

The Colorado Academy Future City Essay Team

Ms. Kirkman and Ms. Farmer

Future City Competition Team

13 December 2022

Caelum, Australia

Caelum, known as Sydney before the Great Fires of 2052, means Heaven in Latin. Caelum rose from the ashes between the Hawkesbury River and the Australian Pacific coast with a population of 350,458. Citizens rebuilt to eliminate urban poverty intensified in every way by the climate crisis, including water availability, food security, and energy production. Sea level rise, extreme heat, and weather events made poverty more widespread. Caelum combats these problems to create a sustainable, innovative, and equitable city.

Climate change has created a dangerous problem to solve. From 2022 to 2050, climate change increased the number of people affected by poverty by 20%. Between 2022 and 2032, tens of millions of people abandoned their homes due to extreme weather and water scarcity. The World Health Organization stated that 250,000 people were killed every year due to climate change between 2030 and 2050. Those in poverty suffered from significantly higher health problems from air particles and heat exposure. Housing security became a more significant problem, as lower-income neighborhoods did not have the structural infrastructure to withstand major weather events. If mitigation efforts were not deployed, climate change would ruin our world, millions would be living in poverty and homeless, and human society would be destroyed.

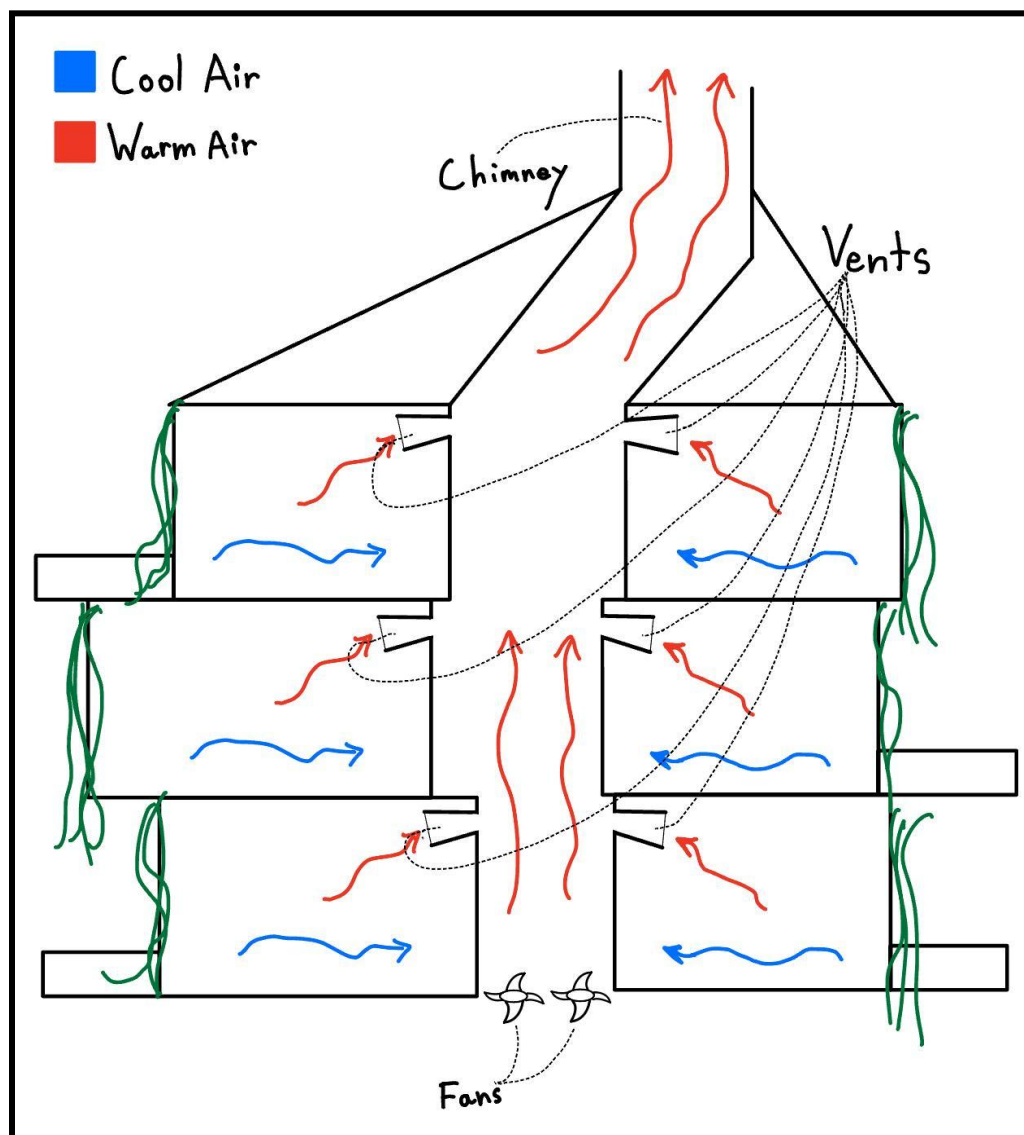
Caelum provides a reliable and comfortable community for all citizens. Civil engineers designed multi-purpose buildings so that necessities are within 15 minutes of all residents by biking, walking, or public transit, removing the need for personal vehicles. Vertical farm towers provide restaurants, stores, and communal spaces. Rewilded areas create a green foundation for the city. Community centers serve as child care, senior

socialization, and support for people with disabilities. Various recreational locations are spread throughout the city, including swimming areas, gyms, and art studios, providing lots of places for residents to have fun.

Jobs include teaching, emergency services, engineering, and government. Entrepreneurship helps reduce poverty so community members are supported as small business owners. Computer engineers develop AI programs that increase work efficiency and allow citizens to focus on more skilled jobs.

Caelum residents live in sustainable, high-density housing to avoid sprawl while creating comfortable spaces for all residents. Civil engineers observed nature and designed residential buildings shaped like termites' nests, allowing airflow to minimize electrical air conditioning.

Residential Building:



Caelum's building materials are sourced and rooted in nature. Recyclable aluminum is the base for metallic materials. Mycelium-based leather, genetically modified to decompose with a trigger gene, replaces industrial-strength sheet materials. Biosystems engineers created efficient and affordable ways to grow chitin shells, replacing traditional tiles and ceramics.

Caelum's agricultural and biosystems engineers worked to create native garden roofs and rewilded parks. These natural areas act as carbon sinks, absorbing harmful greenhouse gasses from the atmosphere. Facilities are covered with vines and trees, creating natural temperature control. These areas are watered with collected rainwater, and AI sensors monitor the nutrient and water levels in soil.

Food production was a known contributor to greenhouse gasses. Hence, Caelum focuses on plant-based foods that improve physical health. Vegetables are artificially infused with protein and vitamins. Vertical farms use much less land, are organic, and composted fertilizer can be easily distributed. Vertical farms use AI technology designed by computer engineers to recognize the readiness of plants for harvesting. Local grocery store Emu Stop offers foods from around the world, cultivated in sustainable and climate-friendly ways.

Energy production in Caelum is safe, reliable, and inexpensive. A combination of solar and lightning sources creates a reliable system. Maximizing solar collection, a satellite developed by aerospace engineers orbits Earth with tungsten solar panels constantly absorbing nearly 2,000 gigawatts of power. Electrical engineers designed a plasma laser and mirror system that beams energy to Caelum's power plant. The significant excess energy is stored in batteries which can each hold approximately 20,000 gigawatts of power. Since one gigawatt is enough to power 750,000 homes, Caelum produces excess energy. Selling this energy funds city services, including free public transportation, education, emergency services, housing, and innovative research without high tax rates, ensuring no Caelum citizen is deprived of basic needs.

Caelum converts food waste into composted material used in vertical farms. Materials were redesigned to be biodegradable to ensure environmental sustainability. For example, plastics were replaced by artificially produced mycelium, bamboo, and cornstarch, all of which were repurposed by materials science engineers and grown with the help of our biosystem engineers. The few outliers, such as foam and glass, are broken down and

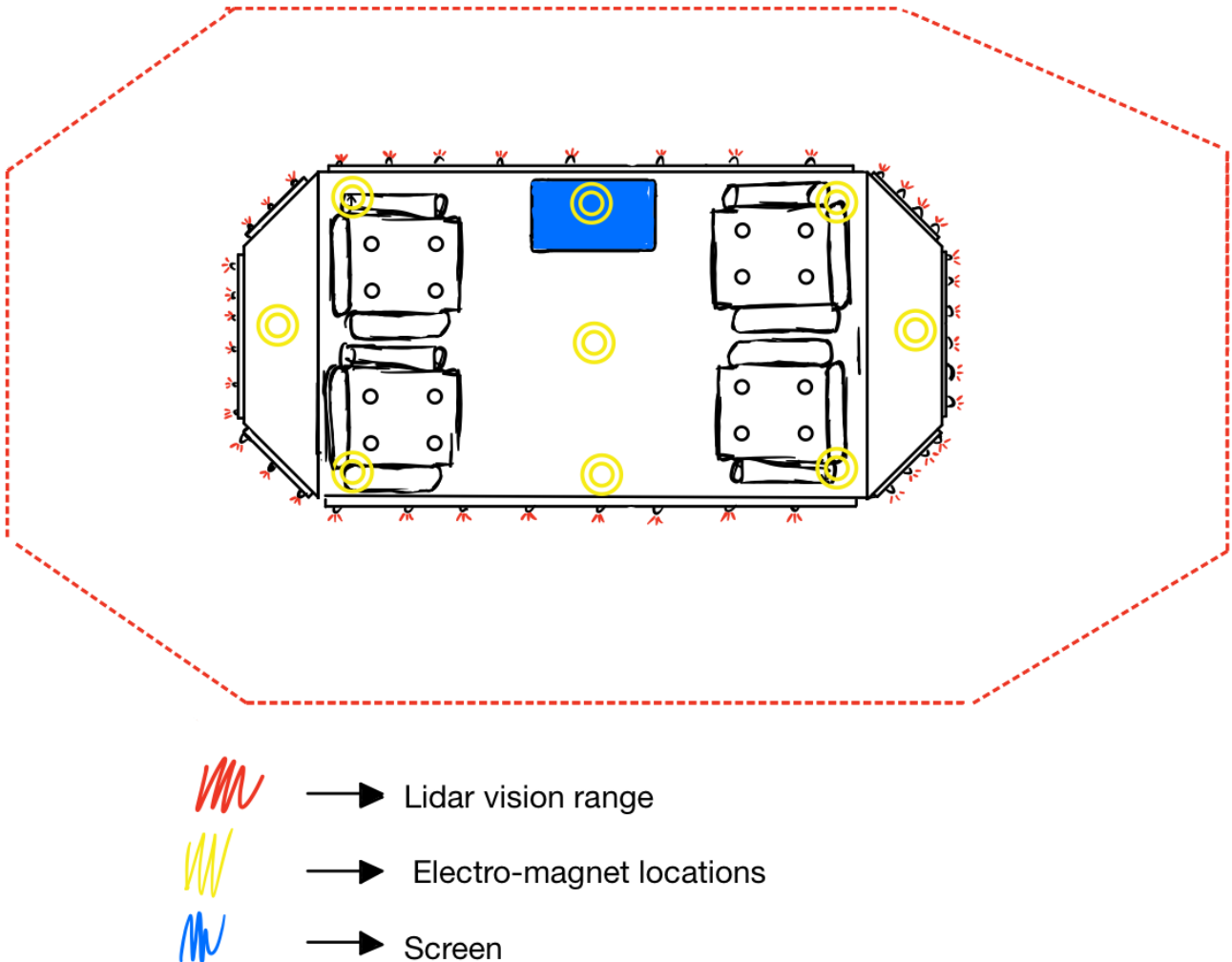
stored to create new items. Residents dispose of waste in underground freight tubes, quickly moving it to the nearest disposal site where it is sorted, stored, or composted.

Healthcare is a priority in Caelum. To secure all residents' access to affordable healthcare, nanobots and wearable technology given to citizens by the government monitor and improve health conditions proactively. When a user's wearable technology detects something wrong, it releases treatment nanobots into the bloodstream to fix the problem as it alerts the user and their medical professional. All technology and equipment have been designed sustainably; material science engineers designed reusable IV bags from silicon and bamboo paper, replacing plastic. Digital X-rays can be found in each residential building. This way, patients can share a scan with their telehealth doctor without needing to leave the building.

In Caelum, sustainable and equitable education is a priority, so all students have free access to world-class teachers and advanced hologram technology created by Caelum's optical and electronic engineers. Students place their holograms in a room to receive a high-resolution, interactive live video of the teacher and collaborative peers. Students communicate with their holograms via voice and gestures. Local classes are also available at the community center to provide social interactions and offer academic support.

Caelum's public transportation is designed in response to the unsustainability of private cars. Max Float, an innovative transportation system created by Caelum's electrical and mechanical engineers, is a space-efficient, electromagnetic hovercraft that moves residents throughout the city. The vehicles travel on multi-use trails that move throughout sectors, creating a road replacement that is accessible to pedestrians and cyclists as well. Each vehicle can hold four people and join together to accommodate any number of passengers, with seats accommodating small children and residents with disabilities. Max Floats have a battery life of approximately 50 hours and electromagnets that charge them wirelessly as they drive. Retail is transported through recycled shipping containers, which are electrically transported underground to the necessary destination. All for free.

Max Float Vehicle:



All emergency services arrive in less than 5 minutes in a modified version of the Max Float created by electrical, computer science, and mechanical engineers. The emergency Max Float travels higher and faster and has built-in tools making it easier to respond to emergencies. The modified vehicles can land on roofs, ground, or hover, allowing easy access to all locations. In dangerous circumstances, the precision of technology ensures safety for all individuals. Police forces are technologically advanced humanoid robots with non-lethal tasers. In a fire, these robots are connected to large hoses to extinguish fires without risking the lives of humans.

To adapt to the challenges of climate-caused urban poverty, Caelum is intentionally divided into 15-minute sectors containing all necessities, including food, housing, retail, and education. The spaces have

been made to avoid major weather event areas, minimizing the possible damages. The quickly moving Max Floats and multi-use trails make sectors fully accessible. Vertical spaces are also used, and buildings are stacked in space-efficient and structurally stable ways. In addition, Australia's weather challenges have been worsened by the climate crisis, such as cyclones and floods. Condensing the city removes long urban stretches that were once devastated by natural disasters.

Caelum takes multiple mitigation measures to ensure the prices of healthy living do not become inaccessible again. Lightning and wildfires created devastating results, leaving communities with nothing. Using rewilding strategies to preserve nature, Caelum has mitigated the severity of wildfires in the area. Caelum also created laser-induced plasma channels to direct lightning to harvesting stations within the city to use as backup energy and income from selling the excess. Controlled fires are used to help germinate seeds of eucalyptus trees that have been sealed with resin. As a result, the effects of wildfires have been mitigated and are used to benefit citizens and the Earth.

Although strategies have been optimized, trade-offs are inevitable. Although rewilding areas positively affects the climate and helps restore the devastated natural world, it prohibits expanding urban spaces and forces denser urban design, which can raise housing prices and limit population growth. Our public transportation system is productive, but there are positives to private transportation, such as privacy, personalization, and convenience. Luckily, Caelum understands these problems and creates housing solutions subsidized by selling excess energy and designs that optimize all space.

From a crumbling earth, Caelum has created an innovative, safe, and truly beautiful place to live.

Word Count: 1491

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