UTILITY MACROECONOMIC THESIS

1. OVERVIEW

The traditional view of the Utilities sector is that it is has been overly regulated, sleepy and slow to adopt new technology. This plus the slow power demand growth along with higher for longer rates narrative and climate change risks have resulted in Utilities trading at lower than historical median absolute P/E and depressed relative P/E ratios, significantly underperforming market benchmarks. SCP believes that, given the urgent need for the country to manage its Energy Trilemma, Utilities must and will be part of the solution for energy affordability, sustainability and security. This creates a significant macro-driven opportunity for the sector to redefine itself, generate significant growth, and ultimately trade at higher premiums.

2. ENERGY AFFORDABILITY

- **Linkage to Standard of Living/Growth**
  As a country, our energy use closely correlates with our standard of living and long-term growth. The role of Energy Utilities are to generate, transmit and supply electricity to the nation's homes and businesses. Without a Utilities sector able to produce affordable and reliable electricity, our current standard of living and prospects would be significantly diminished.

- **Example: Growth of Artificial Intelligence (AI)/Data Centers**
  Markets are making huge bets on the ability of AI to generate significant productivity enhancements across a wide range of industries. This confidence underlies the spectacular premiums AI companies have been enjoying. Yet implementing AI will require large investments by the Utilities sector to meet its voracious demand for electricity.
  - **i.** Electricity consumption from data centers, AI, and cryptocurrency sectors likely to double by 2026.
  - **ii.** Data centers alone could consume over 1,000 TWh by 2026, similar to Japan's total electricity consumption. As per a WSJ report (and quoted by ARM CEO), while US power consumption by AI datacenters sits at ~4% today, it is expected to trend towards 20-25% usage of the US power grid by 2030.
  - **iii.** Other major growth areas are EV and energy transition towards cleaner energy.
  - **iv.** Regulation updates and technological advancements along with massive capex are crucial to manage energy consumption from data centers effectively and Utilities will lead the charge.

- **Imperative of Driving Renewables down Cost Curve**
  We know we need to accelerate electrification. We also know we need to shift energy production away from oil and gas toward renewables. This will not happen unless we can make wind, solar, hydrogen, and nuclear energy more cost effective, although some observers believe that renewables are already more economical than fossil fuels with the help of government subsidies. Either way, Utilities are in best position to make these cost-saving infrastructure investments as part of crucial public-private partnership.

3. ENERGY SUSTAINABILITY

- **Sustainability Imperative:**
  The use of carbon heavy fuels and the rise of greenhouse gases has now led to what many believe are threats to not only our standard of living but to the earth's environment. As documented in the Paris Accords, finding paths to a more sustainable energy future has become critical goals for most advanced economies, with industry making increasingly large bets on how to achieve such sustainability.

- **Role of Electrification in Decarbonization:**
  Electrification, transitioning from fossil fuel-based to electricity-based systems, is crucial for achieving decarbonization goals. Electricity-based systems tend to emit fewer emissions compared to fossil fuel-based systems, such as heat pumps versus gas boilers and electric vehicles (EVs) versus internal combustion engine vehicles. Demand for electricity will continue to grow.

- **Reducing Carbon Intensity of Electricity Generation:**
  Further emissions reductions can be achieved by shifting from fossil fuel-based power generation to green or carbon-neutral power, resulting in net zero carbon emissions. Utilities will lead this charge working with the federal and respective state governments.

  i. Power generation is currently the largest contributor to carbon dioxide (CO2) emissions globally.
  ii. However, the power sector is also leading the transition to net-zero emissions through the rapid adoption of renewable energy sources such as solar and wind power.

- **Impact of Electrification on Global Decarbonization:**
  Mass electrification and growth of carbon-neutral power are expected to significantly contribute to global decarbonization, with electrification projected to account for nearly half of total greenhouse gas abatement by 2050. Projected two-to-threefold

increase in electricity demand by 2050, necessitating decarbonization of electricity generation to prevent increased emissions.

4. ENERGY SECURITY

- **Energy Security is National Security**
  Recent geopolitical events have hammered home point that having secure access to the energy our economy needs is a vital national security concern, with many oil and gas producing nations being willing to use energy as a means to threaten the country into behaving differently. Energy independence is the ideal means of protecting national security.

- **Utilities Play an Increasingly Important Role in Meeting Rising Energy Demand**
  Global electricity demand is projected to grow by 3.4% annually through 2026, driven by economic growth, particularly in advanced and emerging economies. Electrification of residential, transport, and data center sectors contributes to this growth. Despite progress, electrification must accelerate to meet decarbonization targets, with electricity's share in final energy consumption nearing 30% in order to meet sustainability targets. Utilities are critical to such electrification as part of a crucial public-private partnership.

- **Utilities also a Crucial Target for Cyber and Physical Terrorism**
  Disrupting a region's energy supply could cause catastrophic damage, particularly during times of weather extremes. Unfortunately, this means that Utilities have become a critical target for those wishing to harm the country. Examples are recent cybersecurity attacks on Utility Companies.

5. NECESSITY OF PUBLIC-PRIVATE PARTNERSHIP

- **Huge Cap-Ex Expenditures Will Be Required**
  Utilities face the imperative of making large cap-ex expenditures to meet the affordability, security and sustainability demands noted above.

- **State Regulators Must Play Ball/Red States Leading Path**
  For regulated utilities, their state regulators must recognize the need for such Cap-Ex expenditures and pave the way through prudent rate increases, attractive allowable RoE and sensible rate base increase to make them feasible. We have seen Red States understanding this need, although they are lagging in the transition to renewables.

- **Government Support is on the Way**
  Groundbreaking legislative changes during 2021–22 at both the federal and state

levels are unlocking funding and financing for the sector. For example, the 2021 Infrastructure Investment and Jobs Act (IIJA) and the IRA of 2022 will eventually deliver $97 billion in funding to companies researching, developing and deploying clean energy projects and technologies.

i. As 2023 came to an end, the first grants were awarded from the Department of Energy —including $3.5 billion earmarked for 58 projects designed to expand capacity for wind and solar, harden powerlines against extreme weather and develop microgrids.
ii. Another $7 billion in grants was announced for the creation of hydrogen hubs across the country.
iii. The opportunity is far from over; clean energy grants will continue for at least five years, and the tax benefits will likely extend further.
iv. However, there is still plenty of ambiguity in the exact implementation of some of the PTC proposals at this stage albeit this is expected to be clarified over time.

6. SECTOR HEADWINDS

- **Grid Reliability and Stability with Intermittent Renewable Energy Sources.**
  i. Grid connection queues are hindering the progress of renewables projects.
  ii. Grid constraints are identified as the primary bottleneck, with lengthy queues for project connections observed globally.
  iii. Rising connection costs are eroding project margins, leading to cancellations. Growing connection costs pose challenges, with pre-2020 costs of over $100 per kilowatt in the US now escalating to around $250, making projects economically unviable without significant investment.
  iv. Record queues in Europe and the US are resulting in prolonged connection times.
  v. Numerous solar, wind, and battery projects are stuck in interconnection queues due to challenges faced by transmission and distribution operators in upgrading their networks.
  vi. Infrastructure development can span several years, further delaying projects.
  vii. Network operators and regulators are working to reduce backlogs, implementing a first-come, first-served approach or prioritizing first-ready projects.
  viii. Only 11% of wind, solar and battery storage grid capacity applications in the seven US independent system operators have been permitted as of January 2024, while a staggering 1,131 gigawatts (GW) are still waiting for approval. That's nearly four times the 288GW of nationwide cumulative installed capacity for projects of utility-scale size at the end of 2023.

- **Effect of Interest Rates on Utilities Stocks:**

  i. Utilities stocks tend to underperform when interest rates rise due to their capital-intensive nature, relying on borrowing for growth investments.
  ii. Higher interest rates lead to increased borrowing costs, straining utilities businesses. Higher interest rates will escalate costs as utilities issue new debt and refinance at higher rates, necessitating regulatory approval for bill increases.
  iii. Moreover, higher interest rates diminish utilities' dividend yields, impacting income-focused investors.

- **Government Uncertainty**
  As noted above, effective public-partnerships are required at both the state and federal levels to pull off the transition required. Unfortunately, not all state regulators have demonstrated foresight and are reluctant to pass on rate increases. Similarly, it is hard to budget on receiving federal grants and tax subsidies given the current political environment.

- **Climate Change Risk**

  i. Utilities face a growing "black swan" risk caused by climate change, hurriances, and fires on utilities (examples are PSEG, Hawaiian Electrical, Excelon in TX etc.)
  ii. McKinsey: Utilities are already more vulnerable to extreme weather events than in the past. When homes are built in areas prone to wildfires, power companies follow, placing their own assets at higher risk. These can even exacerbate the problem, if sparks from power lines ignite. Fires also emit additional carbon dioxide (CO_2), a greenhouse gas that contributes to climate change. In California, the devastating 2018 fire season emitted approximately 15 percent of the CO_2 California emits from all sources in a typical year.
  iii. McKinsey: If climate change brings significant sea-level rise, as many models predict, that raises new vulnerabilities, but the risk is material today. In the United States, nine nuclear-power plants are located within two miles of the ocean. Many of the nation's 8,625 power plants were deliberately sited near shorelines in order to have access to water. As a result, when hurricanes strike, power plants already face significant flooding damage. According to the Department of Energy, 44 power plants were in flooded areas in Hurricane Irene and 69 were in flooded areas in Hurricane Sandy. During these hurricanes, eight nuclear power plants had to shut down or reduce service. During Houston's Hurricane Harvey in 2017, wind and catastrophic flooding knocked down or damaged more than 6,200 distribution poles and 850 transmission structures; 21.4 gigawatts of generation were affected by wind damage, flooding damage, fuel supply issues, or evacuations and shutdowns. If

sea levels rise, storm surges would hit further inland, causing more damaging coastal flooding to generation, transmission, and distribution infrastructure.

iv. McKinsey: Unless utilities become more resilient to extreme weather events, they put themselves at unnecessary risk, in both physical and financial terms. Repairing storm damage and upgrading infrastructure after the fact is expensive and traumatic. Hurricane Katrina in 2005 forced Entergy New Orleans into Chapter 11 bankruptcy reorganization. There are, of course, compelling environmental and social reasons to invest in mitigation efforts sooner rather than later. We believe there are also economic ones. Power utilities need to invest on the basis that the present is already riskier than what was planned and the future will be more volatile. There is evidence that climate change adaptation can also be cost-effective.

7. PICKS AND SHOVELS WILL BE CRITICAL

- **Revenue Opportunities for OEMs in Electrification:**
  - i. Overcoming bottlenecks in electrification presents significant value-creation opportunities for Original Equipment Manufacturers (OEMs).
  - ii. Global OEM revenues in electrification hardware could increase substantially by 2030, reaching between $0.9 trillion and $1.4 trillion for selected key technologies.
  - iii. Emerging technologies like battery energy storage systems, large-scale heat pumps, and electrolyzers are expected to see double-digit revenue growth.
  - iv. Despite mature applications like transmission and distribution, wind, and solar PV experiencing more moderate growth, they still represent significant portions of global hardware capital expenditure (capex).
  - v. Declining unit economics for some technologies, such as solar PV, may pose challenges for total growth despite capacity additions driving volume growth.