Implementation of Sustainable Roofing Strategies in the Front Range Region

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Research Goals

This study aims to analyze a new Denver building ordinance, analyze the current growth of sustainable building strategies in the state, interview professionals within the industry that include a licensed roofing contractor and engineering facility manager, and conclude with further research.

Background

- **By 2030 Colorado Plans to cut its emissions of climate warming pollution by 50% and hopes to cut 90% by 2050**
- **Jared Polis has proposed a plan for 100% of the states electricity to come from renewable energy resources by 2040**
- **Denver introduced its Green Building ordinance in 2018 which requires buildings to have a green roof element whether it is a solar array or vegetation.**
- **This ordinance applies to:**
  - **New buildings over 25,000 square feet**
  - **Roof permits for existing buildings over 25,000 square feet**
  - **Additions of 25,000 square feet or larger**

Research Approach

Research approach was to interview industry members throughout the Front Range as well as perform research of current practices and projects of green roofs in the Front Range.

Gross Floor Area	Coverage/Size of Green Roof
25,000 – 49,999 SqFt	20%
50,000 – 99,999 SqFt	30%
100,000 – 149,999 SqFt	40%
150,000 – 199,999 SqFt	50%
200,000 SqFt or greater	60%

Table 1: Colorado's Energy Mix

Preliminary Results

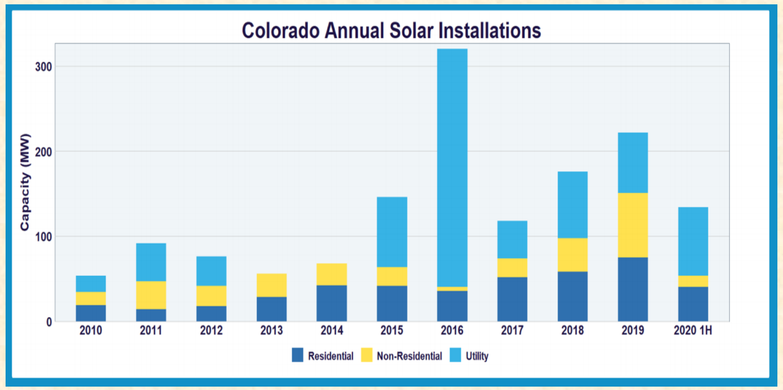

Figure 1: Solar Growth in the state of Colorado

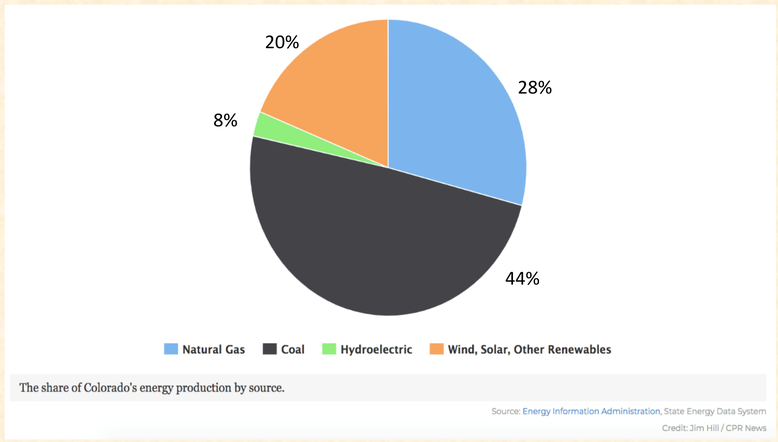

Figure 2: Colorado's Energy Mix

- **Since the beginning of 2020, 1513.95 MW of solar have been installed in the state of Colorado, in contrast to the 221.46 MW that had been installed in 2019**
- **Colorado ranks 8th in jobs in the solar industry with a total of 7,174 jobs.**
- **Over the next five years, Colorado has a growth projection of 3,320 MW of power, which would make Colorado the 8th most solar invested state in the country.**

Preliminary Results

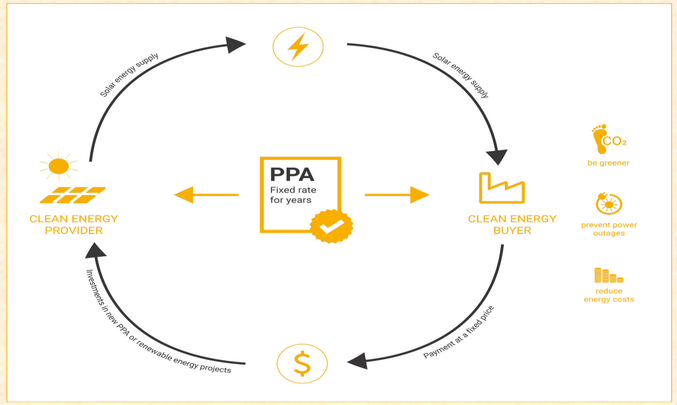

Figure 3: Power Purchase Agreement

How it works

- **Ways to overcome the initial cost of solar installation for example, a solar power purchase agreement (PPA).**
- **PPA is a financial agreement where a developer arranges for the design, permitting, financing, and installation of a solar energy system on a customer's property.**
- **The developer sells the power generated to the host customer at a fixed rate that is typically lower than the local utility's retail rate.**
- **PPAs typically range from 10 to 25 years, and the developer remains responsible for the operation and maintenance of the system for the duration of the agreement.**

Conclusions

- **Solar becomes more efficient when being cooled by vegetation and plants from a green roof.**
- **Provide storm water reduction, reduce heat island effect, increase building efficiency, and urban access to nature.**
- **Based on green building ordinances and power purchase agreements there is tremendous room for growth in sustainable roofing.**

Resources:

- Solar Energies Industry Association. (2019). *State Solar Spotlight - Colorado*. https://www.seia.org/sites/default/files/2020-09/Colorado.pdf
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- Weston, A. (2019). *Denver's Green Buildings Ordinance*. Https://Www.Denvergov.Org/. https://www.denvergov.org/content/denvergov/en/denver-development-services/commercial-projects/green-roof-initiative.html