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A Whitepaper on Cleaner Living

A Whitepaper on Cleaner Living

A Whitepaper on Cybersecurity and Privacy

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A Whitepaper on Cleaner Living

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EXECUTIVE SUMMARY

Tematica Research® investment themes capitalize on the pain points and structural changes that arise from the intersection of changing economics, demographics, psychographics, technology, and public policy that alter consumer behavior. In response, some companies change what they do and, increasingly, how they do it, while others ignore the shifting consumer winds or are simply too late to respond effectively. Tematica themes tend to capture those companies that are on the forefront of these changes.

WHAT IS CLEANER LIVING?

Tematica's Cleaner Living investment theme focuses on the shifting preferences for what consumers put both in and on their bodies, use in their homes and workplaces, how they travel, and their overall impact on the environment. There are several factors driving that shift, including growing physical and mental health awareness amid rising concerns over obesity, diabetes, "added" sugar, genetically modified and other artificial ingredients in food, personal care, and other products, and also a rising concern of impacts of one's environmental footprint.

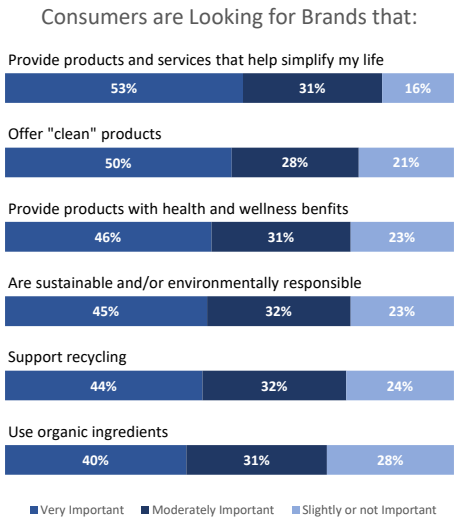
WHY NOW?

At Tematica Research, we break the economy down into three main participants: Consumer, Business, and Government. When we see two of the three pivoting towards a theme, we know we need to pay attention. When we see all three moving in the same direction, we know that something powerful is happening. In the case of Cleaner Living, not only are all three of those components shifting, but the pace of adoption is accelerating.

For example, six in ten consumers surveyed are willing to change their shopping habits[1] to reduce their environmental impact. Nearly eight in ten respondents indicate sustainability is important to them. For those to whom it is very/extremely important, over 70% would pay, on average, a premium of 35% for brands that are sustainable and environmentally responsible.

According to findings from the IBM Institute for Business Value and the National Retail Federation:

- 78% of consumers say it's at least moderately important that brands offer "clean" products that are sustainable and environmentally responsible (77%), support recycling (76%) percent, or use natural ingredients (72%).
- 73% indicate traceability of products[2] is important to them, with 71% willing to pay a premium for it.
- 57% are willing to change their purchasing habits to reduce the negative impact on the environment, and among those who say sustainability is important, that willingness jumps to 77%.
- Over 70% are willing to pay a premium for brands that support recycling, practice sustainability, and/or are environmentally responsible.



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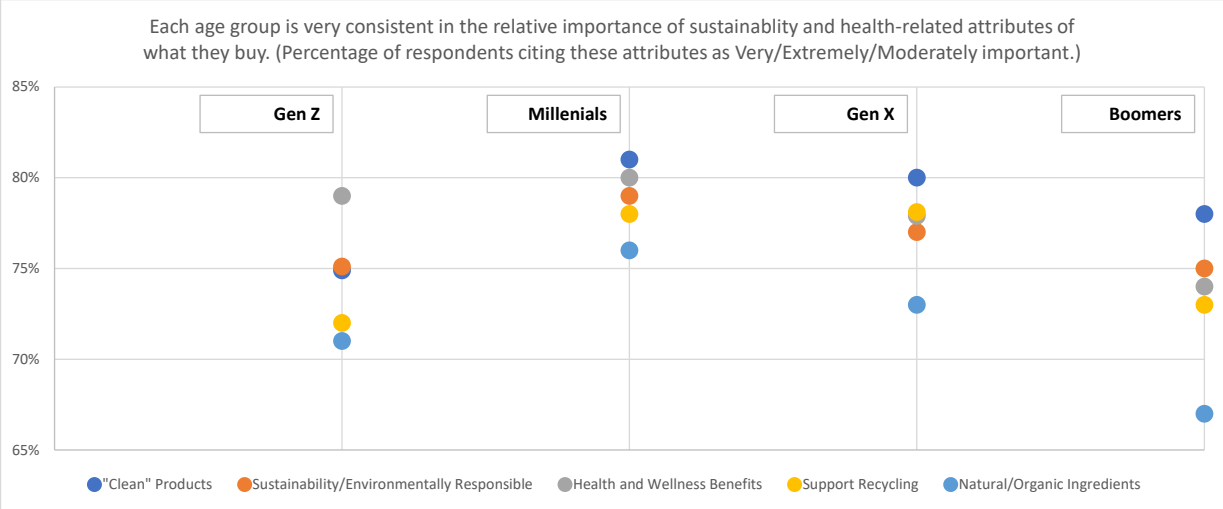
While Millennials are thought to be driving the charge in sustainability awareness, the findings reveal that sustainability, environmental, and or personal wellness goals are significant factors in purchasing decisions in every age group.

In response, some companies are repositioning their product and service portfolios to capture this evolution in consumer spending preferences. For example, **Ford Motor (F)** and **General Motors (GM)** have invested billions in the EV space as demand for those products escalates. In addition, new companies, such as **Oatly (OTLY)**, **Zevia (ZVIA)**, and **The Honest Company (HNST)**, have gone public as consumer demand for their products has driven both sales and overall company valuations. Even the behemoths, such as **PepsiCo (PEP)**, **General Mills (GIS)**, and **Unilever (ULVR-GB)**, are tilting their product offerings to capture this shift in consumer spending.



Concerning examples in public policy, there have been agreements such as the Kyoto Protocol, the Paris Agreement to reduce greenhouse gas emissions, and the European Green Deal, which raised targets on reducing emissions to 55% of 1990 levels before 2030. In April 2021, President Biden announced that the USA would aim to cut emissions by 50-52% below its 2005 levels by 2030, doubling President Obama's pledge. In the US, over six hundred local governments[3] have detailed climate action plans that include emissions-reduction targets.

These are just a few examples of the changes we see around the world. We will dig into them in greater detail in the pages to come.

WHY THE CONSUMER FOCUS?

While all three components of the economy are accelerating into the Cleaner Living theme, we are implementing the theme with a focus on Consumer Spending. This theme is driven by evolving consumer preferences which are either responded to, reinforced by, or incentivized by companies and public policy, making consumer spending a clean and clear metric for implanting the theme.

THE FIVE SEGMENTS

We have organized the Cleaner Living theme into five segments listed below to capture the aspects of Cleaner Living that benefit from the pronounced shift in consumer spending. In the following pages, we

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will dig into the details of each segment and demonstrate how the three components of the economy are shifting towards cleaner products, services, and solutions.

- **Cleaner Food & Dining** - This segment seeks to include companies that focus on the production and/or sale of natural, organic, non- GMO foods and beverages, as well as products that specifically avoid using preservatives, artificial, and other sweeteners, and saturated fats.

- **Cleaner Health & Beauty** - This segment seeks to include companies that develop and manufacture health and beauty products, including natural skincare & makeup, toxin-free toothpaste, shampoos, soaps, feminine hygiene, infant products, and home care products focused on non-toxic, natural ingredients and fewer or no preservatives. This segment also includes companies that develop, manufacture, and sell goods and/or services that promote and/or facilitate health monitoring and fitness activities.

- **Cleaner Building and Infrastructure** - This segment seeks to include companies that focus on developing and producing construction materials utilizing environmentally friendly processes. This includes materials and finished goods that are manufactured using high levels of recycled or sustainable materials.

- **Cleaner Transportation** - This segment seeks to include companies that develop, manufacture, and sell electric-powered vehicles. The segment also seeks to include companies that provide goods and services in support of the electric vehicle industry.

- **Cleaner Energy** - This segment seeks to include companies that focus on renewable energy. This includes companies that generate electricity through renewable power generation as well as companies that provide goods and/or services supporting the renewable power industry

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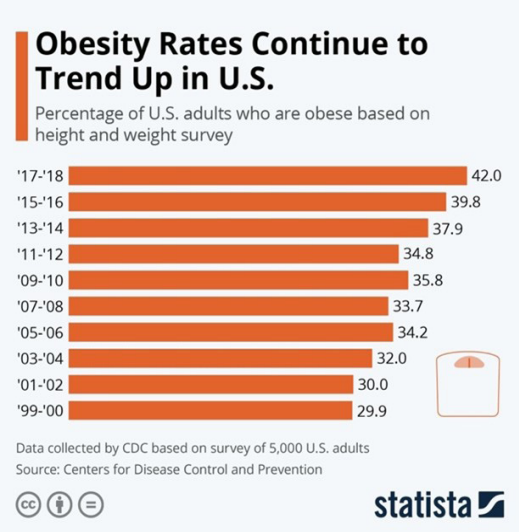
Cleaner Food & Dining

This segment seeks to include companies that focus on the production and/or sale of natural, organic, non- GMO foods and beverages, as well as products that specifically avoid using preservatives, artificial and other sweeteners, and saturated fats.

Consumers are increasingly focused on what they are putting into their bodies to improve their overall health. The abysmal failure of the Standard American Diet (SAD) and the dysfunctional traditional food pyramid4 has led to 42% of Americans being classified as obese and around 10% are diagnosed, diabetic[5] . From 1999 –2000 through 2017 –2018, according to data from the Centers for Disease Control and Prevention, US obesity prevalence[6] increased from 30.5% to 42.4%. During the same time, the prevalence of severe obesity increased from 4.7% to 9.2%.



The recent COVID-19 pandemic highlighted the health risks of both obesity and diabetes as they were two major comorbidities. On average, medical expenditures for those diagnosed with diabetes are approximately 2.3 times higher than those without. In aggregate, the annual cost of diagnosed diabetes in the US is roughly $32[7] billion, according to the American Diabetes Association

Diabetes also increases the risk for heart and cardiovascular diseases, which can lead to heart attack or stroke, as well as kidney disease and eye problems. Although Type 1 diabetes is not preventable, strategies to prevent the other types of diabetes and resulting complications can be helpful in managing all types of the disease, including following a healthy eating plan, being physically active, and maintaining a healthy weight.

GROWING EMPHASIS ON HEALTH AND WELLNESS

The consumer push for Cleaner Living isn't just coming from a need to address excess weight and diabetes, but rather from a wide range of concerns, including chemical sensitivities, allergies, and an overall desire for a longer and higher quality life. According to a recent McKinsey & Company survey[8] of around 7,500 consumers in six countries, 79% of respondents said that wellness is important, while 42% consider it a top priority. At the same time, the majority of consumers in the survey reported that their personal wellness levels are stagnating or even declining. While the importance of wellness, both physical and mental, for consumers has been increasing, the pandemic simultaneously reduced the wellness of most while at the same time increasing its perceived importance.

ORGANIC OPTIONS

As consumers look to improve their health, they are shifting what they choose to put in their bodies. According to data published by Fior Markets[9], the global organic food, and beverages market is expected to grow from $255.2 billion in 2020 to $849.7 billion by 2028 as consumer purchases shift toward clean

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label products and natural ingredients without added sugar. This includes products that are free of any synthetic chemicals such as pesticides, fertilizers and are rich in nutrients such as minerals, vitamins, iron, magnesium, phosphorous, and antioxidants. And lest it be thought that this demand explosion is just a western phenomenon, China has quietly become the fourth largest market for organic food and beverages[10], valued at just under $9.6 billion in 2018 behind the US ($48 billion), Germany ($12.9 billion), and France ($10.7 billion). As consumer awareness and incomes continue to grow, the market in China is expected to reach $13 billion by the end of 2024[11].

NON-GMO PRODUCTS

The growing number of health-conscious consumers, the rise in vegetarian and vegan lifestyles, and the increasing awareness of the risks from consuming genetically modified food products are also expected to be major factors driving the demand for non-GMO food products. That market alone is expected to grow to $2.7 billion[12] by 2026, up from $1.25 billion in 2020. Scientists and environmental groups have cited many environmental and health risks with foods containing GMOs. GMO food products consumption has led to diseases such as gastrointestinal disorders, organ damage, cancer, and infertility.

Consumers are also increasingly seeking colors, flavors, fragrances, and other ingredients that are organic, contain less sodium, are gluten-free, and are non-GMO. Moreover, they are no longer willing to trade off taste for health and nutrition. In 2017, 57% of consumers agreed that nutrition is more important than taste[13], but only 48% of consumers in 2019 agreed. Furthermore, with consumers wanting less sugar and sodium in food and beverages or the addition of functional ingredients to boost nutritional benefits, the need to build back or balance taste expectations will continue to be key. The confluence of these factors is expected to push the global natural and organic flavors market to $10.7 billion by 2027[14], which equates to a compound annual growth rate of 8.1% over the 2019-2027 period. This shift is also fueling the demand for natural food colors, a market that is slated to reach $5.5 billion by the end of 2026[15], up from $4.9 billion in 2019.

PLANT-BASED DIETS

According to the Plant-Based Foods Association, the number one driver of all food purchases is taste. As more food becomes plant-based, there will be more demand for the colors, flavors, and scents to which consumers have grown accustomed, and these products will become a larger part of the science of food. The plant-based meat market is expected to reach $13.8 billion by 2027[16], a dramatic increase compared to just $3.3 billion in 2019, as folks look to adopt healthier lifestyles and become more socially responsible. Conventional animal agriculture contributes 18% of all global greenhouse gas emissions[17] – that's more than the entire transportation sector!

CORPORATE RESPONSE

As consumer demand for cleaner, healthier, and safer alternatives has grown, so have companies shifted their offerings. One cannot walk the isles of a grocery store nor scroll through social media without encountering multiple examples of companies shifting their focus towards cleaner living solutions. Compared to a decade ago, the range of Cleaner Living solutions has expanded significantly. It was not that long ago that these products were found only at **Amazon's (AMZN)** Whole Foods or the local health food store, and fans were often labeled as "crunchy" or "granola-types." Now shoppers see them not

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only on the shelves of **Target (TGT)**, **Wal-Mart (WMT)**, and nearly every local grocery store, but even the stores' private-labeled versions are touting their Cleaner Living aspects — GMO-free, organic, or free from artificial colors and fragrances, etc. According to **Kroger's (KR)** 2021 ESG report[18], its Simple Truth brand that offers organic and natural products exceeded $3 billion in annual sales and featured more than 75 plant-based foods and beverages by the end of 2020. In 2018, **International Flavors & Fragrances (IFF)** announced it would acquire Frutarom[19], a leading company in the global flavors and natural fine ingredients markets.

As consumers increasingly flock to these cleaner options, it will be at the expense of the more traditional products, giving the range of clean-living products and solutions room to expand. The more competition we have for these solutions, the odds are the more affordable they will become over time, which in turn has a high probability of expanding the consumer base. The recent public listings of companies such as **Oatly (OTLY)** and **The Honest Company (HNST)**, which would never have been standalone in prior decades, further emphasize this evolution.

We are also increasingly seeing restaurants focus on Cleaner Living ingredients, such as **Chipotle Mexican Grill (CMG)**, which advertises "preparing real food made with real ingredients. You know, the kind you can recognize and pronounce." Since 2019, Impossible plant-based foods have been available at a growing list of national fast and fast-casual chains in the United States[20], including Burger King, White Castle, and Applebee's. In February 2021, **Beyond Meat (BYND)** announced it entered into a three-year global strategic partnership with fast-food chain **McDonald's (MCD)**[21]. Soon thereafter, **Tyson Foods (TSN)** announced it would launch plant-based hamburgers and sausages ahead of the summer grilling season[22].

PUBLIC POLICY

We have seen public policy responses on a global level. For example, in Asia, legislation has been introduced in countries such as Thailand, India, and Sri Lanka, aiming to reduce sugar content. Part of the Patient Protection and Affordable Care Act of 2010 included FDA requirements for disclosure of nutrition information[23] for restaurants with 20 or more locations operating to provide nutrition information related to standard menu items.

Companies have also been developing more sustainable packaging options in response to consumer demands. The leading four strategies being pursued are:

- Substituting away from polymer packaging where feasible;
- Reducing the amount of plastics in the packaging;
- Wider use of recycled grade plastic
- Broader implementation of re-use formats

And these packaging options aren't just for food, which brings us to our next segment, where we also see sustainable packaging solutions.

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Cleaner Health & Beauty

This segment seeks to include companies that develop and manufacture health and beauty products, including natural skincare & makeup, toxin-free toothpaste, shampoos, soaps, feminine hygiene, infant products, and home care products focused on non-toxic, natural ingredients and fewer or no preservatives. This segment also includes companies that develop, manufacture, and sell goods and/or services that promote and/or facilitate health monitoring and fitness activities.

BEAUTY AND SKIN CARE

The change in consumer preference isn't just for what they put in their bodies but also what goes on their bodies as well, which is driving demand for natural and clean beauty products. By 2027, the global natural cosmetics market is estimated to reach $54 billion[24], up from $36 billion in 2019, with the clean beauty market[25] rising to $11.6 billion[26] in 2027 vs. $5.4 billion in 2020. Clean beauty is defined as products that are created and produced without any proven or suspected toxic ingredients and have transparent ingredient labels. Skincare maintains the top billing[27] in the global organic beauty market, followed closely by haircare.

HOME CARE

Demand for green or environmentally friendly, sustainable cleaning is rising for in-home use as well due to growing concerns regarding the use of toxic chemicals[28] like ammonia, triclosan, phthalates, and parabens in conventional home cleaning products. Moreover, various government initiatives on the ban of toxic chemicals from household cleaning products[29] are expected to accelerate the shift towards "greener" solutions.

Data from the Smithers study, The Future of Sustainable Cleaning Products to 2026[30], finds the market for environmentally friendly laundry, surface care, dishwashing, bath & shower goods will reach $109.7 billion in 2026, equating to a compound annual growth rate of 8.5% from $72.9 billion in 2021. This compares to the expected growth for the overall cleaning products market of just 4.1%, from $169.9 billion to $207.3 billion across 2021-2026.

FITNESS AND WELLNESS

The global consumer wellness market alone is estimated to be over $1.5 trillion today, with annual growth in the 5% to 10% range, according to consulting firm McKinsey while the global dietary supplements market was $140.3 billion in 2020 and is expected to expand at a compound annual growth rate (CAGR) of 8.6% from 2021 to 2028[31].

An increasing number of workout equipment manufacturers, fitness centers, and health clubs coupled with the growing awareness about personal fitness is expected to increase the demand for weight management and sports nutrition. As the desire for better health is growing, consumers are increasingly

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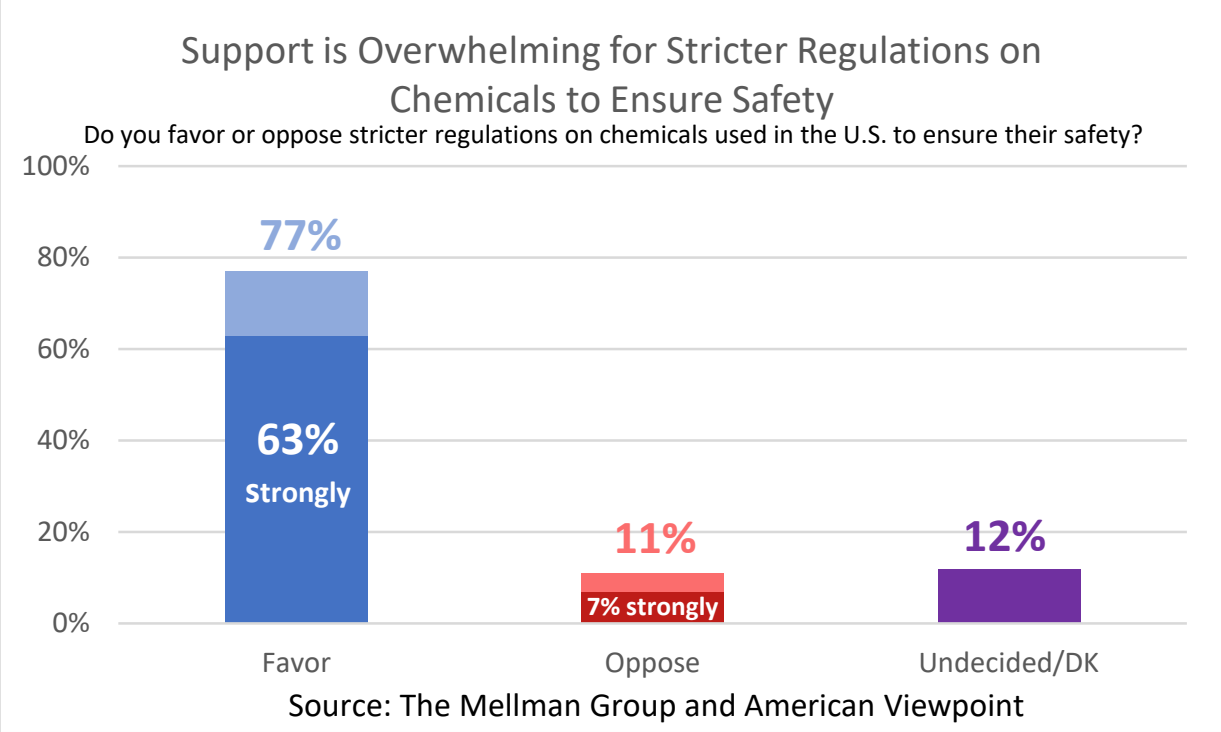
able to take their health into their own hands thanks to advances in technology, ranging from apps to devices that help them monitor their bodies and symptoms. In 2020 alone, fitness-tech apps raised a record-breaking $2 billion[32] from investors. The global fitness app market[33] was valued at $4.4 billion in 2020 and is expected to expand at a compound annual growth rate of 21.6% from 2021 to 2028.

The growing importance consumers are placing on personal health and wellbeing is expected to be a key factor driving the market for dietary supplements, which was valued at $140.3 billion in 2020 and is expected to expand at a (CAGR) of 8.6% from 2021 to 2028[34]. When it comes to dietary supplements, McKinsey & Co.[35] found that between 21% and 41% of consumers around the world, depending on the country, report that if they had to choose between more natural supplements and more effective options, they would choose the more natural.

PUBLIC POLICY

We are seeing more interest in public policy to monitor what goes into the products we put on our bodies as well. The "No PFAS in Cosmetics Act" was introduced in the House and Senate in June 2021 after a new study was released that found high levels of a marker to toxic PFAS substances in 52% of 231 makeup products purchased in the U.S. and Canada. Congress is taking action, following in the footsteps of nonprofits that have been bringing attention to potentially dangerous ingredients. For example, the nonprofit "Mind the Store" campaign was launched in back 2013 with its first "Retailer Report Card[36] – ranking retailers on toxic chemicals" published in 2016 which, "highlights a growing sustainability trend among the largest retailers of the U.S. and Canada over the past year: major retailers are increasingly adopting and implementing policies that restrict classes of toxic chemicals such as PFAS in the products and packaging they buy and sell. This is helping to bring safer products into the hands of consumers all across these countries and catalyze the development of safer chemicals and green chemistry solutions."

The European Union has banned approximately 1,300 chemicals in cosmetics, a category that covers makeup, lotions, hair dyes, deodorant, nail polish, shaving cream, and other beauty products. By contrast,



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the United States — where the average woman uses 12 such products containing 168 chemicals on her body each day — bans and restricts only 11[37].

In late 2020, California's governor Gavin Newsom enacted the Toxic-Free Cosmetics Act, California Assembly Bill 2762[38], that "would, commencing January 1, 2025, prohibit a person or entity from manufacturing, selling, delivering, holding, or offering for sale, in commerce any cosmetic product that contains any of several specified intentionally added ingredients, except under specified circumstances," What makes the bill noteworthy is it's the first time any U.S. state has regulated cosmetics. Under the new rule, banned chemicals include:

...the United States - where the average woman uses 12 such products containing 168 chemicals on her body each day - bans and restricts only 11

- Formaldehyde, a known carcinogen.
- Paraformaldehyde, a type of formaldehyde.
- Methylene glycol, a type of formaldehyde.
- Quaternium 15, which releases formaldehyde.
- Mercury, which can damage the kidneys and nervous system.
- Dibutyl and diethylhexyl phthalates, which disrupt hormones and damage the reproductive system.
- Isobutyl and isopropyl parabens, which disrupt hormones and harm the reproductive system.
- The long-chain per- and polyfluoroalkyl substances known as PFAS, which have been linked to cancer.
- M- and o-phenylenediamine, used in hair dyes, which irritate and sensitize the skin, damage DNA, and can cause cancer.

Given the consumer support to restrict the use of harsh and harmful chemicals, we would not be shocked to see the pending Toxic-Free act in California sour similar actions across the U.S..

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Cleaner Building and Infrastructure

This segment seeks to include companies that focus on the development and production of construction materials utilizing environmentally friendly processes. This includes materials and finished goods that are manufactured using high levels of recycled or sustainable materials.

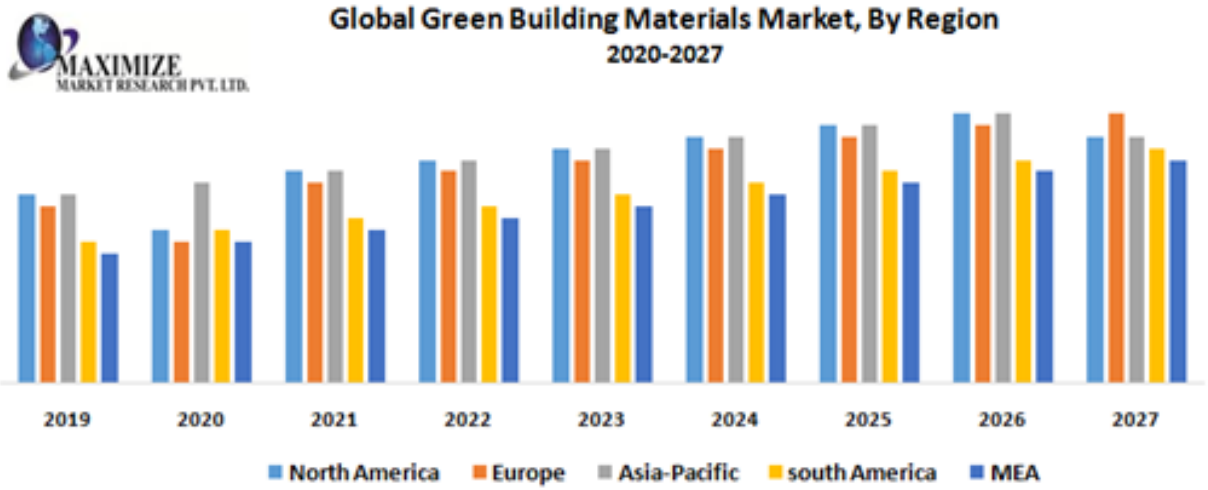
Green buildings, also referred to as sustainable buildings or green construction, are buildings that make use of environmentally friendly and resource-efficient processes for their design, construction, maintenance, and renovation. The global green building materials market was estimated at $299 billion and is forecasted by Maximize Market Research to reach $480.5 billion by 2027 due to the increasing preference for materials that are energy-efficient, moisture-resistant, durable, and easy to maintain.

The forecasted growth of that market reflects the rising number of building regulations and policies mandating energy-efficient structures, particularly in the residential sector. This has and will continue to foster a market for environmentally friendly and energy-conserving materials.

THE TECHNOLOGIES

Green Building Materials refer to materials that enhance the sustainability and efficiency of a building structure in terms of design, construction, maintenance, and renovation. These materials are derived from renewable waste products and are highly energy efficient. Some of the popular materials used in the construction of green buildings are bamboo, hempcrete, straw bales, mycelium, wood, rammed earth, timbercrete, grasscrete, and recycled plastic. **Trex (TREX)** is the world's leading manufacturer of wood-alternative decking and railing and one of the largest recyclers of polyethylene plastic film in North America, having collected over one billion pounds of recycled post-consumer plastic. Its composite decks[40] are a blend of 95% reclaimed wood and plastic film, and the average 500-square foot composite Trex deck contains an incredible 140,000 recycled plastic bags.

Green building materials reduce, or in some cases eliminate, "off-gassing" or the post-production emission of unhealthy fumes from toxic paints[41] or other materials, in turn enhancing indoor air quality[42]. Additionally, the rising adoption of green building materials and construction methods reflects growing concerns over the health and environmental hazards of carbon emissions[43].



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To date, the largest application area for green building materials has been in insulation, followed by roofing. The rising popularity of non-toxic recycled rubber roofing is due to superior properties like weather resistance and greater durability.

PUBLIC POLICY

According to the World Green Building Council[44], a collection of roughly 70 Green Building Councils across the globe, buildings and construction account for 39% of energy-related CO2 emissions[45]. As part of the UN Global Compact, the council works with businesses, organizations, and governments to drive the ambitions of the Paris Agreement and UN Global Goals for Sustainable Development to decarbonize the built environment "that supports the regeneration of resources and natural systems, providing socio-economic benefit through a thriving circular economy." Among those 70 councils is the U.S. Green Building Council that leverages Leadership in Energy and Environmental Design (LEED), which provides a globally recognized framework for healthy, highly efficient, and cost-saving green buildings.

As part of U.S President Joe Biden's push to rebuild American infrastructure, the bill included the Green Building Jobs Act while the U.S. House Committee on Energy and Commerce released the Clean Future Act to decarbonize the key sectors of power, buildings, transportation, and industry, and would update the role of the Department of Energy in supporting strong building energy codes. With regard to the Building sector in particular:

"*The CLEAN Future Act improves the efficiency of new and existing buildings, as well as the equipment and appliances that operate within them. It establishes national energy savings targets for continued improvement of model building energy codes, leading to a requirement of zero-energy-ready buildings by 2030. The bill also sets energy and water savings targets for federal buildings and provides funding for schools, homes, and municipal buildings to improve energy and water efficiency and deploy energy-efficient technologies.*"

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Cleaner Transportation

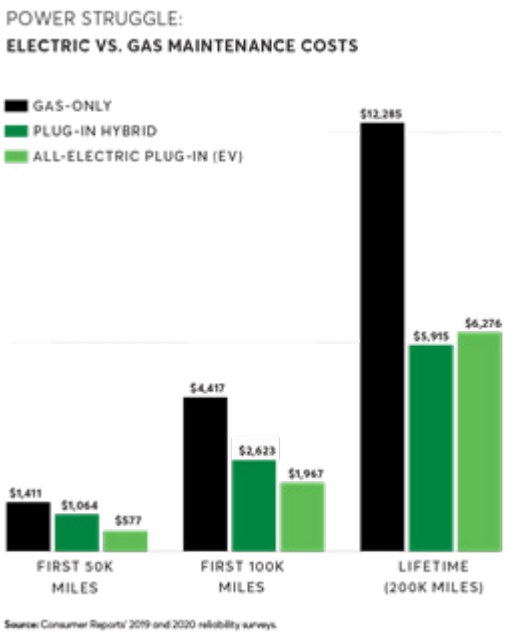
This segment seeks to include companies that develop, manufacture, and sell electric-powered vehicles. The segment also seeks to include companies that provide goods and services in support of the electric vehicle industry.

The CLEAN Futures Act... improvement of model building energy codes, leading to a requirement of zero-energy-ready buildings by 2030

Spurred by falling lithium-ion battery pack prices, which fell 89% between 2010 and 2020[46], and the growing number of charging stations, electric vehicle sales have increased tremendously over the past decade. As a result of the high efficiency of electric motors and the ability to generate electricity from low-carbon sources, electric cars typically have lower emissions[47] in the use phase compared to similar internal combustion engine vehicles, even when accounting for the generation of electricity used for charging[48]. Also lending a helping hand is that total cost ownership for EVs[49] —including such factors as purchase price, fueling costs, and maintenance expenses— is becoming less than traditional combustion engine-powered vehicles.

The EV market has plenty of room to grow. Worldwide electric car sales are estimated to have topped three million units in 2020, roughly 4.4% of the overall automotive market, and are projected to increase rapidly. The U.S. represents only about 17% of the world's total stock of 10.2 million EVs, according to IEA data[50]. China has 44% of all the EVs in the world (more than 4.5 million), and the nearly 3.2 million units in Europe account for about 31% of the global total.

The outlook for EV adoption is accelerating due to a combination of more policy support, further improvements in battery energy density and cost, more ubiquitous charging stations, and rising commitments from automakers. Passenger EV sales are set to increase sharply in the next few years, rising from 3.1 million in 2020 to 14 million in 2025[51]. As of mid-2021, fifteen countries and thirty-one cities/regions have announced plans to phase out internal combustion vehicles. By 2050 it's estimated that eight out of ten automobiles sold worldwide will be powered by electricity[52].



Other segments of road transport are already much further along on EV adoption. Some 44% of global two- and three-wheeler sales[53] and 25% of the existing fleet are already electric. China accounts for the bulk of two-wheeler electrification to date, but sales are growing rapidly in markets like Taiwan, Vietnam, and India.

Consumer Reports points to strong interest in EVs – 71% of U.S. drivers[54] say they would consider buying one at some point in the future, with nearly a third indicating interest in an EV for their next vehicle purchase. Why? More than 70% of those surveyed agree EVs would reduce air or climate pollution and that automakers should offer other vehicle types as well. Consumer Reports also identified

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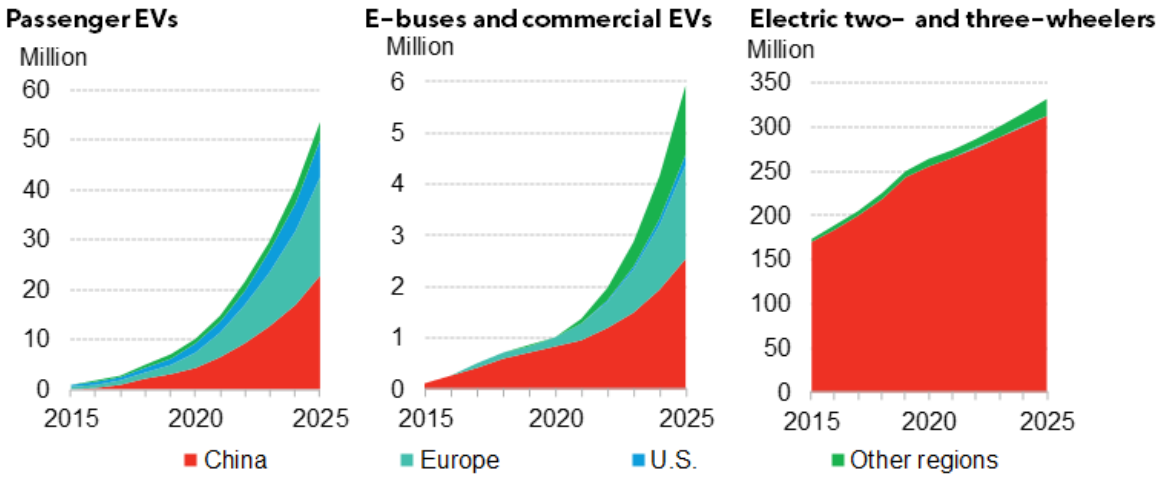
other reasons why that 30% of consumers surveyed were hesitant in purchasing an EV[55] - purchase price (43% of respondents), insufficient knowledge about EVs (30%), and lack of a place to charge one at home (28%).

Other findings from the survey include[56]:

- 55% of U.S. adult drivers "agree" or "strongly agree" that "the federal government should invest money to increase the availability of plug-in electric vehicle charging stations.
- 60% of U.S. drivers agree that state and federal incentives and tax rebates for EVs should be available to all consumers, with only 12% disagreeing.
- More than seven in ten drivers agree that automakers should make a wider variety of vehicle types (like SUVs and pickups) available as plug-in electric models.

Over the last several years, **Tesla (TSLA)** has enjoyed an early mover advantage in the EV market and spurred the birth of a number of new EV manufacturers, including **Nio (NIO)**, Rivian, Fisker, Byton, Faraday Future, and of course, **Nikola (NKLA)**. During that time, traditional auto companies ranging from **General Motors (GM)** to **Ford Motor (F)** and **Volkswagen (VLKAY)** have been repositioning their respective businesses. In June 2021, General Motors announced[57] it would spend $35 billion through 2025 — an $8 billion increase from its previous plan announced in November 2020 – as it targets bringing 30 new EVs to the global market by 2025 and transitioning to all-zero-emission by 2035. As part of that spending, General Motors is also investing in two new battery cell plants as well as Cruise, the autonomous driving business it purchased in 2016. This news followed a similar announcement from Ford[58] the prior month when it shared plans to increase its investment in its electric vehicle future to $30 billion by 2025, up from a previous spend of $22 billion by 2023. In the March 2021 quarter, Ford sold 6,614 Mustang Mach-E vehicles[59] in the US and has since unveiled its F-150 Lightning, for which it has more than 100,000 customer reservations for the electric pickup. The company expects 40% of its global vehicle volume to be fully electric by 2030[60].

Global EV fleet by segment and market



Source: BNEF. Note: Two-wheelers includes mopeds, scooters and motorcycles, excludes e-bikes.

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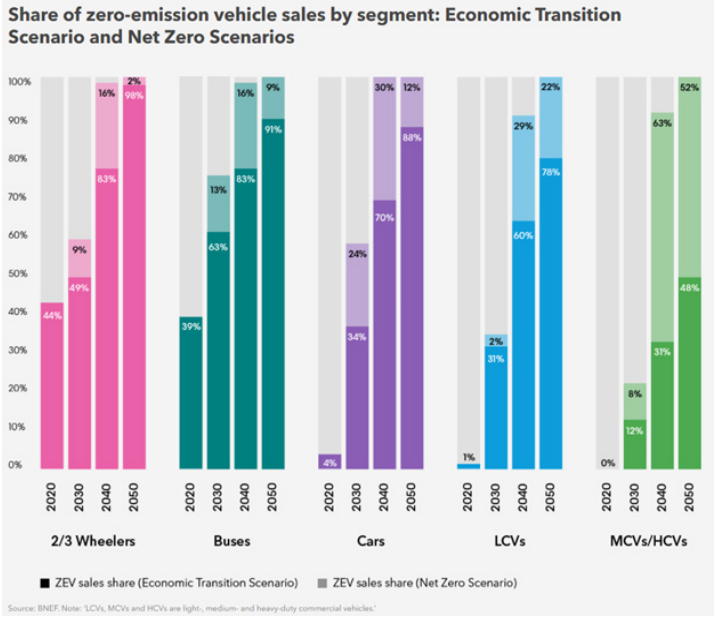
As General Motors, Ford, and other traditional auto companies penetrate the EV market – with some reports calling for a record number of almost 100 pure battery electric vehicles (BEVs) to debut by the end of 2024[61] -- if history holds, it should translate into more competitive pricing that should help spur consumer adoption.



In terms of charging stations nationwide, the number of publicly available charging stations has more than tripled since 2015, when there were fewer than 32,000 throughout the country, according to IEA data[62]. The agency projects that number to grow dramatically by the end of the decade, to between 800,000 and 1.7 million, depending on which public policies are adopted.

The growth of the overall electric vehicle charging stations market is mainly attributed to factors such as government initiatives, such as President Joe Biden's infrastructure proposal includes a national network of 500,000 charging stations, to drive the adoption of electric vehicles and associated infrastructure, rising demand for electric vehicle fast-charging infrastructure, EV range anxiety. These factors and others, including the global adoption of EVs, lead Meticulous Research[63] to forecast the global EV charging stations market will reach 11.7 million units by 2028, a CAGR of 31.1% over the 2021-2028 period.

PUBLIC POLICY

Public policy has been and continues to be highly supportive of the shift from internal combustion motors to electric vehicles. The European Union is looking to accelerate this switch through a multipronged strategy that will drive down the cost of electric vehicles and phase out the combustion engine. The European Commission is expected to present a series of 13 legislative measures in 2021 to ensure the EU can meet its target of cutting average carbon emissions by 55% in 2030 from 1990 levels.

The US currently has an estimated 41,400 charging stations. The consulting firm AlixPartners estimates that an additional $50 billion will need to be invested to build out the nation's charging network to meet 2030 demands.

US President Biden is expected to propose more aggressive fuel-economy and EV adoption targets than were put forth by the Obama administration. The proposed rules are expected to call for fuel-efficiency improvements of 3.7% per year, increasing to 5% in 2025 and then to 6% or 7% by 2026. The rules are also expected to call for 40% of new vehicles sales to be electric by 2030. California is looking to reach 80% EV sales by 2035[64].

The earlier mentioned Clean Future Act also targets the transportation sector[65], and the bill includes substantial investments in transportation electrification "including through grants and rebates to deploy

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electric vehicles and charging stations, zero-emissions school buses, and formally authorizing a Clean Cities Coalition Program. The bill also updates financing programs to expand domestic manufacturing of advanced automotive technologies. It also establishes an Environmental Protection Agency (EPA) grant program to decarbonize and electrify ports around the country, reducing air pollution that disproportionately harms frontline communities."

In the March 2021 quarter, Ford sold 6,614 Mustang Mach-E vehicles in the U.S and has since unveiled its F-150 Lightning, for which it has more than 100,000 consumer reservations for the electric pickup.

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Cleaner Energy

This segment seeks to include companies that focus on renewable energy. This includes companies that generate electricity through renewable power generation as well as companies that provide goods and/or services supporting the renewable power industry.

All over the world, consumers, businesses, and countries are rethinking how they use energy and from where it is being sourced. Those nations that have been fossil fuel powerhouses are restructuring their economies for a future in which carbon-based fuel is increasingly irrelevant. Public policy is fostering investment in and conversion to renewable energy. Businesses are proactively addressing their carbon footprint, and households are investing in renewable energy production that has the potential to upend their relationship with their local utility company and improve power grid resiliency.

The conversation about renewable energy is no longer about technological maturity or feasibility or even about costs, but rather about developing a pipeline of projects that can keep up with the nearly insatiable desire to deploy capital in the sector. The transition to clean energy sources is no longer a story of leveraging subsidies, but rather one of proactively addressing structural, legal, and political barriers as the cost of solar has fallen by over 80%[66] in the past decade, followed by onshore wind at 43% and offshore wind at 24%[67]. In October 2020, the International Energy Agency announced that solar projects now offer some of the lowest-cost electricity ever seen from any source, and over half of the new renewable capacity deployed globally in 2019 achieved a lower cost of electricity production than new coal.

The face of energy production and transportation on a global level is changing dramatically. In 2021, EVs of all types have already displaced over 1 million barrels of oil demand per day and, according to BloombergNEF's 2021 Long-Term Electric Vehicle Outlook, is expected to reach 21 million barrels per day by 2050[68].

Advances in technology, both in the efficiency of capture and in batteries to store the energy, are making renewable sources more viable than they were in years past. In some cases, the introduction of renewable sources is improving the resilience of the energy infrastructure. Much of the electrical grid in most countries is highly centralized, which means that a problem in one area can have far-reaching impacts. With the introduction of solar panels and highly localized battery storage, the impact of power outages can be minimized and potentially even fully mitigated.

The transition to clean energy sources is no longer a story of leveraging subsidies, but rather, one of proactively addressing structural, legal and political barriers...

The impact of Covid-19 further emphasized the relative attractiveness of renewables. The pandemic-induced restrictions enacted by almost every country in the world caused more disruption to the energy sector than any other event in recent history, affecting every aspect from supply and demand to power project development and construction. Renewable electricity, however, was hardly affected, in large part because wind and solar farms are primarily passive generators versus gas-fired power stations; thus, they require fewer staff.

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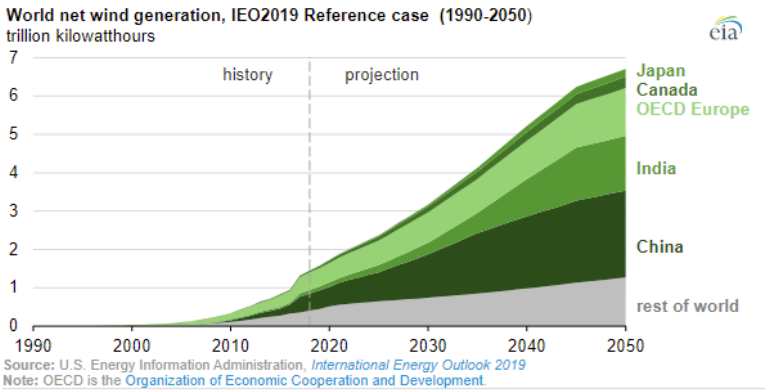
WIND

Now considered a mature technology, offshore wind offers a scale well beyond that of any other form of renewable energy. Over the last ten years, more than 150 new offshore wind projects were deployed globally, and the industry is likely to become worth around $1 trillion[72] in the next twenty years. That means that offshore wind accounts for 10% of planned investment in renewables-based power plants globally.

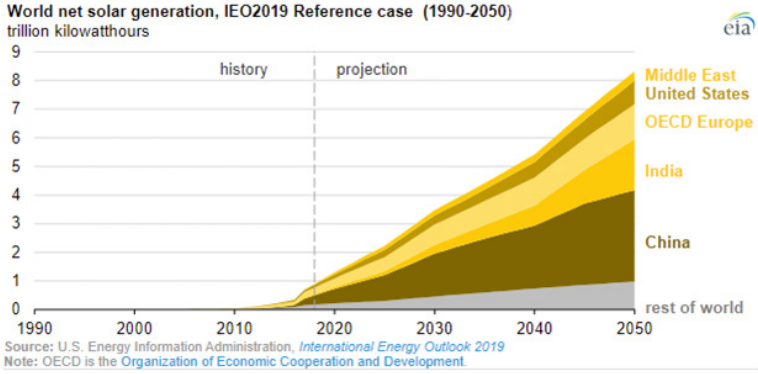


The world's first offshore wind farm was erected off the coast of Denmark in 1991[73] , and while Europe remains the world leader in terms of capacity and experience, the industry is expanding. In 2019 alone, China deployed a record 2.4GW of offshore wind[74]. While the International Energy Agency estimates that today offshore winds provide less than 1% of global power generation[75], some estimates put its potential at more than 18 times the current total annual global electricity demand[76].

SOLAR

Around 90% of today's solar photovoltaic (PV) panel installations are based on crystalline silicon, with the rest using layered thin-film technologies such as copper indium gallium selenide (CIGS) and cadmium telluride (CdTe)[69]. Thin-film solar power technologies have become increasingly efficient, but they've not been able to compete with silicon on price. As discussed earlier, the cost of producing electricity from silicon-based solar panels has dropped by more than 80% in the past decade, making them the default choice for homes and businesses.

While that kind of a drop in costs is impressive, innovation continues as silicon-based technologies reach their limits. We are seeing exciting alternatives being developed, such as perovskite crystal-coated panels, that could be both more efficient and less expensive to produce than crystalline silicon. The use of hexagonal lenses in the protective glass that coats solar panels to concentrate light has been able to produce more energy and increase efficiency. The application of layers of thin-film silicon on both sides of a silicon solar cell, which is referred to as heterojunction technology, is also being deployed to increase the efficiency of silicon cells. Floating photovoltaic panels can generate high volumes of energy at lower costs than land-based solar farms because the water addresses the problem of high temperatures reducing solar panel conversion rates. According to the World Bank's Floating Solar Market Report[70], the most conservative estimates of the overall global potential of water-based solar farms using just the available man-made water surfaces



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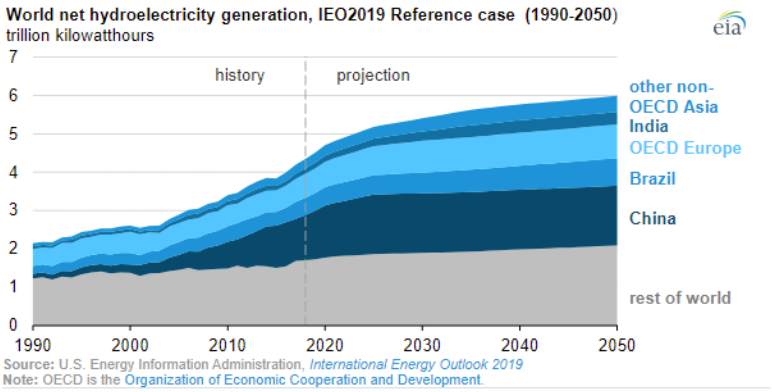
exceeds 400 GWp, roughly the total capacity of solar photovoltaic installed worldwide by the end of 2017.

HYDROELECTRIC POWER

The International Energy Agency's (IEA)'s Net-Zero by 2050[71] report found that the world will need around 2,600 GW of hydropower capacity by 2050 in order to keep global temperatures from rising more than 1.5 degrees Celsius. This means building the same capacity in the next 30 years as was built in the prior 100 at an average pace of 2.3% additional capacity every year. On top of that, the current base is aging, requiring further investments.



The IEA expects hydropower to become the dominant source of flexible electricity by 2050, which makes timely investments all the more important. In 2020 a record 4,370 terawatt-hours (TWh) of clean electricity was generated by the hydropower sector, up from 2019's record high of 4,306 TWh, which is approximately the annual electricity consumption of the United States.

Renewables combined with battery technology also have the potential to improve energy infrastructure resilience. For example, the Great Blackout of 2011[77] saw a widespread power outage that affected much of the southwestern United States and was the largest power failure in California's history. The blackout was the result of just one lone technician's simple mistake in Arizona that shut down a 500kV line, leading to a ripple effect of 23 distinct events on five separate power grids in all of 11 minutes that left nearly 7 million people without power. California has also faced record-breaking wildfires that have led to millions having their power cut off either as a result of the fires or in an attempt to prevent fires during times of high risk. Solar panels combined with battery storage systems are enabling businesses and households to provide their own power during blackout periods, creating a much more resilient network and serving as yet another tailwind to the widespread adoption of solar solutions as a way to increase grid resiliency.

CORPORATE RESPONSE

We are also seeing a pronounced move towards sustainability as part of corporate culture outside of the energy sector. In early 2020, the world's largest asset manager, **BlackRock (BLK)**, announced that it would avoid investing in companies that pose serious climate risks[78]. This comes after the company's 2020 Global Sustainability Survey[79] found that respondents planned to double their sustainable assets under management from 18% on average to 37% on average by 2025. Blackrock isn't alone. Nearly half of the world's assets under management are now pledged to meet climate change goals, having signed up to the Net Zero Asset Managers Initiative[80], which was launched in December 2020. The initiative is committed to supporting the goal of net-zero greenhouse gas emission by 2050 or sooner and has 128 signatories with $43 trillion in assets under management.

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PUBLIC POLICY

The shifts in public policy range from those nations that realize their entire economy needs to shift focus, for those that are heavily dependent on fossil fuels, to mandating changes in everything from energy generation and usage to construction and R&D.

For example, in March 2021, Colombia's Finance Minister announced that his country needs to diversify its economy because it is overly dependent on extracting and exporting oil. Saudi Arabia is already taking major steps in this direction. In December of 2020, the Danish government has said that it intends to stop oil production by 2050[81]. The major oil companies in Europe have announced that they will become electric companies within twenty years, possibly also selling natural gas, but they will no longer be oil companies. **Royal Dutch Shell PLC (RDS.A)** has already ruled out exploring and drilling for oil in new areas after 2025[82].

Public policy pressure is increasing globally. According to the International Energy Agency's Net-Zero by 2050 report, "annual clean energy investment worldwide will need to more than triple by 2030 to around $4 trillion." The report also states that sales of new internal combustion engine passenger cars will need to be halted by 2035, and all unabated coal and oil power plants will have to be phased out by 2040. Electricity generation will need to reach net-zero emissions globally by 2040 and will require immense increases in grid flexibility through "batteries, demand response, hydrogen-based fuels, hydropower, and more." According to the report, by 2045, the vast majority of cars on the road will be "running on electricity or fuel cells, planes will be relying largely on advanced biofuels and synthetic fuels, and hundreds of industrial plants will be using carbon capture or hydrogen around the world." The IEA's model has fossil fuels falling from today's 80% of global energy supply to 20% by 2050, with solar becoming the single biggest energy source.

The European Union's Energy Performance of Buildings Direction[83] and the Energy Efficiency Directive[84] promote policies that will both increase energy efficiency and decarbonize building stock by 2050 by creating a stable environment for investing in this arena and by enabling consumers and businesses to make more informed choices. The 2019 European Green Deal[85] is focused on improving the energy performance of buildings and developing a power sector based largely on renewable sources, reducing net greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels, the "Fit for 55" plan. For reference, emissions were approximately 24% below 1990 levels as of 2019. By 2030, the EU is looking to have 40% of its energy production from renewables, up from today's 32%.

Over 160 countries have adopted at least one type of renewable energy target. Spain has pledged that by 2030, 75% of its electricity generation will be from renewables. France is targeting one-third by 2030. The Austrian government has stated a goal of 100% by 2030.

In the U.S., while the $1 trillion bipartisan infrastructure package unveiled by the Senate includes more than $150 billion to boost clean energy and promote "climate resilience," it falls far short of President Joe Biden's pledge to transform the nation's fossil-fuel-powered economy into a clean-burning one. In particular, the package omits the Clean Electricity Standard, a key element of Biden's climate plan that would require the electric grid to replace fossil fuels with renewable sources such as solar, wind, and hydropower. Should the proposed infrastructure bill pass, it would be a potential headwind to the adoption of Clean Energy in the U.S., however, a proposed $3.5 trillion, Democratic-only package is following close behind. Granted, that bill is still taking shape in Congress, but it is expected to meet

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Biden's promise to move the country toward carbon-free electricity[86].

Even though millions of consumers having electrified their cars and appliances, and many cities and states electrifying public services such as public transportation, these activities still draw most of their charge from dirty power plants. Factor in the growing concerns about climate change and carbon emissions, and we suspect the conversation about the transition to clean energy is far from over.

Important Disclosures and Certifications

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