Ethos Sustainability

Renewable Energy Powered Model School

Presented By:

Arabella Glass

Vision

- A School entirely powered by solar, wind, biomass, and hydroelectric energy systems
- With integrated sustainability systems: water reuse. smart HVAC, LED lighting, White reflective coated facade, and native landscaping
- Every system doubles as a learning experience for students

A Renewable Powered School

Pavng the way for a sustainable future.

Project Design

Features

- North - South orientation for passive solar gain and daylighting
- Compact 3-story design: Reduces energy loss and land use
- Elevatoor system: High-efficiency regenerative braking model that feeds energy back into the system
- Triple pane windows, SIP insulation, zoned HRVs. and LED lighting
- White Reflective Outer building coating: Increases Solar Panel productivity by up to 30%

Renewable Tech Breakdown

- Rotating rooftop solar panels (35%)
- Solar canopies over parking (25%)
- Wind turbines (10%)
- Biomass from cafeteria waste (15%)
- Micro-hydro from rain gutters (1%)
- Battery storage smooths load demand

Renewable Energy Systems Breakdown

Solar Energy

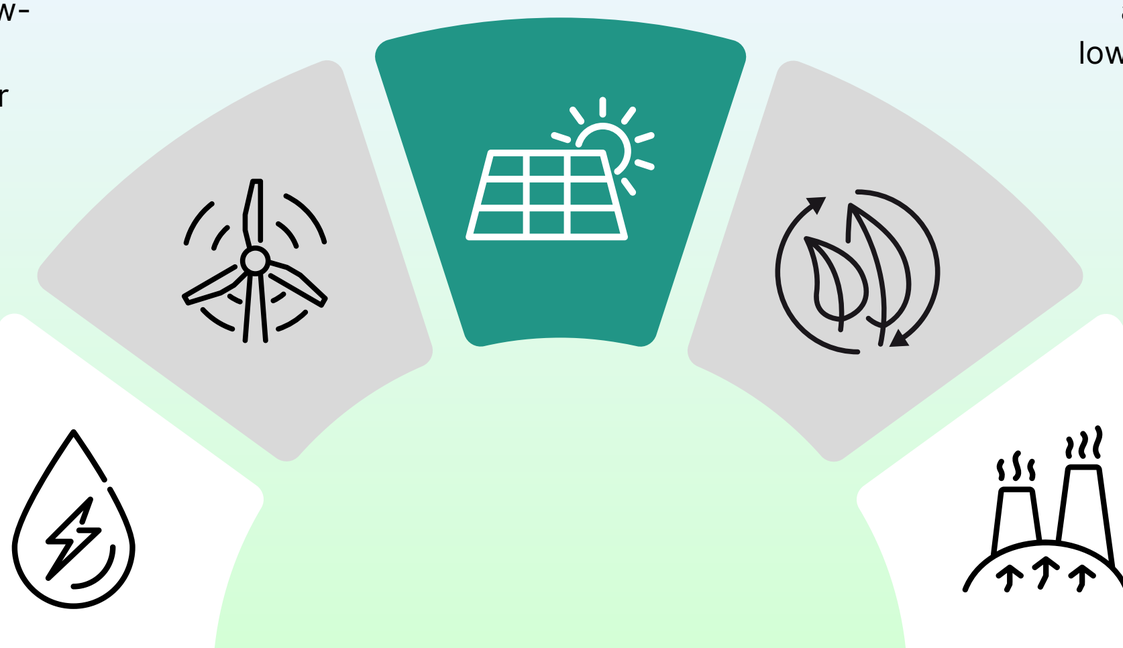
Dual-axis solar panels track the sun for up to 40% more efficiency and are best for flat roofs. Key parts include monocrystalline panels, motors, inverters, and optional batteries. Solar canopies over parking lots generate power, provide shade, and support EV charging.

Wind Energy

Vertical-axis wind turbines (VAWTs) on rooftops work well in urban areas with changing wind directions. They're quiet, low-vibration, and ideal where wind speeds exceed 5 m/s, offering supplemental power (1–10 kW).

Biomass Energy

Cafeteria waste is turned into biogas using digesters or gasifiers, producing electricity and heat. This system cuts landfill waste, lowers emissions, and provides compost for gardens, with safety systems to manage gas.



Hydropower

Micro-turbines in downspouts generate power from rainwater, useful for lighting or irrigation. While low-yield and weather-dependent, they creatively reuse stormwater and support environmental education.

Energy Storage

Lithium-ion batteries store extra generated power, managed by a smart EMS. This system balances energy loads, powers devices during high demand, and includes real-time dashboards for learning and control.

Feasible Execution Plan

1 First Stage

2 Second Stage

3 Third Stage

Year 1-3

- Start small: LED + solar canopies (Years 1-2)
- Add smart HVAC + water reuse + Smart Sensors (Years 2–3)

Years 3-5

- Roof solar panels & trackers + Wind turbines (Years 3-4)
- Biomass digester + rainwater system (Years 4-5)

Years 5+

- New construction: full net-zero school (Year 5+)
- Already being implemented in Portland, Boulder, San Diego

Renewable Powered School vs. Traditional School

The estimate of the total construction costs is $32-39M	The estimate of the total construction costs is $25-30M
The adverage cost of yearly O&M is $75K-$150K	The average cost of yearly O&M is $300K-$400K
Reduced environmental impact and sustainable long-term	Releases fossil fuels and large amounts of pollution, and is not sustainable long-term.

Why Renewable Energy Matters?

Having schools lead the energy transition transforms schools into dynamic, cross-disciplinary “labs for the future,” where the curriculum extends beyond the classroom walls and into the systems powering the building itself. In reimagining our schools this way, we’re not just educating the next generation — we’re equipping them to lead.

- Climate change concerns and energy costs are rising — schools must adapt.
- American schools annually emit an estimated 72M metric tons of CO2 annually
- Schools are ideal testbeds for sustainable infrastructure and education.
- Opportunity to future-proof facilities and reduce long-term costs.

Benefits of Renewable Energy-Powered School

Conclusion

In reimagining schools through renewable-powered design, we create more than just efficient buildings — we build living models of sustainability, innovation, and education in action. Though the upfront cost may be higher, the long-term benefits are clear: lower expenses, reduced environmental impact, and students empowered through real-world learning. This scalable, future-ready approach transforms schools into dynamic labs where education and sustainability go hand in hand — preparing students not just to learn, but to lead

- 70–90% reduction in emissions
- 20–40% drop in absenteeism from improved air/light quality
- Curriculum integrated with real-time energy and environmental data
- Creates climate-aware leaders and saves millions over time.

Thank You So Much For Your Attention

Invest in the future—by powering education with renewable energy, we're not just building schools, we're shaping a more sustainable world.

Any Questions?