Section B. STRATEGY

Question	EBRD CCG Matrix answer	Maturity Level	Opportunity for improvement – Action Plan item	Short Term (2023-2025) / Long Term (2023-2050)
Q9, Q10	<p>Q9. The company has a mission and strategic aims and objectives, according to the policy on Integrated Management System of Navoiyazot.</p> <p>Q10.b Some sustainability / ESG and climate-related aspects are reflected in the company’s general business strategy, policy or targets (KPIs). Monitoring of KPIs is on the board agenda on an ad hoc basis.</p>	Level 2	<ol style="list-style-type: none"> <li>For the risks and opportunities identified, it is recommended to discuss what is the company’s strategy to mitigate risk and capture opportunities.</li> <li>Discuss on management level (Management Board) how climate-related risks and opportunities affect the company’s business planning and strategy in the following areas: Products and services, Supply chain / value chain, Adaptation and mitigation activities, R&amp;D investments, Operations, Access to capital.</li> <li>Communicate the findings of the climate-related risks and opportunity assessment and scenario analysis to the relevant departments and functions (IMS, Department on Environmental Protection, Health and Safety, Chief Engineer, emergency management team).</li> <li>Conduct scenario analysis for the supply chain could be affected by physical climate change and risks or opportunities caused by a transition towards a low carbon economy conducted by ERM to be reviewed by top-management.</li> <li>Regularly (approx. every 2 years) review climate risk and opportunity assessment for physical and transition risks and perform scenario analysis, considering different time frames (short, medium, long-term).</li> <li>Consider the identified increasing risks of extreme heat and cold, water scarcity, droughts and wildfires – as the most material physical climate risks for Navoiyazot - by 2030 and 2050 when defining CapEx and OpEx for next years.</li> </ol>	<p>2023-2025</p> <p>2023-2025</p> <p>2023-2025</p> <p>2023-2025</p> <p>2023-2050</p> <p>2023-2050</p>



# Corporate Climate Governance (CCG) Assessment Results - EBRD CCG Assessment Matrix

## Section C. RISK MANAGEMENT AND PROCESSES

Question	EBRD CCG Matrix answer	Maturity Level	Opportunity for improvement – Action Plan item	Short Term (2023-2025) / Long Term (2023-2050)
Q11, Q12	Q11. The company has a robust risk management system and processes based on the Integrated Management Systems (IMS). Q12.b The company conducts ad hoc assessments of sustainability/ ESG with a focus on direct risks but does not have a process to assess on a regular basis climate-related risks and opportunities.	Level 2	<ol style="list-style-type: none"> <li>Update risk management processes for identifying and assessing climate-related risks and their importance for the business and for identifying existing and future laws and regulations, including the use of multiple climate scenarios, for multiple timeframes to cover risks and opportunities.</li> <li>Develop a detailed action plan, KPIs and process for regular monitoring of identified risks and opportunities (also consider a financial quantification of risks) and for their integration into business strategy.</li> <li>Continue working on metrics and targets, for example: <ul style="list-style-type: none"> <li>Total energy consumed, broken down by source (e.g., purchased electricity and renewable sources);</li> <li>Total energy intensity - by tons of product, amount of sales, number of products depending on informational value;</li> <li>Percent of fresh water withdrawn in regions with high or extremely high baseline water stress;</li> <li>Revenues/savings from investments in low-carbon alternatives (e.g., R&amp;D, equipment, products or services);</li> <li>GHG emissions intensity from buildings (by occupants or square area) and from new construction and redevelopment;</li> <li>Expenditures (OpEx) for low-carbon alternatives (e.g., R&amp;D, technology, products, or services);</li> <li>Investments in new technologies are needed to manage transition risk.</li> </ul> </li> </ol>	2023-2025  2023-2025  2023-2050
Q13	Q13.b The company has a risk register and is in the process of developing metrics and tools to carry out scenario analyses and climate stress tests. The risk department develops basic scenario analyses and stress tests. (The scenario analysis was performed by ERM in the framework of this project).	Level 2	<ol style="list-style-type: none"> <li>Add identified climate-related risks (physical: water stress, drought, wildfires and heat; and transition: carbon pricing mechanisms, investors / stakeholders favoring low carbon investments, and enhanced emissions-reporting) [and opportunities] to the risk register.</li> <li>Conduct a more in-depth assessment of climate risks and opportunities for Navoiyazot and UKS as a whole. Conduct more detailed assessment of asset-specific physical and transition risks and also consider a financial quantification of risks.</li> <li>Regularly (based on the established frequency) update risk register and existing risk management procedures depending on changes to the organization (e.g. changes to the business model, changes due to mergers or acquisitions).</li> </ol>	2023-2025  2023-2025  2023-2050
Q14	Q14.b The company has an internal audit function and the validation of the consistency and robustness of sustainability/ ESG and climate-related data, information and reporting processes is in the Internal Audit Plan, but no recommendations or actions by the board have been put forward.	Level 2	<ol style="list-style-type: none"> <li>Include climate-related topics to the agenda of the internal audit.</li> <li>Develop climate-related risk mitigation and adaptation plans for assets and at a company level which are approved by the board.</li> <li>Review coverage of existing corporate insurance contracts to see which climate related risks would be covered; if none consider making adjustments.</li> <li>Regularly adjust risk mitigation and adaptation plans depending on changes to the organization (e.g. changes to the business model, changes due to mergers &amp; acquisitions) or already materialized risks (e.g. damages to plants or facilities due to increased heat or wildfires).</li> </ol>	2023-2025  2023-2025  2023-2025  2023-2050

# 3 Corporate Climate Governance (CCG) Assessment Results - EBRD CCG Assessment Matrix

## Section D. REPORTING, DISCLOSURE AND ENGAGEMENT

Question	EBRD CCG Matrix answer	Maturity Level	Opportunity for improvement – Action Plan item	Short Term (2023-2025) / Long Term (2023-2050)
Q15	Q15.a The company has a website and publishes its annual report but it does not report on sustainability/ESG or climate-related matters.	Level 1	<ol style="list-style-type: none"> <li>1. Prepare a company’s annual sustainability / ESG report (understood to be in progress), which includes climate-related risk and opportunity disclosure in line with TCFD and reference to a Climate Policy / Statement signed by a member of executive management.</li> <li>2. The sustainability / ESG report is assured internally and externally.</li> </ol>	2023-2025 2023-2025
Q16	Q16.a The company does not disclose information related to GHG emissions externally.	Level 1	<ol style="list-style-type: none"> <li>1. Define emission reduction targets for Scope 1 and 2 (and for Scope 3) GHG emissions for Navoiyazot in line with UKS’s vision statement on emissions reduction.</li> <li>2. Disclose the Scope 1, 2 and 3 (in the future) emissions and targets. Disclose this information in the sustainability report or on the company’s website.</li> </ol>	2023-2030 2023-2030
Q17, Q18	Q17.a and 18.a The company does not disclose on climate-related risks and opportunities.	Level 1	<ol style="list-style-type: none"> <li>1. Disclose information on climate-related risks and opportunities, introduced risk management processes and strategic decision identified for Navoiyazot (already prepared in the framework of TCFD disclosure) and update this material regularly.</li> <li>2. In line with TCFD recommendations, it is recommended to disclose actual and potential impacts of climate-related risks and opportunities on the company’s strategy and financial planning and how your business strategy is resilient considering the transition to low-carbon economy with 2°C scenario: how strategies may change to address potential risks and opportunity, potential impact on financial indicators (revenue, costs, assets, liabilities).</li> </ol>	2023-2030 2023-2050
Q19	Q19.b The company makes generic statements about sustainability/ ESG governance but it does not specifically describe governance of climate-related issues.	Level 2	<ol style="list-style-type: none"> <li>1. Disclose information on governance of climate-related issues (already prepared in the TCFD disclosure format), including for example how climate-related responsibilities are assigned at management level; description of the organizational structure; process how management is informed about climate-related issues; how management monitors climate-related issues.</li> <li>2. Disclose information on how climate-related KPIs are included into a remuneration strategy of the company.</li> </ol>	2023-2030 2023-2050
Q20	Q20.a The company does not engage with its shareholders on sustainability/ESG or climate-related issues.	Level 1	<ol style="list-style-type: none"> <li>1. Disclose climate-related risks and opportunities in financial reports and present and discuss results at Board meeting and inform shareholders of the results.</li> </ol>	2023-2050
Q21	Q21.b The company engages with stakeholders on general sustainability/ESG and/or climate-related issues.	Level 2	<ol style="list-style-type: none"> <li>1. Organize stakeholder consultation that is dedicated specifically to climate risks and opportunities to inform the board and executive management and inform shareholders of the results.</li> </ol>	2023-2050

# Climate- related Risks & Opportunities

- 1 Executive summary
- 2 Corporate Climate Governance
- 3 Climate-related Risks & Opportunities**
- 4 Low Carbon Pathway
- 5 Action Plan
- 6 Disclosure support
- 7 On-site workshops
- 8 Conclusion

# Assessment of Climate Related Risks & Opportunities: Overview

Provided below is an overview of the objective, key steps and deliverables of the task at hand. A dedicated report delivered on 29 November 2023 describes the methodology and results in more detail. The following slides provide a high-level overview of the assessment of climate related risks and opportunities.

## Objectives

- Identify and assess how climate related risk and opportunities evolve over time

## Steps and deliverables

1

Climate related risk and Opportunities identification


- High-level assessment of transition and physical climate related risks and opportunities (impact and exposure level)
- Working session with Navoiyazot colleagues to ground truth assumptions

2

Identify key climate risk/ opportunities “hotspots” (heat map)

- Identification of key climate risk “hotspots” over short, medium and long term
- Summary report

# Navoiyazot – Company overview and scope

Company Name	Sector	Business Description	Location of Operation
<i>Navoiyazot</i>	Manufacturing and chemicals	<p>Navoiyazot is the manufacturer of mineral fertilizers and products of organic synthesis. The company manufactures ammonia, ammonium nitrate, acrylonitrile, sodium cyanide, ammonium sulfate, hydrocyanic acid and mineral fertilizers.</p> <p>The operation sits on approximately 3,864,946.46 m<sup>2</sup> of land and includes a processing plant, railway station and process waste residual ponds/lakes.</p>	<p>The operation is located at: 486J+R3H Navoiyazot, Navoi 210105, Uzbekistan</p> 

This report presents results from the-climate related risk and opportunities assessment for Navoiyazot. The Task Force for Climate Related Financial Disclosure (TCFD) provides a guideline on how to conduct such analysis and is applied for this assessment. This report should be read in conjunction with the *Corporate Climate Governance Report* that assesses how Navoiyazot considers climate-related aspects as part of their governance, strategy, risk management and targets and metrics. The climate-related risks and opportunities assessment can be used to inform Navoiyazot’s strategy, as it assesses how physical and transition risk and opportunities will evolve over time. For further details on the different types of risk and opportunities, please see next slide. Please note that results from this analysis will feed into the *Action Plan*, which summarizes recommended actions from different tasks including this task. The action plan will be issued in a separate document.

# Main Findings across Navoiyazot plant

The conducted scenario analysis of physical and transition risks and opportunities gives an overview of climate-related risk across Navoiyazot's business. The highest overall risks and opportunities are outlined below.



## Very High and High Risks

- The identified very high and high risk are *Water Stress and Drought, Wildfires and Extreme Cold, Carbon pricing mechanisms.*
- Business exposure to most risks is projected to increase from 2030 to 2050, across all climate scenarios.
- Some of the risks are related to:
  - Reduced productivity,
  - production stoppages and therefore loss of profits
  - Increase in water costs
  - Potential upcoming regulatory requirements
- There are some existing controls in place for physical risks; **however due to increase in severity of these extreme events, the arid condition could exacerbate and have negative impacts on the business.**

## Moderate Risks

- The identified **moderate** risks relate to physical and transition-related risks and include:
  - *Extreme Heat*
  - Shift in financial stakeholder / investor feedback that favour low carbon investments and enhanced data reporting obligations
- There are some activities in place that start to manage these risks (e.g. data monitoring & review of GHG emission, participation to energy efficiency initiatives, exploring new technology alternatives, etc.)
- There are some existing controls in place for physical risks (e.g. trees planted to improve high quality, etc.); however due to increase in severity of these extreme events, **further assessment on joint effect of Extreme Heat and Water Stress and Drought is recommended.**

## Opportunities

Navoiyazot has identified and assessed transition opportunities. These are related to the Opportunity to sell new and innovative low-carbon products and decreased cost due to Increased energy efficiency.

# Climate-related Risks and Opportunities

Navoiyazot is committed to disclosing and responding to climate-related issues in line with the TCFD



The **expectation** – from policymakers, financial regulators, lenders, investors and corporates – that companies **assess** and **disclose climate-related** risks is **increasing rapidly**. Physical climate events could also impact **business strategy** and **planning**. These **drivers** have prompted **Navoiyazot** to assess transition and physical climate risks and opportunities in alignment with the **Task Force on Climate-Related Financial Disclosures (TCFD)**.

The TCFD has called for organisations to **assess, manage** and **disclose** their exposure to **climate-related risks** and **opportunities**. The **Navoiyazot** operation could be **exposed** to a **range** of these.

There are **two types of climate-related risks and opportunities** that companies should assess their exposure to these are:

 <b>Physical</b>	<b>Impacts resulting from physical manifestations of climate change</b> (generally categorised as either <b>acute</b> – associated with extreme weather events e.g., floods or hurricanes – or <b>chronic</b> – relating to longer-term shifts in weather patterns e.g., higher temperatures, rising sea levels, increased rainfall)
 <b>Transition</b>	<b>Impacts associated with the global movement towards a low-carbon future</b> (i.e., impacts associated with <b>market, technological, reputational, policy/regulatory</b> and <b>legal</b> developments).

ERM assessed for **Navoiyazot** its exposure towards physical and transition risk and opportunities and includes scenario analysis. Section 3 and 4 of the detailed report outlined the methodology and the results for each type.

# ERM's methodology for assessing transition risks and opportunities

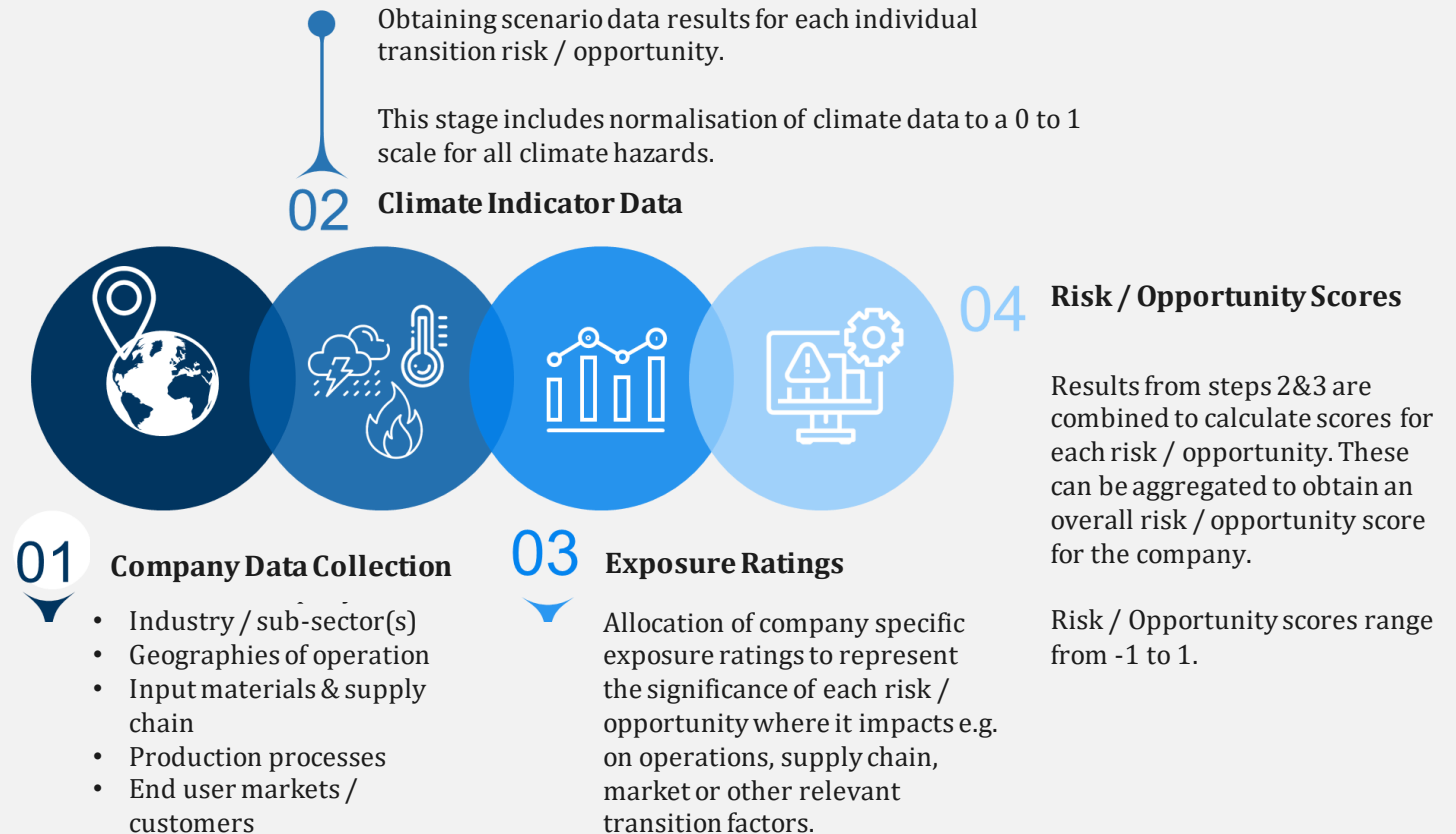
## Transition Methodology

ERM utilises **different future climate scenarios** and multiple time horizons to view potential changes in risks and opportunities over time. **Scenario indicators** are assigned to risk and opportunity items which act as **proxies** to explore how they may develop in each scenario.

Transition scenario indicator data comes primarily from the **Network for Greening the Financial System (NGFS) Climate Scenarios 2022**, supplemented by the International Energy Agency's (IEA) **World Energy Outlook 2023\***.

Besides a business as usual a net zero scenario is used.

*\*A detailed explanation of the chosen scenarios and scenario data please refer to Annex A*





# Transition related risks

**Relevance ratings** for climate-related risk were evaluated and used to assign ‘**exposure ratings**’ for the scenario analysis based on ERM’s judgement. These represent the **significance of each risk / opportunity** where it impacts, e.g., on operations, supply chain, or market.

Risk / Oppo Name	Category	Risk / Opportunity	Rationale	Relevance (low, medium, high)
<b>Carbon pricing</b>	<b>Policy &amp; Legal</b>	<b>Risk</b>	<p>It is expected that the transition to a low-carbon economy will require large scale implementation of carbon pricing mechanisms, which would affect a company’s OpEx.</p> <p>Navoiyazot is currently an Uzbekistan state-owned company and to date Uzbekistan has not implemented any carbon pricing mechanisms. However, the country’s updated 2030 NDCs state that Uzbekistan might implement a carbon tax in future years which could impact Navoiyazot directly. Also, carbon pricing policies in export markets, e.g. the EU Carbon Border Adjustment mechanism (CBAM), could affect the company. Currently the impact is assumed to be very limited since Navoiyazot currently does not export significant volumes to Europe (most of its revenue comes from domestic clients, as well as export to China, Russia etc.).</p>	<b>Low-medium</b>
<b>Shift in financial stakeholder/ investor feedback</b>	<b>Markets</b>	<b>Risk</b>	<p>A tendency of investors favouring lower-emissions generators (sustainable investment) is expected. Chemical companies which prove that they are on track to achieve their climate targets or contribute with their products and services to a decrease in GHG emissions will be more attractive to investors while being a high-carbon emitting company potentially curbs interest of external investors.</p> <p><u>According to publicly available information the government of Uzbekistan is preparing for privatising the chemicals and fertilizer and looking for foreign direct investment.</u></p>	<b>Low-medium</b>
<b>Enhanced emissions-reporting expectation</b>	<b>Policy &amp; Legal</b>	<b>Risk</b>	<p>Currently, there are no emissions reporting obligations for Navoiyazot in Uzbekistan. If the company is privatized and (partially) acquired by foreign investors which fall under any mandatory climate disclosures, increasing emissions reporting requirements might arise. Further, certain markets or regulations (e.g. EU CBAM) will require carbon-related product declarations; Currently, Navoiyazot has a small internal Sustainability team and no established processes around climate reporting, and additional resources would be required leading to increased operating expenses. For now, this risk is assumed to have a low impact on Navoiyazot.</p>	<b>Low</b>

# Transition related opportunities

**Relevance ratings** for climate-related opportunities were evaluated and used to assign '**exposure ratings**' for the scenario analysis based on ERM's judgement. These represent the **significance of each risk / opportunity** where it impacts, e.g., on operations, supply chain, or market.

Risk / Oppo Name	Category	Risk / Opportunity	Rationale	Relevance (low, medium, high)
Increased energy efficiency	Resource Efficiency / Policy & Legal	Opportunity	<p>Chemical companies could achieve energy efficiency and energy-related greenhouse gas emissions reductions through efficiency upgrades regarding their production or distribution processes, resulting in potentially reduced OpEx through energy savings.</p> <p>In its NDCs Uzbekistan commits to an increase in energy efficiency in industrial enterprises by at least 20% but unless Uzbekistan phases out its fossil fuel subsidies or new chemical companies enter the market and create competition, the impact of this opportunity is considered low.</p>	Low
Opportunity to sell lower-carbon products	Products / Services	Opportunity	<p>Customers in the European, American and/ or Asian market are increasingly favouring low carbon products as it helps them to achieve their own Navoiyazot is currently exploring how to decarbonise its production process (e.g. use of green electricity), that would allow the company to decrease the carbon footprint of products, making them competitive and attractive for new markets and customers with the potential to increase revenue.</p> <p>Currently, most of the revenue is generated locally or in markets that are less carbon sensitive making it a low opportunity at the moment.</p>	Low

# Company Analysis – Future Transition Risks and Opportunities

## Key Trends & Associated Risk / Opp:

CRRO Assessment	Risk/ Opp Score		
	2030	2040	2050
Sector Risk / Opportunity			
Carbon Pricing	-0,18	-0,41	-0,43
Enhanced emissions-reporting obligations	-0,01	-0,06	-0,10
Shift in financial stakeholder / investor feedback	-0,01	-0,07	-0,10
Increased energy efficiency	0,06	0,32	0,50
Opportunity to sell new and innovative low-carbon products	0,00	0,07	0,09
Average Risk/Opp score	-0,03	-0,03	0,00

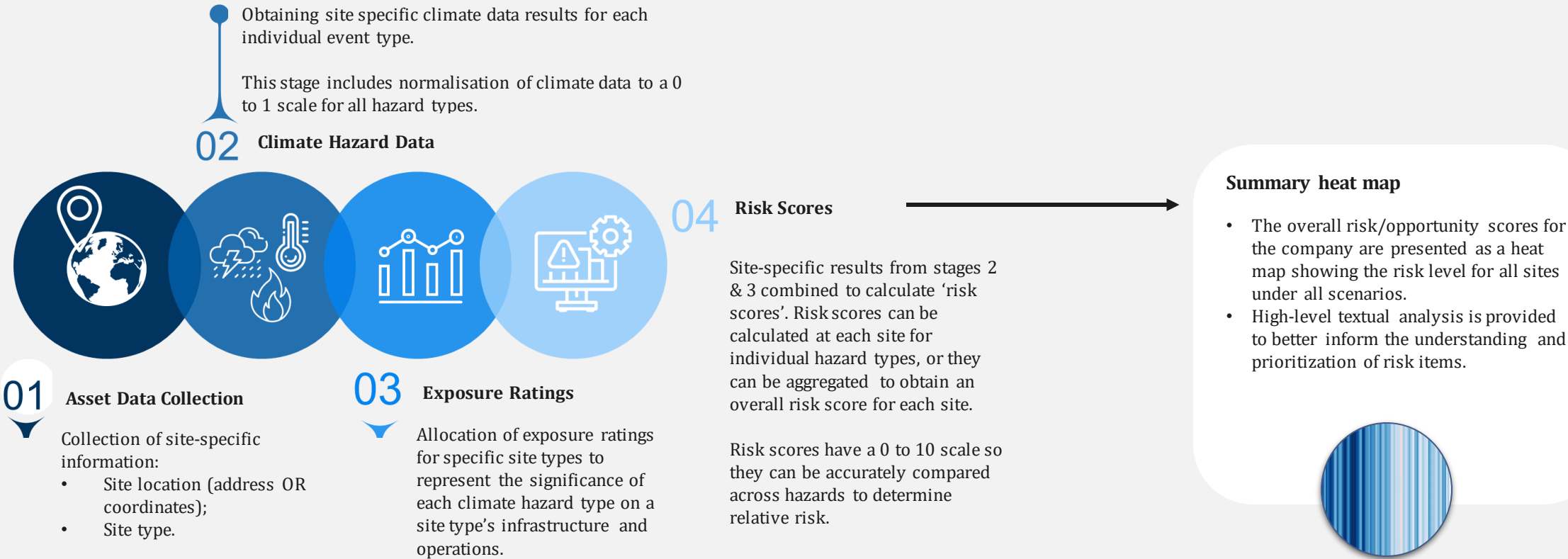
Future Risk/Opportunity Score	
Less than -0.25	High Risk
-0.15 to -0.25	Moderate Risk
-0.05 to -0.15	Low Risk
0.05 to -0.05	Limited Risk/Opp
0.15 to 0.05	Low Opp
0.25 to 0.15	Moderate Opp
More than 0.25	High Opp

Note: Quantitative assessment is high level and all impacts and their significance are estimated. Due to data availability global data was used.

- Navoiyazot faces on average a **limited exposure** towards risks and opportunities caused by a transition towards a low carbon scenario.
- Given Navoiyazot's business footprint (mostly local or regional customers) and the fact that currently, regional regulatory and market pressure for a transition to a low carbon economy are limited, the company's exposure to transition-related risk and opportunities is very limited. However, this could change if Navoiyazot is looking to expand to new markets that favor low carbon products or to increase attractiveness to external investors.
- Key driver for risk exposure are **rising costs from the implementation of different carbon pricing mechanisms** (e.g. a carbon tax in Uzbekistan or through policies like CBAM) which are balanced off through opportunities related to **cost savings caused by increased energy efficiency** of own operations.
- Enhanced emissions-reporting obligations, as well as a shift in investor feedback that favor low carbon investments can lead to increased operating expenses and decreased capital availability are balanced off through revenue increases related to the **opportunity to sell new and innovative low carbon products, like low-carbon fertilizer**.
- It is expected that most of the risks and opportunities will become material starting from 2040.

# ERM's methodology for assessing physical risks

The physical assessment uses ERM's **Climate Impact Platform (CIP)**. The figure below outlines the methodology followed by CIP to complete the physical assessment of risks relevant to Navoiyazot's assets. Further details on the methodology and the used scenarios can be found in Annex B.



# Climate Event Types in CIP

## Hazards Assessed in CIP for Navoiyazot's Assessment





































CIP uses nine climate hazard types and indicators to assess present day conditions and future projected trends. The table below details each of these climate hazard types, alongside their associated indicators and units.

■ Acute Risks ■ Chronic Risks

Hazard Type	Climate Indicator(s)	Unit	Definition
Extreme Heat	Warm Spell Duration Index (WSDI)	Days	Extreme heat looks at whether a location will experience extended periods of unusually high temperatures for a given time of year. Increased number of days may drive more severe extreme heat impacts.
Extreme Cold	Cold Spell Duration Index (CSDI)	Days	Extreme cold looks at whether a location will experience extended periods of unusually low temperatures for a given time of year. Increased number of days may drive more severe extreme cold impacts.
River Flooding	River flooding inundation depth	Metres	Data indicating whether, and the degree to which, a location might flood as a result of a river overtopping. Increased inundation depths may drive more severe impacts.
Extreme Rainfall Flooding	Maximum five-day rainfall	Millimetres	Data indicating whether, and the degree to which, a location might flood as a result of extreme rainfall occurring in locations vulnerable to high rainfall levels. Increased inundation depths may drive more severe impacts.
Coastal & Offshore	Coastal flooding inundation depth	Metres	Data indicating whether, and the degree to which, a coastal location might flood as a result of storm surges, high tides and sea level rise. Increased inundation depths may drive more severe impacts.
Extreme Winds & Storms	Maximum tropical cyclone wind speed	Knots	Data indicating the maximum wind speed associated with a tropical cyclone that a location may be exposed to. Higher wind speeds may drive more severe impacts.
Wildfires	Maximum burned area/ Forest Fire Danger Index	km <sup>2</sup> /Day	1) Data indicating whether the climatic conditions (weather) are favourable for fires to ignite and burn. 2) Observational data indicating whether a location has been burnt in the last 30 years. Higher number of days with favourable fire conditions and larger observed burned areas may drive more severe or frequent impacts from wildfires
Rainfall Induced Landslides	Rainfall-Induced Landslide Index (RILI)	Days	Data indicating the annual number of days with a potential chance of a landslide event occurring, based on extreme rainfall and topographical features. Increased number of days may drive an increased incidence of impacts as a result of landslides.
Water Stress & Drought	Water Stress	Categorical	Categorical data indicating water stress using the ratio between available water (supply) and water demand at a location. Higher categories may drive more severe impacts from water stress & drought.

# Detailed Results – Heatmap – Navoiyazot

## Baseline and Projected Risk Scores by Hazard at the Navoiyazot Operation

Hazard	Baseline (2023)	2030		2050	
		SSP1-2.6	SSP5-8.5	SSP1-2.6	SSP5-8.5
Extreme Heat	Low (1.20)	 (1.86)	 (2.10)	 (2.28)	 (3.00)
Extreme Cold	High (3.60)	 (2.12)	 (2.96)	 (2.36)	 (2.32)
River Flooding	Null (0.00)	 (0.00)	 (0.00)	 (0.00)	 (0.00)
Extreme Rainfall Flooding	Null (0.00)	 (0.00)	 (0.00)	 (0.00)	 (0.00)
Coastal and Offshore	Null (0.00)	 (0.00)	 (0.00)	 (0.00)	 (0.00)
Extreme Winds and Storms	Null (0.00)	 (0.00)	 (0.00)	 (0.00)	 (0.00)
Rainfall-Induced Landslide	Null (0.00)	 (0.00)	 (0.00)	 (0.00)	 (0.00)
Water Stress & Drought	Very High (8.00)	 (8.00)	 (8.00)	 (8.00)	 (8.00)
Wildfires	Very High (6.32)	 (6.32)	 (6.24)	 (6.48)	 (6.56)








This heatmap presents the absolute risk scores (numbers in brackets) and projected change in risk scores (icons) for each hazard across all time horizons and scenarios. Absolute risk scores in bold indicate a score of 'High' or greater. Hazards with the greatest risks to the site are Extreme Heat, Extreme Cold, Water Stress & Drought, Wildfires.

Two keys are shown for

- 1) absolute risk scores (provided for baseline and future time horizons in brackets), and
- 2) change in risk score from baseline (provided for future time horizons).

An interpretation of the heatmap is provided on the next slide.

Risk Score	Hazard Score
Minimal	0 to 1
Low	1 to 2
Moderate	2 to 3
High	3 to 4
Very High	4 to 10

Change from Baseline Risk Score						
Significant Decrease	Moderate Decrease	Minimal Decrease	No/Limited Change	Minimal Increase	Moderate Increase	Significant Increase
						

**Note:** A detailed breakdown of the site specific hazards and a summary of the climate data for the low and high emission scenarios can be found in Appendix C.

# Detailed Results – Interpretation - Navoiyazot

## Key Hazard Trends & Associated Risk:

The chemical and manufacturing **Navoiyazot Plant** in Navoi, Uzbekistan, averages '**Low**' exposure to climate physical hazards. However, the operation may be more at risk of experiencing the impact of specific hazards, which are outlined below.

**Water stress & Drought and Wildfires may pose the greatest risk going forward:** Below is a list of potential impacts associated with these specific hazards.

Both hazards pose a **sustained 'Very High'** risk to the operation across all time horizons and scenarios. This has the potential to have a severe impact on the operation, including:

- Low water flows can reduce the quality and volume available for use, resulting in an increase in OpEx costs for the purchase of clean water for use in the production processes.
- Water infrastructure investments and improved water efficiency mechanisms may have to be implemented which will significantly impact CapEx costs.
- Health and safety risk for staff if there is not adequate drinking water supply.
- Wildfires can cause direct damage to operational assets and health and safety of site personnel especially if there is direct flame and/or heat on infrastructure. This can have an impact on both CapEx and OpEx costs.

Although there is currently a '**High**' risk of **Extreme Cold** events, there is a 'Moderate' decrease in future trends, under both scenarios, indicating a potential reduction in associated impacts such as:

- Business interruption or loss of productivity due to frozen power lines or equipment failures.
- Safety incidents for employees due to icy surfaces leading to slip and fall accidents.

Currently, there is a '**Low**' risk to **Extreme Heat** events, however, there is a '**Minimal**' to '**Moderate**' increase in future trends, under both scenarios. This indicates a potential increase in associated impacts such as:

- An increased need for additional cooling capacity of temperature-controlled environments due to temperature sensitivity of the production processes. This could significantly increase OpEx costs.
- Extreme heat events can compromise safety thresholds and increase the potential for operation failures, such as fires, explosions, etc. This can have significant implications on CapEx costs.

## **Low Carbon Pathway**

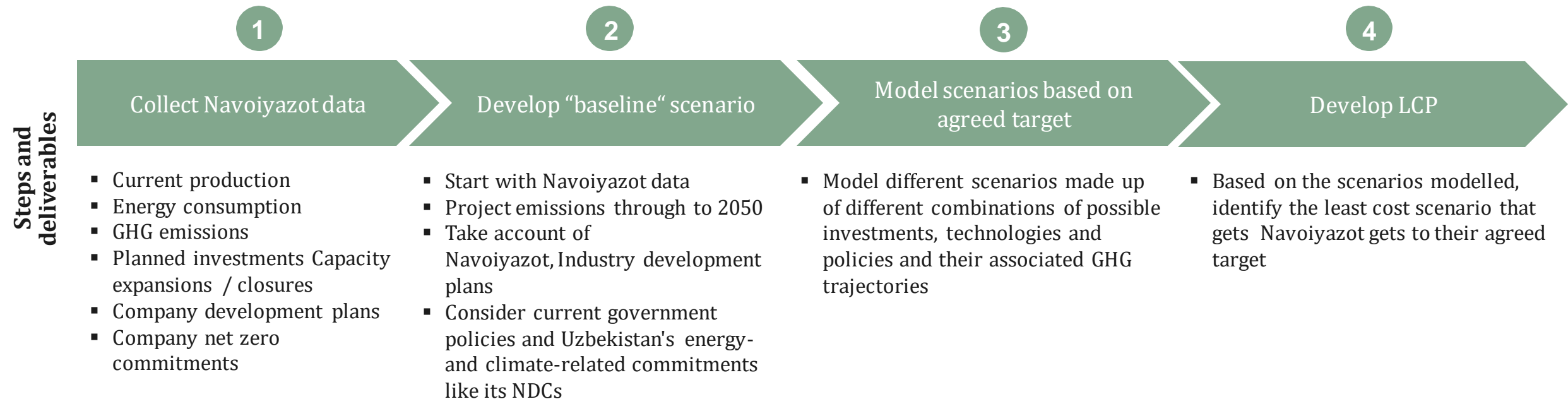
- 1 Executive summary
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# Mapping out a Low Carbon Pathway for the Navoiyazot plant

Provided below is an overview of the objectives, key steps and deliverables of the task at hand. The following slides provide a high-level overview of the low carbon pathway that was mapped out for the Navoiyazot plant up to 2050. A dedicated report delivered on 29 November 2023 has been compiled which describes the methodology and results in more detail, the highlights of which are presented in the following slides.

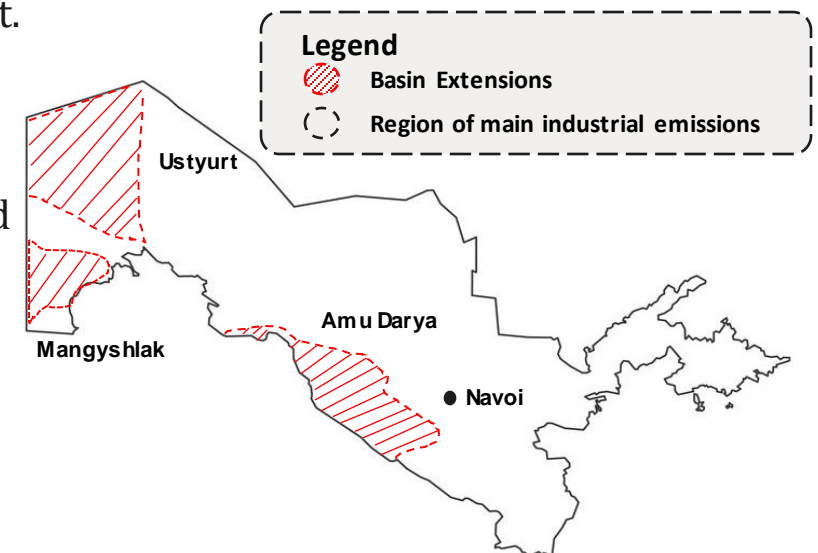
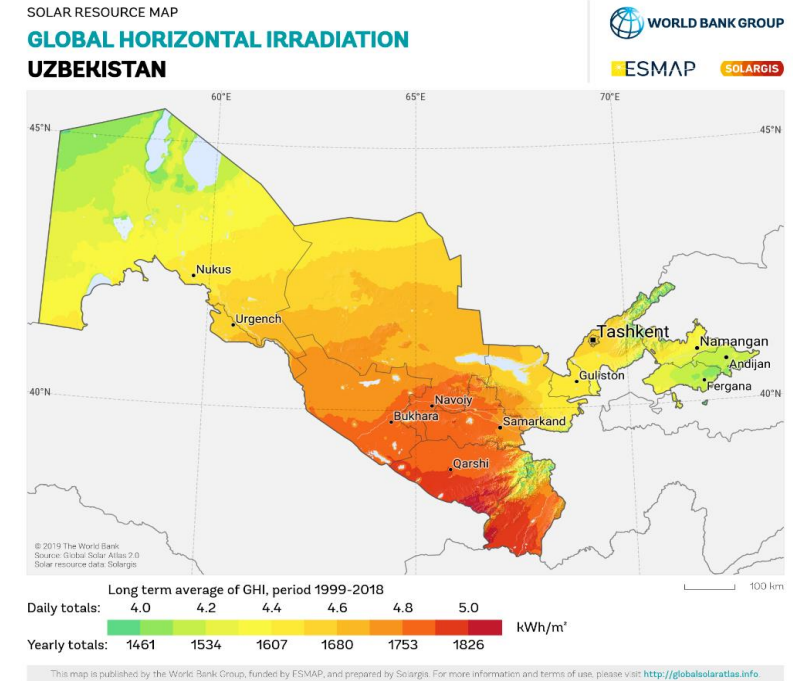
- Objectives**
- Identify specific solutions to address climate impacts and potential sources of finance to implement the decarbonisation vision
  - Identify the least cost combination of various mitigation measures - technologies, investments, policies - to decarbonize Navoiyazot
  - Demonstrate the contribution of each technology to decarbonisation at any given time
  - Indicate which technologies and investments will be required at what point in time to achieve the Navoiyazot emissions reduction target



# The technologies analysed in the LCP utilise Uzbekistan's resources

Uzbekistan's most notable energy resources relevant to Navoiyazot are solar and natural gas

- Uzbekistan benefits from **high solar irradiation** which has led to **large scale projects**. The 100-megawatt (MW) Masdar solar plant located in the Navoi region was inaugurated in August 2021. There is a pipeline of solar energy projects planned.
- Also notable are its uranium reserves (7<sup>th</sup> for reserves although this is less relevant to Navoi's LCP) and geothermal potential, although the viability of its utilisation is not well understood.
- The country has the 11<sup>th</sup> most **natural gas reserves** globally. Where natural gas is continued to be used in the LCP this will need to be paired with **carbon sequestration**. Large basins are extending into Uzbekistan from neighbouring countries, with the **Amu Darya basin** being relatively close to the Navoiyazot plant.
- The basins in the northern part of the country are better-understood, while the Amu Darya basin has **not been explored**.
- Potential reservoirs (depleted oil & gas fields) need to be identified and assessed to ensure that they are suitable for permanent CO<sub>2</sub> storage.
- Exploration, assessment, infrastructure and policy are needed, which can severely delay CCS deployment.



# A range of abatement technologies have been assessed in the LCP reference scenario (1/2)

Only the carbon capture and utilisation technology option is included in the baseline

## Abatement technology assumptions

Technology	Description	CO <sub>2</sub> e reduction % vs reference	CapEx	OpEx *	Scenario inclusion	Notes/sources
Carbon capture and utilisation (CCU)	Production of technical gas (CO <sub>2</sub> ), used in industries such as healthcare, agriculture, food	-78kta (Scope 1 to Scope 3)	\$16 million	n/a	Baseline and LCP reference	Source: UKS. Implementation period: 2022 – 2025. The project is planned to be implemented by creating a joint venture with the Air Products company (USA) with the share participation of Air Products - 60% and Navoiyazot JSC - 40%.
Carbon Capture and Storage (CCS)	Technology capturing CO <sub>2</sub> , then transporting and storing it to mitigate its impact.	95 %	Ame \$221/t CO <sub>2</sub> <i>No CapEx if &gt;95% concentration</i>	\$10/t CO <sub>2</sub> +Transport and storage tariff: \$75/t	LCP reference	Storage capacity appears to be close to Navoi in the southern and western part of the country <sup>1</sup> .
Electrolysis	Electrolysis of water to produce carbon-free hydrogen from renewable sources.		\$790/kW	\$24/kWh	LCP reference	Depends on the availability of renewable energies and water scarcity. <i>Reference capacity: 100MW</i>
Electric boilers	Use of renewable electricity for the generation of steam	100 %	\$102/kW	\$2/MWh	LCP reference	Electric boilers will use renewable electricity to provide low carbon steam. Also used to replace purchased steam

\* OpEx excluding fuel use

# A range of abatement technologies have been assessed in the LCP reference scenario (2/2)

## Abatement technology assumptions

Technology	Description	CO <sub>2</sub> e reduction % vs reference	CapEx	OpEx *	Scenario inclusion	Notes/sources
Methane pyrolysis	Thermal decomposition of methane into hydrogen and solid carbon.	50-70 %	\$314 /kW <sub>NG</sub> feedstock	\$3.45 /MWh <sub>NG</sub> feedstock	LCP reference	Costs greatly vary depending on the design configuration used. Air-fired methane design has been used for costing and mass and energy <sup>1</sup> .
Low carbon electricity	Use of low carbon electricity sources, such as solar	100 %	n/a (assumed purchased electricity)	Electricity cost only (\$27/MWh 2023)	LCP reference	Uzbekistan government focussing on increasing the share of renewable electricity in the power mix to more than 25% by 2030 <sup>2</sup> . This highlights the increasing availability of renewable electricity in Uzbekistan.
Electrified acetylene & hydrogen production unit	This technology uses an electric plasma reactor to convert natural gas to acetylene and H <sub>2</sub>	75 %	\$222 million	Consistent with current acetylene process	LCP reference	High cost in comparison to the partial oxidation of natural gas and lower TRL. Far higher conversion efficiency to acetylene, and lower syngas production.
Electrified SMR	Electric SMR uses electricity to raise temperature rather than natural gas	100 %	\$771/kW <sub>NG</sub> feedstock	\$3.45 /MWh <sub>NG</sub> feedstock	LCP reference	Lower TRL technology assumed available from the early 2030s. Provides 100% decarbonisation of SMR fuel when using renewable electricity.
N <sub>2</sub> O abatement	SCR technology for the destruction of N <sub>2</sub> O	90%	\$1.80/tCO <sub>2</sub> e lifetime costs		LCP reference	Assisted funding from GIZ has been assumed, reducing the costs to the plant by 50%

# A discounted cash flow (DCF) model is used and considers seven abatement technologies

- The **mass and energy balances** and **emissions** of **Navoiyazot** to produce a baseline “business as usual” scenario of emissions to 2050, reflective of the industry evolution under existing policies
- The model takes account of natural gas used as fuel and feedstock as well as electricity purchased from the grid
- The model calculates emissions savings and develops cost profiles for the abatement technologies
- The model **compares the net present value (NPV) of the abatement technologies** to 2050, using a discount rate of 10%, to **arrive at the least cost mix of technologies to abate emissions** to meet the emissions reductions target. The WACC for UKS is based on a 70:30 debt:equity ratio, 17.5% for equity, SOFR+3% for debt with SOFR at 5.3% and a corporate tax rate of 15%.
- An **emissions reduction target** of 25% reduction by 2030 and 96% reduction by 2050. This is aligned with the reductions in direct emissions needed to meet the **IEA Ammonia Technology Roadmap Net Zero Emissions by 2050 Scenario**

# Different LCP assumptions are modelled to enable the discussion on key parameters like RE price and water intensity of abatement options

- The “**Baseline**” scenario only includes the planned CCU project but **no other abatement technologies**.
- The “**LCP reference Scenario**” models the emissions reduction potential of **several abatement options**.

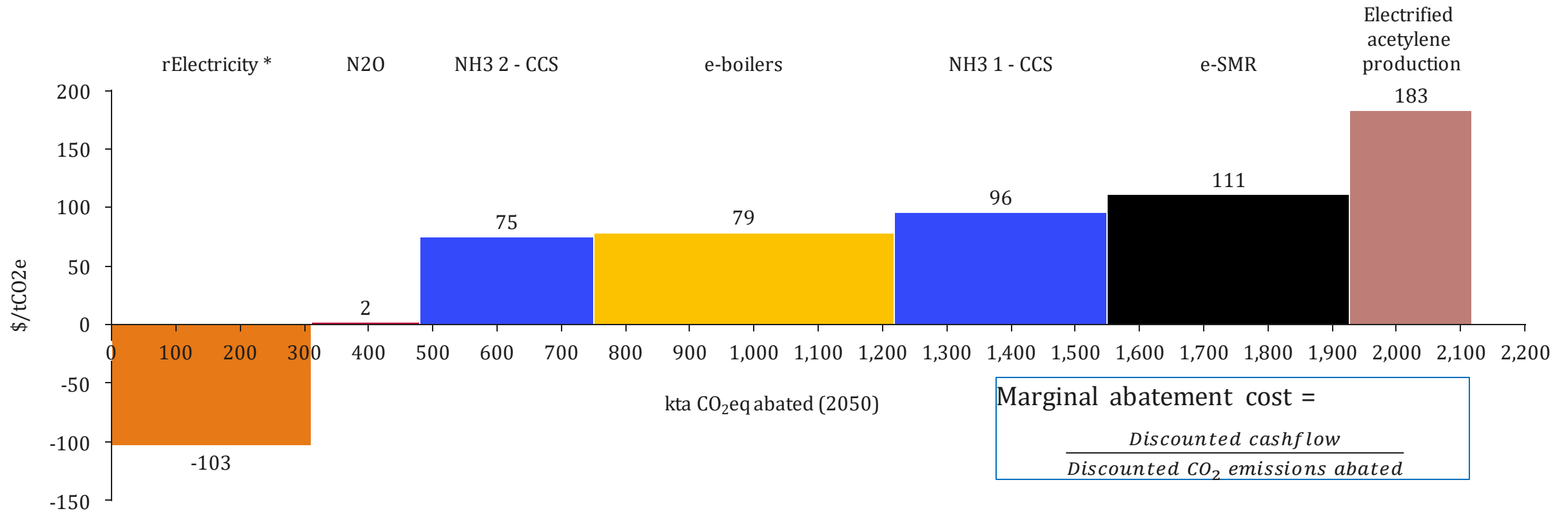
Scenario	Description
Baseline	The baseline consists of the current technologies operating until 2050 without any low carbon abatement option, except the carbon capture and utilisation project, which has reached FID. No capacity adjustments or new product lines are considered in the baseline, the product mix and volume remains as it was in 2022. The baseline provides the “counterfactual” to the LCP scenario with cost inputs as found in the following slide.
LCP reference Scenario	The LCP reference scenario consists of the abatement technologies found to be the least cost options for decarbonisation of emissions contained in the baseline up to 2050. The impact of water stress on technology availability is not considered. Costs assumed are as in the following slide.

- A “**Lower cost sensitivity**” scenario in the table below is modelled with **considerably lower RE and green H<sub>2</sub> prices**.
- Price inputs are based on large planned RE projects in Uzbekistan.

Sensitivity		Description
Lower cost sensitivity	Renewable electricity price	Lower prices for renewable electricity may be available than the price given in the LCP reference. Navoiy Solar PV Park supplies power at \$27/MWh for a period of 25 years. \$18/MWh has been awarded in Uzbekistan start up in Sherabad district, Surkhandarya region with planned start up 2024. It is assumed that the renewable electricity price starts at \$27/MWh in 2023 and reduces to \$18/MWh by 2030.
	H <sub>2</sub> price	The lower H <sub>2</sub> price is a calculated using the lower renewable electricity price above within a H <sub>2</sub> pricing model. The price starts at \$87/MWh in 2023 and reduces to \$51/MWh by 2050.



# LCP marginal abatement cost highlights the relative cost of each technology and attractiveness of switching to renewable electricity

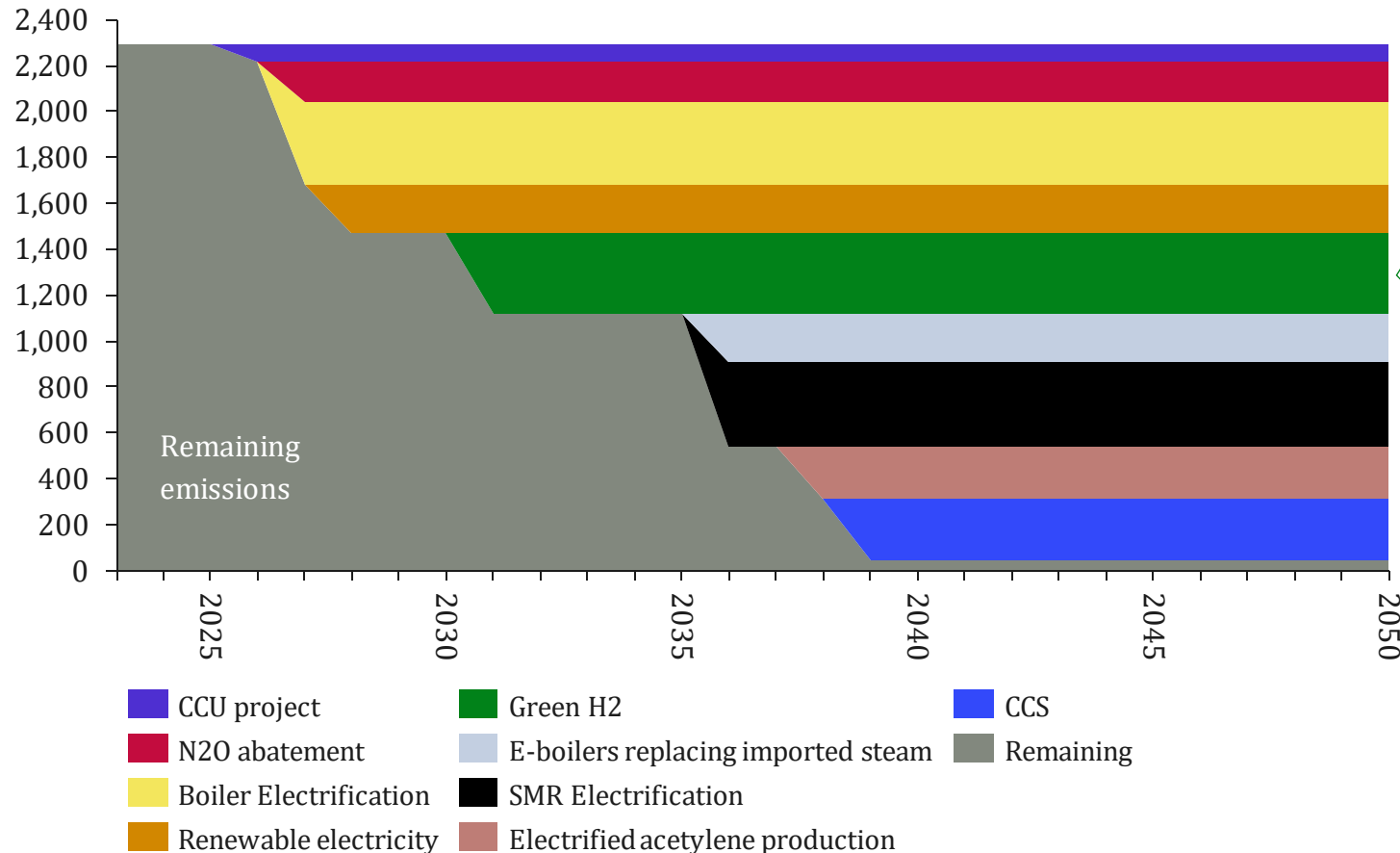


- The overall marginal abatement cost for the LCP is **\$34/t CO<sub>2</sub>eq** – this is the weighted average over the entire lifetime of the LCP
- Decarbonising current electricity consumption with renewable electricity is by far the lowest cost technology option and can be implemented early in the LCP
- There is additional cost to CCS for the older NH<sub>3</sub> unit (NH<sub>3</sub> 1) due to the lower concentration of the CO<sub>2</sub>



# The Low RE price scenario considers lower cost renewable electricity and green H<sub>2</sub> – resulting in green H<sub>2</sub> utilisation in the pathway

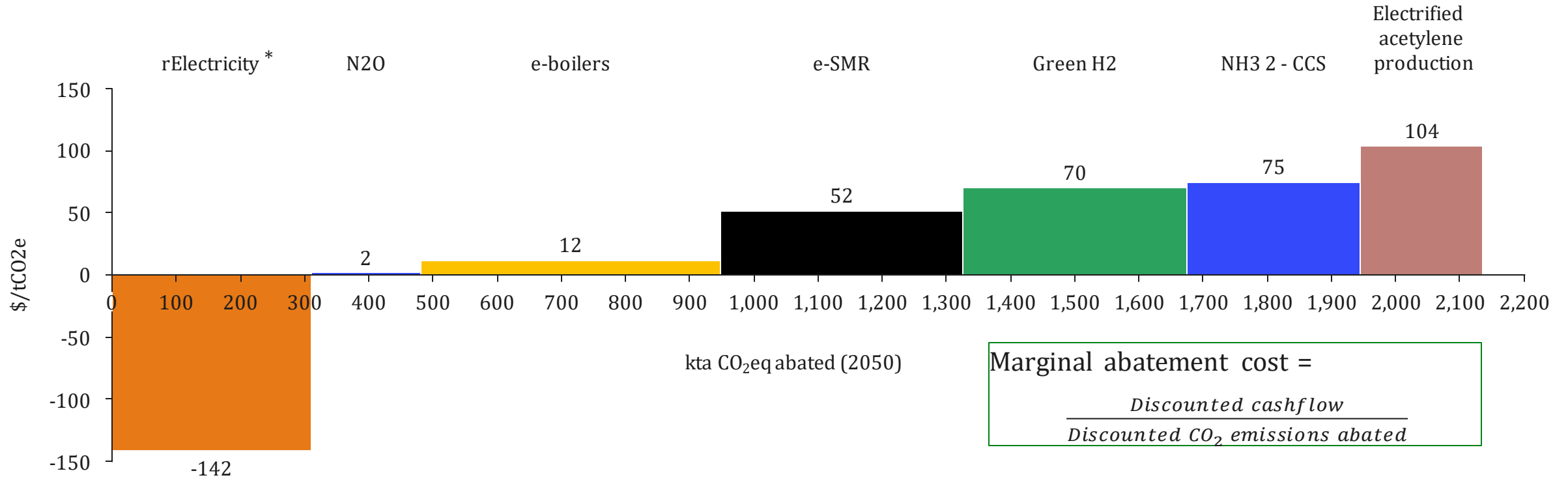
Production emissions reductions by abatement technology (ktCO<sub>2</sub> / yr)



## Green H<sub>2</sub>

- In this scenario, **green H<sub>2</sub> is selected over CCS** to decarbonise the **older NH<sub>3</sub> unit**
- We assume that green H<sub>2</sub> becomes readily available after 2030 when it has been proven at scale
- We assume that green H<sub>2</sub> is made with 100% renewable electricity, operating at high utilization
- Green H<sub>2</sub> displaces far more NG in the older NH<sub>3</sub> unit and is relatively cheaper, due to lower NG/H<sub>2</sub> efficiency. CCS is still the preferred option for the newer NH<sub>3</sub> unit
- The **water intensity of green H<sub>2</sub>** should be **considered** in a water-stressed country like Uzbekistan

# Lowering the renewable electricity and H<sub>2</sub> price lowers marginal abatement cost and makes green H<sub>2</sub> more attractive



- The overall marginal abatement cost for the sensitivity pathway is **-\$1/t CO<sub>2</sub>eq** – this is the weighted average over the entire lifetime of the LCP
- Lowering the price of renewable electricity and green H<sub>2</sub> reduces the marginal abatement cost of most technologies (except for N<sub>2</sub>O abatement and CCS)
- The cost of green H<sub>2</sub> (\$70/tCO<sub>2</sub>eq) is lower than the cost of CCS (\$96/tCO<sub>2</sub>eq) under the LCP reference scenario for the older NH<sub>3</sub> unit (NH<sub>3</sub> 1) causing the switch from CCS to green H<sub>2</sub> for emissions abatement

# Conclusions and next steps for UKS, EBRD and government

- A low carbon pathway (LCP) has been developed providing decarbonisation of **Navoiyazot fertiliser and chemical facility** by 2050
- The LCP reference scenario (using base case cost assumptions) **relies heavily** on the use of **renewable electricity** in the **short term** and on **carbon capture and storage (CCS) longer term**
  - **Replacement** of **fossil sourced electricity** with renewable electricity and **electrification** of key process equipment such as boilers and acetylene production occurs, whilst CCS is used to abate CO<sub>2</sub> emitted from the ammonia production lines
  - The total renewable electricity consumption in 2050 under the LCP reference scenario is 5.6 TWh/yr. Implementation would require **significant development of grid infrastructure** and roll out of renewables in Uzbekistan. Some of the demand may be met with on-site solar (UKS has reported a potential 0.4 TWh/yr) and some with planned RE projects in the Navoi region (2.1TWh/yr of RE is planned for the Navoi region).
  - Potential **CCS storage sites** have been **identified** in **Uzbekistan**, and in relative proximity to Navoiyazot. However, rigorous **geological surveys need** to be **performed** to understand their true potential for long term storage. Further **CO<sub>2</sub> transport infrastructure** also needs developing. This will require co-ordination and investment from multiple industry and government stakeholders
- **N<sub>2</sub>O abatement** is shown to be a low-cost technology, available today and able to achieve significant emission reductions. This should be **prioritised** as a short-term decarbonisation option
- A lower electricity cost sensitivity scenario was also developed using lower renewable electricity and green H<sub>2</sub> prices. Under this scenario there is a **significant reduction** in the overall **cost of decarbonisation**. **Green H<sub>2</sub>** is also **selected** to decarbonise the older NH<sub>3</sub> line in preference to CCS
  - Green H<sub>2</sub> and CCS (depending on the cooling technology used) can have a high-water footprint but **water resources in Uzbekistan** are **scarce** and several regions of the country are susceptible to desertification and drought. Careful consideration should be taken of this potential barrier when implementing these options

## Action Plan

- 1 Executive summary
- 2 Corporate Climate Governance
- 3 Climate related Risks & Opportunities
- 4 Low Carbon Pathway
- 5 Action Plan**
- 6 Disclosure support
- 7 On-site workshops

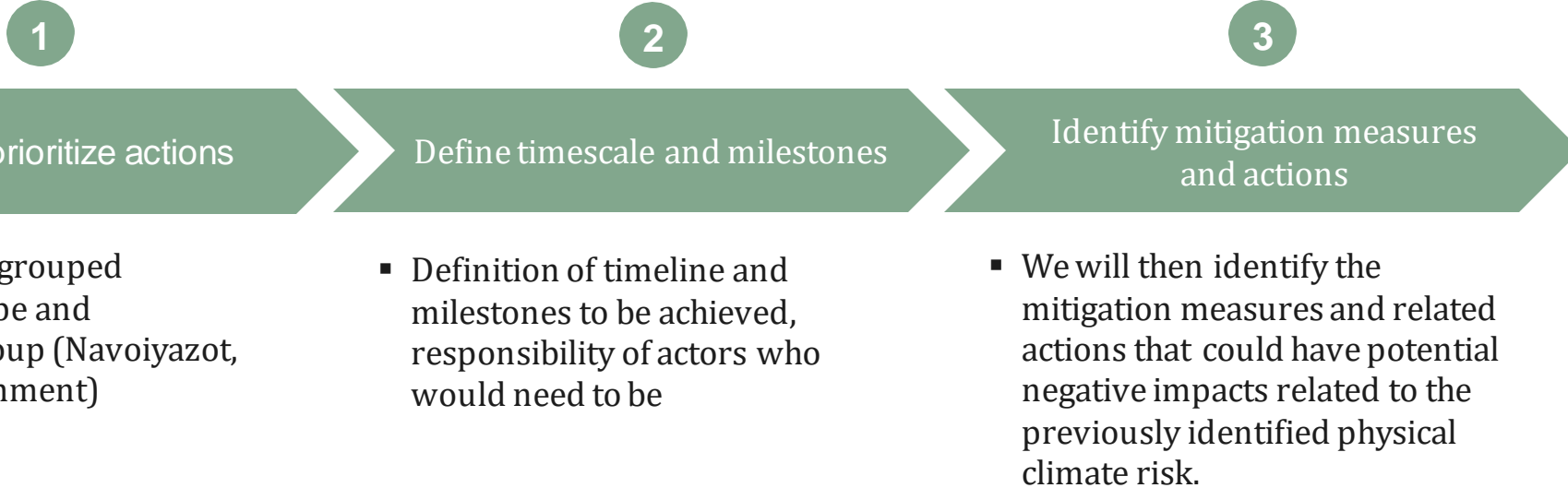
# Action Plan

Provided below is an overview of the objective, key steps and deliverables of the task at hand. A dedicated report dated December 2023 describes the methodology and results in more detail. The following slides provide a high-level overview of the action plan.

## Objectives

- Develop a clear, realistic and commonly agreed action plan that will support the development of the chemical sector decarbonization strategy

## Steps and deliverables



# Corporate Climate Governance Assessment Results (in line with TCFD recommendations)

ERM conducted a Gap Analysis for Navoiyazot through document review, a questionnaire and interviews with key internal stakeholders, following the EBRD Corporate Climate Governance (CCG) Assessment Matrix, EBRD Climate Governance for Companies Assessment Questionnaire and ERM’s TCFD Readiness Tool. This slide includes a brief explanation about the scoring methodology and Navoiyazot’s scoring results in each one of the four relevant areas (Governance, Strategy, Risk Management and Metrics & Targets).

### Methodology

Score	Description
	Meets all TCFD guidance, considered best-practice
	Meets some TCFD guidance
	Meets very few to no TCFD guidance

Score	Description
Level 4	Advanced CCG practices
Level 3	Good CCG practices
Level 2	Improvements towards good CCG
Level 1	No CCG practices
Level 0	No board, executive committee, no strategy and no risk functions, amongst others.

### Scoring results

**1. GOVERNANCE**

Level 2

**2. STRATEGY**

Level 2

**3. RISK MANAGEMENT**





Level 2

**4. METRICS & TARGETS**

Level 2

# Corporate Climate Governance Assessment Results (in line with TCFD recommendations)

This slide includes key findings in relation to the status quo assessment and recommendations. In depth results can be found in the separate Gap Analysis report.

TCFD pillars	1. GOVERNANCE 	2. STRATEGY 	3. RISK MANAGEMENT 	4. METRICS & TARGETS 
Current status of Navoiyazot	<ul style="list-style-type: none"> <li>Well established and comprehensive governance and reporting structures around broader set of risks and not yet specific to climate.</li> <li>Good awareness around climate change and Navoiyazot's role in reducing GHG emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Public mission statement including sustainability topics on the company's website.</li> <li>Strategic aims and objectives are defined in the framework of the policy of Navoiyazot in the Integrated Management System and include topics related to climate change (e.g. reduction of GHG emissions).</li> <li>Material climate-related risks and opportunities have been identified.</li> </ul>	<ul style="list-style-type: none"> <li>Robust risk management system and processes based on the Integrated Management System (IMS) in place.</li> <li>Several physical and transition risks included in risk register.</li> <li>Good communication between production level executives and IMS risk management department.</li> </ul>	<ul style="list-style-type: none"> <li>Some metrics and targets (e.g. around energy and water use, as well as air emission metrics) are in place.</li> </ul>
Key recommendations	<ul style="list-style-type: none"> <li>Prepare <b>internal climate policy</b> with clearly allocated <b>responsibilities and accountability</b> around climate change risk management signed by senior management.</li> <li><b>Include climate – related risk management topics</b> in the <b>agenda of Board meetings</b>.</li> </ul>	<ul style="list-style-type: none"> <li>Consider future climate risks (physical and transition) in the company's strategy for different time frames (short, medium, long-term).</li> <li>Conduct financial quantification for physical and transition risks.</li> <li>Conduct climate risk and opportunity assessment also the supply chain and future investment projects.</li> </ul>	<ul style="list-style-type: none"> <li>Add a full list of material climate risks (physical and transition) to the existing risk register, risk identification and management procedures.</li> <li>Develop risk mitigation and adaptation plans for assets and at company level.</li> </ul>	<ul style="list-style-type: none"> <li>Continue improving measurement of metrics like GHG Emissions, energy consumption and energy intensity.</li> <li>Based on the analysis of climate-related risks and opportunity and scenario analysis, define metrics which will be used to track and manage these identified risk (e.g. energy use, water use, GHG emissions, investments /expenditures for low carbon alternatives, etc.).</li> </ul>

ERM has found that Navoiyazot has well established processes & management and risk management structures where climate topics can be integrated.

# Action items for the TCFD pillar “Governance”



Overview of governance-related actions to integrate climate related risk and opportunity aspects into current governance structure.

## Short term actions 2023 – 2025

- Prepare an internal Climate Policy or a statement signed by a member of executive management (e.g. Chairperson of the Management Board). The policy should include the vision, goals, actions, roles of different functions in climate change risk management. Disclose the Policy / Statement on the Navoiyazot website.
- Include climate change topics into the areas of responsibility of the Supervisory Board and Management Board and update the governing documents which describe responsibilities of the management bodies of Navoiyazot (such as for example Articles of Association).
- Include climate change and ESG risk management topics to the agenda for the meetings of the Supervisory and Management Board meetings. Include climate change topics into the Management Board and Supervisory Board’s discussions on strategy, business plans, annual budgets, performance objectives, capital expenditures, acquisitions and divestitures, risk management policies.
- Include climate-related topics in the agenda of the Navoiyazot’s / UKS’s ESG Working Group meetings.
- Strengthen collaboration of the existing ESG working group with Management Board: introduce a process and frequency of reporting on climate change topics.
- Regular (recommended annually) capacity building training for management on ESG and climate topics (and comprehensive climate training for employees).

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Navoiyazot

## Long term actions 2023 – 2030 and beyond

- Introduce a procedure on how the Management Board and Supervisory Board monitors and oversees progress against goals and targets for addressing climate related issues.
- Continue updating TCFD disclosure on the company’s website with new information, related to:
  - How climate-related responsibilities are assigned at management level;
  - Description of the organizational structure;
  - Process how management is informed about climate-related issues;
  - How management monitors climate-related issues.
  - Introduce incentives related to climate targets, emissions reduction targets into the remuneration policy of the company.



# Action items for the TCFD pillar “Strategy”



Overview of actions to integrate climate related risk and opportunity aspects into strategy of Navoiyazot.

## Short term actions 2023 – 2025

## Long term actions 2023 – 2030 and beyond

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Navoiyazot

- For the risks and opportunities identified, it is recommended to discuss what is the company's strategy to mitigate risk and capture opportunities.
- Discuss on management level (Management Board) how climate-related risks and opportunities affect the company's business planning and strategy in the following areas: Products and services, Supply chain / value chain, Adaptation and mitigation activities, R&D investments, Operations, Access to capital.
- Communicate the findings of the climate-related risks and opportunity assessment and scenario analysis to the relevant departments and functions (IMS, Department on Environmental Protection, Health and Safety, Chief Engineer, emergency management team).
- Conduct scenario analysis for the supply chain could be affected by physical climate change and risks or opportunities caused by a transition towards a low carbon economy conducted by ERM to be reviewed by top-management.

- Regularly (approx. every 2 years) review climate risk and opportunity assessment for physical and transition risks and perform scenario analysis, considering different time frames (short, medium, long-term).
- Consider the identified increasing risks of extreme heat and cold, water scarcity, droughts and wildfires – as the most material physical climate risks for Navoiyazot - by 2030 and 2050 when defining CapEx and OpEx for next years.
- In line with TCFD recommendations, it is recommended to disclose actual and potential impacts of climate-related risks and opportunities on the company's strategy and financial planning. In this context it is recommended that
  - Navoiyazot / UKS discloses an explanation how the assessment of the climate-related risks and opportunities and scenario analysis serves input to their financial planning;
  - Navoiyazot / UKS discloses the impact of climate-related risks and opportunity on financial performance of the company;
  - Navoiyazot / UKS discloses the action planned for achieving greenhouse gas emissions reduction, if official commitments are set.
- In line with TCFD recommendations, it is recommended to disclose how your business strategy is resilient considering the transition to low-carbon economy with 2°C scenario: how strategies may change to address potential risks and opportunity, potential impact on financial indicators (revenue, costs, assets, liabilities).

# Action items for the TCFD pillar “Risk Management”



Overview of actions to integrate climate-related risk and opportunity aspects into Risk Management of Navoiyazot.

## Short term actions 2023 – 2025

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- Add identified climate-related risks (physical: water stress, drought, wildfires and heat; and transition: carbon pricing mechanisms, investors / stakeholders favoring low carbon investments, and enhanced emissions-reporting) [and opportunities] to the risk register and existing risk identification and management procedures.
- Conduct a more in-depth assessment of climate risks and opportunities for Navoiyazot and UKS as a whole.
- Conduct more detailed assessment of asset-specific physical and transition risks and also consider a financial quantification of risks.
- Develop climate-related risk mitigation and adaptation plans for assets and at a company level.
- Review coverage of existing corporate insurance contracts to see which climate related risks would be covered; if none consider making adjustments.

## Long term action 2023 – 2030 and beyond

- Regularly (based on the established frequency) update risk register and existing risk management procedures depending on changes to the organization (e.g. changes to the business model, changes due to mergers or acquisitions).
- Regularly adjust risk mitigation and adaptation plans depending on changes to the organization (e.g. changes to the business model, changes due to mergers & acquisitions) or already materialized risks (e.g. damages to plants or facilities due to increased heat or wildfires).
- In the TCFD disclosure on the company’s website, it is recommended to update information on the introduced risk management processes for identifying and assessing climate-related risks and their importance for the business and for identifying existing and future laws and regulations.
- Further, it is recommended to update TCFD disclosure on the company’s website with information on how climate-related risks are integrated into risk management.

# Action items for the TCFD pillar “Metrics and Targets”



Overview of actions to improve Metrics and Targets of Navoiyazot with regard to climate-related risk and opportunity aspects.

## Short term actions 2023 – 2025

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- Based on the analysis of climate-related risks and opportunity and scenario analysis, define metrics which will be used to track and manage these identified risk (e.g. energy use, water use, GHG emissions, investments /expenditures for low carbon alternatives, etc.).
- Use the existing process for establishing targets (and regular data collection and reporting) on air emissions, define and establish key metrics on company level related to climate –related targets, such as GHG emissions, energy use, water use and other relevant metrics.
- Define emission reduction targets for Scope 1 and 2 (and for Scope 3) GHG emissions for Navoiyazot in line with UKS’s vision statement on emissions reduction. Consider disclosing the Scope 1, 2 and 3 (in the future) emissions and targets.

## Long term actions 2023 – 2030 and beyond

- It is recommended to continue working on metrics and targets, such as for example:
  - Total energy consumed, broken down by source (e.g. purchased electricity and renewable sources);
  - Total energy intensity - by tons of product, amount of sales, number of products depending on informational value;
  - Percent of fresh water withdrawn in regions with high or extremely high baseline water stress;
  - Revenues/savings from investments in low-carbon alternatives (e.g. R&D, equipment, products or services);
  - GHG emissions intensity from buildings (by occupants or square area) and from new construction and redevelopment;
  - Expenditures (OpEx) for low-carbon alternatives (e.g. R&D, technology, products, or services);
  - Investments in new technologies are needed to manage transition risk.
- In line with TCFD recommendations, it is recommended for organization to consider disclosing metrics related to climate risks and opportunities identified and show historical trends and projections. It is recommended that Navoiyazot considers updating the TCFD disclosure on the company’s website with this information.
- Disclose information on how climate-related KPIs are included into a remuneration strategy of the company.

# Different assumptions are modelled to showcase how key parameters like renewable electricity (RE) price affect the Low Carbon Pathway (LCP)

- The “**LCP reference scenario**” models the emissions reduction potential of **several abatement options**.
- A “**Lower cost sensitivity**” scenario in the table below is modelled with **considerably lower renewable electricity (RE) and green H<sub>2</sub> prices**.
- Price inputs are based on large planned RE projects in Uzbekistan.
- The price of the RE and green H<sub>2</sub> in future years will have a direct effect on the selected abatement technologies in the suggested LCP and the extent of their use (e.g. green H<sub>2</sub> comes into play in the “Lower cost sensitivity” scenario and reduces the need for CCS).

Sensitivity		Description
LCP reference scenario		The LCP reference scenario consists of the abatement technologies found to be the least cost options for decarbonisation of emissions contained in the baseline up to 2050. The impact of water stress on technology availability is not considered. Renewable electricity cost is assumed at \$38/MWh in 2023 and \$28/MWh in 2050 based on EBRD projections.
Lower cost sensitivity	Renewable electricity price	Lower prices for renewable electricity may be available than the price given in the LCP reference. Navoiy Solar PV Park supplies power at \$27/MWh for a period of 25 years. \$18/MWh has been awarded in Uzbekistan start up in Sherabad district, Surkhandarya region with planned start up 2024. It is assumed that the RE price starts at \$27/MWh in 2023 and reduces to \$18/MWh by 2030.
	H <sub>2</sub> price	The lower H <sub>2</sub> price is calculated using the lower renewable electricity price above within a H <sub>2</sub> pricing model. The price starts at \$87/MWh (\$2.9/kg H <sub>2</sub> ) in 2023 and reduces to \$51/MWh (\$1.7/kg H <sub>2</sub> ) by 2050.

# Summary of the LCP and future actions for UKS and the government

## LCP conclusions

### LCP Conclusions

- N<sub>2</sub>O emissions can be readily abated but there is little financial motivation to install N<sub>2</sub>O abatement technology currently. Support through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is available to reduce CAPEX through the [Nitric Acid Climate Action Group](#), with which UKS is already working towards this target.
- Electrification of boilers and of some of the production technologies will play a key role in decarbonising the Navoiyazot plant, but sufficient rollout of renewables capacity is necessary. Up to 5.6 TWh/y of renewable electricity will be needed to cover all electrified processes in Navoiyazot, equivalent to 9% of 2019 electricity production in Uzbekistan.
- CCS and green H<sub>2</sub> also represent a significant portion of the low carbon pathway, but their deployment should be carefully considered along with their water intensity, in a water-stressed country like Uzbekistan.

## Short term ambition 2023 – 2030

### Uzkimiyosanoat (UKS) / Navoiyazot

- Significantly reduce N<sub>2</sub>O emissions through N<sub>2</sub>O abatement technology
- Develop RE on-site and investigate investment in RE and green H<sub>2</sub> projects
- Initiate CCS project discussions and deployment with the government and stakeholders

## Long term ambition 2030 – 2050

- Electrify the boilers across the plant
- Deploy electrified technologies (e.g. electrified SMR and acetylene production) once they become commercially mature
- Use green H<sub>2</sub> for the decarbonisation of the older NH<sub>3</sub> production unit once green H<sub>2</sub> becomes available after 2030, and if environmentally and financially viable
- Participate in the formation of CCS clusters and abate emissions through the use of CCS

### Government

- Introduce a Greenhouse Gas (GHG) emissions Monitoring, Reporting and Verification system with frequent reporting to verify the emissions reduction
- Financially support the renewable electricity development and establish a regulatory framework to advance the RE penetration
- Financially support the deployment of abatement technologies that require upfront capital expenditure (e.g. N<sub>2</sub>O abatement, electrified technologies using renewable electricity)
- The reforming of subsidies and the adoption of a carbon pricing mechanism could level the field for RE and green H<sub>2</sub> to be more competitive. Reduce the attractiveness of carbon-intensive production methods e.g. by increasing the price of natural gas for industrial use to help the shift to electrified technologies
- Capacity building e.g. through energy efficiency campaigns & technology transfer assistance to promote abatement technologies

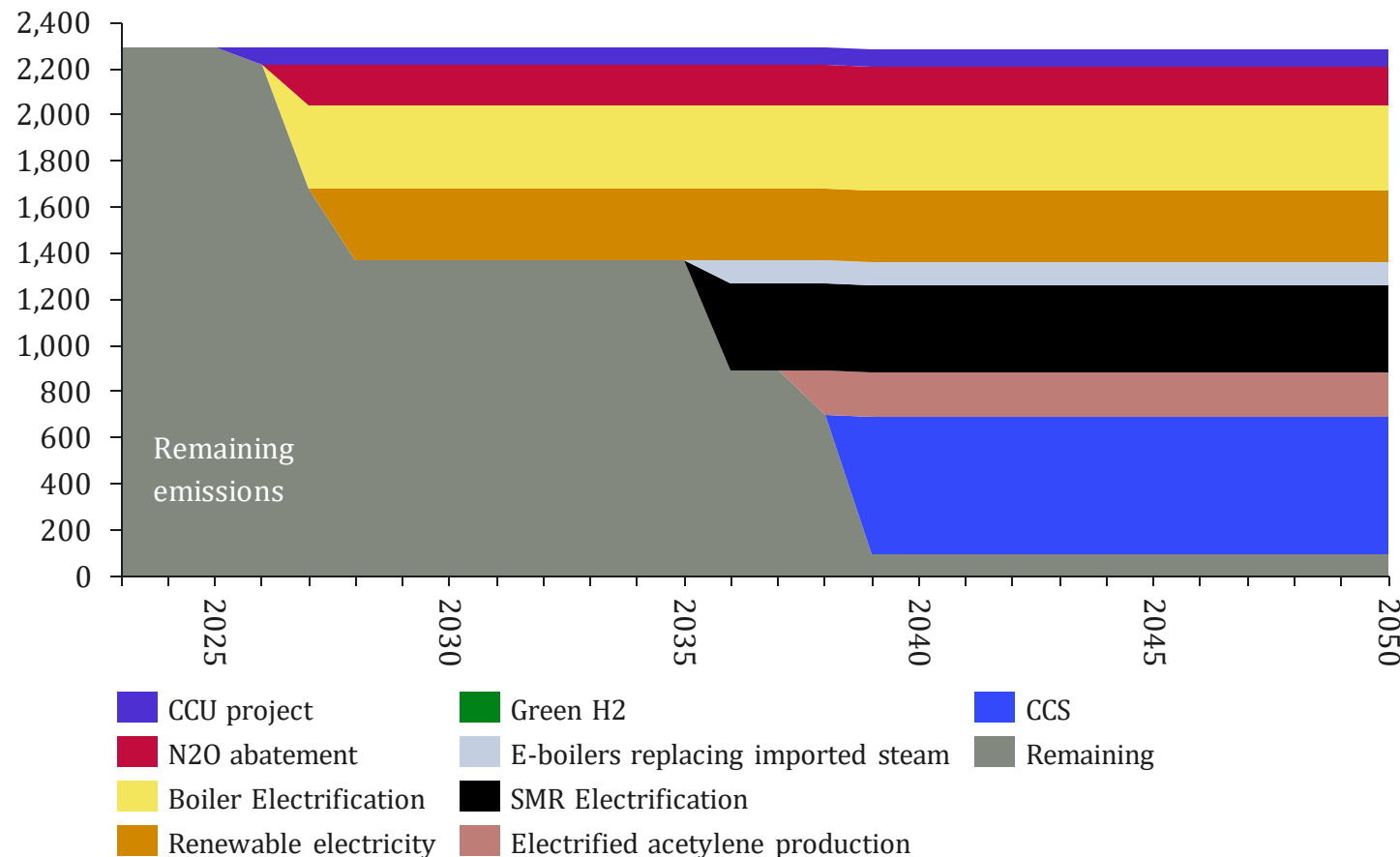
### Investors, Associations & international customers

- Support from international financing mechanisms, e.g. initiatives like the Green Climate Fund and the Green Hydrogen Bank, as well as from multilateral development banks like the EBRD which can provide concessional loans
- Identification and financing support of feasibility studies and projects
- Capacity building campaigns and technology transfer assistance e.g. technical assistance programs of the EBRD like the [Support for Implementation of Wind Auctions in Uzbekistan](#)

# The LCP includes several technologies with significant introduction of renewable electricity and carbon capture and storage (CCS)

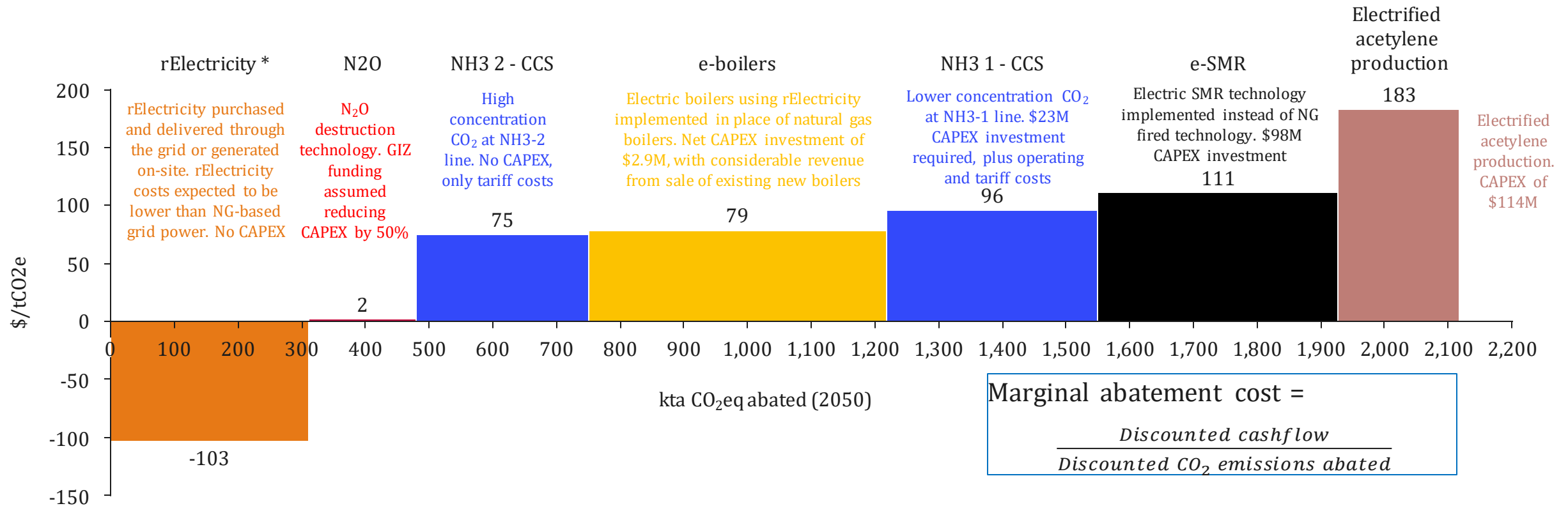
The LCP reference scenario selects the least cost options for decarbonisation of emissions contained in the baseline up to 2050. Renewable electricity cost is assumed at \$38/MWh in 2023 and \$28/MWh in 2050 based on EBRD projections.

Production emissions reductions by abatement technology (ktCO<sub>2</sub> / yr)



- The LCP reference scenario abates ~96% of 2023 plant emissions by 2050
- The pathway suggests **N<sub>2</sub>O abatement and boiler electrification** should be **implemented quickly**
- The pathway has a strong reliance on **renewable electricity\*** and **CCS** to achieve decarbonisation:
  - Renewable electricity for heat and power: 5.6 TWh/yr
    - Equivalent to 9% of 2019 electricity production in Uzbekistan<sup>1</sup>
    - UKS has previously reported 0.4 TWh/yr (7% of the forecast requirement) could be met with onsite solar
    - 2.1TWh/yr of RE (37.5% of the forecast requirement) is planned for the Navoi region.
  - CCS transport & storage infrastructure required for 600 kt CO<sub>2</sub>/yr
- Significant **infrastructure developments** will be **required** to achieve this LCP, related to renewable energy and CCS

# LCP marginal abatement cost highlights the relative cost of each technology and attractiveness of switching to renewable electricity

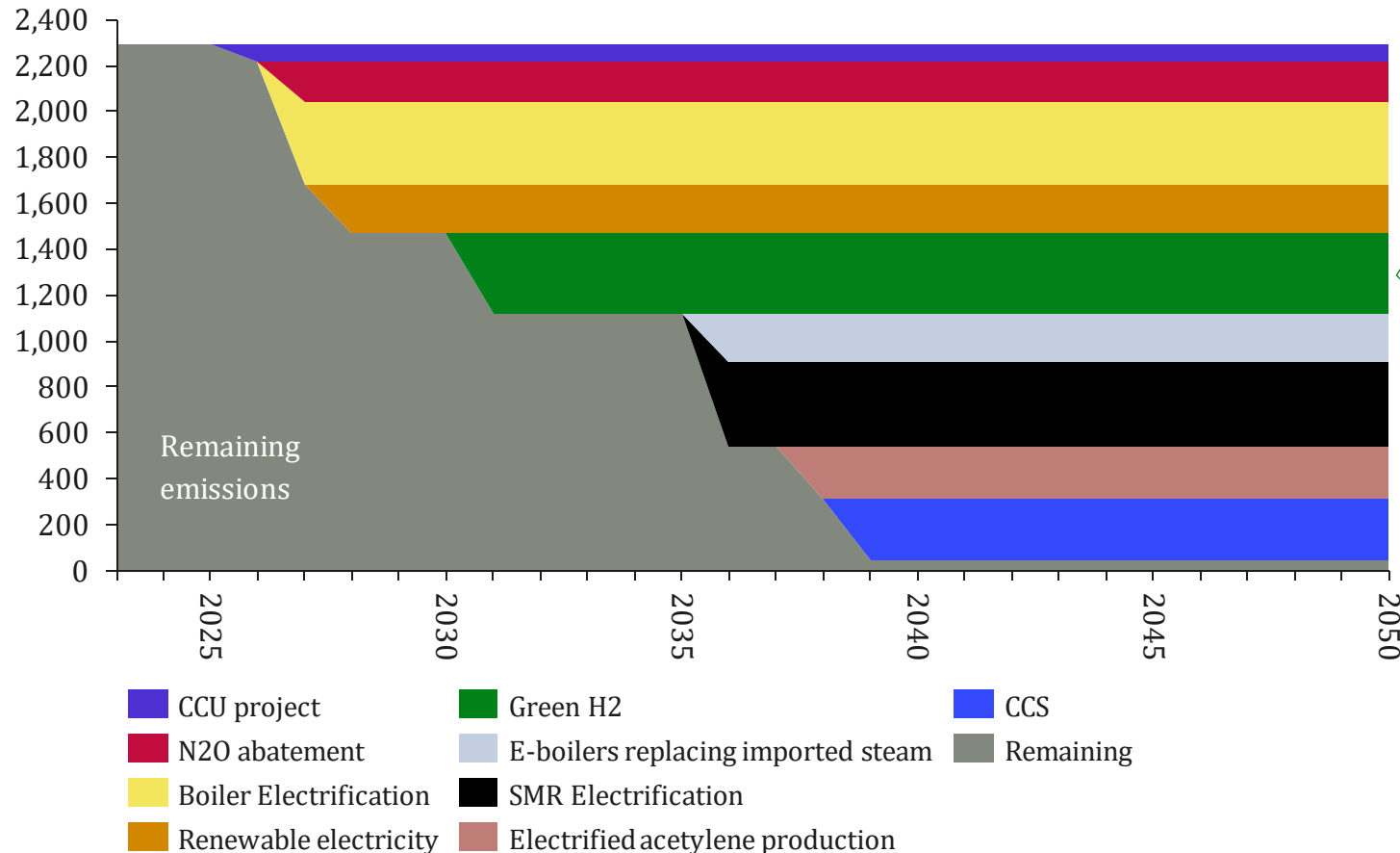


- The overall marginal abatement cost for the LCP is **\$34/t CO<sub>2</sub>eq** – this is the weighted average over the entire lifetime of the LCP
- Decarbonising current electricity consumption with renewable electricity is by far the lowest cost technology option and can be implemented early in the LCP
- There is additional cost to CCS for the older NH<sub>3</sub> unit (NH<sub>3</sub> 1) due to the lower concentration of the CO<sub>2</sub>
- CAPEX figures provided are non-discounted. Key fuel cost assumptions are provided in the Appendix

# The Low RE price scenario considers lower cost renewable electricity and green H<sub>2</sub> - resulting in green H<sub>2</sub> utilisation in the pathway

Lower prices for RE and green H<sub>2</sub> assumed in this scenario. It is assumed that the RE price starts at \$27/MWh in 2023 and reduces to 18 USD/MWh by 2030. The green H<sub>2</sub> price using these RE costs starts at 87 \$/MWh in 2023 and reduces to 51 \$/MWh by 2050.

Production emissions reductions by abatement technology (ktCO<sub>2</sub> / yr)

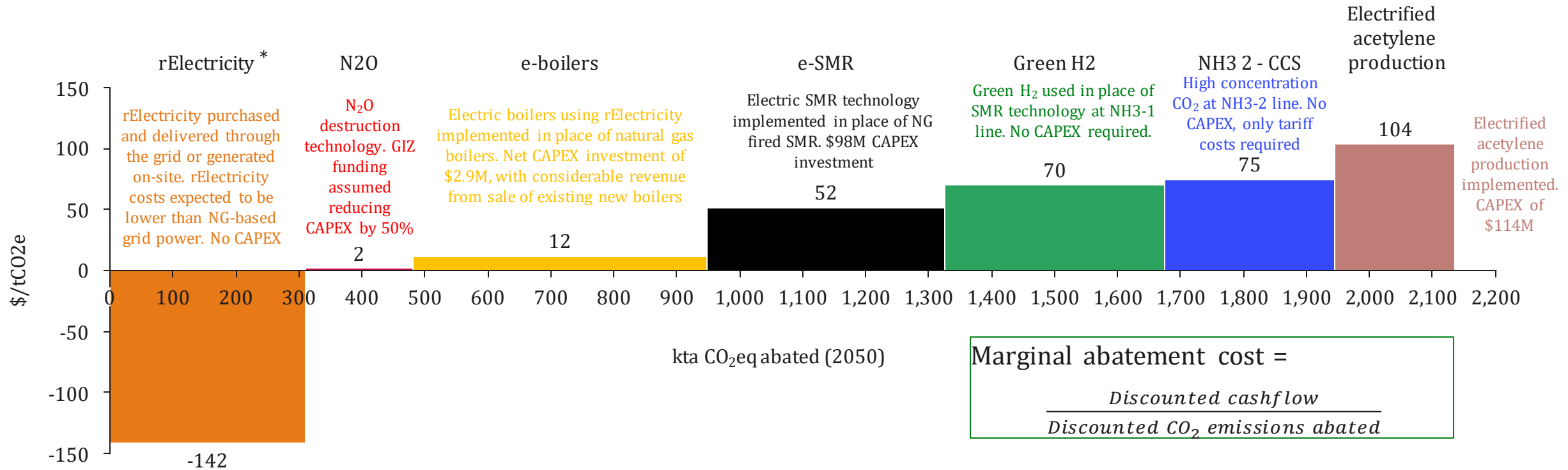


## Green H<sub>2</sub>

- In this scenario, **green H<sub>2</sub> is selected over CCS** to decarbonise the **older NH<sub>3</sub> unit**
- We assume that green H<sub>2</sub> becomes readily available after 2030 when it has been proven at scale
- We assume that green H<sub>2</sub> is made with 100% renewable electricity, operating at high utilization
- Green H<sub>2</sub> displaces far more NG in the older NH<sub>3</sub> unit and is relatively cheaper, due to lower NG/H<sub>2</sub> efficiency. CCS is still the preferred option for the newer NH<sub>3</sub> unit
- The **water intensity of green H<sub>2</sub>** should be **considered** in a water-stressed country like Uzbekistan





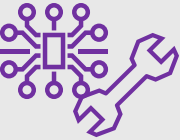



# Lowering the renewable electricity and H<sub>2</sub> price lowers marginal abatement cost and makes green H<sub>2</sub> more attractive









- The overall marginal abatement cost for the sensitivity pathway is **-\$1/t CO<sub>2</sub>eq** – this is the weighted average over the entire lifetime of the LCP
- Lowering the price of renewable electricity and green H<sub>2</sub> reduces the marginal abatement cost of most technologies, lowering OPEX (except for N<sub>2</sub>O abatement and CCS)
- The cost of green H<sub>2</sub> (\$70/tCO<sub>2</sub>eq) is lower than the cost of CCS (\$96/tCO<sub>2</sub>eq) under the LCP reference scenario for the older NH3 unit (NH3 1) causing the switch from CCS to green H<sub>2</sub> for emissions abatement
- CAPEX figures provided are non-discounted. Key fuel cost assumptions are provided in the Appendix.

# Abatement technologies and economic & policy barriers to overcome

Abatement technology	<b>N<sub>2</sub>O abatement &amp; efficiency</b> 	<b>Electrification with RE</b> 	<b>CCS*</b> 	<b>Green H<sub>2</sub></b> 
<b>Overview of technology</b> 	<ul style="list-style-type: none"> <li>Efficiency of production associated with energy consumption.</li> <li>N<sub>2</sub>O (nitrous oxide) abatement technologies destroy N<sub>2</sub>O, a potent GHG, which would otherwise be emitted from nitric acid plants.</li> </ul>	<ul style="list-style-type: none"> <li>Renewable electricity (RE) can be used to directly electrify processes reducing the need to use natural gas for electricity and steam production</li> <li>RE is needed to make Green Hydrogen, which can substitute the hydrogen made from natural gas feedstock (see Green H<sub>2</sub>)</li> </ul>	<ul style="list-style-type: none"> <li>Carbon Capture and storage (CCS) to capture CO<sub>2</sub> emissions associated with reforming natural gas feedstock and burning natural gas fuel</li> <li>The captured CO<sub>2</sub> is transported by pipeline, rail or truck to geological storage sites where it is sequestered</li> </ul>	<ul style="list-style-type: none"> <li>Green hydrogen (H<sub>2</sub>) is made from the electrolysis of water using RE</li> <li>Green H<sub>2</sub> can substitute hydrogen made from natural gas in ammonia production</li> </ul>
<b>Barriers to use</b> 	<ul style="list-style-type: none"> <li>Upfront capital investment required for energy efficiency projects</li> <li>Lack of incentive (e.g. NO<sub>x</sub> limits) to install N<sub>2</sub>O abatement technologies. There are currently no regulations for nitrous oxide emissions in Uzbekistan.</li> <li>Lack of incentive to reduce the carbon footprint of fertilizer and chemicals production, as there is no carbon pricing mechanism in place in Uzbekistan and carbon reduction targets for these sectors are loosely defined.</li> </ul>	<ul style="list-style-type: none"> <li>Use of renewable electricity is limited by deployment of RE and grid capacity. Existing infrastructure may not be adequate to deliver the required RE.</li> <li>Electrification of processes can involve high capex and opex, depending on the process being electrified.</li> <li>Partial or full electrification may result in changes to the plant energy balance.</li> <li>Some electrified processes, e.g. acetylene production or SMR are not mature, leading to deployment delay.</li> <li>Lack of policy support for the adoption of electrified technologies.</li> <li>Lack of a regulatory framework in Uzbekistan to support renewables penetration.</li> </ul>	<ul style="list-style-type: none"> <li>Geological storage potential in Uzbekistan and CO<sub>2</sub> export opportunities are not well understood</li> <li>Lack of legislation governing CCS value chain (capture, transport, storage)</li> <li>Significant upfront capex needed to develop CCS infrastructure (capture, transport, storage)</li> <li>Considerable development and operational risks associated with CCS including, revenue / business model risk, inter-dependency risk (coordination across capture, transport, storage), technology risk, carbon liability risk associated with potential CO<sub>2</sub> leakage</li> <li>Challenging financing of CCS projects due to high capex and risk</li> <li>CCS can be very water-intensive, while Uzbekistan is a water-stressed country</li> </ul>	<ul style="list-style-type: none"> <li>Green H<sub>2</sub> is currently expensive to produce. This is largely due to the electrolyser capex and the cost of RE, as well as transport of H<sub>2</sub>. Also, large scale electrolyzers stand at lower maturity.</li> <li>The price of natural gas is currently low in Uzbekistan relative to the RE price, not allowing green H<sub>2</sub> to be competitive even in 2050, if not increased.</li> <li>Green H<sub>2</sub> is very water-intensive, while Uzbekistan is a water-stressed country. Competition with the agricultural sector for water resources is expected.</li> <li>RE is required to produce green H<sub>2</sub>. Limited capacity and grid infrastructure may limit deployment.</li> </ul>

# Summary overview of action that is required from the government and private sector to address these barriers to deployment

Abatement technology	<b>N<sub>2</sub>O abatement &amp; efficiency</b> 	<b>Electrification with RE</b> 	<b>CCS</b> 	<b>Green H<sub>2</sub></b> 
<b>UKS/ Navoiyazot</b> 	<ul style="list-style-type: none"> <li>Invest in N<sub>2</sub>O abatement technology to eliminate N<sub>2</sub>O emissions. Investigate supporting mechanisms (Article 6 of Paris agr.) and finance e.g. GIZ, EBRD</li> <li>Investigate energy efficiency opportunities, particularly for older units of the Navoiyazot plant</li> <li>Set carbon footprint targets and assign executive-level accountability to prepare to meet external stakeholder expectations</li> </ul>	<ul style="list-style-type: none"> <li>Develop RE onsite and/or secure dedicated RE via PPAs</li> <li>Understand the feasibility and implications of SMR electrification</li> <li>Invest in easy-to-deploy electrification technologies (e.g. replace natural gas boilers with e-boilers)</li> </ul>	<ul style="list-style-type: none"> <li>Work with other players/industries to identify opportunities for CCS clusters and help develop investment case for CCS</li> <li>Initiate cluster projects and develop CCS feasibility studies</li> <li>Ensure sustainability of water use and investigate the possibility to source water from less water-stressed regions in Uzbekistan</li> </ul>	<ul style="list-style-type: none"> <li>Develop business case / feasibility studies for investment in Green H<sub>2</sub></li> <li>Investigate the sustainability of water use for electrolysis and the possibility to source water from less water-stressed regions in Uzbekistan</li> <li>Support the scale-up of renewable electricity to supply green H<sub>2</sub> production</li> </ul>
<b>Government</b> 	<ul style="list-style-type: none"> <li>Set clearly defined emissions reduction targets, including N<sub>2</sub>O emission limits</li> <li>Financially support energy efficiency and N<sub>2</sub>O destruction projects</li> </ul>	<ul style="list-style-type: none"> <li>Financially support RE development</li> <li>Establish regulatory framework to advance RE penetration</li> <li>Reform subsidies and consider the creation of a carbon pricing mechanism to level the field for RE</li> <li>Financially support industrial projects deploying electrified (RE) technologies</li> <li>Remove NG subsidies for industrial use</li> </ul>	<ul style="list-style-type: none"> <li>Understand geological storage potential of new and existing CCS sites</li> <li>Incentivise CCS implementation via cluster formation support</li> <li>Develop supply chain-wide legislation</li> <li>Reduce cost of CCS infrastructure and enhance business case through funding of studies to identify low-cost solutions</li> </ul>	<ul style="list-style-type: none"> <li>Introduce policy support mechanism for green H<sub>2</sub> e.g. carbon pricing to allow green H<sub>2</sub> to compete with natural gas or RE subsidies for green H<sub>2</sub> production</li> <li>Investigate if H<sub>2</sub>O consumption will excessively compete with agricultural demand (e.g. impose usage limits)</li> <li>Remove NG subsidies for industrial use</li> <li>To develop RE for electrolysis, the same actions as electrification are required</li> </ul>
<b>Investors, associations &amp; international customers</b>	<ul style="list-style-type: none"> <li>Reduce the attractiveness of carbon-intensive production methods e.g. by removing subsidies of natural gas for industrial use</li> <li>Support with international financing mechanisms</li> <li>Identification and financing support of feasibility studies and projects</li> </ul>			

# Priority actions

## Priority actions for UKS and the Government

Uzkimyo sanoat  
(UKS)  
/  
Navoiyazot

- Investigate financial support mechanisms and invest in N<sub>2</sub>O abatement technology for Nitric Acid Line 1
- Investigate energy efficiency improvement opportunities, particularly for the old lines of the Navoiyazot plant
- Set internal emissions targets and assign executive-level accountability to ensure they are met
- Invest in easy-to-deploy electrifications technologies like e-boilers
- Investigate the implications of SMR and acetylene production electrification to the process
- Initiate the discussion with the government and other players on CCS project feasibility and the formation of CCS clusters
- Develop RE on-site and investigate investment in RE and green H<sub>2</sub> projects. Secure dedicated RE through PPAs with planned projects

Government

- Introduce N<sub>2</sub>O-limiting laws with clearly defined emissions reduction targets
- Financially support energy efficiency and N<sub>2</sub>O reduction projects
- Financially support RE rollout and establish a regulatory framework to advance their penetration
- Increase the cost competitiveness of RE and green H<sub>2</sub> through various mechanisms (subsidies, carbon pricing)
- Carry out geological studies to identify CCS sites and confirm that they are suitable for permanent storage
- Develop supply chain-wide legislation for CCS
- Financially support feasibility studies for CCS projects and CCS clusters
- Investigate the sustainability of water usage in green H<sub>2</sub> production and CCS and how it is expected to compete with agriculture.

## **Disclosure support**

- 1 Executive summary
- 2 Corporate Climate Governance
- 3 Climate related Risks & Opportunities
- 4 Low Carbon Pathway
- 5 Action Plan
- 6 Disclosure support**
- 7 On-site workshops
- 8 Conclusion

# Disclosure support

Provided below is an overview of the objective, key steps and deliverables of the task.

Objectives

- To draft disclosure material that is based on prior tasks and that is proficient for public disclosure (in the annual report, website or other (to be defined by the UKS))

Steps and deliverables

1



1. The structure of the draft disclosure material will be heavily informed by the results from Task 1 (Standards, best practice and emerging disclosure mapping) to ensure that the client is prepared for existing and upcoming disclosure requirements.
2. Workshop to assess disclosure need and scope

2



1. The following content will be included:
  1. The main principles of the adopted Action Plan.
  2. The anticipated impacts of climate change and climate policies on its business.
  3. An initial assessment of the exposure to climate risks.

# Disclosure support

ERM prepared a disclosure materials for Navoiyazot in line with TCFD recommendations.

TCFD is a framework providing guidance for companies how to assess and disclose climate-related risks and opportunities and embed these into wider risk management frameworks within the organization.

This is the first TCFD-aligned climate disclosure of Navoiyazot. It is structured around the following pillars of the TCFD framework:

1. Governance
2. Strategy
3. Risk Management
4. Metrics and Targets

Disclosure materials could be used for a website or be incorporated into a ESG / Sustainability report.

## Navoiyazot Climate Disclosure following Recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD)

Climate change represents a strategic risk, but also an opportunity with potential financial implications for Navoiyazot and all our stakeholders. That is why we are committed to analyse and disclose such climate-related business implications following the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

TCFD is a framework providing guidance for companies how to assess and disclose climate-related risks and opportunities and embed these into wider risk management frameworks within the organization.

This is the first TCFD-aligned climate disclosure of Navoiyazot. It is structured around the following pillars of the TCFD framework:

1. Governance
2. Strategy
3. Risk Management
4. Metrics and Targets

### 1. GOVERNANCE:

The governing structure of Navoiyazot is a three-tiered structure with the **Shareholders Meeting** as the supreme governing body of Navoiyazot. Furthermore, the **Supervisory Board** reports to the Shareholders Meeting. The members of the Supervisory Board include the First Deputy Minister of Mining Industry and Geology of the Republic of Uzbekistan (Chairperson), the Minister of Energy of the Republic of Uzbekistan, Hokim (a governor of administrative region) of Bekobod district of Tashkent province, Executive at Uzkimyosanoat (UKS) - our holding company, the Deputy Director of the Department of the Ministry of Economy and Finance, the Head of the Department of the Ministry of Investment, Industry and Trade and the Director General of the Agency for Strategic Reforms under the President of the Republic of Uzbekistan. The Management Board is chaired by the **Chairperson of the Management Board**. Management leads our

## **On-site workshops**

- 1 Executive summary
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# Capacity Building Workshop

The Capacity Building Workshop took place on November 6 2023 in the UKS head office. On UKS site 26 persons from senior management and C-level suite as well as a GMC representative participated.

## Workshop Objectives:

1

Know the principles of **GHG Accounting for the Chemical and Fertilizer Industry** and its primary **GHG emission drivers**

2

Know different **decarbonization levers in the Chemical and Fertilizer Industry** and respective challenges and opportunities of implementation

3

Know what **Climate Related Risks and Opportunities** are and how they affect your overall business strategy



## Agenda and Key Discussion Points:

- 1 Introduction and **Short Recap Phase 1 Capacity Building**
- 2 **GHG Emissions:** Navoiyazot
- 3 **Decarbonization:** Abatement Options  
*Break*
- 4 Understanding and managing **Climate Risks and Opportunities**
- 5 **Q&A:** Discussion of the concept of ESG

# Leadership Workshop

The Leadership Workshop took place on November 7 2023 in the UKS head office. Senior management of UKS as well as EBRD and GMC representatives participated.

## Workshop Objectives:

1

Provide an **overview of the overall project**

2

Present the **outcomes of Phase 2**: Corporate Climate Governance, Climate related risk and opportunity assessment and Low Carbon Pathway Development

3

Obtain the **necessary input** for the development of an **Action Plan**



## Agenda and Key Discussion Points:

- 1 | **Setting the scene and high-level project recap**
  - **Corporate Climate Governance**
- 2 | **Climate Related Risks and Opportunitites:**
  - **Low Carbon Pathway**
- Break*
- 3 | **Action Plan & Disclosure Support**
- 4 | **Next Steps**
- 5 | **Q&A**

# Conclusion

- 1 Executive summary
- 2 Corporate Climate Governance
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# Conclusion

The **Corporate Climate Governance assessment** has shown that, in the Governance area, Navoiyazot has a robust governance and climate awareness, but there is a need for extended climate training. In the Strategy area, Navoiyazot has a strong environmental focus in their strategy, but still does not include climate risks and opportunities. In the Risk Management area, Navoiyazot demonstrated a robust risk management and an effective communication, but climate risks are still missing, as well as mitigation and adaptation plans for assets and at company level. In the Metrics & Targets area, Navoiyazot tracks energy, water use and air emissions and aims GHG reduction, but still lacks metrics covering all GHG emission types, as well as transition risks.

In the **Assessment of Climate Related Risks and Opportunities**, it was concluded that Navoiyazot faces moderate risks from Extreme Cold events and potential increases in Extreme Heat events, impacting safety, operations, and costs. Water stress, drought, and wildfires pose severe risks, affecting water availability, infrastructure, safety, and expenses.

Key lessons from the **Low Carbon Pathway** highlight the challenge of incentivizing N2O abatement, the importance of GIZ support for reduced CapEx, the necessity of scaling renewable capacity for electrification, and the need for cautious deployment of CCS and green H2 in water-stressed regions like Uzbekistan.

The outcomes from all tasks were combined in the **Action Plan**, showing that improving Navoiyazot's Corporate Climate Governance enables resilience, competitiveness, financial opportunities, and successful implementation of abatement technologies. Prioritizing available measures, government support, and investing in renewable energy and CCS infrastructure is crucial for achieving decarbonization goals.

The successful **on-site workshops**, driven by interactive exercises and Russian language, engaged Navoiyazot and UKS teams effectively. Future workshops should sustain this format for continued team awareness.



## Key Phase 2 achievements

- ✓ Naoviyazot is aware of how their **Corporate Climate Governance** compares to best practices and has concrete improvement recommendations
- ✓ Navoiyazot has a clear **Low Carbon Pathway** to reach the climate ambition level set by UKS during Phase 1 (*reduce Scope 1, 2 and 3 emissions by 90% by 2050*)
- ✓ An **Action Plan** with priority measures and next actionable steps to support Navoiyazot and UKS in the implementation of the learnings of this project
- ✓ Navoiyazot and UKS top management and technical teams **gained valuable knowledge** regarding climate risks and opportunities, GHG emissions quantification and climate governance best practices

# Thank you

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