

citizen mint

The Case for



Renewable Infrastructure

Renewable infrastructure is an asset class that many investors are beginning to incorporate in their portfolios due to its compelling risk and return characteristics. The asset class provides defensive characteristics through multiple market cycles and can provide consistent returns over extended periods of time. This is the result of the monopolistic nature of these assets and consistency of cash flows from these projects. This paper will delve into the characteristics of this assets class, show case studies on these investments, and present how this asset class can be incorporated into a well-diversified portfolio to enhance returns, reduce volatility and provide better outcomes for clients.

What are infrastructure investments?

Let's first start by reviewing what defines an infrastructure asset.

Infrastructure is a large asset class with a variety of investments that have the following characteristics:

Essential or necessary product or service:

Infrastructure assets provide services that are hard not to use even in a difficult economic environment. Examples include: electricity, water, sewage, cell phones.

Long useful lives:

Infrastructure assets have very long useful lives and usually last between 20-50 years.,

Monopoly/quasi-monopoly market position:

There are usually limited substitutes for the asset in the geographic area in which it is located. Examples: A local utility that provides power, water, sewage is monopolistic by nature given the significant investment it takes to set up and deliver these services to homes. A cell tower or toll road would have a quasi-monopoly as there are very limited options beyond them for these services.

Operate in regulated environments/or are less affected by economic cycles:

These assets can be regulated by authorities and/or benefit from the government encouraging additional investments in certain areas such as renewables with the passing of the Inflation Reduction Act.

Cash flow and earnings vary minimally in multiple environments:

Cash flows have limited variation given these assets necessity in all market environments and the monopolistic structure of the assets.

Infrastructure assets examples:



Energy

- Power generation
- Transmission
- Distribution
- Renewables



Water

- Water & waste water networks
- Desalination plants



Transport

- Ports
- Rail
- Airports
- Roads
- Bridges
- Parking



Comms

- Cable networks
- Telecom lines
- Towers
- Satellites



Social

- Hospitals
- Prisons
- Schools
- Courts
- Public Housing

What are Renewable Infrastructure assets?

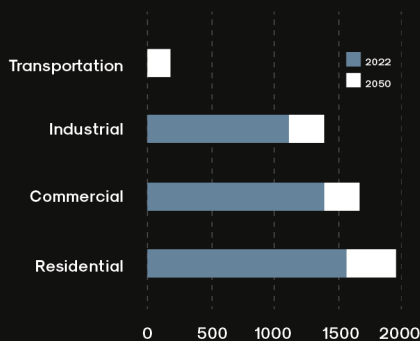
Renewable Infrastructure assets are a subset of the broader infrastructure asset class and can broadly be categorized into three main themes:

01 Clean Power: Solar, Wind, Biogas, Geothermal, Hydro

As the demand for electricity is predicted to climb exponentially in the next 30 years, it has become increasingly vital that cheaper and more sustainable energy solutions be adopted on a global scale. In response, renewable sources such as wind and solar have emerged as viable alternatives due to their low-cost; this shift away from coal, gas and other nonrenewable resources will reduce pollution levels while also providing better long-term price stability. Moreover, sources like solar don't require any cooling water consumption, like coal, which could result in greater cost savings and better environmental outcomes.

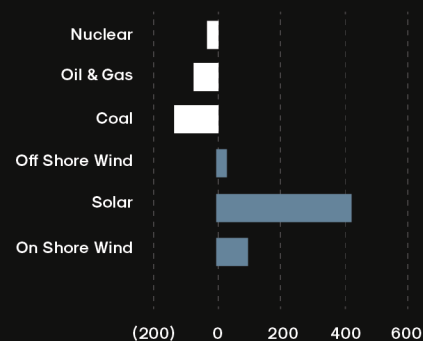
Demand for electricity is expected to grow...

US electric demand growth



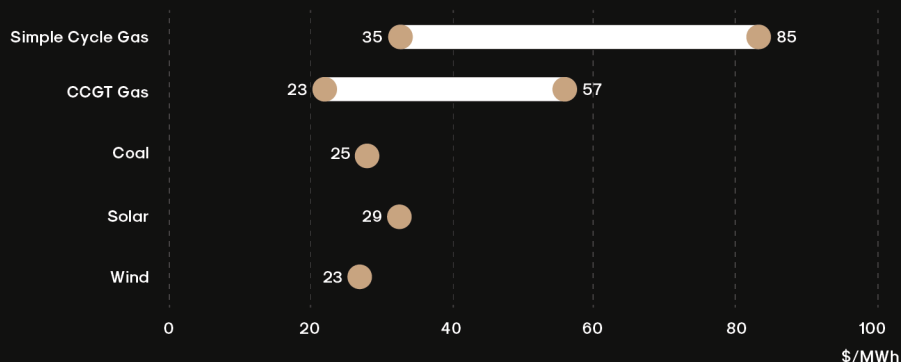
...while existing supply is shrinking due to plant retirements

Announced retirements & projected additions 2022-2050



Wind and solar are now among the cheapest sources of electricity in the US

Marginal cost of power generation



Source: EIA and Schroders Greencoat as of December 31, 2022

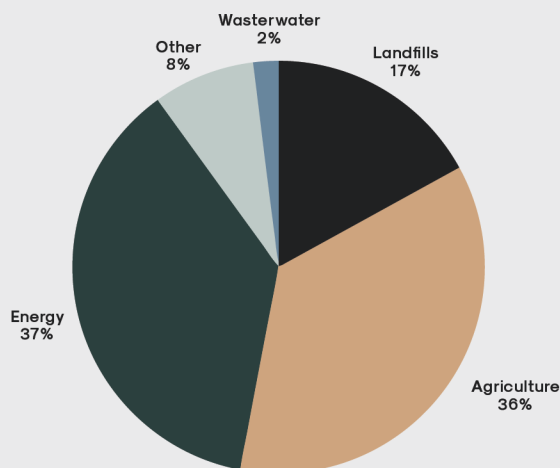
02 Environmental Infrastructure: Waste, Wastewater & Water

The United States' antiquated water, wastewater and waste infrastructure needs to be improved and modernized due to rising sustainability goals among municipalities, states and corporations alike. Potential investments in this space focus on profitable project opportunities that can process waste into renewable fuels, clean power and recycled materials with the focus on opportunities that establish competitive barriers to entry by solving local and regional waste issues. Furthermore, since few qualified developers/operators exist in this sector compared to solar & wind, investors need to find managers that have extensive industry relationships and experience to secure the best opportunities.

Did you know that 95% of landfills and wastewater treatment facilities lack methane capture and utilization systems?

Wastewater methane alone is sufficient to meet 12% of US electricity demands!"

US Methane Emissions by Source - 2019



Source: Environmental Protection Agency - 2019

Opportunity to Deploy Methane Capture and Utilization Systems

	Total # of Potential Sites	# of Methane Utilization Facilities Today	Current Deployments as % of Total Potential
Wastewater	~16,000	860	5.3%
Landfills	~13,000	550	4.2%
Agriculture	8,241	259	3.1%
Total	~37,241	1,669	4.5%

Wastewater methane alone is sufficient to meet 12% of the US electricity demand

Source: North Sky

03 Grid & Efficiency Enhancements

Given the rise in expected electricity usage across the grid over the next few decades it will be necessary to provide significant improvements to current infrastructure. This could take the form of more abundant and higher capacity battery storage, more efficient transmission of electricity and electric vehicle infrastructure (i.e. charging stations) as well as opportunities in reducing electricity usage through sustainability projects.

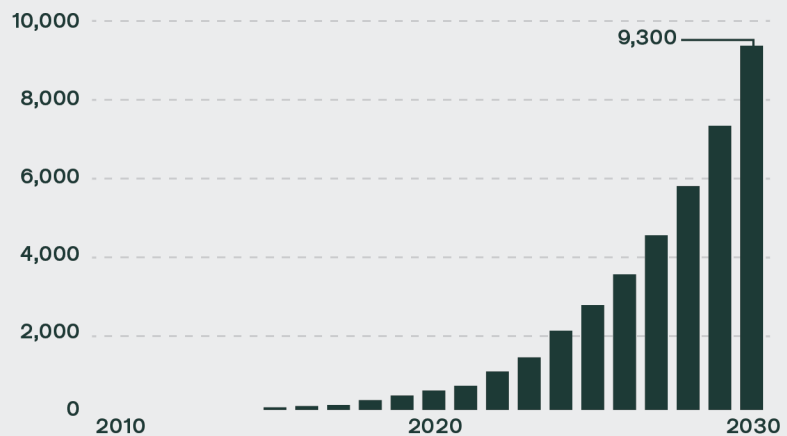


Batteries are growing dramatically as we transition to electric vehicles (EVs) and large battery projects are installed to store energy produced from wind and solar fields. EVs have increased from 4% of the overall car market to 18% in 2023 while grid battery storage is expected to expand 35 fold between 2022 and 2030

(Source: International Energy Agency).

High Demand for Lithium-Ion Batteries

Cumulative lithium-ion battery demand for electric vehicle/energy storage application (in GW hours)



Source: Bloomberg

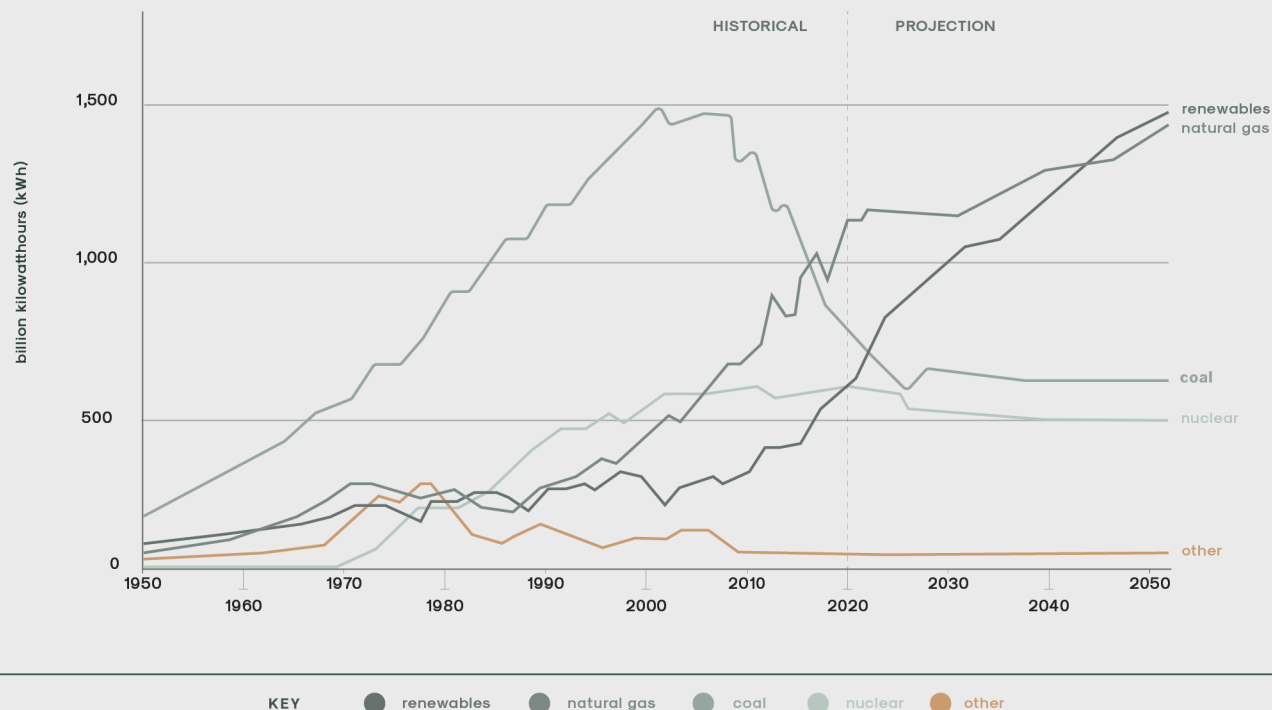
Multi-decade Investment Opportunity

Citizen Mint believes investing in renewable energy infrastructure is a multi-decade opportunity. The majority of these investments will be in wind and solar projects which will be the greatest source of new power generation as noted in the chart below. While previously expensive to build, the price for wind-generated energy has dropped 70% per megawatt hour (MWh) and 90% for solar over roughly the last decade, reducing the need for government subsidies while also accelerating plans of large electric utilities to switch from fossil fuels (oil and coal) to renewables.

Anticipated shift to renewable energy 2020-2050

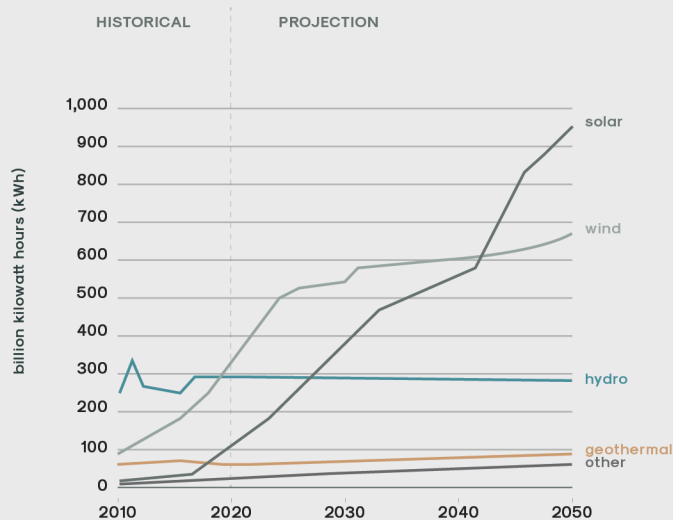
The following chart shows the dramatic projected increase in renewable energy versus other sources of electricity generation. As you can see, renewables are expected to roughly triple between 2020 and 2030.

Annual US Electricity Generation (Past & Future Projects)



Source: US Energy Information Administration, 2021

Projected Renewable Energy Segments



The chart to the left displays the projected growth of several renewable power sources over the next 10 years. Solar and wind will be the main new sources of power with hydro expected to decrease slightly over this time.

Source: US Energy Information Administration, 2021

Reasons for this massive shift include:

Declining costs of renewable energy:

The cost of renewable energy technologies, such as solar and wind, has been decreased dramatically over the last two decades. This cost reduction makes renewable energy increasingly competitive with fossil fuels.

Government policies and targets:

Many countries have set renewable energy targets and implemented supportive policies to promote the adoption of clean energy. These policies include renewable energy standards, feed-in tariffs, tax incentives (Inflation Reduction Act), and carbon pricing mechanisms. Governments worldwide are recognizing the importance of renewable energy in their energy mix and are taking steps to facilitate its growth.



Advancements in energy storage:

Energy storage technologies, such as batteries, are becoming more efficient and affordable. Energy storage solutions help address the intermittent nature of renewable energy sources, enabling better integration into the grid and improving overall reliability and flexibility.

Technological advancements:

Ongoing research and development efforts are driving technological advancements in renewable energy. Innovations in areas such as solar panels, wind turbines, tidal and wave energy, and geothermal systems are expected to improve efficiency and expand the potential of renewable energy generation.

05

Reasons

Why Renewable Infrastructure is Defensive During Tough Economic Cycles



01 Steady Income Streams:

Infrastructure assets, such as renewable power, waste-to-value, biogas, etc. often generate stable and predictable income streams over a long period of time, even during economic downturns. This provides a defensive characteristic for investors seeking income stability.

02 High Barriers to Entry:

Infrastructure projects often require significant capital investment, regulatory approvals, and expertise, creating high barriers to entry for new competitors. This can provide a defensive moat around existing infrastructure assets, protecting them from new entrants and competition.

03 Inflation Protection:

Infrastructure investments are often tied to inflation-adjusted revenue streams, such as tolls or fees. As a result, infrastructure investments can provide a hedge against inflation and maintain their value over the long term.

04 Government Support:

Infrastructure investments are often backed by government guarantees or concessions, which can provide a level of protection against default risk. Additionally, government support can provide stability in uncertain economic environments, further enhancing the defensive nature of infrastructure investing. See additional discussion on the Inflation Reduction Act and the expected benefit to renewable infrastructure investments on the next page.

05 Long-term Horizon:

Infrastructure investments are typically made with a long-term horizon in mind, often lasting several decades or longer. This long-term investment horizon can provide stability and resilience against short-term market volatility, making infrastructure investing a more defensive investment strategy.

Benefits of Renewable Infrastructure Investments in Portfolios

Portfolio Diversification:

In general, renewable infrastructure assets have a low correlation to stocks and bonds. Further, this asset class can reduce volatility in investors' portfolios during economic turmoil as a result of stable earnings streams throughout economic cycles.

Income Potential:

Given the highly predictable cash flows of renewable infrastructure assets, these investments usually provide strong income potential.

Growth:

The global infrastructure market is expected to experience one of the greatest capital investment cycles ever given the transition from fossil fuels to renewable energy sources to address climate change. Additionally, countries are seeking energy security as a result of the war in Ukraine and dependence on foreign powers for energy needs.

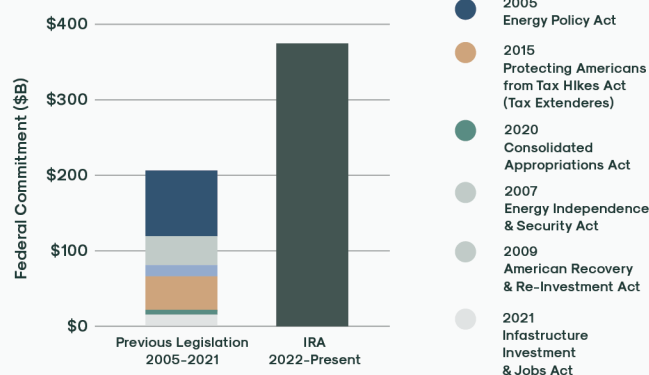
Inflation Reduction Act

The Inflation Reduction Act's \$370 billion commitment to clean energy will provide significant benefits to the renewable energy space and could significantly boost returns. Some key items encompassed in the act include:

- Extension of tax credits for solar, wind, geothermal, hydropower and biomass generated electricity for projects started prior to 2025
- Making standalone battery storage and interconnection facilities eligible for federal tax credits
- Creation of "technology neutral" credits beginning in 2025
- A 3-year carryback provision to expand the tax equity market
- Transferability provisions for federal tax credits, allowing more efficient monetization for investors
- Large new incentives for renewable natural gas, renewable hydrogen, electric vehicle infrastructure and energy efficiency
- Significant focus on prevailing wage labor at qualifying projects, Made in USA components and building in historically underserved areas

Inflation Reduction Act

Largest Legislation in U.S. History to Promote Clean Energy



Overall, the act will dramatically increase private capital flowing into the space and provides a unique investment opportunity at the current point in time.

Political and Regulatory:

Regulations and changes to the tax code can negatively affect the cash flows and valuations of these assets. Additionally, while rare, these assets have been nationalized, or taken over by governments.

Technical & Operational Capabilities:

Owners and operators must be highly skilled given the complexity of running these assets.

How can you incorporate Renewable Infrastructure into a portfolio?

While there are multiple ways to invest in renewable infrastructure the most direct way, which also provides the most benefit to client portfolios, is through Private Renewable Infrastructure funds. These funds which are usually restricted to accredited investors and qualified purchasers, provide the best way of taking advantage of the significant growth in the space while providing limited volatility to client portfolios compared to public markets.

Returns:

Returns for this asset class usually fall between 8%-20% based on the specific investment type and possess half the volatility of public markets and private equity (as measured by standard deviation) [Source: Burgiss].

Allocation:

While there is no standard for a size of allocation to the asset class, we suggest that 2.5% - 10% of a client's portfolio be allocated to this asset class. The weighting of this will depend on the individual's risk tolerance, liquidity needs and financial goals. We further believe that the recent boost to returns due to the Inflation Reduction Act should lead to prioritizing this asset category over alternatives when initiating a client's initial investment in private markets.

Type of Investment:

We suggest a well-diversified investment opportunity in order to reduce risk in the asset class. This may be through a multi-manager fund that can give you access to both core assets (e.g. solar and wind that is already built) as well as opportunistic assets (e.g. the building of biogas facilities, battery storage, etc.) as the client builds out their private market weighting.

Case Study

Below is a case study where a fund made an investment in a wastewater methane to RNG project. This project produces a necessary gas offtake that can be sold at 10x the price of traditional natural gas and reduces the methane gases that would have otherwise been released into the atmosphere.

Investment Overview

Total Commitment	\$20M
Date of Initial Investment	June 2020
Security Owned	Preferred Equity
Fund III Ownership	100% of Preferred
Asset Type	Wastewater methane-to-RNG
Total Capacity	320,000 mmbtu/year
Project Life	20 years
Status	Under construction
9/30/21 Performance	1.2x MOIC and 35.8% gross IRR ²

Sourcing & Investment Thesis

- **Sourcing:** Existing relationship with project developer ("Partner")
- **Favorable market conditions:** RNG is presently priced at approximately a 10x premium to traditional "brown" natural gas
- **Proven technology:** Project Golden Bear ("Project") uses proven technology that was utilized in the Point Loma project described herein
- **Experienced developer and operator:** Partner is the global leader in the waste recovery industry with a deep track record spanning 1,700 facilities globally; Partner has invested significant capital in the project
- **Predictable costs:** Partner brings internal manufacturing and engineering capabilities that will help manage construction costs and timing pursuant to a long-term Operations & Maintenance (O&M) Agreement
- **Predictable cash flow:** RNG produced by Project will be sold to a NYSE-listed regulated utility under a long-term offtake agreement

Municipal Wastewater

Processed effluence forms project feedstock



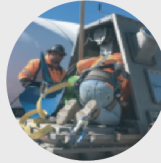
Anaerobic Digestion

Converts waste feedstock into methane gas



Biogas Upgrading

Improve raw biogas to pipeline specifications (RNG)



Gas Pipeline Injection

Connects RNG to utility natural gas pipeline



Source: North Sky Capital

✱ Summary

In summary, renewable infrastructure is an incredibly attractive asset class at the current point in time that can potentially provide significant benefits to client portfolios through enhanced returns, reduced volatility and diversification. If you want to learn more about this asset class and how to incorporate it into portfolios, please reach out to us.

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