

January 9, 2024


Dear Sustainable Equity Strategy Clients and Friends:

The turn of the calendar year is ripe for taking stock and distilling lessons for the future. Among the big questions we've been considering is this: what did 2023 teach us about who is better at forecasting — economists or climatologists? The answer carries implications for how we strive to protect and grow client wealth, so we will unpack it in this letter while touching on select contributors and detractors to our 2023 performance. The Strategy returned 26.30% gross / 25.31% net of fees in 2023. More relevantly given our long-term horizon, we just completed a seven-year track record, returning 16.18% gross / 15.13%, net of fees, annualized since inception, which puts the Strategy's performance ahead of our three reference indexes. (Past performance is no guarantee of future results.) Please feel free to skip to page five below for the performance table. Meanwhile, back to our question...

Let's start with economists: 2023 suggests that their "dismal science" may well be more reliably dismal than scientific.<sup>1</sup> Economists surveyed in Q4 of 2022 — observing generational inflation and a Fed halfway through a rate-hiking cycle that would take the benchmark rate to a 22-year high — forecasted slow growth or an outright recession in the U.S.<sup>2</sup> Yet 2023 demonstrated that inflation can fall rapidly without a recession, and the U.S. economy is expected to have grown at surprisingly robust ~2.4%. Few economists foresaw that Financial Conditions Indexes would ease in November more than they had in any single month in more than four decades, re-igniting a powerful rally in equities.<sup>3</sup> Nor that this stark reversal would be amplified on December 16 by a suddenly dovish Fed whose newly released "dot plot" implied as many as three rate reductions in 2024.<sup>4</sup> In fairness to the originally downbeat economists, Europe may well have entered recession in 2023, and China's post-Covid recovery stalled, so the global picture remains murkier. Even in the U.S., a still-restrictive rate regime, a softening if surprisingly resilient consumer and the crowding out effect of high federal debt interest constitute potential 2024 headwinds, not to mention a second destabilizing war and a polarized Washington poised for more shutdown brinkmanship and a pivotal election. Bottom line, though: economists did not exactly have a Nostradamus year.

How about the climatologists? Swedish chemist and Nobelist Svante Arrhenius' 1896 projection about the sensitivity range of the planet's temperature to rising greenhouse gases remains spot-on.<sup>5</sup> Meanwhile 2023 demonstrated the accuracy of modern climatologists' more refined models, with "global heating to date...entirely in line with three decades of scientific predictions."<sup>6</sup> Their main confessed errors have been underestimating extremes within accurately projected averages. In June, Canada experienced record wildfires that turned the skies orange and triggered health alerts in New York City and down the Eastern Seaboard. In July, a buoy in the Florida Keys recorded a hot tub-like temperature of 101.1 degrees, possibly the highest marine temperature ever recorded.<sup>7</sup> In the Mediterranean in September, overheated waters fueled torrential rains that collapsed dams in Libya and washed 10,000 people out to sea.<sup>8</sup> 2023 broke the 2016 record for hottest year on record, with November 16 breaching, for the first time and so far only for a single day, the 2 degrees C limit specified in the Paris Agreement.<sup>9</sup>

What do we make of all this? Economists focus on inherently unpredictable human behavior and markets, and draw from a limited sample of historic patterns to try to predict uniquely configured futures. Steep rate hiking cycles usually induce recession, but how to account for wrinkles such as the extended release of consumers' "animal spirits" after the COVID hibernation? Climatologists, by contrast, focus on the objective thermodynamics of heat-trapping gases: we emit over 50 billion tons of them into our thin atmosphere year after year and, lo and behold, they trap a large and quite easily calculable amount of heat, with profound implications for human well-being, our economy...and our investments.




As the late 2023 surge in equity prices demonstrated, a rapid turn in short-term fortunes can be orchestrated by human agency in the form of a Fed decision. When a pronouncement reprices shares with such alacrity, it can appear to undermine the idea of intrinsic value. For companies with significant debt or selling into especially rate-sensitive end-markets like housing, a new rate regime can alter cash flows for years at a time, and adjust intrinsic value. But often, these quick, rate-driven moves in equity prices remind us that a share price on a given day only tells you its market value on that single day, with the moving interest rate acting as a transitory discount rate applicable to the future cash flows from that company. In other words, the risk-free Treasury is treated as an opportunity cost: you could sell the equity and buy the Treasury...on that day. But if you're a long-term investor, you probably don't make that immediate trade. Rather you see that share like we do, as conferring fractional ownership of the future cash flows of a high-quality business that constitute a more enduring source of intrinsic value — and one that tends to appreciate, on average, more than those foregone Treasuries. Less watched than rate movements, though we believe more significant in affecting intrinsic value over the mid- to long-term, are secular trends such as climate change, agricultural degradation, deforestation, extinction of biodiversity and water stress. These factors will be resistant to systemic rescues by human agency and instead require robust, preemptive actions to stave them off in the first place. Fortunately, humanity possesses strong survival instincts once roused by clear-eyed threat perception, and these efforts are gaining steam and beginning to reward aligned capital.<sup>10</sup>

Consider that most asset managers were glued to their screens as Fed Chair Jay Powell spoke on December 16, whereas few appeared to even notice the release of the fifth *U.S. National Climate Assessment* on November 14.<sup>11</sup> Market participants fixate on the Fed, and economists more generally, while largely ignoring climatologists' consistently more accurate projections. This "market inefficiency" speaks to the value of incorporating these neglected factors into fundamental economic analysis, and to our edge as active managers with decades of relevant domain expertise, including service on a prior National Climate Assessment.<sup>12</sup> Assets are beginning to reprice to reflect environmental risks and opportunities, and the exposure that corporate leaders and laggards have to them. Ratings agencies and insurers are helping market actors to identify, price and transfer climate and other environmental risks to smooth out this process, which is why we maintain exposure to **S&P Global**, **Moody's** and **Aon** (the first two outperformed in 2023, with a total return of 32.6% and 41.3%, while Aon lagged with -2.2%).<sup>13</sup>

### **Double Click on Inflation: Monetary Policy, Fiscal Policy and....Climate Change?**

Inflation was arguably the economic story of the past two years. Monetary easing and fiscal stimulus drove some of the COVID-era inflation we're still fighting. But another big factor was supply-push inflation: snarls in the supply of inputs and goods, resulting in under-supply relative to demand. Climate change portends similar but even more enduring supply-push inflationary effects. In trying to reconcile consumer negativity about the state of the economy with positive indicators about subsiding inflation, solid growth and low unemployment, analysts have noted the disproportionate effect that high food prices have had on consumer sentiment. And here, climate change is already sneakily joining the fray as a material contributor to food prices, due both to acute supply shocks from weather disasters, and also the reduction in crop yields as temperatures increase and soils erode amid more intense precipitation. As with climatology, plant biology is scientific, and comparatively more predictable than economics.<sup>14</sup>

Consumption of coffee, for example, is already outstripping production, according to the International Coffee Organization, with the *Financial Times* suggesting we may have hit "Peak Coffee" since "climate change is already having a devastating impact on yields" of coffee trees.<sup>15</sup> The supply gap could widen in 2024 due to the effect of extreme weather in Brazil on arabica bean harvests and climate change-enhanced El Niño on robusta beans in Indonesia.<sup>16</sup> This is an exposure for our new 2023 holding **Nestlé** (NSRGY), the largest coffee seller in the world.



As covered in our Q3 letter, NSRGY (3.2% total return in 2023) is positively engaged in making its agricultural supply chain more resilient to climate change. In December, NRSRGY co-founded the “First Movers Coalition for Food” to aggregate \$10-20 billion in purchasing to promote sustainable farming across the globe.<sup>17</sup> Or consider egg prices, which peaked in January of 2023 but fell throughout the year before ending 52% above their pre-pandemic price. “Eggs” were the top-ranked Google search on cost in 2023.<sup>18</sup> Spiking grain prices for chicken feed following Russia’s invasion of Ukraine were part of it, but the biggest driver was likely avian influenza which led to massive culling of diseased poultry flocks. It turns out that climate change has altered migratory bird patterns and likely driven the avian flu virus transmission cycle, while also boosting virus survival outside the host.<sup>19</sup> How many “hard-nosed” economists were aware of this connection between climate change and egg prices?


**Costco** (COST), a longtime holding, was selling a dozen eggs at about half the price of Walmart (\$3.25 vs. \$6.00) as their price peaked a year ago. By that time 52 million birds, or ~10% of the U.S. poultry population, had been culled due to avian influenza.<sup>20</sup> COST was able to maintain low prices because of its business model, which garners most of its profits through membership fees rather than margins on sold goods, and its vertical integration into poultry farming, with facilities featuring real-time digital monitoring and traceability of bird health. While this did not entirely spare COST from culling flocks, it gave it better control of pricing and could enhance its resilience to future climate-sensitive disease outbreaks.<sup>21</sup> COST has helped consumers cope with inflation across many essential categories, and its stock returned 48.7% in 2023. When the effects of climate change on the prices and availability of cherished foods becomes more widely understood, we believe this will spur more climate action across the board – benefitting companies like ours that sell climate solutions or, like Costco, feature higher climate resiliency.

Another holding, **ThermoFisher** (TMO), offers PCR tests as part of its poultry diagnostics segment, a critical tool in the avian influenza crisis, which was accelerating as 2023 ended.<sup>22</sup> Pick a problem in human or animal health, or testing of food, air and water, and chances are ThermoFisher’s robust catalogue offers best-in-class solutions, complete with instruments, consumables and the efficient workflows and regulatory guidance to put them to use.<sup>23</sup> In 2023, TMO (-3.4%) faced tough year-over-year comparables coming off COVID highs, and higher interest rates leading biotech customers to cut their spending on TMO solutions.<sup>24</sup> But our focus remains on the long-term, where our projections show the company’s outyear revenues benefitting as it supplies diagnostics, vaccine production and therapeutics for a range of infectious diseases that are projected to worsen and progress in the U.S. in a warming climate – from dengue and West Nile to amebic meningoencephalitis and Valley fever – see Chapter 15 of the U.S. National Climate Assessment for more.<sup>25</sup> **Danaher** (DHR) returned -1.2% in 2023 due to rate effects and dampened revenues from bio-processing and China. But again, we saw these headwinds as mostly short-term, while instead focusing on DHR’s innovative leadership in therapeutic modalities (cell, gene, and mRNA medicines) and use of AI to help its customers accelerate drug discovery and production — applicable to tackling many diseases including emerging pathogens arising from climate change and increasing human encroachment on animal habitat.<sup>26</sup> CASGEVY was approved in December by the FDA as the first treatment in the U.S. based on CRISPR gene editing technology.<sup>27</sup> While DHR does not invent drugs like CASGEVY, it supplies essential tools and materials to others to do so, and is collaborating to unleash gene editing on other diseases.<sup>28</sup> The majority of FDA-approved cell therapies use solutions from DHR’s Cytiva segment, as do most gene therapies and mRNA vaccines.<sup>29</sup> DHR is well positioned as a leader in this ongoing revolution in medicine and one of a number of growth engines in our portfolio.

### **Climate Action: Renewables, Infrastructure and Staying Cool**

The rising impacts of climate change are eliciting powerful corporate, consumer and policy responses that grow steadily each year. Renewable energy will, as soon as 2024, overtake coal-fired power stations to become the





world's largest single source of electricity, according to the International Energy Agency.<sup>30</sup> While the Ukraine war was a short-term spur to oil prices, they have fallen back since (oil prices fell ~10% in 2023 and the equities of U.S. oil majors also retreated).<sup>31</sup> The war galvanized Europe to accelerate its deployment of renewables as well as electrification and efficiency solutions, benefitting our holdings **Siemens** and **Schneider Electric**, which returned 39.5% and 45.8% respectively in 2023.<sup>32</sup> Investment opportunities abound amid a historic paradigm shift, still in early innings, to a low-carbon, resource-efficient economy. By the middle of 2023, a staggering 1 gigawatt (1 billion watts) of solar capacity was being installed each day. That equals the capacity of a large nuclear power plant, but better distributed – from utility-scale solar fields to rooftops and therefore more climate-resilient.<sup>33</sup> Reuters reported that 68 planned gas plants were abandoned or postponed globally in 2023 as the cost of utility-scale batteries paired with renewable energy demonstrated superior economics.<sup>34</sup>

Still, 2023 was a difficult year for renewable energy equities: supply chains struggled to re-shore to meet the domestic content requirements of the Inflation Reduction Act, California reduced its solar incentives and higher interest rates weighed on the yields and bankability of projects.<sup>35</sup> Renewable equipment suppliers tend to be narrow- or no-moat businesses experiencing commoditization and facing determined Chinese competition. We've largely avoided investments here despite their thematic alignment with our Strategy. These issues ultimately drove our sale in 2023 of **SolarEdge**, which we discussed in the Q3 letter. **NextEra Energy (NEE)** was also a big detractor for 2023, producing a -25.1% total return, having traded down in sympathy with the underperforming utility sector whose dividend-rich payouts became comparatively less attractive as bond yields surged. Nonetheless, as the world's largest generator of renewable energy from the wind and sun, NEE is a beneficiary of falling renewable equipment costs (the commoditization mentioned above) and has been building and executing on its market-leading pipeline.

Our exposure to mounting infrastructure investments has boosted performance and we augmented it in 2023. Since the beginning of 2023, consensus estimates for **United Rentals'** sales and EPS were revised up and the shares returned 63% for the year. This was driven by robust demand in non-residential construction, especially in end markets with multi-year tailwinds such as EV and semiconductor factories and public infrastructure. Contract awards for highway, bridge and tunnels increased to a record of \$114 billion for the 12-months through last September due to the bipartisan infrastructure law and reallocation of unspent COVID funds, and much of this is poised to flow through to actual spending in the 2H of 2024.<sup>36</sup> We also invested in **Brookfield Asset Management (BAM)** in 2023 – diversifying our Strategy into an alternative asset manager of private funds that deploy capital to essential physical assets such as logistics warehouses, railroads, cell towers, (greener) commercial space and renewable assets. The firm, whose shares returned 44.7% in 2023, manages +\$440 billion in fee-bearing capital, and we believe management's +\$1 trillion target by the end of 2027 is achievable. The Chairman of BAM, Mark Carney, is one of the rare economists who “gets it” on climate change. Having served as Chairman of both the Bank of Canada and England, he has advocated for capital markets to tackle climate change as a systemic risk.<sup>37</sup> We are strapped in alongside Carney as he drives BAM's capital deployment into updating and decarbonizing our global infrastructure.

We also increased our exposure to the HVAC (Heating, Ventilation, Air Conditioning) sector in 2023. Analysts were generally focused on the declining HVAC replacement cycle, weak new home demand and tough post-COVID comparables. We focused more on 2023's record heat and wildfire intensity (which impairs air quality and puts a premium not just on cooling but on purifying indoor air) — both of which are poised to worsen in coming years.<sup>38</sup> We invested in **Carrier (CARR)**, which was comparatively resilient to the residential downturn and whose operational excellence generated a 130 basis point margin boost.<sup>39</sup> We also valued CARR's strategic repositioning, as it divested its non-HVAC businesses and acquired one of Europe's leading residential heat pump-makers,

Viessman Climate Solutions. Longtime holding **Trane** (TT) (46.9% total return in 2023), which is focused on commercial HVAC, saw its backlog grow to \$6.9 billion at the end of Q3 — 2.5x its historical norm.<sup>40</sup> We believe TT will see a continued lift from data center, semiconductor, and manufacturing construction demand. Tax incentives in the Inflation Reduction Act and the 2025 regulatory phase-down of refrigerants that are potent greenhouse gases will further boost the adoption and pricing power of TT and CARR products.<sup>41</sup> Again, our eyes were on the climatologists, not just the economists.

## Performance

Economic fundamentals (not economists’ projections) are core to our investment process. While few economists — except for outliers like Mark Carney — realize it yet, we believe that climate change is a matter of economics and that integrating data and insights from the world’s accelerating efforts to address it will support equity outperformance in the future even more than it already has. We’ve discussed AI and its sustainability implications in prior letters. 2023 was a big year for AI-related equities, including the three of the “Magnificent 7” we own (**Google**, **Microsoft** and **Amazon**, which returned 58.8%, 58% and 80.9%) and two positions whose manufacturing equipment and prowess are enablers of the GPU chips powering AI (**Taiwan Semiconductor** and **ASML**, which returned 42.1% and 39.7%).<sup>42</sup> We executed six sales and five purchases in 2023, while trimming / adding to others.

	Reference Indexes				
	DWA Sustainable Equity (gross)	DWA Sustainable Equity (net)	MSCI SRI TR Index	S&P 500 Total Return Index	MSCI World TR USD Index
<b>Annualized Returns</b>					
1Yr	26.30%	25.31%	27.83%	26.29%	23.79%
3Yr	5.61%	4.71%	7.97%	10.00%	7.27%
5Yr	17.18%	16.16%	14.38%	15.69%	12.80%
Inception	16.18%	15.13%	12.34%	13.42%	10.73%
<b>Cumulative Returns</b>					
1Yr	26.30%	25.31%	27.83%	26.29%	23.79%
3Yr	17.79%	14.80%	25.85%	33.10%	23.44%
5Yr	120.90%	111.45%	95.74%	107.21%	82.65%
Inception	185.72%	168.11%	125.74%	141.38%	104.09%

Inception date: January 1, 2017  
 Past performance is no guarantee of future returns.

Best wishes for a great 2024. Please reach out to Dan Abbasi (dan@douglasswinthrop.com) if you would like to set up a call, and also kindly let us know of any others who might be interested in our Sustainable Equity Strategy.

Best regards,

The Douglass Winthrop Team

Please see endnotes below and important disclosures at the end of this document



<sup>1</sup> The term “dismal science” was coined by Scottish historian Thomas Carlyle to describe economics and, while the origin is disputed, one theory holds that Carlyle was inspired by T.R. Malthus’ gloomy prediction that population would always grow faster than food, dooming mankind to unending poverty and hardship. See: <https://www.investopedia.com/terms/d/dismalscience.asp>

<sup>2</sup> <https://www.economist.com/leaders/2023/12/20/economists-had-a-dreadful-2023>

<sup>3</sup> There are a number of Financial Conditions Indexes from Wall Street research organizations that reflect variously weighted metrics, including: yield levels, credit spreads, volatility, dollar direction, equity levels, commodity levels. Here is a link to Goldman Sachs’ version:

<https://marquee.gs.com/content/subjects/81e513e4-53e8-11e0-a339-00215acdb578.html?entity=US&fromDate=04Jan2023&toDate=03Jan2024>

<sup>4</sup> <https://marquee.gs.com/content/subjects/81e513e4-53e8-11e0-a339-00215acdb578.html?entity=US&fromDate=04Jan2023&toDate=03Jan2024>

<sup>5</sup> <https://www.sciencedirect.com/science/article/pii/S0160932716300308> and

<https://earthobservatory.nasa.gov/features/ModelingIntro#:~:text=Although%20his%20calculations%20were%20surprisingly,already%20risen%20by%2023%20percent>. For “hothouse gases” reference, see: <https://medium.com/predict/the-man-who-predicted-global-warming-125-years-ago-e5316bd21469#:~:text=They%20had%20also%20figured%20out,we%20know%20them%2C%20greenhouse%20gases>.

<sup>6</sup> If anything, scientists confessed they had underestimated the severity and breadth of record-breaking extremes within the trendlines they correctly projected. See: <https://www.theguardian.com/environment/2023/aug/28/crazy-off-the-charts-records-has-humanity-finally-broken-the-climate>

<sup>7</sup> <https://www.newyorker.com/culture/2023-in-review/the-un-announces-the-hottest-year>

<sup>8</sup> <https://www.cnn.com/2023/09/13/middleeast/what-we-know-about-libya-floods-intl/index.html> and <https://www.bbc.com/news/world-africa-66961312>

<sup>9</sup> <https://twitter.com/CopernicusECMWF/status/1726578518463816078?s=20> and regarding 2023 record, see:

<https://www.nytimes.com/2024/01/09/climate/2023-warmest-year-record.html?searchResultPosition=1>

<sup>10</sup> The recent global “stocktake” at the UN Climate Negotiations (Conference of the Parties 28 in Dubai in December 2023) indicated that “significant collective progress towards the Paris Agreement temperature goal has been made, from an expected global temperature increase of 4 °C according to some projections prior to the adoption of the Agreement to an increase in the range of 2.1–2.8 °C with the full implementation of the latest nationally determined contributions.” This is still well above the 2015 Paris Agreement’s target to keep the global average temperature increase “well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.” For more on the 2023 stocktake, see: [https://unfccc.int/sites/default/files/resource/cma2023\\_L17\\_adv.pdf](https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf)

<sup>11</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2023/11/14/fact-sheet-biden-harris-administration-releases-fifth-national-climate-assessment-and-announces-more-than-6-billion-to-strengthen-climate-resilience-across-the-country/> and

<https://nca2023.globalchange.gov/#:~:text=The%20Fifth%20National%20Climate%20Assessment%20is%20the%20US,to%20support%20informed%20decision-making%20across%20the%20United%20States>.

<sup>12</sup> One of the Portfolio Managers on the Strategy’s Investment Committee, Dan Abbasi, was an appointee to the U.S. National Climate Assessment and Development Advisory Committee for the Third Assessment that was issued in 2014. See: <https://nca2014.globalchange.gov/credits>

<sup>13</sup> All stock-specific returns quoted in this letter are total returns including dividends and are sourced from Bloomberg. We selected Aon for the portfolio in part because it is a risk advisor and insurance broker without direct underwriting exposure to extreme climate risks such as wildfire that are increasing causing insurers to increase prices or stop writing policies in certain geographies: [https://www.wsj.com/business/insurance-home-auto-rate-increases-climate-change-03b806f3?mod=Searchresults\\_pos1&page=1](https://www.wsj.com/business/insurance-home-auto-rate-increases-climate-change-03b806f3?mod=Searchresults_pos1&page=1)

<sup>14</sup> <https://thehill.com/changing-america/sustainability/climate-change/3673368-how-climate-change-is-likely-to-worsen-inflation/#:~:text=Climate%20change%20isn%E2%80%99t%20viewed%20as%20a%20major%20contributing,it%20increasingly%20will%20be%20if%20temperatures%20keep%20rising>.

<sup>15</sup> <https://www.economist.com/the-world-ahead/2023/11/13/metrics-to-keep-an-eye-on-in-2024-from-solar-cells-to-superhero-movies> and <https://ig.ft.com/coffee/#:~:text=For%20the%20past%20two%20years,changes%20in%20temperature%20and%20rainfall>

<sup>16</sup> <https://www.economist.com/the-world-ahead/2023/11/13/metrics-to-keep-an-eye-on-in-2024-from-solar-cells-to-superhero-movies>

<sup>17</sup> <https://www.weforum.org/press/2023/12/first-movers-coalition-for-food-to-create-up-to-20-billion-value-chain-for-sustainable-farming/> and

<https://www.csolfutures.com/news/global-food-companies-worth-us-2-1-trillion-join-forces-for-sustainable-farming/>

<sup>18</sup> <https://www.axios.com/2023/12/14/inflation-egg-prices-expensive-2023>

<sup>19</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2709837/>

<sup>20</sup> [https://en.as.com/latest\\_news/why-is-the-price-of-eggs-increasing-in-us-and-how-much-does-a-dozen-cost-prices-at-costco-target-n/](https://en.as.com/latest_news/why-is-the-price-of-eggs-increasing-in-us-and-how-much-does-a-dozen-cost-prices-at-costco-target-n/)

<sup>21</sup> [https://www.ey.com/en\\_us/consumer-products-retail/how-vertical-integration-is-impacting-food-and-agribusiness](https://www.ey.com/en_us/consumer-products-retail/how-vertical-integration-is-impacting-food-and-agribusiness). And on Costco’s culling:

<https://www.gobankingrates.com/money/economy/bird-flu-outbreak-could-cause-costco-rotisserie-chicken-shortage/>

<sup>22</sup> On ThermoFisher, see: <https://www.thermofisher.com/us/en/home/industrial/animal-health/other-species-diagnostic-solutions/birds.html> and on the avian flu crisis, see: <https://www.cidrap.umn.edu/avian-influenza-bird-flu/avian-flu-strikes-more-poultry-flocks-woah-weighs-vaccination-and-trade>



<sup>23</sup> For a timely human health example, consider PFAS (polyfluoroalkyl substances), which are chemical compounds used since the 1940's in a range of products from stain-resistant fabrics to lipstick, and now implicated in health risks that led EPA last year to increase reporting obligations on industry and propose PFAS drinking water standards. ThermoFisher (and Danaher) offer testing instruments, consumables and services/software to meet this burgeoning market, sized at \$6-21 billion for consumer product testing. From Goldman Sachs Investment Research:

<https://marquee.gs.com/content/research/en/reports/2023/10/19/fae2fa5c-5533-41f5-b0dd-2ddc61fd53b1.html> See also:

<https://www.thermofisher.com/us/en/home/industrial/environmental/environmental-contaminant-analysis/emerging-contaminants/pfas-testing.html> and

<https://scix.com/events/the-need-for-pfas-analysis>

<sup>24</sup> In Q2 2023, biopharma R&D slowed to 8.3%, down from 14.6% growth the prior quarter and Capex declined to -6.1% vs. 2.4% the prior quarter. See Goldman Sachs Investment Research

<sup>25</sup> <https://nca2023.globalchange.gov/chapter/15/#key-message-1>

<sup>26</sup> <https://lifesciences.danaher.com/us/en/blog/engineering-biology-scale-up-manufacturing.html>

<sup>27</sup> <https://www.reuters.com/business/healthcare-pharmaceuticals/us-approves-two-gene-therapies-sickle-cell-disease-2023-12-08/>

<sup>28</sup> Danaher, Jennifer Doudna, and Innovative Genomics Institute Launch Danaher-IGI Beacon for CRISPR Cures with Aim to Address Hundreds of Diseases Using Gene-editing Platform Solution. See: <https://investors.danaher.com/2024-01-09-Danaher,-Jennifer-Doudna,-and-Innovative-Genomics-Institute-Launch-Danaher-IGI-Beacon-for-CRISPR-Cures-with-Aim-to-Address-Hundreds-of-Diseases-Using-Gene-editing-Platform-Solution>

<sup>29</sup> Cytiva 2022 Capital Market Day. See:

[https://filecache.investorroom.com/mr5ir\\_danaher/752/2022%20Danaher%20Investor%20Day%20at%20Cytiva.pdf](https://filecache.investorroom.com/mr5ir_danaher/752/2022%20Danaher%20Investor%20Day%20at%20Cytiva.pdf)

<sup>30</sup> <https://www.economist.com/the-world-ahead/2023/11/13/metrics-to-keep-an-eye-on-in-2024-from-solar-cells-to-superhero-movies>

<sup>31</sup> Brent crude oil dropped 10.33% and West Texas Intermediate fell 10.73% in 2023. Source: Bloomberg

<sup>32</sup> After the war-driven recovery in oil prices and especially equities in 2022, Brent and West Texas Intermediate were both off -10% for 2023 due to OPEC mismanagement of its cartel, a surge in US production, China's stall and the EU's successful efforts to reduce its dependence. Oil majors like Exxon and Chevron were similarly losers in a significant up-year for the market. See: <https://www.fxstreet.com/news/oil-flat-with-saudi-arabia-cutting-its-key-oil-price-202312291130>

<sup>33</sup> <https://www.newyorker.com/culture/2023-in-review/the-un-announces-the-hottest-year>

<sup>34</sup> <https://www.reuters.com/business/energy/giant-batteries-drain-economics-gas-power-plants-2023-11-21/>

<sup>35</sup> For more on California's reduced incentive for rooftop solar, see: <https://www.energysage.com/blog/net-metering-3-0/>

<sup>36</sup> The Cornyn-Padilla Amendment passed in 2023 allowed unused COVID funds to be used on other public works projects

<sup>37</sup> <https://www.bbc.com/news/business-55944570>

<sup>38</sup> "An airtight building where you have controlled ventilation that is filtered can really be a big difference for people's health". See:

<https://www.marketplace.org/2023/11/14/climate-change-effects-likely-to-include-long-term-inflation/>

<sup>39</sup> Carrier Q3 2023 earnings call

<sup>40</sup> Trane Q3 2023 Earnings Call

<sup>41</sup> In the US, the phase out of most common R-410A refrigerant for a lower GWP alternative in Jan 2025 is expected to lift equipment pricing by 15-20% over the next two years, while also increasing maintenance and repair revenue in the medium term. <https://www.epa.gov/climate-hfcs-reduction/regulatory-actions-technology-transitions>. Provisions in the IRA include major tax incentives for commercial HVAC retrofit projects and residential heat pumps. See: <https://www.ac-heatingconnect.com/contractors/transition-lower-gwp-plan-2025/>

<sup>42</sup> GPU refers to Graphics Processing Unit chips designed for parallel processing, originally used in graphics and video rendering for gaming and in recent years for artificial intelligence (AI).

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