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Climate's Popping Bubbles

In 2007, the British economist Sir Nicholas Stern proclaimed that climate change represents the greatest market failure the world has ever seen. At the time, concerned economists discussed the unpriced externalities of burning fossil fuels. Today, economic bubbles created by ignoring scientific forecasts are now deflating or in some more extreme cases imploding. One example of which, PG&E we discussed in our last letter. We bring it up again because it is evidentiary basis of two additional theses 1) there is a significant and growing market inefficiency created by climate trends and 2) those trends' economic impacts are further reaching than generally understood.

It has been well reported that wildfires hurt PG&E investors including Californian pensioners, as over \$20 billion of equity value disappeared into flames. Gov Newsom promptly created a strike team and delivered an April 12th report focused on utility wildfire risk. In his press conference, he called on the state legislature to act swiftly and decisively to create liquidity funds, revisit the state constitution on inverse condemnation, and redesign the CPUC. The Governor's concern is not entirely due to lost PG&E equity value. He knows that wildfires' threat to utilities effects everyone in the Golden State.

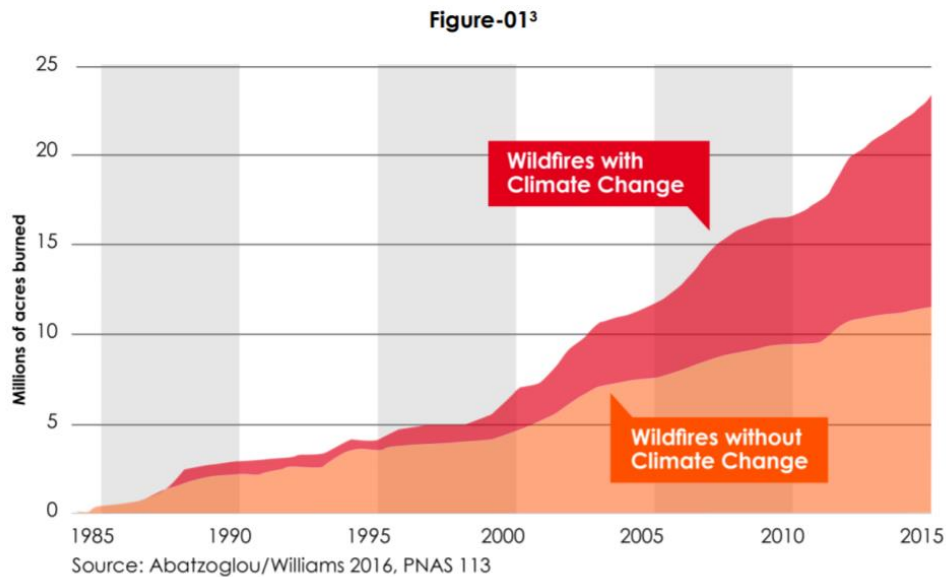
One might assume it is "just" the 25% of Californians that live in Wildland Urban Interface (WUI) zones or the local utility that is hurt. However, higher insurance costs and fire risk reduce property values, lowering property tax revenue, the state's single largest revenue source. By reducing the property tax base there is less money to spend on schools, roads and other municipal projects. The financial impact on the state is far greater than what is felt by any single utility company. The state, CPUC, bankruptcy court and potentially FERC are now left with the unenviable position of determining the best way to distribute this recently realized economic burden among wildfire victims, equity and debt holders, electricity rate payers, the state, taxpayers and PG&E service providers.

By virtue of pre-emptively filing for bankruptcy we know PG&E understands they need the power of a bankruptcy court to shed liabilities. Just how much of a financial burden does this "new normal" cost just PG&E? Well, it's hard to know the timing and distribution of future wildfires or their costs. We do know that the fires of 2017 and 2018 are expected to be about \$30 billion of liabilities for just PG&E. And last month, the utility claimed that in order to meet US District court Judge Alsup's request that they limit the potential for future fires, it would cost the company \$150 billion. So, with \$30 billion of known costs and \$150 billion of preventative costs, we can assume the number to be between those, albeit wide, goal posts. While we have some thoughts on where it might come out, it's not important for this letter. What we want to focus on is that the cost did not go from zero to \$150 billion between 2016 - 2018. It has been growing for two decades. Southern California Edison (SCE) now keenly aware of its own potential wildfire risk has just requested the Public Utility Commission allow them to raise rates by \$2.20/month for each

customer to improve their R.O.E to 17% in order to compensate SCE for the risk of operating and maintaining transmission lines in California. Not to be left behind PG&E has asked the CPUC for a 16% ROE. Both are a significant increase from their historical requests of 9% ROE to provide electricity transmission.

The Risk Was Forecast, So How Did the Markets Miss it?

These growing prospective wildfire costs have been widely forecast and documented by climate scientists, but economists and the capital market continued to ignore it right up until it bankrupted a \$70 billion utility. Given the significant economic impacts, how did the market miss this off-balance sheet liability for so long? We think the below chart Figure-01¹ and Figure-02 do a reasonable job of illustrating why the capital markets were not forced to deal with it until 2017/2018.



The red portion of Figure-01 coupled with the red line in Figure-02 is evidence that PG&E’s off-balance sheet liability was growing, but that the associated costs were not yet felt. And like much of the market’s failure to price the externalities of climate change, this inefficiency or blind spot was only realized when the costs created by those externalities became so overwhelming as to be impossible to ignore.

In Figure-01 the increasing wildfire risk has been expanding quickly for over a decade and a half. As acres burned by wildfires increased, the potential for catastrophic losses for utilities throughout California in a given year also increased. California utilities reported 2,009 fires caused by their wirelines over the past four years. PG&E alone reported over half the total incidents. With approximately 500 catalysts a year, the prospect for more severe fires increased as the wildfire season lengthened, and drought create more flammable conditions.

Figure-02 Overall California Losses due to Wildfires 1980-2018

¹ Eberhard Faust & Markus Steuer, Climate Change Increases Wildfire Risk in California | Munich Re munichre.com (2019), <https://www.munichre.com/topics-online/en/climate-change-and-natural-disasters/climate-change/climate-change-has-increased-wildfire-risk.html>

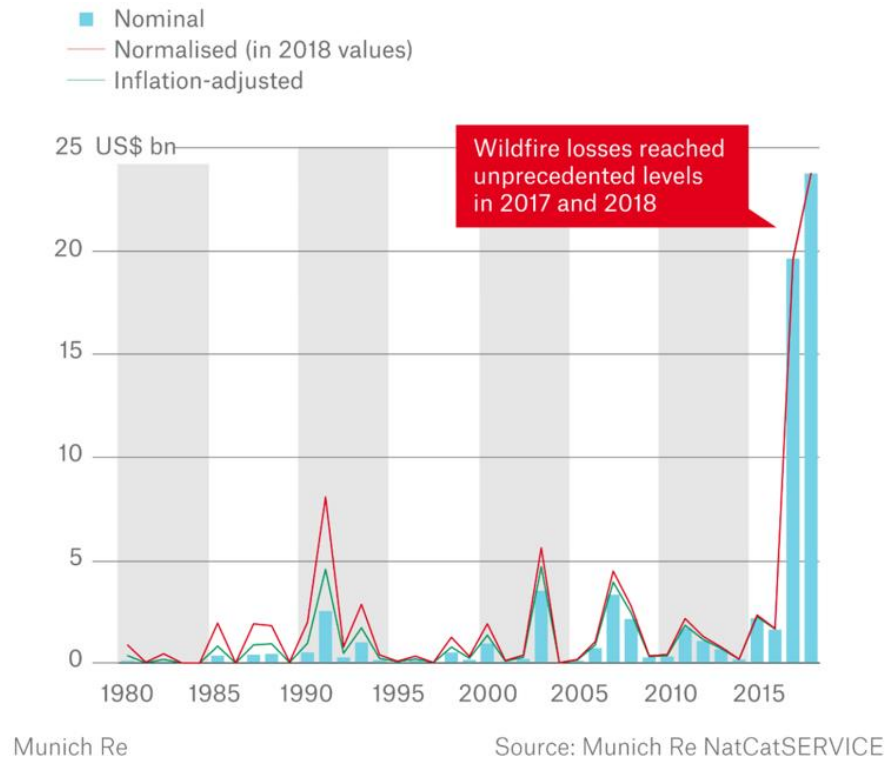


Figure-02 demonstrates, that over the last 40 years, in spite of the increased number of acres burned the costs of these wildfires were relatively flat. Not every acre of burned land costs the same to repair. So more land was burning, but fortunately, those acres were outside of populated areas. A similar affect is happening with hurricanes in Florida. Any given year, based on the distribution of events, can mask (or overstate) the rising risk.

If figure-01, were relabeled and the orange and red portion of the chart were labeled as more traditional financial risks, like off balance sheet pension liability the market would quickly recognize the potential impact on future earnings and would likely discount its valuation. In the case of wildfires, as in the case for many climate related risks, the market is either unwilling or unable to analyze the risk. **It is understandable because there is no historical road map on which to base analysis. However, that does not reduce the necessity for modern investors to incorporate climate science into their thinking if they do not want to find future PG&E's in their portfolio.**

Portfolio Construction

If there is a current consensus in the equity market right now, it is that we are near the end of a decade long global expansion. The benefits of the corporate tax cuts have been fully digested and are no longer acting as a stimulus. Economically cyclical companies like those found in the consumer discretionary and industrials sectors are trading at low valuations, and economically defensive companies like those found in consumer defensive and utilities sectors are trading at multiple premiums.

Redwood Grove Capital's portfolio remains contrarian, value oriented and concentrated. Typically, value is found in areas where the market has low expectations. Rarely, if ever, do you find hype and enthusiasm

coupled with low valuation multiples. Our portfolio is intentionally designed to find those pockets where market sentiment has overstated the downside risks. Ideally, we find companies that are out of favor and have idiosyncratic risks that are weighing too heavily on the price. But valuation and fundamental research alone does not drive our investment decisions.

Our portfolio is built by dual analysis. The two-pronged research process identifies fundamentally undervalued companies that also reflect a market inefficiency associated with climate change. We divide the most impactful macro trends forecasted by climate scientists and economists into four main categories; 1) technological disruptions (ex: automated and electric vehicles, 5G, renewable energy and battery storage) 2) physical impacts of climate change, (ex: rising sea-level, increased storm and wildfire risk) 3) consumer behavioral changes (ex: focus on healthier and cradle to cradle manufacturing), and 4) prospective global, federal and state regulations (ex: carbon tax, changes in FEMA flood zones, inverse condemnation). Each of these macro trends have underlying sub-trends, many of which are reflected in our portfolio holdings. Our value bias means that some sub-trends are not represented.

For example, we have high conviction, based on climate models that water security will decrease particularly in already water stressed areas. By 2025, two thirds of the world's population could face water shortages. The EPA program WaterSense, estimated that household leaks in the United States alone can waste more than a trillion gallons of water annually. This trend will raise the need for products that improve water efficiency and desalinization solutions. However, many "water" stocks evidence low earning volatility and are seen as defensive. Because of the near consensus that we are nearing an end of a decade long global economic expansion the equity markets are valuing defensive stocks at higher than historical valuations. Water related stocks carry this premium not because of the market's climate outlook but because of its near-term economic concerns. As of March 31st, the 35 top water companies are trading at 23.75x P/E, a 25% premium to the S+P 500. While we understand their appeal and the desire to find safe harbor in these turbulent times, those premiums are inconsistent with our contrarian focus on low valuations.

When things happen in the market that ratify the consensus thinking, like greater than expected slowdown in corporate earnings or increased concerns about geopolitical trade, our portfolio will likely decline more than the market. However, if the economy performs at or above the reduced expectations, or the geopolitical risks subside, our portfolio should outperform. In all market conditions, our dual analysis creates a portfolio with an asymmetric risk/reward profile.

First let's look at the portfolio characteristics. We'll then discuss Qualcomm, a company that reflects our sustainable technological disruptions trend in our portfolio. In the chart of portfolio metrics below, you'll see that our portfolio Last Twelve Months Price to Earnings (P/E) ratio is 14.8x, or 23% and 14% cheaper than the Russell 1000 and 2000 respectively. Also importantly, Redwood Grove's portfolio companies' current P/E ratio is approximately half their five year average valuation of 28.2x. In other words, our holdings are cheap relative to the broader market, and particularly cheap relative to their own historical valuations. This is true even if one adjusts for corporate debt, as can be seen in the Enterprise Value to EBITDA ratios.

	NTM PE	LTM PE	3 year avg LTM PE	5 year avg LTM PE	NTM EV/EBITDA	LTM EV/EBITDA	3 year avg LTM EV/EBITDA	5 year avg LTM EV/EBITDA
Redwood Grove	13.8x	14.8x	26.1x	28.2x	9.4x	10.9x	12.7x	13.3x
Russell 1000 Index	16.5x	18.2x	19.4x	18.5x	11.4x	12.8x	12.7x	12.0x
Russell 2000 Index	21.1x	16.8x	19.1x	19.1x	10.8x	13.1x	14.0x	13.8x

We search for growth companies at value prices. Our focus on companies that can return to higher growth, helps us avoid “value traps,” companies that are in long term secular decline. You can see this reflected at the portfolio level. In the below chart you’ll see that although trading at lower valuation multiples, the consensus outlook for our portfolio companies is for faster growth for Revenue, EPS, EBITDA and Cash From Operations (CFO) than the Russell 1000 or 2000.

	CY19 Revenue Growth (%)	CY19 EPS Growth (%)	CY19 EBITDA Growth (%)	CY19 CFO Growth (%)
Redwood Grove	6.4	11.1	7.9	11.5
Russell 1000	4.5	4.2	4.8	8.2
Russell 2000	5.6	11.7	6.7	NA

Of course, it’s never quite this straight forward. Many of the names in our portfolios have short term risks that often explain the combination of higher than average growth expectations with lower than average valuations. In this letter we’d like to discuss one of those names, Qualcomm.

Qualcomm

Our investment in the company is an example of our Technology Disruption/Innovation theme. Qualcomm is the unquestioned leader in 5G technology which is going to act as a backbone for a more efficient use of resources. When we first discussed Qualcomm in our March 2018 letter, the China trade war had threatened Qualcomm’s acquisition of NXP (which ultimately was blocked in what seemed like a retaliatory move by the Chinese Government). In addition, Qualcomm was in a protracted legal battle with Apple related to 5G modems and licensing fees. There were over 20 cases worldwide between Qualcomm and Apple, many of which threatened Qualcomm’s IP and their fundamental business model.

Legal challenges are nothing new for the company. In fact, when the wireless industry transitioned from 2G to 3G and from 3G to 4G, the then leading wireless handset manufacturer also challenged Qualcomm’s licensing fees in court. This strategy, of court fights during periods of transition, ends once IP licensing fees are established. They tend to remain unchallenged until the next generation of technology. As a result, the period of transition is seen as a moment to negotiate licensing fees that will likely be paid

for the next 6-10 years. Court trials are one of the strategies that handset manufactures use to apply pressure on Qualcomm.

When this fight with Apple first started almost two years ago, Qualcomm's CEO Mollenkopf's first move was to press his technological advantage by investing an additional \$500 million in 5G research. This signaled from the onset, that Qualcomm was fighting this through its technological strength, while Apple was going to challenge Qualcomm "fair and reasonable" (FRAND) terms. Apple, and maybe more accurately Tim Cook, took this fight to the very limit. Apple stopped exclusively using Qualcomm chips in their iPhone (they switched to Intel) and sued them for upwards of \$27 billion in damages. Apple even managed to get the FTC involved, through a questionable process that involved a "midnight filing" right after the FTC chairwoman had resigned, with only three of five commissioners at their posts.

But the most important court case was due to start on April 15th 2019, in San Diego between Qualcomm and Apple. While a jury is always hard to predict, we took confidence in the series of victories Qualcomm had been accumulating in previous trails over the past year. At the same time, Apple's supply chain and 2020 iPhone was increasingly at risk, as competitors started introducing 5G phones and Apple's primary provider of 5G modems, Intel, was unable to deliver those modems. While we were optimistic that a deal with Apple would get done, we also knew that 5G was going to be an area of major growth in 2020 and beyond.

Finally, 5G has been determined to be strategically important for the United States. Broadcom tried to buy Qualcomm for \$80 a share in 2017 but the acquisition was blocked by the Committee on Foreign Investment (CFIUS) for reasons of national security. In addition to what we felt was a weak legal case the FTC has received pressure from the State and Defense Department to protect U.S. leadership in 5G technology. While not impossible, it was hard for us to understand why the FTC would rule against Qualcomm.

5G is important for Apple but also for the next generation of mobile internet connectivity. The technology offers up to 100x's faster download speeds, higher network reliability and lower latency. It's easy to wonder, do we really need to watch more videos on our phone? But that's not the promise of 5G. It is a rare technology that could transform industries across every sector of the economy. It will be used in augmented and virtual reality, reshape supply chains, facilitate IoT functionality and be the network that enables automated vehicles. Importantly to us, it is likely the backbone for smart cities and a new era of sustainability.

5G's role is critical in designing more efficient systems. It will do it in ways small and large. For example, 5G modems will be built into pipes enabling city managers to identify and locate municipal pipe leaks the moment they happen. Transportation, which accounts for about a third of greenhouse gas emissions, will be transformed by enabling automated and electric vehicles, smart traffic systems, and more integrated and efficient global distribution systems. 5G enables smart traffic and better building efficiency. Buildings account for almost 40% of GHG emissions. Architects are designing technology solutions for monitoring, managing and verifying of energy use, resulting in up to 70% reduction in energy usage. 5G potentially impacts agriculture as well. Digital agriculture applications coupled with 5G, enable precision agriculture which reduce both water as well as pesticide usage.

On April 16th, Apple dropped its case against Qualcomm and agreed to a multiyear agreement to purchase Qualcomm's chips as well as to a new licensing agreement for Qualcomm's IP. The exact details of the agreement have not been released but Qualcomm has said they expect a positive \$2 impact to EPS.

In addition, this will likely force the remaining handset holdout, Huawei to sign a contract with Qualcomm, likely adding another \$.75 to QUALCOMM's EPS. The stock jumped about 40% in the 48 hours following the April news. While we do not know Apple's reasons for settling, it appears to have been concerns about being able to deliver a 5G phone in 2020, lower likelihood of winning the case and losing Intel as a supplier of 5G modems. At current valuations, QCOM remains a sizable position and remains attractively valued given the improved earnings prospects and its technology leadership.

Closing thoughts

This quarter marked the end of our second year investing for Redwood Grove Capital's clients. As we reflect on our first two years, we are increasingly confident in our central thesis: climate change is unpriced in the capital markets. A failure to account for that inefficiency will result in reduced returns prospectively.

We are long term investors. But do not mistake our investment horizon as multi-decadal. We are already in the early innings of multiple long-term secular trends driven by an unflinching necessity to adapt to and mitigate the effects of climate change. Some of these trends will provide a basis for significant revenue and earnings growth, even in what may be a muted growth environment for the developed markets. Some of these trends will result in long term slow deteriorations. The energy sector, which is predominately fossil fuel companies, made up 25% of the S+P Index in the early 1980's, 12% in 2009 and today is just 6% of the index. We believe that our focus on these trends give us a contrarian insight into the market that will help us generate outsized returns.

We look forward to continuing this journey together with our clients. Thank you again for placing your trust in us.

Best,

A handwritten signature in black ink, appearing to read "Red Gray". The signature is written in a cursive, flowing style.