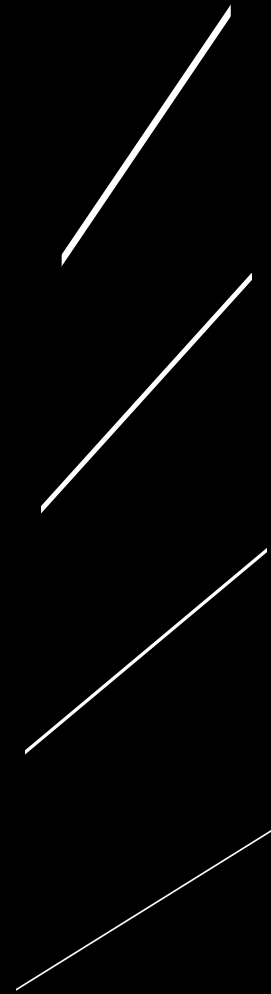


Enterprise climate resiliency and decarbonization

IBM **Research**



IBM's commitments on climate action



IBM Announces It Will
Achieve Net Zero
Greenhouse Gas
Emissions by 2030
February 2021

IBM Commitments :

IBM will also procure
75% of the electricity it consumes
worldwide from **renewable sources by
2025**, and **90% by 2030**.



IBM is one of 53
companies joining The
Climate Pledge, a
commitment to reduce
carbon emissions
February 2021

IBM will reduce its GHG emissions
65% by 2025
against base year 2010



IBM Joins the MIT
Climate and
Sustainability
Consortium
January 2021

- 1 Collaboration on projects between 13 member companies and MIT
- 2 Road mapping and identification of acceleration opportunities
- 3 Thought leadership

Enterprises are strongly communicating their commitments on climate action



2012
Carbon Neutral
(Offsets)

2025
100% renewable
energy operations

2050
Carbon Invisible
(Offsets)

**\$1B Climate
Venture Fund**

Microsoft wants to eradicate its carbon footprint by going emissions 'negative' by 2030



1998
Carbon Neutral
(Offsets)

2017
100% renewable
energy operation

2030
Carbon free
operation

**Climate Fund
and Incubator**



Offer 1 billion people new ways to take actions to reduce their environmental footprint by 2022

Help over 500 cities to reduce 1 gigaton of carbon emissions annually by 2030



2025
100% renewable
energy operations

2030
50% of shipments
will be net-zero

2040
Carbon Neutral
(Offsets)

**\$2B Climate
Venture Fund**

Amazon to share its carbon footprint for 1st time as part of new 'Shipment Zero' sustainability initiative

BY NAT LEVY on February 18, 2019 at 10:14 am



Factors that are accelerating climate action by Enterprises

Investor pressure

Blackrock Doubles Down On Climate Pressure In The Midst Of Global Crisis

Climate Changed

Large Exxon Shareholder Starts Divesting Over Climate Change

Bloomberg

Exxon Directors Face Shareholder Revolt Over Climate Change

Bloomberg

Tesla's Sustainability Cred Is Being Challenged With Shareholder Proposals at Annual Meeting

BARRON'S

Shareholder climate rebellions surge despite coronavirus crisis

Investors pile pressure on companies including JPMorgan and Rio Tinto over global warming

FINANCIAL TIMES

Consumer pressure

40%

Purpose-driven consumers who seek products and services aligned with their values.

57%

Consumers willing to change purchasing habits to help reduce negative environmental impact.

75%

Consumers across generations state sustainability as a very important attribute (Gen Z, Millennials, Gen X, and Boomers)

Policy landscape

A European Green Deal

Striving to be the first climate-neutral continent

Ratified by EU parliament, Jan. 2020
Investment: €260B (2030), €1T (2050)

China's new climate pledge could cut emissions everywhere else too

Xi Jinping has announced the country's goal of going carbon neutral by 2060, but China's manufacturing heft will mean other nations will reap benefits too

WIREID

**THE BIDEN PLAN FOR A
CLEAN ENERGY
REVOLUTION AND
ENVIRONMENTAL
JUSTICE**

**BIDEN
HARRIS**

Patterns in business drivers and technology needs for enterprises

Carbon accounting and reduction technologies
to support reporting and performance metrics

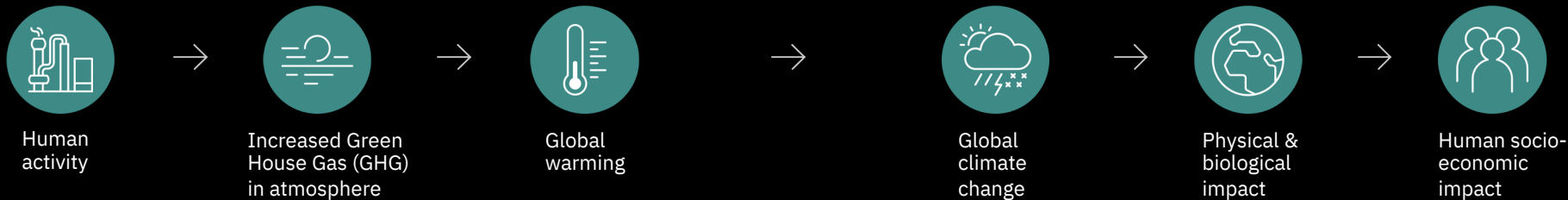
Climate risk and impact modeling and predictions technologies across all timescales

Client Examples	Business Imperative	Business Drivers
	Sustainability Strategy	- Adapt and respond to a fast-changing climate action related regulatory, investment, and consumer landscape - Evolve toward efforts to decarbonize the energy ecosystem, and pivot to new market opportunities
	Emissions Reduction Resilient infrastructure and intelligent operations	- Facilitate low-carbon transition and electrification efforts; develop climate resilient energy infrastructure - Manage physical risk to infrastructure and enterprise assets; inform planning and operations including renewable integration
	Climate Risk Management	- Identify, quantify, and monitor risks in investment portfolio (physical, transition, and regulatory compliance risks) - Drive climate informed capital management with carbon reduction and climate resiliency
	Sustainable Supply Chains	- Ensure supply chains and infrastructure are resilient to climate change by helping prepare for extreme event disruptions - Identify emission hotspots across supply chains; drive decarbonization efforts and demonstrate compliance

Unified Data and AI technologies and platforms for climate and sustainability data curation, ingestion and management

Integration into **enterprise process offerings** for decision making (e.g., in asset management, supply chain, infrastructure operations)

Global effort on wide array of technology innovations



Mitigation

Direct carbon capture technologies

Materials / Processes for fertilizers

Materials for carbon capture & conversion

Climate-smart supply chains and GHG optimization

Green IT/Cloud, IT Optimization

Trusted carbon accounting platforms

Food waste reduction platforms

Decision platforms for agriculture

Geo-engineering

Building emission optimization

And many more...

Renewable energy forecasting

Adaptation

Climatic extremes forecasting and impact modelling

IOT and drones for environmental monitoring

Lightweight earth observation systems

AI enabled climate risk and impact prediction

Biodiversity, ecology, and land cover mapping

Air quality management platforms

Decision platforms for disaster recovery

And many more...

Future of Climate

A set of focused initiatives in IBM Research



Sustainable hybrid cloud

A hybrid cloud in which we measure, visualize, and optimize carbon footprint at all levels.

Enabling innovations:

- Carbon-aware controllers
- Green datacenter designs
- Transformation tools & services



AI for Enterprise carbon performance

Account for, monitor, and help enterprises and supply chains reduce emissions

Enabling innovations:

- Carbon Accounting Engine
- Hotspot identification and reduction
- AI, Optimization, and Blockchain use cases



AI for Climate risk and impact

AI to improve climate predictions and identify events, impacts and risks that matter

Enabling innovations:

- Regional Climate Predictions
- Impact Modeling Framework
- Spatio-temporal risk models, analytics, and insights



Accelerated discovery of materials for CCUS

Efficient materials intelligently designed to capture and separate CO2 at point sources

Enabling innovations:

- Materials knowledge ingestion, augmentation
- Accelerated materials discovery
- Cloud-based autonomous lab

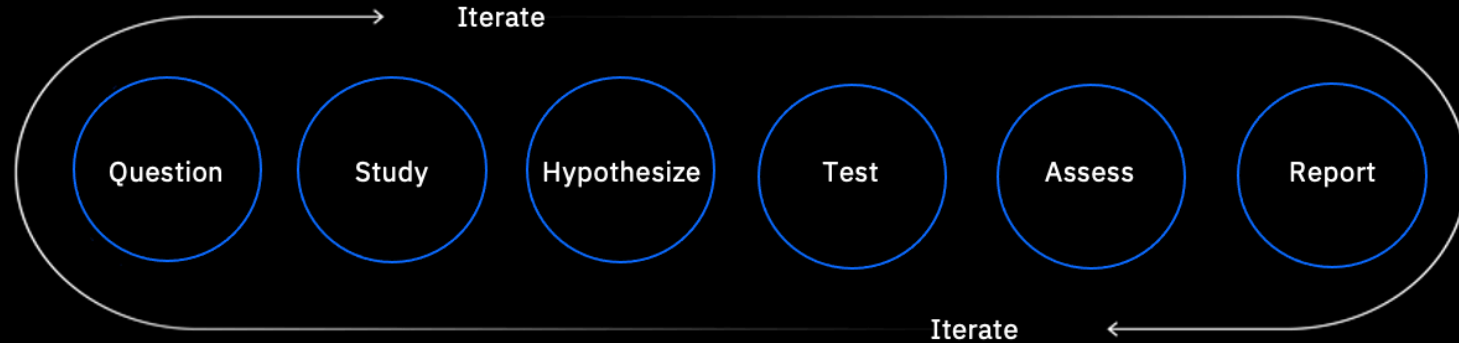
Beyond CCUS – new sustainable materials and process are needed to achieve global decarbonization goals



It typically takes roughly
10 years and upwards of
\$10 - \$100 million to
discover one new material.

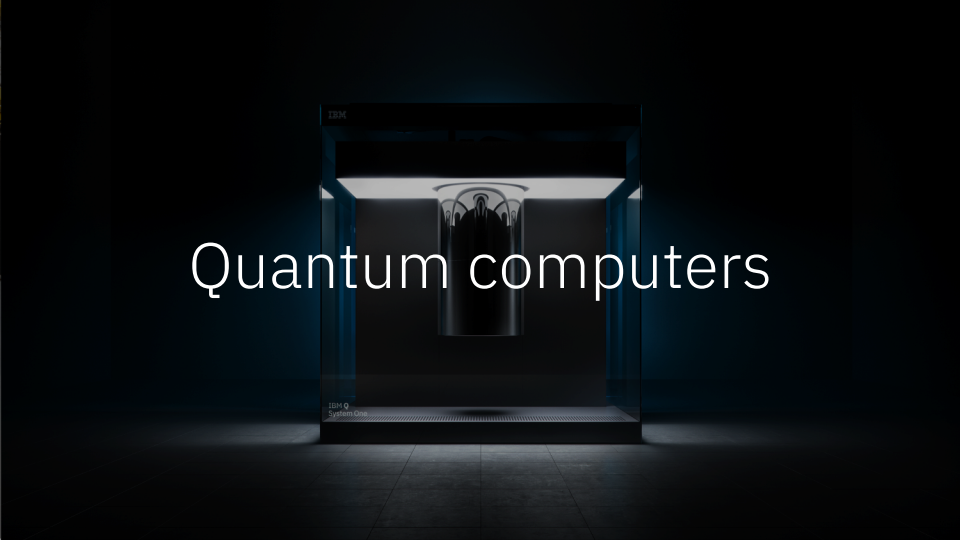
We aim to cut down both years
and cost by 90%

The scientific method has served society well...

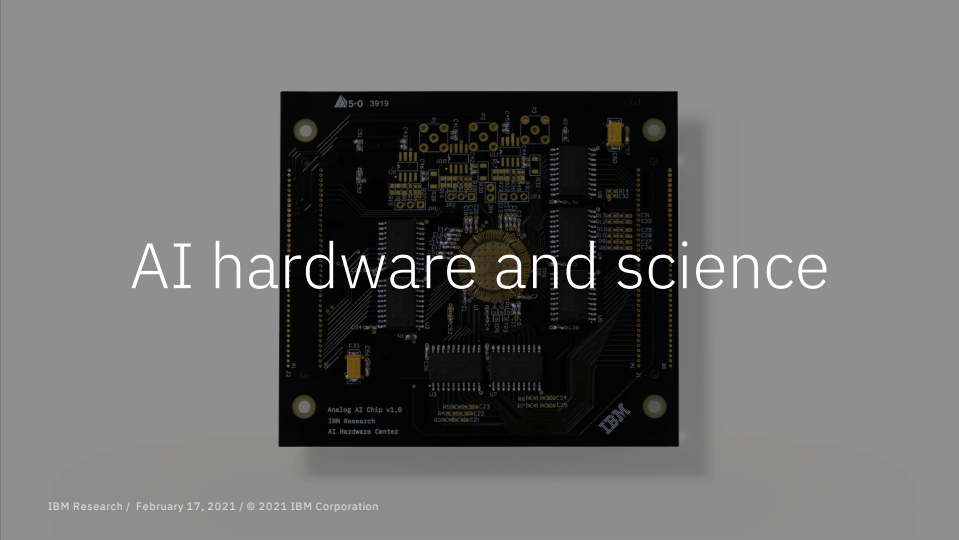




Supercomputers



Quantum computers



AI hardware and science



Hybrid cloud

Accelerated Discovery

Turbocharging the trusted scientific method to discovery of new materials

AI-enriched simulation

2-40x faster screening

Automatically determine the right multi-physics simulation workflow

Generative models

10x faster designs

Identify knowledge gaps and generate new material candidates

Deep search

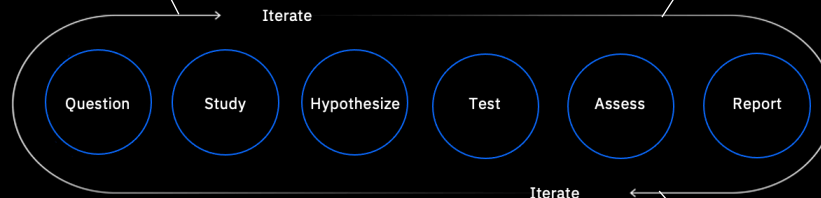
1000x faster ingestion

Ingest and structure technical literature at scale

Cloud-based AI-driven autonomous labs

100x faster synthesis

Synthesize and validate most suitable candidates



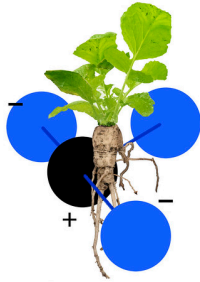
IBM is already applying Accelerated Discovery

Carbon Capture



#1
Capturing and transforming CO₂
to mitigate climate change

Nitrogen Fixation



#2
Modeling Mother Nature to feed
a growing citizenry while reducing
carbon emissions

Energy Storage



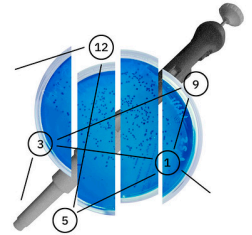
#3
Rethinking batteries before we
have to rethink our world

Photoacid Generators



#4
Sustainable materials, sustainable products,
sustainable planet

Antiviral Drugs



#5
Learning from our past
for a healthier future

Cleveland Clinic – IBM Discovery Accelerator

TEN YEAR MISSION: Deploy the next frontier of computing technologies and tools including AI and quantum computing in the hybrid cloud to revolutionize pathogen research and treatment and foster the next generation healthcare workforce.

 CNN

Cleveland Clinic and IBM hope their tech partnership could help prevent the next pandemic

New York (CNN Business) After a year in which scientists raced to understand Covid-19 and to develop treatments and vaccines to stop its ...

1 week ago



 TechCrunch

IBM brings its Quantum System One to the Cleveland Clinic

IBM has installed a couple of its own Quantum System One machines across the world in recent years, but today it announced its first ...

1 week ago



 Business - Insider

How IBM and Cleveland Clinic's Partnership Could Stop Next Pandemic

In a world where a few months could be the difference in saving hundreds of thousands of lives, quantum computing can't come soon enough.

5 days ago



Cleveland Clinic and IBM Unveil Landmark 10-Year Partnership to Accelerate Discovery in Healthcare and Life Sciences

IBM Hybrid Cloud, High Performance Computing, Artificial Intelligence, and Quantum Computing technologies to serve as foundation for newly launched Cleveland Clinic Global Center for Pathogen Research & Human Health

IBM plans to install its first private-sector, on premises quantum computing system in the U.S. at Cleveland Clinic. Cleveland Clinic also plans to receive first, next-generation IBM 1,000+ qubit quantum system in the coming years





UK STFC– IBM Discovery Accelerator

FIVE YEAR MISSION: Apply AI, quantum computing, and hybrid cloud technologies to produce innovations in materials, life sciences, climate, agriculture, and manufacturing, and cultivate new opportunities for businesses and enhance economic competitiveness.



UK STFC Hartree Centre and IBM Begin Five-Year, £210 Million Partnership to Accelerate Discovery and Innovation with AI and Quantum Computing
New Hartree National Centre for Digital Innovation will bring together innovative AI, quantum computing and the expertise of STFC Hartree Centre and IBM to benefit UK industry and research communities



DARESBURY, United Kingdom, June 3, 2021 /PRNewswire/ -- Science Minister Amanda Solloway has unveiled a five-year, £210 million partnership with IBM (NYSE: [IBM](#)). Its mission is to support UK businesses and the public sector by reducing the risk of exploring and adopting innovative new digital technologies, such as artificial intelligence (AI) and quantum computing, by breaking down practical barriers to innovation such as access to infrastructure or digital skills gaps within their organisation. By advancing the pace at which businesses can take advantage of new digital technologies, the collaboration will enhance productivity, create new skilled jobs and boost regional and national economic growth.

