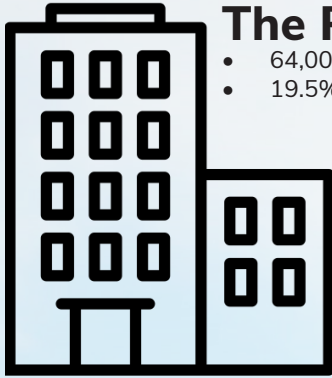


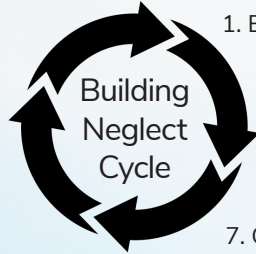
Sustainable & Community Driven Adaptive Reuse of Underused Office Buildings in Arlington County, VA

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 Design by: Jenna Peabody



The Problem

- 64,000,000 ft² Vacant Office Space Due to COVID-19
- 19.5% Vacancy Rate at the end of 2022 (up from 16.6% at the beginning of 2020)



1. Building ages, becomes less appealing to workers
2. Workers leave, work from home
3. Companies leave building
4. Building owner struggles to pay loans
5. Building transfers owners or goes into foreclosure
6. Local government suffers because of decreased property tax
7. Community suffers from struggling government and an empty building

Arlington County's Current Initiatives



Arlington County Green Building Incentive Program

- A voluntary program that offers private developers bonus density in exchange for meeting stringent sustainability and energy efficiency standards, such as LEED and ENERGY STAR.
- Offer incentives to developers to include more green features.



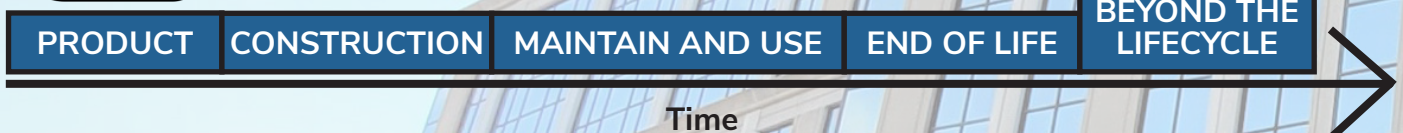
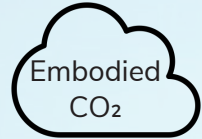
Plan Langston Boulevard: A Local Solution

Develop a walkable, urban main street with neighborhood activity centers



Embodied Carbon

The Building Lifecycle: 11% of Global Greenhouse Gas Emissions are caused by the production of concrete, steel, and insulation.



Solution: Adaptive Reuse

Refers to the repurposing of an existing structure for new use

Community Data

Arlington Zip Code Analysis / Top demographic groups according to Claritas PRIZM

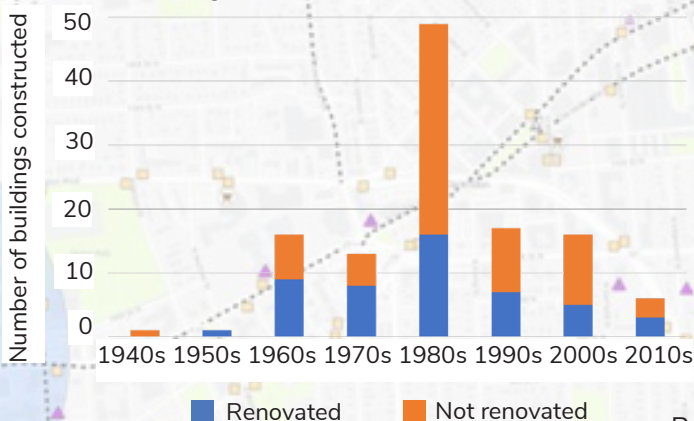
Group 1

Midscale Younger Mostly without Kids
 Mobile urbanites, tech savvy, early adopters
 Enjoy comedy clubs, art museums, tennis, and organic restaurants

Average Rent: \$2,290
 Renters: 57%
 Non-family Households: 54.4%

Group 2

Wealthy Middle Age Mostly with Kids
 Affluent, highly educated, tech savvy
 Live in trendy homes, ecofriendly lifestyles
 Enjoy healthy restaurants and coffee houses



Evaluated Example Buildings and their Carbon Impact

- 124 county office buildings (Arlington Economic Development)
- Most are pre-2000s with many from the 1980s
- <50% renovated and >50% class A buildings
- Used vacancy rate, age, building class, and past renovation status to identify potential buildings
- Arlington GIS Department mapped top 6 of 10 potential candidates

References: NounProject, ARLNow, WTOP and GazetteLeader

Develop New Uses for the Buildings that are Sustainable and Benefit the Community

Top Property 1: Courthouse Area

- Some floors have been renovated for office use
- Large ground floor plaza, good for outdoor restaurant seating or dog park

Vacancy: 62
Year Built: 1987
Building class: B

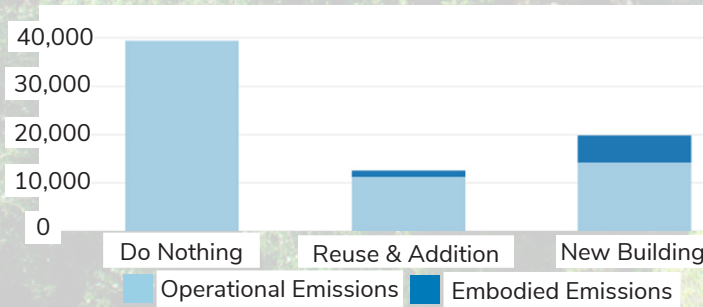
Calculating the Carbon Impact of Adaptive Reuse vs. New Construction

- Carbon Avoided: Retrofit Estimator (CARE) tool was used to determine the amount of carbon dioxide emissions that can be saved through adaptive reuse of these buildings

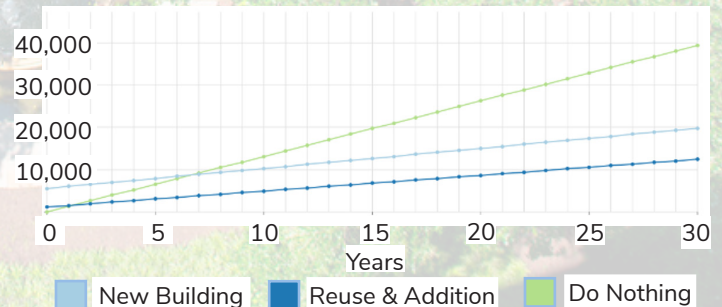
Inputs for the CARE Tool

Arlington County's targets for reduction in energy use and percentage of energy generated through renewables	Building Use (Multi-Family Residential used in both examples)
Building Characteristics	Percent Reuse of Structural System, Envelope and Interior (60% for adaptive reuse)

Top Property 1: Total Added Embodied & Operational Emissions (Metric Tonnes CO2e) Over 30 Years



Top Property 1: Cumulative Emissions (Metric Tonnes CO2e) Over Time

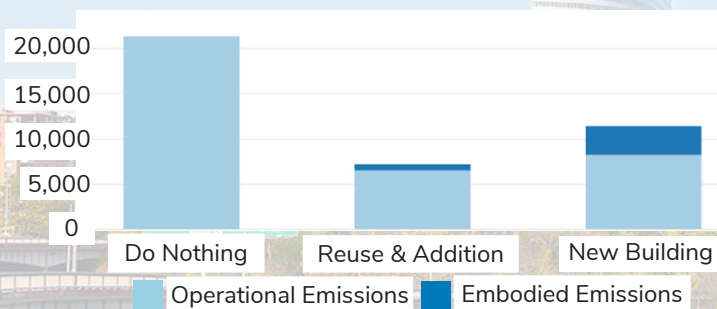


Top Property 2: Arlington Village Area

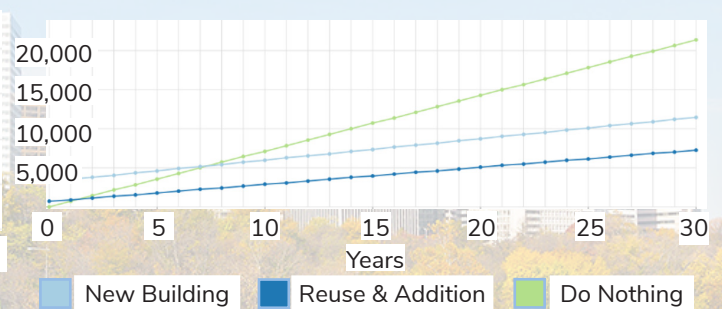
- A developer pursued adaptive reuse but was unsuccessful
- Large above ground parking garage could be adapted for a recreation center or pop-up market
- Simple rectangular floor plate ideal for residential use

Vacancy: 59.6%
Year Built: 1970
Building class: B

Top Property 2: Total Added Embodied & Operational Emissions (Metric Tonnes CO2e) Over 30 Years



Top Property 2: Cumulative Emissions (Metric Tonnes CO2e) Over Time



Adaptive Reuse Options for Arlington County

Residential Uses

- Hotels: High influx of tech jobs, Business travelers, Economic benefits from tourism
- Affordable Housing: Expensive housing market, High housing demand
- Luxury Housing: Young population enjoys trendy and fashionable housing, Wealthy population willing to pay for sustainable building features and amenities.
- Senior Housing: Community is overall younger, Physical activities like pickleball, biking, and walking could be beneficial to seniors



Non-Residential Uses: Dog park, recreation center, retail, restaurants, urban farm, brewery, laundromat, and boutique

Adaptive Reuse



Business Travel & Tourism

- Boutique Hotel: Offers unique style
- Museum: History of county
- Retail: Travel necessities



Health and Wellness

- Senior Housing: Mini clinic, personal trainers, IT Help center
- Rec center: Large scale activities space
- Auditorium: Community center, renting space



Community Engagement

- Affordable Housing: Amenities - Bike storage, dog park
- Laundromat: Local business partner, reduced price for residents
- Market space with local businesses: rotating vendors, open to the public, encourages traffic to area



Sustainability & connectivity

- Luxury Housing: Roof park, greenspace, coworking, ev charging
- Urban Farm: supply for restaurant, market for locals
- Brewery or Restaurants: makes use of sustainable practices, targets upper class office workers

Evaluation Categories for Adaptive Reuse Projects (ECARP)

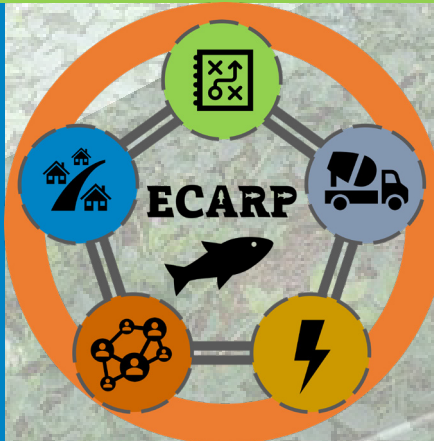
This system uses 5 core categories to help evaluate the effectiveness of various reuse methods in a retrofit project.

Future Proof

- Future Proofness rates a use based on whether the building could be easily adapted to another use in the future.
 - Projects that understand their impact on future developments can help improve future infrastructure.
- Continued use throughout lifetime
 - Space reuse in the future
 - Upgrades/adaptive to existing systems
 - Expansion to existing infrastructure (park/metro/bike)
 - Creative use of constraining spaces
 - Limit major changes to floorplans that will require reassessment or changes for other uses

Surrounding Assets

- Surrounding Assets are the nearby businesses, services and amenities that could support the new reuse.
 - Depending on the use of the building, different assets may be more useful in certain locations. For example, residential areas will need closer access to things like grocery stores when compared to business areas.
- Nearby transportation options such as bus or metro stops
 - Nearby businesses and restaurants
 - Local parks and recreational sites



Embodied Carbon

- Embodied carbon is the carbon emissions produced throughout the life cycle of a building.
 - Adaptive reuse projects can save substantial wells of avoided embodied carbon which in turn helps the environment.
- Keeping existing walls, windows, floor plate & ceilings
 - Using recycled building materials
 - Using locally sourced materials
 - Recycle existing materials from demolition

Demand

- Demand describes the social interest in an adaptive reuse project.
 - Solutions that cater to larger audiences or offer a specialized use will be more impactful to the community. This is based around the demographics of a given area and how it will be used.
 - Providing an essential service that will be used by large demographics.
- Providing an essential service to vulnerable demographics
 - Adding a new use that is needed or currently missing from the community
 - New building use is attractive and marketable

Operational Carbon

- Operational carbon is the carbon emissions produces from the day-to-day uses of the building.
 - An adaptive reuse project can lower operational emissions by upgrading these existing systems. This includes the energy, water, and heating of the building.
- Convert boilers to heat pumps
 - Use LED/high efficiency lighting
 - Install energy efficient appliances
 - Install double paned windows
 - Electrify gas-based systems

Future Recommendations

Government-Private Partnership

Building Repurposing Taskforce: Members drawn from several departments: development, planning and development, permitting, green buildings, and capital finance

Adaptive Reuse Program

- County lists priorities for new building uses
- Provides requirements for meeting green building standards
- Give developers criteria for ranking buildings (ECARP)

10 Year Capital Improvement Plan

Additional Incentives: fast-track permitting, special use permits and zoning, bonus density

Expanding ECARP

Develop a set of standards similar to LEED, but specifically for adaptive reuse -> Award specific points to adaptive reuse projects based on ECARP categories