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### **Microchip Shortage**

In our last letter, we discussed in some detail our investment in Intel (INTC). In that letter we wrote, “from a climate change risk perspective we think that INTC’s U.S. centric manufacturing capabilities are an asset. The McKinsey Global Research Institute published a report showing that global supply chains on average would be disrupted for over a month once every 3.7 years, costing companies on average 42% of their annual EBITDA every ten years. Climate, according to multiple reports is expected to exacerbate these disruptions through increased storm damage, flood risk, heat stress and geopolitical unrest.” The potential for a climate driven disruption was particularly true for Taiwan and in fact happened in the first quarter.

Semiconductor manufacturing is highly water intensive. Taiwan, home to two thirds of semiconductor manufacturing, gets more than half its water from typhoons. Those typhoons are increasing in intensity due to climate change, but also changing course away from Taiwan, leaving them in a drought prone environment. The impacts of this are being felt, right as the semiconductor industry is going through a shortage. The Wall Street Journal reported this week that, “the worst drought in half a century is hitting Taiwan, adding strain to an island that is home to two-thirds of the world semiconductor manufacturing capacity during the worst global chip shortage in recent memory.”<sup>1</sup>

The article goes on to say that Taiwan Semiconductor Manufacturing, one of Intel’s largest competitors is “feeling the pinch.” “Taiwan officials and scholars have warned that water scarcity could become a more persistent problem in the years to come because of climate change, a worrying possibility for the global semiconductor industry given the concentration of chip production in Taiwan.”

The semiconductor shortage is certainly due to a variety of macro-economic events, ranging from pandemic disruptions to capital deployment decisions made years ago. Geopolitical tensions are also a rising risk to Taiwan’s semiconductor manufacturing. However, climate change is an important part of a supply chain analysis. More important to the active investor, climate change is the risk least commonly recognized and priced by the market. INTC’s largely U.S. centric manufacturing supply chain has 11 of its 16 fabs based in the U.S. and as a result faces neither the geopolitical risk nor the concentrated climate risk of Taiwan Semiconductor. We continue to believe our ability to analyze the climate economic impacts like this one, Pacific Gas and Electric’s fire risk and United Rental’s storm business represents one of our most durable advantages.

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<sup>1</sup> <https://www.wsj.com/articles/the-chip-shortage-is-bad-taiwans-drought-threatens-to-make-it-worse-11618565400>

## The Details Matter

Over the past decade the rise of ESG investing has been dramatic. According to US SIF, a trade group for sustainable investing, U.S. based sustainable investments are \$17.1 trillion at the start of 2020, up 42 percent over the past two years. That sum represents approximately a third of all U.S. assets under management. At Redwood Grove Capital we are pleased to see that investors are increasingly interested in sustainability and believe this trend represents an important change for the capital markets. However, Wall Street has never seen an asset flow trend it did not embrace. ESG investing is no exception. According to Morningstar in 2020 alone there were 76 new climate funds. Unfortunately, the lack of standardized information, untested investment processes and the novel nature of this type of investing make it difficult to determine who is approaching it with integrity.

We welcome the new funds but worry they may not be meeting the investors' expectations. The Security and Exchanges Commission is also concerned. On April 9<sup>th</sup>, the SEC issued a risk alert following a review of ESG funds.<sup>2</sup> The alert stated that "despite claims to have formal processes in place for ESG investing" some funds have a "lack of policies and procedures related to ESG investing" and "that did not appear to be reasonably designed to prevent violations of law." In more plain English, many ESG funds were just not considering E, S, or G in their investment process. While disappointing our concern is a bit different. Since a third of U.S. assets are in sustainable investment funds, one might reasonably expect it to result in more sustainable practices at the corporate level. To date that has not been true. Greenhouse gas emissions continue to go up. This is in sharp contrast to the 50% reduction in greenhouse gases by 2030 that many climate scientists believe is required to maintain a sustainable planet.

But it is not just investment firms that are struggling to find a clear framework for sustainability. The Nature Conservancy, an organization that has been a leader in land conservation, has been selling carbon credits to some of the nation's largest corporations, including JP Morgan, Blackrock and Disney.<sup>3</sup> Those corporations in turn, are able to claim that they have met their greenhouse gas reductions targets without necessarily reducing their own emissions. However, some of those carbon credits were created by "conserving land" that was already protected. In other instances, they conserved trees that might have been cut down according to a hypothetical model of future land use. Counting trees in the ground, some protected by existing conservation measures, against the very real new annual emissions of the company does not reduce greenhouse gas emissions. (We recommend Bloomberg's excellent reporting on this issue [here](#) for those interested in the details). While The Nature Conservancy is currently investigating these practices, it is no surprise that global greenhouse gas emissions are rising at the same time companies are claiming significant reductions through inexpensive "offsets."

So, what does it look like when a company actually reduces its greenhouse gas emissions? Let's look at one of our portfolio companies. Alphabet (GOOG) is one of the largest corporate purchasers of electricity in the world. Due to the tremendous growth of cloud and search, their electricity demand doubles every four years. Where and how they source their electricity has a real economic and climate impact. Back in 2007, GOOG became carbon neutral, the current 2030 goal for many high-profile sustainable companies. Recognizing that carbon neutrality did not result in reduced greenhouse gas

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<sup>2</sup> <https://www.sec.gov/files/esg-risk-alert.pdf>

<sup>3</sup> <https://www.bloomberg.com/news/features/2021-04-05/a-top-u-s-seller-of-carbon-offsets-starts-investigating-its-own-projects>

emissions they started replacing their electricity with renewable energy sources. In 2010 they started signing purchase power agreements (PPAs) with new renewable energy projects. Each project was dependent on GOOG's support to be viable, thereby ensuring that their involvement was "additive" to emission reductions. By signing these PPAs, GOOG became a long-term, high-quality customer to renewable energy developers which allowed them to get funding for their projects.

At the time utilities did not like their customers procuring their own energy sources and fought GOOG's efforts. So GOOG created Google Energy and registered with Federal Energy Regulatory Commission allowing them to circumnavigate the utilities roadblocks. GOOG then formed the Renewable Energy Buyers Alliance (REBA) with RMI (formerly Rocky Mountain Institute) and a consortium of industry leaders (including GM, Facebook and Walmart). REBA wrote the playbook for other companies looking to buy utility scale renewable energy and created a clearing house for companies to partner if their individual needs were not sufficient to sign a PPA. Due to these efforts GOOG was the first company to be 100% powered by renewable energy, making them the largest corporate purchaser of renewable energy in the world. To put that in context, they added enough renewable energy to power two San Franciscos.

GOOG also understood that their 24-hour demand for energy meant that while they purchased 100% of electricity needs from renewable energy sources, at certain parts of the day they were still dependent on the grid which was powered by fossil fuels. (They would offset it by oversupplying the grid with clean energy during other times). In 2017 they set out to solve for that problem, making sure that every electron they used on an hourly basis is produced by renewable energy. GOOG plans to spend an additional \$5 billion on renewable energy projects by 2030 to reach this new goal. Just this aspect of their plan is the carbon equivalent of reducing 1 million cars from the road every year.

GOOG is opaque about the details of their historic energy contracts, but we know current PPAs are below the cost of buying electricity directly from the grid. In the ultra-competitive cloud business this has meant their competitors are now sourcing electricity through PPAs. The company continues to look for ways to reduce electrical costs and to drive economic value. They are using Deepmind, their artificial intelligence arm, to build a neural network trained on weather forecasts and turbine data to reduce the uncertainty of wind production. By being able to better forecast the energy production of their wind farms, they can increase their value by 20%. This is a significantly more impactful approach to "greening" your company than buying a carbon offset created by protecting an already protected tree. However, it is a distinction not made by all sustainable investors.

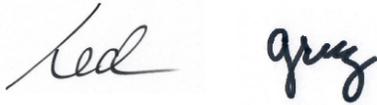
It seems clear that protecting already protected trees does not help global CO2 emissions. However, it does not mean that planting trees is not effective. As a quick example, take Alibaba's Ant Financial which has planted over 120 million trees. In 2016, Alipay Ant's mobile payment system launched Ant Forest-a payment scheme that accounts for your personal carbon. The more you participate in green activities, the more "points" you get. You can earn green energy by doing green activities like walking to work or by purchasing products. This activity is then converted into a virtual tree in your account. When the virtual tree has fully grown it is converted into a real tree in the Ant Forest. To date, AliPay's program covered 100,000 hectares of land on the edge of the Gobi Desert. According to the UN this is the country's largest private sector tree planting scheme. This creative approach encourages positive behavioral change which we applaud. Both the greener behavior and tree planting reduce the planet's CO2 emissions.

## Closing Thoughts

When looking at corporate sustainability strategies, it is easy to become overly skeptical. However, there are companies acting with integrity. The more companies that pursue a transition to a low carbon economy, the stronger the virtuous cycle. It is affirming for us to see some of our portfolio companies working together to reach their emissions goals, like Portland General Electric (POR) and Intel. In February, Intel signed a 15-year agreement to be the only purchaser of power from a new solar facility developed by POR. Since 2004, Intel has been the largest purchaser of POR's Green Future Enterprise product. Working together, both companies help each other reach their individual emission goals. We continue to look for companies that are addressing climate trends with integrity. We believe it benefits the companies in our portfolio, our investors, and the planet.

As always, we thank you for your trust in us. If you have any questions, please do not hesitate to reach out.

With gratitude,

Two handwritten signatures in black ink. The first signature is a cursive 'Ted' and the second is a cursive 'Greg'.