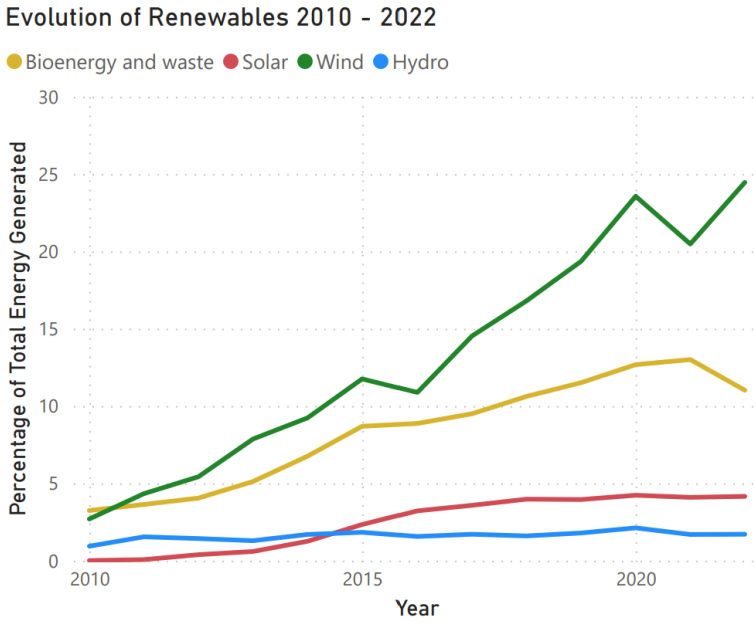
Investing in Renewables

The growth of the renewable energy sector is paramount in the pursuit of reducing humanity's environmental impact. The past few decades have seen an unprecedented leap in investment into and overall energy output from renewable energy sources. Throughout this report, we aim to investigate the size and trends of the renewable energy sector in the United Kingdom, whilst considering the potential rewards and pitfalls which arise from investing in domestic Renewables companies.

A Snapshot of UK Renewables

Since 2010, the increase in adoption of renewables domestically has been dramatic. In 2010, Wind accounted for 2.7% of the total electrical power demands of the UK, this figure has jumped almost tenfold to 24.46%.



Across 2022, Renewables combined generated 135,000 GWh of electricity, enough to power 13 trillion LED bulbs for an hour. Renewables accounted for 41.35% of the total electricity generated in the UK, and given the current growth rates, this will continue to increase substantially over the coming decade.

Wind power far outstrips the often publicised competition in Solar and Hydro-electric. Hydro in particular has seen a negligible increase in energy generation from 2010 to 2023, and whilst solar is on the rise, it only accounts for around 4% of the total electricity needs of the UK.

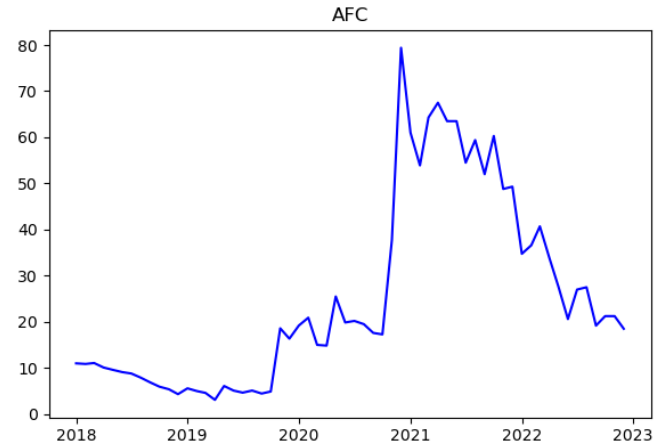
Our 5 Renewables Companies

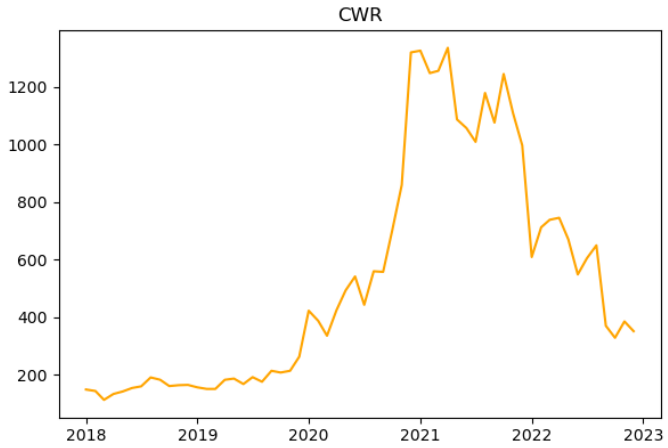
To investigate the opportunities presented by investing in Renewables, we have selected five companies listed on the London Stock Exchange:

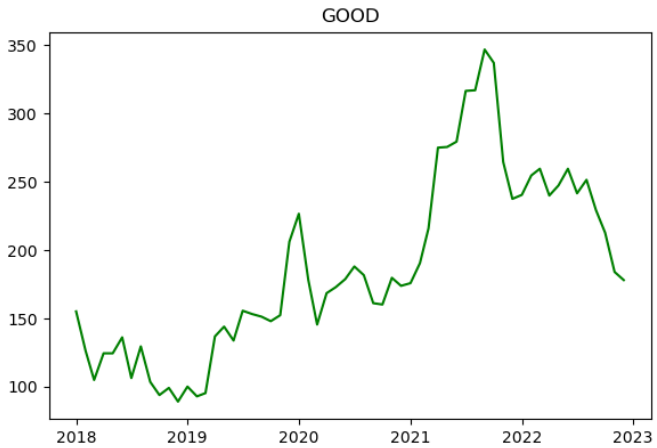
1. **AFC Energy** (AFC.L): Hydrogen Fuel Cells are at the core of AFC's offerings. Through AFC, organisations can buy or lease hydrogen fuel cell generators, as a replacement for traditional fossil fuel generators. AFC also offers support and consultation services on all things hydrogen generation and the associated supply chain.
2. **Ceres** (CWR.L): Specialising in stationary fuel cells - big batteries - Ceres' technology has applications in shipping, commercial power and the national power grid. As our reliance on renewables grows, as will the need for power storage to fill the gaps when the wind speeds drop or when the sun is behind cloud cover.
3. **Good Energy** (GOOD.L): Proving Renewable Energy solutions directly to homes and businesses Good Energy's memo. As an electrical provider, they only offer electricity

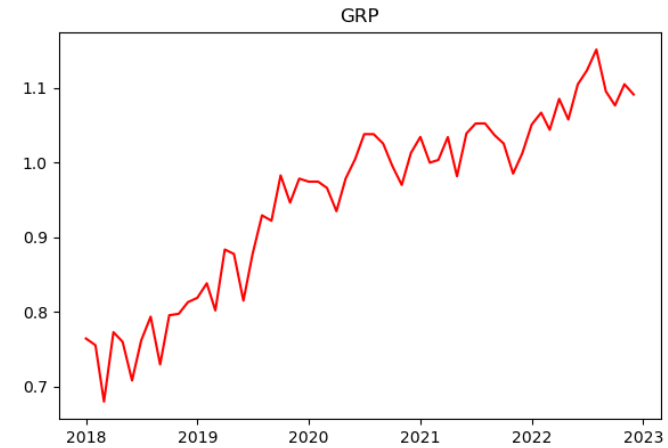
matching renewable generation elsewhere on the grid. Beyond this, they offer solar panel and heat pump installation, alongside other products to reduce emissions and increase renewable generation.

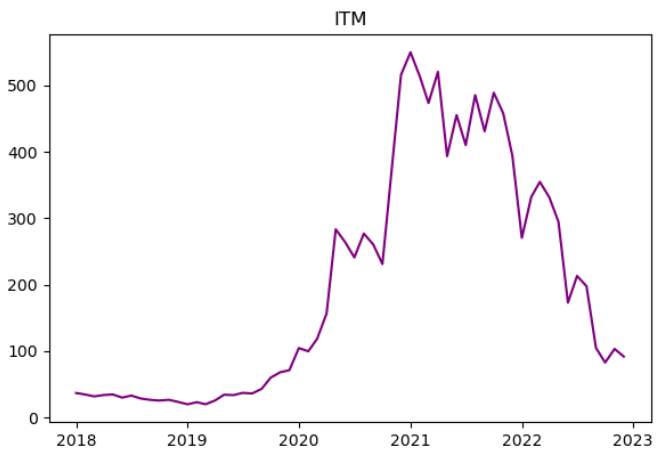
4. **Greencoat Renewables** (GRP.L): Greencote is an investor into euro centric renewable energy generation and infrastructure. Wind farms and specifically Irish wind farms are the centrepiece of the company's holdings.
5. **ITM Power** (ITM.L): ITM Leans on innovative technology to produce "green" hydrogen. The green refers to the power required to produce the hydrogen gas originating from renewable energy sources. ITM's electrolysers only require an input of green electricity and water, with no harmful waste products.





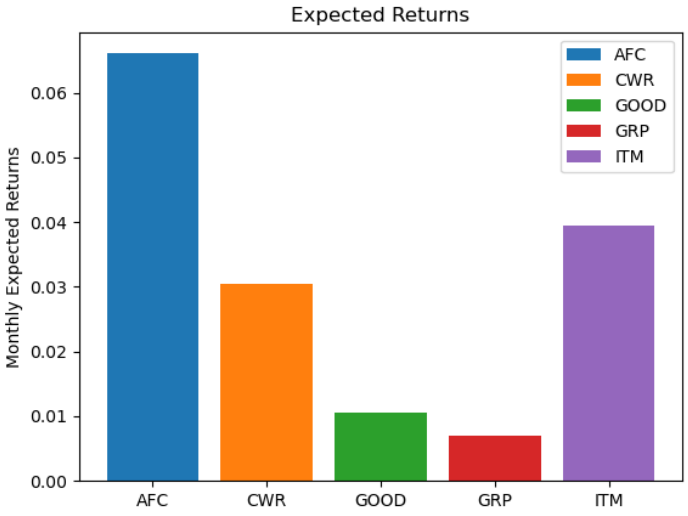


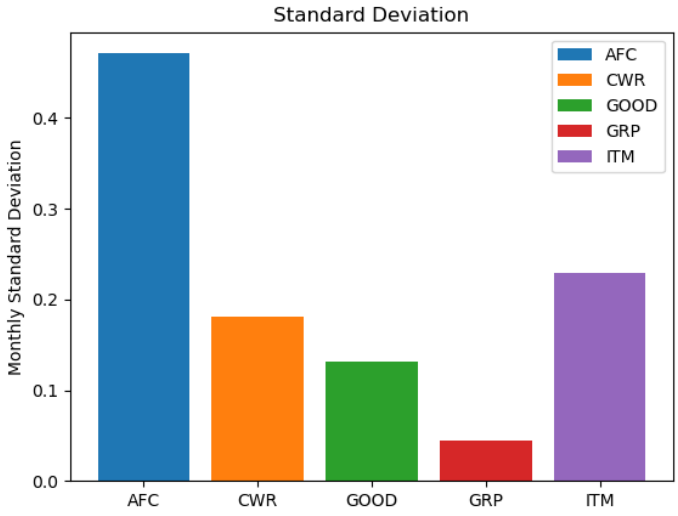




Plotted above are the five aforementioned stocks from 2018 through to the end of 2022. With the exception of Greencote, all of our stocks follow a similar trend, hitting a peak in early 2021 and falling off dramatically throughout 2022. GRP meanwhile exhibits a steady uptick, yet, showcases slimmer gains than the other stocks when viewed over the entire 5 year time frame.

Expected Monthly Returns and Standard Deviation:
Delving into the Monthly Expected Returns and Standard Deviations of the stocks, the five of them follow a fairly linear relationship, with lower returns resulting in smaller deviations and vice-versa. As expected Greencoat (GRP) in particular shows significantly lower volatility than the others, whilst AFC Energy displays the opposite behaviour.



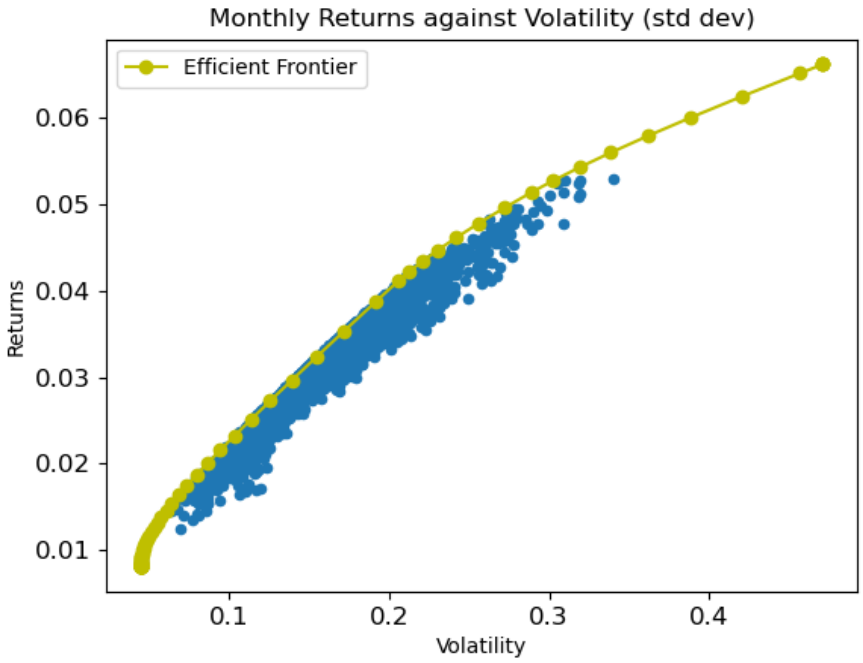


Investigating the **correlations** between the monthly adjusted returns on the stocks, we see a spread of mid range values. Yet, despite all the companies being from the same sector, and for a couple similar sub-sectors, none of the stocks showcase high levels of positive or negative correlations.

	AFC.L	CWR.L	GOOD.L	GRP.L	ITM.L
AFC.L	1.000000	0.269941	0.047670	-0.098132	0.440007
CWR.L	0.269941	1.000000	0.365768	0.207911	0.663892
GOOD.L	0.047670	0.365768	1.000000	0.324131	0.161561
GRP.L	-0.098132	0.207911	0.324131	1.000000	0.223545
ITM.L	0.440007	0.663892	0.161561	0.223545	1.000000

Potential Portfolios

Looking into a selection of portfolios with a mixture of these stocks, we have a Mean-Variance optimisation plot. Given that many of the stocks have exhibited similar behaviour over the last five years, as illustrated above in the individual stocks plots, the grouping is relatively linear and diversifying the portfolio does not lead to a significant reduction in risk.



From our portfolios on the Efficient Frontier, we have selected 5 options with scaling levels of risk and expected monthly returns, as shown below.

Portfolio	Returns	Volatility	AFC.L Weight	CWR.L Weight	GOOD.L Weight	GRP.L Weight	ITM.L Weight
1	5.08%	0.30	0.54	0.05	0.06	0.02	0.33
2	4.70%	0.26	0.42	0.13	0.09	0.00	0.36
3	3.98%	0.20	0.18	0.27	0.02	0.04	0.48
4	3.15%	0.15	0.16	0.31	0.08	0.22	0.22
5	2.32%	0.10	0.11	0.18	0.04	0.51	0.17

Having the greatest expected return, AFC dominates the top portfolio with respect to returns, whilst GRP has the lowest volatility and thus is the key stock within the least risky portfolio.

Conclusion

Two things are clear from our investigations. 1. Renewables have seen a dramatic increase in adoption since 2010 within the United Kingdom and this trend is almost certain to continue as the country looks to decarbonize further moving forwards. 2. Risk comes hand in hand with this sector and the majority of stocks will see strong fluctuations.

Four of the 5 companies investigated lost significant proportions of their stock values over the past couple of years, and whilst we took a lengthy time frame of 5 years into our calculations, you cannot discount the possibility that these downward trends continue to occur.

Investing in Renewables has its value and sizable returns are certainly possible. However, given the volatility it seems clear that having these investments as a smaller piece of an overall diversified portfolio is the sensible approach. Of course, one aspect that comes in tandem with

investing in companies with Renewable energy at their core is a view towards our environmental impact, alongside other social and ethical concerns. For those with sympathies in these areas, this added incentive and ethical payoff may help justify the inherent risks with investing in Renewables.

SOURCES
Stocks data - yahoo finance: https://uk.finance.yahoo.com/
Renewable Energy Sources Data:
https://www.gov.uk/government/statistics/energy-trends-section-6-renewables