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Glimpses from the Future

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The Largest Gathering of Futurists Hosted by the Dubai Future Foundation at the Museum of the Future

19 – 20 November 2024
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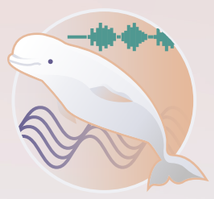
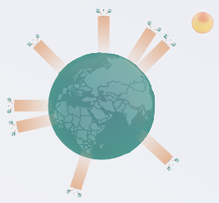
The previous two editions provided us with significant insights on these four topics:

1. Feeding the Planet



2. The Unexpected Uses of AI

3. Biohacking Your Health



4. Harnessing the Sun

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Glimpses from the Future Series

Feeding the Planet

The growing global population and pressure on planetary resources threaten global food security. Reducing emissions and ensuring food safety and security are crucial, meaning tomorrow's food may look vastly different from today's.

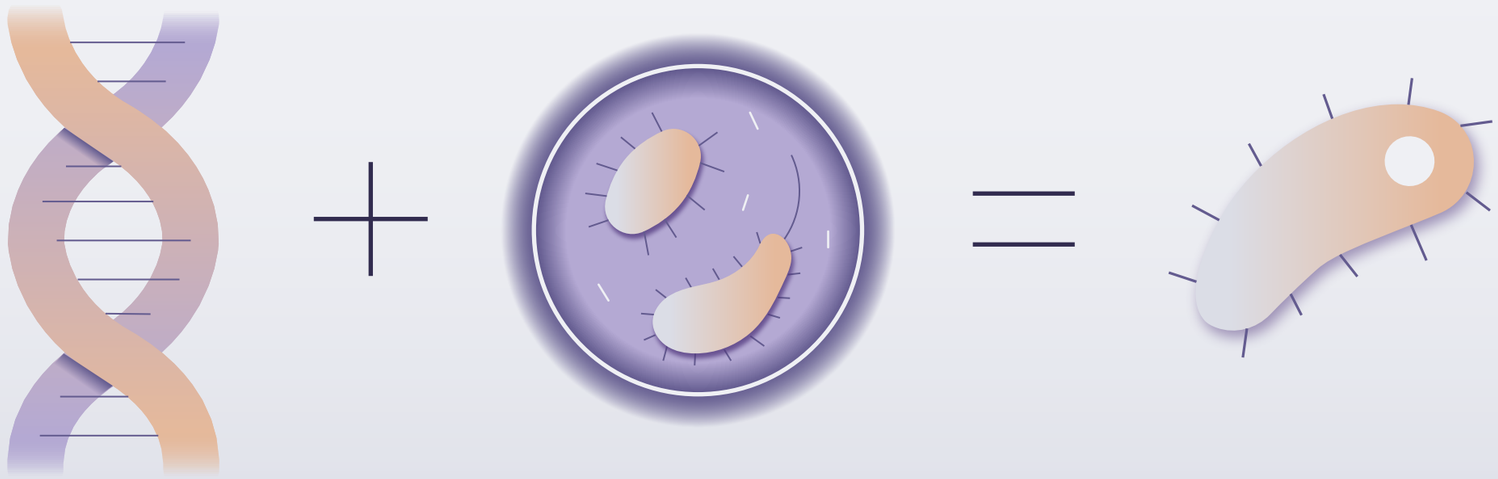
Tomorrow's Food Sources Need to be Diversified

Synthetic biology processes like precision fermentation are crucial in reducing the overall environmental impact of food production.

Precision Fermentation Process

01

Creation of dairy-producing microbes.



Dairy genes

Host microorganisms (e.g. yeast)

Dairy-producing microbes

02

Fermentation of dairy-producing microbes results in new dairy proteins.

Dairy-producing microbes

Feedstock (sugar)

Fermentation

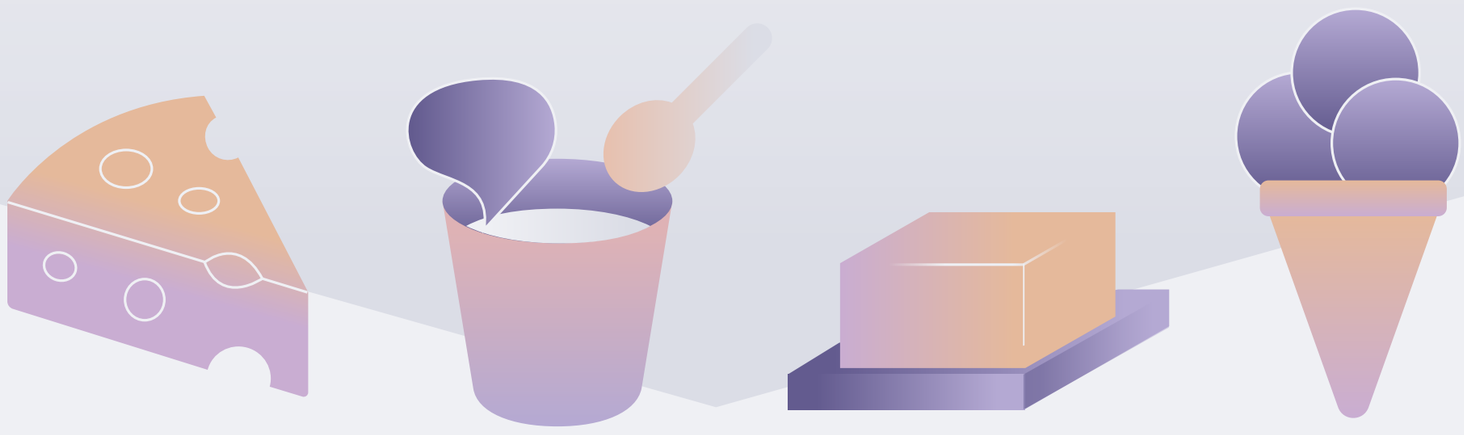
03

New dairy proteins can be used to create common milk products.

Dairy proteins

Fats

Plant-based ingredients



Cheese

Yogurt

Butter

Ice cream

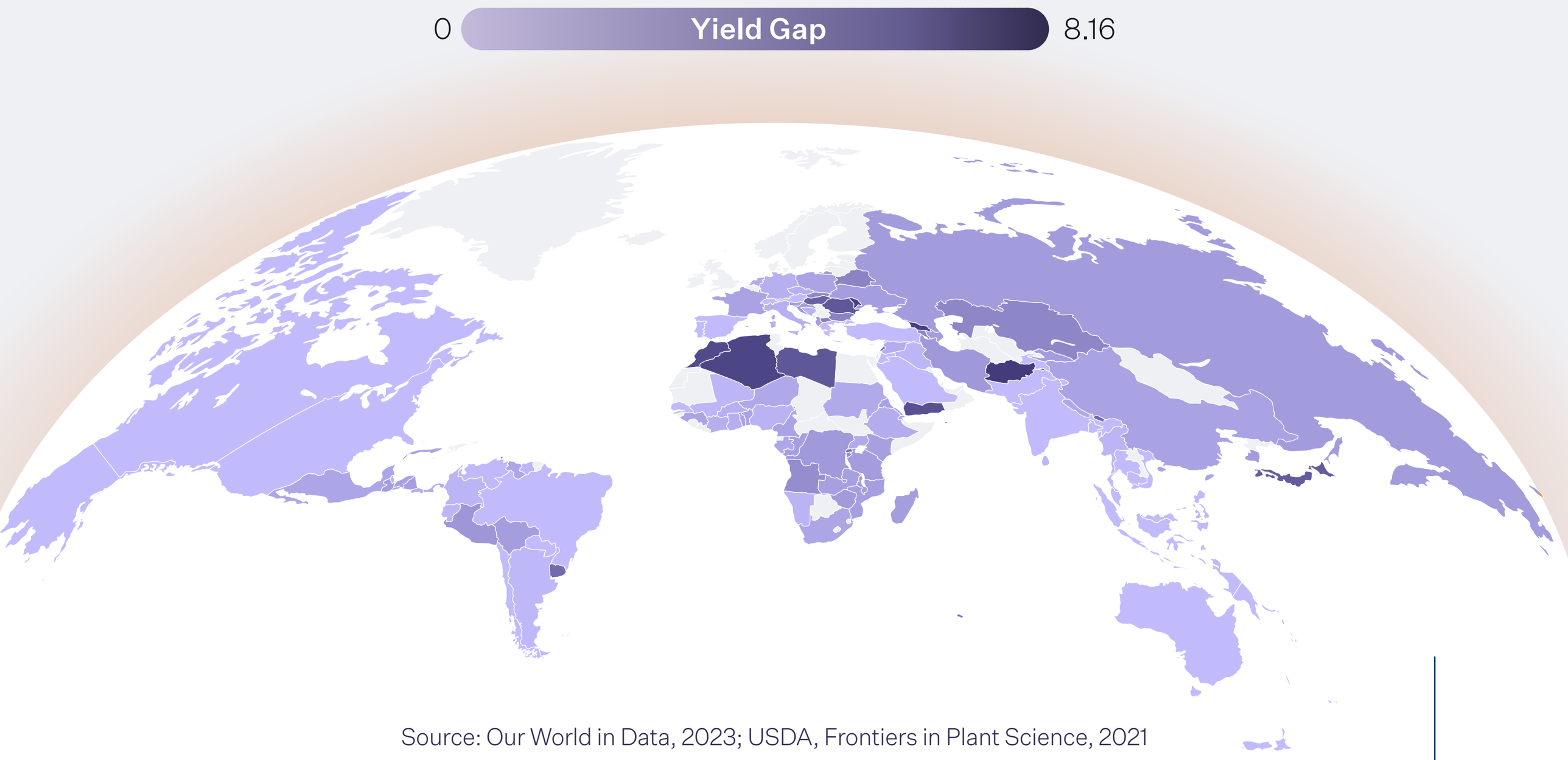
Source: Change Foods via Dubai Future Forum, 2021

Tomorrow's Food Needs to Be Resilient

In 2022, global corn production was 1.1 metric tons per hectare less than expected due to climate change and other environmental factors.

But some countries were impacted more than others:

Global Corn Yield Gap 2023, metric tons per hectare



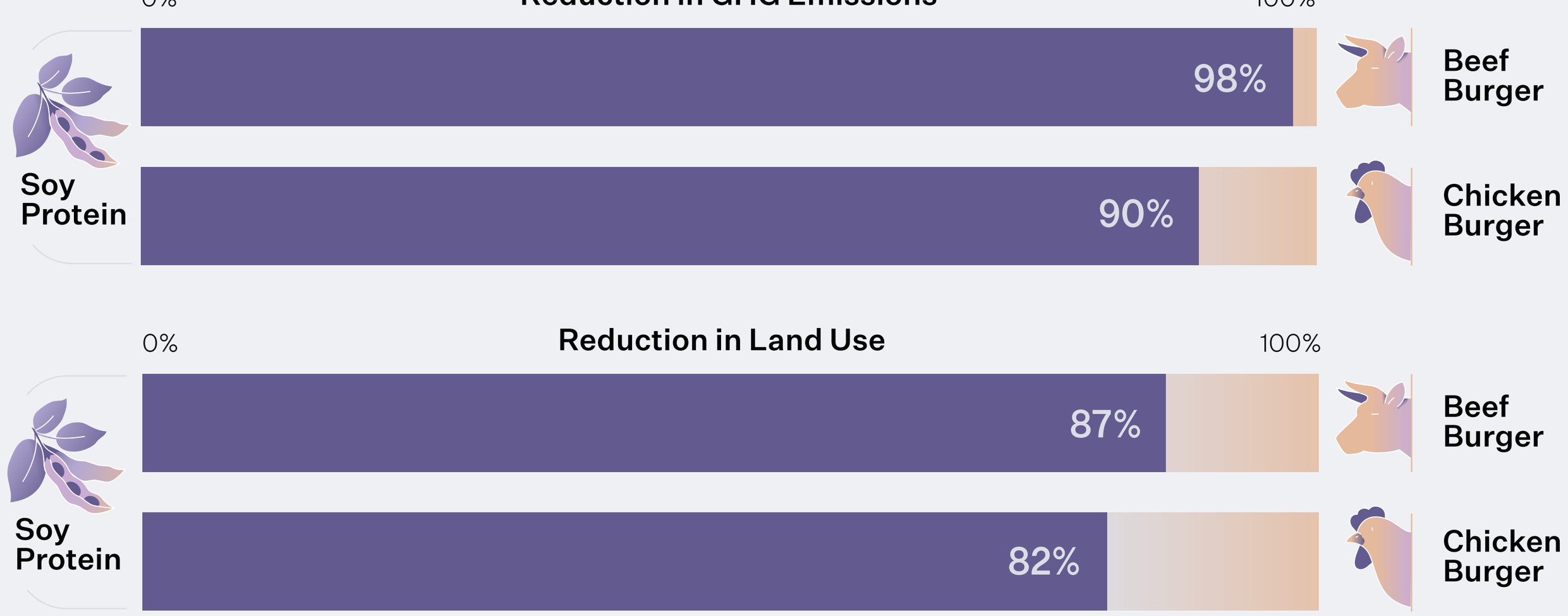
Source: Our World in Data, 2023; USDA, Frontiers in Plant Science, 2021

Improving crop resilience is critical for food security. By diversifying crops and using carbon capture techniques, farms can enhance crop yields and while reducing their carbon footprint.

Tomorrow's Food Needs to Be Sustainable

Switching from livestock to plant-based proteins reduces land use, freshwater use, and GHG emissions.

Plant-Based Soy Protein vs Livestock



Source: Good Food Institute, 2023

The challenges presented by climate change have hurt food production. However, through advances in synthetic biology and sustainability practices, tomorrow's food could differ significantly from today's.

Expand the conversation around the future of food and the connection between food systems and planetary health at the following session at the Dubai Future Forum 2024:

Earth's Checkup:

How Can We Connect Our Well Being to That of the Planet?

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The Unexpected Uses of AI

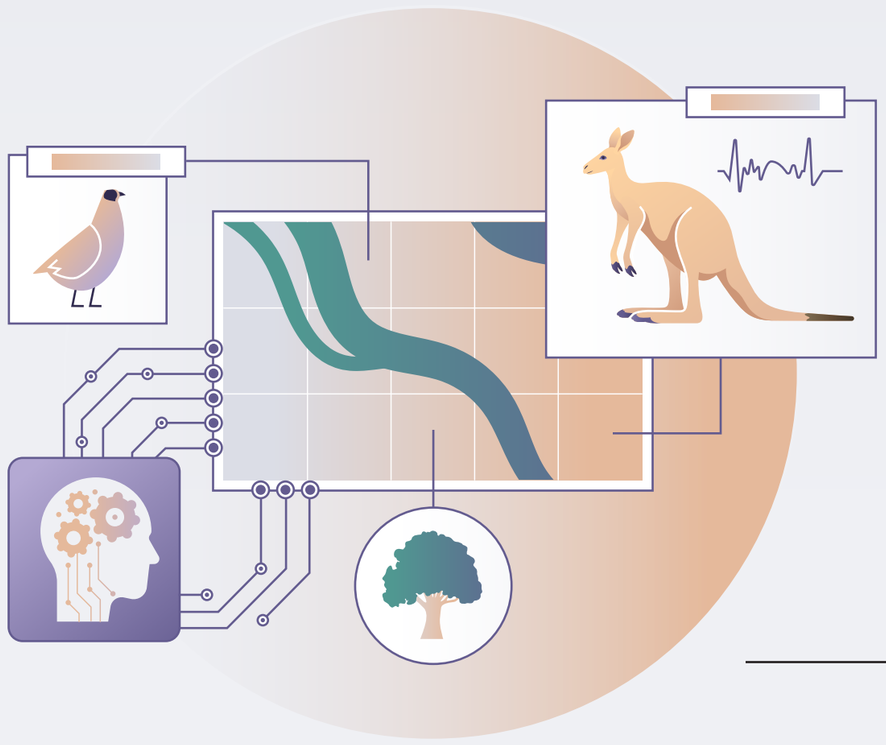
The discussion around AI has often revolved around its economic impact.

We are just beginning to uncover the immense possibilities of AI—what we see now is just the tip of the iceberg.

AI as an Advisor to Mother Nature

Conservation organizations and research teams worldwide are using AI models to predict wildlife movements, aid in disaster recovery efforts, and even help understand how wildlife communicates.

AI Use	AI In Action
Sustainable Beekeeping	Safe, eco-friendly beehives made from modern materials use AI to regulate temperature and detect parasites, reducing bee mortality by up to 80% compared to standard hives.

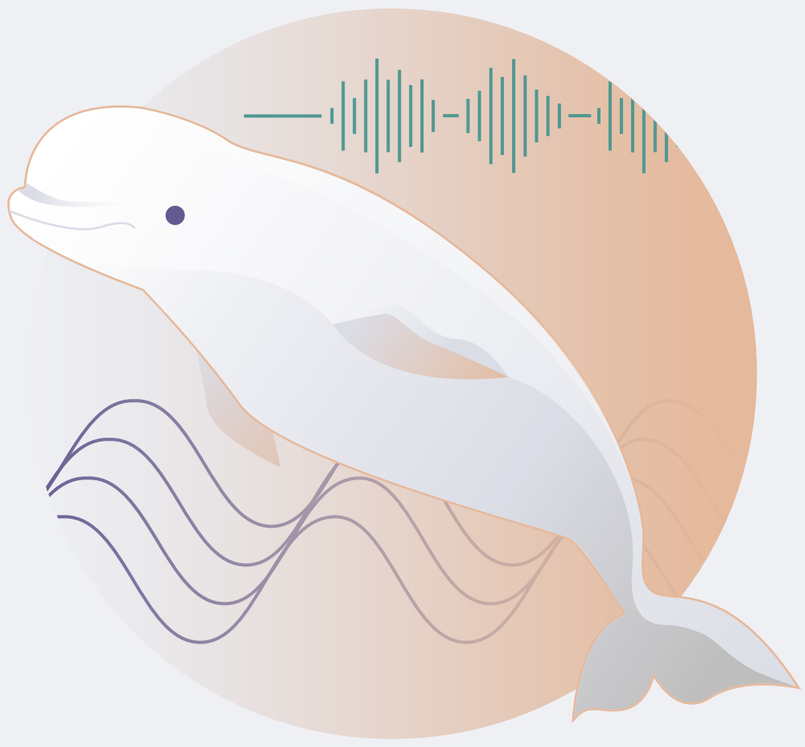


Wildlife Monitoring

After the 2020 Australian wildfires caused incredible harm to wildlife, an AI developed by the WWF and Google evaluated 7 million images in weeks, helping to guide the environmental recovery.

Understanding Animals

The Earth Species Project uses AI to analyze bioacoustics and behavioral ecology to try and study animals' complex communication patterns.

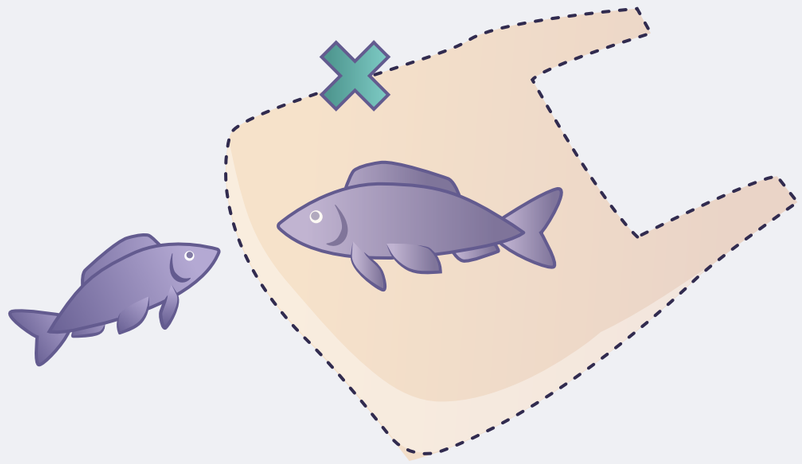


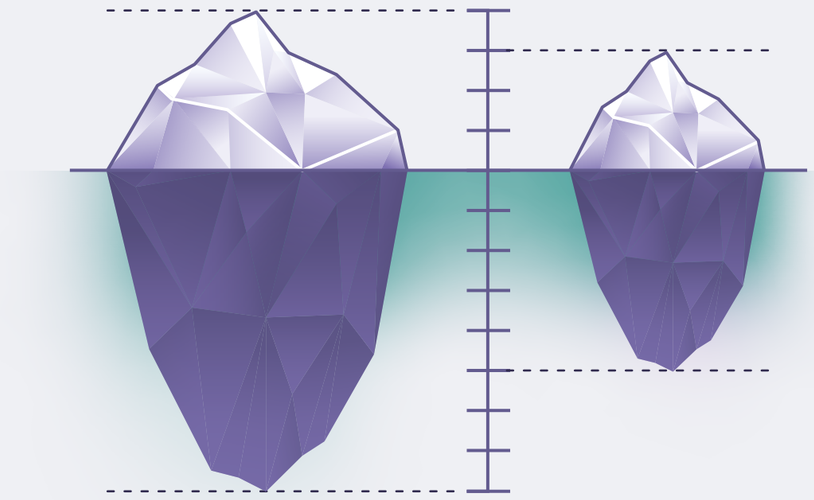
Sources: Arm; WWF; EarthSpecies.org

AI as a Tool for Sustainability

The computing potential of AI can be used to make the world a greener and better place.

AI Use	AI In Action
Removing Waste from the Ocean	AI developed by the Ocean Cleanup has contributed to removing **16 million KG** of waste from oceans and rivers by analyzing images to find waste.
Improving Recycling	Greyparrot used AI to monitor **32 billion waste items** across 67 categories in 2022, and identified 86 metric tons of waste that could otherwise be recycled.
Monitoring Environmental Changes	The U-net AI analyzed satellite imagery to map changes in iceberg sizes **10,000 times** faster than any human.

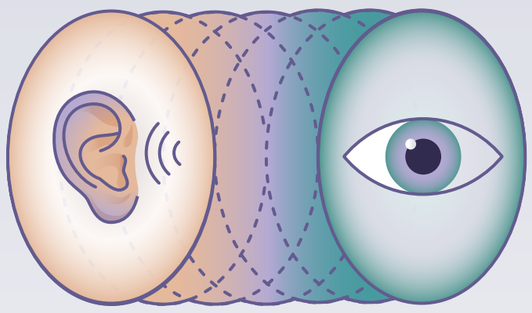
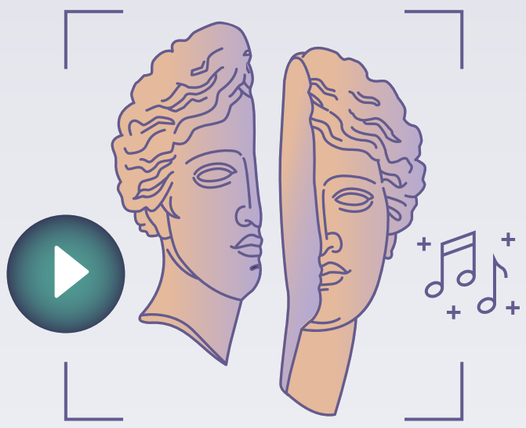
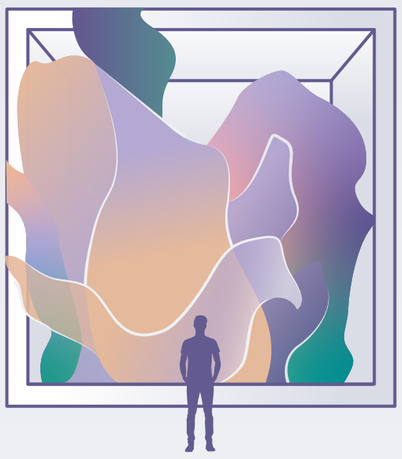




Sources: The Ocean Cleanup; Greyparrot via World Economic Forum; European Space Agency

AI as an Instrument for Art

By working with AI, artists can enhance their creative processes, bringing new and unique works of art to life.

	Creating Multi-sensory Experiences	Exploring New Media	Living Art
AI In Action			
	Sheen, an art group based in Berlin, uses neural networks to merge audio and visual information, creating unique art experiences in real-time.	AI programs allow artists to work in any medium, turn a painting into an animation, generate accompanying music, or even turn their ideas into tangible objects using 3D printing.	Artist Refik Anadol's first major solo LA exhibition featured dynamic paintings that use publicly available data to create abstract works of art.

Source: Sheen-ai, 2024; L.A. Times, 2023

Advancements in AI have given us new, unexpected perspectives on our natural world, and this is only the beginning.

Learn more about the potential of AI to transform our perceptions and interactions with our fellow inhabitants on Earth at the following session at the Dubai Future Forum 2024:

Nature Talks Back:

How Can AI Facilitate the Dialogue with Humans?

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Glimpses from the Future Series

Biohacking Your Health with Epigenetics

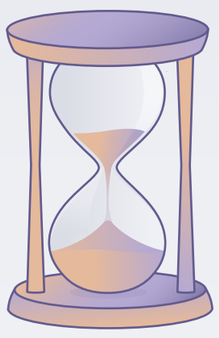
Healthy genes are essential to the body's overall well-being. However, a person's experiences and environment can change how our bodies read, or express, our DNA, with significant consequences for our health.

By optimizing environmental factors, a person can hack their genes and improve their health; this is called **epigenetics**.

How Epigenetics Works

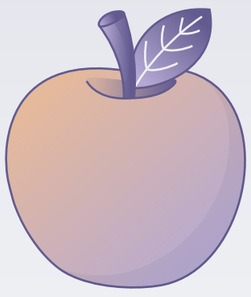
External Factor

Time



As we age, changes in chromatin structure can occur, which may alter how our body reads and expresses our DNA.

Diet



A poor diet can change how our bodies read and express our DNA, increasing the chance of disease.

Smoking Cigarettes

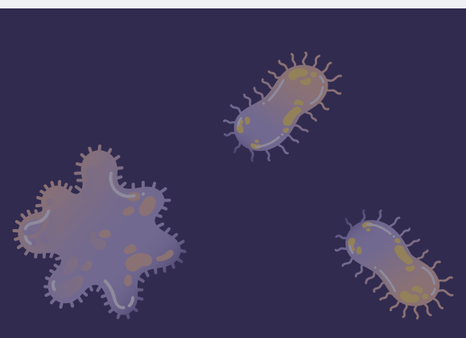
While smoking does cause epigenetic changes, scientists have noted that quitting smoking can reverse these changes.

Stress

Stress can impact the body in various ways, altering how our DNA is expressed.

Causes

Changes That Affect the Way Your Genes Work



Resulting in

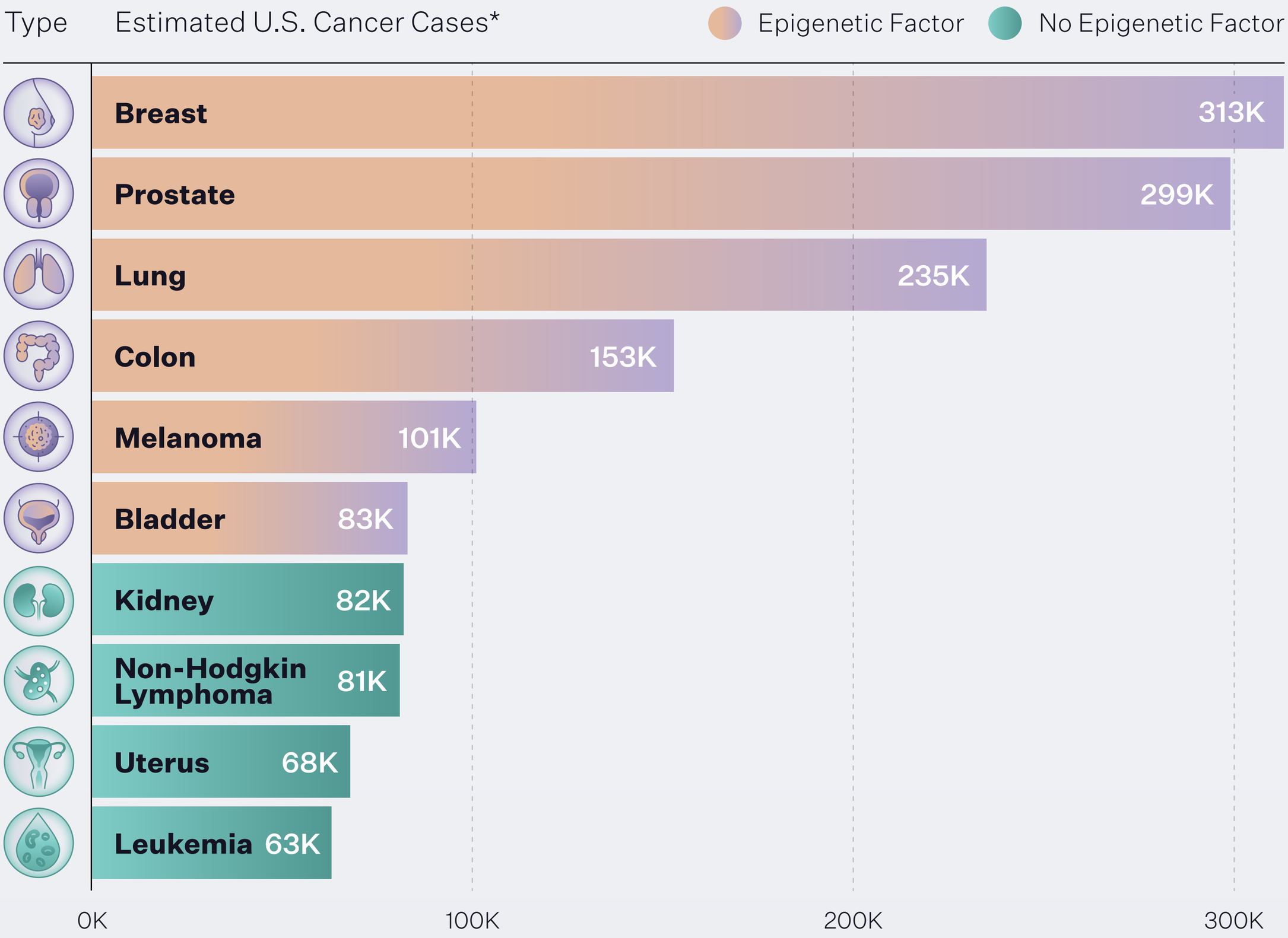
Consequences to a Person's Health

Source: U.S. National Library of Medicine; Lorenzo et al. via Science Direct; Translational Psychiatry

Scientists have linked epigenetic factors to many mental conditions, patterns of addiction, and cancers.

Prevalence of Epigenetic Diseases

When the way our bodies read DNA is changed, it can increase the likelihood of contracting diseases, and is particularly true for cancers, many of which have an epigenetic component.

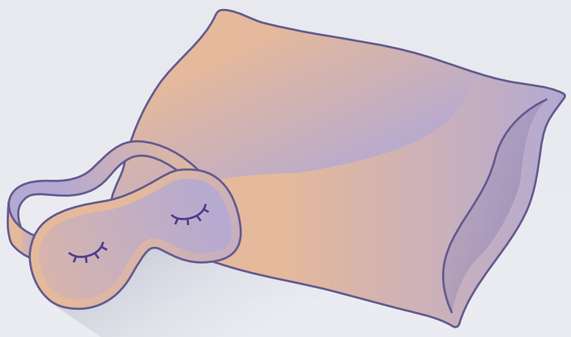
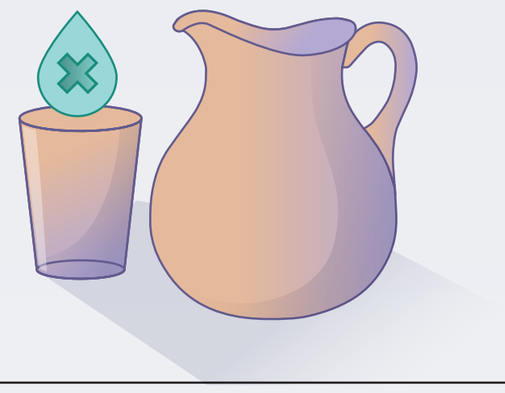


*Note: The list is not exhaustive. Figures are rounded. Sources: U.S. National Cancer Institute; U.S. National Library of Medicine

While external factors can negatively impact epigenetics, they can also help optimize health.

Promoting Your Health Using Epigenetics

A healthy lifestyle ensures that the right genes are switched on, at the right time, which can significantly reduce disease risk. It enables our bodies to create disease-resistant cells, suppress tumors, and more.

Epigenetic Factor	Solution	
Exercise	Physical exercise triggers changes in how our DNA is read, improving functional capacity, resiliency, and health.	
Sleep		Sleep is a fundamental part of a healthy lifestyle and plays a critical role in gene expression in our bodies.
Hydration	Consistently staying hydrated can promote positive epigenetic changes, supporting overall health and reducing disease risk.	
Diet		Studies have shown that certain foods, such as tea, soy, herbs, garlic, and vegetables like cabbage or broccoli, can switch on the genes that suppress tumors.

Sources: U.S. National Library of Medicine; Rupa Health

Understanding epigenetics empowers everyone to make better lifestyle choices and improve mental and physical health.

Weigh in on the solutions that the field of epigenetics offers at the following session at Dubai Future Forum 2024:

Epigenetic Editing:
What Can It Achieve?

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Glimpses from the Future Series

Harnessing the Sun

The Potential of Beaming Solar Power from Space

The Sun is a 1.4 million km ball of fusion that releases the energy equivalent of **4 million tonnes of matter** every second. However, only a tiny fraction of the Sun's energy can be harnessed on land compared to what could be collected from space.

So, how much of the Sun's energy could humanity use?

Did you know that the Sun radiates 4 x 10^{26} Watts of energy every second—Over 5.5 trillion times what humanity consumed in 2023?

Sources: Big Think, 2024; Statistical Review of World Energy, 2024

Earth's Energy Budget

16%
Absorbed by Atmosphere

6%
Reflected by Atmosphere

3%
Absorbed by Clouds

20%
Reflected by Clouds

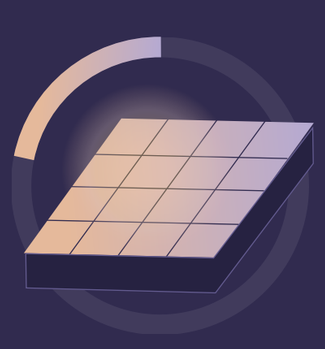
51%
Absorbed by Land and Oceans

4%
Reflected by Earth's Surface

Only 51% of Earth's energy budget from the Sun reaches its surface, and even less is harvested by current solar technology.

Source: NASA GPM via UCAR, 2024

Global Solar Energy Capacity*



Monocrystalline solar panels are known for their efficiency, but they only convert 20% of the light that hits the panel to energy.

Source: Forbes, 2023

*Figures rounded to the nearest whole number. Source: IEA, 2023

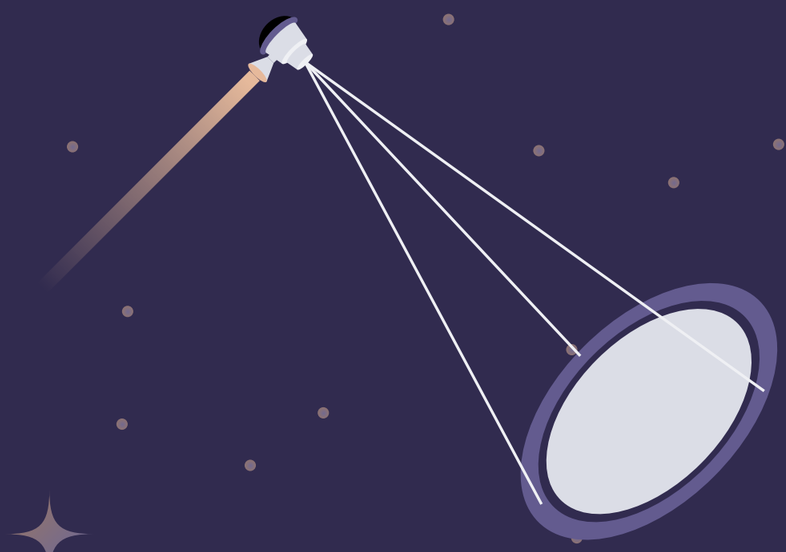
Solar energy plays a pivotal role in the transition towards net zero. However, satellites could supply vast amounts of clean energy and avoid obstacles associated with land-based solar power.

What are Space Solar Satellites?

Space solar satellites collect energy similarly to land-based solar energy systems, but they sit in orbit where weather conditions and the time of day don't hamper their ability to gather energy.

Laser Satellites

Groups of satellites beam energy to collecting stations on Earth using lasers.



Deployment Altitude

400 KM

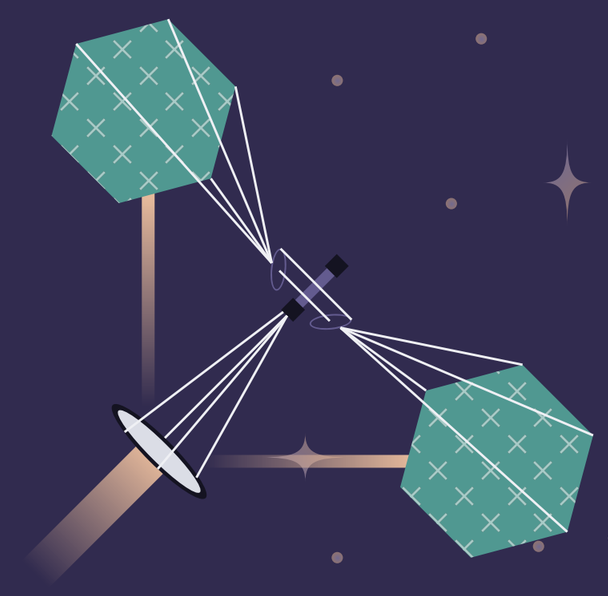
Energy Collection (per satellite)

1-10 MW

Source: Energy.gov, 2024

Microwave Solar Satellite

Light is reflected in the center of the satellite, which is converted to microwaves and beamed to earth.



Deployment Altitude

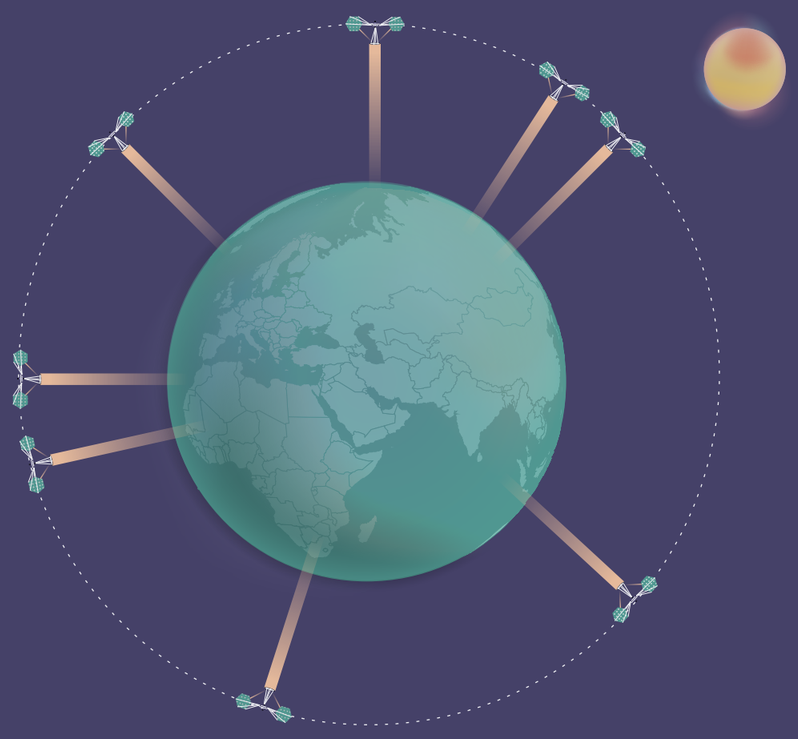
35,000 KM

Energy Collection (per satellite)

1 GW+

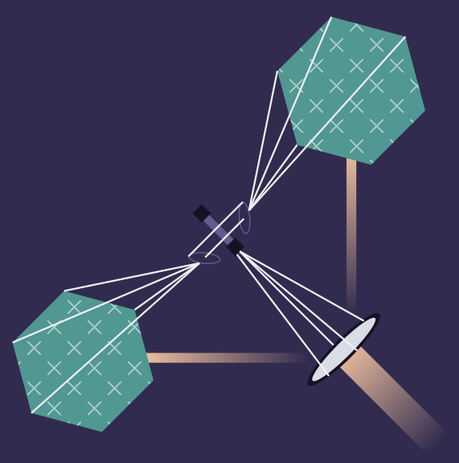
Spurred on by the need for clean energy, in 2023, scientists achieved the first successful wireless transmission of solar power from space to Earth.

Source: Space.com, 2023



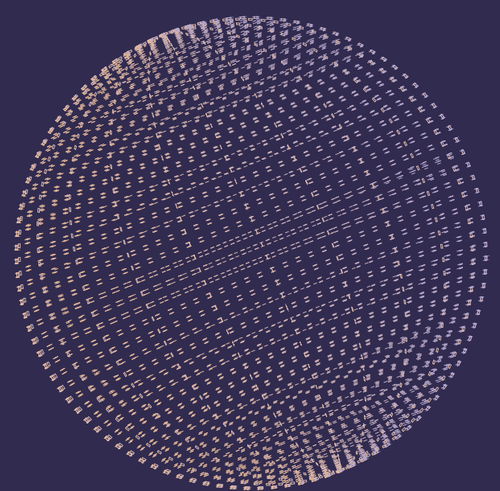
Current Space Solar Projects

CASSIOPeiA



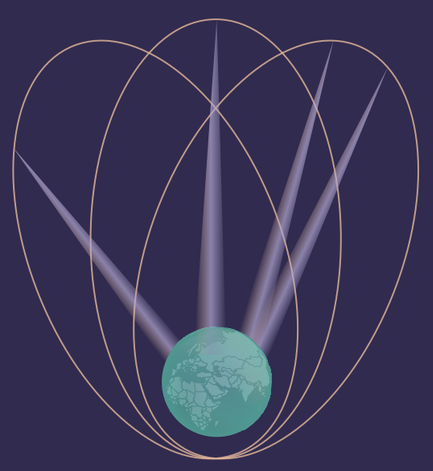
SPACE SOLAR

Innovative Heliostat Swarm Concept



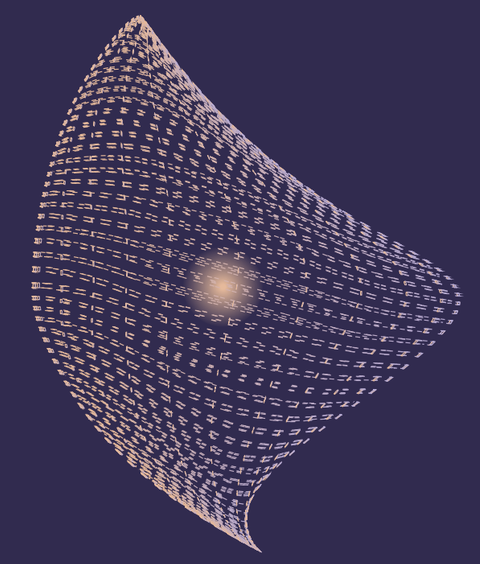
NASA

Space-Based Solar Energy



VIRTUS SOLIS x ORBITAL

SOLARIS



esa SPACE SOLUTIONS

Sources: Gizmondo, 2023, NASA, 2024, Space.com, 2024, ESA, 2022

By maximizing the potential of the Sun's energy budget, space solar power collection could help us achieve a green and sustainable future and provide near-limitless power for all.

Sign up now for a chance to join the session and dive deeper into this topic at the 2024 Edition.

Join Us at the Session

Deflecting the Sun:

Is Geoengineering the Solution to Climate Change?

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