

Assignment 1: Defining Sustainability

Topics: LA's Green New Deal, UN Sustainable Development Goals, and The Paris Climate Agreement

To slow down the rate of global warming it is important that the climate crisis is tackled at both large and small scales. From an international perspective, The Paris Climate Agreement and the UN Sustainable Goals set up a framework of policies and principles that should be ideally followed by all countries around the world. In fact, without global cooperation, possible improvements in the current trends of ever-increasing atmospheric CO<sub>2</sub>, environmental, economic, and social degradation in one location would be offset by the lack of action in another. This is because climate change and the consequences of it cannot be contained within artificial boundaries: polluted air, contaminated water and toxins move around the globe following natural currents and cycles. However, without local jurisdiction, it would be nearly impossible to monitor and enforce the environmental law strategies that aim at enhancing sustainability worldwide: cultural and political influences over a country, a state or even a city are too powerful to be neglected from a public policy point of view. Therefore, comprehensive sustainability plans must be developed not only at global scales, but at the city scales as well, and an example of the latter is the LA's Green New Deal. This paper aims at analyzing how the LA's Green New Deal aligns small scales goals to the bigger picture set by the Paris Climate Agreement and the UN Sustainable Development Goals: in fact, complete sustainability is possible only when the two support each other to achieve the common aim of meeting the current population's needs without compromising those of future generations.

The targets of the Los Angeles' Green New Deal were established in 2019 and they consist in: 90000 trees planted by 2021; 100% electrification by 2030; 100% of wastewater recycled and 70% of all water locally sourced by 2035; 100% renewable energy generated by 2045 (achieved in three steps, the first two being 55% by 2025 and 80% by 2036); and finally 400000 green jobs created, 100% net zero, and 100% of waste diverted from landfills by 2050.

On the other hand, there are 17 Sustainable Development Goals, which were adopted in 2015, and are monitored yearly since then with an SDG Progress Report. The goals - spanning between various areas that include resources' management, mobility & transportation, carbon reduction, ecosystems' restoration, safety & resiliency, public health, social equity, and environmental justice - are the following: no poverty; no hunger; good health and wellbeing; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice and strong institutions; and finally partnerships for the goals.

Similarly, the Paris Agreement, which was adopted by 196 parties in December 2015, is of global nature and in line with the SDGs. It serves as a legally binding international agreement on climate change, and it started being enforced in November 2016. Its main goal is to limit global warming below 2 degrees Celsius, a critical temperature after which a point no return risks to be reached escalating in unprecedented consequences for humanity. The countries that signed the agreement must work individually by submitting their own nationally determined contributions, but at the same time they can also benefit from international cooperation, which strives to provide financial, technological, and capacity-building support.

The three policy frameworks explained above intertwine with each other deeply, even though the scope of their work may differ. For example, the goal of planting 90000 trees in the city of Los Angeles acts as a small carbon sink that contributes to absorbing CO<sub>2</sub> in the long term and keeping temperatures below 2 Celsius as required by the Paris Agreement; it also follows the SDGs of climate action, and life on land. Achieving 100% electrification for residential as well as commercial buildings and infrastructure, in combination with the 100% renewable energy generation and the 100% net zero targets in the LA area directly cuts CO<sub>2</sub> previously emitted through power coming from traditional fossil fuels and appliances running on natural gas, thus aligning with the Paris agreement' main objective of decreasing GHG and the UN goals of affordable and clean energy, sustainable cities and communities, and industry, innovation,

and infrastructure. Then, if LA can recycle 100% of its wastewater and source 70% of all its water locally, CO<sub>2</sub> emissions linked to transportation of this resource from far away will be decreased, and the sustainable development goals of clean water and sanitation, and life below water will be enhanced. Moreover, creating 400000 green jobs for all skill and educational levels that promote gender and ethnic inclusion in the workforce for the metropolitan area will help not only the environmental, but also the social and economic spheres, building a resilient, diverse, and successful community that has the tools to adapt to rising temperatures as suggested by the Paris Agreement, and aligning with the UN SDGs of no poverty, gender equality, decent work and economic growth, and reduced inequalities. Last, but not least, LA's goal of diverting 100% waste from landfill will cut carbon emissions indirectly by affecting the end of life and the sourcing of materials in the supply chain, since reusing, recycling, and upcycling significantly decreases the amount energy and emissions during the processes that would otherwise be needed to manufacture new materials, and, in addition, waste to energy is a form of renewable energy generation: thus, also this goal complies with the Paris Agreement and the UN goals of responsible consumption and production, at a small scale.

Therefore, it is clear how local efforts, when summed all together across cities, states, and countries, have the potential of resulting in global success if their objectives are designed to support global sustainability frameworks instead of conflicting with them. In addition to this cooperation at large and small scales, it is also important that all these frameworks, no matter their scope, are updated in the future as environmental research produces new data and green technologies advance: sustainability is by no means a static field, but an ever changing, growing and dynamic effort to create a just and abundant future for all locally, and globally.

#### References:

“The 17 Goals | Sustainable Development.” *United Nations*, United Nations, <https://sdgs.un.org/goals>.

“The Paris Agreement.” *Unfccc.int*, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.

“Plan.” *PLAn*, <https://plan.lamayor.org/>.

Assignment 2

My name is Elena, I am originally from Italy, but I recently also became a US citizen. I moved to the United States about 8 years ago, during my last year of high school. While in California, I lived in the San Francisco Bay Area, in San Diego and in Los Angeles, where I had the opportunity to witness how the state has advanced during the past few years within the field of sustainability, by passing stricter environmental laws and investing in the research and development of new technologies. Even though I believe that my native continent, Europe, may be more advanced in terms of waste management or conservation strategies, I think that California can really play a leading role in global sustainability when it comes to the development of new clean technologies.

I am now a graduate student in Green Technologies, which is in the department of Electrical and Computer Engineering at USC Viterbi. I have always been very interested in sustainability, I am a LEED Accredited Professional in Building Design and Construction, and I am currently working in the Sustainability and Climate Change team at a firm called Mott MacDonald, which performs civil engineering consulting. During my undergraduate academic career at UCSD, I studied environmental systems, and I firmly believe that sustainability needs a holistic approach to be achieved, combining science, engineering, public policy, economics, and architecture. This class is my second architecture course at USC, as last year I attended ARCH557, which focused on how to apply sustainable measures to historic buildings: there I learned a great deal about how important it is to maintain the character defining features of those buildings while attempting to retrofit them and make them more environmentally friendly; moreover, I discovered to my surprise that a lot of very old buildings are actually more sustainable than newer constructions because they were designed to have a lot of passive energy saving strategies, such as increased natural daylight and ventilation.

I signed up to this class because I would like to learn more about sustainability in the field of architecture applied to all types of buildings, and infrastructures too. It would be particularly great to learn more about the AIA “Framework for Design Excellence”: I have some knowledge of the LEED rating

system already, but I think I am lacking information about sustainability frameworks ideated specifically for architects and I would be really interested in learning more about the differences between the two.

I am proud to be attending the University of Southern California, also because of its sustainability goals. The school has, in fact, a “USC Campus Sustainability Plan” and it periodically releases a Stars report as well through AASHE. Currently, the University has a transparent, self-reported silver rating Stars report with a score of 57.87. While looking at the individuals scores for Academics, Engagement, Operations, Planning and Administrations, and Innovation & Leadership, I was particularly surprised by the fact that on the curriculum score for the Academics section is only 20.99/40, given that the school has an entire master’s degree dedicated to sustainability only – the Green Technologies Program. Regarding engagement, the scores for both public and campus engagement are quite high, even though there is still some room for future improvement. The Operations area is wider and more complex, but the two categories who seem to be doing the worst are energy and waste, while transportation seems to be well provided. Finally, planning & administration has good scores overall, except for investment & finance, which seems relatively low given the financial potential of USC.

As mentioned above, the school has also its own Sustainability Plan. In 2020, this plan comprised 7 categories for action: sustainability in education and research, engagement in sustainability, energy conservation & greenhouse gas mitigation, sustainable transportation, sustainable procurement, waste diversion, and water conservation. Each of these categories had one or more goals, which all contribute to the universal vision of promoting “development that meets the need of the present without compromising the ability of future generations to meet their own needs”. The 2020 sustainability plan is not the first action that the school has taken to enhance sustainability. In fact, as early as 2008, the Office of Sustainability and the Sustainability Steering Committee started ideating strategies for a greener campus. In 2010, campus sustainability resolutions were legally passed by the Board of Trustees, making the issue of climate change an official priority for the University. Then, between 2012 and 2015, more trees were planted, net zero buildings were created and student organizations advocating sustainability were born. Now the school is offering sustainability certifications and encouraging research and faculty engagement

in green practices, it is increasing public awareness and expanding the green engagement fund while fostering partnerships with external firms and the government. The University is also implementing a Climate Action Plan and a Green Revolving Fund, it is adopting a bike plan and it is increasing alternative transportation options. Moreover, metrics are being developed to track sustainable food sources and retailers on campus are striving to cut wastes and reduce costs. Waste is an important topic to the administration, which released a comprehensive integrated waste management plan and even started a pilot program within USC housing to increase recycling. Finally, water metering on campus is being expanded, and water conservation awareness campaigns are being created to resonate not only with students, but also with faculty, staff, and visitors.

Overall, it is clear USC is very committed to work on decreasing its impacts on the environment at multiple levels in a continuous effort to adapt to ever increasing global temperatures and mitigate climate change at the local level.

#### References

“University of Southern California Los Angeles, CA, US.” *University of Southern California | Scorecard | Institutions | STARS Reports*, <https://reports.aashe.org/institutions/university-of-southern-california-ca/report/2021-07-29/>.

*University of Southern California*. [https://customsitesmedia.usc.edu/wp-content/uploads/sites/467/2019/08/18202510/Sustainability2020\\_Update\\_082619.pdf](https://customsitesmedia.usc.edu/wp-content/uploads/sites/467/2019/08/18202510/Sustainability2020_Update_082619.pdf).

# Denver Water Treatment Plant

KIMIA BONYADI, BRANDON JACOBSON, DHRITI PANGASA,  
ELENA VINDROLA, BRIANNA WARD

# Introduction

Project: Northwater  
Treatment Plant

Location: Colorado

Consultants: CDC Smith,  
Jacobs and AECOM

Site: 183 acres

Capacity: 75 million gallons of  
water/ day

Objective: Sustainability

# Rendering of Northwater Treatment Plant (After Construction)



A rendering of what the Northwater Treatment Plant site will look like when complete and operational in 2024. Most of the two round storage tanks will be buried underground. Image credit: Denver Water.



Quality of life

# CREDITS

## QL 1.1 Improve Community Quality of Life

The Denver Water Treatment facility offers several educational programs to keep the community informed about the treatment project. There are programs that specifically cater to youth in order to bring awareness to students on water in Colorado, the Denver project, and how to improve water-use behavior. There are also educational outreach to teach the community about winter water consumption, water bills, and general water practices.

## QL 1.2 Enhance Public Safety

The Denver Water Treatment facility utility's team test the water on a daily basis from the mountains to points around the city. Denver Water collects water from 4,000 square miles of mountain watershed and uses water treatment plans to clean drinking water for customers. They ensure that water is clean and safe before delivering to 1.5 million people throughout the area.

## QL 1.4 Minimize Noise and Vibration

Denver water took several steps to minimize noise impact and any other inconveniences to residents in the community. To address noise and safety concerns, the construction team mitigated noise generated from the project by not hauling material during typical commuting hours and producing gravel and sand on site to reduce truck usage.

## QL 1.5 Minimize Light Pollution

The Denver Water Treatment brought attention to energy savings by encouraging LEDs to save money, cut energy, and improve lighting in workspaces. They are conducting a lighting retrofit to move away from traditional lighting to use metal halides, fluorescents, and LEDs, which last significantly longer, use less electricity, and cut maintenance costs.



GROSS RESERVOIR

## QL 3.2 Historic Preservation

The Eleven Mile Dame is an 84 year old architectural marvel that sits between rock walls. The Denver Water Treatment facility uses dams to store drinking water, while it also provides fishing opportunities for the public. The Eleven Mile Dam was built in 1932 and is inspected annually to ensure that the dam is safe and functional.

## QL 3.4 Enhance Public Space

The Gross Reservoir is one existing site that experienced minor impacts by construction. During construction, there were lower water levels, which resulted in about two-thirds of its normal capacity in order to maintain safe operations for construction workers. Denver Water also addressed community concerns of the project such as viewshed, noise, and traffic.

# LEADERSHIP

# PROJECT PRIORITIES DRIVEN BY LEADERSHIP

## Project Priorities:

- BUDGET
- QUALITY
- SAFETY
- MODULARITY
- SUSTAINABILITY
- EASE OF ACCESS/MAINTENANCE
- PERSONNEL

### Collaboration and sustainability driven Leadership

- 21% of the current Envision Score is due to this sector
- Goal setting from the beginning of the project, for future development

These priorities were socially and environmentally responsible for organization, developing a zero incident safety culture, creating and fostering a culture focused on cost while maintaining quality.

Dedicated team which targeted collaboration and visual management tools.

Gathering organizational input and focus on continuous improvement from stakeholders, by conducting phased design workshops.

Collaboration to Optimize Project Performance, with an intention to further future development and making sure its cost effective.

Denver Water Leadership is involved in all key decision making.

# Resource Allocation

1. Materials
2. Energy
3. Water

Total: 72/188 points

# Materials

RA1.1 Support Sustainable Procurement Practices

RA1.2 Use Recycled Materials

RA1.3 Reduce Operational Waste

RA1.4 Reduce Construction Waste

RA1.5 Balance Earthwork On Site

Total: 17/58

Credit Assessment Status	Evaluation Questions Assessed		Assessment Status						Assessed Maximum Points Available	Total Maximum Points
	Yes	No	Improved	Enhanced	Superior	Conserving	Restorative	Points		
Assessed	2	0	3	0	0	0	--	3	12	12
Assessed	1	0	0	6	0	0	--	6	16	16
Assessed	2	0	4	0	0	0	--	4	14	14
Assessed	2	0	4	0	0	0	--	4	16	16

# Energy

- RA2.1 Reduce Operational Energy Consumption
- RA2.2 Reduce Construction Energy Consumption
- RA2.3 Use Renewable Energy
- RA2.4 Commission and Monitor Energy Systems

Total: 37/76 Points

Credit Assessment Status	Evaluation Questions Assessed		Assessment Status						Assessed Maximum Points Available	Total Maximum Points
	Yes	No	Improved	Enhanced	Superior	Conserving	Restorative	Points		
Assessed	2	0	6	0	0	0	--	6	26	26
Assessed	2	0	0	4	0	0	--	4	12	12
Assessed	1	0	0	0	0	0	24	24	24	24
Assessed	2	1	0	0	0	0	--	3	14	14

# Water

RA3.1 Preserve Water Resources

RA3.2 Reduce Operational Water Consumption

RA3.3 Reduce Construction Water Consumption

RA3.4 Monitor Water Systems

Total: 18/54 Points

Credit Assessment Status	Evaluation Questions Assessed		Assessment Status						Assessed Maximum Points Available	Total Maximum Points
	Yes	No	Improved	Enhanced	Superior	Conserving	Restorative	Points		
Assessed	6	0	0	0	0	0	12	12	12	12
Assessed	4	0	4	0	0	0	0	4	22	22
Assessed	2	0	1	0	0	0	--	1	8	8
Assessed	2	0	1	0	0	0	--	1	12	12

# Natural World

Points achieved: 70/232 total maximum

Categories: 1.Site (24/82), 2.Conservation (23/78), 3.Ecology (23/72)

# NW Credits Assessed

- 1.2 Provide Wetland & Surface Water Buffers: the site was chosen carefully and deliberately to protect wetlands and water bodies. (16/20 - conserving)
- 1.3 Preserve Prime Farmlands: the site does not contain prime farmland. (8/16 - superior)
- 2.3 Reduce Pesticide & Fertilizer Impacts: The species planted on site will require no fertilizers or pesticides after a brief establishment period. (9/12 - conserving)
- 2.4 Protect Surface & Groundwater Quality: Surrounding waters and wetlands were protected. (14/20 - conserving)
- 3.3 Maintain Food Plain Functions: The site is being restored post-construction. (7/14 - superior)
- 3.4 Control Invasive Species: Native, non-invasive grass, tree, and shrub species were planted. (12/12 - restorative)
- 3.5 Protect Soil Health: The soil nutrients are restored after construction through subsequent addition of local flora. (4/8 - superior)

# Climate and Resilience

2 main goals: (1) minimizing emissions that may contribute to climate change and other short- and long-term risks, and (2) ensuring that infrastructure projects are resilient.

# EMISSIONS

## EMISSIONS

### CR1.1 Reduce Net Embodied Carbon

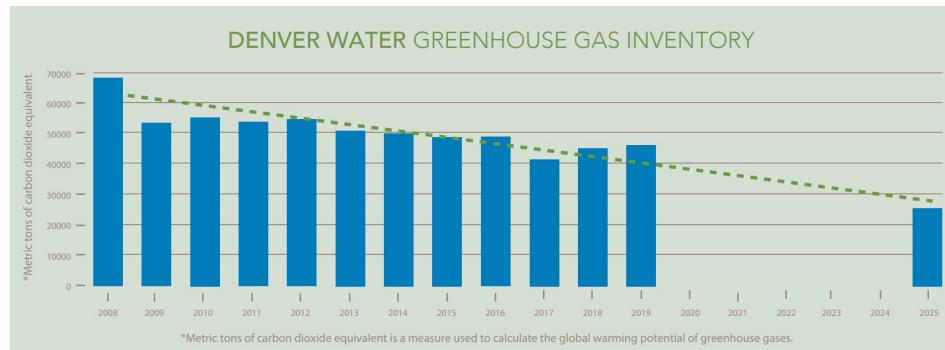
- Denver Water works to divert waste continuously, including providing shred bins for direct paper recycling, returning waste material to manufacturer for reuse when possible, and donating electronics before recycling. Road base material used to access Denver Water's raw water collection system is reused by the U.S. Forest Service, reducing landfill waste. Compost and recycling bins are located throughout facilities, where hauling is available, reducing landfill waste.

### CR1.2 Reduce Greenhouse Gas Emissions:

- Denver Water participates with the Climate Registry, a nonprofit collaboration among North American entities that sets consistent standards to calculate, verify and publicly report greenhouse gas emissions into a single registry. Since 2008, they have been tracking and reporting their greenhouse gas footprint so they can find ways to reduce their impact.

### CR1.3 Reduce Air Pollutant Emissions

- At Denver Water, efforts to protect people from the health risks posed by lead from old, lead service lines getting into drinking water, has been part of the job for decades. There is no lead in the water Denver Water delivers to customers, but the utility regularly tests for lead in the drinking water of homes that are known to have lead water service lines, the primary source of lead in drinking water. In the first half of the 20th century, lead was a common, cheap and easy-to-work-with material to use when forming small pipelines that carry drinking water from utility pipelines in the street into customers' homes. But these old lead service lines, which in Denver Water's experience are more often found in homes built before 1951, pose a threat in the community, particularly to children, infants and pregnant women. Denver Water has tested for lead in customers' drinking water for decades under the Environmental Protection Agency's Lead and Copper Rule. In 2012, the routine monitoring indicated the utility needed to investigate whether it could adjust the chemistry of the water it delivered to customers to better protect them from the risk of lead getting into drinking water.



Centralized waste for garbage, recycling and compost.

# RESILIENCE

## CR2.1 Avoid Unsuitable Development

- Denver Water's Water Quality Operations team looked at how the summer 2020 Williams Fork Fire, which burned nearly 15,000 acres might have affected the water flowing through the area. By sampling water as it pours through the mountains, long before it reaches any reservoirs or treatment plants, Denver Water can understand what's happening on the landscape. The field test results came back in a healthy range, with no indication yet that a significant amount of sediment left by the summer of record fires in Colorado had ended up in the water.

## CR2.2 Assess Climate Change Vulnerability

- In 2008, Denver Water hired a climate scientist and brought climate change into resource planning. They are working with national climate agencies and universities to best understand how climate conditions may change in the area. They also are promoting the need for better science, and better modeling and uncertainty planning, in order to meet the needs of water providers.

## CR2.3 Evaluate Risk and Resilience

- The Denver Water Treatment team work with multiple federal agencies, nongovernmental organizations, private landowners to identify and prioritize at-risk watersheds that will be the focus of protection measures, and to preserve, restore and ensure the health of watersheds. They work with mountain communities daily to proactively identify ways to operate our system so that flows are provided for rivers and streams.

## CR2.4 Establish Resilience Goals and Strategies

- In the sustainability guide, they have created several pages which lay out a set of long-term goals, standards and commitments. This is an overview of the best practices Denver Water operates within and it showcases both their successes and trials at advancement. They have analyzed and scrutinized projections for sustaining our operations into the future, with customers and the environment at the forefront of this planning. As they work toward these goals with their commitments and standards, they will see additional areas for improvement that will become new goals.

## CR2.5 Maximize Resilience

- Denver Water's new plant is part of Denver Water's North System Renewal effort, which brings critical updates to an aging 80-year-old system that was reaching the end of its lifespan. The advanced new technology that is part of new Northwater Treatment Plant will provide advanced treatment processes which will improve resiliency in times of potentially challenging treatment issues, such as those created by drought or wildfires. Therefore, the utility's northern system will be more resilient and adaptable to changing demands for water now and into the future.

## CR2.6 Improve Infrastructure Integration

- Denver Water has taken a leadership role in understanding and promoting sustainability both in the state of Colorado and in water utility planning. The goal is to build environments responsibly and enhance Denver Water property. There is a strong dedication to sustainable growth and operation of assets and leading by example to share experience and expertise. One of the main goals includes incorporating standards that include stormwater runoff in the redevelopment of two Denver Water properties by 2025.

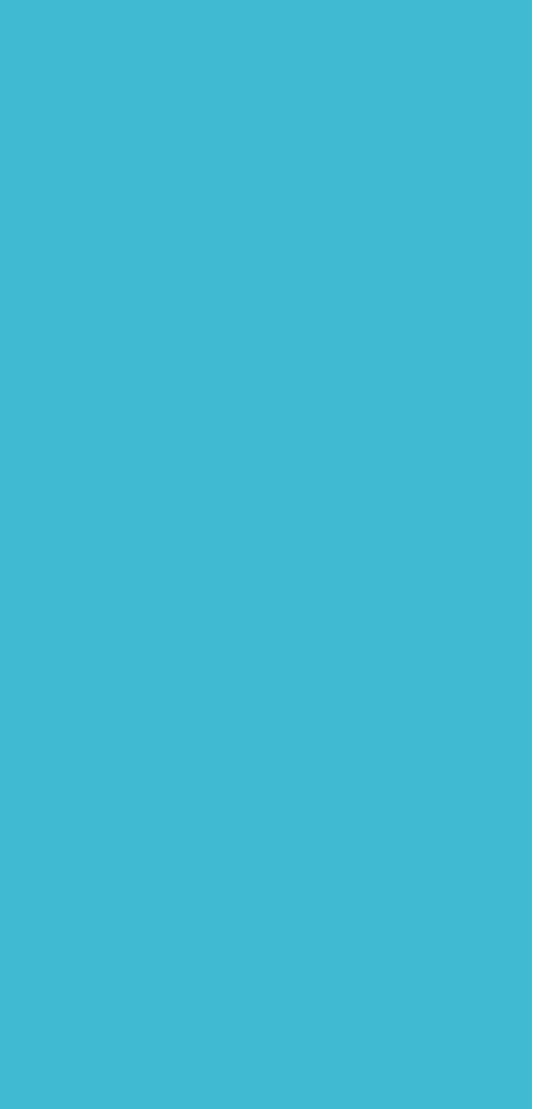
# Results

Achieved Envision Gold  
Certification



# References

- <https://www.denverwater.org/tap/behind-scenes-northwater-treatment-plant>
- <https://www.denverwater.org/sites/default/files/sustainability-guide.pdf>
- <https://www.denverwater.org/your-water/water-supply-and-planning/environmental-planning-and-stewardship>
- <https://www.denverwater.org/tap/what-sustainability-looks-like-up-close-and-personal>
- <https://sustainableinfrastructure.org/project-awards/denver-water-northwater-treatment-plant/>
- <https://sustainableinfrastructure.org/project-verification/verify-a-project/>
- <https://v4.sustainableinfrastructure.org/non-member/education/course/44>



Thank you for  
listening.

Do you have any questions?

# Summary Results

			Credit Assessment Status	Evaluation Questions Assessed		Improved
				Yes	No	
 <b>Quality of Life</b>	<b>Wellbeing</b>	QL1.1 Improve Community Quality of Life	Assessed	5	2	2
		QL1.2 Enhance Public Health & Safety	Assessed	2	4	0
		QL1.3 Improve Construction Safety	Assessed	4	1	0
		QL1.4 Minimize Noise & Vibration	Assessed	4	1	1
		QL1.5 Minimize Light Pollution	Assessed	6	0	0
		QL1.6 Minimize Construction Impacts	Assessed	4	2	0
	<b>Mobility</b>	QL2.1 Improve Community Mobility Access	Not Applicable	0	0	0
		QL2.2 Encourage Sustainable Transportation	Not Applicable	0	0	-
		QL2.3 Improve Access & Wayfinding	Assessed	3	1	0
	<b>Community</b>	QL3.1 Advance Equity & Social Justice	Assessed	6	1	0
		QL3.2 Preserve Historic & Cultural Resources	Assessed	6	0	--
		QL3.3 Enhance Views & Local Character	Assessed	6	0	0
		QL3.4 Enhance Public Space & Amenities	Assessed	4	0	0

			Credit Assessment Status	Evaluation Questions Assessed		Improved
				Yes	No	
 <b>Leadership</b>	<b>Collaboration</b>	LD1.1 Provide Effective Leadership & Commitment	Assessed	3	1	0
		LD1.2 Foster Collaboration & Teamwork	Assessed	4	0	0
		LD1.3 Provide for Stakeholder Involvement	Assessed	5	1	3
		LD1.4 Pursue Byproduct Synergies	Assessed	2	3	0
	<b>Planning</b>	LD2.1 Establish a Sustainability Management Plan	Assessed	4	1	0
		LD2.2 Plan for Sustainable Communities	Assessed	4	1	0
		LD2.3 Plan for Long-Term Monitoring & Maintenance	Assessed	5	0	0
		LD2.4 Plan for End-of-Life	Not Applicable	0	0	0
	<b>Economy</b>	LD3.1 Stimulate Economic Prosperity & Development	Assessed	1	4	0
		LD3.2 Develop Local Skills & Capabilities	Assessed	1	3	2
		LD3.3 Conduct a Life-Cycle Economic Evaluation	Assessed	2	3	5

			Credit Assessment Status	Evaluation Questions Assessed		Improved
				Yes	No	
 <b>Resource Allocation</b>	<b>Materials</b>	RA1.1 Support Sustainable Procurement Practices	Assessed	2	0	3
		RA1.2 Use Recycled Materials	Assessed	1	0	0
		RA1.3 Reduce Operational Waste	Assessed	2	0	4
		RA1.4 Reduce Construction Waste	Assessed	2	0	4
		RA1.5 Balance Earthwork On Site	Assessed	0	1	0
	<b>Energy</b>	RA2.1 Reduce Operational Energy Consumption	Assessed	2	0	6
		RA2.2 Reduce Construction Energy Consumption	Assessed	2	0	0
		RA2.3 Use Renewable Energy	Assessed	1	0	0
		RA2.4 Commission & Monitor Energy Systems	Assessed	2	1	0
	<b>Water</b>	RA3.1 Preserve Water Resources	Assessed	6	0	0
		RA3.2 Reduce Operational Water Consumption	Assessed	4	0	4
		RA3.3 Reduce Construction Water Consumption	Assessed	2	0	1
		RA3.4 Monitor Water Systems	Assessed	2	0	1
 <b>Natural World</b>	<b>Siting</b>	NW1.1 Preserve Sites of High Ecological Value	Not Applicable	0	0	0
		NW1.2 Provide Wetland & Surface Water Buffers	Assessed	4	1	0
		NW1.3 Preserve Prime Farmland	Assessed	3	2	--
		NW1.4 Preserve Undeveloped Land	Not Applicable	0	0	0
	<b>Conservation</b>	NW2.1 Reclaim Brownfields	Not Applicable	0	0	0
		NW2.2 Manage Stormwater	Not Applicable	0	0	0
		NW2.3 Reduce Pesticide & Fertilizer Impacts	Assessed	4	0	0
		NW2.4 Protect Surface & Groundwater Quality	Assessed	5	1	0
	<b>Ecology</b>	NW3.1 Enhance Functional Habitats	Not Applicable	0	0	0
		NW3.2 Enhance Wetland & Surface Water Functions	Not Applicable	0	0	0
		NW3.3 Maintain Floodplain Functions	Assessed	3	2	0
		NW3.4 Control Invasive Species	Assessed	6	0	0
		NW3.5 Protect Soil Health	Assessed	3	1	--

			Credit Assessment Status	Evaluation Questions Assessed		
				Yes	No	Improved
 <b>Climate and Resilience</b>	<b>Emissions</b>	CR1.1 Reduce Net Embodied Carbon	Assessed	3	0	0
		CR1.2 Reduce Greenhouse Gas Emissions	Assessed	2	0	0
		CR1.3 Reduce Air Pollutant Emissions	Assessed	4	1	0
	<b>Resilience</b>	CR2.1 Avoid Unsuitable Development	Assessed	3	3	0
		CR2.2 Assess Climate Change Vulnerability	Assessed	4	1	0
		CR2.3 Evaluate Risk and Resilience	Assessed	5	1	0
		CR2.4 Establish Resilience Goals and Strategies	Assessed	3	1	-
		CR2.5 Maximize Resilience	Assessed	5	0	0
		CR2.6 Improve Infrastructure Integration	Assessed	5	0	0

		Credit Assessment Status	Evaluation Questions Assessed		
			Yes	No	Improved
	<b>Total Points</b>	All Credits Assessed	171	45	36

Possible Award Level:	Gold
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# CRENSHAW / LAX TRANSIT CORRIDOR PROJECT - LEED BC+D

BRANDON JACOBSON, ALEX GASCA, RONAKKUMAR PRAJAPATI, ELENA VINDROLA  
ARCH 519 - YING WANG



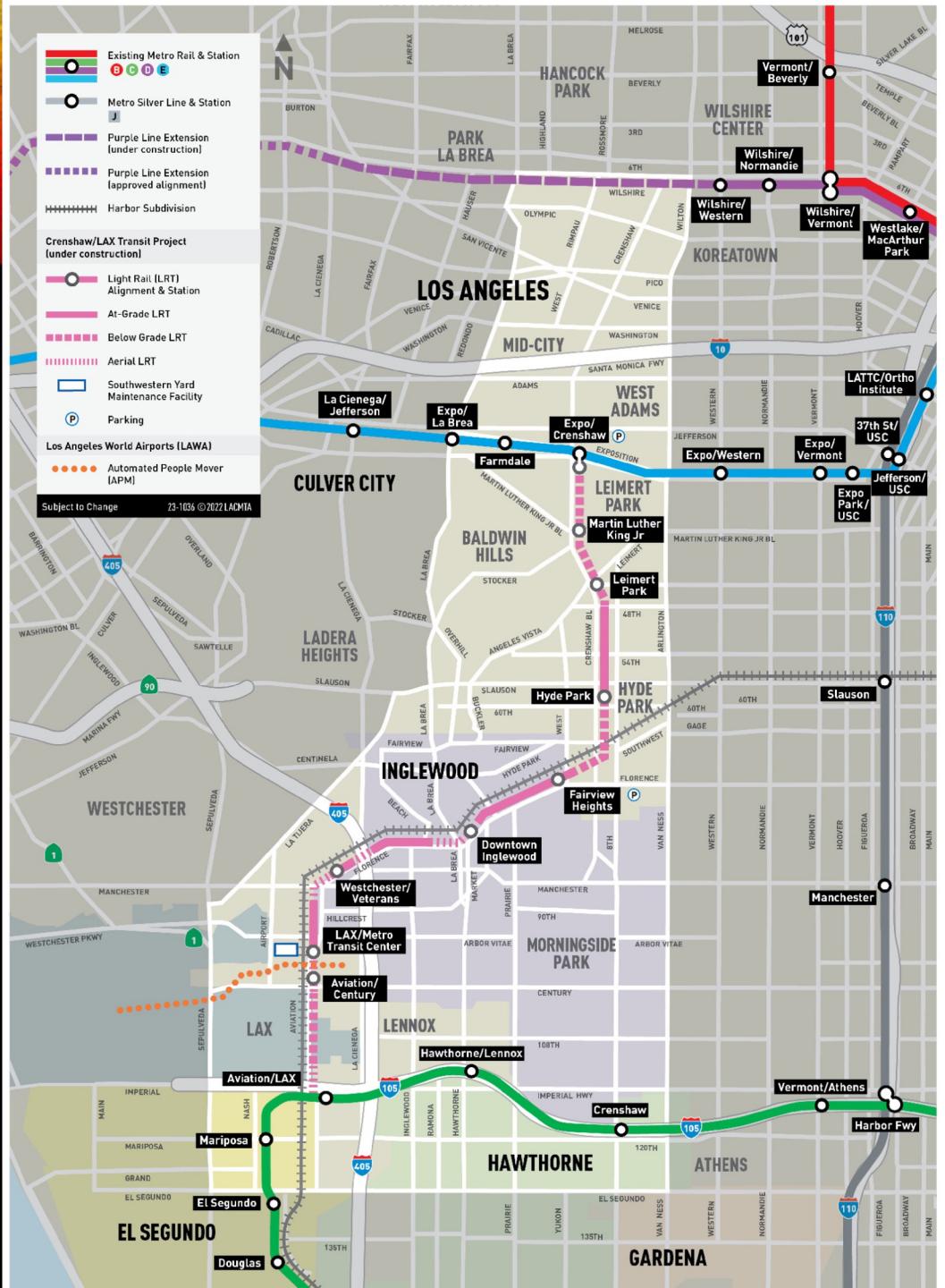
# INTRODUCTION- Metro Division 16 Southwestern Yard (SW Yard)

- Type: LEED BD+C New Construction
- Location: 5600 Arbor Vitae Street, Los Angeles, CA, 90045
- Site size: 18-acres
- Architect: Gruen Associates
- Engineering Consultant: Hatch - Mott MacDonald
- Cost: \$2.1 Billion USD



# INTRODUCTION

The Metro Division 16 Southwestern Yard supports the Crenshaw/LAX Transit Corridor Project and provide Metro light rail vehicle transportation maintenance and storage functions, current use and future expansion for the Metro Crenshaw/LAX Project and Metro Green Line LRV fleet.



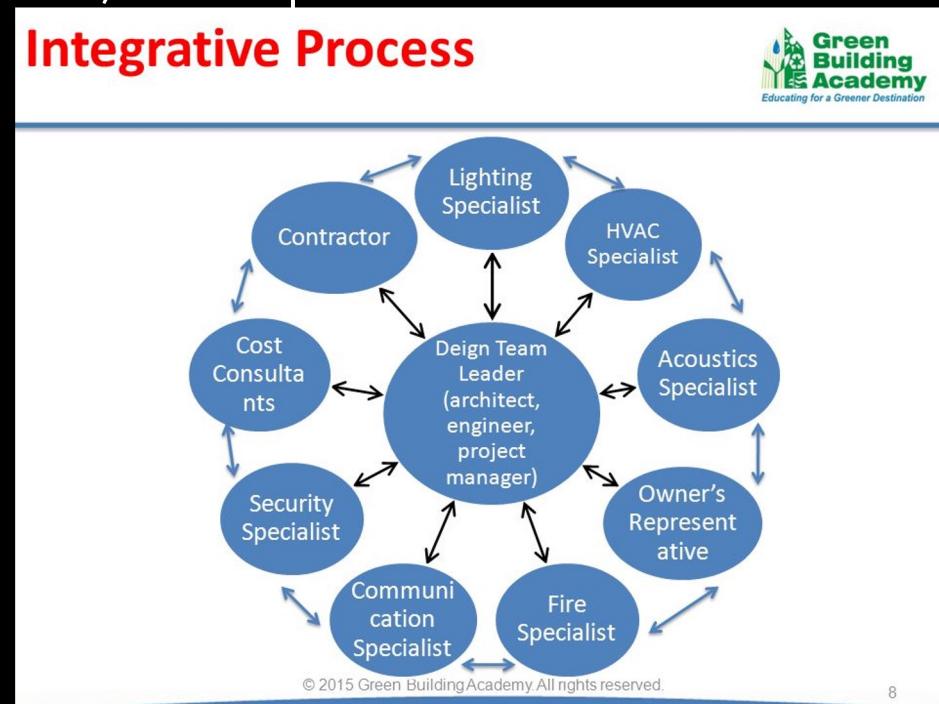
# INTEGRATIVE PROCESS

Y ? N  
1 0 0

Credit Integrative Process

1

- Integrative process credit: 1 point achieved by carrying out a design charrette and planning sustainable strategies in advance during the pre-design stage together with owner, engineers, architects, and specialists.



# LOCATION AND TRANSPORTATION

15	1	0	Location and Transportation - Alex	16
0	0	0	Credit LEED for Neighborhood Development Location	16
0	1	0	Credit Sensitive Land Protection	1
2	0	0	Credit High Priority Site and Equitable Development	2
5	0	0	Credit Surrounding Density and Diverse Uses	5
5	0	0	Credit Access to Quality Transit	5
1	0	0	Credit Bicycle Facilities	1
1	0	0	Credit Reduced Parking Footprint	1
1	0	0	Credit Electric Vehicles	1

- Sensitive land protection is not applicable.
- Transportation is a high priority for Los Angeles and achieves equitable development.
- Project provides access to quality transit.
- Bicycle facilities are shown on the drawings and are provided at stations.
- Reduces vehicles required, therefore the parking footprint required.
- LA Metro Trains are electric, additionally, electric vehicle charging is shown on the facility drawings.

# SUSTAINABLE SITES

6	1	3	Sustainable Sites - Alex	10
Y			Prereq	Required
1	0	0	Credit Construction Activity Pollution Prevention	1
0	0	2	Credit Site Assessment	2
0	0	1	Credit Protect or Restore Habitat	1
3	0	0	Credit Open Space	3
2	0	0	Credit Rainwater Management	2
0	1	0	Credit Heat Island Reduction	1
			Credit Light Pollution Reduction	

- Our assumption is that the affected sites have been assessed.
- This project does not require the protection or restoration of habitats.
- This project does not provide open spaces.
- The facility has a storm piping system for rainwater management.
- Heat island reduction can be achieved by installing green or cool roofs.
- This project does not contribute to additional light pollution.

# WATER EFFICIENCY

8	2	1	Water Efficiency -	11
Y			Prereq      Outdoor Water Use Reduction	Required
Y			Prereq      Indoor Water Use Reduction	Required
Y			Prereq      Building-Level Water Metering	Required
2			Credit      Outdoor Water Use Reduction	2
6			Credit      Indoor Water Use Reduction	6
	1	1	Credit      Optimize Process Water Use	2
	1		Credit      Water Metering	1

Water Efficiency : 8 credits + all prerequisites

Our assumption is that the water use reduction have been assessed by 23 to 26%.

<b>8</b>	<b>1</b>	<b>24</b>	<b>Energy and Atmosphere - Elena</b>	<b>33</b>
Y		Prereq	Fundamental Commissioning and Verification	Required
Y		Prereq	Minimum Energy Performance	Required
Y		Prereq	Building-Level Energy Metering	Required
Y		Prereq	Fundamental Refrigerant Management	Required
0	0	6	Credit Enhanced Commissioning	6
5	0	13	Credit Optimize Energy Performance	18
0	0	1	Credit Advanced Energy Metering	1
2	0	0	Credit Grid Harmonization	2
0	1	4	Credit Renewable Energy	5
1	0	0	Credit Enhanced Refrigerant Management	1

Energy and Atmosphere: 8-9 credits + all prerequisites

**Optimize energy performance** - HVAC systems are improved and passive energy design strategies are used; **grid harmonization & renewable energy** - green power is bought from the grid and in the future solar can be installed onsite; **enhanced refrigerant management** - no CFC or HCFC are used because of their high GWP.

# MATERIALS AND RESOURCES

2	0	11	Materials and Resources - Brandon	13
Y			Prereq Storage and Collection of Recyclables	Required
		5	Credit Building Life-Cycle Impact Reduction	5
		2	Credit Environmental Product Declarations	2
		2	Credit Sourcing of Raw Materials	2
		2	Credit Material Ingredients	2
2			Credit Construction and Demolition Waste Management	2

Credits 2/13

All aspects have not been currently addressed except construction and demolition waste management. LACMTA has not put into place any plans except for waste management, the rest of the categories are in development and not implemented.

<b>3</b>	<b>1</b>	<b>12</b>	<b>Indoor Environmental Quality - Elena</b>	<b>16</b>
Y			Prereq Minimum Indoor Air Quality Performance	Required
Y			Prereq Environmental Tobacco Smoke Control	Required
0	0	2	Credit Enhanced Indoor Air Quality Strategies	2
3	0	0	Credit Low-Emitting Materials	3
0	0	1	Credit Construction Indoor Air Quality Management Plan	1
0	0	2	Credit Indoor Air Quality Assessment	2
0	1	0	Credit Thermal Comfort	1
0	0	2	Credit Interior Lighting	2
0	0	3	Credit Daylight	3
0	0	1	Credit Quality Views	1
0	0	1	Credit Acoustic Performance	1

Indoor Environmental Quality: 3-4 credits + all prereq.

**Low emitting materials** - the materials used meet or exceed the requirements or the client; **thermal comfort** - fairly easy to achieve because of local mild climate, even though some attention must be paid to ventilating and air conditioning systems.

# INNOVATION

1	3	0	Innovation - Brandon	6
1	3	0	Name? Innovation	5
1			Credit LEED Accredited Professional	1

- LACMTA redefines sustainability principles in their LA Metro Sustainability Strategic Plan 2020 as “6. Encourage innovation in strategic planning and sustainable practice through adaptation and resilience.”
- They have received USGBC innovation awards on Division 13 and 14.
- Pilot tests:
  - Low Flow Nozzle Pilot Installation for Bus Washes
  - Permeable Pavement and Bioretention Pilot Project
- Future Plans: “1.4 Conduct pilot studies on rail wash facilities to reduce potable water use and replace existing equipment with more efficient equipment based on the pilot results.”

# REGIONAL PRIORITY

2	0	2	Regional Priority	4
1			Credit      Regional Priority: Specific Credit	1
		1	Credit      Regional Priority: Specific Credit	1
1			Credit      Regional Priority: Specific Credit	1
	1		Credit      Regional Priority: Specific Credit	1

Regional Priority : 2 credits

According to the public reports, there are some number of alternative transportation options and water reduction.

The project does not provide a waste water use technology and daylight importance use.



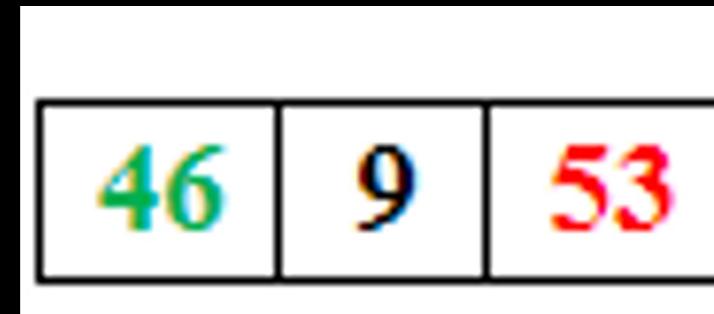
The project is able to achieve LEED Silver.

46/110 - Points achievable

9/110 - Points probably achievable

42/110 - Points not achievable

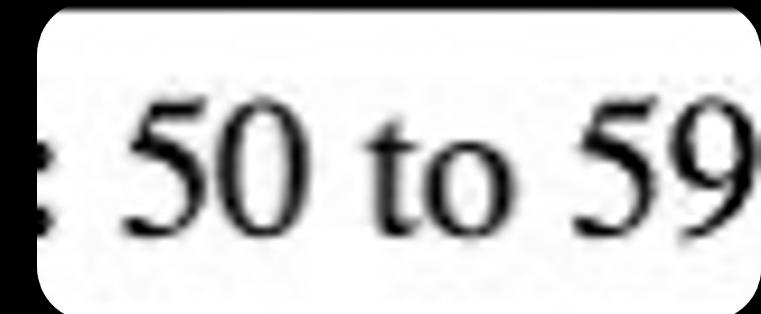
16/110 - Points not targeted



Total points towards project rating

$$46 + 9 = 55 \text{ points}$$

## Conclusions



Silver certification boundaries

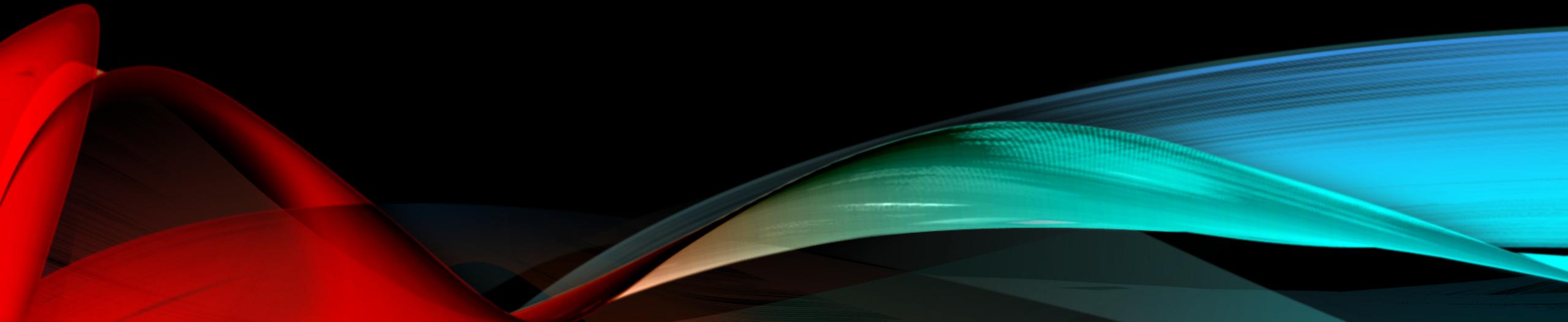
$$50 < 55 < 59$$

# References

- <https://www.usgbc.org/>
- <https://www.transit.dot.gov/sites/fta.dot.gov/files/2022-03/LA-Metro-Sustainability-Strategic-Plan-2020.pdf>
- <https://www.gruenassociates.com/project/division-16-southwestern-yard/>
- <https://www.mottmac.com/>

# THANK YOU FOR LISTENING.

Questions?





## LEED v4.1 BD+C

### Project Checklist

Project Name  
Date:

Y ? N

1	0	0
---	---	---

Credit Integrative Process

1

15	1	0	Location and Transportation - Alex	16
0	0	0	Credit LEED for Neighborhood Development Location	16
0	1	0	Credit Sensitive Land Protection	1
2	0	0	Credit High Priority Site and Equitable Development	2
5	0	0	Credit Surrounding Density and Diverse Uses	5
5	0	0	Credit Access to Quality Transit	5
1	0	0	Credit Bicycle Facilities	1
1	0	0	Credit Reduced Parking Footprint	1
1	0	0	Credit Electric Vehicles	1

2	0	11
Y		
	5	
	2	
	2	
	2	
2	1	5

6	1	3	Sustainable Sites - Alex	10
Y			Prereq Construction Activity Pollution Prevention	Required
1	0	0	Credit Site Assessment	1
0	0	2	Credit Protect or Restore Habitat	2
0	0	1	Credit Open Space	1
3	0	0	Credit Rainwater Management	3
2	0	0	Credit Heat Island Reduction	2
0	1	0	Credit Light Pollution Reduction	1

3	1	12
Y		
Y		
	2	
3	0	0
0	0	1
0	0	2
0	1	0
0	0	2
0	0	3
0	0	1
0	0	1

8	2	1	Water Efficiency - Ronak	11
Y			Prereq Outdoor Water Use Reduction	Required
Y			Prereq Indoor Water Use Reduction	Required
Y			Prereq Building-Level Water Metering	Required
2	1	0	Credit Outdoor Water Use Reduction	2
6	1	0	Credit Indoor Water Use Reduction	6
1	1	1	Credit Optimize Process Water Use	2
1	1	0	Credit Water Metering	1

1	3	0
1	1	1
	3	
1	1	1
1	1	1

2	0	2
1	1	1
1	1	1
1	1	1
1	1	1

8	1	24	Energy and Atmosphere - Elena	33
Y			Prereq Fundamental Commissioning and Verification	Required
Y			Prereq Minimum Energy Performance	Required
Y			Prereq Building-Level Energy Metering	Required
Y			Prereq Fundamental Refrigerant Management	Required
0	0	6	Credit Enhanced Commissioning	6
5	0	13	Credit Optimize Energy Performance	18
0	0	1	Credit Advanced Energy Metering	1
2	0	0	Credit Grid Harmonization	2
0	1	4	Credit Renewable Energy	5
1	0	0	Credit Enhanced Refrigerant Management	1

46 9 53

# ERC - WELL

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TEAM: ELENA VINDROLA, DHRITI PANGASA, XINGHAN WANG, YUANQI WANG

# INTRODUCTION

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Project type: New and Existing Building

Pilot Strategy: Hydrogen Home

Certifications pursued: LEED, WELL

# AIR - 14/29 points achieved

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## Precondition

100% pursued and all their subparts are complete:

1. Air Quality Standard - yes
1. Smoking Ban - yes
2. Ventilation Effectiveness - yes
3. VOC Reduction - yes
4. Air Filtration - yes
5. Microbe and Mold Control - yes
6. Construction Pollution Management - yes
7. Healthy Entrance - yes
8. Cleaning Protocol - yes
9. Pesticide Management - yes
10. Fundamental Material Safety - yes
11. Moisture Management - yes

## Optimization

### 25. Toxic Material Reduction - yes, 5/5

subparts complete: the project achieved LEED low-emitting materials full score.

### 26. Enhanced Material Safety - yes, 1/1

subpart complete: the project does not contain any red listed material.

# WATER- 5/8 points achieved

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## Precondition

1. Fundamental Water Quality - yes
2. Inorganic Contaminants - yes
3. Organic Contaminants - yes
4. Agricultural Contaminants - yes
5. Public Water Additives - yes

## No optimization

# NOURISHMENT- 9/15 points achieved

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## Precondition

1. Fruits And Vegetables - yes
2. Processed Foods - yes
3. Food Allergies - yes
4. Hand Washing - yes
5. Food Contamination- yes
6. Nutritional Information - yes
7. Safe Food Preparation Materials - yes
8. Serving Sizes - yes
9. Mindful Eating - yes

## Optimization

46. Safe Food Preparation Materials  
-yes, score: 2/2  
subparts complete: the project achieved cooking material all used for cast iron, glass, steel and etc.  
-The score estimate comes from the huge area of the kitchen and comprehensive facilities on the floor plan.

# LIGHT - 10/11 points achieved

---

## Precondition

1. Visual Lighting Design - yes
2. Circadian Lighting Design - yes
3. Electric Light Glare Control- yes
4. Solar Glare Control - yes
5. Daylighting Fenestration-yes

## Optimization

63. Daylighting Fenestration- yes 3/3  
subparts complete: the window-wall ratio of the facade can meet 20%-60%, and there is a sun visor for shading treatment.



# FITNESS - 4/8 points achieved

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## Precondition

1. Interior Fitness Circulation - yes
2. Activity Incentive Programs - yes

## Optimization

66. Structured Fitness Opportunities- no 0/2  
subparts complete: There is no corresponding  
indoor fitness space to provide conditions for  
fitness training.

# COMFORT - 6/12 points achieved

---

## Precondition

1. Accessible Design - yes
2. Ergonomics:Visual And Physical - yes
3. Exterior Noise Intrusion- yes
4. Internally Generated Noise- yes
5. Thermal Comfort - yes

## Optimization

82. Individual Thermal Control- yes 2/2  
subparts complete: The project room is reserved for enough free stations, and each station has enough space to arrange personal heating or cooling equipment.
83. Radiant Thermal Comfort-no 0/2  
The project uses HVAC and ventilation for cooling or heating, and does not use radiation.

# MIND

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## Precondition

1. Health and Wellness Awareness - yes
2. Integrative Design - yes
3. Post-Occupancy Surveys - yes
4. Beauty and Design I - yes
5. Biophilia I - Qualitative - yes

## Optimization

99. Beauty and Design II - yes
  - Ceiling height
  - Artwork
  - Spatial Familiarity
100. Biophilia II - Quantitative - yes
  - Outdoor biophilia
  - Indoor biophilia
  - Water feature

Score: 10/24

# CONCLUSION

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According to our study, the project achieved Silver Certification: all precondition requirements, but less than 40% of optimization points.



# BIBLIOGRAPHY

---

- <https://www.eosis.energy/our-services/well-building-certification/>

ELENA VINDROLA

ARCH 519

Professor Ying Wang

Fall 2022 – November 22

Prompt: These terminologies are vital for you to understand what they are about. Please write 3 pages about your understanding of them: 1. Benchmarking from EPA, sign into the website and have a general idea about it. (<https://www.energystar.gov/buildings/benchmark>) ; 2. EC3 - reading material; 3. LCA and EPD - reading material.

### Assignment 7

#### Benchmarking

It is the act of comparing a building's performance to other data, coming from different buildings of similar size or previous performance metrics. It is important because it allows the owners and the customers to rate their level of consumption relative to an average, and thus determine whether they are ahead or should push for stricter energy level measures. One famous benchmarking initiative followed by the government of the City of San Diego in 2019 was the Better Building Challenge, initiated by the Department of Energy (DOE) as a mean to decrease energy consumption at the county level in multiple regions across the United States. Participation to the program was voluntary and I had the honor to work as an intern on this project, where we analyzed the energy performance of all the buildings bigger than 50,000 sq. ft. owned by the City of San Diego and compared their usage to previous years. We used Energy Star Portfolio Manager to perform the analysis and a striking 11% reduction was seen, which was a great success for the Sustainability Department of the city. Benchmarking is often implemented at the

private level too, to achieve the goals of carbon reduction set by legislation or to push towards exemplary performance of buildings.

### EC3

This is the Embodied Carbon in Construction Calculator, and it allows to determine the embodied carbon for a building, which unfortunately is often the major cause of emissions over its life. For this reason, it is deemed more sustainable to retrofit a building rather than constructing a new one from scratch. When retrofitting is not possible, using sustainable materials such as wood or carbon cure concrete rather than heavily relying on normal concrete or steel, which emit a huge amount of CO<sub>2</sub> in manufacturing, is recommended.

### LCA and EPD

LCA mean Life Cycle Assessment. There are three main types of LCA: EIO (economic input output) LCA, process-based (engineering) LCA, and hybrid LCA.

As the name suggests, the first is an economic and financial review to find the impacts of a product across its life cycle, which usually spans from cradle to gate or, if enough data is available, from cradle to cradle; in this context, cradle means the start of a product supply chain, such as raw materials extraction, and gate its end of life, which can be recycling, reuse, upcycling, or disposal. The main advantage of EIO-LCA is that it encompasses system boundaries, while the main disadvantage is that it is very aggregated.

On the other hand, process based LCA focuses mainly on the materials and the engineering processes that may impact the environment or the people living in it: it is not concerned with the costs associated with production and use of such product. Its main advantage is that it is process specific, while its main disadvantages are that it entails truncation, and it is time consuming.

Finally, hybrid LCA utilized information coming from both economic and engineering or scientific databases: as such it may be able to amplify advantages and overcome challenges by combining the strengths and minimizing the weaknesses of the first two. This enhances efficiency, timeliness, and practicality, and allows the approach to be “generally correct rather than precisely wrong”.

Then, EPD are Environmental Product Declarations. They are a useful way to certify that a product is sustainable, and they are usually released by third parties so that no bias is involved. They are a great tool to check compliance with certain regulations or expectations, and for this reason they are widely used in the LEED certification process for building's materials.

## **Assignment 5: Final Project Discussion - Proposals FA22 ARCH 519**

*Team: Dhriti Pangasa, Brianna Ward, Alexander Gasca, Elena Vindrola, Kimia Bonyadi*

*Our team is proposing a variety of case studies to choose from for our final project. This discussion aims at explaining the strength of each to evaluate which one to eventually pursue as a team.*

### **1. 1800 Larimer Street - Xcel Energy Headquarters, Denver CO - Project Proposal - Dhriti Pangasa**



We can study this building as its energy efficiency measures (UFAD based - HVAC system) resulted in - energy cost savings of \$212,000 every year. Xcel Energy is the 10th largest provider of natural gas service in the country, based on the number of customers. They fuel homes and businesses in Colorado, Michigan, Minnesota, North Dakota and Wisconsin and some gas transmission in South Dakota and Texas as well. Being a reliable and secure source of energy, they've enhanced their facilities and are mindful about their headquarters. It will be interesting to learn more about them and this 293,328 sq ft corporate building by RNL Design. It has been awarded Platinum Certification by LEED ID+C: Commercial Interiors.

#### References:

- <https://www.usgbc.org/projects/xcel-energy-0>
- <https://airfixture.com/blog/famous-leed-certified-buildings>
- <https://www.xcelenergy.com/staticfiles/xe/Marketing/Files/CO-Bus-EDA-1800-Larimer-Case-Study.pdf>
- <https://www.smwllc.com/projects/xcel-energy-tower/>

### **2. E+ / Interface Studio Architects - Project Proposal - Brianna Ward**



We can study this building as the first completed project under the City of Boston's Energy Plus (E+) Green Building Program. This program is a pilot initiative to help develop energy efficient sustainable housing. The project was created as a replicable prototype for family friendly, energy efficient, urban townhomes. Each unit is approximately 1850-square-feet, with flexible living areas, 3 bedrooms, and 2.5 bathrooms. It was selected through a design competition hosted by the Boston Redevelopment Authority (BRA) and the Department of Neighborhood Development.

Incorporating both passive and active energy efficiency measures, the project has achieved HERS ratings between 6 and 9, and is certified LEED for Homes Platinum.

#### Reference:

- <https://www.archdaily.com/633320/e-interface-studio-architects>

### **3. NYC East Side Coastal Resiliency Project - Alexander Gasca**



The East Side Coastal Resiliency Project is a publicly funded project to reduce flood risk from rising sea levels in lower Manhattan. What I like about this project is that it contributes green spaces to the community while future-proofing the city from potential environmental catastrophes. This project is just one of 6 coastal resiliency projects happening in lower

Manhattan so there are a variety of projects to look at within this same scope. This project received an envision gold award and is still under development through 2026. It could be interesting to explore a project which is still in progress.

#### Links

<https://edc.nyc/project/lower-manhattan-coastal-resiliency>

<https://www1.nyc.gov/site/escr/index.page>

<https://www.nycgovparks.org/planning-and-building/planning/neighborhood-development/east-side-coastal-resiliency>

#### **4. Burbank Water and Power Ecocampus - Elena Vindrola**



Burbank Water and Power is a small utility company located in Burbank, CA, within the Los Angeles Metropolitan Area. The LEED Platinum Ecocampus includes offices for employees, a water treatment plant and a double cycle natural gas plant. The sustainable features include a green roof, solar panels over the parking lot and local flora covering the old substation. The project also obtained SITES certification for landscaping.

#### Links

<https://www.burbankwaterandpower.com/about-us/about-bwp/eco-campus>

#### **5. NUS School of Design and Environment, Singapore - Kimia Bonyadi**



The National University of Singapore's extension for the School of Design & Environment is a net-zero energy building. The five-story building consists of labs, design studios and workshops for the schools of architecture and interior, landscape and product design. As a school with an emphasis on energy-efficient technologies, the building had to embody these principles and be an example to the students, faculty and extended design community. Transsolar guided the design team to create a building that serves the various programs while making thermal comfort and energy efficiency among its highest priorities.

Links: <https://transsolar.com/projects/singapore-nus-school-of-design-and-environment>



# BURBANK WATER AND POWER (BWP) ELECTRICAL SERVICES BUILDING

ARCH 519 FINAL PROJECT

**TEAM: ELENA VINDROLA, ALEXANDER GASCA,  
KIMIA BONYADI, DHRITI PANGASA, BRIANNA WARD**

Professor: Ying Wang

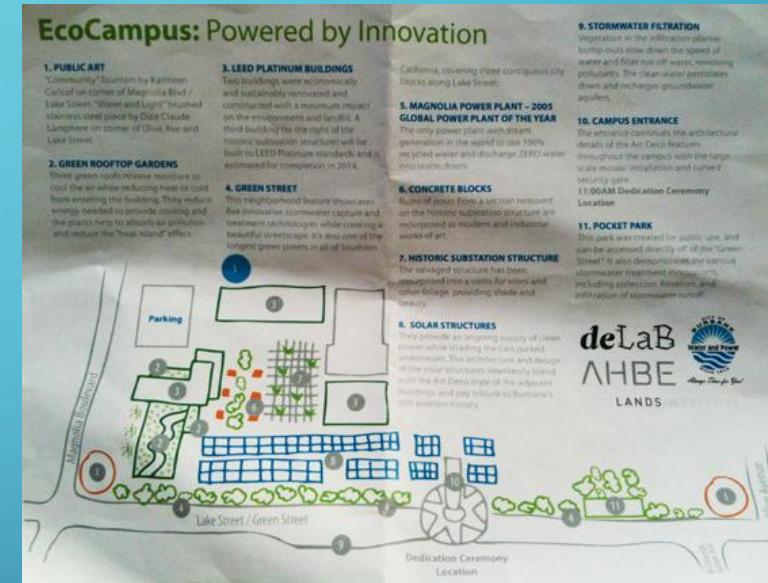


# INTRODUCTION

Overview of an energy efficient facility that is environmentally responsible, profitable, and a healthy place to work.

# Type of certification pursued: LEED New Construction

- Location: Burbank, CA, United States
- Project Size: 3.2 acres
- Project type: Industrial
- Site Context: Urban
- Former Land Use: Greyfield
- Terrestrial Biome: Mediterranean Forests, Woodlands & Scrub





## The Electrical Services Building is one of the main constructions in the BWP Eco-Campus

The Campus includes other 2 LEED Platinum buildings, a green street, a centennial courtyard, architecturally integrated solar, underground water storage percolation, the Magnolia Power Plant, and landscaping at Olive Flood Channel.

## SUSTAINABLE SITES

Total points achieved: 22 / 26

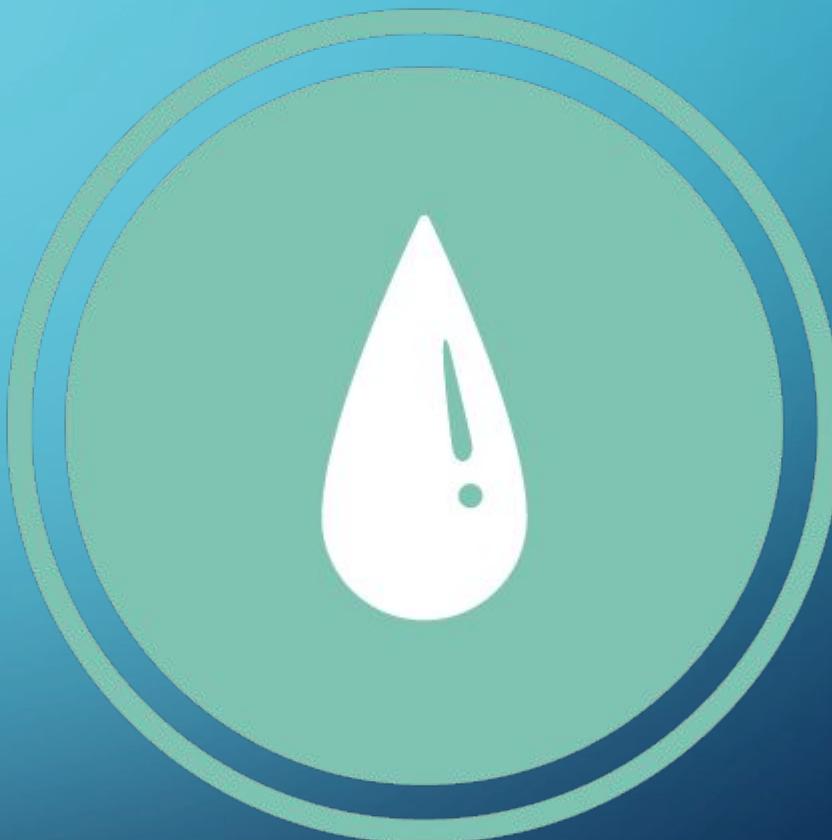


# Credits targeted

- Site Selection: the project stands on a previously developed site (1/1)
- Development density and community connectivity: the building is in the heart of Burbank, it provides power and services to the surrounding community and local shops or amenities can be easily accessed by its workers (5/5)
- Brownfield redevelopment: the previous industrial designation is now regenerative and green (1/1)
- Alternative transportation
  - public transportation access: there are bus stops walking distance from the building, plus a private bus that stops at the entrance every ~20 minutes (6/6)
  - bicycle storage and changing rooms: bike racks are installed at the entrance of the building and around the campus, and changing rooms with showers are provided (1/1)
  - low-emitting and fuel-efficient vehicles: there are EV chargers available for BWP vehicles and employees (3/3)
  - parking capacity: 2 parking lots with preferred parking provide enough space to accommodate all parking needs (2/2)
- Stormwater design
  - quantity control: stormwater runoff is channelled to be reused for irrigation (1/1)
  - quality control: a water treatment system prevents any toxic leakages to end up into city streams (1/1)
- Heat island effect - roof: a green roof with native species of drought resistant flora is installed on the roof, lowering temperatures naturally while enhancing beauty (1/1)

# WATER EFFICIENCY

Total points achieved: 10 / 10



# Credits targeted

- Water Use Reduction (0/0 - Required)
  - uses 20% less water than the water use baseline
- Water Efficient Landscaping (4/4)
  - there are water filtration systems hidden below ground, allowing the entire campus to serve as a water filtration system
- Innovative Wastewater Technologies (2/2)
  - The site features five different types of water filtration technologies including infiltration, flow-through, detention, tree root cells, and rainwater capture. The landscape running across three contiguous City streets acts as a filter before runoff enters the stormwater system
- Water Use Reduction (4/4)
  - reduced the burden on municipal water supply and wastewater systems

# ENERGY & ATMOSPHERE

Total Points Received: 29/35



# Credits Targeted

- Fundamental commissioning of building energy systems (Required)
- Minimum energy performance (Required)
- Fundamental refrigerant management (Required)
- Optimize energy performance 19/19
- On-site renewable energy 7/7
  - Included with Solar
- Enhanced commissioning 2/2
  - Achieved by Commissioning Agent
- Enhanced refrigerant management 0/2
- Measurement and verification 1/3
  - Achieved by Commissioning Agent
- Green Power 0/2

# Project Features



Architecturally Integrated Solar Panels

## FAST FACTS ABOUT SOLAR CARPORT

Cost for Solar Panels:	\$1,750,000
Dept. of Energy Grant:	<u>\$1,100,000</u>
Net Cost of Panels:	\$ 650,000
Solar Modules	1074 panels
Inverter	1 – 260 kW
Orientation	Southwest, 15 degree tilt
Power in DC kW	263
Estimated Annual Production in kWh	352,000 kWh
Retail Value of Energy	\$53,000 annually

# Project Features



Magnolia Power Plant

## MPP Sustainability Fast Facts

- The plant produces 98% less air pollution than the 2 units it replaced
- The plant has zero liquid discharge
- All wastewater is used on-site, so none is ever discharged into the LA River
- 2 water treatment systems make it possible to reuse the water in the plant
- 1 million gallons of potable water are saved via the water treatment systems that would have otherwise been required to operate part of the plant

# MATERIAL & RESOURCES

Total Points Received: 6/14



# Credits Targeted

- MRp1 - Storage and collection of recyclables 0/0
- MRc1.1 - Building reuse - maintain existing walls, floor and roof 0/3
- MRc1.2 - Building reuse - maintain interior nonstructural elements 0/1
- MRc2 - Construction waste management 2/2
  - to divert construction and demolition debris from disposal in landfills and incineration facilities.
  - redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites
- MRc3 - Material reuse 0/2
- MRc4 - Recycled content 2/2
  - to increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of materials.
- MRc5 - Regional materials 2/2
  - to increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.
- MRc6 - Rapidly renewable materials 0/1
- MRc7 - Certified Wood 0/1

# INDOOR ENVIRONMENTAL QUALITY

Total Points Received: 12/15



# Credits targeted

- EQp1 Minimum Indoor Air Quality Performance (0/0-Required)
  - Intent is to contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality. Meets the requirements for both ventilation and monitoring.
- EQp2 Environmental Tobacco Smoke Control (0/0-Required)
  - Prohibit smoking inside the building. Prohibit smoking outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows.
- EQc1 Outdoor Air Delivery Monitoring (1/1)
  - Install permanent, continuous monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain minimum outdoor airflow rates under all operating conditions.
- EQc2 Increased Ventilation (1/1)
  - Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity. Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004 as determined by EQ Prerequisite 1.
- EQc3.1 Construction IAQ Management Plan-during construction (1/1)
  - To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.
- EQc3.2 Construction IAQ Management Plan-before occupancy (1/1)
  - To reduce indoor air quality (IAQ) problems resulting from construction or renovation to promote the comfort and well-being of construction workers and building occupants. Develop an (IAQ) management plan and implement it after all finishes have been installed and the building has been completely cleaned before occupancy.

# Credits targeted (continued...)

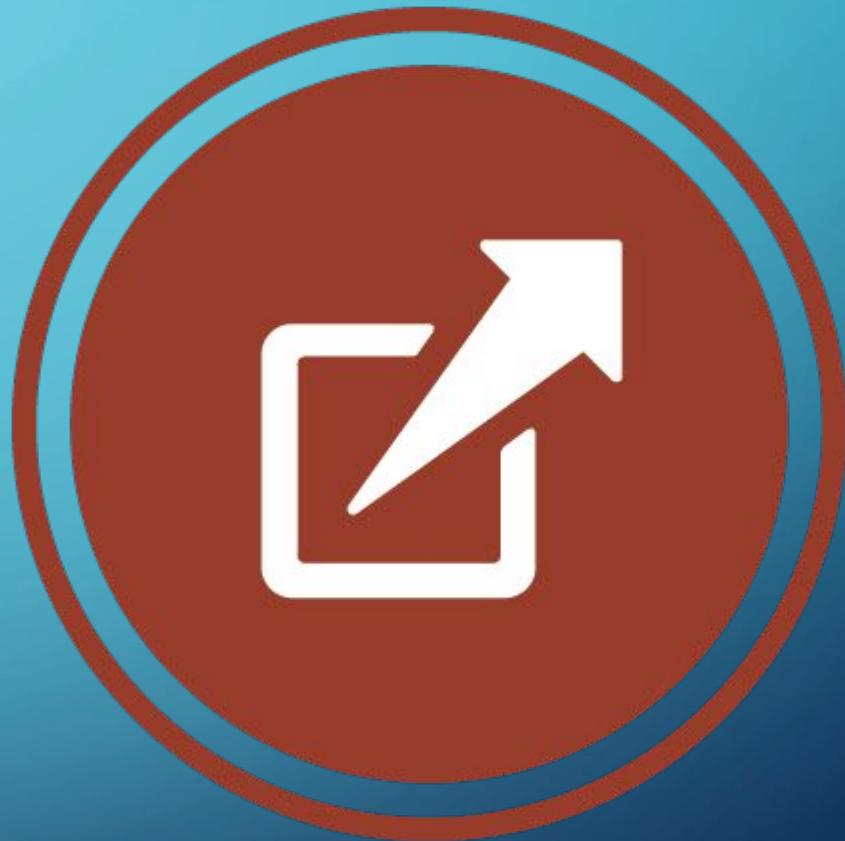
- EQc4.1 Low-emitting materials-adhesives and sealants (1/1)
  - Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.
- EQc4.2 Low-emitting materials-paints and coatings (1/1)
  - To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.
- EQc4.3 Low-emitting materials-flooring systems (1/1)
  - To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.
- EQc4.4 Low-emitting materials-composite wood and agrifiber products (1/1)
  - Composite wood and agrifiber products used on the interior of the building (i.e., inside the weatherproofing system) must contain no added urea-formaldehyde resins.
- EQc5 Indoor chemical and pollutant source control (0/1)
  - To minimize building occupant exposure to potentially hazardous particulates and chemical pollutants. In mechanically ventilated buildings, each ventilation system that supplies outdoor air consists of particle filters or air cleaning devices to clean the outdoor air at any location prior to its introduction to occupied spaces. BWP did not meet this requirement.

# Credits targeted (continued...)

- EQc6.1 Controllability of systems-lighting (1/1)
  - Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences.
- EQc6.2 Controllability of systems-thermal comfort (0/1)
  - Intent is to provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. BWP does not meet this requirement.
- EQc7.1 Thermal comfort-design (1/1)
  - To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort. Meet the requirements for both thermal comfort design and thermal comfort control.
- EQc7.2 Thermal comfort-verification (1/1)
  - To provide for the assessment of building occupant thermal comfort over time.
- EQc8.1 Daylight and views-daylight (0/1)
  - To provide building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building. This credit was not achieved.
- EQc8.2 Daylight and views-views (1/1)
  - To provide building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

# INNOVATION

Total Points Received: 6/6



# Credits targeted

- IDc1 - Innovation in design +5
  - provide design teams and projects the opportunity to achieve exceptional performance above the requirement set by the LEED Green Building Rating system and/or innovative performance in green building categories not specifically addressed by the LEED Green Building Rating System.
- IDc2 - LEED Accredited Professional +1
  - support and encourage the design integration required by a LEED Green Building project and streamline the application and certification process.

The project received six points for innovation as it transforms the utility company's site from an industrial complex into a regenerative green campus. The campus features one of the longest green streets in Southern California. The street showcases products and techniques for stormwater treatment within a public right-of-way. There are three vegetated green roofs, a photovoltaic array that hosts a rainwater catchment system, a canal that uses plants to treat stormwater, LED lighting, a solar powered fountain pump, salvaged and repurposed concrete and gravel. The project has implemented five different water filtration technologies.

## REGIONAL PRIORITY CREDITS

Total points achieved: 3 / 4



## Credits targeted

- On-Site Renewable Energy (+1)
  - reduce environmental and economic impacts associated with fossil fuel energy use
- Innovative Wastewater Technologies (+1)
  - reduce wastewater generation and potable water demand while increasing the local aquifer recharge
- Water Use Reduction (+1)
  - reduce burden on municipal water supply and wastewater systems

# CONCLUSION

The project was completed and awarded credentials on June 5th, 2014

# Main achievements

- Carbon emissions reduction
- Water savings and drought tolerance
- Emergency prevention - decreased wildfire and blackouts incidence
- Energy independence and resilience
- Habitat restoration
- Employees' health and wellbeing
- Exemplary regulatory performance
- Diversity, inclusion & accessibility



The project achieved LEED Platinum Certification

Total points: 88/110

QUESTIONS?

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THANK YOU

Extra Credit

For this extra credit assignment, I will analyze three of the articles provided in the prompt. In fact, only up to this number of articles can be read for free on the Economist each month, if one does not have the paid subscription.

The first article is titled “A broken system needs urgent repairs” and it explains how the Environmental, Social and Governance (ESG) approach is not functioning well and thus needs to be modified. For example, one problem with ESG is the risk of “greenwashing” where false information is stated for marketing purposes. Regarding its three main components’ drawbacks, a low rate of actual positive impacts on the environment derived from it, social variables are hard to measure and thus monitor, and governance targets are often more of an unachievable burden on companies than a concrete help. That said, even though the ESG market is confusing, its intent is noble. One useful fix could be creating more consistent metrics across categories since measurements are often subjective and disparate.

The second article is titled “The savior complex” and it goes over the strengths and shortcomings of ESG. For example, a strength is that young people prefer investing in funds that are sustainable, however funds may oversell their use of sustainable practices just to attract buyers, which is a shortcoming deriving from the strength of ESG. To resolve this issue, legal cases have been raised to impose fines on companies that lie about their ESG statements. On the negative side, a shocking statistic is that companies in ESG investment portfolios polluted more and treated employees more poorly than companies in non-ESG portfolios, which is absurd given that ESG purpose is really to improve the environmental and social impacts of a firm. However, a solution is possible, and it would involve creating smaller, more targeted, and credible ESG funds.

The third article is called “The warm glow” and it dismantles the belief that ESG investments always outperform. Here the author says that sustainability improves economies, and ESG are a useful tool to enhance it, however they are controversial and hard to use, such that trade-offs are often required in the quest for a valuable and greener future. ESG stocks have historically outperformed traditional ones, however, with the recent war in Ukraine, fossil fuel stocks have surpassed renewable energy ones, showing that ESG do not always win in the market. One way to make sure that ESG outperform is to choose a strategy from them that is close to the core of a company’s business. In that way, the company will take the ESG very seriously, and the result will be improved performance in return. An interesting insight is also that the most successful companies when it comes to economic growth are usually successful in ESG too, but it is not clear whether this is a cause or an effect. Finally, a way to ensure sustainability is to not focus too much on short term results, because those will just fluctuate and lead a company astray.

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