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The Market Commentary

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1 Executive Summary

The US continues negligent of its geopolitical concerns. The Trump administration continues its radicalism and law-breaking. The economy moulders along. The green energy revolution is continuing because it is driven by unstoppable market forces. There are significant growth opportunities in many parts of the Power Industry in consequence. Markets appear to have plateaued for the moment.

2 Geopolitics

Encouraged by his success in Gaza Trump is taking another stab at ending the Russian-Ukraine war. His initial proposal was approximately a Ukrainian surrender with modest restrictions on the Russians. It was unpalatable to all parties. A leaked telephone exchange revealed his principal negotiator Witkoff working hand in glove with the Kremlin. This reminded everyone that the would be mediator is actually an enemy of Ukraine - a fact widely circulated during Trump's first impeachment proceeding. The Russians have made it clear that they are looking for a partnership with the US which imposes their rule on Ukraine and returns Russia to the role of Eastern Europe's hegemon.

On the battlefield November opened with the fall of Pokrovsk appearing imminent. In mid-December the town's northern periphery is still contested as the Russians appear stalled by urban warfare. Kremlin propaganda is announcing a strategic breakthrough, the collapse of the Ukrainian front and an imminent march on Kiev. It is too much nonsense for even Russian ultranationalists to swallow. One wonders who is the target of this influence campaign. Possibly westerners who otherwise are not paying attention (e.g. the MAGA faithful.) Or perhaps the Kremlin is setting the ground work with the Russian people for rejecting any proposal from Trump as an insult to Russian arms. Whatever deal Trump might wish to make with Russia, a good fraction of his party remembers Russia is our hereditary enemy and given Trump's weak hold on Congress he cannot drive that fraction into open rebellion. It seems unlikely he can actually give the Kremlin what it wants and it probably knows that. But it suits them to play along and keep their adversaries confused and not unified behind a workable strategy to end the war.

Russia itself does not have a workable strategy. In 2025 it succeeded in extending its control over Ukraine by eight tenths of one percent of Ukraine's territory at a cost

of about 400,000 casualties. Estimates show that Russia is advancing at about one-fourth the speed of Western front offensives during World War I. Ukraine's strategy is to conserve manpower, slowly trading terrain for Russian blood and to strike hard in Russia's rear at key economic, logistic, military and command points. It is a policy of slowly exhausting Russia which could eventually lead to the comprehensive collapse of its adversary. It depends, however, on adequate resources from friendly nations to protect its home front from Russia's own deep strikes - which so far have primarily targeted civil society.

India is returning to its cold war alignment with Russia. It will likely supply Russia with contract laborers to fill out the manpower gaps in the Russian industrial base and manufacture drones and other light weaponry for the Ukraine war. Visions of an Asian Bloc (China, Russia, India, Iran and North Korea) float in the air. India's move is in response to Trump's multiple hostile moves towards India (lack of support for India in recent Pakistan war, tariffs, H1-B visas.) These have undone the careful sustained diplomacy of the Bush and Biden administration which at one point seemed on the verge of drawing India into alignment with the Western alliance. In alienating India, Trump has substantially weakened the US position in the Indo-Pacific and Middle East. It also sacrifices what could have been a good long term export market for the US defense industry. However, India has grown up since its alignment with the Soviet Union. We suspect it will demand more in this alignment and give less. In the last analysis, the Western bloc has more to offer India than the Asian bloc. India will find it to its advantage to teeter between the two - so preventing either from abusing its interests and extracting benefits from both sides.

In Israel Netanyahu is riding the crest of his success and is seeking to use it to end his domestic legal exposure. He likely will secure his domestic position before resuming operations abroad. In Syria, Assad remnants are attempting to establish a base in the Alawite community. The community appears only tactically interested at this moment. The Alawites are skeptical that the Damascus government will provide them with effective intercommunal protection and they would prefer to handle public security on a semi-autonomous basis. They are also happy to take Assad money. But the Alwaites do not seem to want conflict with the Damascus government - unlike the Assad faction.

China continues preparing for an invasion of Taiwan. It is enhancing its sea lift and air assault capabilities and it is conducting an intimidation campaign against Japan to keep it from aiding Taiwan. The US Navy is no longer the dominant naval power in the Western Pacific. It badly needs to focus on countering the Chinese threat but its ship building program is in disarray and shows no signs of quickly regaining focus. Taiwan's government has introduced a significant spending bill to

strengthen the country's defenses but the KMT opposition is determined to scupper it. The KMT is fairly openly working to support a Chinese takeover. The island of Taiwan contains two distinct ethnicities: the native Taiwanese and mainlanders who mostly fled to the island in 1948 and who form the bulk of KMT support. We are concerned that in the event of a takeover by Beijing we would see a campaign of ethnocide unleashed against the native Taiwanese similar to what has happened to the Tibetans and the Uighers in other peripheral regions now controlled by Beijing.

China has demonstrated a drone aircraft with a range of 5,000 miles, an endurance of 12 hours and the cargo capacity to launch a swarm of 100 attack drones. It is believed that the drone mothership may be deployable from China's most recently built aircraft carriers. A naval air wing of such drone carriers would present a novel adversary for existing surface fleets.

China has succeeded in taking control of its littoral seas and there is no doubt that its ambition is to push the US Navy back to the mid-Pacific while drawing the nations of the Indo-Pacific into a Chinese dominated economic block. Success in taking Taiwan would be a critical step in accomplishing this initiative. China can push its program for Taiwan under the cover of "seeking national reunion", which disguises the deeper strategic program. This clever ploy gives China substantial diplomatic advantage and throws its adversaries off balance. Obama is clearly responsible for China's initial success, but Trump's fecklessness is compounding his predecessor's folly. China is a smart highly capable adversary and its aggression needs to be met resolutely and with steady purpose.

3 Domestic Politics

Six Democratic Congressmen issued a statement reminding military officers that they need not follow unlawful orders. In fact the Code of Military Justice prohibits them from following such orders. MAGA Republicans reacted with fury. Secretary Hegseth threatened to recall one of the Democrats, Senator Kelly (a naval captain on the retired list), to active duty to face a court martial. It turns out more lies behind this than legal fussing. The US Navy commenced sinking Venezuelan shipping on September 2. Apparently the first sinking left survivors on board the damaged vessel. CNN reports that a second salvo was made in accordance with an order of Hegseth's that there be no survivors. An admiral who questioned Hegseth's instruction had previously been forced into retirement.

The nearest analogy to this situation is the sorry history of attacks on life boats - a history which we now review. In World War II lifeboats were occasionally found adrift in the Atlantic with evidence of having been machine gunned. One incident

exists where a specific U-boat captain is known to have done this. In the Pacific theater the US Air force (not Navy) ordered pilots to strafe Japanese lifeboats. The Japanese also sank lifeboats and executed prisoners of war. In the vast expanse of the Pacific meeting a lifeboat was a rare occurrence, however, and neither side seems to have followed this policy with much energy. The US Navy seems to have held to the immemorial custom of the sea that stranded mariners are to be rescued, not left to perish or to be killed outright. After the war the Navy energetically hunted down and hanged enemy officers who attacked lifeboats or executed prisoners. In the course of a bitter war lifeboat attacks seem to be mostly personal acts of men under extreme combat fatigue rather than policy. Since the war the most prominent such incident was the USS Liberty. It was a US Navy reconnaissance ship with an NSA signals intelligence team embarked. It stumbled across evidence of the Israeli army massacring Egyptian officers in the 1973 war. The Israeli's sank the US ship and reportedly killed the survivors. Killing to preserve the secrecy of a covert action appears to be the principle reason for ordering such attacks on survivors. The laws of war are absolutely clear that such attacks are very serious crimes and in fact hanging offenses.

So returning to the Venezuelan matter it seems that there was some confusion at the start as to whether it was a military or covert action but it appears to be operating at present as a military affair. The Navy has rescued a few survivors of its strikes and repatriated them. Meanwhile the Secretary of War labors under the cloud of having committed a hanging offense. At a minimum his resignation appears called for if the facts are as laid out above. But who would take over? Unfortunately, here we run into the peculiar staffing practices of the Trump administration. Both the Deputy Secretary and the Secretary of the Navy are money managers with no important experience of military matters. Their appointments appear to be honorifics bestowed on competent fund raisers rather than working officials. Meanwhile Hegseth is attempting to pass the responsibility to the admiral in charge of the operation. The admiral's account is that the boat they sank was headed for Suriname (i.e. away from the US.) The first strike broke the boat in two. There were two survivors who made desperate attempts to clamber on to the overturned hull. After watching this spectacle for an hour a second strike was ordered which killed them. We are asked to conclude this act was justified as the men were a continuing threat to the US. The reader may make up his own mind as to whether that was plausibly the Admiral's thought process at the time. We note that the second strike used two missiles at an approximate cost of $ 250,000. We remark that we do not see a campaign advantage to the US justifying this expense.

Where the Venezuelan affair is going is very unclear. Trump is threatening to

attack land targets which are associated to drug cartels. No one particularly believes this. The US has been hostile to the Venezuelan government for at least 20 years - initially because the present dictator's predecessor stifled Venezuelan democracy and tilted towards Cuba. More recently friendship with China has drawn US ire as has the problem of political refuges (over a million) who have fled the troubled country. Trump's true objective appears to be forcing the retirement of the dictator. But Maduro intends to fight, US domestic support for Trump's policy is poorly developed and the Administration looks headed towards a Bay of Pigs type fiasco. The most likely outcome is the Navy bombing a few sites in Venezuela and then sailing home under the banner of having saved America from fentanyl.

The Epstein scandal has claimed another scalp. In this instance Larry Summers. His mistake was asking Epstein for dating advice - a misstep which proved terminally embarrassing to the proud institutions to which Summers was attached. It is widely believed that Summer's skill at human relations does not match his undoubted brilliance in economics. He was probably correct to seek advice and likely profited from Epstein's entirely conventional remarks. However the Epstein scandal long ago departed from any connection with ground reality. Trump remains the target *de jour* for scalp seekers and the Venezuelan affair certainly labors under the suspicion of being a distraction (colloquially a "wag the dog") operation. The Department of Justice has released about ninety thousand pages of discovery in its Epstein file - all of it at first glance drivel except for 130 pages of entirely redacted material. The record has been so thoroughly scrubbed of references to Trump as to constitute an obvious cover up.

Marjory Taylor Greene has announced her resignation from Congress and decision not to seek re-election in the face of Trump's hostility to her. Speculation swirls around this decision. Is she positioning herself to seek higher office? Her personal wealth has increased substantially while in office, apparently having benefited from being on the inside track for market moving news. Perhaps she is withdrawing before new regulations attract more scrutiny of her finances. Or perhaps we should take her at her word that Kirk's death has caused her to rethink her political stance. Certainly her formerly inflammatory political style ran the risk of inflaming the wrong sort of attention. In any case, wisdom is always to leave the party while the band is still playing and Greene is the first prominent departure from Trump's inner circle.

A young woman serving in the National Guard was gunned down by an Afghani refugee. His motives are unclear. He appears to have worked for the CIA in Afghanistan (perhaps as a translator) and to have been admitted to the US under a program of granting refuge to our in country collaborators. The guardsman had been put in harms way by Trump in a purely performative role. The rules of

engagement under which the guard is deployed to DC allow the guard simply to stand around and call for police intervention when they think the public is getting rowdy. Trump's response to the event was to seek to ban immigration from some 30 nations.

The administration has issued a defense strategy white paper (the NSS.) Normally this is a serious policy document that sets the framework for a host of policy decisions on force structure and weapons procurement. This year's document is far more rhetorical. To quote from the first line of the cover letter: "Over the past nine months we have brought our nation – and the world – back from the brink of catastrophe and disaster." Quite frankly this sounds as if the author is certifiable as insane. Although signed by Trump we suppose the actual composition was by some White House dweeb. We do not suppose the White House is staffing itself with lunatics. Rather we conclude that the White House's dweebs understand that their job security rests on supplying heaping portions of flattery and that the boss's tin ear puts them in no danger of attracting the editor's pen. From this unpromising start the NSS continues trying to make bureaucratic banalities look revolutionary:

1. The US will no longer act as the world's policeman. This is a purely internal political stance. The US never acts abroad except in its best interest. It is a favorite political stance of the Trump Republicans, however, that left wing Internationalists are putting US forces at the service of foreign interests. In fact Trump just did so with regard to Israel in the war with Iran. Overall Trump has been far more interventionist abroad than Biden.

2. The Europeans and Japan etc must look to their own defense. This is part of continuing arm twisting on the part of the US to get its allies to spend more on their defense. We agree that they should. But the phraseology may give China and Russia hope that the US is dissolving the Western Alliance. The Alliance is certainly in trouble but it is premature to announce its demise.

3. The US will play a more forceful role in the Western hemisphere. It is impolitic to make vague threats towards your neighbors. But that is never a concern of this Administration.

4. The US will gradually disengage from the Middle East. Reducing our engagement has been ongoing since the Obama administration. With petroleum gradually becoming a less strategic resource it is likely this very gradual disengagement will continue long term. So no news here.

Top officialdom at the FDA is being changed. The CDC continues implementing the anti-vax agenda.

When the US renews H1-B visas and similar long term residency permits it requires those renewing the visa to journey to their home country to complete the formalities with the US consulate in their home country. At any given moment thousands of long term residents will be abroad completing this process. Recently the administration stranded thousands of such people abroad by canceling renewal appointments for six to twelve months. The unfortunate victims of this political dirty trick are thus left cut off from their families and jobs in the US and often forced to incur the cost of residency in a country where they no longer have a home base. This is not "taking care that the laws be faithfully executed" to quote from Article II section 3 of the US Constitution's definition of the duties of the President.

Besides the immediately effected individuals and families the other victim is the US business community which has its workforce disrupted and its products shunned by foreign purchasers stirred to a general ant-American hostility by these abusive acts. So far the business community has raised little protest. We believe they have been intimidated. They have observed Trump grab control of the FTC, a regulatory agency with wide ranging powers over the business community. Knowing Trump's vengeful nature they are choosing to lie low and not attract attention. Meanwhile Trump's coup at the FTC is before the Supreme Court. That court looks likely to overturn a 90 year old precedent to give Trump the power he seeks.

4 Domestic Economy

The situation should come in to better focus this month as the government's statistical operations recover from the disruption of the shutdown. The Treasury has retired the penny. This is a modestly inflationary step as retailers reprice goods from $3.99 to $4.05. Real estate investors tend to think inflation is a good thing and nearly all of Trump's economic interventions are pro-inflationary. The American public bitterly disagrees with their president on this preference but so far that frustration is more oozing than roaring out.

The Administration has awarded $20 billion in extra budget authority to the National Laboratories to fund AI research. This move is a modest course correction to the Administration's otherwise marked hostility towards science. The Administration's suicidal hostility to foreign born/US trained talent remains in place. We expect this stance to remain in place until the next President takes over and in the wholesale reversal of Trump's policies which then likely occurs this particular policy will be reversed.

5 The Green Energy Transition

Several case studies provide a progress report on the green energy transition.

5.1 The UK

The British Royal Society has published an in-depth study of what decarbonizing the UK's electrical grid involves (*"Large Scale Electricity Storage"*, July 2025.) This study is interesting in its own right, and with green energy research largely suppressed in the US it is also useful for some inferences that might be drawn for the US. The UK government's policy goal is for electricity production to be fully decarbonized by 2050. The study's base case is that this goal is fully met by transition to low cost renewables backed by power storage realized as hydrogen stored in underground salt domes. The study tests key assumptions and presents full sensitivity testing. However it does not consider in a substantial way the possibilities from integration with the EU power grid, biomass energy production or cogeneration. These are complex 10% effects which require substantial modeling work in their own right for them to be incorporated in the study conducted here. Here we focus on the base case and some of the unexpected insights it turns up.

The southernmost city in the UK is north of every US city in the core 48 states. As a result the role of solar is somewhat attenuated in the UK. Solar production basically drops to zero in the winter months. Wind resource, both onshore and offshore, is abundant in the UK. While both types of power fluctuate the nature of the fluctuation is quite different. Solar production has sharp highly predictable diurnal and seasonal fluctuations but random fluctuations at the level of weekly averages are small. Wind also has predictable daily and seasonal variability which is largely complementary to solar, with best production at night and in winter. However it also has random fluctuations which are much more significant at all time scales. In particular the decade long North Atlantic Oscillation can result in a cluster of years in which conditions in the North Sea are dominated by an anticyclone that brings cold calm air to the UK - simultaneously raising heating loads and depressing wind power. This stochastic factor is only visible in long term studies. The Royal Society used a 37 year history and estimated as a result a power storage need four times higher than what would be estimated from a twenty year study. For the UK the Royal Society assumed that power production in 2050 would be 20% solar, 56% offshore wind and 24% onshore wind. This is not a critical assumption, but it seems to be the optimal mix for the baseline study.

Current UK electricity consumption is 317 Terwatt hours per year (TWh.) The

study assumes a 4% annual growth rate driven by adoption of electric vehicles and electrical heating in efforts to decarbonize the transportation and heating sectors in parallel with decarbonization of electric power. Accordingly demand in 2050 is expected to be 570 TWh - an 80% increase. This is broken down as 62% base load, 17% heating load and 21% transportation load. Power production capacity must both meet the average demand and provide an excess production for charging power storage. The study estimated an annual production need of 741 TWh based on its sizing of the storage need from the study of weather variability. Specifically the study indicated a 50 TWh storage need in the typical year rising to a peak need of 192 TWh required to deal with the observed extremes from the North Atlantic Oscillation.

These figures indicate sprightly growth in generation capacity Ten fold growth

Table 1: Growth Required To Decarbonize the UK Grid By 2050

Type	Weight in Mix		Production (TWh)		Change (x)
	2025	2050	2025	2050	
Solar	4	20	13	148	11
Offshore Wind	18	56	41	414	10
Onshore Wind	11	24	35	178	5

over 25 years represents an annual compound growth rate of 10%.

Backing this production is a hydrogen storage facility. Power is brought to the storage point as electric power. Electrolyzers convert power to hydrogen gas with a 74% efficiency. The gas is pumped into underground caverns in salt domes. These are either repurposed existing natural gas storage reservoirs or new constructed reservoirs for hydrogen storage. When power is needed the gas is drawn from the reservoir and converted back to electricity either by fuel cells or by internal combustion engines. Here the conversion efficiency is 55% so the total round trip efficiency is 41%. The produced power is then fed to the national grid for transmission to the point of use. The UK has three regions with suitable geology for construction of storage caverns, but Yorkshire is likely to be the dominant storage point in the initial build out. Massive amounts of energy are being stored in hydrogen - an explosive gas. But the study considered this raised no new safety issues as there is already experience with industrial scale use of hydrogen and with storage of natural gas. The UK would need to expand its existing underground reservoir capacity about 5x. The study concluded this would be a large but doable challenge for the countries existing drillers. The total facility would likely consist of 85 separate storage points each with about 10 reservoirs holding 0.1TWh equivalent of stored hydrogen. A single such

storage point requires about 5 years to construct, so about 17 storage points need to be under construction at any given moment (assuming build out starts now for completion in 2050.)

Although massive energy storage is required, the momentary rate of drawn down is small. The study projects that the ability to deliver 100 GW of power on demand represents a reasonable safety margin to maximum need. Charging of the reservoir is conducted a slower rate of 80GW. With these sizings electrolyzers constitute 20% of capital cost, fuel cells or engines also about 20% and the caverns together with pumps about 60% of the capital cost. Utility infrastructure generally can be financed at a moderate cost of capital The study assumed a 5% real rate of return. Operating and maintenance expense is 1.5%-2% of capital cost per year so the annual cost is 6.5%-7% and operating costs represent about 25% of total cost. Attention to minimizing this cost is therefore worthwhile. Stored power is expensive. A 41% round trip efficiency makes stored power cost 2.4x raw power before storage facility costs are added. Facility costs depend on how many times the storage is cycled over the economic life of its plant. The cycle time is long since most of the stored power is being held against once a decade dips in production. Assuming three cycles over the equipment lifetime indicates the facility costs only increase the cost of stored power by 10-15%. In other words, round trip efficiency is the critical parameter for controlling the cost of stored power. However only about 15% of electricity demand is met from stored power. As a result total system cost is only moderately sensitive to the cost of storage. However with stored power costing nearly 3x raw power there is a very substantial economic incentive to improve round trip efficiency.

In terms of the cost of delivered power the system couples low cost generation to expensive storage through an enhanced grid. The breakdown of costs is as shown in table 2 (next page.) For comparison the average wholesale price of power in the UK has been $ 46/MWh in most years. But in 2022 that cost spiked 5x to $ 220/MWh. The Royal Society's system eliminates variability but at a cost 40% above the current typical value. It is likely an implemented system would deliver at lower cost but permit exogenous means of meeting extreme conditions, for instance interrupting service to low impact users, allowing cost of day pricing to encourage more efficient use and importing power.

Technical improvements also are possible with reductions in overall system cost. To improve system functioning one needs an uncorrelated source of power which can follow a variable load and whose costs are not much higher than the power mix considered here. Nuclear has poor load following characteristics and high cost, so it is unlikely to improve system performance. Existing gas fired combined cycle plants have good load following and low costs most of the time but retrofitting

Table 2: Cost Structure of Modeled Grid

Item	Cost ($/MWh)	Cost (% Total)
Generation	35	56
Grid		
...Transmission	2.1	3.4
...Stabilization	0.6	0.01
...Distribution	1.3	2
...Total Grid	4	6.3
Storage		
...hydrogen production	5	8.0
...storage	15	24
...hydrogen consumption	4	6
...Total Storage	24	38
Total Cost	63	100

them for carbon capture is very costly and perfect carbon capture is not attainable. The best candidates for system improvement are medium frequency power storage technologies. These technologies have higher round-trip efficiencies which permit them to be cycled more rapidly. Rapid cycling spreads higher plant cost over more delivered megawatts resulting in a lower cost of stored power. The study identified a number of promising technologies - including compressed air storage (a technology very similar to hydrogen storage), flow batteries and systems for combined storage and utilization of heat. More specifically the paper identified a number of R&D initiatives with good potential pay back:

1. In depth modeling of the total system
2. Investigation of optimal market design in terms of the mix of spot and long term contract pricing and how rarely utilized but necessary stabilization services are compensated. How collaboration of different firms to achieve engineering optimal solutions can be fostered without opening the door to collusive rent extraction.
3. Hydrogen fired internal combustion engines. The major automotive and marine engine manufacturers appear to be the current leaders here.
4. Battery storage optimized for stationary power service

5. Incorporation of long term weather forecasts into optimal use of storage facilities
6. Efficient construction of storage reservoirs
7. Adaptation of industrial processes to the new power regime with more stable somewhat higher costs.
8. Gleaning storage capacity from parked electrical vehicles (e.g bus fleets which are idle at night.)
9. Systems for distributing heat within municipal districts in conjunction with thermal storage of power
10. Improved power conditioning electronics

In short the energy transition can bring growth opportunities to a very wide range of industries and firms.

5.2 South Australia

South Australia is an Australian state fronting on the Southern Ocean. Its principal city is Adelaide (population 1,469,000.) About 67% of the total population of the state is in Adelaide. The coast enjoys a Mediterranean climate but much of the interior is very arid and practically a subtropical desert. South Australia has economic deposits of coal and natural gas and a massive uranium deposit (30% of world reserves.) Despite this mineral abundance the state government made the decision to become a green energy hub based on exploiting the state's abundant wind and solar potential. The state systematically surveyed its potential and then determined the necessary upgrades to its transmission and distribution systems required to realize its potential. Build out of facilities was performed by private enterprise working within the regulator's master plan. In 2024 the state's electricity was sourced as shown in table three.

Penetration of roof-top solar is about 50% of homes. Production excess to household requirements is sold to the grid but the inverters are under remote control and the supply is curtailed when the grid cannot absorb the load. Battery storage is being integrated to the roof top solar and similarly will be under remote control so that the roof-top production becomes a virtual power plant. The natural gas contribution is legacy gas peakers that supply power at power demand peaks. The average demand is 1.3 GW with peak demand of 3.3GW. Storage is through a 150MW lithium

Table 3: Sourcing of South Australia Generated Power in 2024

Source	Contribution
Wind	45%
Roof Top Solar	21%
Utility Solar	10%
Natural Gas	20%
Stored Power	4%

battery facility. The system has no base load generators. Grid stability has been excellent however. Although wind and solar are variable due to weather, this variation is mostly predicable from short term weather forecasts permitting effective grid management. The distributed nature of production means any random failures are small scale. This is in contrast to the other Australian states which mostly rely on a fairly old fleet of large scale thermal plants. When one of those plants goes offline unexpectedly that is a major grid disruption. A traditional thermal generator is a heavy spinning piece of metal which acts as a gyroscope. Any variation in line current generates a counterbalancing response from the gyroscope that acts to stabilize the grid. South Australia achieves the same effect with synchronous condensers. These are DC powered motors which provide the same "spinning reserve" to stabilize grid frequency. On a bit over 25% of the days in the year South Australia relies only on renewable generation. The aridity of the region does not lend itself to pumped hydro energy storage so the state is moving ahead with a pilot hydrogen storage plant. It is also improving interconnects to the national grid so it can sell excess production. The State has a pilot project to develop its geothermal potential. Geothermal can perform some of the load following function traditionally supplied by large gas fired plants. South Australia intends to phase out fossil fuel generation before 2030 and to earn significant revenue selling green power to the national grid.

Delivered power costs do not lend themselves to comparison between the states as several states have significant subsidies or have prices which reflect the presence of old fully depreciated facilities in the pricing mix. However the Australian energy regulator has estimated the cost of power from new generation plants as shown in table four.

The last three rows are based on foreign experience as there is no Australian experience. The number shown is the LCOE - levelized cost of electricity. This is intended to be an all inclusive estimate of cost stated as the average cost of a MWh required over a facility's design life for break even operation. We give the premium to Utility Solar as this determines the competitiveness of the source with stored power

Table 4: Estimated Power Cost From New Built Generators

Type	Power Cost (AUD/MWh)	Premium to Utility Solar
Roof Top Solar	1336	-9%
Utility Solar	1463	–
Combined Cycle Gas	2250	53%
Onshore Wind	3351	129%
Offshore Wind	4710	220%
Gas With Carbon Capture	5802	296%
Large Nuclear	8984	572%
Modular Nuclear	29227	20x

initially charged from solar. Currently battery stored power at the short horizon is at a 25% premium to feed power. Pumped hydro is about a 70% premium and hydrogen is a 200% premium.

5.3 The United States

Turning to the US we can draw certain inferences. Current US annual demand is 4200 TWh - about 12x the UK. Currently in the UK power is 50% generated from renewable while the US is 40%. The UK has had a steady government policy for decarbonization in place for over a decade, whereas US policy has swung like a door in the winds of partisan politics. The similar degree of market penetration indicates this transition is actually being driven by market forces rather than government policy. The geographic position of the US is far more favorable to solar than the UK. In fact the deserts of the sunbelt may be the best location for solar on the planet, surpassed only by the Sahara and Arabian deserts in terms of productive capacity and closer to developed power users. The US also has substantial potential for stored hydro power storage, whereas the UK does not. Pumped hydro has somewhat better round trip efficiency than hydrogen storage. These factors indicate a green power economy in the US would need proportionally less storage, would deliver storage more cheaply and would have a lower system cost than in the UK. In fact, a green power system in the US might be lower cost than the current system once key technologies have matured. The business opportunity also would be greater of course given the larger overall system.

It is also interesting to compare the South Australia grid to the two leading US grids in non-carbon power: California and Texas (see table five.) Intensity of electricity use is comparable in California and South Australia. It is higher in Texas due

Table 5: Comparison of Three Grids

Region	South Australia	California	Texas
Population (Millions)	1.9	39.5	31.2
Average Load (GW)	1.3	32.7	57
Average Load per capita (kW/person)	0.68	0.82	1.82
Peak Load (GW)	3.3	48.3	85.5
Generation Mix (% total)			
Roof Top Solar	21	11	1
Utility Solar	10	19	9
Wind	45	6	22
Hydropower	0	10	0
Nuclear	0	6	7
Geothermal	0	4	0
Battery Storage	4	4	0
All noncarbon	80	60	39
Gas	20	36	50
Coal	0		12
Other	0	4	0

to a large industrial base. Grid reliability has been excellent in South Australia, but troubled in California and Texas. California's problems derive from legacy equipment which has exploded, caused devastating fires and forced grid shut down in extreme weather as a safety precaution. Texas deliberately under invested in grid stability and ultimately suffered between 246 and 800 deaths when people froze to death in their homes during a winter storm.

Regulatory approach is instructively different in the three states. South Australia takes an entrepreneurial approach. It is deliberately building a green energy export industry to offset the decline it anticipates in its mineral energy sector. California is focused on reducing air pollution and green house gasses and improving grid safety. It is favorable to distributed power production. Texas aims to deliver the lowest cost power to attract industry to the state and thus grow the state's economy. It favors centralized mega-projects. These predilections have led it to keep dirty legacy generators online, to under invest in stability and to neglect the opportunity in solar. But Texas is shifting gears. Its plans emphasize fast growth in solar and batteries as it realizes these are now very price competitive.

5.4 Investment Implications

From these case studies a number of implications can be drawn

1. The green transition is a massive growth driver for the power industry
2. A largely decarbonized grid has been demonstrated at scale. A fully decarbonized grid is clearly feasible - both technically and economically.
3. Contrary to misinformation widely supplied by defenders of fossil fuel generation, significant adoption of renewables can improve grid stability.
4. Solar is the price leader by far and solar coupled to low cost storage is becoming competitive with gas in the load following role.
5. Climate zone matters. Solar dominates from the equatorial through southern temperate region. Wind is dominant in mid and northern temperate regions. Nuclear may dominate in the subarctic.
6. By implication of the two prior points, electricity intensive industry may be expected to migrate towards the equator.
7. In the key technologies of solar, batteries and long line transmission China is the clear technology leader and we expect it to capture the export market. The US lags in these technologies because the Republican party is wedded to protecting the fossil fuel producers by the logic of the electoral college. This is a massive harm to the US economy - comparable to losing an important war.
8. However politicians can only slow market forces, in the end their resistance is futile. Green power is cheaper more reliable power and adoption is inevitable.
9. The key area of technical uncertainty at present is in power storage from the day horizon to the several month horizon. A number of solutions are contesting this arena. Battery based solutions appear to be improving faster than solutions based on mechanical, thermal or chemical principles. Where feasible the combination of batteries and pumped hydro looks like the likely winner of this competition.
10. There are locales where pumped hydro appears unsuitable. Here liquid air, hydrogen and compressed air power storage may have a key role to play.

Table 6: Market Performance to December 1, 2025

Asset Group	Asset Class	6-month trend	3-month return	1-month return
Equity	US Large Cap	rising	5.45%	-0.23%
	...Large Cap Growth	rising	7.03%	-1.45%
	...Large Cap Value	rising	3.63%	1.21%
	...Growth – Value	rising	3.40%	-2.66%
	US Mid/Small Cap	rising	1.66%	0.32%
	Intl Developed	rising	3.54%	0.24%
	Intl Emerging	rising	8.82%	-1.84%
Fixed Income	Treasury 3-7 year	flat	-0.08%	-0.16%
	Treasury 7-10 year	flat	0.56%	-0.17%
	TIPS	flat	-0.65%	-0.79%
	Municipal	flat	2.31%	-0.57%
	Investment Grade	flat	0.97%	-0.34%
	Medium Grade	flat	-0.48%	-0.41%
	Preferred	flat	-2.57%	-1.79%
	REIT	flat	-2.89%	-1.06%
Commodity	Euro	rising	-0.85%	0.24%
	Gold	rising	21.57%	7.33%
	Crude Oil	falling	-13.24%	-2.72%

6 Capital Markets

NVIDIA delivered great earnings growth, wrong footing short sellers and financial journalists in the process.

Markets are mostly volatile and directionless at the present juncture (table 6 above.) The sole exception is Gold which has resumed its advance. We also call attention to silver, which has has risen 90% in the past twelve months - comfortably outpacing US large cap growth which has gained 23% over the same period. Historically silver has traded as a hybrid monetary metal and industrial metal. When viewed as a monetary metal its price has often been analyzed as a certain ratio to gold, whereas when viewed as an industrial metal the strength of demand from end use sectors has been the relevant factor. In our November 2024 *Market Commentary* we noted that industrial demand for silver from the electronic industry appeared to have increased sufficiently to make up for lost demand from the photographic film industry. The silver-gold ratio which had bottomed at 1:120 had by then advanced to 1:80. At end of November the ratio was 1:73 - indicating that silver is rising faster

than gold even in a strong gold bull market.

Although the Federal Reserve has ended its "quantitative management" of the yield curve, the Treasury has stepped into its shoes as a market manipulator. Specifically the Treasury is buying up long dated bonds using the proceeds from mid term bond sales. This operation is being described as an effort to improve market liquidity. Actually the operation seems to be suppressing a rise in long rates which otherwise would be occurring. Suppressing that rise is definitely beneficial to parts of the banking sector which have substantial unrealized losses in their long Treasury portfolio. It may be beneficial to the real estate market to the extent it keeps mortgage rates from climbing higher. However financial analysts such as ourself must recognize that the long rate is not providing its customary information on the economy at present.

7 Advice

Abroad the United States faces significant geopolitical challenge. The Administration has yet to articulate a coherent response to the challenge. At home the Administration is pursuing an assortment of policies on immigration enforcement, foreign workers, tariffs, energy policy and outright industrial policy. Cumulatively these amount to the largest interventions we have seen in the economy in decades. But again there is no policy coherence and little reason to expect these policies to survive the next swing of the political pendulum. The benefits we see from the Administration's policies flow to specific interest groups, while the costs of its policies are we fear structural and long lasting. Somewhat offsetting this negative picture the US remains a force in technology and in AI has the beginning of what we think will be a powerful growth driver. In the short term, Trump will likely gain control of the Federal Reserve next spring and will favor soft money policies in a last minute effort to heat up the economy before the midterm elections. Overall our assessment remains cautious. Specifically we advise readers to

1. Approach investing with a focus on capital preservation rather than capital enhancement.

2. Maintain robust liquidity. Be prepared to commit some of that liquidity should a panic create a buying opportunity.

3. Emphasize high quality assets (those with clear pricing models and good retention of liquidity even in troubled markets.)

4. Ensure real assets can handle any likely economic downturn.

5. Once the core position has been fortified one may consider growth initiatives, but these should be kept very well diversified in terms of the growth drivers.

8 About Our Cover

We share with our readers an 1863 poem of Henry Wadsworth Longfellow's as a reminder that it is no new thing for the world to be troubled but it always seems to overcome those troubles in the end and make its way to prosperity

I heard the bells on Christmas day
Their old familiar carols play
And mild and sweet their songs repeat
Of peace on Earth, good will to men.

And in despair I bowed my head
"There is no peace on Earth" I said
For hate is strong and mocks the song
Of peace on Earth, good will to men.

Then rang the bells more loud and deep
God is not dead nor doth he sleep
The wrong shall fail, the right prevail
With peace on Earth, good will to men

Then ringing singing on its way
The world revolved from night to day
A voice, a chime, a chant sublime
Of peace on Earth, good will to men.

Shown on our cover are the bells of Notre Dame de Paris. It is traditional to baptize and name church bells at their installation. The eldest bell of Notre Dame is Emmanuel cast in 1686. He weighs about 6.5 tons and his diameter is 8.7 feet. His tone is F-sharp. During the German occupation of Paris in World War II, the occupying military took charge of the radio stations and it was the ringing of Emmanuel which first announced to the Parisians (and to the occupiers) the liberation of the city. Emmanuel was declared a national monument shortly thereafter. He is rarely rung to preserve his voice. One notable ringing was on September 12 2001 when Emmanuel tolled for an hour in honor of the victims of the terror attack in the United States the previous day. Emmanuel is companioned by

Marie, Gabriel, Anne Genevieve, Denis, Marcel, Benoit-Joseph, Maurice and Jean-Marie. These were cast in 2012 as successors to a nineteenth century set of bells which had gradually gone out of tune. Various dignitaries stood as godparents to the bells at their installation February 2, 2013. Notably Pope Benedict XVI stood (*in absentia*) godfather to Benoit-Joseph. The bells were threatened by the fire of 2019 and it was feared their falling would trigger the collapse of the remaining structure. A special effort by the firemen saved the bells and their towers at the front of the church. Lost in the fire were the six bells of the spire.

As resonant chambers, when not being rung, the bells will hum along stimulated by the ambient noises of the city. An interesting recording of this phenomena can be heard online at https://www.smithsonianmag.com/smart-news/secret-sounds-notre-dames-bells-180980313/.

But bells are of course meant to be rung and that requires bell ringers. Notre-Dame is forever associated to Quasimodo, the protagonist of Victor Hugo's romantic novel *The Hunchback of Notre Dame.* Quasimodo carries a golden heart within a deformed frame and can only express himself in a socially acceptable manner by ringing the bells of the cathedral. In fact the position of bell ringer at Notre Dame remained a semi-hereditary post up to the installation of an electric ringing mechanism in 1930. The English have made an art of change ringing. The goal of change ringing is to play the bells in every permutation while also regarding certain rules of ordering designed to ensure a not too clangorous sound. A set of N bells has N! (1x2x3...xN) changes. A full peal on six bells thus has 720 ringings and can be done in about a half hour. A full peal on eight bells involves 40,320 changes and has only been accomplished once on bells installed in a tower. That exercise consumed 18 hours. We recommend to the reader seeking some light seasonal literature Dorothy L. Sayer's detective fiction *The Nine Tailors* where the learned campanologist opens to the reader the mysteries of the tintinnabulations of the bells.

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`https://commons.wikimedia.org/wiki/File:Prehttps://commons.wikimedia.org/wiki/File:Pr%C3%A9sentation_des_nouvelles_cloches_de_Notre-Dame_de_Paris_en_2013_16.jpg`

9 About Lloyd Tevis Investments, LLC

Lloyd Tevis Investments LLC is a registered investment adviser offering its services over the internet to US individual investors and their families. Our Precision investing ™ service provides clients with highly personalized investment solutions tuned to the client's specific circumstances and objectives. We believe the strategic asset allo-

cation decision is the key decision faced by our investors. Accordingly, our monthly commentary focuses on matters which can shape the longer term performance of asset classes. We do not time market swings or pick individual stocks. Discussion at this level of detail is made for the light which it throws on relative valuations and such discussion should not be read as an investment recommendation. Indeed, our investment focus is on maximizing diversification, careful risk budgeting and maximizing implementation efficiency. These are the proven builders of long term investment success.

In evaluating political and social developments our perspective is that of long term investors. We believe the investor's interest is best served by a stable environment in which change occurs incrementally as broadly supported policies rather than by an environment of abrupt changes and frequent U-turns driven by transient partisan advantages. Finally, our assessments should always be read as what we consider likely to occur and not as expressions of what we would like to see come about. To learn more about our firm visit us at lloydtevis.com.