BDO

AI in Public Sector: ESG aspect

December 2023

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The public sector is expected to lead efforts in addressing the global sustainable ESG agenda

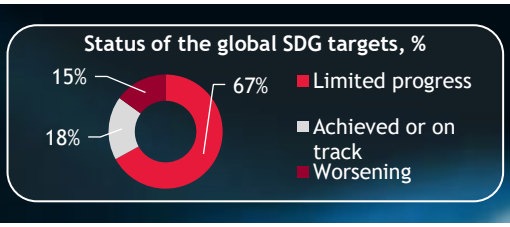
Amidst escalating global geopolitical, environmental, economic, and technological challenges, effective leadership from the public sector is vital to achieving long-term sustainability goals. In 2022, progress on the UN Sustainable Development Goals (SDGs) globally encountered significant challenges across 15 SDGs, stalling their advancement. If current trends persist, there is a looming risk **that none of the SDGs will be met worldwide by the projected target year of 2030.**

The **world is also off track** to meet the **climate goals of the Paris Agreement**, emphasising the prominence of **climate change as the most urgent** among current global challenges.

Main reasons for accelerating SDG efforts

19-23 Gt[1] CO_2	The gap in the emission reductions needed by 2030 to keep 1.5°C within reach.
10.2 Tn Euro	Climate investment gap from 2022-2050 to meet climate change, biodiversity and land-degradation goals.
71.8%	Companies worldwide experienced supply chain disruptions in 2022[2] due to geopolitical and economic challenges.
69.0%	The average annual decline in wildlife populations over the past fifty years indicates a rapid rate of biodiversity loss.

Global SDG outlook as of 2023:



Key roles of the public sector in addressing ESG

The public sector drives action on ESG through **regulatory change,** including antipollution, resource use, antidiscrimination, privacy, and labour regulations, as well as **green taxes, standards, loans and grants** for green investments.

The public sector leads by example in **setting and implementing policies on ESG,** including establishing ESG commitments and targets, **ensuring financing, and regular reporting**, alongside fostering **collaboration and developing green coalitions.**

The public sector has a significant impact on **advancing ESG goals by building sustainable supply chains and procurement**, setting an **example by reducing its own GHG emissions** and meeting agency ESG targets.

The public sector shows a sustained commitment to **addressing ESG for its employees and stakeholders** by **investing in a healthy, diverse and competitive workforce** to enhance employee attraction, retention and engagement.

National, regional, and local governments | State enterprises | Other public organisations[5]

Source: GlobeScan and The SustainAbility Institute — Sustainability Leaders Survey — [2023]; UN — Sustainable Development Report — [2023]; Oxford Business Group — Emerging Market Trends 2022 — [2023]; WWF — The living planet report — [2022]; Carbonstreaming website; Media overview
Notes: (1) Gigatonnes; (2) According to the Oxford Business Group survey conducted in December 2022; (3) Measures the progress of UN members on SDGs, scoring from 0 to 100; (4) Organisation for Economic Cooperation and Development with 38 member countries; (5) Public agencies that provide goods and services to the general public in education, health care, military, energy and water supply, law enforcement, justice, public transport and infrastructure, etc.

Artificial intelligence revolutionises ESG management and reporting efforts worldwide

As a result of **accelerating AI adoption**, **global GDP** will increase by an additional **14.5 Tn Euro in 2030**. The economic impact of AI will be driven primarily by **rising productivity** from **businesses automating processes**, as well as **augmenting labour force efficiency** with new AI technologies. Meanwhile, 45% of the total economic gains will come from **rising consumer demand** resulting from the availability of personalised and **AI-enhanced** products and services.

Organisations' sustainability efforts worldwide using AI in 2022[1], %

AI plays a transformative role in ESG management and reporting. By harnessing AI technologies, organisations can **improve their ESG performance**, **achieve sustainability** goals and **meet the growing demands** of stakeholders, regulators and investors in an increasingly ESG-conscious world. In 2022, organisations worldwide placed the **greatest emphasis on using AI to improve their environmental impact** and **measure their sustainability efforts**.

AI-driven ESG opportunities

Improve efficiency and resource optimisation

AI-powered algorithms can analyse vast datasets to identify inefficiencies in resource consumption and supply chains.

Enable renewable energy management

AI enables the seamless integration of solar, wind and other renewable sources into the overall power grid.

Mitigate climate change

AI's predictive capabilities help organisations formulate adaptive strategies and develop climate-friendly technologies.

Revolutionise ESG reporting

AI-driven data analytics improve the accuracy and efficiency of ESG metrics and reports, expanding sustainable investment opportunities.

AI-driven ESG challenges

Growing ethical and privacy concerns

Data protection standards and strong measures amidst ethical AI development practices can help in addressing these issues.

AI skills shortage

Upskilling and reskilling strategies are essential to ensure a skilled workforce that can navigate the AI-powered landscape.

Limited accessibility

Bridging the technological divide and democratising AI tools will be critical to ensuring widespread benefits.

Increasing energy consumption

Developing energy-efficient AI hardware and algorithms is critical to reducing the environmental impact of training sophisticated AI models.

Top-3 risks for adopting AI in 2022 vs 2019[1]

Cybersecurity	Regulatory compliance	Personal privacy
59%+19 p.p.	**45%**+10 p.p.	**40%**+10 p.p.

Harnessing the **transformative power of AI** while minimising its potential drawbacks can be leveraged through the **development of public-private partnerships** and **stakeholder engagement**. Governments, businesses and academia should collaborate to establish **frameworks for responsible AI adoption**, regulatory guidelines, standards and incentives to **foster innovation** while **safeguarding societal interests**. Meanwhile, stakeholder engagement, including **local communities, NGOs, and affected individuals**, is critical to understanding the nuanced impacts of AI applications.

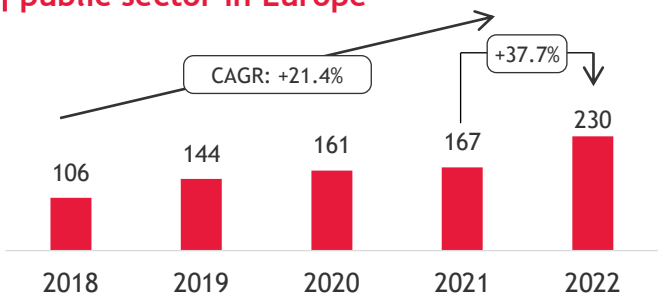
Source: DQ Institute — Digital ESG: New sustainability standards for the digital economy — [2022]; Statista website; Accenture website; Media overview
Notes: (1) According to a global McKinsey survey on AI among 1,492 participants representing the full range of regions, industries, company sizes, functional specialities and tenures in May-August 2022

The public sector plays a key role in improving AI regulations and adopting AI in its operations

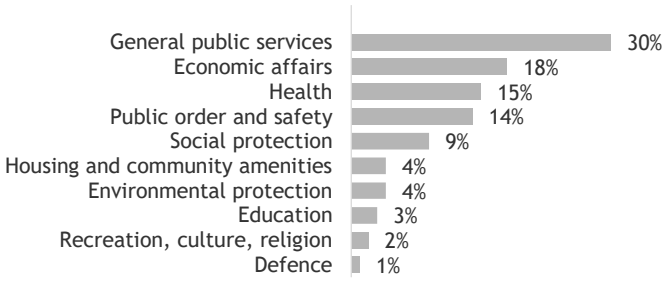
The public sector plays a crucial role in driving legislative efforts to guarantee the ethical utilisation of AI technology. In April 2021, as part of its Digital Strategy, the European Commission presented the AI Act, the world's first comprehensive AI law, and reviewed a Coordinated Plan on AI. The proposed regulation aims to develop proportionate and flexible rules to address the specific risks AI systems pose.

Meanwhile, the plan outlines the policy changes and investments needed at the Member State level to strengthen Europe's leadership in the development of sustainable, secure, and trustworthy AI. As of 2022, 24 European countries published their AI strategies. In December 2023, the proposed AI Act was approved by the European Commission becoming binding on member states.

The number of AI adopted cases in the public sector in Europe[1]



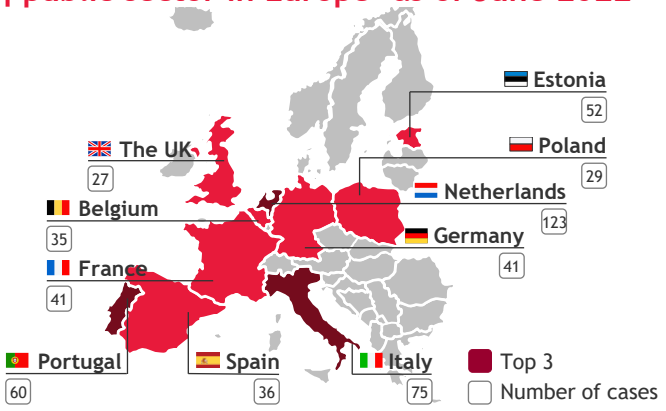
AI adopted cases by main functions of the public sector in Europe[1] in 2010-2021, %



The number of AI deployments in the public sector in Europe has shown a positive trend over the past five years and experienced significant growth in 2022, driven by rapid technological advancements, increased adoption of cloud computing and social media platforms, as well as the launch of ChatGPT. According to the European Commission report, as of June 2022, the Netherlands had the highest number of AI cases adopted in the public sector, followed by Italy and Portugal.
Looking ahead, the market size of AI in Europe is expected to grow by 17.3% annually, resulting in a market volume of 185.7 Bn Euro by 2030.

The primary public sector function in which AI initiatives have taken place over the last ten years has been general public services. Fewer AI cases focused on social protection (9%) and environmental protection (4%). The reason is that public authorities are not the primary implementing bodies in these domains and have to engage the private sector, raising security concerns.
Meanwhile, from 2010 to 2021, more than half of the AI cases (54%) were launched at the national level, followed by local (27%) and regional ones (10%). Finally, cases classified as across-countries initiatives involving multiple nations that aim to drive experimentation and the adoption of AI-based solutions accounted for 9%.

Top countries by AI adopted cases in the public sector in Europe[1] as of June 2022



Source: EU — European landscape on the use of AI by the Public Sector — [2022]; JRC Technical Report — AI for Interoperability in the European Public Sector — [2023]; DQ Institute — Digital ESG: New sustainability standards for the digital economy — [2022]; Statista website; AI4GOV website; Statista website; AI watch website; Media overview
Notes: (1) EU 27 countries, Norway, Switzerland and the UK

Global software and IT services leaders support ESG management with AI solutions

As of 2022, nearly 89% of investors worldwide consider ESG issues as part of their investment approach, encouraging companies in various industries to explore ways of improving their ESG data management and reporting processes through automation.

To meet the rising customer demand for sustainable solutions, the leading global software and IT services companies are engaged in expanding their product and service portfolios with AI-based ESG tools and services to address ESG issues.

AI-powered ESG tools[1] of Top-5 software companies worldwide by revenue in 2022

Software companies	Revenue, Bn Euro	AI-powered ESG tools
Alphabet Inc.	268.6	
Microsoft Corp.	188.0	
IBM Corp.	57.5	
Oracle Corp.	40.3	
SAP SE	30.9	

Selected types of ESG tools:

- ESG data capturing
- ESG reporting
- Disaster predictions
- Pollution control
- Energy control
- Others[3]

AI services for ESG[2] of Top-5 IT services companies worldwide by revenue in 2022

IT services companies	Revenue, Bn Euro	AI services for ESG
Accenture plc.	31.2	
TCS Ltd.	14.5	
Infosys Limited	11.1	
IBM Consulting	9.1	
Cognizant Corp.	7.5	

Selected types of ESG services:

- Support in AI adoption
- Assistance in developing AI tool
- Provision of own AI tools
- Developing strategy based on AI insights

Overview of selected AI-powered ESG tools

Microsoft Sustainability Manager
A **cloud-based solution supported by AI** allows recording the sustainability footprint of operations, identifying and analysing trends and patterns in data, and reporting ESG progress.

IBM Environmental Intelligence Suite
An **AI-powered SaaS[4] platform** for monitoring and predicting the **effect of weather and climate on companies' operations**. Clients can order a customised model of this solution.

Oracle Fusion Cloud EPM
A complex enterprise performance management cloud-based solution with an **AI-guided embedded digital assistant** that allows automatically separate ESG data for further progress reporting.

Overview of selected AI services for ESG

Accenture Sustainability service line
Accenture cooperates with technology providers, such as Microsoft and Salesforce[5], and supports customers in implementing **AI-powered ESG tools** and making decisions based on their insights.

TCS Intelligent Urban Exchange
TCS offers customers its own AI-powered analytics tool for smart cities and enterprises to **optimise their energy and water usage** and transportation activities in line with climate goals.

Cognizant Net zero pathways service line
Cognizant supports its customers in implementing AI solutions to **improve carbon, water, and biodiversity data accounting** and analyse future scenarios to enhance operations.

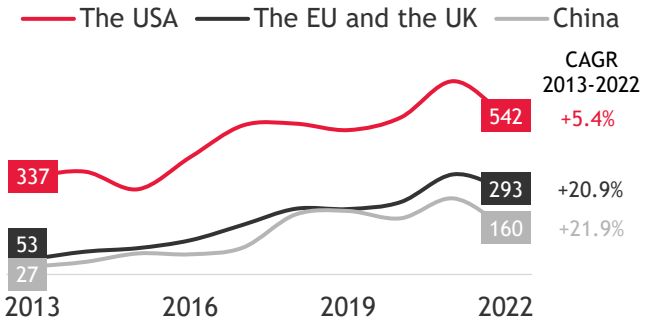
Source: Companies' websites; Capital Group — ESG Global Study 2022 — [May 2022]
Notes: (1) Based on the publicly available product portfolio of companies as of December 2023; (2) Based on publicly available service portfolio of companies as of December 2023; (3) ESG data automation solutions other than those presented in the legend, such as health & safety solutions, human rights management, etc.; (4) Software-as-a-Service; (5) The US-based provider of cloud solutions

Nearly 800 companies annually enter the global technology market with AI solutions

Beyond the endeavours of prominent corporations in developing AI-enabled ESG tools, **new AI companies are swiftly emerging annually,** contributing to this landscape. In the past decade, the USA remained the foremost region for newly-funded companies, boasting a significant concentration of highly skilled technology experts.

Smaller enterprises often specialise in delivering a **limited yet highly technological array of ESG tools, which positions them favourably for partnerships or acquisitions** by larger corporations. For example, in May 2022, Schneider Electric SE[1] acquired AutoGrid Systems, Inc.[2] to accelerate the energy transition.

Number of newly-funded AI companies by geographic area



Overview of selected AI-powered ESG tools from SMEs and start-ups[3]

Novisto ESG Software
- ESG data capturing
- Performance insights and benchmarking against comparable companies
- ESG report building

Meta, Danone, Equitable Bank

Datamaran ESG Software
- Identifies and visualises changes in ESG risks
- Provides ESG insights
- Tracks and predicts changes in ESG regulations

PepsiCo, Dell Technologies, Philips

Enablon ESG Excellence
- Automated data consistency checks
- Identifies ESG risks and opportunities
- Creates ESG reports

Pfizer, Avery Dennison, Suncor

Sustainalytics ESG risk ratings
- Measures exposure to industry-specific ESG risks
- Examines and identifies gaps in ESG risk management of companies

LGFA, Sydney Airport, Windstream

NetO platform
- Automated CO_2 emissions data collection
- Identification of carbon reduction opportunities
- CO_2 emissions reporting

Race to Zero, Fenice Bulk Monaco, Educate Online

ClimateLens Adapt
- Tracks and forecasts climate changes
- Evaluates exposure of operations to climate
- Identifies climate risks

Nuveen, Advanta, Hazera

Enevo Waste Analytics Platform
- Provides insights on waste collection needs based on sensors in containers
- Reports theft, fire, or vandalism
- Creates waste management reports for each container and waste type

Waste Solutions Canada, Duke University, Aramark

Orbital Insights GO platform
- Detects objects, identifies land use, and road traffic
- Tracks changes in real-time
- Analyses historical data

BMW Group, Jamestown

Infrastructure Management
- Detection of trees, road damages, public lighting
- Provides insights about maintenance or improvements needed to enhance safety

Straat Meubilair

Complex solutions | Environmental solutions | Social solutions | Selected disclosed customers

Source: HAI – Artificial Intelligence Index Report – [2023]; Companies' websites
Notes: (1) A French-based developer of energy management technologies; (2) The US-based developer of AI-powered software for energy optimisation; (3) Some of the SMEs and start-ups presented may have already been acquired by large companies

AI adoption has allowed the public sector to accelerate the addressing of climate issues

The City Government of Vienna
Local government, Austria

Project focus: Climate actions & community engagement **Year of launch:** 2022

In the spring of 2022, the City Government of Vienna launched the Vienna Climate Team project. In partnership with CitizenLab N.V.[1], the local government created an AI-powered platform which allows Vienna's residents to share their ideas for actions to combat climate change. In the first out of two cycles of the project, nearly 1,100 ideas were received, which will be evaluated by AI.

Expected result: implementation of 19 climate projects proposed by citizens.

Council of the Capital City of Prague
Local government, the Czech Republic

Project focus: Waste management **Year of launch:** 2021

In 2021, the local government of Prague equipped 464 recycling bins with sensors across Prague and increased their number to 1,200 in 2022. The AI-powered mobile application allows real-time data transfer from sensors and automated waste counting by type. The annual savings from smart waste management in the central district of Prague alone amount to 12.5 K Euro.

Result: higher efficiency of waste truck usage and a corresponding CO_2 reduction.

Selected cases of AI tools adoption by the Public Sector

Environmental challenges

Metro de Madrid S.A.
A municipal public transport company, Spain

Project focus: Energy efficiency **Year of launch:** 2019

In 2019, Metro de Madrid, owned by the local government of Madrid, developed and deployed an AI-based ventilation system. The AI algorithms monitor air temperature, passenger load, train frequency, and electricity prices to predict the optimal energy use by ventilation systems at each of the 301 metro stations.

Result: annual reduction of CO_2 output by 1,800 tonnes and energy costs for ventilation by 25%.

Skellefteå Kraft AB
A municipal energy company, Sweden

Project focus: Energy supply **Year of launch:** 2018

Over 2018-2022, Skellefteå Kraft AB deployed sensors and an AI-based Smart Grid Surveillance system of a Swedish electricity monitoring company, Exeri AB, to monitor a 270-kilometre electricity grid spanning the Skellefteå municipality. The AI allows the delivery of real-time data on failures received from sensors and predicts maintenance needs.

Result: optimisation of energy supply and consumption.

Source: The European Commission website; Official governments' websites; Companies' websites; Media overview
Notes: (1) Belgium developer of AI platforms for community engagement

Government bodies leverage AI capabilities to handle social and governance challenges

Vestre Viken HF
Public provider of healthcare services, Norway

Project focus: Public health **Year of launch:** 2023

In 2023, Vestre Viken HF[1] adopted the cloud-based Philips[2] AI-enabled clinical applications platform in the radiology departments. The AI-based platform assists medical practitioners in detecting patterns in X-rays, providing diagnosis, and developing reports, allowing them to accelerate workflow for bone fractures and reduce patient waiting times.

Result: potential to improve efficiency of public health services for nearly 3.8 million people.

Ministry of Justice
Central government department, the UK

Project focus: ESG data management **Year of launch:** 2021

In 2021, the UK's Ministry of Justice entered a multi-year agreement with Rio ESG Limited, the UK-based developer of AI-powered tools. Rio AI platform measures and manages sustainability data from several[3] UK government departments, provides advice on solving ESG issues, and generates sustainability reports.

Result: increasing the level of accountability and transparency of public ESG data.

Selected cases of AI tools adoption by the Public Sector

Social and Governance challenges

Ministry of Agriculture and Food
Central government department, France

Project focus: Food safety **Year of launch:** 2019

In 2019, the Ministry of Agriculture and Food in France introduced the Food AI tool[4] for use by its restaurant inspectors. The AI algorithms analyse more than 10 million comments of consumers on digital platforms, such as TripAdvisor[5] or Google, about the restaurants, predict their non-compliance with food regulations, and target the need for health inspections.

Result: ensuring higher effectiveness of health checks and food safety.

Road Traffic Safety Directorate
Central government department, Latvia

Project focus: Road safety **Year of launch:** 2016

In 2016, the Road Traffic Safety Directorate partnered with a Latvian technology company, WeAreDots, SIA., to implement the Fits.speed AI system for road safety improvement. AI algorithms within road cameras recognise car licence plates, measure traffic speeds, check road and vehicle conditions, and transfer real-time data to the public authorities.

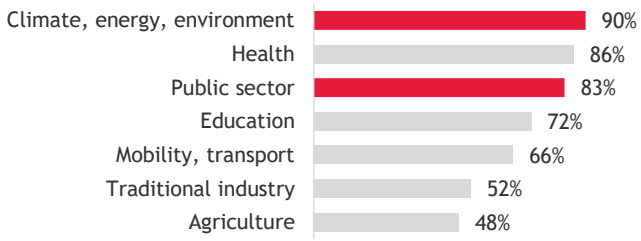
Result: drop in the number of road accidents by 47% over 2016-2018 compared to pre-AI adoption.

Source: The European Commission website; Official governments' websites; Companies' websites; Media overview
Notes: (1) Owned by the Southern and Eastern Norway Regional Health Authority in Norway; (2) Koninklijke Philips N.V. is a Dutch-based developer of electronics and medical equipment; (3) The number and names of the authorities involved are not disclosed; (4) The Ministry of Agriculture and Food did not determine the developer of the tool; (4) A website allowing to plan a future trip around the world

Tightening AI regulations of the EU will drive the increasing focus on climate in the future

On 9 December 2023, the European Parliament and the Council agreed on the comprehensive legal framework for artificial intelligence, the EU AI Act. The final version of the regulation aims to ensure that fundamental rights, democracy, the rule of law, and environmental sustainability are protected from the high risks associated with AI systems while stimulating investment and innovation in AI in Europe. The regulations describe the new obligations that will apply to both providers and deployers of in-scope AI systems that are used or produce an effect in the EU, irrespective of their place of establishment.

High-priority sectors for AI adoption in European countries[1] by 2025-2030, % of initiatives



Meanwhile, the climate and environment sector is identified as a high-priority area for AI deployment, both in the revised EU Coordinated Plan on AI and in European countries' national AI strategies.

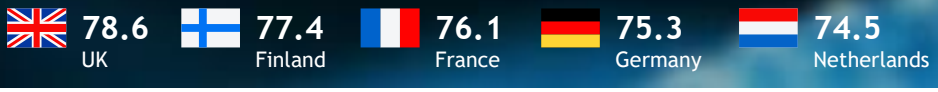
Selected AI action plans and policies in European countries[1] to implement by 2025-2030, % of countries

Fostering data & computing infrastructure	
Computing Policies	90%
Data Strategy	72%
Cloud Strategy	48%

Research and experiment abilities	
Research excellence centres	59%
Testbeds & regulatory sandboxes	48%
AI market places	28%

Ensuring trust in the AI ecosystem	
International partnerships	93%
Standardisation policy in AI	83%
AI awareness campaigns	76%

Top-5 European countries by Government AI Readiness index[3] as of 2023



To effectively address current and future challenges using AI technologies, the public sector should promote the development of data and computing infrastructure, invest in R&D and human capital, and ensure trust in the AI ecosystem. Globally, the countries with the highest government readiness to implement AI in operations and public service delivery are the USA and Singapore, followed by the UK and Finland, the leaders among all the European countries. In addressing the climate change agenda at the global and national levels, AI creates new opportunities to accelerate the progress of climate-related tasks in reporting, mitigation, adaptation, and resilience applications. Thus, by scaling currently proven applications and technology with AI, it is possible to mitigate from 5% to 10% of global greenhouse gas (GHG) emissions by 2030.

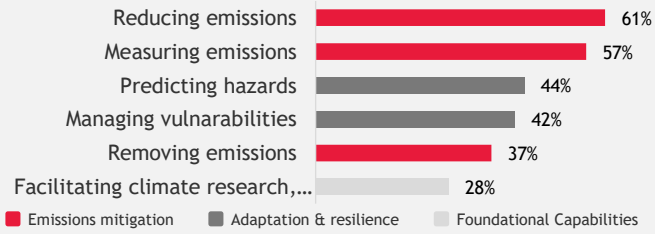
Key AI application areas to catalyse climate progress

Emissions mitigation
Assisting with the reduction and removal of emissions and the underlying measurement and reporting required to track progress

Adaptation and resilience
Helping humans, countries, regions, cities, and businesses to prepare and respond to the inevitable consequences of global warming

Foundational capabilities
Enabling climate action via improvements in climate modelling, economics, and education and accelerating breakthrough innovation

The most important areas for climate-related AI applications[2], % of respondents



Source: The European Commission — AI Watch: National Strategies on AI: A European Perspective — [2022];]; OECD iLibrary — Global trends in government innovations — [2023]; BCG — Accelerating climate action with AI — [2022]; Oxford Insights — Government AI readiness index — [2023]; The European Commission website; Media overview
Notes: (1) Within national AI policies and strategies of the EU 27 countries, Norway, and Switzerland; (2) According to Boston Consulting Group's Climate AI survey conducted in May 2022, reaching out to 1,005 global private and public sector leaders with decision-making authority on AI or climate change initiatives; (3) Measures the AI readiness across 193 governments across the world, scoring from 0 to 100

Measurement and reduction of emissions are key potential AI uses for climate goals progress

As of 2023, climate and environmental risks are the core focus of global risk perceptions over the next decade, while **failure to mitigate climate change tops the rankings** as the **most severe risk** worldwide. Moreover, just 30% of respondents[1] indicated they are effectively prepared to handle climate change while identifying **international organisations and national governments as key stakeholders** who can **effectively manage the risk**. Yet, the **public sector** can widely **implement existing AI applications to accelerate** efforts to **measure, reduce, and remove emissions** to achieve climate progress.

Mitigation & Reporting

Measurement & Monitoring[2]

Macro-level measurement

Calculating carbon footprints at the **global, regional or country level** can be used to monitor the impact of new and existing climate policies to simulate future climate scenarios

Climate Trace
The first comprehensive source-level global inventory of GHG emissions analyses data from over 300 satellites and more than 11,000 sensors to create highly granular emissions data for over 80,000 sources globally.

Micro-level measurement

Measurements of emissions at the **level of individual businesses, products or activities**, including emissions generated at **any point in the supply chain**, for monitoring and further reporting to the government if deemed necessary

CO2 AI
End-to-end carbon management software to measure, track, simulate and reduce emissions.

Dayrize
allows companies with large product ranges to quickly assess the environmental impact of consumer products.

2022

Net0 partnered with the **Swiss Federal Council and Energie Schweiz**[3] to provide **Swiss businesses** with all the support they need to ensure a **smooth transition to net zero**. Net0's AI-powered carbon management platform enables companies to accurately measure all three scopes of carbon emissions and disclose their carbon footprint through reporting standards.

Reduction & Removal

Enabling emissions reduction

Integrating renewable energy into **smart grids**, improving grid planning decisions, **better forecasting demand**, optimising the transport of goods, energy-efficient public transport

Tapestry
Creates a single virtualised view of the electricity system to lower emissions, minimise outages and integrate renewables into the grid.

Supporting nature-based & technological removal

Assessing carbon stocks, **carbon-capture storage sites, monitoring the level of carbon sequestration achieved in an ecosystem**, enabling public and private sector representatives to make informed decisions about land management, reforestation efforts and technology-based removal

Albo Climate
AI and satellite technology to map, measure, and monitor carbon sequestration.

Single.Earth
Uses methods based on AI to evaluate and quantify forest health.

2023

Google Research announced a new partnership with **EUROCONTROL's air traffic control centre**[4] to provide aircraft flying through its airspace with information on how to **avoid producing contrails**. AI solutions developed by Google Research in collaboration with Breakthrough Energy[5] have **enabled airline pilots in trial studies to reduce contrails by up to 54%.**

Selected existing AI solutions

Selected public sector's AI partnerships

Source: World Economic Forum — Global Risks Report — [2023]; BCG — Accelerating Climate Action with AI — [2023]; Global partnership on AI report — Climate change and AI: Recommendations for government actions — [2021]; Companies' websites; Media overview
Notes: (1) World Economic Forum Global Risks Perception Survey conducted in September-October 2022, reaching out to 1,200 experts across academia, business, government, the international community and civil society; (2) Monitoring is included in climate reporting; (3) Energy Department of Switzerland; (4) The air traffic control centre manages the airspace over Belgium, the Netherlands, Luxembourg and northwest Germany, one of the busiest airspaces in the world; (5) The group of organisations founded by Bill Gates in 2015 to accelerate innovation in sustainable energy

The public sector has to redouble efforts in adapting to climate change by leveraging AI

As global surface temperatures rise, the frequency of **extreme weather events,** such as heat waves, heavy rainfall, droughts and severe storms, is **increasing**. In addition to the enormous environmental impacts of climate change, the **adverse economic effects are also growing**. According to the World Meteorological Organisation, in the last decade, financial losses due to weather, climate and water extremes rose to nearly 1.4 Tn Euro compared to 170.3 Bn Euro in the 1970s. In light of this, **government and business leaders must redouble their efforts to adapt to climate change**. AI can make a significant difference in both hazard prediction and vulnerability management.

Adaptation & resilience

Hazard prediction

Building early warning systems

Predicting **near-term extreme events** such as flooding, cyclones, heatwaves, heavy precipitation, droughts, and severe storms to **minimise property damage** and give governments and people time to prepare

Flood Hub (Google Flood Hub)
Powered by AI models, Flood Hub aims to predict when and where riverine flooding will occur to promptly warn governments, organisations, and the people. As of 2023, Flood Hub covers more than 80 countries, providing forecasts up to seven days in advance.

Projecting long-term trends

Modelling localised sea-level rise and drought frequency, assessing their implications for local communities on economic development, infrastructure, agricultural and fishing output, developing resilient strategies

Jupiter Climate Score Global (JUPITER)
Provides both portfolio-level analyses of climate risk and very high-resolution assessments of the risk to specific neighbourhoods, buildings, and assets from flooding, heat, wind and fire to local, regional, and national government agencies for emergency response planning and resilience engineering.

UNOSAT 2022

The United Nations Satellite Centre (UNOSAT) Rapid Mapping Service **provides satellite image analysis during humanitarian emergencies**. The UNOSAT FloodAI pipeline uses fully convolutional neural networks to **predict flooded regions** automatically. FloodAI is already deployed in Bangladesh, Cambodia, Mozambique, Myanmar, Nepal, Thailand, and Vietnam.

Vulnerability management

Responding to crises

Monitoring of **epidemics, droughts and the spread of wildfires** to optimise the use of personnel and resources, improve situational awareness and decision-making in crisis situations

Wildfire Boundaries Tracker (Google)
Uses satellite imagery and machine learning to track wildfires and inform affected communities.

ArcGIS (esri UK)
Offers location intelligence and Geographic Information System software for better decision-making.

Building resilient infrastructure & protecting biodiversity

Intelligent irrigation, monitoring of endangered species, predicting large-scale migration patterns to **help local governments model vulnerabilities** and prioritise resilience-building investments

ARUP Neuron (ARUP)
Smart building optimisation tools help save 10-30% of the energy used in a commercial building using AI-based Building Information Modelling.

InFraRed
Deep learning models to predict simulation results, reducing the time and cost of running environmental simulations.

UNHCR 2022

UN Refugee Agency (UNHCR) partnered with **Omdena**, a global crowdsourced community of AI experts, to develop **machine learning models that can predict areas for intervention** based on identified conflict combined with drought and agricultural production metrics. The insights from these models enable UNHCR to optimise the deployment of its staff and resources.

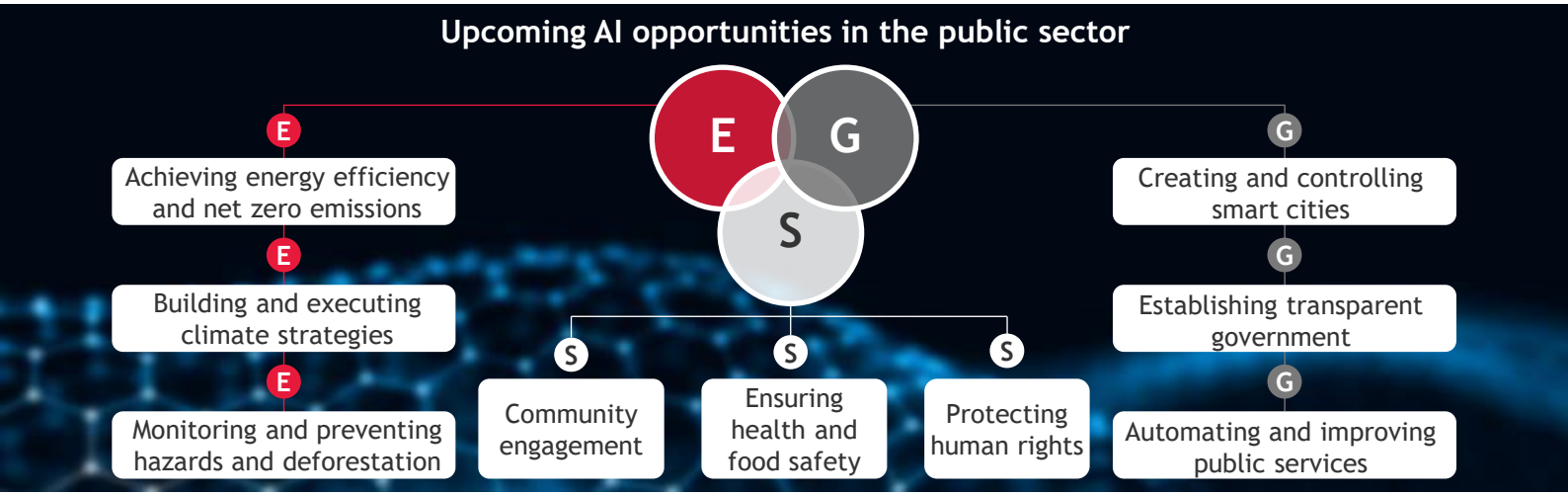
Selected existing AI solutions

Selected public sector's AI partnerships

Source: BCG — Accelerating Climate Action with AI — [2023]; Global partnership on AI report — Climate change and AI: Recommendations for government actions — [2021]; WMO website; Companies' websites; Media overview

Consulting firms can assist the public sector in successfully harnessing AI potential in ESG

AI technologies can fundamentally change and facilitate the public sector's path to solving ESG issues. However, their successful implementation requires an adequate assessment of the application possibilities and deployment strategies. Thus, according to the survey[1], approximately 77% of respondents across various industries worldwide received ESG and sustainability consulting services from consulting firms over 2020-2022 in choosing the proper technologies, conducting risk assessments, developing strategies, etc.



ESG consulting services ordered by the public sector, by domain, share of respondents[1] around the globe in 2022

Service domains	Public sector	Total average[2]
Reducing environmental impact	63%	39%
Investing in technology for ESG	38%	42%
Measuring and reporting environmental impact	38%	36%
Devising a circular economy strategy	38%	34%
Climate risk assessment	23%	34%
Developing more sustainable services	23%	32%
Using green technologies	13%	33%

X% Higher than total average X% Lower than total average

How have consulting companies already supported the public sector across the Nordics countries?

Nordic Innovation
Organisation of the Nordic Council of Ministers[3]

Creation of a roadmap for smart government to ensure real-time data sharing.

Project period: 2016-2024

Finnish Immigration Service
A central government body, Finland

Creation of an AI-powered communication channel for immigrants, enabling the Service to increase the answer rate by 75%.

Project launch: 2018

Roskilde municipality
A local government, Denmark

Development of an AI platform that allows local authorities to respond to 92% of citizen requests in real time.

Project disclosure: 2023

Source: Source Information Services Limited — The Sustainability Consulting Market in 2022 — [December 2022]; Nordic Innovation website; boost.AI website
Notes: (1) The survey of a Finland-based company, Source Information Services Limited, 'The Sustainability Consulting Market in 2022' launched in December 2022; (2) Average across surveyed industries: energy, manufacturing, healthcare, media and telecom, financial services, pharma, retail, services, and public sector; (3) Official body for intergovernmental cooperation between Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland

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