

Meet the team



Marlon Hötze 67741 Niklas Kohl 65304 Maximilian Meurer 64735 Julian Müller 64906



Agenda





Introduction



THE FUTURE OF URBAN LIVING

"How does The Line's approach of redefining the concept of urban development impact the domains of air, water, soil and socio-economic influences in Saudi-Arabia? Is this mega project really as sustainable as promised?"

"The Line" is a visionary urban infrastructure project within Saudi Arabia's NEOM initiative that is aiming at defining the future of sustainable living

Introduction – The Project



Source: NEOM (2024), Alwafi (2025), Hammond (2024), Mizzi (2025)



Impact Assessment



Despite expected construction emissions, "The Line's" zero-emission operation warrants a superb air impact rating, making its impact highly positive

Impact Assessment – Air



While "The Line" pioneers smart water innovation, it also faces critical risks to ecosystems and long-term resilience

Impact Assessment – Water



Source: Ferrell (2021), GWI Desalination & Reuse Market Focus Deck (2023), IPCC (2022), M. Amin Mir & M. Waqar Ashraf (2023), navigator (2025), NEOM (2022), NEOM's Water Infrastructure (2024), Rockström (2009), Thundiyil & Thundiyil (1998), UN World Water Development Report 2022 (2022), UNESCO (2023), Unesco & World Water Assessment Programme – United Nations (2015), Vörösmarty et al. (2010)



05/06/2025

THE LINE PROJECT

While "The Line" aims to restore ecosystems and protect soil through innovative design, it also poses long-term risks to biodiversity and soil stability

Impact Assessment – Soil



While "The Line" creates jobs, infrastructure and local economic benefits, it also poses risks to local communities, labor rights and social inclusivity

Impact Assessment – Socio-Economic



Source: Arab News (2024), NEOM (2023), Washington Post (2023), The Wallstreet Journal (2024), Business & Human Rights Resource Center (2023), Alwafi (2025), Adileh (2022), Noaln & Hay (2024)





Tool Application



Leveraging environmental impact and strategic planning to guide sustainable development for 'The Line'"

Tool Application

	Environmental Impact Assessment	Strategic Environmental Assessment	Life Cycle Assessment
Focus	Project-specific environmental impacts	Policies, plans, and programs with long-term or cumulative environmental impacts	Environmental impact of products and processes across their life cycle
Purpose	Identify and evaluate direct and indirect environmental risks before construction	Assess broader sustainability implications beyond the project level	Evaluate inputs/outputs like energy, materials, and waste
Value for "The Line"	 Essential due to the scale and environmental sensitivity of the project Helps mitigate habitat loss, emissions, water overuse, and biodiversity threats Legally required: Saudi Environmental Law Includes stakeholder consultation, mitigation measures, and monitoring Increases transparency and regulatory alignment 	 Aligns with Vision 2030 goals (climate, water, land use, economic transition) Supports high-level sustainability integration in planning Encourages stakeholder and public involvement in early decision-making Allows comparison of alternative development strategies 	 Not a priority in early project stages due to narrow focus on specific products and processes Less holistic compared to EIA and SEA Complements other assessments with detailed analysis of energy, materials, and waste flows Can still be useful in later phases of the project
Significance	Ø Ø Ø	\$\$	\$ \$ \$

Source: Ramos (2025), Royal Decree No. M/165 (2020), NCEC (2025), European Commission (2025),



Recommandations

4



Low-emission construction ambitions will improve air quality, while smart water systems boost sustainability and climate resilience

Prevention and Mitigation Strategies for Air- & Water-Related Impacts

Prevention and Mitigation Strategies Anticipated Impacts Lower material-related carbon emissions Additional use of construction materials like hempcrete or geopolymer Enhanced thermal performance, which reduces operational cooling needs .= Full commitment to using no/low-emission construction equipment Reduced machinery emissions and air pollutants Transparent tracking of constructions emissions, X∱ OX Establish carbon accounting and offsets tied to specific project milestones enabling phased mitigation and accountability Prevents marine degradation from brine discharge Implement advanced brine management techniques Enables mineral recovery from desalination waste Water Reduces reliance on freshwater sources Enhance decentralized wastewater recycling systems Lowers energy use through local treatment Adopt Water-Sensitive Urban Design (WSUD) principles 10 Strengthens urban resilience to climate stress



Mitigating environmental and social impacts through proactive design, monitoring and inclusive planning

Prevention and Mitigation Strategies for Soil- & Socio-Economic Related Impacts

Prevention and Mitigation Strategies



Adoption of mitigation hierarchy (avoidance, minimization, restoration, offsetting) to preserve soil integrity and associated ecosystem services



Implementation of low-impact construction methods, such as tunneling and buffer zoning, to reduce compaction and protect soil structure



5.

<u></u> ĠŢŢĮ

Deployment of real-time soil monitoring and topsoil reuse strategies, overseen by a dedicated Mitigation Management Unit (MMU)



Labor standards according to the International Labour Organization, independent audits and compliance reporting systems



Social Impact Assessment, profit sharing programs with local inhabi-tants and healthcare, education and employment support

Community engagement in planning, cultural programs for reserving historic areas, promoting local art and traditions

Anticipated Impacts

- Enhanced post-construction habitat recovery and biodiversity connectivity
- Early detection of degradation through real-time feedback systems
- Enhanced soil resilience and reduced erosion through stabilized topsoil, and control measures
- Fair wages, safe working conditions, reasonable working hours and employee empowerment
- Transparency, reduction of social conflicts and inequalities, easier transition for relocated people
- Preservation of local heritage and reinforcement of cultural ties

Source: ILO (2025), IAIA (2025), Environmental Impact Assessment Review (2015), Frontiers (2024)



Conclusion





In the context of "The Line", it is essential to balance bold sustainability promises with risks and growing doubts about practical implementation.

Prevention and Mitigation Strategies for Socio-Economic Impacts

Sustainability Takeaways

- All key sustainability domains (water, air, and soil) are closely interlinked and must be assessed as a whole (e.g., the biodiversity impact of water desalination).
- A holistic evaluation requires looking **beyond Saudi Arabia's borders** (e.g., virtual water flows and material emissions abroad).
- The Line introduces the **most innovative sustainable technologies** aiming to enhance air and water quality.
- International experts are contributing to planning, with goals of regional socioeconomic development.

Subjective Reflections

- The project is still **conceptual**, with experts doubting its full realization.
- Promises of **sustainability often fail in practice** despite appealing theory.
- Past regional examples (e.g. FIFA World Cup, Amnesty reports) raise **doubts** about **genuine sustainability and social equity commitments**.
- Constructing a mega city in a resource-scarce desert contradicts climate goals. In light of degrowth theory and lacking proof for green growth, the project's environmental credibility remains weak.



05/07/2025



Thank you for your attention!

Questions?

Following up on our initial question: Do you believe The Line is truly as sustainable as promised?

Sources

Adileh, I. (2022, September 15). NEOM and its impact on the future of KSA. Grant Thornton Saudi Arabia. Home. https://www.grantthornton.sa/en/insights/articles-and-publications/neom_in_KSA/

Alwafi, A. a. M. (2025). Climate change as an influential factor in designing future cities (case study the NEOM Project "The line city" in Saudi Arabia). Deleted Journal. https://doi.org/10.1007/s43995-025-00103-6

Amnesty International. (2023). Human rights in Saudi Arabia. Amnesty International; Amnesty International. https://www.amnesty.org/en/location/middle-east-and-north-africa/middle-east/saudi-arabia/report-saudi-arabia/

Arab News. (2024, April 15). NEOM's workforce anticipated to exceed 200k by 2025: CEO. Arab News. https://www.arabnews.com/node/2493401/business-economy

AZoBuild. (2019, July 8). Hempcrete vs. Concrete. https://www.azobuild.com/article.aspx?ArticleID=8335

Brown, E. B. (2024, November 14). The Big Problem for Saudi Arabia's Futuristic City? The Country Doesn't Have Enough Money. <u>https://www.wsj.com/world/middle-east/the-big-problem-for-saudi-arabias-futuristic-city-the-country-doesnt-have-enough-money-9b825a67</u>

Cipolletta, G., Lancioni, N., Akyol, Ç., Eusebi, A. L., & Fatone, F. (2021). Brine treatment technologies towards minimum/zero liquid discharge and resource recovery: State of the art and techno-economic assessment. Journal of Environmental Management, 300, 113681. https://doi.org/10.1016/j.jenvman.2021.113681

Editorial Board. (2023, May 10). Saudi Arabia's new mega-city may be built on a foundation of tyranny. The Washington Post. https://www.washingtonpost.com/opinions/2023/05/10/saudi-arabia-neom-huwaitat-mbs/

FAOLEX. (n.d.). https://www.fao.org/faolex/results/details/en/c/LEX-FAOC201014/

Ferrell, M. (2021, July 6). Is Neom The Future of Sustainable Cities? Undecided with Matt Ferrell - Exploring How Technology Impacts Our Lives; Undecided with Matt Ferrell. https://undecidedmf.com/episodes/is-neom-the-future-of-sustainable-cities/

Friedlingstein, P., O'Sullivan, M., Jones, M. W., Andrew, R. M., Gregor, L., Hauck, J., Quéré, C. L., Luijkx, I. T., Olsen, A., Peters, G. P., Peters, W., Pongratz, J., Schwingshackl, C., Sitch, S., Canadell, J. G., Ciais, P., Jackson, R. B., Alin, S. R., Alkama, R., . . . Wright, R. (2022). Global Carbon Budget 2022. Earth System Science Data, 14(11), 4811–4900. https://doi.org/10.5194/essd-14-4811-2022

GWI Desalination & Reuse Market Focus Deck. (2023, October). Globalwaterintel.com. https://www.globalwaterintel.com/pages/desalmarketreport

Hammond, A. (2025, January 10). Neom raises \$24 billion from the private sector. AGBI. https://www.agbi.com/giga-projects/2024/10/neom-private-sector-raises-24-billion/



Sources

ILO homepage. (n.d.). International Labour Organization. https://www.ilo.org/

IPCC. (2022). Climate Change 2022: Impacts, Adaptation and Vulnerability. IPCC Sixth Assessment Report; IPCC. https://www.ipcc.ch/report/ar6/wg2/

Lall, U. (2018). Positive Water Sector Disruptions by 2030 An Opinion Paper prepared for the Inter-American Development Bank. https://water.columbia.edu/sites/water.columbia.edu/files/content/emerging%20disruptive%20innovations%20in%20the%20water%20sector_12.4.18.pdf

Life Cycle Assessment & the EF methods. (n.d.). Green Forum. https://green-forum.ec.europa.eu/environmental-footprint-methods/life-cycle-assessment-ef-methods_en

Mizzi, O. (n.d.). Saudi NEOM's The Line project 'won't be finished for 100 years' The New Arab. https://www.newarab.com/news/saudi-neoms-line-project-wont-be-finished-100-years

Morais, M. B. (2020). Socio-economic Impact Measurement and the World Business Council for Sustainable Development (WBCSD). In Encyclopedia of the UN sustainable development goals (pp. 924– 935). https://doi.org/10.1007/978-3-319-95867-5_25

Name, Y. (n.d.). Social Impact assessment. https://www.iaia.org/wiki-details.php?ID=23

Neom. (2024, December 15). MEWA and NEOM discover eight new native plant species. NEOM. https://www.neom.com/en-us/newsroom/mewa-and-neom-discover-eight-new-native-plant-species?

Neom: A human rights and environmental impact assessment - Business & Human Rights Resource Centre. (n.d.). Business & Human Rights Resource Centre. <u>https://www.business-humanrights.org/en/latest-news/neom-a-human-rights-and-environmental-impact-assessment/</u>

Nolan, B., & Hay, M. (2024, August 27). The Line will be more resort than real city, says consultant for Saudi Arabia's Neom. Business Insider. <u>https://www.businessinsider.com/neom-saudi-arabia-the-line-resort-city-consultant-2024-8</u>

Ramos. (2025). Environmental Impact Assessment & Strategic Sustainability Assessment [Slide show]. <u>https://moodle.novasbe.pt/pluginfile.php/674134/mod_resource/content/5/Class%20Apr%2023%202025%20TR.pdf</u>

Rockström, J. (2009). A Safe Operating Space for Humanity. Nature, 461(7263), 472–475. https://doi.org/10.1038/461472a



Sources

Saudi Arabia: ITV finds migrants constructing "The Line" at megacity project, Neom, experience egregious labour rights abuse - Business & Human Rights Resource Centre. (n.d.). Business & Human Rights Resource Centre. https://www.business-humanrights.org/tr/en-son-haberler/saudi-arabia-itv-finds-migrants-constructing-the-line-at-megacity-project-neom-experience-egregious-labour-rights-abuse/

SaudiPedia. (2024, June 3). National Center for Environmental Compliance. Saudipedia. https://saudipedia.com/en/article/562/government-and-politics/centers/national-center-for-environmental-

Silver Chips online. (n.d.). https://silverchips.mbhs.edu/content/the-line-a-problematic-city-of-the-future-35770/

Strategic Environmental Assessment. (n.d.). Environment. <u>https://environment.ec.europa.eu/law-and-governance/environmental-assessments/strategic-environmental-assessment_en</u>

Tallis, T. (n.d.). Mitigation for one & all: An integrated framework for mitigation of development impacts on biodiversity and ecosystem services. ScienceDirect.

Tebeje, A. K., Abebe, W. B., Hussein, M. A., Mhiret, D. A., Zimale, F. A., Desta, G., Assefa, T. T., Tilahun, S. A., & Ahmed, M. A. (2024). Dynamics of soil quality in a conserved landscape in the highland sub humid ecosystem, Northwestern Ethiopia. Frontiers in Sustainable Food Systems, 8. <u>https://doi.org/10.3389/fsufs.2024.1270265</u>

THE LINE a revolution in urban living. (n.d.). <u>https://www.neom.com/en-us/regions/theline</u>

UN World Water Development Report 2022. (2022, March 21). UN-Water. https://www.unwater.org/publications/un-world-water-development-report-2022

UNESCO. (2023). UN World Water Development Report 2023. Www.unesco.org. https://www.unesco.org/reports/wwdr/2023/en

Unesco, & World Water Assessment Programme - United Nations. (2015). Facing the challenges : case studies and indicators : UNESCO's contribution to the United Nations world water development report 2015. United Nations Educational, Scientific And Cultural Organization.

Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S. E., Sullivan, C. A., Liermann, C. R., & Davies, P. M. (2010). Global threats to human water security and river biodiversity. Nature, 467(7315), 555–561. https://doi.org/10.1038/nature09440

What is Saudi Arabia's eco-friendly city (The Line)? (2024, October 17). https://greenly.earth/en-gb/blog/company-guide/what-is-saudi-arabias-eco-friendly-city-the-line

What is the Carbon Footprint of Concrete? (2024, January 24). https://greenly.earth/en-gb/blog/company-guide/what-is-the-carbon-footprint-of-concrete

