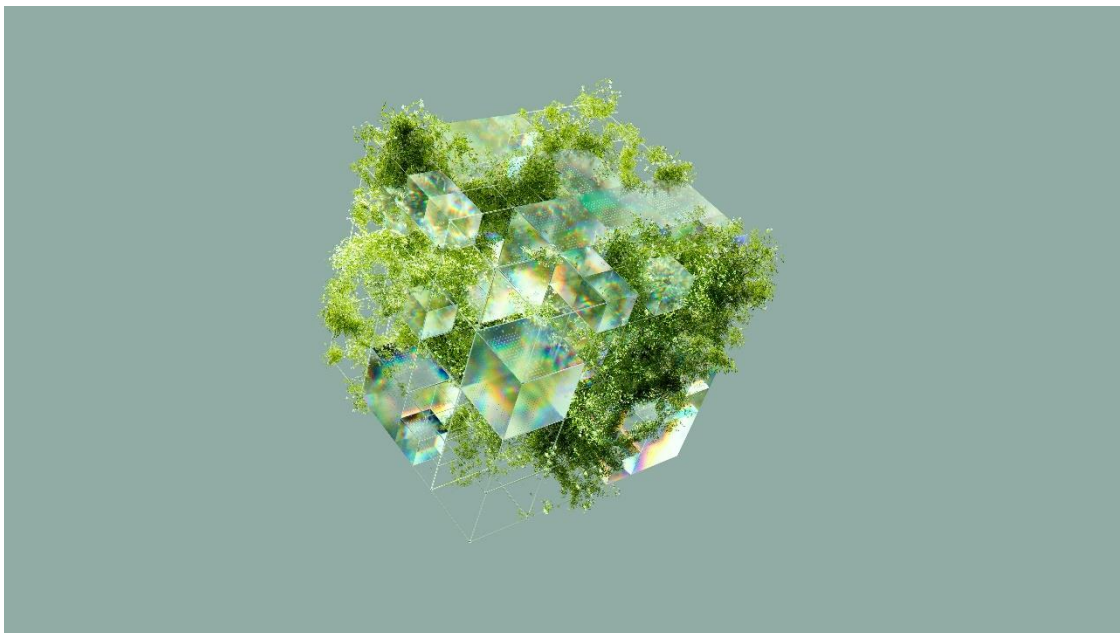


Will Artificial Intelligence Rescue Climate Emergency?

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At **Change NOW 2024**, which brought together the actors of **sustainable change** and **innovations for the planet** in Paris last March, HEC, as official academic partner¹ reaffirmed its commitment to preparing the leaders of today and tomorrow for their responsibilities in a dizzying world in the grip of an **unprecedented** societal and environmental **revolution**.

Artificial Intelligences [“AI”] recently awarded at the 2024 Nobel Prizes² should play a crucial role in meeting **sustainable ambitions by 2030** in a context of **state of emergency** where **pressure on States is growing** and by reconciling the **heavenly promises** AI announces with **the original**, even “**capital**”, **sins** that it also carries in germ... to envisage **positive perspectives**.



¹ [HEC Paris at Change Now 2024: Academics, Businesses and Entrepreneurs Join Forces to Build Solutions | HEC Paris](#)

² Nobel physics prize 2024 won by AI pioneers John Hopfield and Geoffrey Hinton for discoveries and inventions in machine learning and artificial neuronal networks [Press release: The Nobel Prize in Physics 2024 - NobelPrize.org](#) . Nobel chemistry prize 2024 won by David Baker, Demis Hassabis and John Jumper for work on proteins in connexion with an AI mode AlphaFold2 [Press release: The Nobel Prize in Chemistry 2024 - NobelPrize.org](#)

▪ **Ambitions for sustainability towards 2030**

In September 2015, the United Nations General Assembly adopted **17 Sustainable Development Goals**³ ("SDGs") aimed at transforming our world to promote **prosperity** while protecting **planet** and **people**.

This was a new cry of alarm addressed to all countries to respond urgently, concerted and responsibly to the excesses caused by economic growth, the effects of which have been devastating since the Second World War in terms of widening inequalities, accelerating pollution and wasting natural resources.

The 193 signatory States have thus committed to signing an **Agenda for 2030** to reconcile economic development and environmental preservation for present and future generations, in the wake of the concept of "sustainable development" born from the Brundtland Report⁴ and widely disseminated at the 1992 Rio Earth Summit.

It is obvious that not achieving the objective of **Combating Climate Change** through the reduction of greenhouse gas emissions (*Goal 13*) jeopardizes all the objectives of the 2030 Agenda and thus Life and Prosperity on our Planet.

▪ **A state of emergency**

What is the outcome after almost 10 years?

In a context of **intertwined crises** combining economic recession, climate change, the collapse of biodiversity, the stalemate of high-risk wars in Ukraine and Gaza, after a Covid-19 pandemic whose effects persist, it is clear that the "SDGs" progress is considered weak and insufficient with an **alarming situation on the environmental** level in view of the increase in greenhouse gas emissions, temperature spikes, heat waves, floods, droughts and wildfires, rising sea levels threatening hundreds of millions of people, colossal plastic pollution with 17 million metric tons on track to double or even triple by 2040 ...⁵

The financial abyss also threatens many countries facing a myriad of challenges, with the annual financing gap for the SDGs increasing from **\$2.5 trillion** before the Covid pandemic to around **\$4.2 trillion** today.

The 28th United Nations Climate Change Conference "**COP 28**" in Dubai from November 30 to December 12, 2023, in a climate of controversy related to its organization by a "petromonarchy", certainly reaffirmed the objective of **limiting global warming to 1.5°** as well as that of a **tripling of renewable energy capacity** on a global scale and a

³ Sustainable Development Goals (SDGs) [Sustainable Development Goals: 17 goals to transform our world | United Nations](#)

⁴ Brundtland Report published in 1987 by the World Commission on Environment and Development set up by the United Nations in 1983 [The Brundtland Report available in French \(adequations.org\)](#)

⁵ High-Level Political Forum on the SDGs from 10 to 19 July 2023 in New York

doubling of the global average annual rate of improvement in energy efficiency by 2030, **but** COP 28 also favored a **gradual transition** and not an exit towards the abandonment of fossil fuels and a **gradual reduction** in the use of coal.

However, time is sorely lacking. There are now less than ten years left for the 193 Member States of the United Nations to achieve the 17 "SDGs" and avoid ending up, as Antonio Guterres, the UN Secretary-General, reminds us, in a fragmented two-speed world where some 660 million people will remain without electricity, nearly 2 billion will continue to depend on polluting fuels and technologies.

Transformative and accelerated action is needed and requires a **reform of the international financial architecture** to ensure sustainable financing for all countries, particularly those in the South. ⁶

▪ **Growing pressure on governments**

In this context, the pressure on States is growing as governments are not acting quickly enough to adapt⁷ and as demonstrated by the proliferation of **procedures for climate inaction** which, although symbolic, are manifesting themselves all over the world⁸ by gradually creating a case law and a standard of reference.

From this point of view, the decision handed down by the **European Court of Human Rights** ("ECHR") on 13 April 2024⁹ marks a **historic milestone** because it is the first time that the ECHR has condemned a State for its lack of initiatives in the fight against global warming.

Even though it condemns Switzerland, the scope of this binding condemnation is "**universal**" as François Gemenne reminds us¹⁰, recognizing that climate change does indeed represent a **threat to human rights** and that it is **the responsibility of States to fight climate change** without being able to offload it onto companies or citizens.

▪ **The « Promised Land » of Artificial Intelligence**

Faced with the climate emergency, Artificial Intelligences capable of creating computer systems to solve complex problems by imitating human intelligence "seem" to be our allies in confronting these colossal challenges with the hope of meeting them.

⁶ SDG Summit 18-19 September 2023 in New York

⁷ Boston Consulting Group, The cost of climate inaction can spur collective action, Sylvain Santamarta and Annika Zawadzki, September 09 2024 [Cost of Climate Inaction Can Spur Collective Action | BCG](#)

⁸ In the United States alone, at the federal level, there are 1349 ongoing lawsuits for climate inaction.

⁹ ECHR Senior Climate Association vs Swiss Confederation 13/04/2024

¹⁰ Political scientist, researcher, lecturer at the Institut d'études politiques de Paris, HEC Paris and director of the Hugo Observatory dedicated to migration, President of the Foundation for Nature and Mankind [Switzerland condemned for climate inaction: for François Gemenne, "the Court reminds all countries of their responsibilities" \(francetvinfo.fr\)](#)

As Claire Monteloni¹¹, a pioneer in **climate computing** with Gavin Schmidt, a leading climate scientist at NASA,¹² reminds us, climate science is one of the fields of **Big Data** and "**machine learning**" is the key to learning from this colossal set of data from multiple sources, weather stations, radars, atmospheric balloons and satellites with various dates.

However, **Big Data** and **Machine Learning** mean **Artificial Intelligence**, or rather Artificial Intelligences, among which Generative AI is making a sensational breakthrough.

There are many use cases that are still being developed: improving weather forecasts, predicting the path of hurricanes, guiding public authorities' decision-making with a view to developing new strategies for adapting to climate change.

AI also has an increasing role to play in optimizing **systems**, such as freight transportation, food refrigeration, building heating and cooling. But also, in the field of **predictive maintenance** to detect and plug methane leaks in natural gas infrastructure before they get worse, preventing methane from escaping into the atmosphere.

In the field of **cities**, AI can help with **energy renovation** but also with the **construction** of ultra-modern cities, such as *Net City*, an ecological and car-free city announced in 2020 by the Chinese behemoth Tencent, or the 500 other smart cities being created in China.

At the **industrial** level, the use of AI makes it possible to improve production conditions by acting on the **choice of less polluting materials** or by shortening and greening supply chains.

In the **agricultural** sector, AIs can participate in the **agroecological transition** through so-called precision agriculture that can address various use cases, such as the spraying of pesticides¹³ or estimating the carbon trajectory of a farm¹⁴.

AIs can also enable better **resource management** by making wastewater treatment or waste recycling smarter.

In summary, the **range of possibilities** offered by Artificial Intelligence is **infinite**, provided that the risks are measured and supervised.

¹¹ Claire Monteloni, researcher at the Inria Centre in Paris [AI to fight climate change and promote environmental sustainability | Inria](#)

¹² CIDU 2010 Data Intelligent Understanding Conference [CIDU_Proceedings.pdf \(nasa.gov\)](#); International Conference on Climate Informatics (2011)

¹³ Rippa robot powered by solar energy and equipped with a hyperspectral camera to target areas in which pesticide applications need to be carried out [RIPPA The Farm Robot Exterminates Pests And Weeds \(youtube.com\)](#)

¹⁴ MyEasyCarbon [Solutions Sustainable and Regenerative Agriculture - RegAg - MyEasyCarbon](#)

▪ **The capital sins of Artificial Intelligence**

Despite these promising perspectives the question of the compatibility of Artificial Intelligence with the fight against climate emergency is on the table in view of its "original" or even "capital sins".

I will mention only four of them ...

Sin n°1: Gluttony

As of today AI and generative AI in particular are very **energy-intensive**¹⁵ **throughout their life cycle**, from the **manufacture** of their electronic components involving the extraction of rare metals used in processes and electronic chips, their **hosting** in *data centers* which, as a reminder, are the largest consumers of electricity in the world, training and **exploitation** of their algorithmic models, managing **e-waste** and **recycling** their components.

If until now the carbon footprint of AI has remained low,¹⁶ it will mechanically increase as Artificial Intelligence spreads in response to phenomenal market demand forecasts and it is necessary to **measure** and **monitor its impact in complete transparency**.

The global artificial intelligence market grew beyond **184 billion US dollars in 2024**, a considerable jump of \$50 billion compared to 2023. This staggering growth is expected to continue with the market racing past **\$826 billion in 2030**¹⁷.

Moreover, since the release of Open AI's ChatGPT generative AI tool in November 2022, **generative AI** has become the **key driver of growth and innovation**. With a generalist vocation, generative AIs will be able to be infused in **all sectors** and respond to an incalculable number of use cases.

The estimated average annual growth rate of the generative AI market is around 24% per year with a global turnover of **\$200 billion** and **700 million users** by 2030.¹⁸

Sin n°2: Greed

The prospects of a **colossal market** for Artificial Intelligence by **2030** suggest that AIs will not devote themselves exclusively to rescuing the climate emergency, as the temptation is great to engage in extremely lucrative projects with radically opposed interests.

¹⁵ The Growing Energy Footprint of AI, Joule Review, October 2023

¹⁶ In 2019, the global information and communication technology sector accounted for 1% to 2% of greenhouse gas emissions, and AI was responsible for only a small fraction of these emissions.

¹⁷ Statista 2024 [Global AI market size 2030 | Statista](#)

¹⁸ <https://fr.statista.com/infographie/amp/30941/evolution-taille-du-marche-ia-generative-et-parts-de-marche-principaux-acteurs/>

Artificial Intelligence, for example, is also being used to **accelerate the exploration and extraction of oil and gas** in a way that is expected to generate \$400 billion in profits for the oil and gas industry by 2025, to **stimulate consumption** through targeted advertising, and to **develop autonomous** vehicles who "support individualized transit as opposed to multimodal transit."¹⁹

Sin n°3: Pride

Artificial Intelligences have superpowers and thus can be subject to **a kind of hubris** and **"hallucinate"** sometimes. Their algorithmic models can make them inaccurate or wrong. The consequences could then be catastrophic in terms of economic and human costs, especially when these errors and inaccuracies concern infrastructure such as electricity grids or public safety, for example.

Sin n°4 : Lust

In a fragmented AI market²⁰ **Big Techs** are key players ²¹ and each is undertaking **pharaonic investment plans in the field of Artificial Intelligence**. **Google** recently announced investments of more than **\$100 billion**, **Microsoft**, **\$10 billion** as part of its multi-year partnership with Open AI and **\$50 billion to finance the construction of data centers** dedicated to AI...In September Blackrock announced the launch of one **\$30 billion investment** fund with Microsoft and Sam Altman the boss of OpenAI announced planning to raise **\$7 trillion** for semiconductor factories...

▪ **Perspectives**

At this stage, the **Combination of Human & Artificial Intelligence** and the **Transformation towards a more sustainable world** capable of resisting the climate emergency and all its excesses are two **sides of the same coin** that we are still far from having won. The SDGs have set the course to address climate emergencies and to be able to transform our world in a responsible, humanistic, equitable and united way.

It is certain that AI should help us in this. However, the rules of the game remain to be clearly defined, both individually and collectively, to specify and guarantee them through **environmental** and **ethical** regulations, **responsible consumption behaviors**, **research** and **innovation** to build **green AI sustainable by design**, a **financial** and **fiscal system** that places **sustainability** and **shared value**²² at its core, as well as a solid **techno-political governance**²³.

¹⁹ Fighting climate change with machine learning, 24 octobre 2023, Dylan Walsh [Lutter contre le changement climatique grâce à l'apprentissage automatique | MIT Sloan](#)

²⁰ [Mapping: who are the players in the AI market in 2024? \(blogdumoderateur.com\)](#)

²¹ [Artificial Intelligence: Statistics and Key Figures \(2024\) \(sales-hacking.com\)](#)

²² Michael Porter, Mark Kramer, Harvard Business School, 2011

²³ Asma Mhalla, Technopolitique, Editions du Seuil, 02/2024