AURA
(Adaptive Universal Renewable Array)
* AURA is a roof extension, not a whole new roof

Brainstorming Ideas:

Topic: Energy/Environment

Stuff to do for Oct 6, 2025, Monday:

- Choose roles for the 2nd phase of Conrad; each person will have a minimum of 2 roles, being:
- Research (Mandatory 1st role EXCEPT if you are a Business Specialist)
- Coder (Choice)
- Animator (Choice)
- 3D Modeler (Choice)
- Website Creator (Choice)
- **Business Specialist (Choice, one person only):**
- The Business Specialist will take on all things business, aka researching different products similar to ours, determining flaws in other possible products, looking at customer type and wealth using available datasets, will help refine our business to professional levels, and will answer ALL 2nd phase questions related to business, no questions asked

Research: Everyone except Christian
Coder: Justinas, Chan, Ryan
Animator: Lance, Chan, Justinas
3D Modeler: Lance, Chan, Justinas
Website Creator: Lance, Chan, Ryan
Logo Designer: Christian
Logo Maker: Ryan
Business Specialist: Christian Lee

Air conditioning demand is rising rapidly, with 50–70% of household electricity consumed for cooling in the summer. Low-income communities are disproportionately affected by high utility costs and the harmful use of refrigerants. Hydrofluorocarbons (HFCs), the standard refrigerants in most AC units, trap up to 1000 times more heat than CO_2 if leaked into the atmosphere. The result is a cycle of higher bills, grid strain, and escalating climate impact.

A universal adaptive panel designed to reduce electricity consumption and provide clean energy. The panel combines multiple renewable subsystems to harvest energy depending on environmental conditions:

Components:

- Solar cells capture energy during sunny hours.
- Microturbines harvest wind energy when the wind blows.
- Rainwater is filtered and directed through a micro-hydroelectric generator.
- A thermal coating layer radiates heat, reducing cooling demand in buildings without refrigerants.

Impact

- Reduces electricity bills by supplementing household power.
- Provides accessible, sustainable cooling without refrigerants.
- Delivers a scalable, low-maintenance solution for vulnerable communities where utility costs and climate risks hit hardest.

Search up:

Solar panels

Cooling/heating panels based on temperature

Mini-wind turbines

Hydroelectric generator

Source information:

https://www.worldbank.org/en/topic/energy/publication/tracking-sdg-7-the-energy-progress-report-2025

It shows that 666 million people still don't have access to electricity, underscoring why affordable, decentralized solutions matter. It also says that over half of new connections in underserved areas come from decentralized renewables, which lines up with the adaptive panel idea.

The gaps: progress is uneven across regions (Africa is way behind) and funding has dropped since 2016, so there's a big need for low-cost, scalable innovations like ours to fill that space.

https://www.sciencedirect.com/science/article/abs/pii/S0038092X25002087
This paper overviews radiative cooling technologies, mechanisms, and material performance. It helps explain the fundamental physics behind the radiative cooling layer of the panel and offers insight into what materials and emission ranges work best.

https://pmc.ncbi.nlm.nih.gov/articles/PMC9843130/
A review focusing on sustainable, zero-energy radiative cooling, photonic structures, energy savings, and carbon neutrality. Offers a broad physics foundation and current challenges—useful for designing efficient passive cooling coatings.

https://www.mdpi.com/1996-1073/17/13/3210
This article examines real-world passive radiative surfaces and reviews their energy balance equations and costs, guiding how to quantify cooling performance and project economics.

https://www.nature.com/articles/s41467-024-48150-2
Introduces polymer-based metamaterials with integrated radiative cooling and light diffusion. Helps us combine multiple functions (e.g., self-cleaning, light diffusion, cooling) in a single panel.

https://www.researchgate.net/publication/384681023_Micro-Hydro_Power-Harnessing_the_Potential_Energy_of_Water_for_Small-Scale_Electricity_Generation
Focuses on micro-hydro turbines for low-head water sources, such as stored water or rainwater collection. Guides how to convert rainfall on the panel into hydroelectric power using compact turbines

https://arxiv.org/abs/2203.14697
Proposes stretchable photonic structures whose thermal emission can be tuned via mechanical strain—allowing adaptive control of cooling. Great for adding dynamic responsiveness to the panel design.

https://arxiv.org/abs/2008.12107
Modeling of passive radiative cooling paired with thermoelectric generators for electricity generation. Inspires adding a layer that generates power from temperature differences at night.

https://pubmed.ncbi.nlm.nih.gov/38292424/
Demonstrates that radiative cooling can reduce temperature of solar panels, improving performance. Supports combining radiative cooling with PV cells to boost solar efficiency.

https://attra.ncat.org/publication/micro-hydro-power-a-beginners-guide-to-design-and-installation/
Offers practical design and installation guidance for micro-hydro systems, covering components, power estimates, and feasibility—useful for prototyping your rainwater energy conversion.

https://www.sciencedirect.com/science/article/abs/pii/S0360544223000889?
Introduces a micro-hydro generator enhanced by magnetic coupling for efficiency. Useful if we plan on compact, efficient generators on our panel's rainwater subsystem.

https://en.wikipedia.org/wiki/Kouris_Centri_Turbine
Obviously cant use as source but for design
Describes a vortex-based turbine that operates with low water drop heights—ideal for small-scale implementations like rooftop rainwater collection powering a turbine-driven generator.

https://www.sciencedirect.com/science/article/abs/pii/S1364032122007481
A systematic overview of micro hydro challenges and characteristics in urban contexts — directly applicable when designing panels for rooftops or urban housing.

https://en.wikipedia.org/wiki/Passive_daytime_radiative_cooling?
Just info for us
Summarizes core principles, materials, performance metrics (e.g., ~100–150 W/m² cooling power), and integration with HVAC. Provides a quick reference for performance expectations and academic terms.

https://www.nature.com/articles/s41467-024-52028-8?
Projects that global AC ownership may rise from ~27% to ~41% by 2050, which could double residential cooling electricity consumption (from ~1,220 TWh/year to ~1,590-2,377 TWh/year depending on scenario). Also shows AC access/use will remain highly unequal across income levels and regions.

https://energyinformatics.springeropen.com/articles/10.1186/s42162-022-00228-1?
Measured 25 urban homes in India over nine months across climate seasons. Found AC homes consumed ~15.1 kWh/day during summer vs ~6-7 kWh/day otherwise. AC accounted for ~39% of total household electricity in summer. Peak usage often overnight.

https://www.cmcc.it/article/cooling-poverty?
On average, households with AC see ~36% more residential electricity use globally. By 2050, global residential electricity demand for cooling might reach 1,400 TWh/year, costing $124-$177 billion in associated bills/emissions. Also highlights "cooling poverty": lower-income households often spend much larger shares of income on cooling.

Why does it work?

Solar Panels:

Micro-Wind Turbines:

Hydroelectric Generator:

Adaptable Cooling/Heating Roof (Can be achieved through AI):

Electricity (Not Green Energy):

Green Energy Generator/Power Storage:
- Can be set to store a certain percentage amount of green energy collected (10-90%)
- Rest of the excess energy not stored will be sent to a giga-storage, allowing for mass-collection of green energy
- Can be diverted to power own house

Giga-Storage (Innovation Stage)
- Large storages that can be placed in facilities around the world, will collect all excess green energy not stored to personal storages
- Can be diverted to power entire cities, factories, and possibly more

Lean Canvas Problems (1-10)

Here are some tips to consider as you develop your Lean Canvas:

Start with the Problem
Clearly define the specific problem or need your innovation solves. This sets the foundation for everything else.
Know Your Customer
Identify who will use your solution, what they truly need, and who your early adopters will be.
Understand the Market
Research existing solutions to highlight what makes your idea different and better.
Be Clear and Measurable
Use simple language and include numbers (like costs, goals, or user metrics) to show you understand how to measure success.
Keep It Realistic
Be honest about the costs, revenue potential, and how you'll fund and grow your idea over time.
Refine and Collaborate
Treat the Lean Canvas as a living document. Share it, get feedback, and update it as you learn more.
What is a Lean Canvas?
A Lean Canvas is a one-page business plan that helps you quickly map out your innovation. It highlights the key elements like the problem you are solving, your solution, who will use it, and how it will succeed. This tool is designed to help you think clearly and focus on the most important parts

of your idea.

Possible Team Names:
AURA – Adaptive Universal Renewable Array,
→ Evokes “air,” “cooling,” and atmosphere — fits your panel’s cooling + renewable hybrid nature.

ARISE – Adaptive Renewable Integrated Smart Energy-system,
→ Has inspirational tone (“Arise” → uplifting sustainable future).

1. Problem (Ethan)
What is the customer need the innovation will address? Is there a social or environmental challenge your team aims to solve?
Limit: 40 words

Our innovation will provide a mostly electricity-free alternative to AC and easy access to green energy generation from anywhere. We plan to reduce a social problem of the electricity bill, and an environmental problem of the limitations of green energy. (Draft)

2. Existing Alternatives: (Justinas)
How is this problem solved today? Think about other products or solutions already in the market.
Limit: 40 words

Most people today use regular air conditioners or window units, which rely on harmful refrigerants and high electricity. Solar panels or passive cooling surfaces exist, but no single product combines solar, wind, rainwater power, and adaptive cooling in one panel. (Draft)

3. Solution: What are the key features of your innovation? Ryan
Limit: 40 words

Solar cells harvest power in sunlight, mini wind turbines capture breezes, micro-hydroelectric generators convert filtered rainwater into power, and thermal coating that reflects heat. Together, providing refrigerant-free, eco-friendly cooling that reduces electricity use while keeping homes comfortable like traditional ACs.
(Draft)

4. Key Metrics What are the most important numbers to measure your innovation’s success?
Limit: 40 words

It costs $500 for 10 solar panels, $1200 for 10 microwind turbines, $800 for a hydro-generator, and $1000 for 10 thermoradiative panels. We will cut 80-90% of AC energy use (20-30 kWh daily), and 500 million tons of CO_2 yearly.

Annual/Daily electricity usage for house
Household electricity saved (%)
Amount of utility bills saved ($)
Green energy produced (kWh/tile/year)
CO_2 emissions avoided (kg/year)
Cost per tile
Costs for panel (solar panels, micro-wind turbines, hydropower generator, AI system)

5. Unique Value Proposition What makes your innovation different from others?
Limit: 40 words (Ethan)

Some people have solar panels on their roof, but solar energy alone is not enough. Our innovation revolutionizes roof design by using heating/cooling adaptable panels that can collect green energy any weather and time of the day. (Draft)

6. High Level Concept Give your innovation a short tagline or slogan. Limit: 10 words or Less

AURA FARMING— Anytime, Anywhere, Clean Energy

7. Sustainable Advantage: Why will it be hard for others to copy your innovation?
Limit: 40 words Justinas

Our panel combines solar, wind, rainwater, and smart radiative cooling in one unit with special coatings and modular design. This all-in-one, scalable, and low-maintenance system is difficult for competitors to copy, providing a strong and lasting advantage in the market. (Draft)

8. Channels: How will your innovation reach customers? How will it be sold or delivered?
Limit: 40 words (CHRISTIAN)

Our innovation will reach customers through partnerships with community organizations, rebate programs, and housing authorities like Habitat for Humanity. Units will be sold online —- Shopify, distributed through nonprofit networks, and paired with workforce training to deliver affordable, sustainable community-based energy. (Draft)

9. Customer Segments: Who will use or benefit from your innovation? Describe your target audience. Limit: 40 words (CHRISTIAN)

Our target audience includes low-income households, urban renters, and families in climate-vulnerable regions burdened by high utility costs. Community organizations, housing authorities, and nonprofits also benefit by accessing renewable technology that cuts bills, creates workforce opportunities, and improves community well-being. (Draft)

10. Early Adopters: Who are the very first people likely to try your innovation? Describe them.

Limit: 40 words:
Pilot partners in hot cities such as Los Angeles, Houston, Delhi will test prototypes. NGOs addressing energy poverty. Families and builders engaged in renewable programs, schools seeking sustainability demonstration provide ideal early adopters to validate, refine, and showcase our innovation. (Draft)

11. Cost Structure What are the biggest costs for your innovation? Limit: 40 words
Specialty radiative coatings, durable substrates, solar/micro-turbine/hydro components, electronics, installation labor, and ongoing R&D. Prototype costs are higher per panel, but scaling to mass manufacturing lowers material and assembly expenses through economies of scale partnerships, and supply arguments. (Draft)

12. Revenue Streams How will your innovation make money to keep going?
Limit: 40 words
Revenue from direct panel sales, licensing of panel integration IP, partnerships with developers, and NGO-funded deployments. Additional funding will be supported by impact investors, grants, and sustainability-focused venture capital. Long-term ROI via household savings drives adoption, expansion, and investor confidence. (Draft)

Additional information: (around 100 words or so)

INNOVATION STAGE FRQS

1. Elevator Pitch (150 words) Pitch the innovation, along with its impact, customers and business potential

As the world continues to grow, problems such as global warming also rise with us. Problems like these threaten the survival of humanity. Also, the long-awaited shift permanently to green energy may seem extremely difficult, but it is right within reach. Imagine an invention where we can all contribute to a greener environment, one where we can generate green energy any time, any weather. Also imagine if that invention was right above our heads as a component of our own houses! Our technology, the Adaptive Universal Renewable Array, is an adaptable panel that generates clean energy regardless of weather conditions and reduces air conditioning demand. Each roof is dedicated to collecting green energy any time of day while reducing electricity costs and GHGs for all. The potential that AURA can achieve is significant; we're not cooling homes, but rewriting the future of clean energy, one household at a time.

2. Team (150 words) • How did the team form? • What role will each team member play? • What motivated the team to create the innovation? • What special capabilities, resources, or experiences do the team members bring?

We are all friends from the same school, and came up with the roof/green energy generation idea through our common goal for environmental improvement and the push towards a world running on green energy that was inspired mostly from our school's nature club (Nature Conservation Club). Initially, we thought that our skillsets would not match and the project would go out in all sorts of different directions, but we soon realized our varied talents that made us an effective team that came together and made this innovation. Our counselor, Mr. Bourdon, helps us with the applied Physics behind our innovation. Lance and Justinas worked on the 3D Model. Ethan developed a website to explain its significance and give visual engagement. Christian was the market/businessperson, and Ryan was our lead researcher. Together, we strive to create a unique and effective innovation that can permanently change our world for good.

3. Opportunity (300 words) What issue or main point does the innovation address? (Lance)
Industrialization and the use of fossil fuels continue to grow with humanity. Emphasis on green energy has never been more apparent, also forcing many to increase the use of air conditioners. HVAC accounts for around 14% of total electricity usage in the US, and this percentage continues to grow as heat waves and icy blizzards strike unexpected places due to global warming. This inevitably increases the electricity bill for many houses, which upsets many people that must constantly run HVAC units to match extremely variable temperatures. ACs still rely on refrigerants with hydrofluorocarbons, which trap 100000+ times more heat than CO_2. These growing problems, however, can have a quite simple and effective solution- roofing. It can be utilized as so much more, but instead pose as a simple cover for buildings. There are many types of green energy collectors like solar panels, wind turbines, or hydropower generators, but they only have time and weather specific usages. Solar panels only operate while the sun shines, lose efficiency when they become too hot, and do not lower temperature on their own. Turbines and hydropower generators also operate at specific times under specific weathers, notable ones being windy and rainy. AURA intends to solve all of these problems. We modify the roof so it can trap/release heat based on adaptable panels, which is powered by an AI system based on user preference. This acts as an eco-friendly AC eliminating HFCs while retaining effectiveness, which also cuts electricity costs. We attach all types of green energy generators to our roof, which perfectly works as most rainwater and wind usually breeze through our home roofs. This allows green energy collection at any time of day. AURA tackles both global warming and green energy problems, striving to be the next breakthrough of eco-friendly innovations.

4. Key Metrics (750 words) • Describe the innovation, its design, and its technology. How does it work? • What is new or proprietary about the innovation? • How does it meet needs and resolve pain points? • What impact does the innovation create for individual users and humankind? Describe this qualitatively and quantitatively. • How can new or proprietary aspects be protected and made valuable by one or more methods such as a patent, trade secret, copyright or otherwise competitively defensible configuration? (Lance & Chan)

Our design, AURA, incorporates multiple variants of green energy collectors, and adaptable roof panels into a roof design that can fit on any building, residential or commercial. We incorporate solar panels to collect solar energy at a rate of 200 W/hr, micro wind-turbines to collect wind power through tiny upright wind rotors at 100 W/hr, filters that channel water to a hydropower generator, and prototype thermoradiative (lunar) panels that collect natural heat from Earth, all with the goal of efficiently collecting green energy at any time of day or weather. We also incorporate a fairly recent technology: adaptable roof panels. They incorporate wax motors that can generate thermal into mechanical energy for heating, and sun absorption panels that release heat for cooling. Our built-in AI system is the mainframe of the roof, connecting everything together like a brain. We will build our AI system from pretrained weather condition data from extant databases, leveraging Pytorch/Pandas to make it function properly. Sensors will also be incorporated for the AI to monitor the weather and temperature conditions. Based on outside temperature, the AI system will determine through sensors that it must turn on the heating/cooling aspect of our roof to a preset value, which can be manually adjusted to suit a user's needs. All the collected energy will be stored and possibly used as an alternative to electricity. We incorporate prototypes like thermoradiative panels and adaptive roof panels that are all reasonably attainable. Our unique design smoothly merges a variety of green energy collectors for maximum efficiency, making our roof a consistent energy collector and an alternative to AC based products. Through our convenient and multi-purpose design, we meet needs like AC alternatives, green energy collectors while providing bonus needs and benefits such as electricity bill costs cut and the consistency of our collectors. The continuous reduction of electricity costs and green energy collected will continue to grow the longer our product is used. Early pain points in our business would be costs and customer base. AURA's main component, the roof, is a prototype. Prototypes on release are usually more expensive. However, through partnership and knowledge of replicating these prototypes, we can cut costs down to an affordable level. The existing customer based for environmental benefits may be small due to industrialization and economies relying on fossil fuels. However, time will be our greatest ally as more will come to the realization that global warming is a planetary threat, and invest in ways to help combat it. It will additionally lessen costs as our production continues to become more efficient and cost-effective. Because our product incorporates different elements into its creation, it is near impossible to copy. Construction information will be solely insider knowledge, with all employees and people in the company signing a contract to never disclose information to the public. We will additionally put a patent on our product due to its unique nature, which will give us an even greater advantage in the market. Currently, GHG emissions from ACs comprise 3-4% of the world's emissions, with global warming increasing this percentage from increased usage. ACs account for 19% of electricity usage in residential homes, and 14% in commercial buildings, also increasing proportionally with global warming. Our green energy % of total electricity in the world, although at an impressive 30%, is nowhere near our goal of 100%. To meet yearly energy requirements, we only need 50% of the world's rooftops to be covered with ONLY solar panels, but only 7% of US homes have them installed currently. Our product, differentiated from merely solar arrays, can be used in any weather and any time of day. This makes it multitudes of times more consistent than solar panels alone. Our impact on the economy and the world will thus be massive, reducing electricity bills and greenhouse gases alike, generating green energy, and serving as backup power, all at the same time. Later extensions of our product will link collected green energy to mega-storages in facilities, allowing humanity to temporarily power large cities or even a nation with the collected energy. The largest strength in our model lies not in its multi-purpose consistency, but the population itself. Society can achieve 100% green energy through mass adoption of our product. We will be an effective weapon in the long battle against global warming, giving an incentive to step towards green energy while reducing GHG emissions. Ultimately, AURA will be the ace of humanity's green energy production and fight against global warming.

5. Validation/Progress (450 words) • How have you validated the innovation, technology, or processes? • What progress has the team made in developing the innovation?

AURA has not been physically validated yet. So far, our progress has surrounded design and planning how we will validate it in a real, measurable way. The biggest step we have made is designing and revising our 3D model and layout, because AURA only works if the components work together in tandem and still do their job without interfering with each other. The 3D model is where we work out spacing and fit between parts. We are using it to ensure that the many elements of a multi-module setup (solar and lunar panels, wind turbines, and water channel turbines) do not interfere with the performance of other elements. It also helps us plan wiring routes, how everything will connect, mounting points, and clear space so nothing overlaps in a way that would cause failure later. We are not using the model to claim performance and data as of yet. Our prototyping will be somewhat expensive, so we are carefully ensuring that our design maximizes efficiency before building anything out. From that, we write validation questions that guide what we need to test. For example, will the solar or lunar panels block water from reaching the water filter. Will internal water channels drain quickly enough to prevent flooding? Will water flow become contaminated by debris, or does the design keep the water path protected? Will the wind turbine sit in clean airflow or be stuck in turbulence because of where it is positioned. Will any part shade or block another part of another component's access to sunlight, moonlight, or wind. Will spacing and mounting prevent vibration issues or stress when weather becomes hectic? Although we can leverage existing data on energy production, the interplay of our design's parts will remain important. When we move into physical testing, we will test each part individually first. That means buying a single small wind turbine and measuring how much power it can generate under different angles, light levels and wind conditions, then scaling the result into what a full array would accomplish. For the rain system, we would measure drainage rate through the channels to determine the optimal placement of hydroelectric generators. Testing each part alone lets determine the most cost- and energy-efficient layout. Afterward, we will test these layouts in a wide variety of weather conditions to ensure that our product is at once efficient and durable across the varied climates of the world.

Our 3D interactive model file can be found under Additional Information #2, and can be accessed through our website under the section “Interactive Model”.

6. Market (300 words) • Describe the customer and the target segments. • What is important to them? • What is the size of the opportunity? • Is the buyer or payer different from the customer in this market? • Describe the industry ecosystem.

Our project is generally targeted towards environmental-positive advocates, middle and upper-class families willing to invest in the future, and certain areas with consistent weather like Arizona (sunny) or Chicago (windy) as test markets. From our targeted families, these would be families that advocate for environmental change and the eventual permanent use of green energy as a main fuel source, positive to cutting-edge innovations that revolutionize the field of green energy, and the reduction of hydrofluorocarbons or greenhouse gases. Finally, they would also be looking forward to futuristic and revolutionary ideas. In this market, the buyer/payer is the same as the customer. The buyer makes their interactive choice through our website, and pays for our product that gets shipped to them. Our product would fit in very nicely with the industry ecosystem of environmental-friendly products and home-improvements. We would partner with renewable energy corporations to gain discounts to green energy collectors, especially as early adopters of solar energy are reaching the end of their installations’ viability. Collaboration with contracting and roofing companies will be essential. In an ecosystem like this, there is a sizable amount of competition through brands of different green energy generators or roof remodeling services, but our design will stand out both in terms of capability and visibility. Moreover, there is little large-scale brand recognition of current green energy companies, which will ease our entry into the market. The pitch in that context is a simple one: climate change is a problem felt by all of us, so we must all strive to be part of the solution. If it is possible–as AURA will enable–to do so in an economical way though lowering energy bills at a time they are rising precipitiously, that only makes things easier for everyone to get started. Right at home, with AURA.

7. Competition (300 words) • What competes with the innovation and how does the innovation compare? • What are the advantages and disadvantages of innovation? • What is the positioning?

The current market of environmental/eco-friendly products only focus on one particular thing, like how solar panels focus on green energy and eco-friendlier ACs try to reduce greenhouse gases. However, no product combines features like AURA. Our current competitors are green energy collectors like solar panels, wind turbines, hydropower generators, and eco-friendly ACs.

Green energy collectors like solar panels may be a strong individual collector, but only at a certain time and weather, and current brands are not household names. Eco-friendly ACs may reduce GHGs, but they still take up a considerable amount of electricity. Our product does not best these designs, but rather integrates their individual power into a multi-purpose roof and green energy production system. In this way, we would quickly become the most efficient product in the market capable of generating energy anytime. We hold many advantages like the reduction of GHGs, electricity bills, and generation of green energy almost indefinitely. Even our costs are decently priced for our innovation. However, there are minor disadvantages, mainly due to some of our technology being prototypes like thermoradiative (lunar) panels or adaptive roofs, along with ensuring that our design meets building codes across the world. This is not a major problem, however, as the prototype technology will be tested and operational for certification. Our positioning in the market will be extremely flexible and standout significantly. We portray ourselves as a somewhat affordable, extremely efficient, and globally impacting brand aiming to help cut electricity bills and combat global warming. Our unique idea gives us a cutting-edge advantage over the environmental market. We want our product to be the main reason the world reaches 100% green energy. By globally outreaching our product, generating green energy for worldwide use in place of fossil fuels, and reducing GHGs, we can change the world.

8. Go-To-Market (150 words) • How will the team attract and sell to customers? • Who are the best initial or pilot customers? • Is the market best served through direct sales, distribution, licensing, strategic partnerships, or other strategies?

We plan to start testing AURA in highly populated cities like Los Angeles, Chicago, and Phoenix, where there are often high cooling costs. Our initial customers will be community housing groups, schools, and nonprofits that focus on clean energy and affordable living. We plan for our product to reach middle-upper class families and people willing to make environmental investments. We will partner with renewable energy companies to gain discounted prices on green energy collectors. Then, we'll sell AURA online through our website and platforms like Shopify, and promote them through social media and renewable energy events. Later, we'll expand by working with home builders and city programs that support green projects. By combining online sales, partnerships, and local outreach, AURA will grow from small pilot projects to a global solution that helps people save money, stay cool, and use clean energy anywhere in the world.

9. Business Model (300 words) • What are the key revenues and costs? • What are the pricing and costs to deliver one product or service unit?

AURA's focuses on affordability, easy to install features, and widely/remotely accessible for households and community groups that face high cooling costs. We will keep costs affordable by partnering with renewable energy companies and bulk-buy collectors, allowing us to sell our units for cheaper. Also, as production continues, unit costs will also continue to fall. To initially develop this product, we need a set $50000 for AI development and around $13000-23000 per unit, accounting for variability of roof size. Our “adaptable” roof will be placed upon an existing roof with cut out water filters, costing $5000-15000, depending on roof size. 10 solar panels (200W+) will cost $1000. 10 micro-wind turbines will cost $1300. A hydropower generator will cost $1000. 10 thermoradiative panels would cost around $1800. A 20 kW green energy storage would cost $2000. It would cost $400 for a tablet with our AI, and $500 for a group of thermal sensor boards to track temperature connected to our AI system. Roof shipping will vary from $400 (local), $1000 (national) to $2500 (international) and have a set installment cost at $2000. Our roof will be tightly packaged and folded to conserve maximum space. We plan to sell each unit at a flexible price according to roof size, from a range of $18000-34000. Our key costs will come from paying employees, creating units, and projects to improve design or efficiency. Our main revenue will come from selling AURA units, installation packages, and shipping. Important sales will come from community housing organizations, residential areas, and urban areas where corporations reside. We will sell AURA through our website and platforms like Shopify, allowing customers to choose their current roof size and location for extra optimization and more accurate costs.

10. Fundraising (150 words) • What funds are needed to get started and how will those funds be used? • How much will it cost to develop the product and roll it out? • What different sources will be pursued for funding and why are these a fit? (Ethan)

Our projected initial investment will be $1M for testing and development beyond the initial prototyping stage. When we reach a need for focused advertising, that budget will expand to $5M to accommodate both local builders and advertising rollouts in our initial target markets.

AI development will cost $50k to hire specialist engineers for a year of coding, but fortunately, the demand for such positions has fallen, which will help to lower long-term computer engineering staff costs. Materials costs will likely vary throughout our development phase, but should be in the range of $13-23k/unit with sales margins of 40-50% for most designs. Fortunately, construction takes time, so we do not need to deal with warehousing and can bring in system parts on the fly. Federal and state governments can assist with our funding needs through grant programs, but private investment like large-scale investors and renewable energy corporations are more preferred.

Providing detail of care to show u care

Get a full draft together by Tuesday night

Verify in key Metrics to show how our thing will work

Show that it is practical, when talking about AI tell what it is doing (input/output)

Remove price and say is customizable in website

Look into NOAA(API)

In order to figure out unique climate needs, enter avg electricity bill, zip code, location, address, country

edvize.com

Website Requirements:

- Common Theme
- Team Details
- Team Photo
- Team Video (add later)
- 3D Model (add later)
- Social Media information (cuz we formal business group fr)
- Innovation Description
- Innovation Applications
- What we plan to achieve with our innovation
- Links to our work documents

Christian Business Info About Current Market:

The market for decentralized cooling and renewable energy is rapidly expanding due to a combination of factors, including rising temperatures, urbanization, and growing energy demand. Residential cooling demand is one of the fastest-growing sources of electricity use worldwide. According to *Nature Communications*, global air conditioner ownership is projected to rise from 27% to 41% by 2050, increasing residential cooling consumption to as high as 1,400 TWh per year (Wang et al. 2). This puts significant pressure on power grids and drives up electricity bills.

In hot areas, cooling already accounts for up to 70% of household electricity use in the summer, especially among low-income communities (Singh et al. 5). Research shows that households with air conditioners use 36% more electricity than those without, making the cost for these coolers more challenging in extreme heat events (CMCC). Problems with these air conditioners have led to the global issue of "cooling poverty," where vulnerable families cannot afford safe indoor temperatures, especially in hotter regions, such as sub-Saharan Africa, northern Brazil, and Southeast Asia, which are close to the equator.

Environmental risks make the situation worse. Traditional AC systems release hydrofluorocarbons (HFCs), which can trap 1000 times more heat than carbon dioxide (IPCC 17). As governments aim to reduce HFCs, the need for non-refrigerant cooling solutions is growing.

Another challenge is the uneven distribution of energy access worldwide. The World Bank reports that 666 million people still lack access to electricity, and progress toward universal energy access has slowed (World Bank 11). However, more than half of new electricity connections in underserved areas now come from decentralized renewable energy systems, such as small-scale solar and microgrids (World Bank 22). Despite this progress, current decentralized technologies remain fragmented: solar only works in daylight, micro-wind requires steady airflow, rainwater micro-hydro relies on specific conditions, and radiative cooling surfaces do not generate electricity (Li et al., Mandal et al., Zhou et al.).

This mismatch creates a clear gap. The market lacks an affordable, weather-independent, cost-efficient, multi-source rooftop system that can produce clean energy while meeting its cooling needs. The Adaptive Universal Renewable Array (AURA) addresses this critical gap by combining solar cells, micro-wind turbines, a rain-powered micro-hydro generator, and a radiative cooling layer into a single adaptive, modular panel. As demand for decentralized, climate-resilient energy rises, especially in low-income, vulnerable areas, AURA is ready to meet an urgent global need in a growing market economy.

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