Forbes IGNITE

Sustainable Transformation

The Successor to Digital Transformation

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INTRODUCTION:

A New Story About Sustainability

It's time to tell a new story about sustainability. It may be the most important story of our time, and it's been hiding in plain sight.

We've been told that companies must choose between doing right by people and the planet or their shareholders. This idea of an unavoidable tradeoff is not just an argument from advocates of the status quo, but also those most passionate about changing it. Both sides have good points but miss the bigger picture.

It is true that purpose and profit do not perfectly overlap in all places or time frames under our current market rules. This explains why boil-the-ocean studies seeking a smoking gun link might bury real areas of sustainable progress in top-line averages. It also makes sense why some environmental champions claim that purpose and profit cannot co-exist.

But slowly, the evolution of technology and skyrocketing consumer demand for sustainable products has quietly pushed the two circles of the Venn diagram closer together.[1] Today, the very innovations essential for saving the planet are also those that can usher in a new era of business self-reliance in energy, materials, and resilience in the face of a sputtering global supply chain. More than this, digital transformation has given companies a decade-long dry run of the processes to create value from these technologies.

We are entering an era of sustainable transformation, the successor to digital transformation. This report is designed to be a clarion call to C-level leaders and board directors around the world that there's a new business case and tried-and-true roadmaps to take bolder climate action. Yes, it will take government action to transform the sustainability-profitability Venn diagram into one solid circle. But sustainable transformation, focused on the areas of overlap today, is the way companies can lead and build the momentum that will drive collective action.

This report isn't so much a *how-to* guide as it is a *how-to-think* guide. Our purpose isn't to summarize all we know—or you should know—about sustainability, technology, and innovation. There's no shortage of amazing resources to support sustainability actions companies might take, like the incredible work of the non-profit research group Project Drawdown.[2] We're also awash in advice on profitable digital transformation. Consider this work your jumping-off point for a deeper exploration of this essential information.

A better future isn't just possible—it's also highly probable. It's now up to us to forge a new path that leads from probability into reality.

WILL THOMPSON
Chief Strategy Officer | Forbes Ignite

Methodology

Forbes Ignite, in collaboration with Accenture and Salesforce, assembled a taskforce of C-level sustainability and technology leaders representing companies with a combined market capitalization of over $2 trillion, along with scientists, futurists, sustainable start-up founders, and Forbes 30 Under 30 listmakers. Their mission, fleshed out across 10 design thinking-inspired roundtables, was to create the roadmap for global boards and C-suites to navigate the next phase of technological disruption that will also lead the way to a net-zero world.

This report represents a synthesis of these discussions as well as dozens of individual interviews, academic and industry research, and far more.

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Sustainability: The Business Case

For the first time in history, technology makes it possible for companies to be more profitable by becoming more sustainable. This is not just a possibility, but an imperative. In the same way that a series of key technologies became powerful and affordable enough to make the iPhone possible in 2007, an even broader and more disruptive set of technology cost curves are converging today to reshape the future of every industry.

If you thought the last decade of digital transformation was a wild ride, buckle up. As Kelly James, GM of Energy and Utilities at Salesforce, put it,

"It turns out digital transformation was like a warm-up act for business' race to net-zero."

Sustainable transformation is the successor to digital transformation. It's about taking the lessons we've learned from dealing with disruption, data, speed, and agility over the last several years and applying them to sustainability. Using tools and processes that we already understand creates a clearer path to net-zero, one that's based on business fundamentals and is proven to work in other contexts. Just as digital wasn't driven by some moral imperative to use new technologies, sustainable transformation will surge ahead based on economics and market dynamics as much as, or more than, corporate altruism. This is no different than in every previous agricultural and industrial revolution.

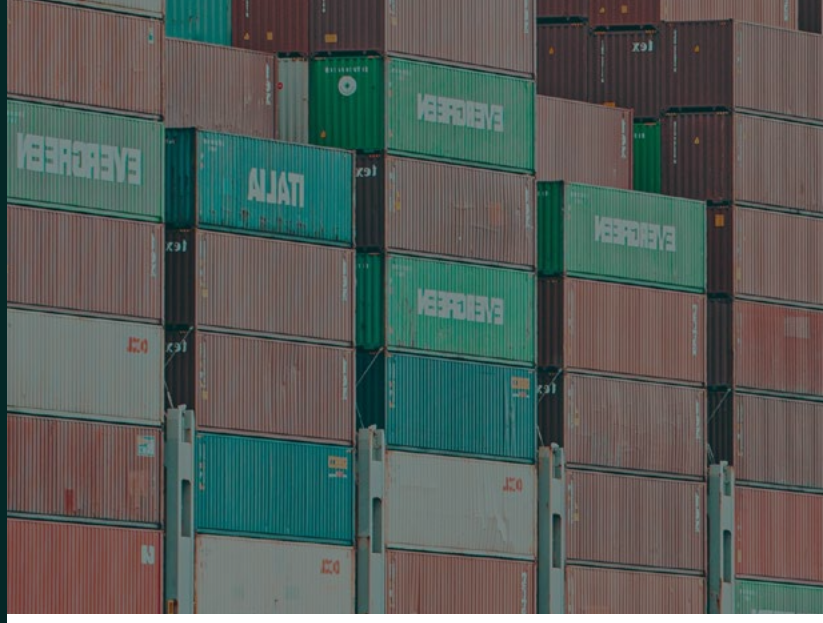
This transformation is different because the solutions companies must pursue to reach net-zero are the same as the ones they need to implement anyway to address **three major challenges** shaping the most uncertain decade for business in memory.

CHALLENGE 1

Fossil fuels have high, unpredictable costs that endanger business continuity. They are leading to an ecosystem collapse that endangers every company, and they keep organizations heavily dependent on a fragile global supply chain.

Solution

A race to decarbonize through clean energy independence, defined by cleaner, cheaper, "ownable" power supplies that are produced closer to the point of use, have predictable prices, and that companies can better control.



CHALLENGE 2

We can't count on just-in-time supply chains and cheap materials. COVID-driven logistics disruptions and geopolitical shocks have revealed the fundamental fragility of our global infrastructure. Materials prices are surging and unpredictable. Even common goods like paper cups are becoming nearly impossible to find.[3] ***"Every commodity,"*** said Ann Tracy, a sustainability leader at a major consumer products firm, ***"must now be treated like the precious resource it is."***

Solution

A transition to circularity through resource independence that shields companies from rising materials and supply chain costs and minimizes unnecessary dependence on third parties. This is driven by the electrification and automation of manufacturing and transportation, affordable and sustainable materials that are "grown" in a lab instead of extracted from nature, improved production economics, and producing and reusing materials closer to customers.

CHALLENGE 3

The benefits of net-zero are long-term, but investments are needed now. Significant resources will be directed to decarbonization through clean energy independence, and circularity through resource independence, but results won't be immediate.

Solution

Digital long-term value business models that see products sold as a service or subscription and services transitioning to outcome-based contracts or consumer experiences. Companies that switch from spikey, transaction-based revenue to long-term, predictable fees will gain greater certainty around future cash flow so they can invest with confidence. Firms also get more control of the full product lifecycle, using that new power to create efficiencies through data and technology. Savings are passed along to customers with competitive, lower prices.

The challenges listed here are very real, but the solutions may sound fantastical or unachievable. Yet, in the words of author William Gibson, ***"the future is already here, it's just not very evenly distributed."*** Today, there are large-scale, tangible examples of each of these three sustainable transformation goals in some of the world's largest companies and most innovative start-ups.

What this all means is that sustainability is not just about future generations; it's about future-proofing businesses today. It's not just the question of whether there will be any economy at all in a world ravaged by future climate catastrophes, but whether your business will fail or rise above this decade's volatile markets and the inevitable progress of emerging technologies.

Changemaker Perspectives:
Insights and Ideas from Leaders in Our Sessions

"Renewables aren't free of problems: they're intermittent if the sun doesn't shine or the wind doesn't blow. But these challenges create exciting opportunities, such as to develop new energy storage technologies. New challenges and new business models go hand-in-hand."

Aashna Mehra
New Energy Capital Partners

"The scientific community can address sustainability problems more effectively than what the general public perceives. The challenge lies in communicating these scientific possibilities with the greater community."

Simon See
Head of NVIDIA AI Technology Center and AI Nation at NVIDIA

"Where I see a big opportunity is for the combination of two different skill sets: the digital skills of the IT team and the skills of environmental scientists. We need to create scalable tools that accomplish the goals of environmental science that can be used by non-experts."

Francesco Ferrero
Director, IT for Innovative Services Department at Luxembourg Institutute of Science and Technology

Three Forces Driving in One Direction

With the world's largest organizations caught between the three tectonic forces of an impending climate crisis, fragile global infrastructure, and innovation's relentless march, the question is not whether this will happen, but when. How, though, do we pay for a transition that's fast enough to make a difference for investors and the environment?

First, we have to realize that the status quo is actually more expensive than the cost of change.

Companies are torching stacks of money every time they pay for fossil fuel energy or let waste hit our landfills and oceans. Burn a barrel of oil and it is gone forever. You always have to keep paying for more if you want the lights on. You can never tell how much energy is going to cost, or if prices might swing so high that they endanger your company's survival, as has frequently happened in the shipping and transportation industries.

So why stick with the status quo when companies can invest in—not merely spend on—renewable energy sources that are built once and provide "ownable" power at a stable, cheaper price for 30 years? Why pay unpredictable rates again and again for the same raw materials customers are tossing in the trash when they can be recovered and reused? Why extract raw materials from nature when they can be sustainably "grown" in factories using proven and increasingly affordable green chemistry techniques?

Well, it's because we've all internalized waste, inefficiency, and volatile input prices as simply a cost of doing business; a law of physics that can't be broken.

Technology is overturning these assumptions, and with it, what's considered business-as-usual for every company. Even if you're perfectly fine continuing to pay these costs forever, just ask yourself what would happen if one of your competitors significantly cut energy and materials costs and passed the savings along to their customers. Everyone in the industry, including your company, would be forced to respond.

"We don't have sustainability costs, we have sustainability investments," said Jonathan Gill, Global Sustainability Director at Unilever. ***"We invest in sustainability to future-proof our business—the same way we do for employee training, factory or office development. Consumer demand, regulatory requirements, and weather patterns are all shifting and will make this a good investment."***

If this seems theoretical, consider the automotive industry. That's exactly what Tesla did to drive traditional car manufacturers into electric vehicles' (EVs) warm embrace. EVs are becoming cheaper and easier to manufacture. They require fewer parts, last up to five times longer, and have a lower total cost of ownership.[4]

A Shot in The Arm, Not an Insurance Bill

We should view investments in sustainable transformation as an unprecedented business opportunity for the entire world, not an insurance check we must begrudgingly sign. Estimates of the investments needed to get to net-zero by 2050 range from $2 trillion to $9 trillion or more per year. But it's not like this money is a simple expenditure.

Those trillions will be paid by companies and governments to other firms who will in turn cycle them back into the economy.

Every liability, basic economics teaches us, is someone else's asset. After decades of slowing global growth, it would seem a historic round of global investment would be just the shot in the arm the economy needs.

So why the hand wringing? It's because some companies have more work to do than others if they want to be net beneficiaries of sustainable transformation instead of net payers.

"All companies must step up to protect our most vulnerable communities. There are major losers every day, especially when it comes to the impact of climate change. But if we sweep those harsh realities under the rug, it prevents us from actually tackling some of the most important global sustainability challenges."

Sunya Norman
Vice President of ESG Strategy and Engagement at Salesforce

"This sustainable transformation journey is happening and those businesses leading the way will have a clear long-term competitive advantage as climate innovation translates to stronger outcomes for all stakeholders."

Tara Hemmer
SVP and Chief Sustainability Officer of WM

Whatever your views on climate change or its causes, the invisible hand of the market will win the arm-wrestling contest with any company that doesn't respond immediately to the very real competitive shifts that will also deliver a better future for people and the planet. In this new paradigm, sustainability becomes the single biggest driver of system-wide innovation. It is a fundamental redesign in value creation and markets, not just a shift towards greener tools or practices. Businesses led the way into the situation we find ourselves in today, and they will lead the way forward.

But just how long do businesses have to get their acts together?

Climate Change

An intergenerational struggle to reach net-zero, completely decarbonizing our economies to prevent the worst effects of rising global temperatures.

2030

2050

The Climate Crisis

The urgent race to cut global emissions by half before 2030, or risk global warming becoming a runaway train no amount of investment can stop.

The global consensus is that we must cut human-made CO2 emissions to zero by 2050 to keep global temperatures from rising 1.5 degrees Celsius above pre-industrial revolution levels. Doing this could avoid the worst consequences of climate change. Global climate experts have warned that this temperature threshold is supported by a strong scientific consensus and not just a talking point for climate advocacy.[5]

This relentless, intergenerational march to a net-zero 2050 is our effort to grapple with climate change. But as the world's leading organizations plan for 2050, there's one way most of them are missing the mark. They fail to differentiate between climate change and the climate crisis. They forget that there are targets we must hit in the next eight years in order to have a chance of getting to 2050.

"I think the energy transition, being multi-decade, cannot and should not take away the urgency of what we have to get done this decade," said Apoorv Sinha, Founder and CEO of Carbon Upcycling Technologies.

The Intergovernmental Panel on Climate Change (IPCC) says that before we hit net-zero, we first must hit **"net-fifty,"** or cut 50% of global emissions by 2030 at the latest. Otherwise, climate change will become a runaway train that no amount of investment can stop. This is the climate crisis.

"There are so many climate activists who say that we're going to be in bad shape if we don't stop doing this or that to get to net-zero by 2050," said Neil Hardwick, CEO of the non-profit technology and innovation think tank, RethinkX. ***"How ridiculous! Few know where we will be by 2030, let alone 2050. Anyone who's worrying about 2050 is missing the whole point. We could be in a completely different situation in five- or seven-years' time, forget 28 years from now."***

Mr. Hardwick's comments are as much about the impending threat of the climate crisis as they are about the relentlessly advancing technological innovations that can overturn business models all on their own.

"Sustainability is truly the most all-encompassing, all-pervasive issue that we humans will face in our lifetimes. It's truly a test of our humanity. Are we able to prove ourselves as sacrificing and giving people? Do we know what it means to love and care for living beings beyond our own time?"

Apricot Tang
Sustainability Tech GTM Lead
Salesforce Business Group at Accenture

Disrupting Sustainability

Since 2014, RethinkX, whose research efforts are led by technological disruption experts Tony Seba and James Arbib, has stood alone like a prophet in the desert. Unlike the climate scientists who are now getting more of a hearing, this think tank's message to business leaders remains largely unheeded. Perhaps that's because the world they're predicting, one where we not only survive the climate crisis but come out much more prosperous on the other side, is unimaginable to traditional corporate leaders.

Yet, all of this is changing as RethinkX forecasts have proven correct over many years. ***"They're the only ones getting this right,"*** said Emmanuel Lagarrigue, former Chief Innovation Officer of the global green behemoth Schneider Electric, and now a climate tech investor as Managing Director of General Atlantic's multi-billion-dollar BeyondNetZero fund.

"The point is that 80% of the technologies we need to keep the planet under global warming targets are already invented, or someone is working on them today," Lagarrigue continued. ***"The question is how quickly will they be adopted? Will the incumbents and otherwise well-meaning regulators try to slow them down, which is what they always do in a disruption?"***

State of technology needed for net-zero emissions by 2050

An International Energy Agency report on pathways to cut global greenouse gas emissions to net-zero by 2050 finds that nearly half the emissions cuts come from technologies that are still under development in either demonstration or prototype phases.

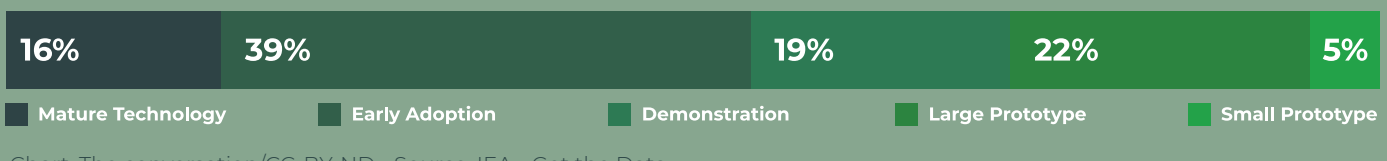


Chart: The conversation/CC-BY-ND - Source: IEA - Get the Data

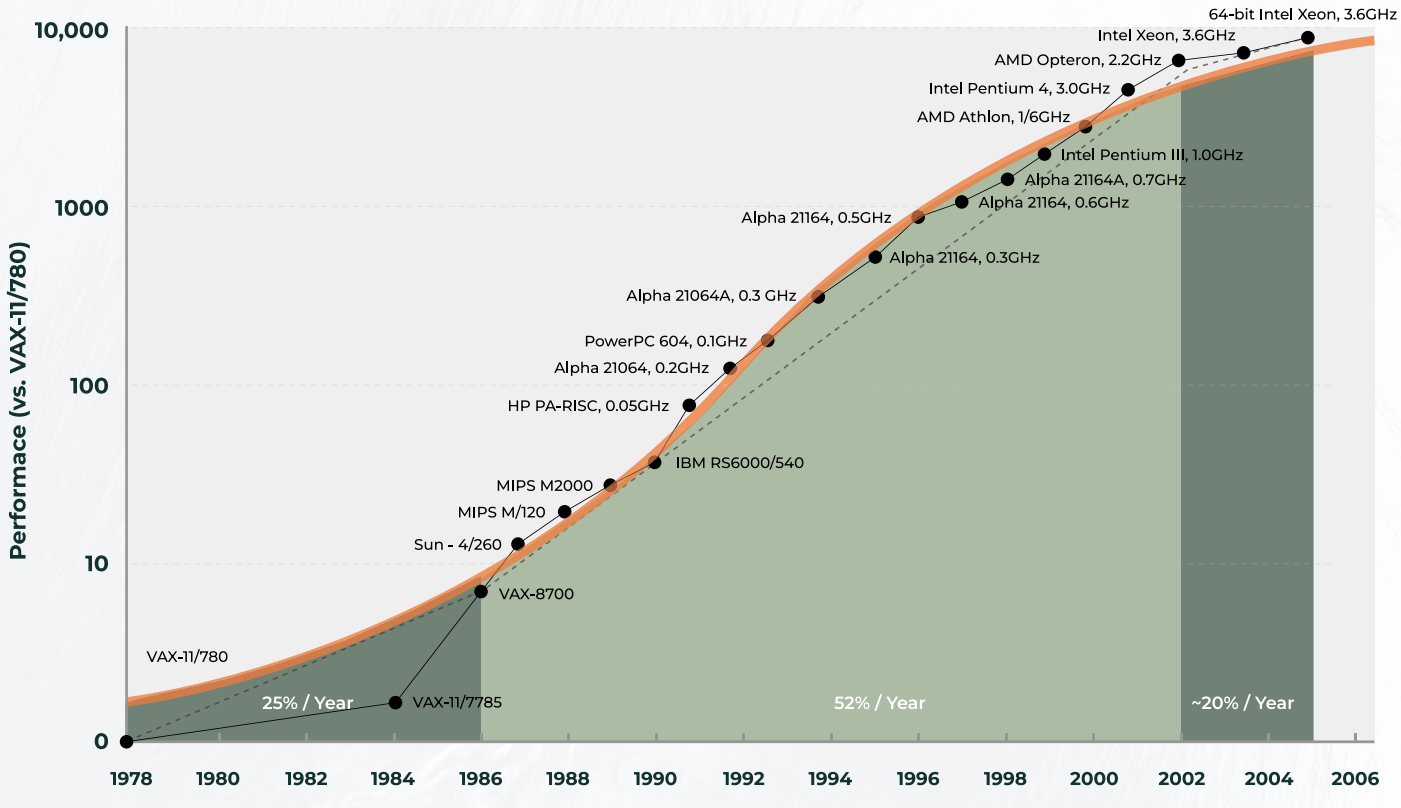
Moore's Law is Now Contagious

Lagarrigue and other investors are looking to the quantitative models pioneered by Seba and Arbib in their 2021 report, **Rethinking Climate Change**, as essential elements of their investment theses.

Arbib and Seba write (condensed for brevity): ***Conventional models underestimate the threat of climate change and the potential of technology to address it. Every year, the threat of climate change is corrected to 'worse than we originally thought' while the underestimated potential of technology is corrected to 'better than we originally thought.'***

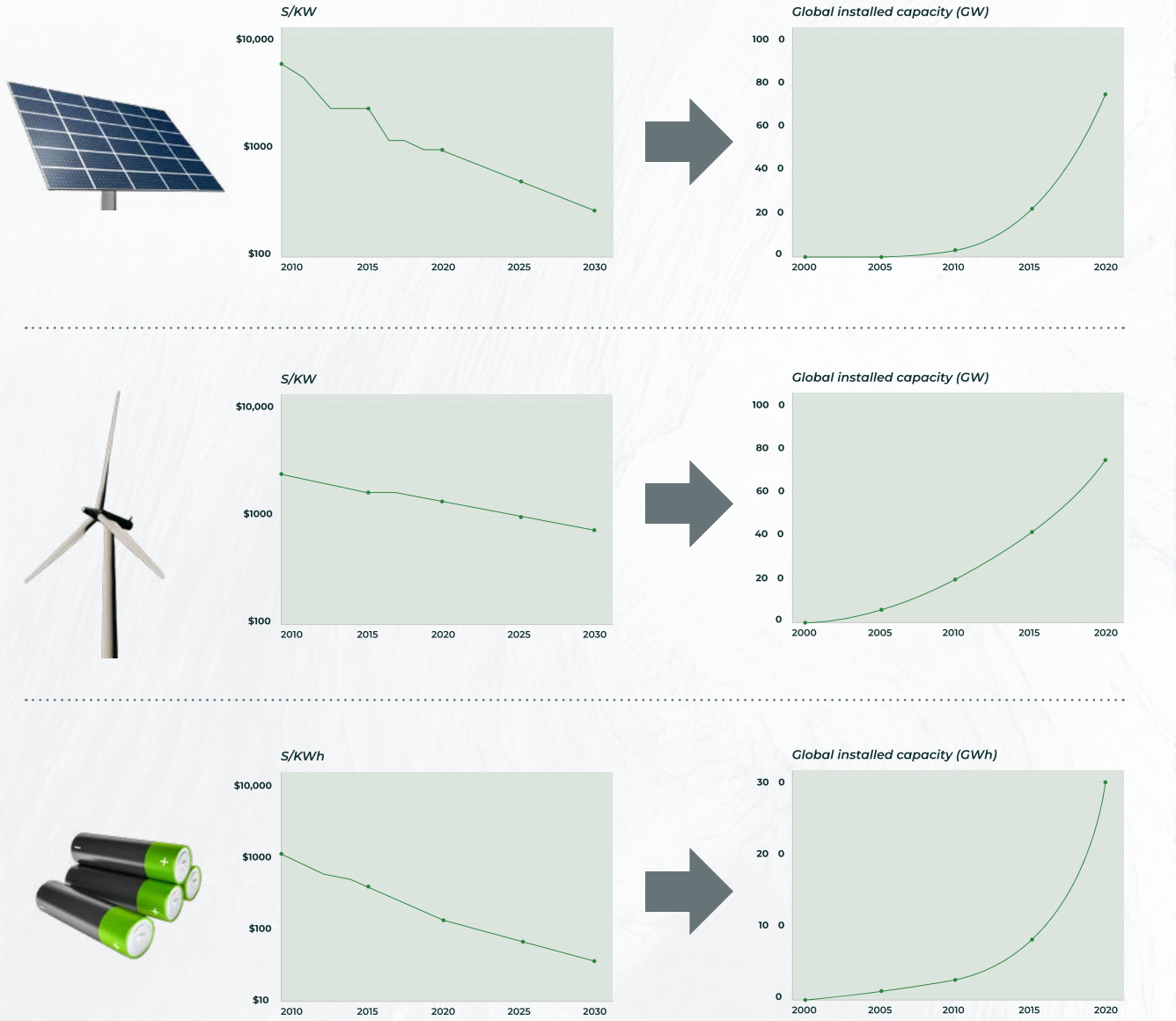
Our research shows that disruptions of the energy, transportation, and food sectors are inevitable. Solar, wind, and batteries will disrupt coal, oil, and gas. Autonomous electric vehicles providing transportation-as-a-service will disrupt internal combustion engines and private vehicle ownership. Precision fermentation and cellular agriculture will disrupt meat, milk, and other animal products. These disruptions are unfolding simultaneously, with profound implications for climate. It will be up to us to decide whether we deploy these technologies rapidly enough to avoid dangerous climate change.

One way to think of the future path of technology costs and capabilities is to imagine that Moore's Law, the idea that computer chips will double their performance for half the cost every two years, is "contagious" and spreads to other technologies. Now, many of the core tools of our modern world follow similar "S-curves" of adoption and growth that defined Moore's Law and drove the information revolution.



"Humanity and business have reached a point of disruption where we now have an opportunity to make fundamental changes for the planet's benefit," said Solange Chamberlain, COO of the Commercial Banking division at NatWest. ***"We can make changes that could ensure the survival of all living beings. We can make changes that result in a fairer society. We can make changes that result in a healthy and growing economy for people and businesses, for years to come. But it is imperative that big financial institutions make the funding available, and make major commitments of their own, to ensure these changes happen on a lasting, global scale."***

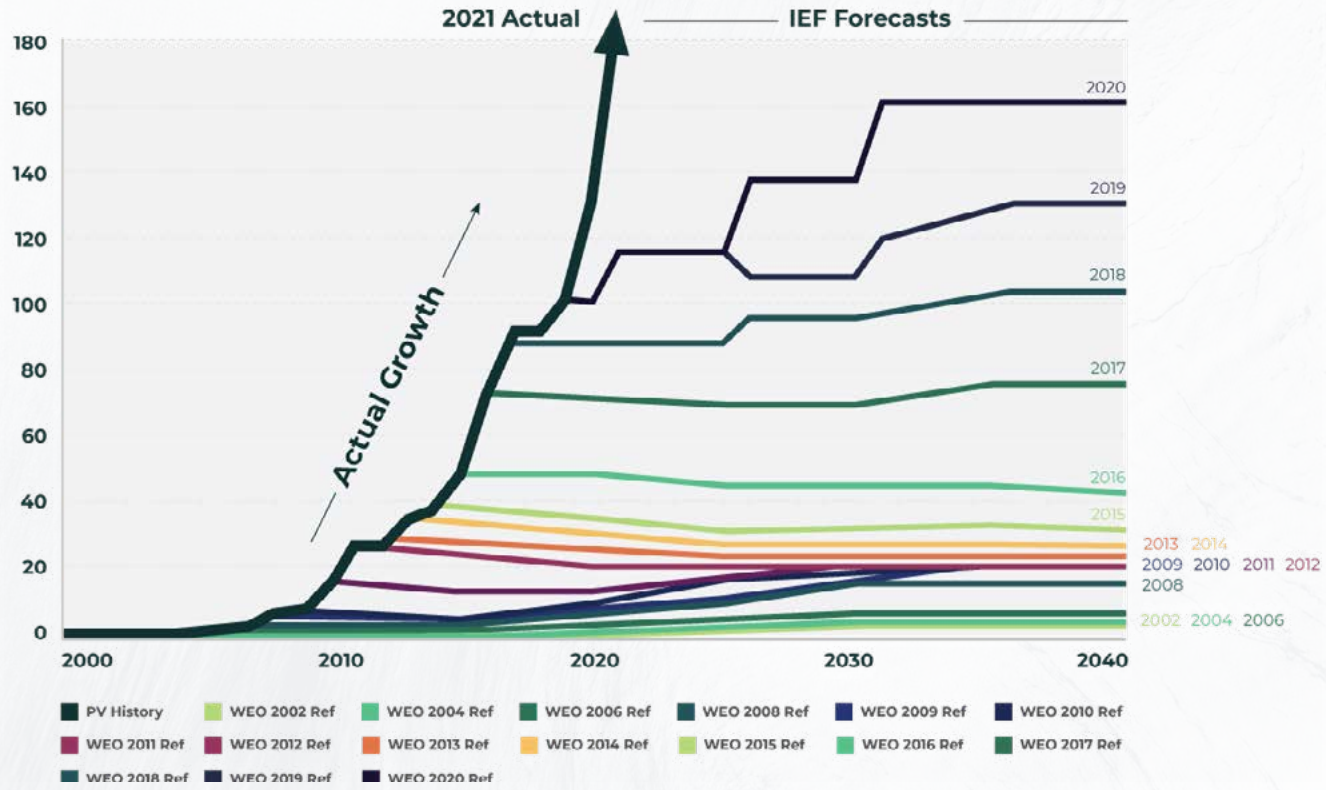
By most estimates, the cost of solar panels has fallen by over 80% in the last two decades. Wind power costs have dropped more than 50% in the last 10 years[6] and are expected to decline by an additional 37–49% by 2050.[7] Lithium-ion battery prices have plunged by 97% since 1991.[8] In most places, renewable power is already much cheaper than coal or natural gas.[9]



Source: Rethink X[2]

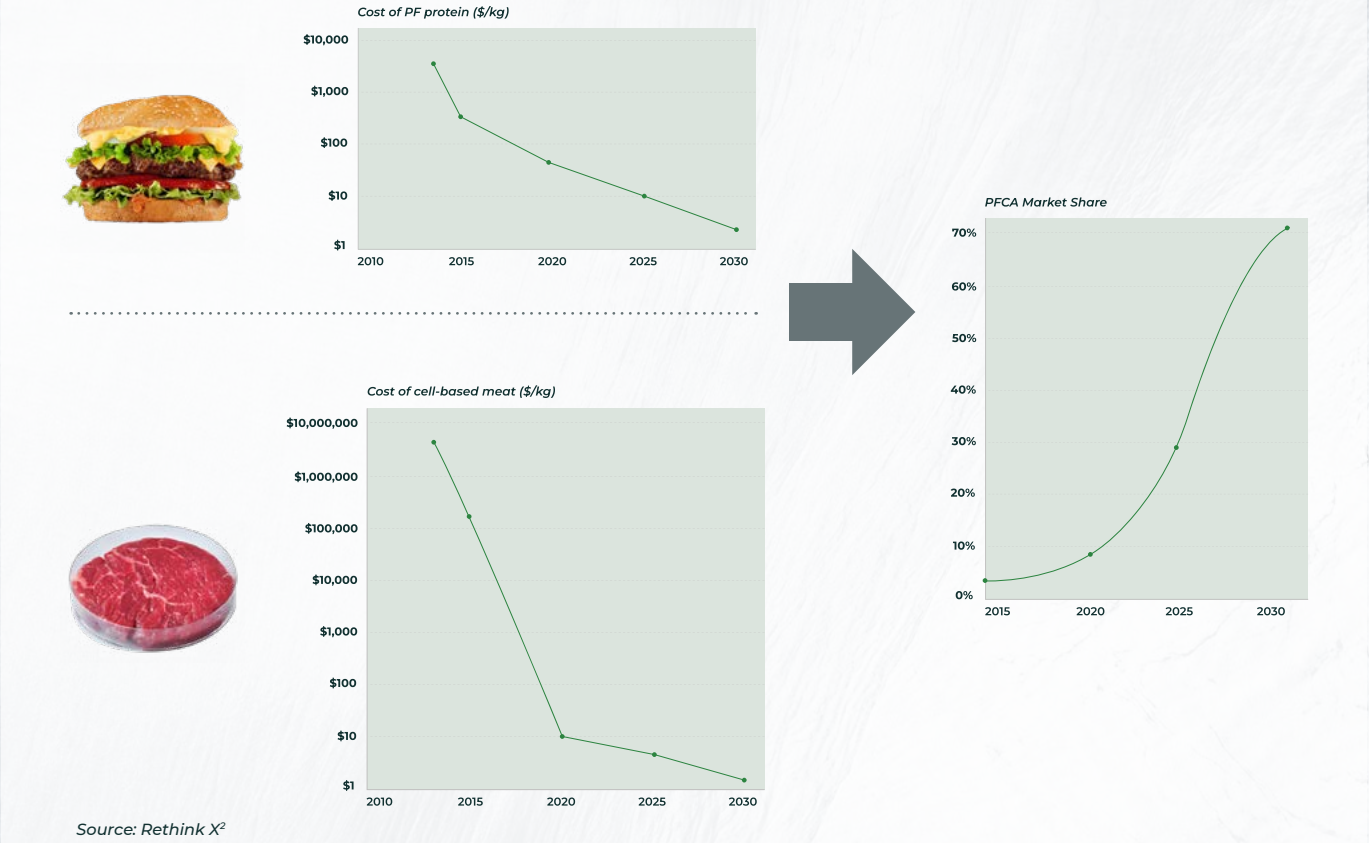
One reason more investment hasn't poured into the renewables sector is because most businesses and traditional forecasters didn't see this coming. They continued to project linear, gradual changes to the cost and quality of technologies as if the Moore's Law "contagion" hadn't been spreading (as if more and more technologies weren't following similar cost trajectories). For an example, take a look at this chart, courtesy of climate tech investor Ramez Naam, Chief Futurist at Prime Movers Lab, that shows how the International Energy Agency (IEA) has flubbed years of predictions about global solar panel installations. The chart shows additional gigawatts of new capacity per year.[10]

Traditional Forecasts Fail:
Projection vs. Reality for Solar Panel Installations



As the prices for sustainable technologies fall, demand increases, and they become accessible to new markets. This further increases demand. From there, forces like public opinion, regulation, and investment accelerate new technologies while dooming the old to decline. The cost of capital to build a new coal plant today is essentially unaffordable as a result of these forces, while renewable energy continues to boom.[11]

Other key technologies are on similar disruptive journeys, including genome sequencing. It's also increasingly cheaper to "grow" organic compounds like meat, dairy, and olive oil using precision fermentation and cellular agriculture.[12] Even chemicals can be made through similar approaches. Goodyear is working to replace oil-derived synthetic rubber in its tires with a new monomer that can be sustainably grown in labs.[13]



Source: Rethink X[2]

Wherever you look, exponential technologies, which by definition improve at least 10% a year in cost and quality, are replacing legacy technologies that can't keep up.

According to the International Energy Agency, the fuel efficiency of traditional car engines improved by less than 0.09% between 2017 and 2019, while the range of battery-powered electric vehicles *nearly doubled*.

In the same way investors are running away from coal plants because those facilities will become "stranded assets," it's high time for companies to realize that they're also sitting on assets that will be stranded within the next few years. There are machines on factory floors around the world that will become worthless because they can't keep pace with exponential technologies. Whole business models in every industry will vanish. It will be painful, but it's time to walk away from outdated assets and practices and invest in the future.

It's nothing personal, legacy technology. It's just business.

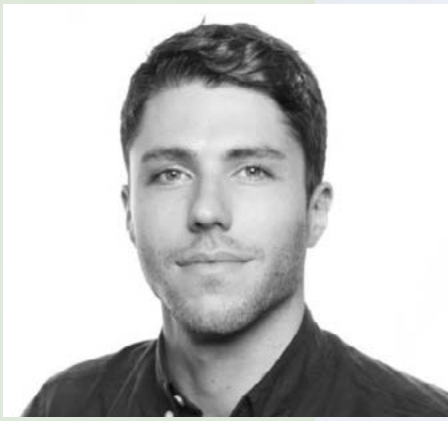
Changemaker Perspectives:
Insights and Ideas from Leaders in Our Sessions

"Finding the right talent who have the aspirations, the experience, and the tenacity to work for a start-up has been really, really tough. The hiring market is really complicated right now. As a young entrepreneur trying to build our organization, that's one of the biggest inhibitors to our success in driving sustainability in manufacturing. We need the right team to do it."

Haley Marie Keith
CEO and Co-Founder, MITO Material Solutions

"In Silicon Valley, where I work, the mantra used to be 'move fast and break things.' Recently, I've seen a cultural shift towards 'move more slowly and build things', with a focus on the long-term. Companies are starting to realize that driving sustainable impact takes time and requires involving stakeholders and working to find common ground while addressing key challenges."

Ignacio Lopez Francos
Senior Research Engineer at NASA



"I'm concerned about the amount of marketing for really small sustainable initiatives. I see clients who will really be blowing up a project they can market as sustainable. In reality, it's a small portion of what they're making. I'm concerned about companies using sustainable initiatives for marketing when it's not really what they are striving to achieve in the bigger picture. I hope that these companies expand these initiatives, and eventually strive to make these a larger part of their output."

Winona Quigley
CEO & Founder of Green Matters Natural Dye Company

Cascading Clean Disruption

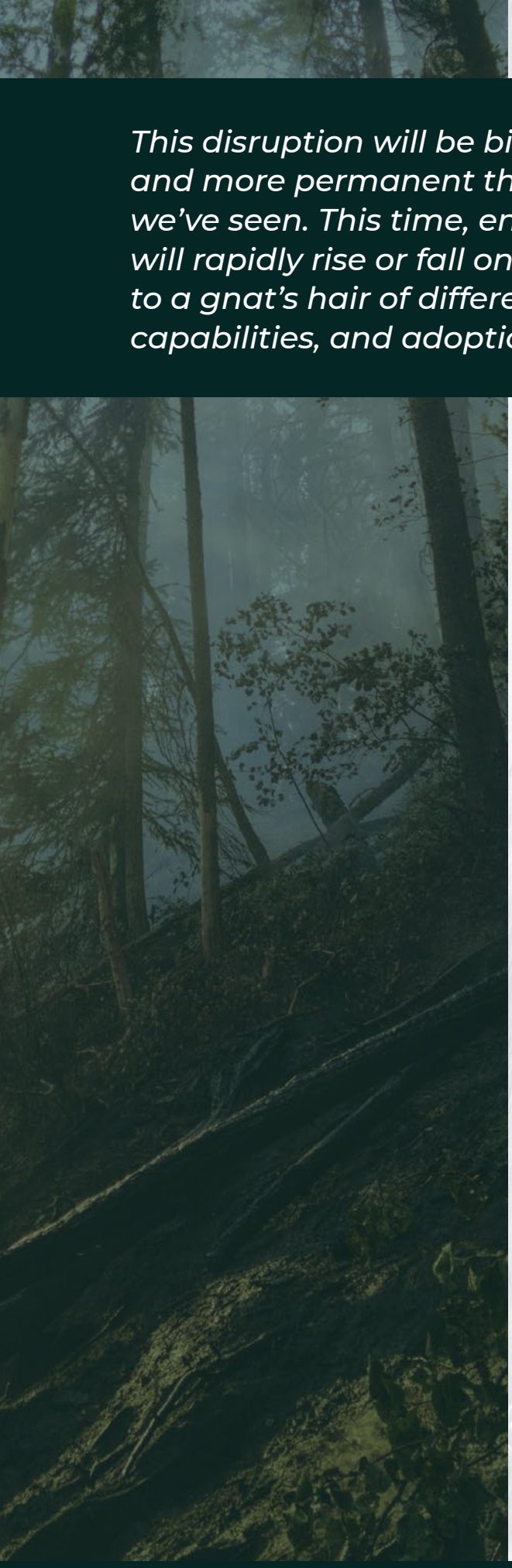
If this isn't unsettling enough for industry incumbents, it gets much more worrisome when you consider that new technologies are not one-to-one replacements for older ones, just as a car isn't a faster horse. Further, none of these technological disruptions happen in isolation. They are all interconnected in a mutually reinforcing cycle that's propelling new alternatives forward and replacing old-school revenue models faster than we imagined.

RethinkX analysts point out that

"The declining costs and improving capabilities of the new technologies... tend to render previous technologies obsolete within just 10–15 years."

In his conference presentations, Seba brings this point home by showing the audience two photographs from the turn of the 20th century. The first shot, a New York street scene snapped on Easter Sunday in 1900, is filled with horse drawn carriages. "See if you can spot the car," Seba routinely asks the audience, in a "Where's Waldo?" type way. Closer inspection reveals that there's one single car in the photo, as this was only a couple of years since the introduction of the first consumer vehicles to the US and eight years before the first Ford Model T rolled out of the factory. He then switches to an image of that same street captured just 13 years later. "Now," he says with an impish grin, "see if you can find the horse." Only one beleaguered horse remains, hiding in plain sight amid a sea of cars.

This is the speed of transformation businesses must prepare for as we navigate from an age of waste and carbon to one of self-sufficiency, resilience, and balance with nature. Some industries will tip sooner than others because technologies relevant to them are further ahead on the S-curves of disruption. Others will get sideswiped because their margins are so slim that even a small market dislocation can undo them.



This disruption will be bigger,faster, and more permanent than anything we've seen. This time, entire industries will rapidly rise or fall on what amounts to a gnat's hair of difference in costs, capabilities, and adoption.

"We were talking to one of the largest dairy companies in the world," said Neil Hardwick, "***and they realized that a huge part of their final product was sold in the form of powdered milk that goes into industrial foods."*** That milk powder, basically dairy proteins, represents only 3.3% of a glass of milk. Precision fermentation can bypass the cow and create just the milk proteins in a way that will make the economics of cow milk obsolete. This isn't science fiction. Precision-fermented cream cheese and other dairy products are already on the market in the United States and other regions.[14]

Business is also seeing wider adoption of, and unprecedented investment in, carbon technologies. These include a variety of emerging hardware and software solutions that help businesses identify, measure, mitigate, sequester, or reuse carbon emissions to meet climate and regulatory goals, while improving operational and financial outcomes. Carbon technologies are being deployed by organizations worldwide to capture CO2 from the atmosphere, industrial energy flows, and waste streams. The CO2 is then sequestered in rocks and soils, or converted for use into products such as plastics and concrete, according to the International Energy Forum.[15]

The story of disruption in the age of sustainable transformation is not the familiar yarn of corporate behemoths being undone by a thousand cuts from a thousand start-ups. This disruption will be bigger, faster, and more permanent than anything we've seen. This time, entire industries will rapidly rise or fall on what amounts to a gnat's hair of difference in costs, capabilities, and adoption.

Nine Sustainable Transformation Technologies

01

AUTONOMOUS VEHICLES
Along with ride-hailing services, autonomous vehicles will provide mobility with fewer vehicles on the road, consuming less energy.

02

BATTERIES
Battery technology has improved exponentially in recent years, making electric vehicles and renewable energy storage affordable and practical.

03

CELLULAR AGRICULTURE
Cellular agriculture is the production of animal-sourced foods from cell culture using organic molecules, according to New Harvest.[16]

04

ELECTRIC VEHICLES
EVs are becoming much more economical and energy-efficient than gas-powered cars, with zero emissions at the tailpipe.

05

GREEN CHEMISTRY
Green chemistry will usher in an era of made-to-order medicines and replacements for petroleum-derived products.

06

SOLAR TECH
Solar has grown rapidly in recent years and is expected to grow 20% in 2022, with sector investment reaching $170 billion.[17]

07

PRECISION FERMENTATION
Synthetic biology allows organic substances to be grown in labs, not fields, and could provide the world with cheaper, sustainable foods.

08

WIND
2022 is expected to be a record-level year for wind power and battery installations to replace fossil-fuel-powered plants.[18]

09

CARBON TECHNOLOGIES
Tools that identify, measure, mitigate, sequester, or reuse carbon emissions in valuable products, like cement and jet fuel.

Please see end notes in Appendix for attribution of #16, #17, #18

Other key technologies that drive SBT

5G
5G connectivity, with increased speed and lower latency, could help reduce CO2, save water, and connect efficient smart cities.

3D PRINTING
Super-efficient, local manufacturing can save on transport costs and help create closed-loop material uses.

AI & AUTOMATION
AI is a major energy consumer, but can help make factories, smart cities, and agriculture more efficient to reduce emissions.

BLOCKCHAIN
Decentralized computation, data storage, identity, trust architecture, and value creation and exchange mechanism.

CLOUD COMPUTING
Data centers and cloud computing helps reduce hardware footprint and enables us to use software and apps more efficiently.

INTERNET OF THINGS
As billions of internet-connected smart devices come online, we'll continually optimize their performance and energy usage.

Changemaker Perspectives:
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"It's very difficult for a lot of companies and governments to define what is actually sustainable and what is not. Is wood sustainable? Is our plastic sustainable? There are too many opinions on different aspects and different types of materials. We must pursue a model that structures what sustainability is for all, not just a definition, but a set of scientific international protocols. It's the only way to really achieve it."

Pablo Vidarte Gordillo
CEO at Bioo & Arkyne Technologies

"An opportunity for many industries is to connect to the usage of its products. How might the energy industry better ensure products are being used in a more sustainable way? Instead of relying on consumers to manage the use of gasoline, how about the oil company combusts the fuel on site in a clean way to produce electricity? Turning scope three emissions into scope one emissions could help us gain more efficiency and sustainability."

Deanna Zhang
Tudor, Pickering, Holt / Independent

"The biggest business opportunity is for companies to find strategic medium-term projects that allow them to decarbonize their supply chain. How do you go from buying carbon credits to implementing new technologies and new things that can result in lower emissions?"

Maddie Hall
CEO & Co-founder at Living Carbon

How Digital Drives Sustainability

The sustainability era brings a host of new challenges, but it's not uncharted territory. The last decade of digital transformation provides a problem-solving blueprint to profitably address planetary woes while fixing business pain points. We call this approach **sustainable transformation**, the successor to digital transformation.

"I tell boards all the time that this is not old school environmentalism. This is not just about reporting carbon usage or hedging against investor activism. Sustainability is a real management discipline."

Evan Harvey
Global Head of Sustainability at NASDAQ

This new wave of transformation enables companies to take the powers of digital technologies and focus their energy on clearer, more ambitious goals.

"Companies that have embarked on their digital transformations required a vision, required technology, required data, and required a culture that embraces change," said Jitendra Kavathekar, a Global Vice President at Salesforce, who leads the firm's partnership with Accenture as well its broader portfolio of sustainability collaborations. ***"If you've already gone through that or are going through it, you've got all that's necessary to think about sustainability as a key driver for your vision."***

Where Growth Meets Net-Zero

Sustainable transformation is about using new technologies to compete in a way that also mitigates existential business risks like climate change. It's about fusing purpose and profit in every product or service.

The challenge is, under the market's current rules, purpose and profit don't naturally overlap in all places or over all time frames. Policy changes are needed to address this, and businesses should aggressively advocate for them. But in the meantime, strong business cases exist for sustainable transformation goals in the places where they already converge.

"What's frustrated me is that too many companies are waiting for regulators to act before they move. The private sector created things like Bitcoin that we once imagined a government would have to make," said Adam Muellerweiss, Chief Sustainability Officer of battery manufacturer Clarios. ***"Why can't people and companies also lead the way in finding new markets and opportunities for sustainability? It shouldn't take a government to tell us what to do."***

The largest profit-purpose overlaps that companies can act on today include:

- **Decarbonization through *clean energy independence.***
- **Supply chain reliability and waste reduction through *resource independence.***
- ***Resilience* that future-proofs businesses and adapts to climate impacts.**

While the terminology may be new, the playbook is already in action and delivering results today. Take O-I Glass, for example.

The New “Green” Glass Bottles

The Ohio-based company is one of the world’s largest manufacturers of glass food and beverage containers. Making them traditionally requires furnaces the size of a high-school gymnasium that must operate nearly 24/7. While modern technologies can make glassmaking less carbon-intensive, it still requires massive economies of scale to be cost-effective. This creates a series of production and flexibility challenges.

Big vats need large, expensive factories. This |requires production to be centralized while |finished goods are shipped nationwide—which isn’t cheap, reliable, or clean. From an operations standpoint, it can be difficult to adjust to fluctuations in demand when the only production sizes on offer are XL, XXL, and XXXXXXL. Not anymore.

“We figured out how to make glass differently,” said Randy Burns, Chief Sustainability Officer of O-I Glass. ***“We took a process that required something the size of a high school gymnasium to melt ingredients and created one that’s the size of a large truck trailer. We developed a furnace that can be turned on and off and makes smaller batches cost-effective. The new furnaces are modular, can be built quickly, and potentially be located nearby or within customers’ facilities.”***

This innovation addresses many challenges that have faced the glass-making industry. Smaller batches mean more flexibility to balance supply with demand. Moving production closer to consumers cuts shipping costs and makes it easier and cheaper to recycle glass. This, in turn, reduces the amount of new materials glassmakers have to buy. When paired with electricity from low-or-no-carbon fuels, these technologies have the potential to transform the global carbon footprint of glass containers.

This is a meaningful step in the direction of true resilience, another sustainable transformation north star goal.

“Resilience is acknowledging that we’re in a tough situation as a planet and as a business community. But resilience also allows us to change the things we’re doing that created this mess and design solutions that keep us safe. How can we make it so that our coastal cities have a better chance? So that automotive companies can survive into the future? So that the waste that goes into a landfill isn’t being thrown away, but getting recycled or diverted? Somehow the idea of ‘sustainability equals resilience’ resonates a lot more than the way we typically talk about. It’s the idea that we’re going to make the best we can out of everything.”

Bruce Pon
Founder and CEO of Ocean Protocol

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"We're not in the run-up to climate change, we are already at the impact stage of climate change. As with COVID, people only react when they've got the fire burning at their door."

Konrad Dobschuetz
Head of Digital Innovation, Customer Solutions and BIOME Lead UK at Novartis, Team Lead

"Companies might suddenly start to care when employees and shareholders are asking for ESG accountability, or because SEC mandatory climate disclosures may be looming. That's what makes people move. Those outside factors matter very much."

Avery Schlicher
Director of Sustainability Solutions at Salesforce

"Sustainability is core to the long-term growth and success of modern companies. Every industry must do its part to create more sustainable business practices and products. I am proud that the life sciences industry is responding to this global challenge and working for a more sustainable future."

Leonard Robinson
Engineering Team Lead at Cytiva, a Global Life Sciences Leader

The Goals of Sustainable Transformation

Just as no organization was untouched by the oil revolution, no company will dodge the fundamental changes required for sustainable transformation.

Things can't stay the same when human survival depends on cutting global emissions by 50% this decade. How can any industry not change when the most fundamental things about it—what's produced, how it's made, and how it's delivered to and used by customers—are being revolutionized by technology?

To harness the untapped possibilities of clean technology, we must go beyond digital-transformation-as-usual, which author John Hagel likens to "just helping caterpillars walk faster," not transforming them into an "unrecognizable butterfly." Tectonic business model shifts and product overhauls are the main goals of sustainable transformation, not merely an aspiration.

If you sell products today, you'll likely find yourself transforming those products into services tomorrow. Goodyear, for instance, is really selling fleet management intelligence to companies through the trojan horse of smart, data-producing tires. You may also just provide access to those products instead of fully selling them to an end user. Think of companies like Rent The Runway, which lets consumers borrow high-end clothing for a monthly fee. If your organization provides services, you'll see business customers increasingly demanding outcomes, and consumers demanding experiences. There will also be entirely new models of value creation and delivery we won't fully realize until a few years into the transition.

As Phil De Luna, carbon tech innovator and Adjunct Professor at the University of Toronto, puts it, ***"Reaching net-zero hinges on innovation. As a species, we need goalposts to reach. On the journey, we find new discoveries along the way. Think of the space race and all the technologies that spawned, and all the amazing innovations developed during the pandemic. By moving rapidly towards sustainability, we will discover many other things along the way."***

A transition to sustainable, digital business models is the journey companies must take to discover these new innovations. Nearly every one of the models has four common goals:

1. Eliminate waste by tying revenue to the true value provided to end users.

Costs of inefficiency that were once unknowingly borne by customers when they bought products outright or paid for time-based services will now be the responsibility of sellers. Companies that can use data and automation to cut fat from their processes while more directly addressing core customer needs will outprice competitors and reap healthier profits.

2. Prioritize more direct and longer-term customer relationships.

Long-term data collection and analysis is essential. Data helps companies better understand how customers use their products, enables the creation of digital features for physical goods, and predicts when they may break. Lasting customer relationships also mean longer-term, predictable customer payments that better match long-term investment horizons.

New data-driven products need time to get to scale and should be targeted to a customer segment that's motivated and able to pay a premium during the product's infancy. ***"Business decision-makers need to keep in mind that any sustainable initiative needs to have a growth plan,"*** said Daniela Blanco, CEO and Founder of Sunthetics. ***"You have to tackle different types of customers and investors at different stages of that product or service's growth."***

"The Internet of Things, sensors, and the large amounts of data they produce are essential to our business. Through these tools we promote more efficient processes and the mobility of the future, thereby increasing safety and the resilience of our infrastructures and reducing the environmental impact. Further, these efficiencies can also be passed along to our clients in a way that makes us more competitive and creates additional value."

Amelia Celia
Chief Sustainability Officer of ASTM, one of the world's largest motorway management and infrastructure construction companies.

3. Focus on hardware as much as software.

Much of the easy wins around software adoption and integration have already been scooped up. Reimagining the things made from atoms, not bits and bytes, and fusing them together with intelligent programming is the order of the day. For B2B companies, this can mean streamlining every part of internal processes and the way the company interfaces with customers. For B2C, it also means migrating the seamless and adaptive experiences we expect online into the physical world.

4. Take an ecosystem view of transformation, not an industry one.

Sustainable transformation is a team sport that requires a company's entire value network to play along. As Eric Adamson, Co-Founder and CEO of Tortuga AgTech puts it, ***"Systemic problems require systemic solutions. It takes all levels and all focus areas. The smallest ground-level efforts and the biggest global transformations all must be connected, all must coexist."***

Transformation requires working with unlikely players outside of your space and finding places where competitors can collaborate. Companies will need to invest in partners and suppliers so they aren't innovation bottlenecks—or find ways to work around them. They'll need to team up with complementary providers to create more holistic suites of offerings or experiences. Firms must join forces to make long-term promises to purchase renewable power and recycled materials to send powerful demand signals and scale the market.

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"Climate data is notoriously difficult to work with—there are a lot of gaps in coverage, and it's so hard to work with that people get frustrated and quit trying to solve issues. Open source is the best way to deal with this, on a platform that anybody can use. If people have access to data, they can help solve problems. That's what it's all about."

Todd Olson
CEO at dClimate

"This is investing not only in the future of us and our organizations, but in the future of humankind."

Ashish Jandial
Managing Director, Accenture

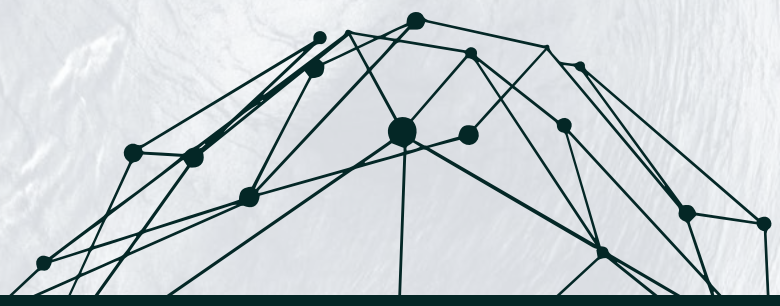
Learning From Digital Missteps

To deal with the scale and scope of sustainable transformation, we must learn from the mistakes made during the digital transformation era. Sahir Zaveri, Founder and CEO of sustainable eyewear manufacturer King Children, explains:

"If you look at how big corporations initially responded to digital disruption, the approach was, 'how do we layer in the use of software and digital capabilities to augment what we're already doing?' But that is a recipe for failure. Companies that used software as the foundation for their business models instead of treating it like an add-on ended up winning. Sustainable transformation is the same. If you try to add sustainability as an additional layer to your existing activities instead of putting it at the core of your strategy, you end up losing."

A good industrial-era analog for this can be found in the first great electrification. Before factories were electrified, for instance, all the machines on the shop floor were powered by, and packed tightly around, a single big steam engine. This meant workers were tripping over each other. It wasn't economical, though, to spread the machines out since each would need its own hulking engine. The earliest stages of electrification saw manufacturers just replace their steam engine with an electric motor, keeping the factory's machines exactly where they were, in a system called "group drive."

But electric motors were different from steam engines. They could be small enough so that each machine could have its own. Eventually, companies started doing this, allowing them to arrange equipment in ways that made production far more efficient. This was called "unit drive." While Henry Ford gets a lot of credit for "inventing" the assembly line, that wouldn't have been possible without the electric motors and unit drive. What is the equivalent in your industry when it comes to digital and sustainable transformations?



What's Your Sustainable Transformation Strategy?

"Sustainability in business is now about engineering a new operating model. The big misunderstanding is that net-zero is not exclusively about emissions reduction and renewable energy. Accelerating the transition to a net-zero world is about deploying all the solutions that get us to that net-zero operating model. This goes beyond tech and grid solutions to include nature-based and equity-based solutions, which do the double-duty of reducing our global emissions and bringing about the world we actually want to live in."

Alexis Haass
Chief Sustainability Officer, Arcadis

"In the last 10 years we have made a huge effort in getting the business community smarter on ESG issues, but we have now a long way to go in terms of execution. We have to go from theory to practice and from awareness to action."

Aniket Shah
Managing Director and Global Head of ESG and Sustainability Research at Jefferies Group LLC

Since sustainable transformation builds on digital transformation, nearly every company that has progressed past doing business on ink and paper has begun the race to net-zero.

That means that the reams of digital transformation content around agility, teamwork, silo-busting, incentives, and scaling mostly apply. You can go and read that anywhere, and we encourage you to.

What's most important about this next phase is that the means remain similar, but the strategic ends are different and more focused. While measuring carbon emissions and other negative impacts is foundational to any sustainable transformation, measurement is not the strategy itself.

"The place to start is being clear about your entire sustainability strategy," said Michael McGuire, Head of Technology Strategy and Product for Sustainability at Walmart. "***The quickest way to kill momentum is to say we're going to throw everything at the wall and measure everything. We need to start instead with a clear focus to prioritize the most impactful ideas and measure the most important things."***

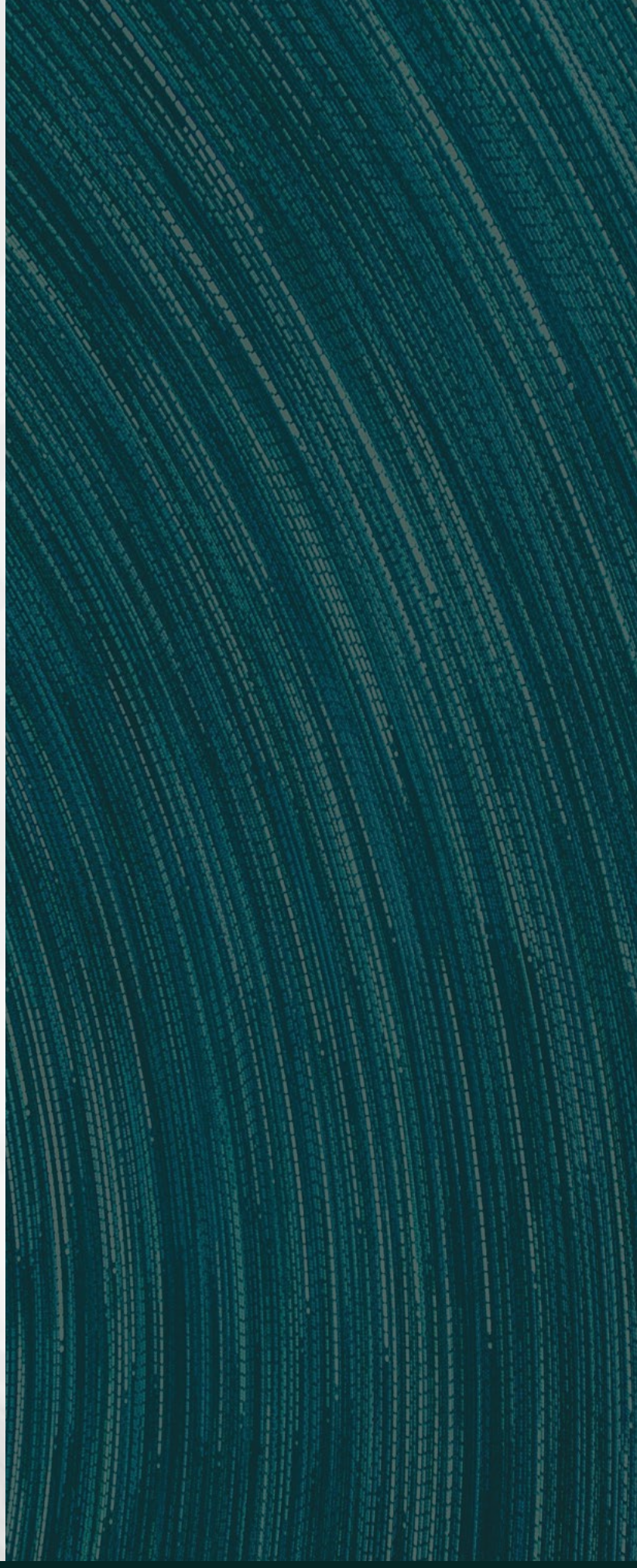
Digital transformation taught us that legacy thinking won't solve legacy problems. Charting a new course requires deep introspection. Digital transformers took many of their cues from "digital native" companies that were typically fast-moving start-ups with technology at their core. Today, there are many "sustainable native" companies blazing a trail for others to follow. The founder of one such company, Sahir Zaveri of King Children, suggests that large enterprises take a "zero-based" approach to understanding what their future businesses should look like.

Zero-based budgeting, an en-vogue accounting idea, is an analog for this frame of thinking. In zero-based budgeting, every financial line item must be justified anew every year as if the company was starting from scratch.

Imagine that you're rebuilding your whole organization from the ground up and can do whatever you want with it. Next, imagine a future that both preserves life on earth and is shaped by the inevitable evolution of technology. There are many possible futures, but the ones that meet those conditions have far more in common than not.

What does that future world need? What does it not need? If we follow the trend lines of technology costs and capabilities, what new solutions become possible? What types of customers could afford them? How would a world of abundant clean energy and sustainable materials change your definition of what's possible?

"Sustainable transformation will be a massive mind shift for those stuck in older paradigms," said Matt Marcotte, SVP and Industry Advisor, Retail and Consumer Goods at Salesforce. ***"This is almost like starting from scratch and saying that we must rebuild our businesses with sustainability as part of every single element. It's an overwhelming idea, but necessary if we're to avoid incrementalism."***



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"It cannot be the role of one person to take on sustainability for an organization, product, or entire market. The paradox is, it can't also be everybody's job that gets no attention and no resourcing either."

Brian Luciani
Head of Rise New York, created by Barclays

"We won't meet sustainability goals without both individual and collective action. The ability to empower individual consumers so they don't have to go through financial markets means they can actually offer themselves an opportunity for success within an economy, because financial inclusion is extremely important to sustainability—it's hard to see how we can have one without the other."

Christian Zimmerman
CEO of Qoins

This thought exercise helps uncover non-obvious cardinal directions your organization can follow in its transformation journey. But even if you know which way to go, how do you know when you've arrived?

Our research and sessions with more than 50 executives and science and technology experts from the world's leading organizations have identified six key strategic shifts that are common to nearly every organization's sustainable transformation strategy. Think of them like a checklist for evaluating investment decisions. The more boxes ticked, the more impactful the approach.

01	Products & Services	→	"Servitized" Products, Outcomes & Experiences
02	Cutting Waste & Carbon	→	Clean Energy & Resource Independence
03	Exponential Growth	→	Higher, Predictable Growth
04	Value Chains	→	Value Network
05	Centralization	→	Localization
06	Competition	→	"Co-opetition"

Products & Services

"Servitized" Products, Outcomes & Experiences

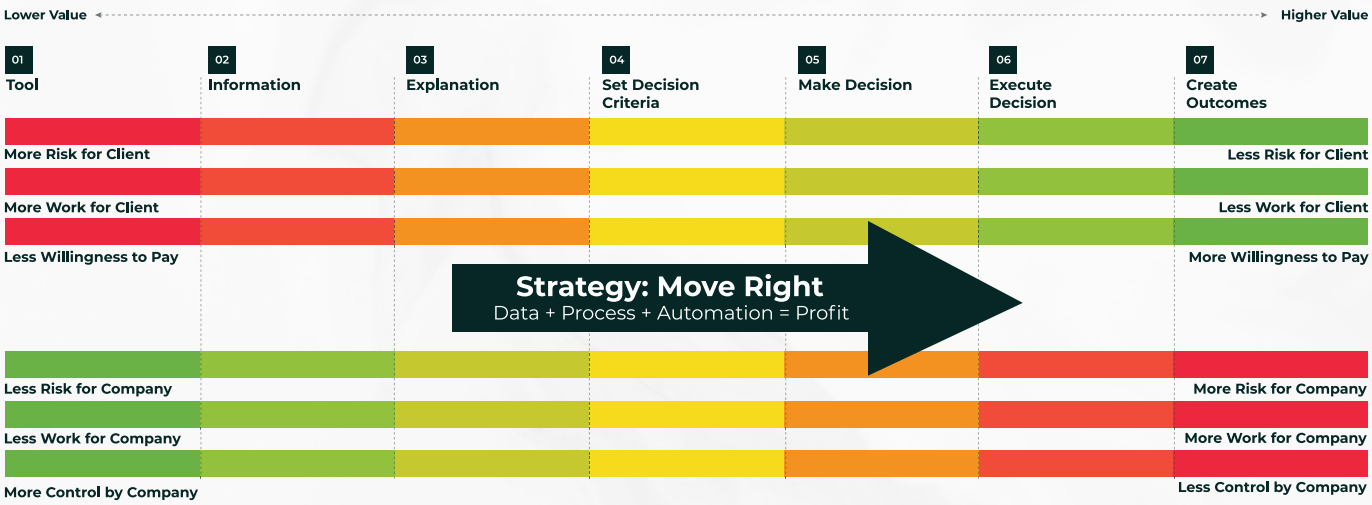
Are you selling customers a drill, or a hole? A drill can puncture a wall, but do customers want to buy a drill if you can give them the hole? The closer you can get to delivering on the actual "job to be done," in Clayton Christensen's famous formulation, the fatter the margins to be had.

For a product manufacturer, this might mean selling your product as a service, or bundling it with one. Many airlines, for instance, no longer own, or even maintain, their planes' engines. The engine's manufacturer owns them and charges for them only when they're on, in a concept Rolls Royce calls "power by the hour." None of this would be possible without the real-time data provided by cheap and ubiquitous sensors attached to those engines.

For services companies, this may mean charging for outcomes delivered instead of time spent. This is already a hugely popular practice in managed IT services, where outsourcing vendors must keep systems running smoothly to earn more or avoid losing fees. In the realm of healthcare, many insurance companies and pharmacy benefits managers are opting to pay to cure costly diseases or achieve specific health outcomes instead of buying a particular volume of expensive treatments. A 2021 survey by health technology firm Avalere found that 56% of healthcare payers had entered into at least one outcome-based contract, with 12% having 10 or more.

A consumer products company may seek to stop talking about being a lifestyle brand and actually make it real. The company can augment or replace some of its product revenue by providing digitally enabled experiences that provide lifelong memories instead of bags of forgettable stuff.

But these models involve assuming more risk, doing more work, and grappling with success factors that may have previously been out of your control. Data, automation, and intelligent service design can reduce the risks and bring some semblance of order to this transition. Below is a diagram of this value-centered transition for a data product, prepared by Forbes Ignite for a client. But you can change the names of the steps to more accurately reflect your particular product or service.



Cutting Waste & Carbon

Clean Energy & Resource Independence

All companies must cut waste and carbon emissions, but we need to make a better business case for urgent action. This is fundamentally about de-risking a company's operations by becoming more self-reliant in terms of energy supplies and physical materials.

A good example of companies taking energy independence into their own hands is Volkswagen's solar power park in Chattanooga, TN. The park features 33,600 solar panels that generate 12.5% of the plant's energy, and employs 50 sheep full-time as "animal mowers" for the grounds.

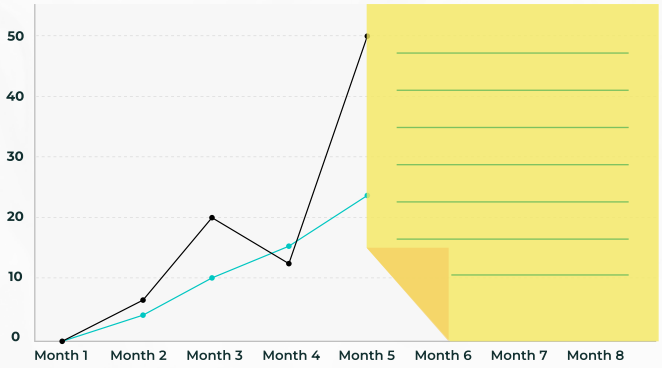
The EPA has reported that as of January 2022, participants in its Green Power Partner programs—organizations that are generating power from clean resources onsite—have generated nearly 2.3 billion kilowatt-hours of green power, equal to the average annual electricity use of 211,000 American homes.

At the same time, companies all over the world are re-evaluating supply chain resilience strategies and their dependence on others for the tools and materials they need to succeed. Enabled by technologies including 3-D printing, many companies are exploring the use of local manufacturing to move the production of materials close to suppliers and customers. Breaking this dependency in the places where it's possible will create a more predictable, lower cost-structure that makes it safer to innovate and grow.

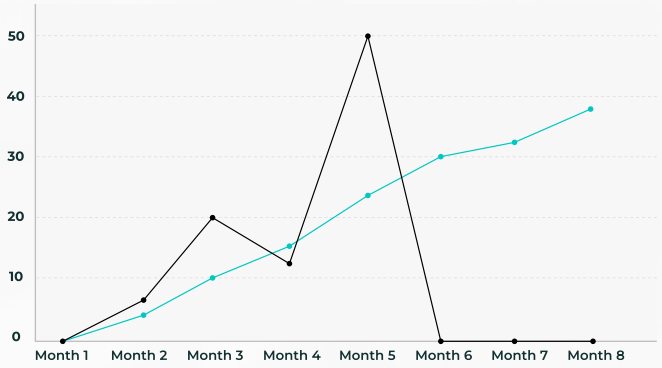
✕ Exponential Growth

✓ Higher, Predictable Growth

Imagine that the two lines on the chart below are two investment options. Which would you put your life savings into?



What about now?



Much of today's focus is on exponential growth, or business models that look like our high-flying line that crashed into the dirt. Very few companies riding that dragon can stay on top forever.

Here's a better dream. What could be possible if you knew well in advance what your revenue was likely to be, or at least the minimum "floor" for earnings? How would that give you the confidence to invest boldly and manage your business more wisely? Switching to recurring revenue models instead of one-off transactions makes this a real possibility. It means you may miss some of the market's highest highs, but you'll also avoid suffering its lowest lows.

✕ Value Chains

✓ Value Networks

"Systems thinking is a way to understand the complexity of economic, social, and ecological systems. Integrating this into corporate decisions is a key success factor for transformation towards sustainability. This holistic approach enables us to better understand the long-term impacts of our actions, which in turn fosters innovation." said Meghna Tare, Chief Sustainability Officer for the University of Texas at Arlington

There is no such thing as a value chain. There is not a simple, linear collection of entities that pass inputs down the line like a conveyor belt until they reach your hands and morph into a finished product. Pedantic, yes, but also important.

Each company actually sits within a broader network of stakeholders that influences their behavior. Behind every supplier sits another network of suppliers with their own networks of investors, communities, and stakeholders. Many of those more distant stakeholders will connect to your firm in ways you haven't imagined—and present unforeseen opportunities or challenges.

While this brings a huge level of complexity, it also provides massive opportunities. Interdisciplinary thinking and partnerships with unlikely bedfellows often bring the best results. Someone somewhere is working on a solution to your problem, but neither of you know it. Companies building more sustainable, antifragile systems must be prepared to nurture and invest in broader networks. When you do have to rely on others' tools and product roadmaps to accomplish your goals, it requires deep engagement with those organizations.

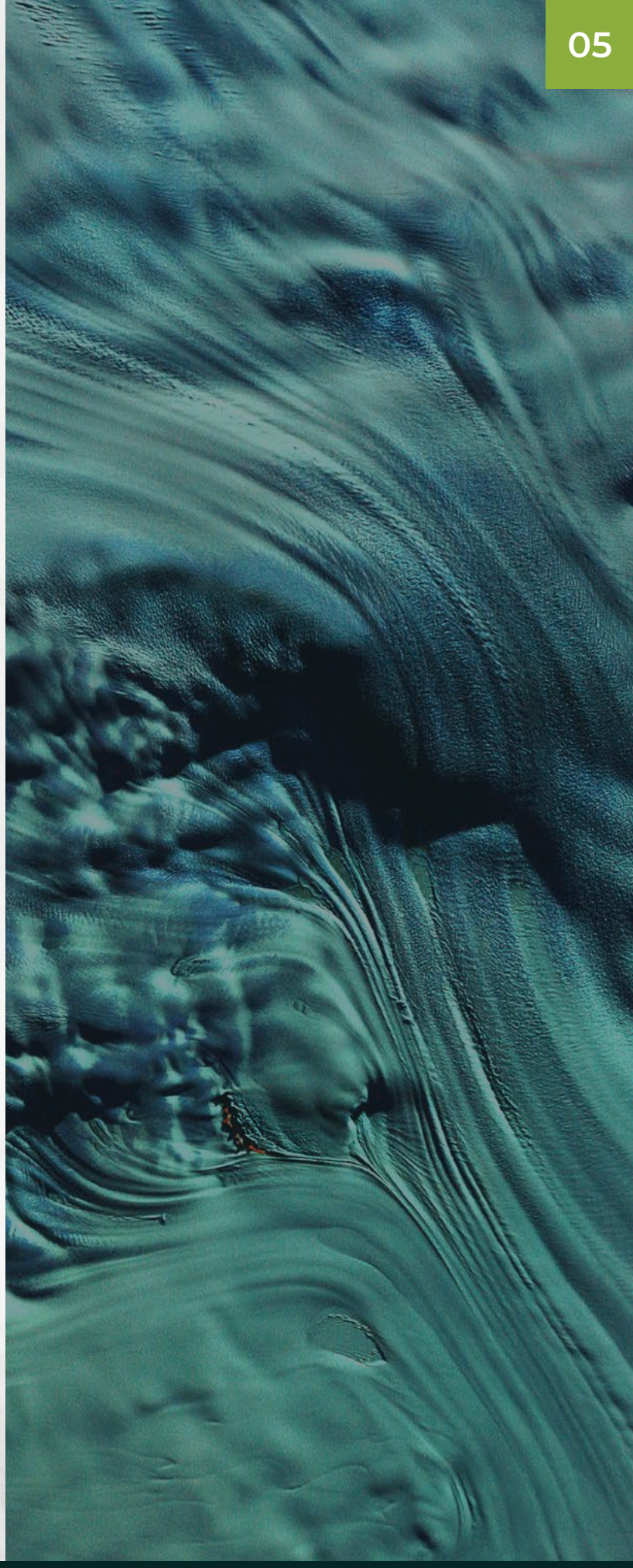
A good rule of thumb for managing this came from Farshad Family, Managing Director, Global Sustainability Lead at Accenture. ***"The big opportunity to make change happen in sustainable innovation is to ensure you're spending almost as much energy outside of your own four walls as within them."***

✕ Centralization

✓ Localization

Major transformations across all sectors, including energy, transportation, food, and manufacturing, all point to increasingly localized production. The need for companies to take their futures into their own hands, in light of a broken global logistics network, is one reason. Another is that being closer to consumers saves money on shipping and cuts emissions, while facilitating a deep customer understanding that leads to outcompeting rivals.

The technology needed for every building, patch of land, and physical structure to generate its own energy exists today. 3D printing, precision fermentation, and cellular agriculture food products make it possible to produce more sustainable goods within communities using less materials and land. Localization also provides opportunities for people who live in underserved communities, especially those that have been historically marginalized or disadvantaged.



~~Competition~~

"Co-opetition"

The rise of today's tech giants ushered in a new, fuzzier definition of competition. Many of these firms fight tooth-and-nail over one product or market segment, while collaborating energetically in other areas. As industry boundaries continue to dissolve and companies find new business models targeting different customers, they'll find themselves meeting new adversaries in some areas while finding more common ground with others.

"We're seeing the electric vehicle companies, which technically are in the automotive sector, moving into the software business," said Andrew Witherspoon, AVP of Manufacturing Industry Thought Leadership at Salesforce. ***"Some of our manufacturing customers are trying to supply the entire automotive sector, in the old world and in the new world. The pace of change, the opportunities—and the risks—are all unprecedented."***

Realizing the promise of sustainable transformation requires every company to take the same pragmatic, segmented approach to competition and collaboration seen in enterprise technology today.

"I believe there are many analogs to the quality revolution in the 20th century," said Evan van Hook, Chief Sustainability Officer of Honeywell. ***"At that time, mass manufacturing had to figure out how quality could become part of the way they did business, how multiple actors could all work together towards the same goals. That is the same pathway that sustainability has to go through. This is no longer 'vogue' - it's how companies should operate and part of their culture."***

One shining example of the benefits of co-opetition exists in electric vehicles. This critical component of reducing emissions and meeting climate goals needs smart and efficient charging infrastructure around the world so consumers will feel comfortable buying them. No single organization could fund this infrastructure or provide all the solutions required. Cooperation and collaboration between EV manufacturers, regulators, and utilities is essential.

"Sometimes sustainable innovation comes from unusual partnerships that form when organizations have a common problem they need to solve," observes Francesca DeBiase, Chief Global Supply Chain Officer at McDonald's. ***"We all benefit significantly from groups and processes that bring together a wide range of people and perspectives."***

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"One of the biggest questions is how we're going to do a good enough job quantifying and making really complex topics transparent, especially in changing consumer behavior, where consumers need bite-sized narratives. We actually need to incentivize much more complex behavior change."

Allen Kramer
Investor, entrepreneur, and Forbes 30 under 30

"How inclusive will the sustainable energy revolution be? Is it just within developed countries? Are we going to solve a regional, national, or global problem? And in solving these global problems, we must ensure we do not create another set of problems for less-developed countries."

Mushtaq Gaffar
Managing Director at Accenture

"The manufacturing sector will remain very competitive, but we'll also see a collaborative mindset among companies within the same industry using technology to create credible sustainability plans and execute against them."

Chris Chiappa
Managing Director at Accenture

How To Get Started, Right Now

"Companies can put 'Sustainable Transformation' on PowerPoint slides and have their executives signal that 'sustainability is very important to our future.' But it's actually the leadership behaviors and the tangible actions that signal what is important and truly shape organizational culture."

Lisa Morden
Vice President of Safety, Sustainability and Occupational Health, Kimberly Clark

There's one thing every business in the world can do today, for nearly no cost, to get started on their sustainable transformation journey: include sustainability considerations in every decision they make, at every level of the company. If there was one overwhelming point of consensus among the corporate sustainability leaders in our sessions, this was it.

This isn't about substituting discussion for action or greenwashing for decision-making. Once sustainability becomes a decision criterion, over time it will factor more and more into outcomes. It's also a good way to start rewiring brains across the organization to keep sustainability top-of-mind and drive culture change. Importantly, it builds momentum for bigger initiatives by showing short-term results while longer-term strategies play out.

General Motors has also taken the step of including a message about sustainability in every company meeting, a practice that started with safety considerations, but soon expanded.

"We went through a major transformation after a product safety issue. One key evolution was to simply include a message about safety at the start of every meeting. Even outside of work, we started seeing safety issues everywhere that we'd have never noticed before. It changed our mindset. Now, we are working on ways to expand the role of sustainability in everyday decision-making."

Kristen Siemen
GM's Chief Sustainability Officer

Another important benefit of engaging all levels of the workforce is attracting and retaining key talent—especially younger employees—at a time of unprecedented turnover in the labor market. Karen van Bergen, Chief Environmental Sustainability Officer at Omnicom Group and Dean of Omnicom University, explains:

"A lot of young people in the workforce deeply believe that companies should act on environmental sustainability and want to make a difference. When I took the sustainability leadership role, I was overwhelmed with messages from people who earnestly wanted to know how they could help. Companies that can galvanize the passion of their workforce to drive sustainability have a big advantage in attracting and retaining top talent."

Conclusion: There's More Than Enough Reason to Hope

"A sense of optimism is required to succeed in sustainable transformation. Sustainability is making sure we're lifting up the quality of life in an equitable way for all people, globally. That includes healthcare, access to affordable, reliable, sustainable energy, and the ability to travel to connect with family and friends and economic opportunities."

Roger Martella
Vice President and Chief Sustainability Officer, GE

As dire as the prognosis for our environment and society may be, this is no time for fatalism. If technology follows its historical adoption curves, if the forces of consumer behavior, financial markets, and regulatory action pile on to push the curves further and faster, it's possible that humanity will achieve net-zero even earlier than we can imagine.

While sustainable transformation is digital transformation's successor, there's hope for companies that haven't gone digital. In the same way that countries in Africa and Asia leapfrogged past generations of computing straight to mobile phones, your company can do the same.

The foundation of a new net-zero economy is already under construction. But since every revolution is market-driven, it's time for us to act, innovate, and build the infrastructure, marketplace, and global community we need to take us there.

Much of the investments in this new future, even if you're thinking of a 2050 time frame, will need to be front-loaded into the next few years. Realistic plans must be made today regarding our actions five to 10 years from now. Depending on your industry, the timeline may be even shorter. Remember that just a few years ago, many industry experts were still in a "wait-and-see" mode around electric vehicles and solar power.

"In many organizations and sectors, the focus seems to be on business as usual. We don't have time for business as usual," said Ashley Allen, Chief Sustainability Officer of the Swedish plant-based food and beverage company Oatly. ***"We don't have time to slowly figure these things out. We literally have to integrate this work into the fabric of our business today. We have to do things differently today. There's still a long way to go, and we have to get there quickly."***

Climate change is not only about our children or their children anymore. The latest science tells us that addressing the climate crisis and climate change is about this generation, and now is the only time we've got. What kind of world do those of us in leadership positions in 2022 want to work and live in today? What is the kind of society we want to retire in? What is the legacy we want to leave?

History presents certain moments of flux when even one person in the right position can reshape the future. Each of us also has only a brief window when our capacity to create impact is highest. What will you do with your moment? How do you want to be remembered? At this historic juncture, where history presents a window and you hold the levers, what will you do?

Appendix:

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