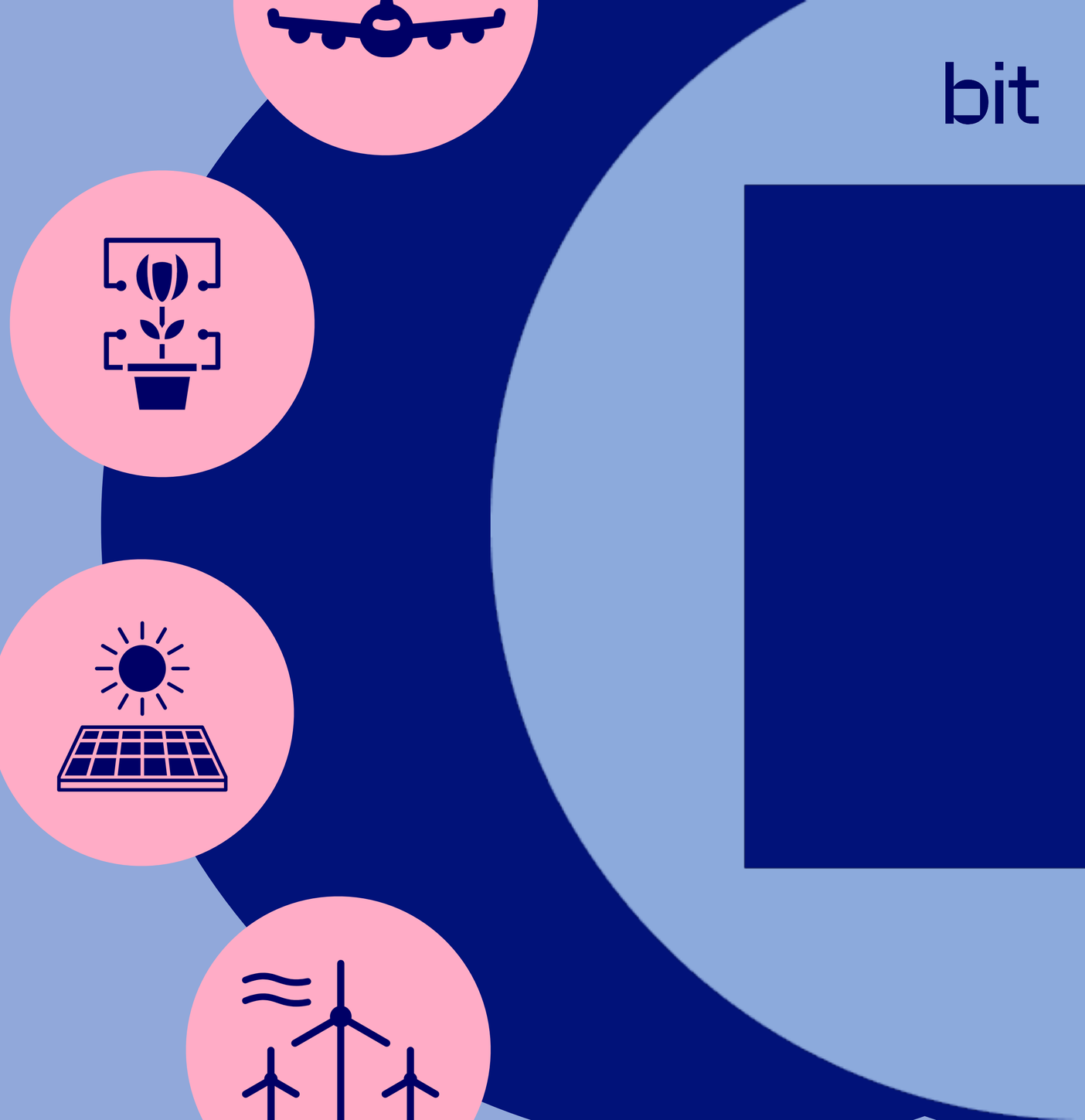
e-book #2

Tech Scan

Clean Tech



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Technology lies at the root of many innovations. It got us from combustion engine to adaptive cruise control, and from gunpowder to launching rockets to Mars.

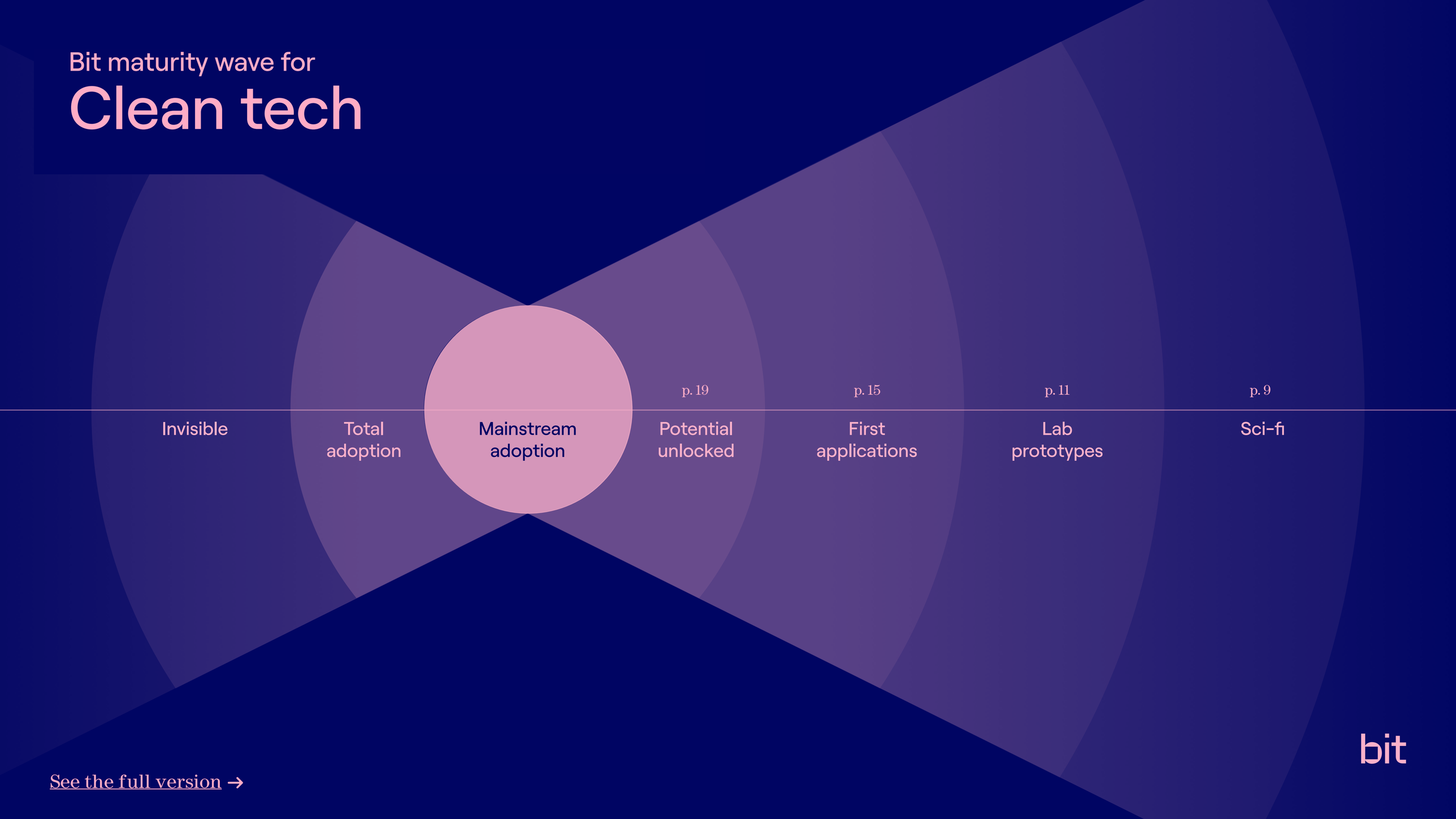
Nonetheless, the potential of a lot of new exciting technologies is still waiting to be unlocked, such as million-mile batteries and supercharging batteries.

Our mission at Bit is to help companies innovate 10 years earlier. We do this by helping you find out which of these emerging technologies fit your challenge, creating a chance to early adoption rewards.

For this, we created the Bit Maturity Wave.

Bit maturity wave for

Clean tech



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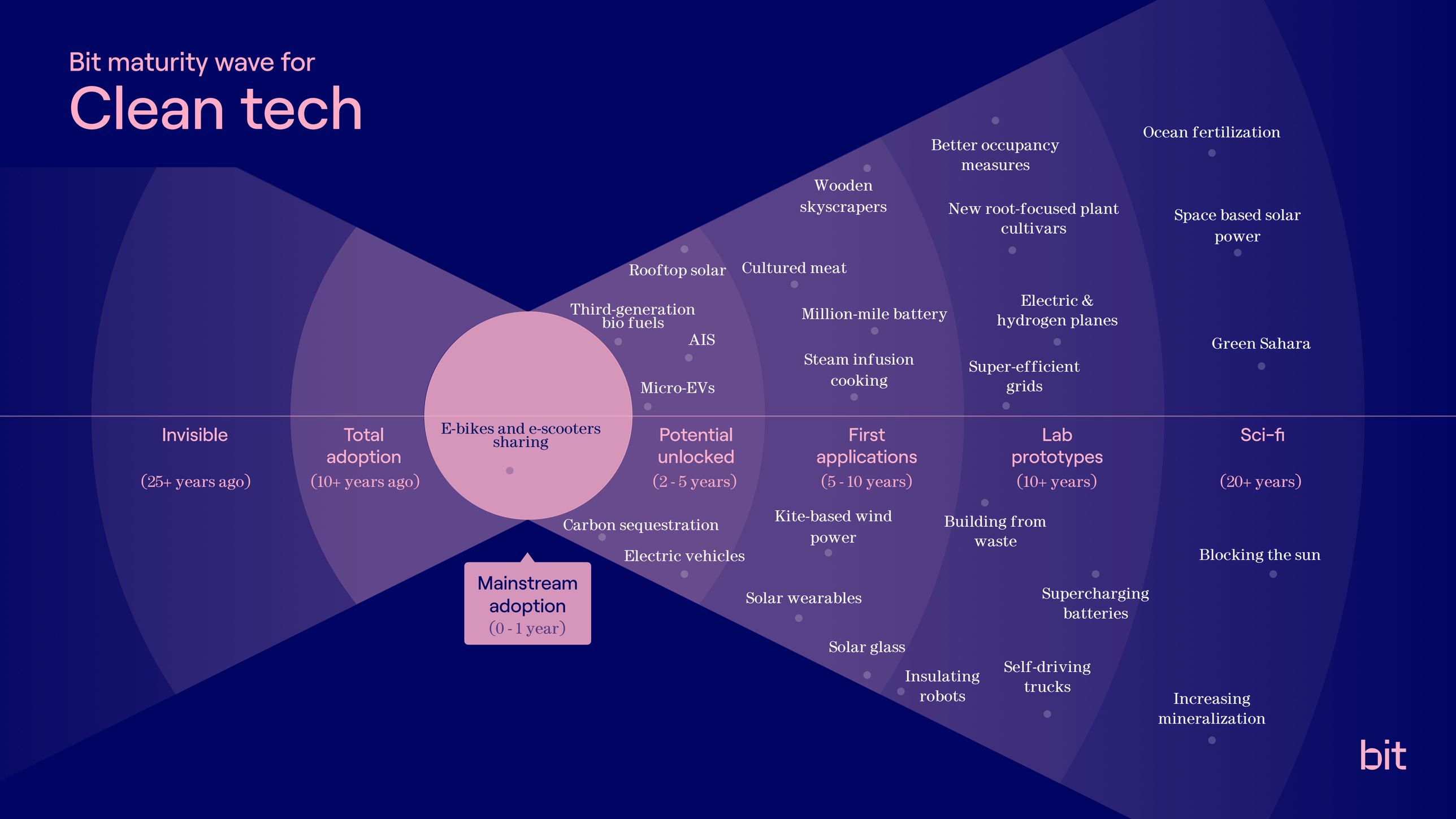
Bit maturity wave for

Clean tech



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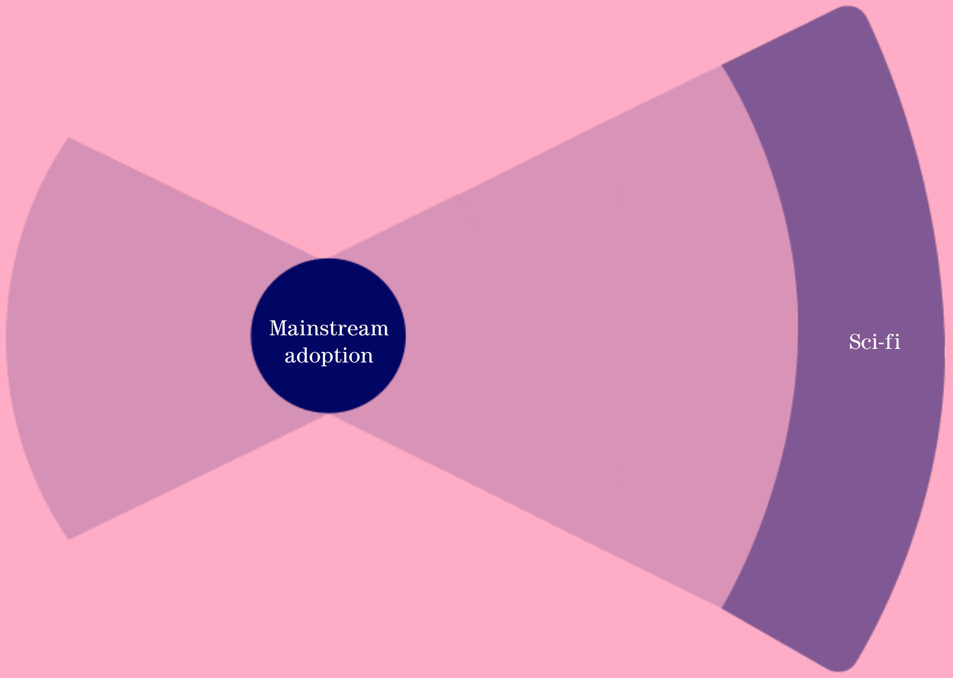
1 Sci-fi

The first wave is the furthest away from becoming reality. It captures technologies that we can only envision. We have yet to figure out how we would build these technologies.

Think of tech you see in Star Wars or Jules Verne novels like teleporting or Quantum internet.

20+ years

Time to mainstream



1 Sci-fi

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Ocean fertilization

Climate engineering has come up with a number of techniques that could potentially fertilize or nourish the oceans. The purpose is to decrease the amount of carbon dioxide from the atmosphere by introducing nutrients in the waters, which eventually would lead to an increase in marine food production. The final goal would be to slow down climate change and to enlarge fish stocks. One of the propositions is to leverage on iron fertilization that would develop marine phytoplankton: the basis of the marine food chain. Read more →

Image: Penn State

Green Sahara

Eleven thousand years ago the Sahara desert had a completely different image compared to now: the main noticeable color was green thanks to the abundance of grasslands and forests. Climate change is the predominant cause of the desert's droughts which led to turn that green area into a barren wasteland. Unexpectedly, during the last 30 years, an overall greening of the desert has started to take place again. As of 2005, a plan to reverse the Sahara's desertification was advanced, boosting inhabitants' hope to gain back those lost lands. Read more →

Image: Public Questions

1 Sci-fi

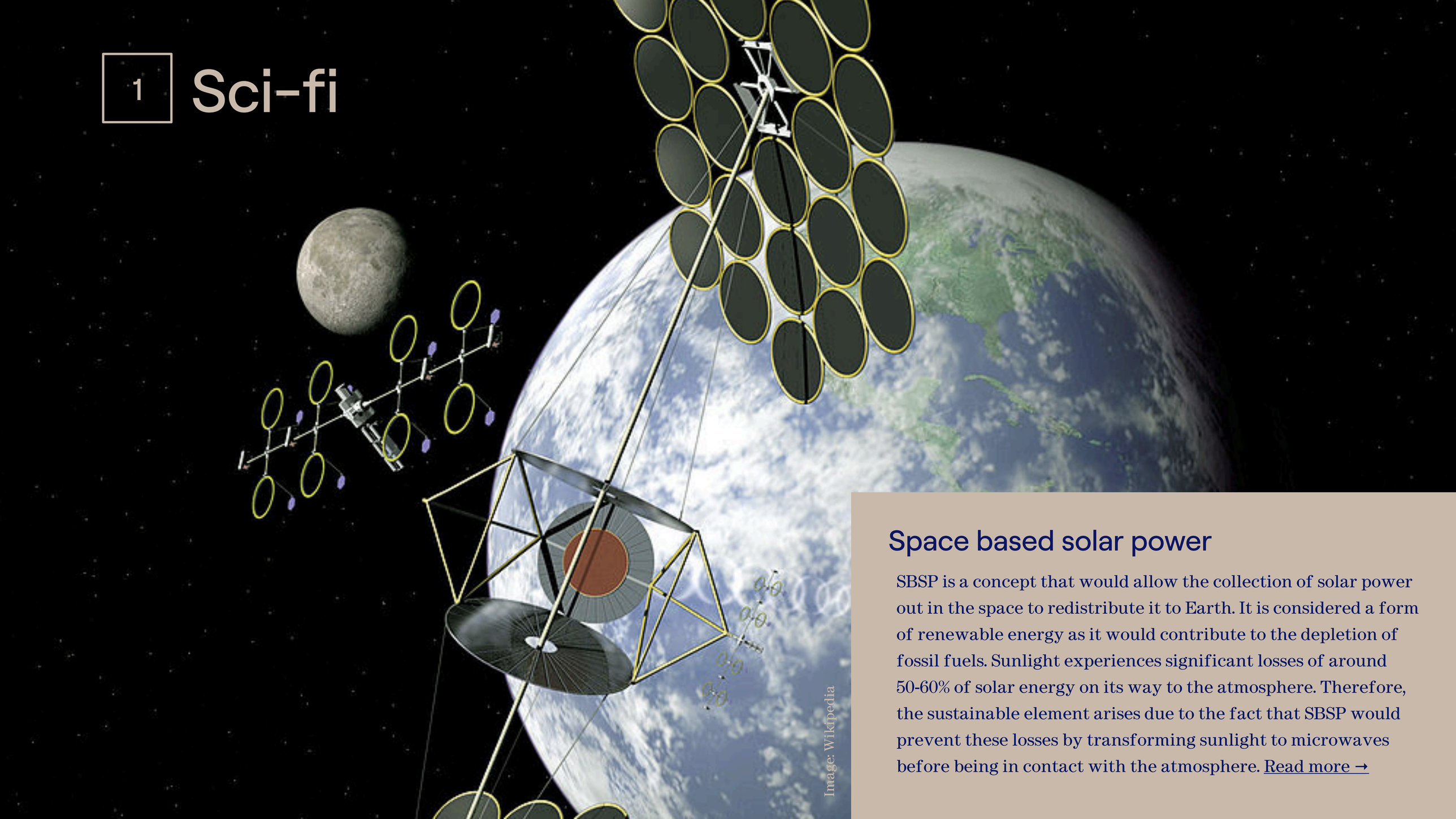

Image: Wikipedia

Space based solar power

SBSP is a concept that would allow the collection of solar power out in the space to redistribute it to Earth. It is considered a form of renewable energy as it would contribute to the depletion of fossil fuels. Sunlight experiences significant losses of around 50-60% of solar energy on its way to the atmosphere. Therefore, the sustainable element arises due to the fact that SBSP would prevent these losses by transforming sunlight to microwaves before being in contact with the atmosphere. Read more →

1 Sci-fi

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Blocking the sun

By ejecting sulfates in the atmosphere, it could be possible to counteract global warming. This strategy has been previously demonstrated at the eruption of Mount Pinatubo in 1991, whose immense amount of sulfur release ended up decreasing the global temperature by one degree Celsius. Studies have shown that this practice would be feasible, fast-acting and cheap, therefore a promising solution to fight climate change. However, a controversy lies at the basis of this innovation: this solution entails blocking a part of the sun rays which would have irreversible negative consequences on our planet. Read more →

Increasing mineralization

Carbon mineralization, an emerging approach to remove carbon dioxide from the air, would provide the mining industry with an opportunity to drastically reduce their carbon emissions. The project could be developable thanks to economic incentives and the public pressure for environmental sustainability in the mining field. Read more →

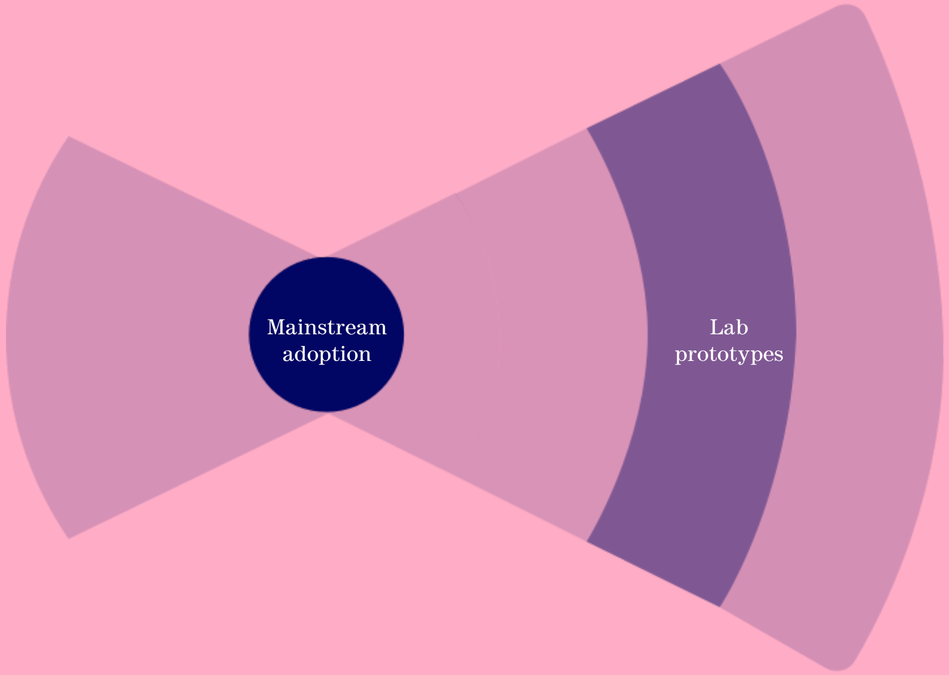
2 Lab prototypes

The second wave comprises the first manifestations of what used to be sci-fi. These prototypes that emerge in research labs (MIT, Harvard) or R&D heavy companies (Google, IBM) are tasked to show that it can be built in a controlled environment.

Now we have proof that conceptually it can be built, but these prototypes are not built for scale. From these prototypes, it can take over 10 years to reach mainstream adoption.

10+ years

Time to mainstream



2 Lab prototypes

Better occupancy measures

SENSOR program developed projects including user-transparent sensor systems that accurately detect the human presence to reduce energy usage in buildings. These sensors could contribute to saving up to 30% of ventilation and air conditioning which belong to a total of 2-4 quadrillion BTUs across the US power system. Read more →

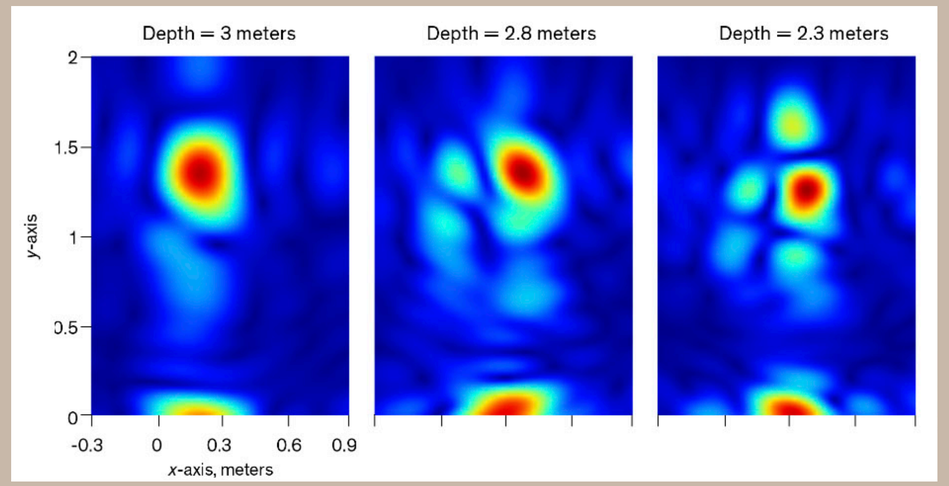


Image: Science News

Tools to retrofit single-pane windows

Single-Pane Highly Insulating Efficient Lucid Designs (SHIELD) are projects that aim at improving windows' thermal insulation, reducing cold-weather condensation, and having a minimal impact on the window's appearance. On top of this, other benefits are expected such as improved soundproof, which will make retrofits more desirable to occupants and owners of residential and commercial buildings. Read more →

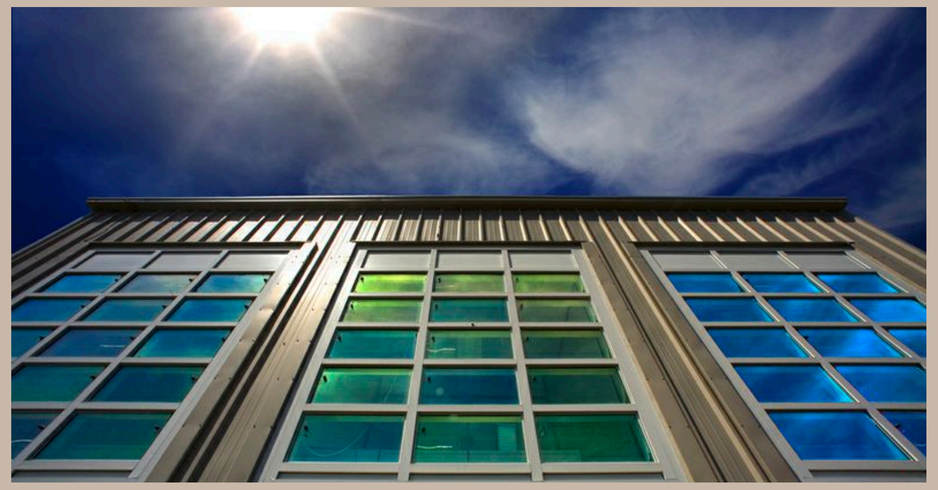


Image: alamy.com

2 Lab prototypes

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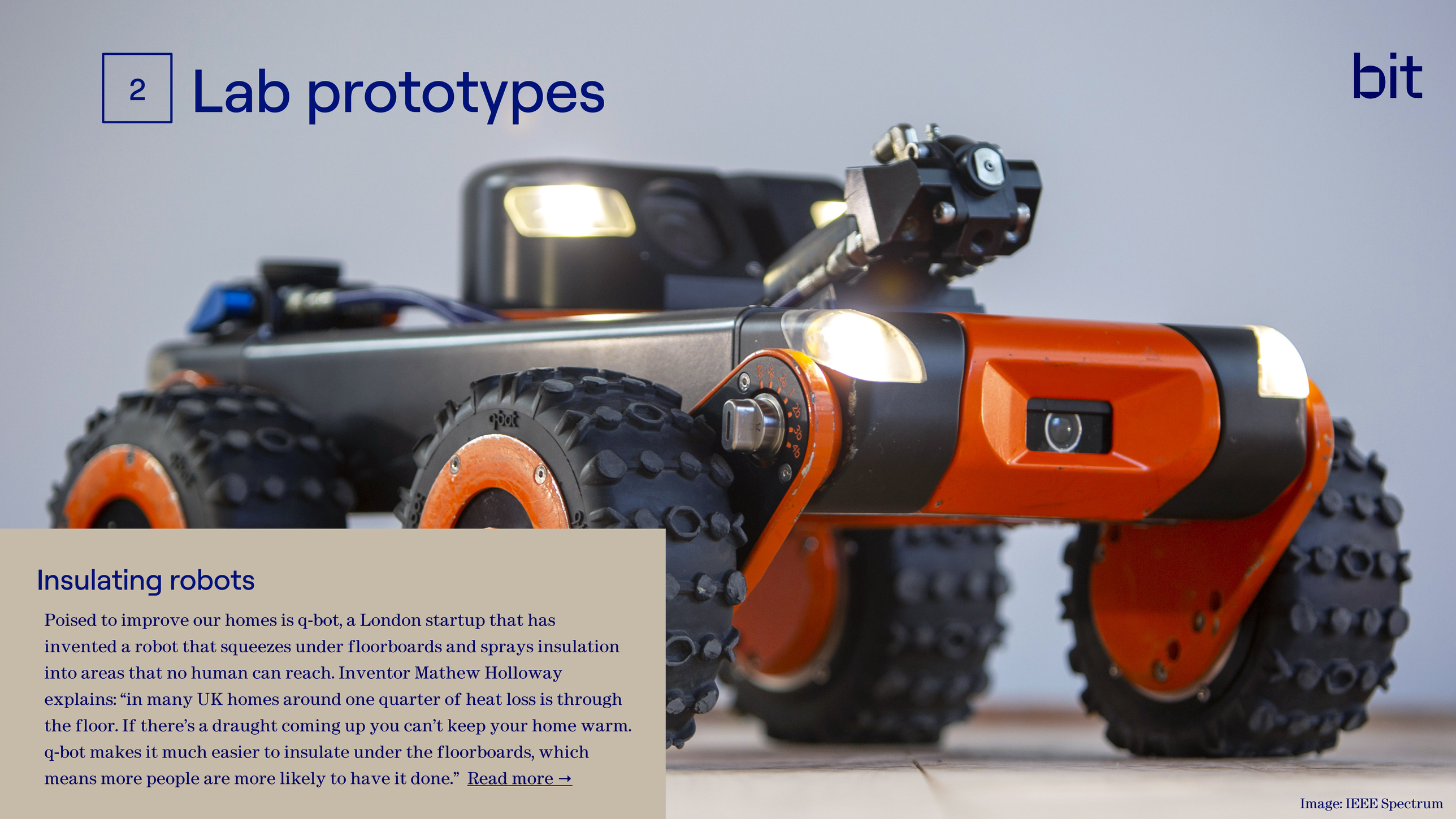


Insulating robots

Poised to improve our homes is q-bot, a London startup that has invented a robot that squeezes under floorboards and sprays insulation into areas that no human can reach. Inventor Mathew Holloway explains: “in many UK homes around one quarter of heat loss is through the floor. If there’s a draught coming up you can’t keep your home warm. q-bot makes it much easier to insulate under the floorboards, which means more people are more likely to have it done.” Read more →

Image: IEEE Spectrum

2 Lab prototypes

Self-driving truck "train" convoys

“Platooning” refers to close, connected, fleet-based driving where follower trucks connect to the vehicle ahead of them with Wi-Fi and maintain a very tight driving formation. There is an incredibly high number of advantages of self-driving tracks such as fuel-saving, which amounts to 15% compared to the fuel necessary for human-driven tracks. The most recent success of this innovation has taken place across Europe, where a dozen of self-driving tracks managed to complete over a thousand miles. Read more →

Image: Scania

New root-focused plant cultivars

Over the past hundred years the quality of cultivable soil has declined, which led to increasing necessity for nitrogen fertilizer with as a result, also a steep intensification of greenhouse emissions. One potential solution to this process is harnessing the photosynthetic bridge between atmospheric carbon, plants, microbes, and soil. Root-focused plant cultivars could result in being incredibly effective to reverse the amount of CO2 emitted by cultivation fields. Read more →

Image: Jon Ewing

2 Lab prototypes

Image: Polar Lifehaus

Building from waste

Lifehaus is the first low-cost and self-sufficient project that applies ancestral building methods to lower the carbon footprint. Using up-cycled and local materials, manufacturers would have a totally different impact on the environment as the first 3D construction time-lapse demonstrates. See more →

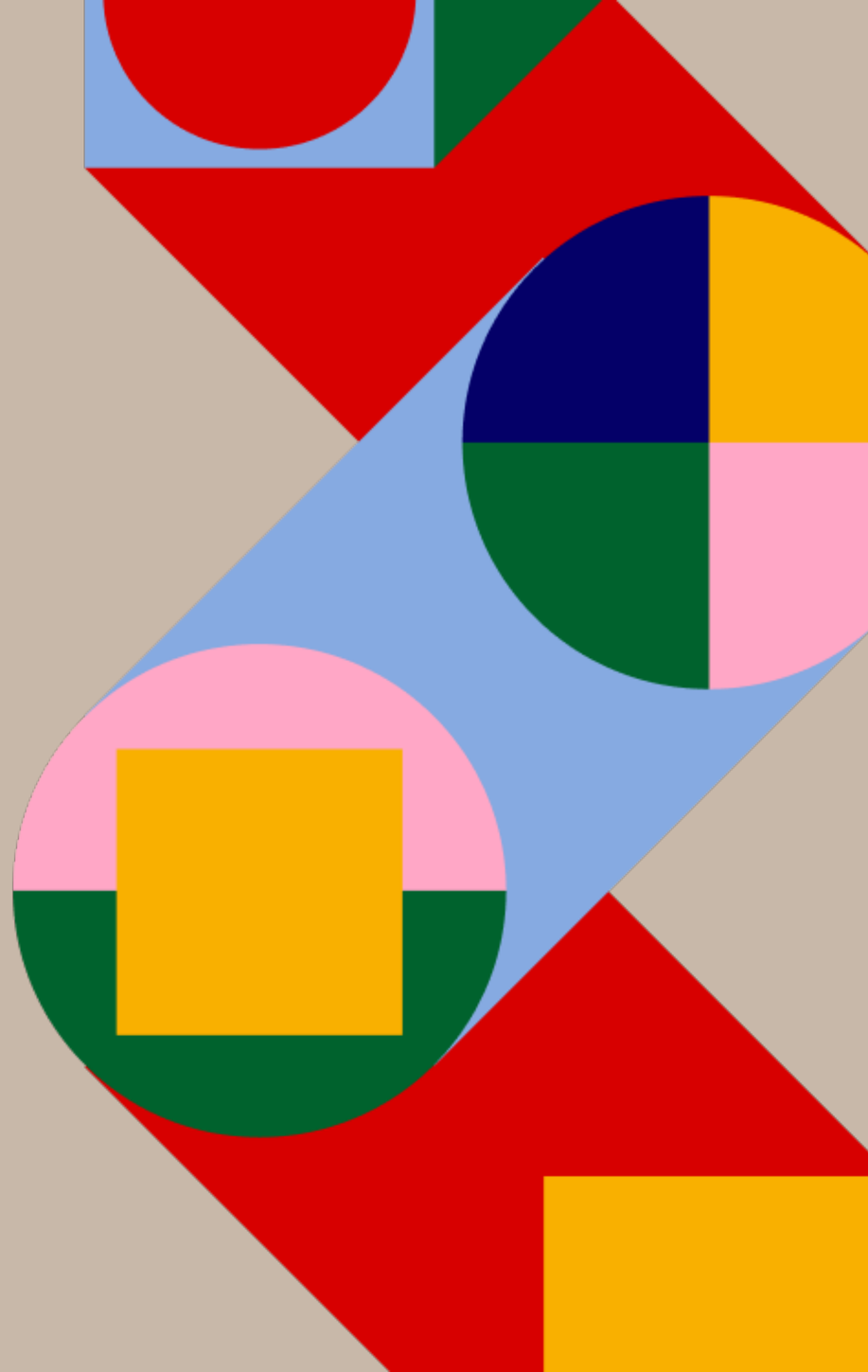
2 Lab prototypes

Supercharging batteries

V3 Supercharging has the potential of recovering up to 75 miles of charge in 5 minutes and charge at rates of up to 1,000 miles per hour. Therefore, the estimated amount of time required for it to fully recharge is only 15 minutes. All these numbers represent a dream for car industries in the process of developing better electric cars. Unsurprisingly, Tesla is already largely exploiting supercharges all around Europe, North America and Asia. However, the number of vehicles suitable for this emerging piece of technology still needs to be reinforced. Read more →

Super-efficient grids

More than 1.2 billion people in the world do not have access to electricity. Renewable energy-based off-grid solutions offer a significant opportunity to increase access to electricity services. Moreover, off-grid renewable energy solutions are extremely sustainable and have the potentiality to empower those rural communities that compose the majority of the areas without access to electricity. This would be achieved by increasing electricity access by 60%. Read more →



2 Lab prototypes

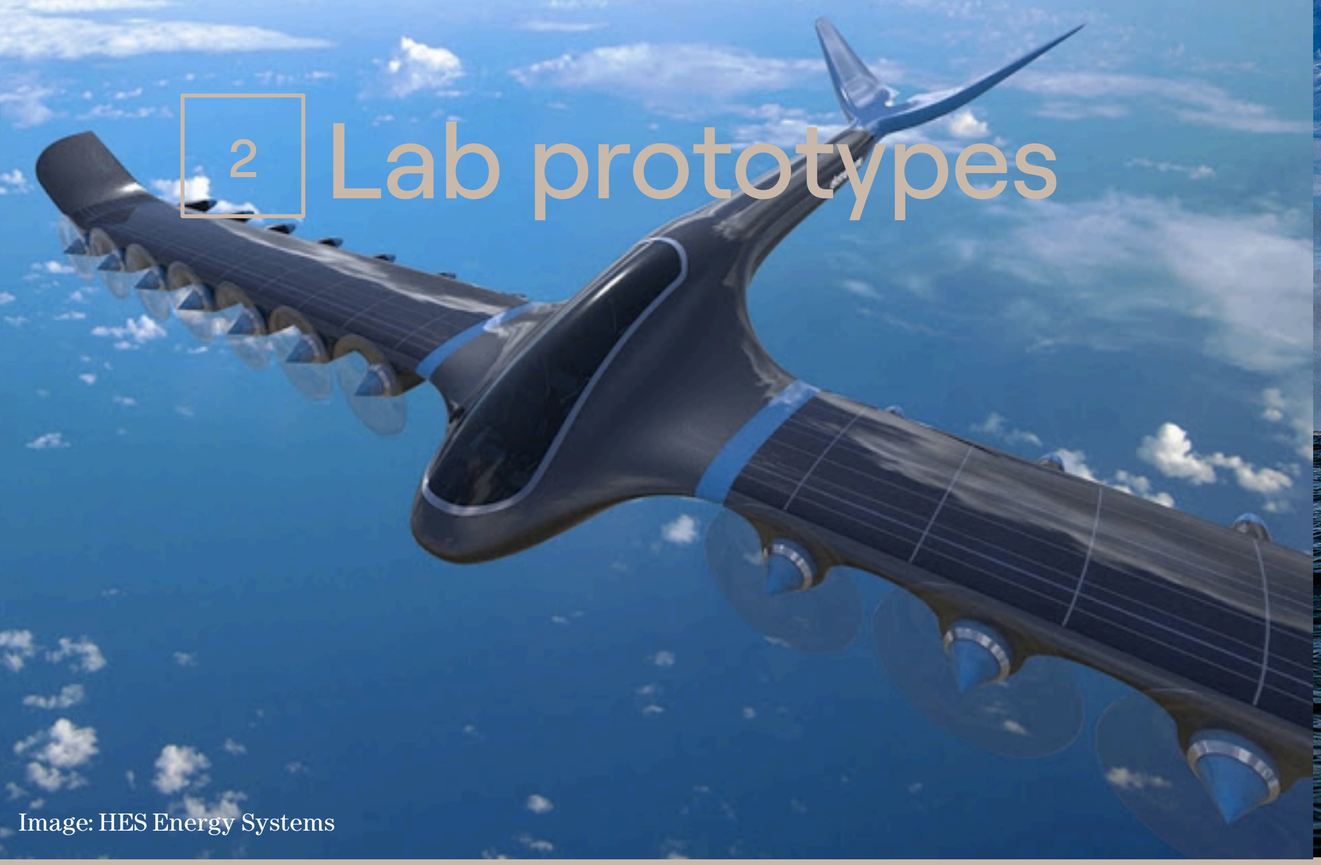


Image: HES Energy Systems

Image: National Geographic Society

Hydrogen-powered planes

Element One is the world's first regional hydrogen-electric passenger aircraft ideated by HES energy systems. Taras Wankewycz, the founder of HES, claims: "It's now possible to break past the endurance limits of battery-electric flight using HES' ultra-light hydrogen energy storage in a distributed propulsion arrangement". Read more →

Hydrogen-powered ships

Royal Caribbean stated that hydrogen fuel cell technology, a combination of oxygen and hydrogen to produce power, does not burn anything during the power generation process. This characteristic leads to releasing zero emissions that could harm the environment. Race For Water is collaborating with Swiss Hydrogen to install hydrogen stack prototypes on solar-powered ships. Read more →

3 First applications

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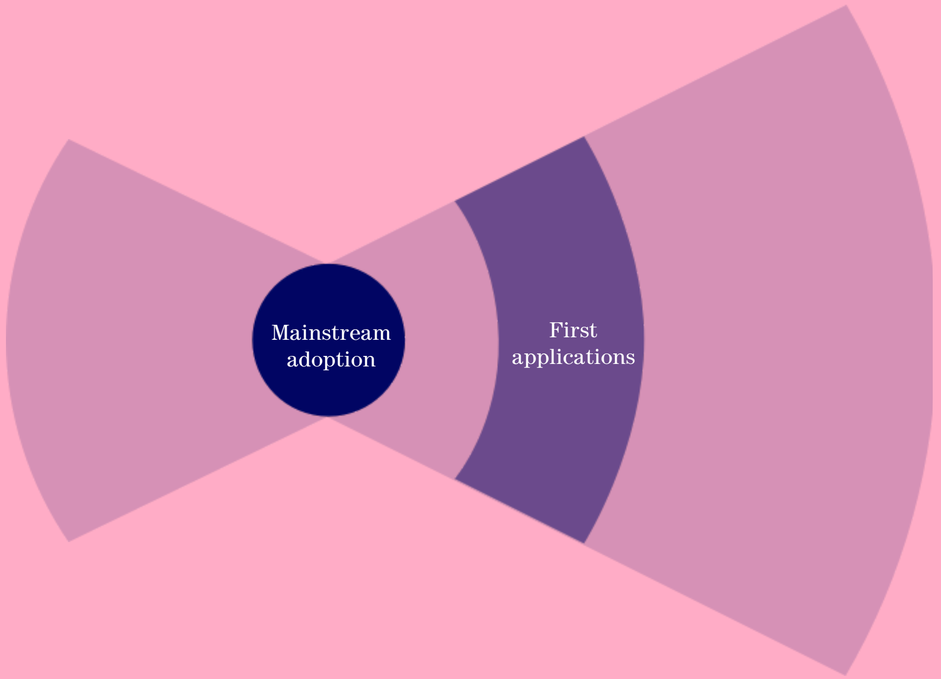
The third wave occurs once a technology leaves the lab. At this point, it's exposed to the real world. Startups, prototyping studios and new ventures try to find the right applications for the newly available technology. A lot of blockchain solutions are in this wave, as they are applied in many areas to see which are a good fit. Once this fit is, found it will usually take 5 to 10 years to reach mainstream adoption.

5 - 10 years

Time to mainstream



3 First applications

Wooden skyscrapers

Architects are investigating a new material to build skyscrapers: timber. The first attempts are admirable in Chicago, but designers are aiming at building more in London and Stockholm. Wood had been discarded by architects due to its inflammatory nature. However, nowadays, innovative types of wood such as cross-laminated timber, have been declared to be even more robust than steel. The re-implementation of wood as a construction material can act as a lockbox for carbon dioxide reducing the amount of CO2 in the air. Read more →

Image: River Beach Tower

Steam infusion cooking

Originally designed for boats, steam infusion cooks huge quantities of food very quickly and evenly while keeping food nutritious and tasty. It works on liquid foods like sauces and soups by blasting them with steam traveling at three times the speed of sound, heating food from 20C to 80C in only a second, and can cook 1000kg of food in just 10 minutes. Designed by British engineering company OAL Group, the steam infusion has been successfully making ready meals, ketchup, béchamel sauce, and minestrone soup. It has been used to feed refugees in northern Iraq and to make a new maize-based nutritional drink in Zambia. Learn more →

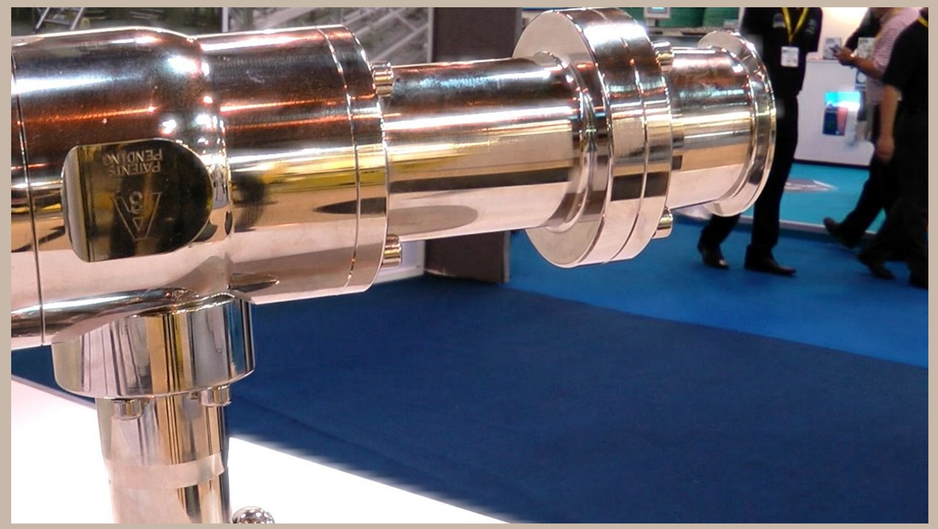


Image: FoodBev Media

3 First applications

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Cultured meat

In the early 2000s, Jason Matheny founded the first non-profit organization dedicated to supporting in vitro meat research named New Harvest. Since then, the concept of cultured meat began to become viral. Cultured meat is produced by making use of tissue engineering techniques which are already common in the regenerative medicine department. Its application would have various health and environmental benefits. However, vitro meat is still waiting to be commercialized. Read more →

Image: OneWorld

3 First applications

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No-till farming

No-till farming is an agricultural technique for growing crops or pasture without disturbing the soil through tillage. No-till farming decreases the amount of soil erosion tillage caused in certain soils, especially in sandy and dry soils on sloping terrain. The U.S. Department of Agriculture estimates more than 35% of farmers who plant the eight major crops were using no-till methods in 2009, although only about 10 percent used no-till methods full-time. The list of perks includes lower fuel usage, time-saving, decreased soil erosion and soil compaction. Read more →

3D printing for sustainable manufacturing

3D printing can create complex structures not possible with traditional subtractive manufacturing and gives the manufacturers much more flexibility when designing their products. The reasons behind this are numerous. For instance, 3D printing could represent an integration to design more complex parts. In addition, they tend to employ an inferior amount of material at the same time, contributing to making manufacturing more sustainable oriented. Read more →

3 First applications

bit

Kite-based wind power

Wind energy has the potential to power the world over 100 times, yet only 4% of the world's electricity comes from wind. That is why Makani has come up with an energy kite system that integrates advances in aerospace engineering, materials science, and autonomous controls to create a lightweight design that is easy to transport and install. This project would give an increasing number of people around the world access to affordable clean wind power. This positive effect stems from the technology's design that is capable to generate a large capacity. Read more →

Image: Euronews

3 First applications

Solar glass

Today's solar photovoltaic systems are made possible when engineers apply electricity-generating SolarWindow™ coatings to glass. Not only do these solar glasses generate electricity, but they are also extremely aesthetically appealing. As a consequence, they could extend the request for this type of renewable energy steeply. Furthermore, the environmental benefits are impressive: every single installation reduces 2.2 million miles of CO2, meaning 12 times more than common PS. Read more →

Image: Solar Power World

Mycelium (schimmeldraden)

Fungi are the key to a new low-carbon, fire-resistant and termite-deterring building material. That is why scientists are attempting at creating new building material made of fungus, rice and glass. The process begins with the formation of fungal bricks by combining rice hulls and glass fines which are extremely low in energy consumption and carbon emission. One of the advantages of these bricks is their versatility deriving from the easily moulding material that allows to shape them in various ways according to the need. Read more →


Image: Shutterstock

3

First applications

bit

Image: Teslarati

Million-mile battery

Tesla’s researchers started developing battery cells with the potentiality to last over 1 million miles on the road or 20 years if utilized in grid energy storage. These batteries feature pouch cells rather than the usual cylindrical cells used by Tesla in the past. Thanks to this characteristic, new chemistry is involved which leads to improved energy and charge rate. Read more →

Image: Solar Power World

Image: Dazed

Thin-film solar

SunPower® has released solar panels featuring two astonishing characteristics: portability and flexibility. The high degree of flexibility, circa 30˚, is provided by a lightweight polymer material that allows the panel to bend without breaking. On top of this, the lightness of the material contributes to making the panel extremely easy to be transported and adapted to different surfaces. Read more →

Solar wearables

Solar company Pvilion is testing solar panels that can be adapted to a disconcerting range of surfaces. One example is the collaboration with Tommy Hilfiger based on the idea that every person with a smartphone can potentially become a source of energy. The incredible adaptability of these solar materials is given by woven solar fabrics that have photoactive dyes coating individual threads. Read more →

4 Potential unlocked

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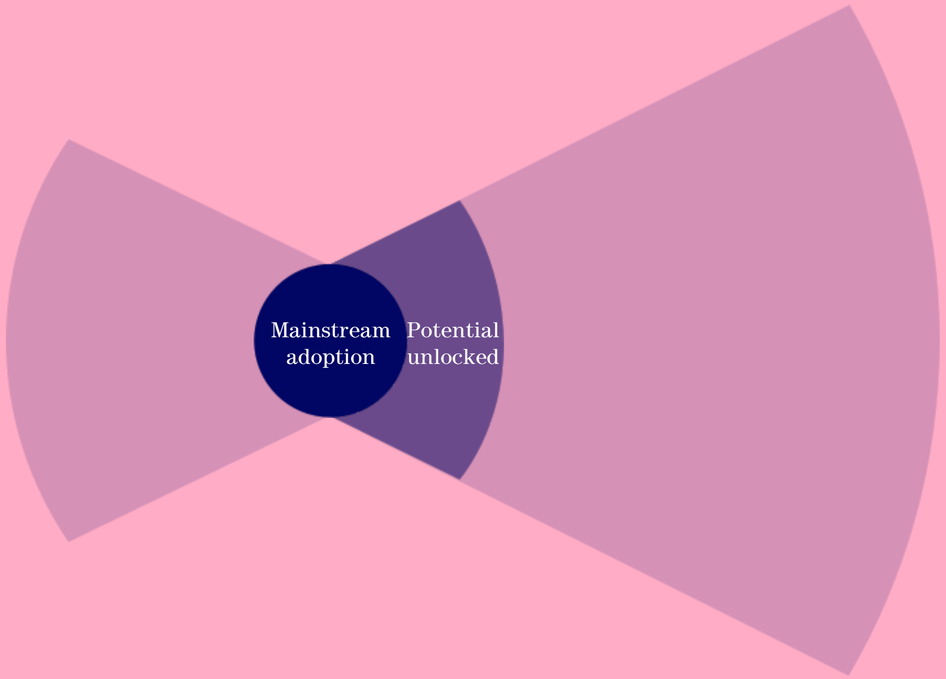
The fourth wave is crucial when spotting early successes. Once an applied technology has found its place in the real world and starts to provide value, its potential will truly be unlocked. Note that for adoption to ensue, the value it generates should at least be on par for the competing solutions. This is the reason why blockchain is stagnating, as in many cases it isn't superior to a centralized database. Within 2 to 5 years, a technology in this wave can become mainstream.

2 - 5 years

Time to mainstream



4 Potential unlocked

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Third-generation bio fuels

The potential of biofuels is on the verge of being fully exploited. As a matter of fact, 1G biofuels have already been claimed to be more performing than petroleum-based ones and the second generation is about to be commercialized. The following step, which is currently being pursued, is to take advantage of microorganisms, such as algae, for the envision of 3G biofuels. Potential efficient industrial processes are still being tested, nonetheless, important improvements are being made. Read more →

Image: Shell

Micro-EVs for urban environments

Citroen has found the perfect balance between convenience and sustainability: the Citroen Ami. Although at first glance it can be interpreted as another attempt by a multinational to commercialize electric vehicles, Ami is not considered a motor vehicle. In facts, it is being positioned as an urban mobility solution that does not require a driving license and is suitable for underage drivers. With only €19.99 a month, it is possible to make use of a potential future urban mobility solution. Read more →

Image: TechCrunch

4 Potential unlocked

Electric vehicles

The number of fully electric vehicles is constantly augmenting. By the beginning of 2020, just in the Netherlands, the quantity of plug-in hybrid and electric vehicles has increased by 43% compared to the previous year. Due to the increased demand, innovative projects have been released in order to improve the offer. For instance, The Mobility House company is developing projects regarding the battery and charge of electric vehicles. For instance, smart charging ensures that electric cars are charged whenever it makes most sense economically. Read more →

4 Potential unlocked

Automated irrigation systems

Irrigation systems are not an easy task when working with large open areas. The main problem of organizing the work of such systems is a dependency on weather conditions when forecasting the resources required for irrigation. Automated irrigation systems are used to continuously maintain the required soil conditions. This not only significantly requires less human labor but also has the potential to reduce production costs. In addition, irrigation systems are crucial for optimizing and accounting for freshwater consumption statistics. Many scientists believe that these technologies will subsequently have a global impact on global water supply processes. Read more →

Machine learning to measure carbon sequestration

Machine learning algorithms have been developed to analyze satellite images together with monitoring tools to estimate greenhouse gas emissions. A first assessment reported that 15% of all greenhouse gas emissions come from deforestation, thanks to the exploitation of a satellite drone, machine learning, and lidar images. Furthermore, a startup called Pachama is planning to launch a marketplace that can help carbon offsets purchasers to reach high-quality offsets. Read more →

4 Potential unlocked

Image: Respro

Image: Shutterstock

Air pollution-free cities

Air pollution causes 7 million deaths per year according to the World Health Organization and represents a threatening obstacle to limit the rise in temperature of only 1.5°C, as established in the Paris Agreement. C40 is a network of the world's megacities committed to addressing climate change. In 2018, C40 launched an Air Quality Network that aims at providing support to cities in reducing their air pollution level. Read more →

Noise pollution-free cities

A number of solutions that could mitigate noise pollution are out there waiting to be thoroughly exploited. Some examples are quieter engines for aircrafts, acoustically treating night clubs, and muffling jackhammers for roadwork. These solutions would tackle the issue at the source contrarily to some short-term ones, such as earplugs and sound barriers surrounding the streets, that do not fix the problem permanently. The good news is that several research projects are working to reach a sustainable resolution. Read more →

5 Mainstream adoption

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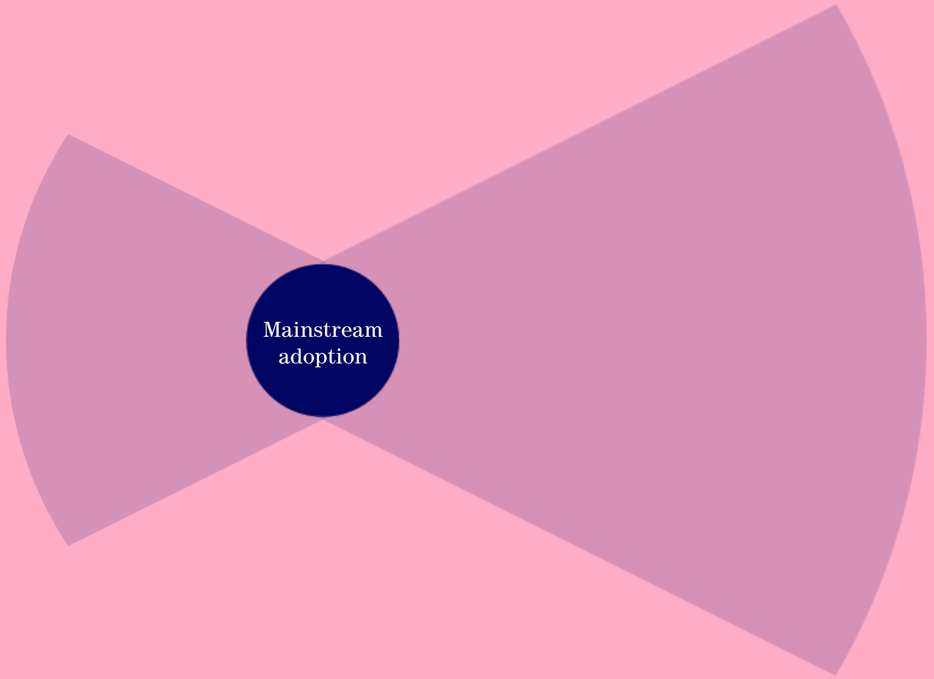
When potential is unlocked, things start to develop really fast. Solutions become easier to implement as technology becomes available off-the-shelve. Think of how easy it is these days to integrate a chatbot on your website. 10 years ago, this would have required fast teams of developers to build it.

When the technology hits mainstream adoption, being a forerunner is hard, as there is a lot of competition. It means you have to get into it within a year, or you are out.

Think of having an app as a customer interface.

0 - 1 years

Time to mainstream



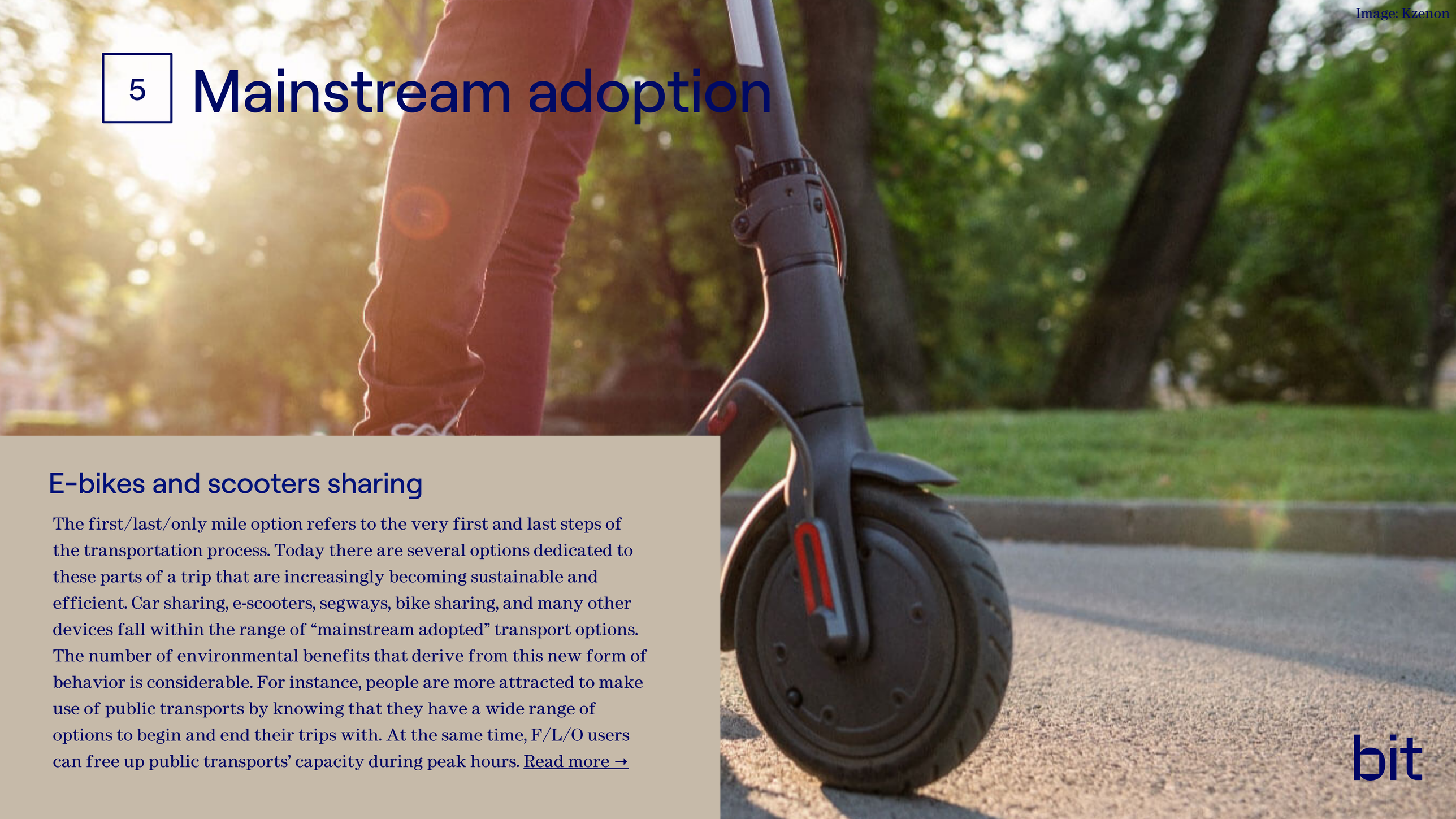


Image: Kzenon

5 Mainstream adoption

E-bikes and scooters sharing

The first/last/only mile option refers to the very first and last steps of the transportation process. Today there are several options dedicated to these parts of a trip that are increasingly becoming sustainable and efficient. Car sharing, e-scooters, segways, bike sharing, and many other devices fall within the range of “mainstream adopted” transport options. The number of environmental benefits that derive from this new form of behavior is considerable. For instance, people are more attracted to make use of public transports by knowing that they have a wide range of options to begin and end their trips with. At the same time, F/L/O users can free up public transports’ capacity during peak hours. Read more →

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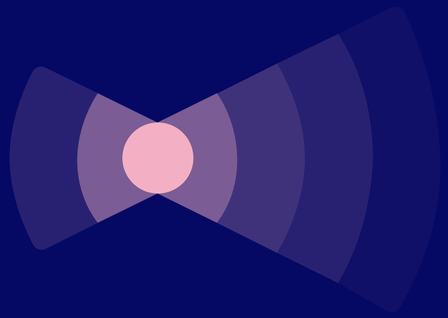
You can now...

Pick technologies

What technologies reveal promising opportunities for the context of your industry and organization?



Plan innovation

When will these technologies be relevant and applicable? How does this translate to your short- and longer-term innovation strategy?

Start experimenting

What technology fits your challenge and creates a change to early adoption rewards?

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tech trends & intelligence platform,
and consulting services at
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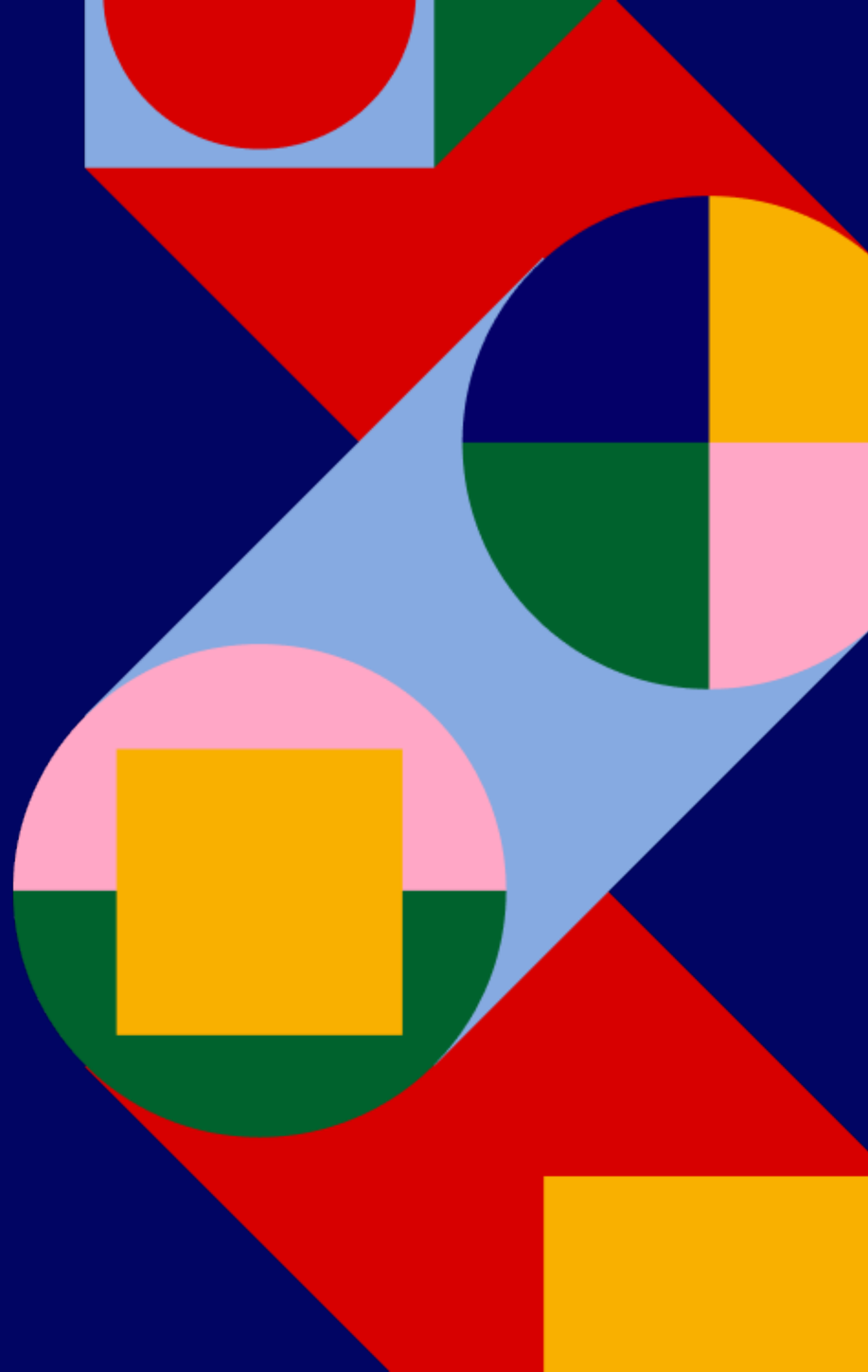
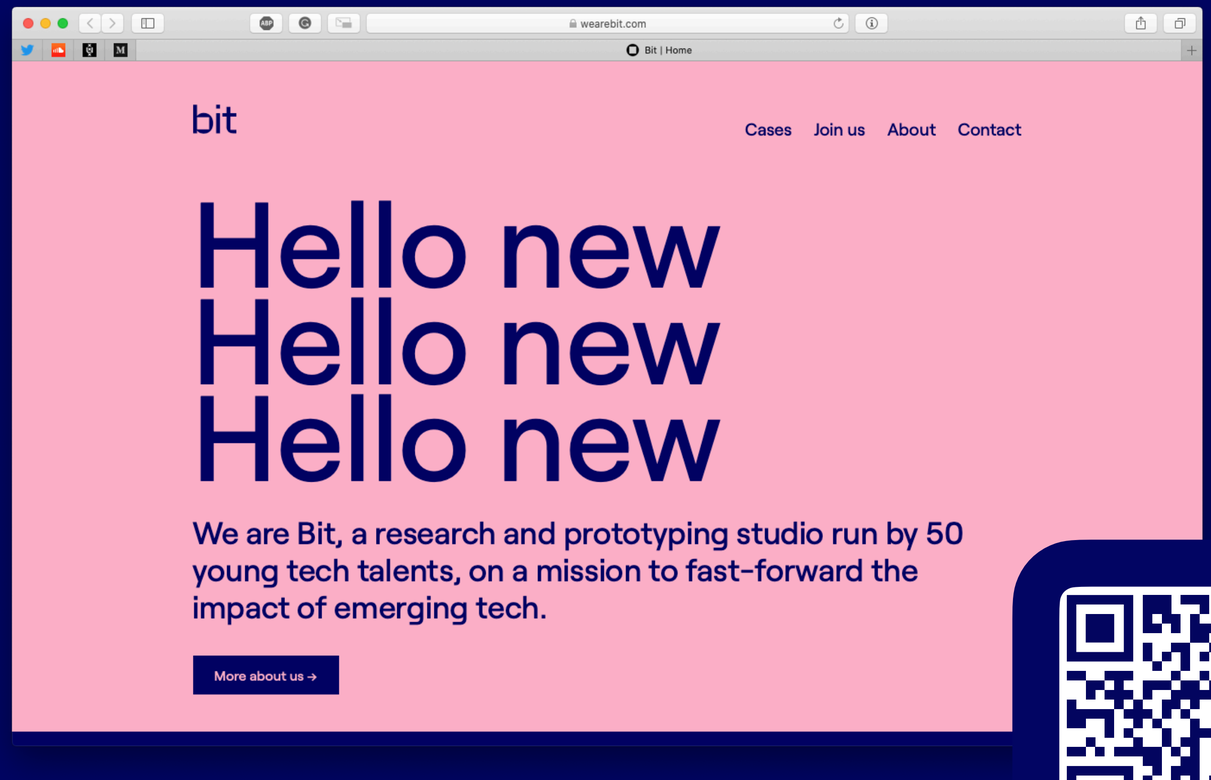


bit Prototyping futures



Let’s innovate 10 years earlier! 🚀

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