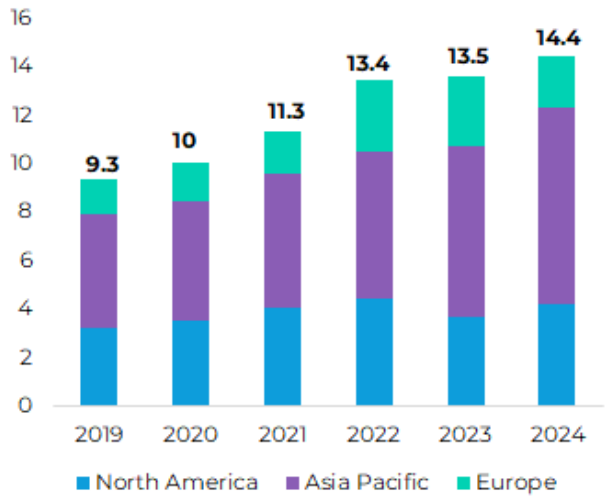
Chart of the Month: Heat Pump Sales Rebound

Global heat pump sales rebounded in 2024, growing 6% with strong growth in Asia and North America. Sales in Europe materially declined due to faltering policy support and high electricity costs. Canada and the UK were the fastest growing regions, according to Bloomberg New Energy Finance (BNEF), with shipments up 53% and 64% respectively. Continued growth remains dependent on consistent and supportive policy as well as further affordability improvements.

Electricity generation from solar power (TWh)



Source: BNEF, 2025

News

- Global electric vehicle (EV) sales have demonstrated considerable resilience in the face of ongoing trade disruptions, recording 29% year-on-year growth according to research house Rho Motion. China has seen 35% sales growth this year as domestic manufacturers have met surging domestic demand with little impact from increasing trade barriers. Europe has also enjoyed 25% year-to-date sales growth as tightening emission targets continue to drive adoption in key markets such as Germany (+42%), Italy (+56%), Spain (+57%), and the UK (+32%). In contrast, growth in North America continues to be constrained by tariff volatility and policy uncertainty, resulting in just 5% sales growth year-to-date.
- In May, President Trump signed a series of executive orders aimed at revitalizing the US nuclear industry. The measures include fast-tracking licenses for new reactors, streamlining regulatory processes, and initiating a broader overhaul of the Nuclear Regulatory Commission to reduce bureaucratic delays. These moves signal a significant policy pivot designed to re-establish nuclear power as a cornerstone of US energy strategy, potentially unlocking new investment in small modular reactors (SMRs) and next-generation nuclear technologies.
- Developments in the sustainable aviation fuel (SAF) sector point to growing international momentum. The International Air Transport Association (IATA) recently projected that global SAF production will double in 2025 to reach 2 million tons – equivalent to 0.7% of the industry's fuel consumption. However, the agency also cautioned that without substantial investment in production

capacity and consistent policy support, the sector may struggle to scale efficiently. Elevated costs could persist, limiting the aviation industry's ability to decarbonize.

- Rising forecasts for US power demand continue to fuel mergers & acquisitions activity in the sector. In May, Blackstone Infrastructure announced the acquisition of utility TXNM Energy for $11.5 billion, representing a 15% premium to the undisturbed market price. The firm cited surging electricity demand and TXNM's transition-oriented generation portfolio as key drivers of the investment. In the same month, NRG Energy disclosed plans to acquire a portion of LS Power's generation assets for $12 billion, with management noting that the US is in the early stages of a power demand "supercycle". These transactions mark the latest in a flurry of high-value deals in the space, following Constellation Energy's $16.4 billion acquisition of Calpine in January.
- Danish energy company Orsted has cancelled its £8bn (approx. $10.9bn USD) Hornsea 4 offshore wind project in the UK, citing deteriorating economic conditions including inflationary pressures and supply chain constraints. The decision underscores the mounting challenges facing large-scale renewable energy developments, particularly amid rising capital costs and uncertain policy support. While the decision is clearly detrimental to the UK's net zero ambitions, the opportunity remains for the projected to be restarted when conditions improve.

Manager's Comments

Accelerating electricity demand remains a critical issue facing US President Trump and his goal of achieving "energy dominance". To narrow the growing short-term supply/demand imbalance, the administration must oversee a rapid built-out of affordable and scalable power generation capacity. At the same time, Trump is seeking to reduce federal support for wind and solar projects to extend corporate tax cuts enacted in his first term. However, according to NextEra, the country's largest electricity provider, renewables and storage technologies are best placed to meet incremental short-term demand, with new natural gas and nuclear unlikely to play a meaningful role before 2030.

The future of the Inflation Reduction Act (IRA) is now in the hands of the Senate

On May 22nd, the US House of Representatives passed a Budget Bill with implications for the Inflation Reduction Act (IRA). In its current form, the Bill does not attempt to repeal the IRA but raises around $570bn from the reduction of IRA credits. The proposals can be summarized across the different clean technologies as:

- **Electric vehicle purchasing tax credits:** to be eliminated (consistent with market expectations at the start of the year)
- **Utility solar and utility wind development credits (ITC and PTC):** to be wound down within 60 days of the Bill being passed (negative versus expectations)
- **Solar equipment manufacturing tax credits:** phased down in 2032 (positive versus expectations)
- **Battery equipment manufacturing tax credits:** phased down in 2032 (positive versus expectations)
- **Wind equipment manufacturing tax credits:** phased down by the end of 2027 (consistent with expectations)
- **Residential solar tax credits:** negative vs expectations, with tax credits being removed.

If the bill is passed in its current form, this would be incrementally negative for US clean energy production in the short term, albeit a smaller negative for clean energy equities which were already pricing in a highly pessimistic scenario. Our portfolio has limited direct exposure to IRA subsidies. We have one position (Enphase at 1.0%) exposed to US residential solar, where the proposals are negative, and a couple of positions

(First Solar at 3.2%; Canadian Solar at 1.2%) exposed to US utility solar, where the news is partly negative (removal of the development tax credit) and partly positive (maintenance of the solar equipment tax credits).

We must now wait for the passage of the Bill through the Senate, where the outcome is hard to predict. On the one hand, the Senate is clearly under pressure to pass the Bill and find savings. On the other, these proposals would result in significant job losses in the residential solar industry which some Senators have lobbied to protect. They would also slow the deployment of utility-scale solar and wind at a time when the US is facing a potential power deficit. Regardless of the outcome, we remain confident in the future of US renewables thanks to their competitive offering on an unsubsidized basis; and we look forward to the clearing of a policy overhang that has suppressed sector sentiment for the last 18-24 months.

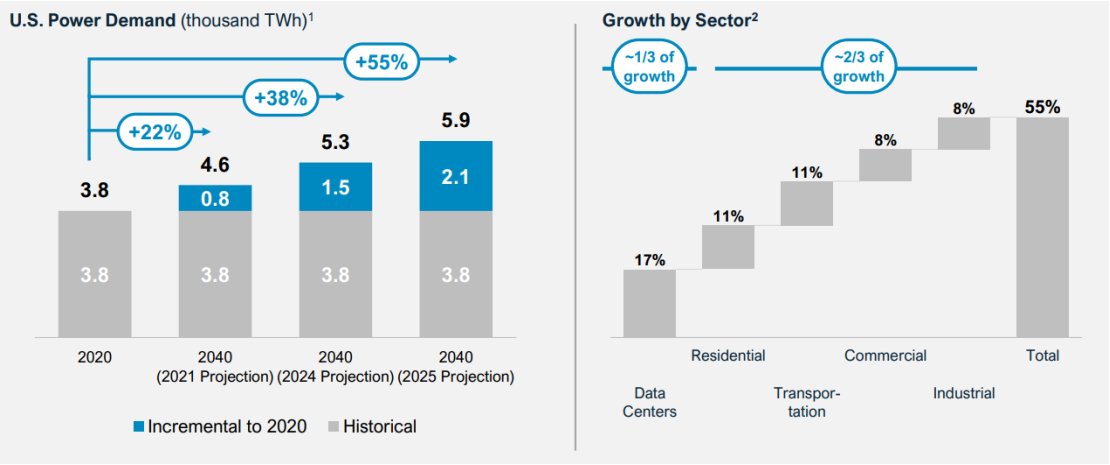
US electricity demand is accelerating – are renewables needed to fulfil this?

Policy uncertainty aside, one of our portfolio holdings, NextEra Energy, one of the largest utilities in the US, operating a diverse portfolio of fossil fuel and low-carbon assets, offers a realistic commentary regarding the future of the US power market. At its recent capital markets event, the company communicated a credible roadmap for how the power sector can balance surging demand growth with decarbonization targets and reliability needs over the coming decades, outlining a scenario of rapid renewable build-out, supported by longer-term capacity additions from natural gas and nuclear.

NextEra see electricity demand in the United States rising at a pace not seen in decades, reaching c.5,900TWh (terawatt hours) by 2040. The company now expects total consumption to grow by 55% between 2020 and 2040, a marked increase from the 38% forecast it offered just a year ago and the 22% estimate it offered in 2021.

Over the long term, the trend will be driven by the broad electrification of households, transport and industry as well as the rapid expansion of artificial intelligence, and the proliferation of power-hungry datacenters needed to support it. NextEra expects datacenters to account for nearly a third of incremental demand through 2040, with the remaining two-thirds evenly divided between buildings, transport, and Industry.

US power demand forecasts 2020-2040E



Source: NextEra, 2025

A substantial expansion of the country's generation capacity is required to meet this surging demand. NextEra estimates that 460GW (gigawatts) of new capacity will be needed by 2030, with solar accounting for around half, complemented by wind, battery storage, and gas-fired plants that are already in construction.

Given the scale and speed of projected demand growth, short-term supply/demand imbalances will need to be met by cost-efficient technologies that can be deployed at pace and scaled rapidly.

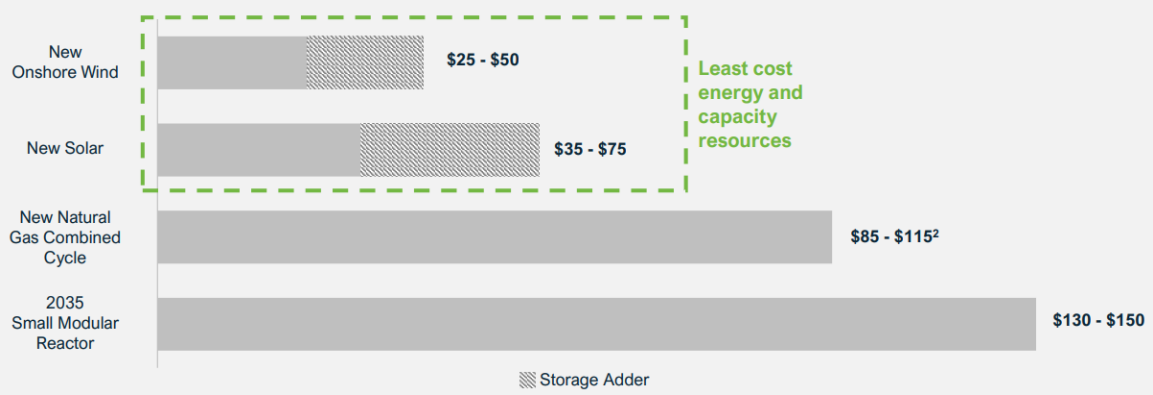
Renewables plus storage are best placed to bridge the growing supply/demand imbalance

In the short term, a combination of renewables and storage is the only source of generation that can be deployed to meet incremental power demand. The advantage of these technologies lies in their speed to market, flexibility and cost advantages.

- **Speed to market:** NextEra estimates that it can add between 36.5GW and 46.5GW of incremental renewable-plus-storage capacity by 2027, leveraging existing technologies and well-developed supply chains to support rapid deployment. This is possible, in part, due to the availability of battery equipment which the company estimates it can source within around 12 months. This is in stark contrast to natural gas or new nuclear, which due to sub-scale supply chains, bottlenecks, regulatory delays and longer lead times, have deployment timelines that stretch from 5-10+ years.
- **Flexibility:** Storage projects can be built on existing sites and connected to existing grids, whereas new gas generation requires new gas supply and new pipelines to connect facilities to existing gas networks.
- **Cost Advantages:** As battery technologies have matured and scaled, costs have fallen sharply. The opposite is true for natural gas projects, which are experiencing cost inflation and extended build times.

Given these characteristics, NextEra sees "firmed" generation (intermittent renewables backed by storage), as having the lowest levelized cost of generation in 2030. The company reports an estimated cost of $25-$50/MWh (megawatt hours) for new onshore wind (including storage) and $35-$75/MWh for new solar (including storage). This is considerably cheaper than new natural gas combined cycle at $85-$115/MWh and a small modular reactor (in 2035) at $130-$150/MWh.

Estimated Costs of Firmed Generation Resources, 2030 ($/MWh)



Source: NextEra, 2025

Renewables and storage are the cheapest and most readily available form of incremental supply and are likely to be so for the next several years.

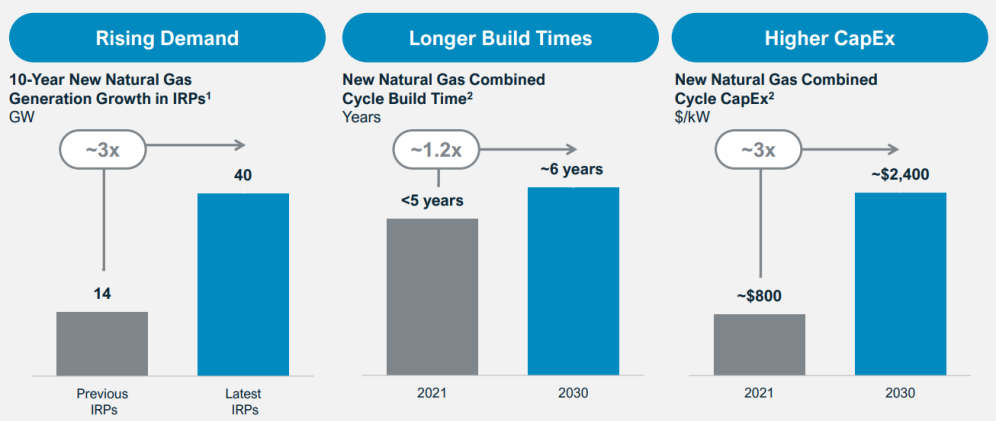
Natural gas will complement renewables in the longer term

New gas plants are needed to meet current demand projections and NextEra has outlined plans to triple its gas generation capacity from 14GW to 40GW. However, longer build times, cost inflation, and

underdeveloped supply chains mean that gas cannot meet short-term demand growth and will ultimately be a more expensive source of incremental supply than renewables.

- **Longer build times:** NextEra estimate that build times for new natural gas combined cycle plants are likely to have lengthen by c.20% by 2030 (vs. 2021) due to turbine availability constraints and competition for skilled labor.
- **Increasingly expensive:** NextEra expects the cost of building new combined-cycle gas plants to triple by 2030, rising from around $800 per kilowatt of capacity in 2021 to roughly $2,400 per kilowatt, even as deployment timelines continue to lengthen.

Rising cost of natural gas power generation



Source: NextEra, 2025

Natural gas has an important role to play in the US's long-term generation mix. However, as the company stated in its Development Day, "Natural gas-fired generation cannot meet demand in the near term, and is a longer-term, more expensive solution."

New nuclear unlikely to play a part until 2035 or later

After decades of underinvestment, supply chains need to be rebuilt, and technology developed before new nuclear can contribute meaningfully to the generation mix. NextEra estimates that it will be 10 years or more before new nuclear can be deployed and even then, it is likely to be the most expensive source of generation available. However, the company believes that all forms of energy are needed to meet their electricity demand projections and therefore new nuclear will have an important role to play as a low-carbon baseload source of generation.

Conclusion

Utility-scale renewables now offer the most economic option, even without subsidy, to meet incremental power demand in most geographies. That said, the energy transition has never been about a single technology becoming dominant. NextEra's roadmap for meeting long-term electricity demand growth demonstrates that a number of technologies are relevant and substantial investment in generation capacity additions is required.

In the US over the next five years or so, renewables in combination with storage are the cheapest and fastest way to meet the country's power crunch, and the only realistic source of short-term supply. So, whilst nuclear

and natural gas will have an important role to play in the long term, renewables remain the key technology to meet incremental demand today.

Performance

As of 5/31/2025	YTD	1 Year	3 Years	5 Years	10 Years
GAAEX	4.57%	-12.55%	-2.79%	10.44%	3.65%
MSCI World Index NR	4.95%	13.72%	13.17%	14.17%	9.92%

As of 3/31/2025	YTD	1 Year	3 Years	5 Years	10 Years
GAAEX	-4.97%	-15.78%	-7.63%	12.75%	3.08%
MSCI World Index NR	-1.79%	7.04%	7.57%	16.12%	9.49%

All returns after 1 year annualized.

Inception 03.31.2006 Expense ratio*1.10% (net); 1.76% (gross)

Performance data quoted represents past performance; past performance does not guarantee future results. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Current performance of the Fund may be lower or higher than the performance quoted. Performance data current to the most recent month end may be obtained by visiting www.gafunds.com or calling 800-915-6566.

* The Advisor has contractually agreed to reduce its fees and/or pay Fund expenses (excluding Acquired Fund Fees and Expenses, interest, taxes, dividends on short positions and extraordinary expenses) in order to limit the Fund's Total Annual Operating Expenses to 1.10% through June 30, 2028. To the extent that the Advisor absorbs expenses to satisfy this cap, it may recoup a portion or all of such amounts absorbed at any time within three fiscal years after the fiscal year in which such amounts were waived or absorbed, subject to the expense cap in place at the time recoupment is sought, which cannot exceed the expense cap at the time of the waiver. The expense limitation agreement may be terminated by the Board of the Fund at any time without penalty upon 60 days' notice.

Top 10 Fund Holdings as of 5/31/25:

1. Iberdrola SA 4.91%
2. Trane Technologies PLC 4.90%
3. Schneider Electric SE 4.75%
4. Legrand SA 4.71%
5. Siemens AG 4.68%
6. Eaton Corp PLC 4.60%
7. Hubbell Inc 4.54%
8. Nextera Energy Inc 4.42%
9. Amphenol Corp 4.09%
10. Spie SA 3.98%

MSCI World Index captures large and mid cap representation across 23 Developed Markets countries. With 1,546 constituents, the index covers approximately 85% of the free float-adjusted market capitalization in each country.

Fund holdings and/or sector allocations are subject to change at any time and are not recommendations to buy or sell any security.

One cannot invest directly in an index.

Earnings Growth is not a measure of future performance.

Opinions expressed are subject to change, are not guaranteed and should not be considered investment advice.

The Guinness Atkinson Alternative Energy Fund's investment objectives, risks, charges and expenses must be considered carefully before investing. The statutory and summary prospectuses contain this and other important information and can be obtained by calling 800- 915-6565 or visiting www.gafunds.com. Read and consider it carefully before investing.

The Fund invests in foreign securities which will involve greater volatility and political, economic and currency risks and difference in accounting methods. The risks are greater for investments in emerging markets. The Fund also invests in smaller and mid-cap companies, which will involve additional risks such as limited liquidity and greater volatility than larger companies. The Fund's focus on the energy sector to the exclusion of other sectors exposes the Fund to greater market risk and potential monetary losses than if the Fund's assets were diversified among various sectors.

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