

Contracting for Change

Integrating Sustainable Materials and Practices into Public Construction Projects

IMLA Annual Conference – September 27, 2024

Agenda

1. Introductions
2. What is Net Zero / a sustainable building?
3. Sustainable practices in the Built Environment
4. How to spec in sustainable practices?
5. Case studies
6. Q/A
7. Contact Information

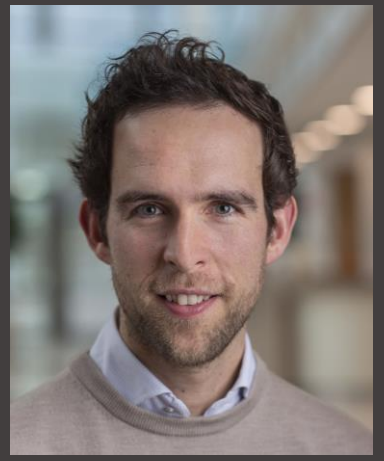
1. Introductions



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Partner

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Ian Minnes

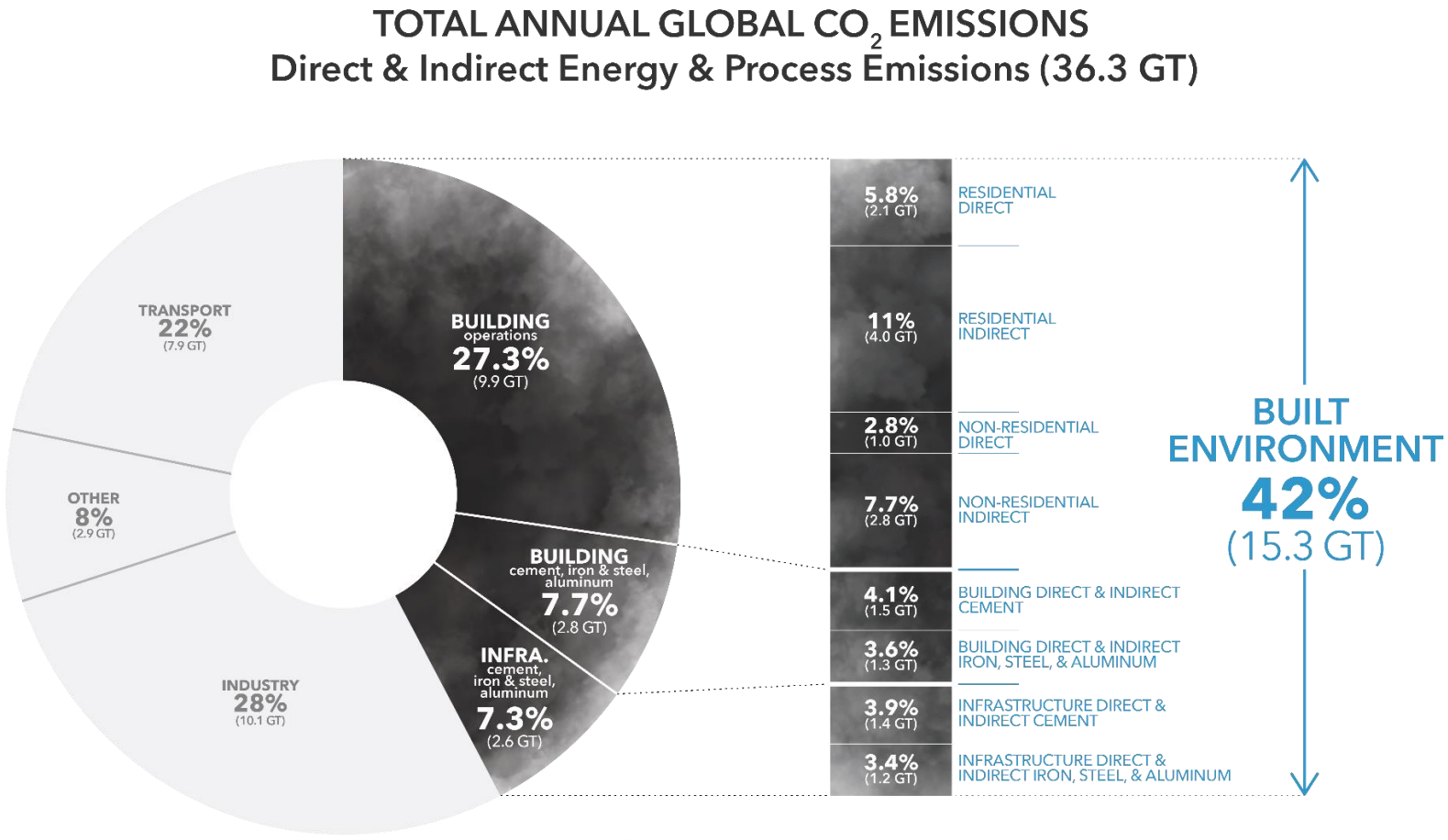
Net Zero Programs Practice Lead

Arcadis North America



1. Introduction in Climate Change & the Built Environment

Close to half of all global emissions are produced in the construction and operation of built assets.

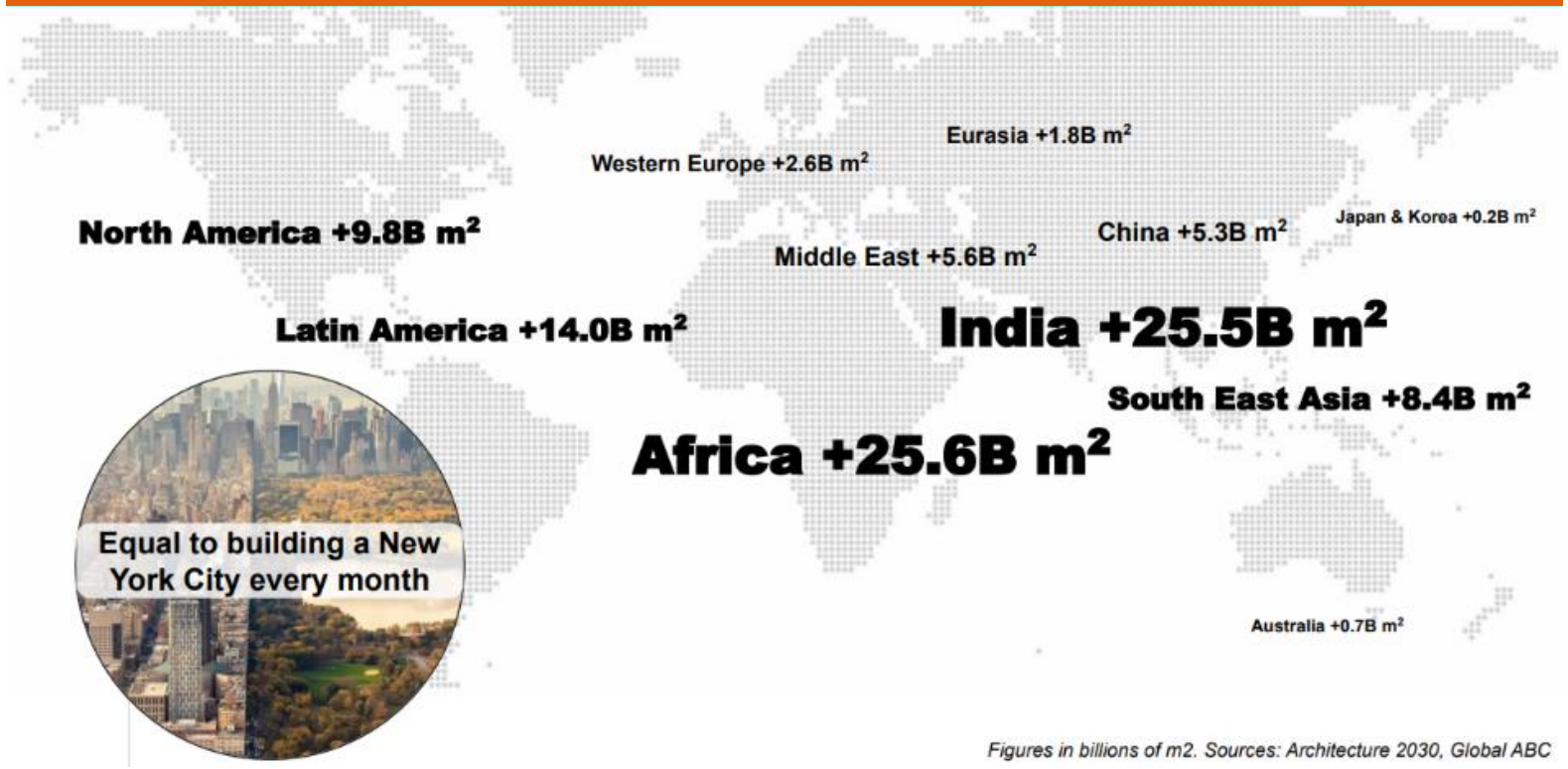


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Analysis & Aggregation by Architecture 2030 using data sources from IEA & Statista.

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While the industry has begun to decarbonize, increasing populations will drive exponential growth in construction.

THE GLOBAL BUILDING STOCK WILL DOUBLE IN 40 YEARS



Figures in billions of m2. Sources: Architecture 2030, Global ABC

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Strong ESG and Sustainability Credentials Increase Investment Potential

> *Assuring sustainable and ethical just management of Environmental, Social and Governance (ESG) risks, opportunities and impacts that can affect future revenue of a financing"*
>
> www.arcadis.com/esg-esia

> *Sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs."*
>
> *United Nations Brundtland Commission*

Brand Recognition

Public Perception

SDG's

Investors

Competitors

Clients

Employees

Peers

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2. What is Net Zero / a sustainable building?

What is Net Zero?

- Greenhouse gas emissions from human activity are in balance with emissions reductions. It refers to the equilibrium between greenhouse gas production and removal from the environment.
- Balance between greenhouse gas production and removal from the environment.

GHG Scope Classification

Scope 1

Direct emissions from owned or controlled assets and/or facilities.

Scope 2

Indirect emissions from the purchased energy *(electricity, steam, heating & cooling)*

Scope 3

Indirect emissions from purchased upstream or downstream activities such as goods and services, transportation, and distribution, leased assets, and/or end-of-life treatment of sold products.

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What is Net Zero Carbon?



- Upfront carbon
- Use stage embodied carbon
- End of use carbon

- Direct emissions
- Indirect emissions

- Exported green power
- Carbon offsets

OPERATONIAL | GHG emissions associated with operations of a building

This includes all carbon released from energy to heat and power the building :

- Lighting
- Sanitary water
- Power & plug loads (idle consumption)
- Heating, Cooling, Ventilation
- Building envelop (windows, walls, roof, etc.)
- Lifts, automatic doors, etc.

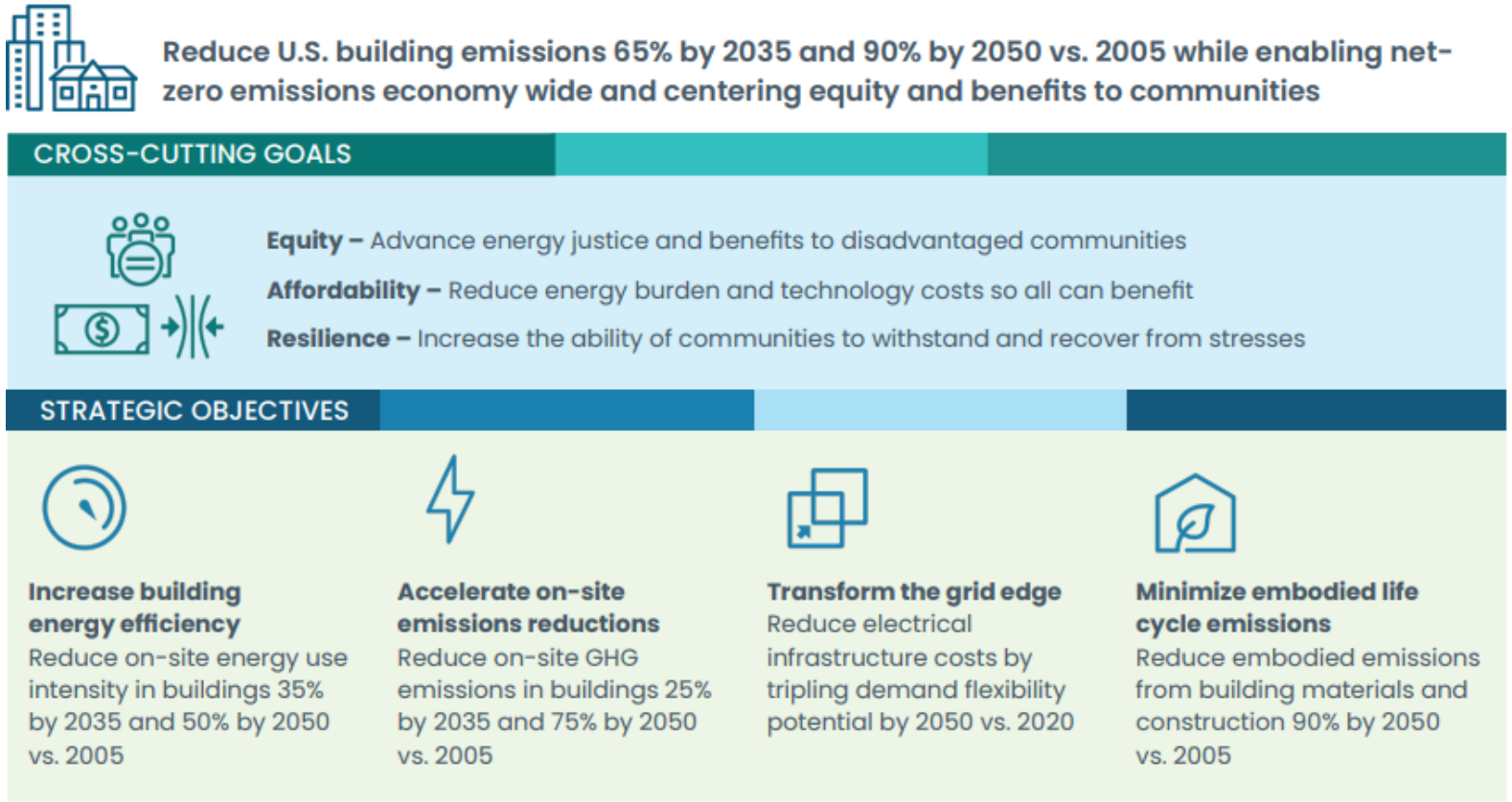
EMBODIED | GHG emissions associated with construction and demolition

- Raw material extraction
- Manufacturing and processing, transportation and installation of all building materials
- Carbon released by plants and machinery throughout the building process

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Federal Goals

The first National Blueprint for the Buildings sector – **Decarbonizing the U.S. Economy by 2050, was launched in April 2024.**

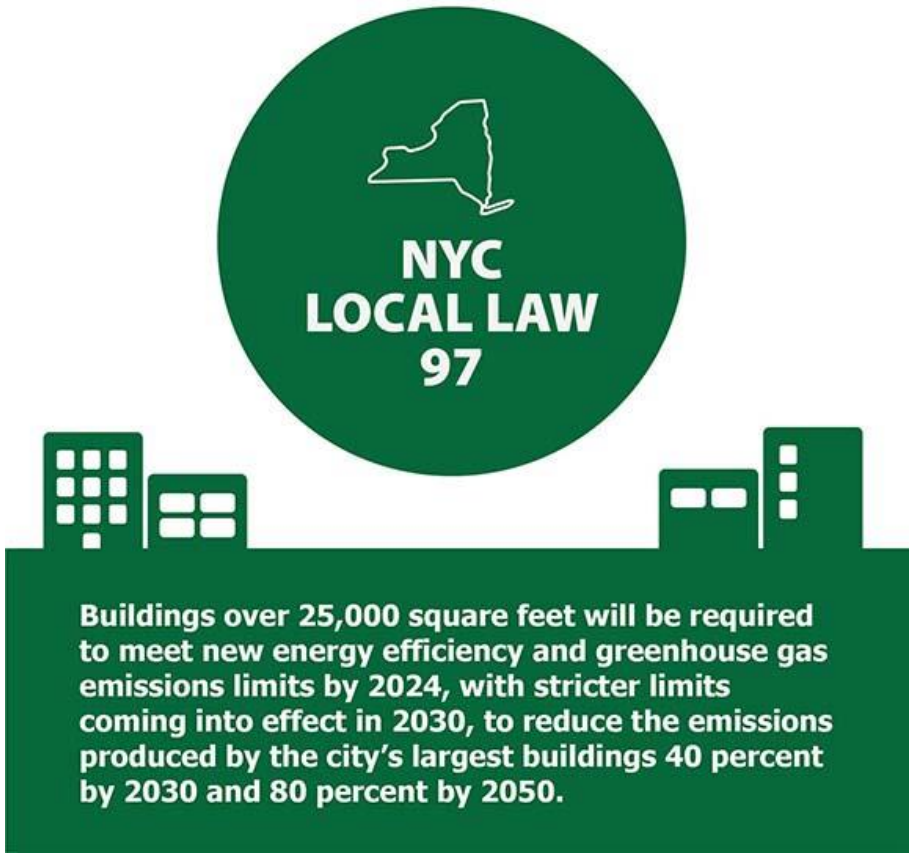


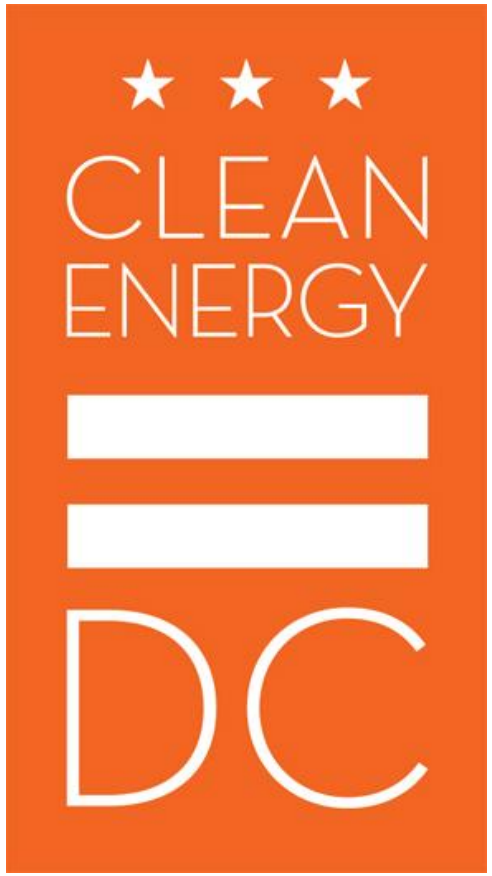
Rapid decarbonization of the buildings sector by 2050 is marked by the achievement of three crosscutting goals and four strategic objectives.

U.S. Department of Energy, 2024

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Local regulation of energy and carbon from buildings









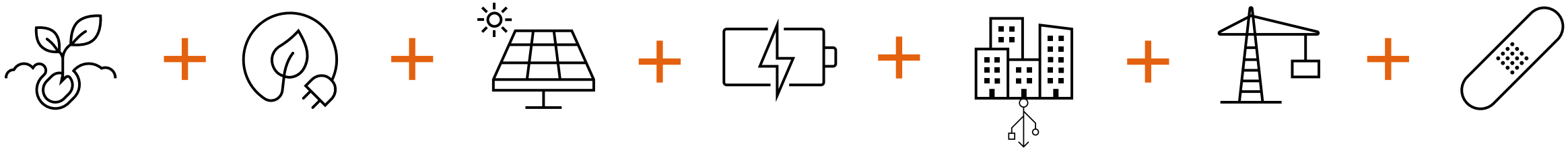
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3. Sustainable practices in the Built Environment



How can we decarbonize buildings?

The more carbon you save upfront, the less carbon offsets are needed.

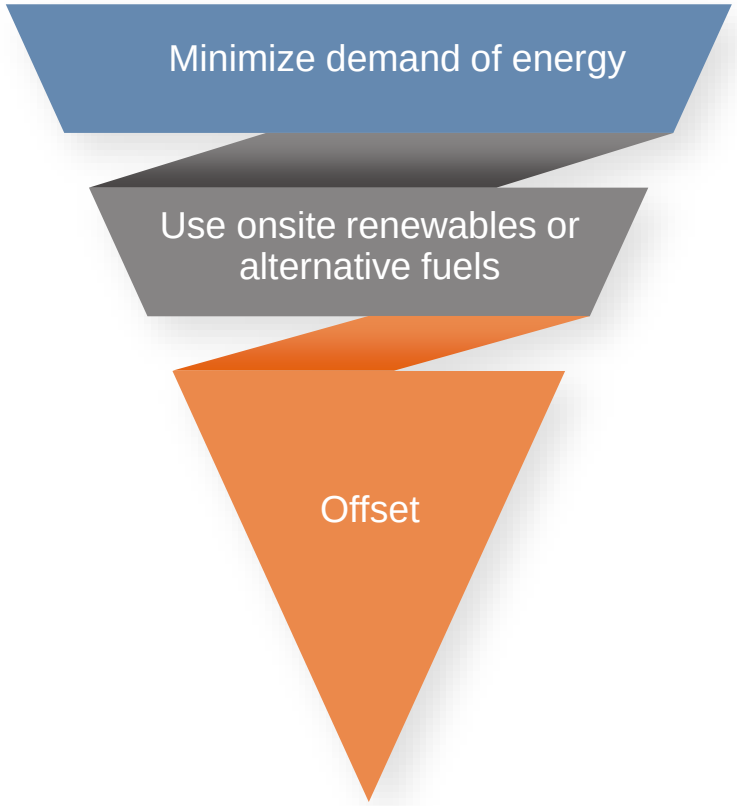


Smart Growth + **Energy Efficiency** + **Renewable Energy** + **Grid Integration & Storage** + **Building Electrification** + **Embodied Carbon** + **Carbon Offsets**

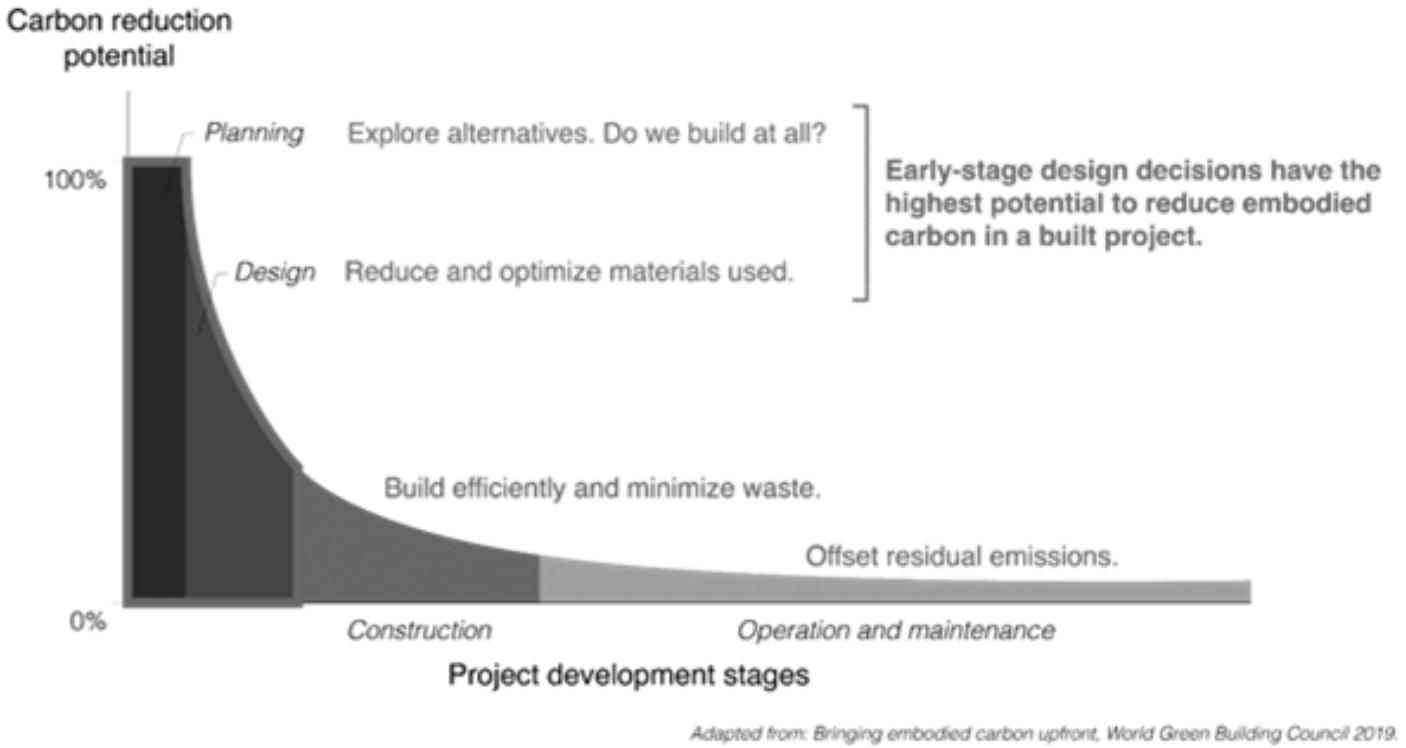
- **DEEP ENERGY RETROFIT** • DAYLIGHT HARVESTING • SOLAR PV • **GEOTHERMAL** • BATTERY STORAGE • **MATERIAL OPTIMIZATION**
- INSULATION • BUILDING FORM • RADIANT COOLING • **THERMAL STORAGE** • HEAT PUMP • STRUCTURAL OPTIMIZATION
- SPACE UTILIZATION • PASSIVE DESIGN • SOLAR THERMAL • **DISTRICT ENERGY** • ELECTRIC VEHICLE PARKING • EPDS & HPDS
- AIR TIGHTNESS • RIGHT SIZING • BIPV • COMMUNITY ENERGY • NET METERING • DESIGN FOR DISSASSEMBLY
- **15 MINUTE CITY** • EQUIPMENT EFFICIENCY • MICRO HYDRO • **MICRO GRID** • BIDIRECTIONAL CHARGING • DURABILITY
- BUILDING ORIENTATION • RADIANT HEATING • WASTE HEAT RECOVERY • LOAD BALANCING • SMART BUILDINGS • RIGHT TO REPAIR
- TRANSPORTATION • THERMAL COMFORT • DEMAND RESPONSE • PRECOOLING • PREHEATING • PREFABRICATION • MODULAR

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Tactics to achieve deep emission reductions



The price of carbon offsets are expected to increase. Act now by prioritizing solutions that will reduce the need for carbon offsets.



The cost of change increase per development stage.

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Space Conditioning & Fuels

Project	Ground Source Heat Pump	Building Energy Management Systems (BEMS)	Alternative Fuels
About	HVAC that uses the constant ground temperature to transfer heat	Use advanced technology to monitor, control, and optimize energy usage	Use renewable fuel sources as heating fuel
Benefits	• Maintains consistent indoor temperatures • Long lifespan • Space efficient within building	• Improved efficiency, reduced energy waste • Enables proactive maintenance • **Innovation: IoT devices, digital twins**	• Emissions are offset by the carbon absorbed during the biomass's growth • Diversified fuel sources improve resilience

Project	Heating, Ventilation and Air Conditioning (HVAC)	Solar heating and cooling	Combined heat and power (cogeneration)
About	Replace HVAC system; reduce system size; use low-GWP refrigerants	Use solar thermal collectors or heat pumps to harness solar energy	Simultaneous generation of electricity and useful heat from a single fuel source
Benefits	• Enhances indoor air quality • Maintains consistent indoor temperatures • Enables energy optimization	• Reduces reliance on fossil fuels • Enhances indoor air quality	• Recovered heat used for space heating, hot water production, etc. • Energy efficiency levels of 80%+ • Enhances energy resilience

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Efficiency & Renewables

Project	Insulation	Draft / Draught Proofing	Solar Shading
About	Adding insulating materials to walls, ceilings, floors, and roofs.	Sealing unintended openings with specialized materials.	Fixed: canopies, awnings, overhangs, solar control glazing Dynamic: blinds, shades, screens
Benefits	• Prevents leakage of conditioned air • Maintains consistent indoor temperatures • Reduces heating and cooling needs	• Prevents leakage of conditioned air • Maintains consistent indoor temperatures • Reduces heating and cooling needs	• Reduces solar heat gain • Maintains comfortable indoor temperatures • Optimizes natural light

Project	LEDs	On-site Renewables	Off-site Renewables
About	Replace bulbs with high efficiency LEDs	Install solar panels within client site boundaries (rooftop or ground mount)	Enter contracts for renewable electricity from utility-scale projects
Benefits	• Increased efficiency and long lifetime • Improved lighting quality • Reduced heating load	• client uses power directly • Improves resilience • Parking shades reduce heat gain in cars	• Multi-year contracts simplify procurement and can hedge against future REC prices • Supports new renewable energy projects

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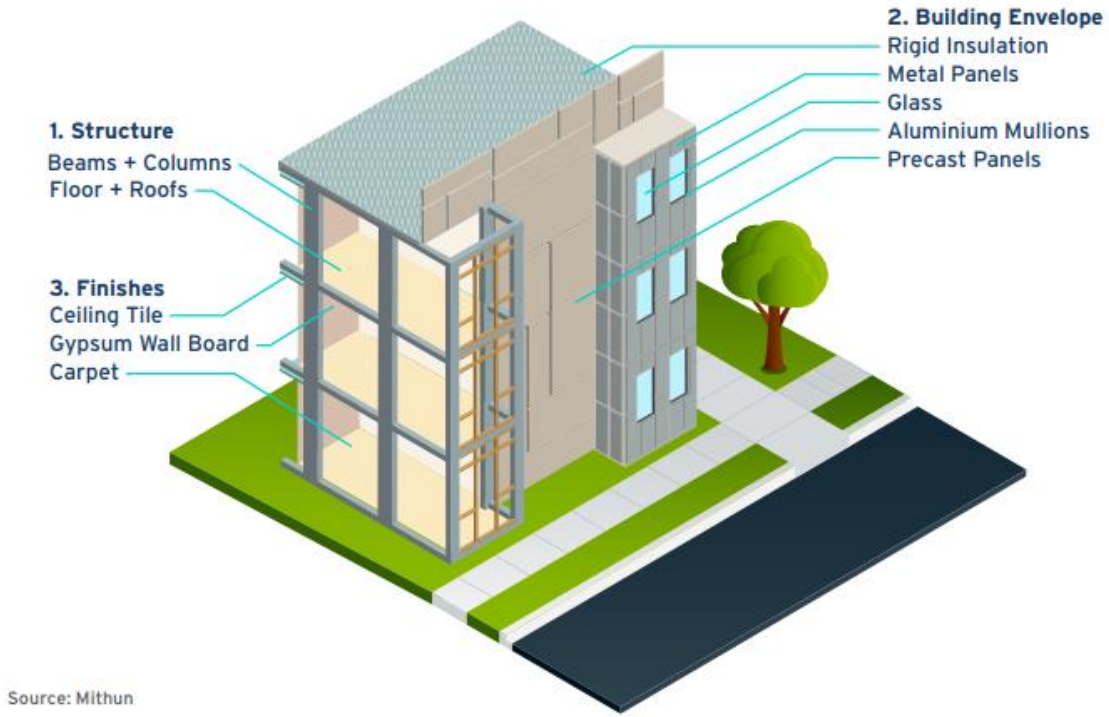
Innovative & Behavioral

Project	Solar Glass	Transpired Solar Collectors	Battery Storage
About	Replace glass façade with transparent solar glass	Perforated metal sheeting acts as solar collector to preheat ventilation air	Install batteries to store electricity for use during spikes in demand
Benefits	• Fewer space limitations • client uses power directly • Improves resilience	• Improved efficiency, reduced energy waste • Ideal for sunny climates with long heating seasons	• Improves resilience • Extends benefits of onsite solar • Contributes to grid stability

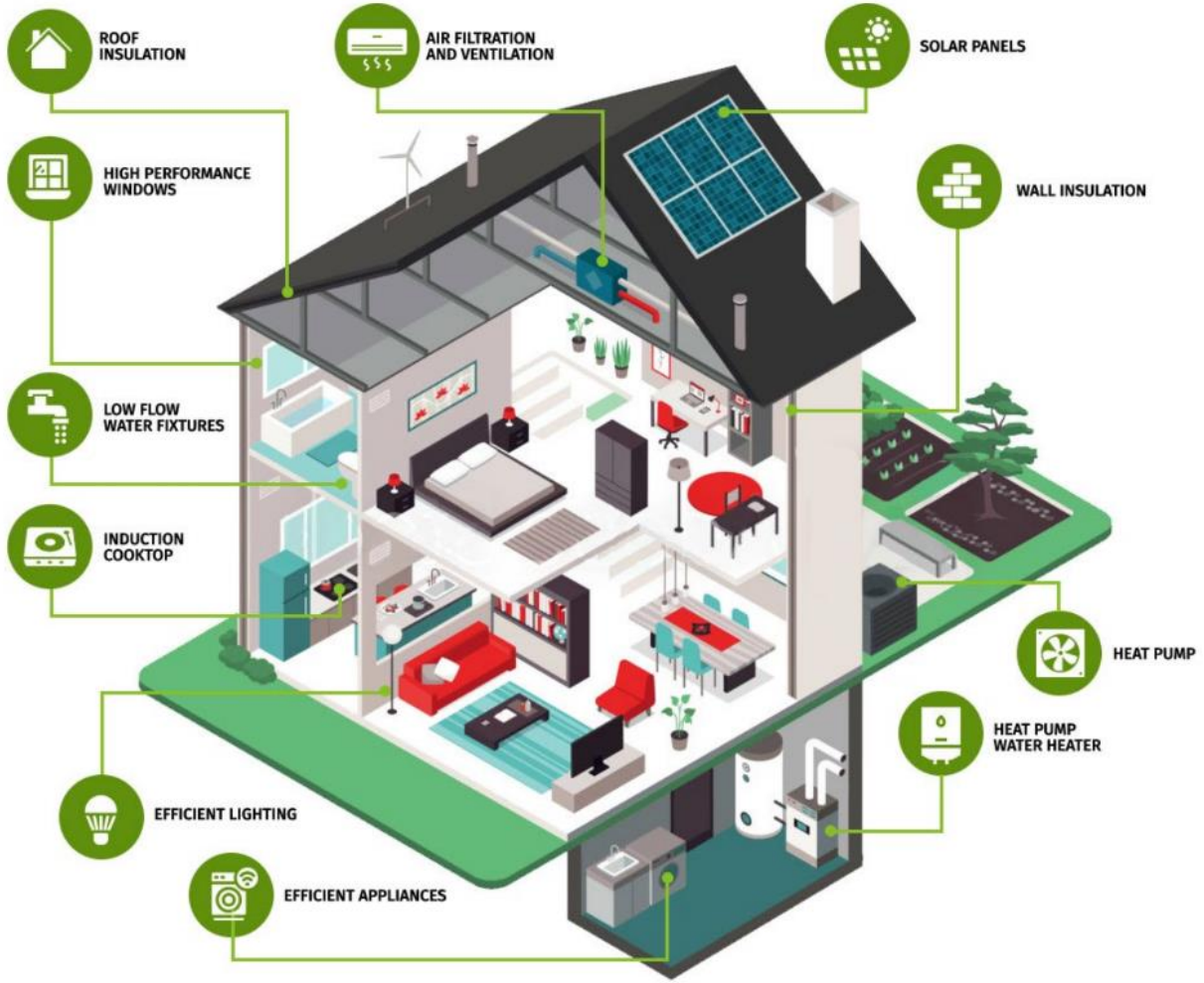
Project	Temperature Schedules	Days In Office	Real Time Energy Use Displays
About	Optimize set points and schedules based on occupancy load	Optimize in-office time (e.g., assign specific days to teams, close some floors Fridays, etc.)	Display building energy use to occupants and hold reduction contests
Benefits	• Improved efficiency, reduced energy waste • Improved occupant comfort	• Yields space reduction • Enables idling of unused space	• Raises employee awareness • Gamifies energy use • Prompts energy-saving behavior

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Sustainable Building



Source: Mithun



Typical high-embodied-carbon structural elements, building envelope materials, and finish materials

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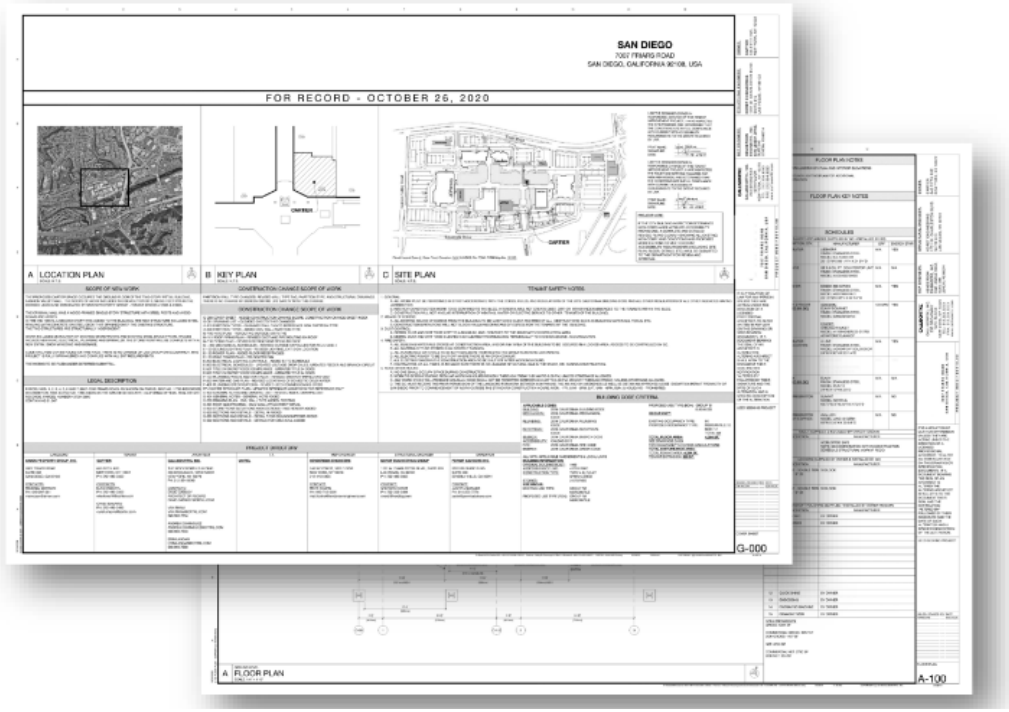


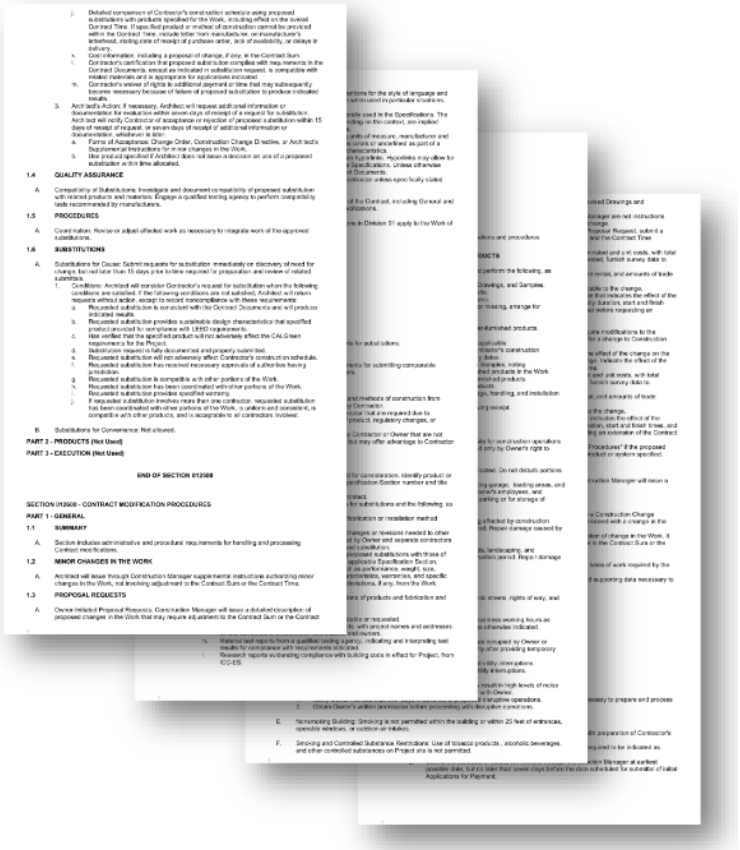
4. How to spec in sustainable practices?

Specifications

Communicating Intent

Contract Documents are compiled of multiple sections. Specifications are the written part of the contract documents.

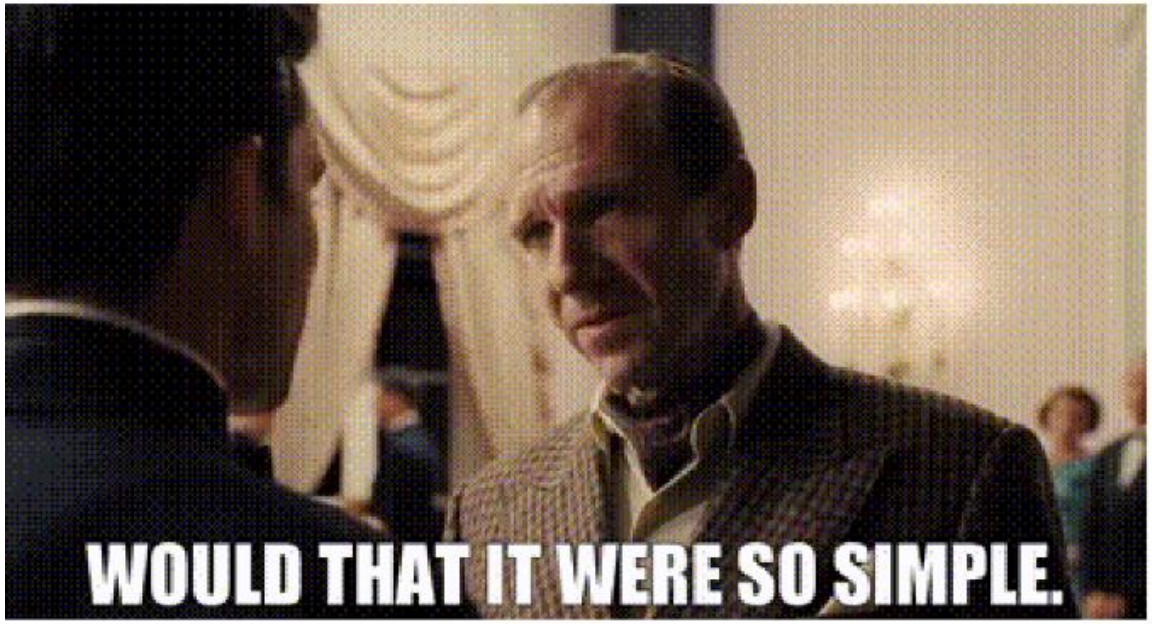


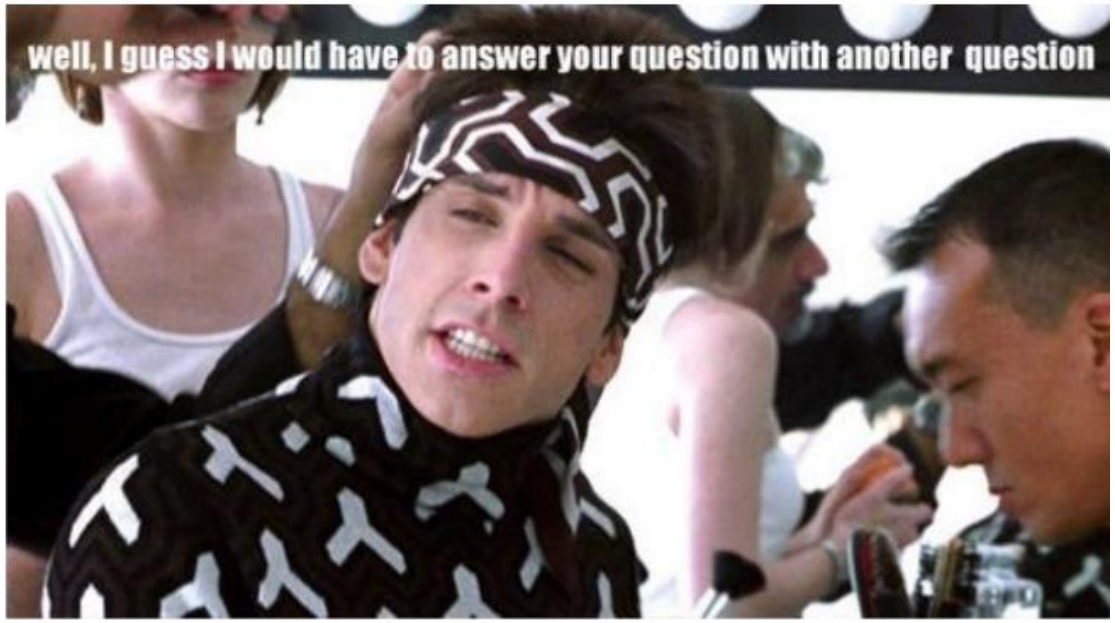


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Sustainability + Specifications

Specifications are complex





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Developing Effective SPECS

Integrative Process

- The specs **won't have any special magic** if the design team hasn't already selected the sustainable products & materials that make the difference.
- The Specifier is documenting the design decisions in a written form (while the design team does so in a graphic form).
- How can the design teams make sustainable decisions and better convey their design to the Specifier, to then convey to the contractor.



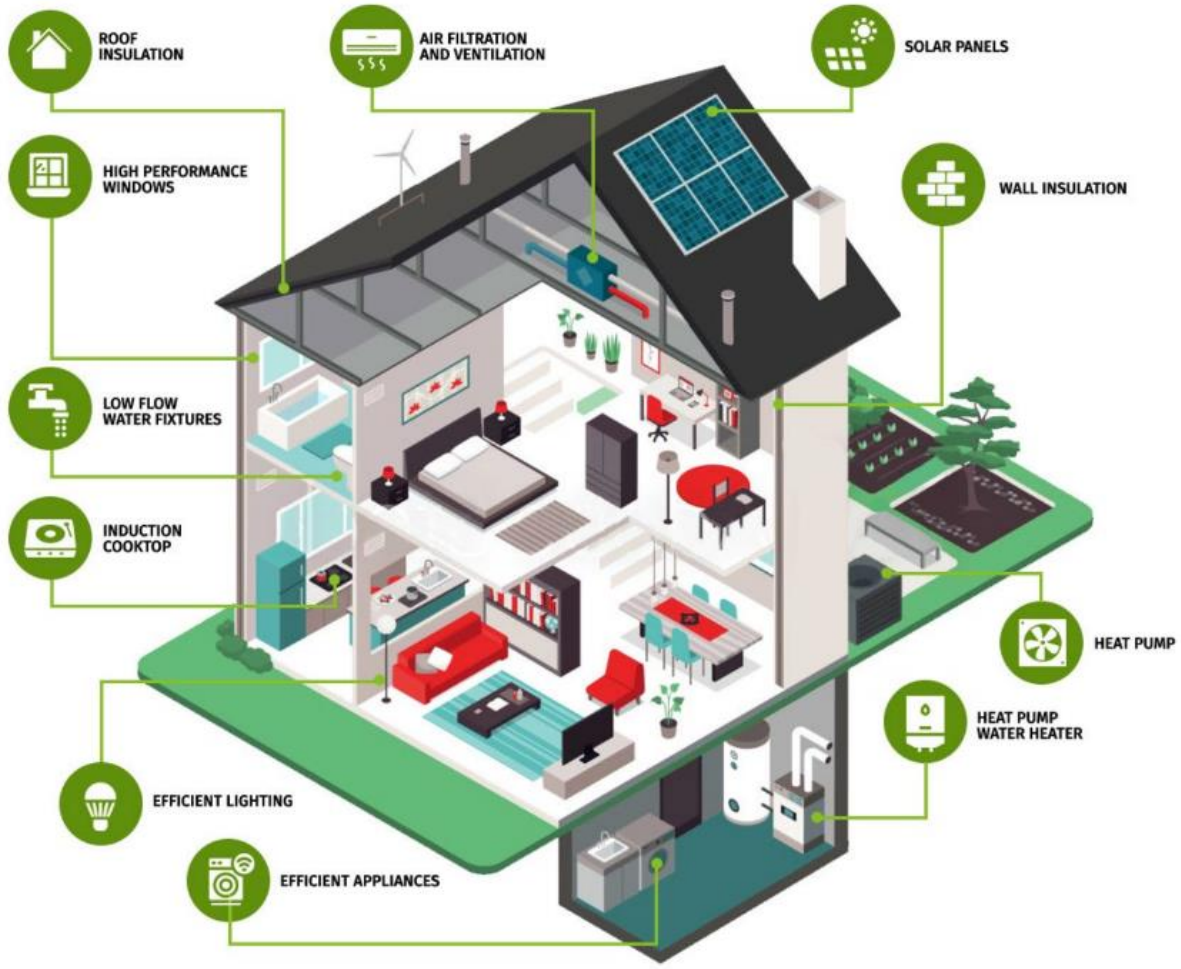
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Sustainable SPECS

Intended Outcomes

When it comes to sustainability, how the project gets constructed is narrated through specifications, to hold the GC accountable to our design intent. Potential impacts include:

- Environmental Performance
- Occupant Health (IEQ)
- Social Responsibility



Source:https://bit.ly/2X6ye6P

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Legal Mechanics of Sustainable Practices

Municipal Regulatory and Proprietary Solutions

[New or Rehab. Construction]

- **Local Legislative Mandates**
  - Fossil Fuel Free Mandates / Buildings
  - Requirements for Publicly Constructed facilities
- **Sustainable Procurement Practices [local ordinance or policy]**
  - Invitation for Bids – Minimum Criteria
  - Requests for Proposals – Minimum and Comparative Criteria
    - Emissions
    - Water usage
    - Renewable sources/distributed generation
  - Energy Procurement Contracting

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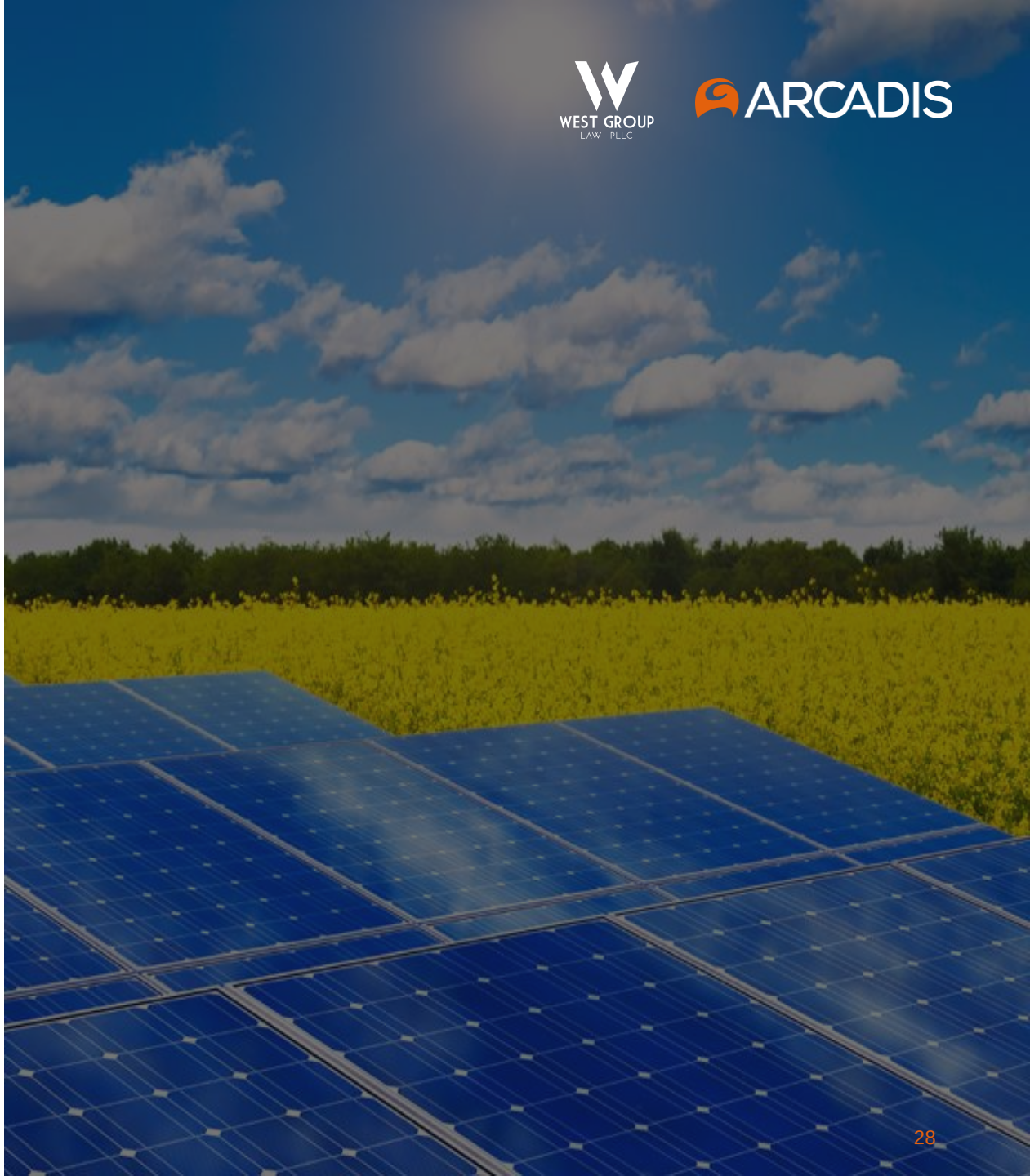
Green Building

Green Building

The Green in Green

LEED CERTIFICATION – A Framework of Strategies and Processes

- Building Design
- Building Construction
- Building Operations
- Building Maintenance



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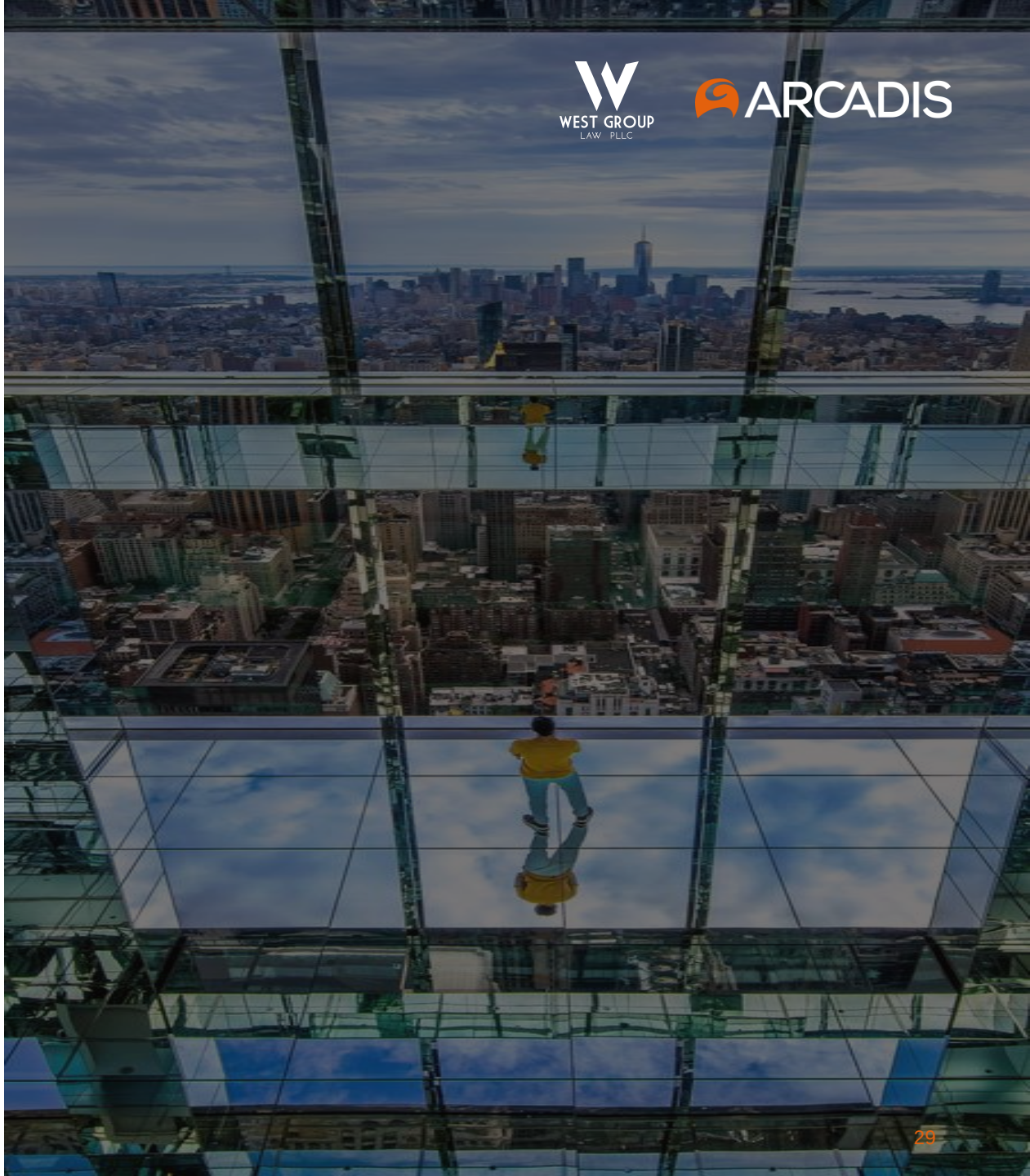
Green Building

The Green in Green

New or Existing Construction

- Entire Building or Interior Spaces
- Neighborhoods and Communities
- Certification Levels
- Certified 40-49 points
- Gold 60 -79 points
- Silver 50 59 points
- Platinum 80+ Points

Find the value in LEED Certification – State – Federal – Local



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State codification of Green Building

Many states have enacted green building codes

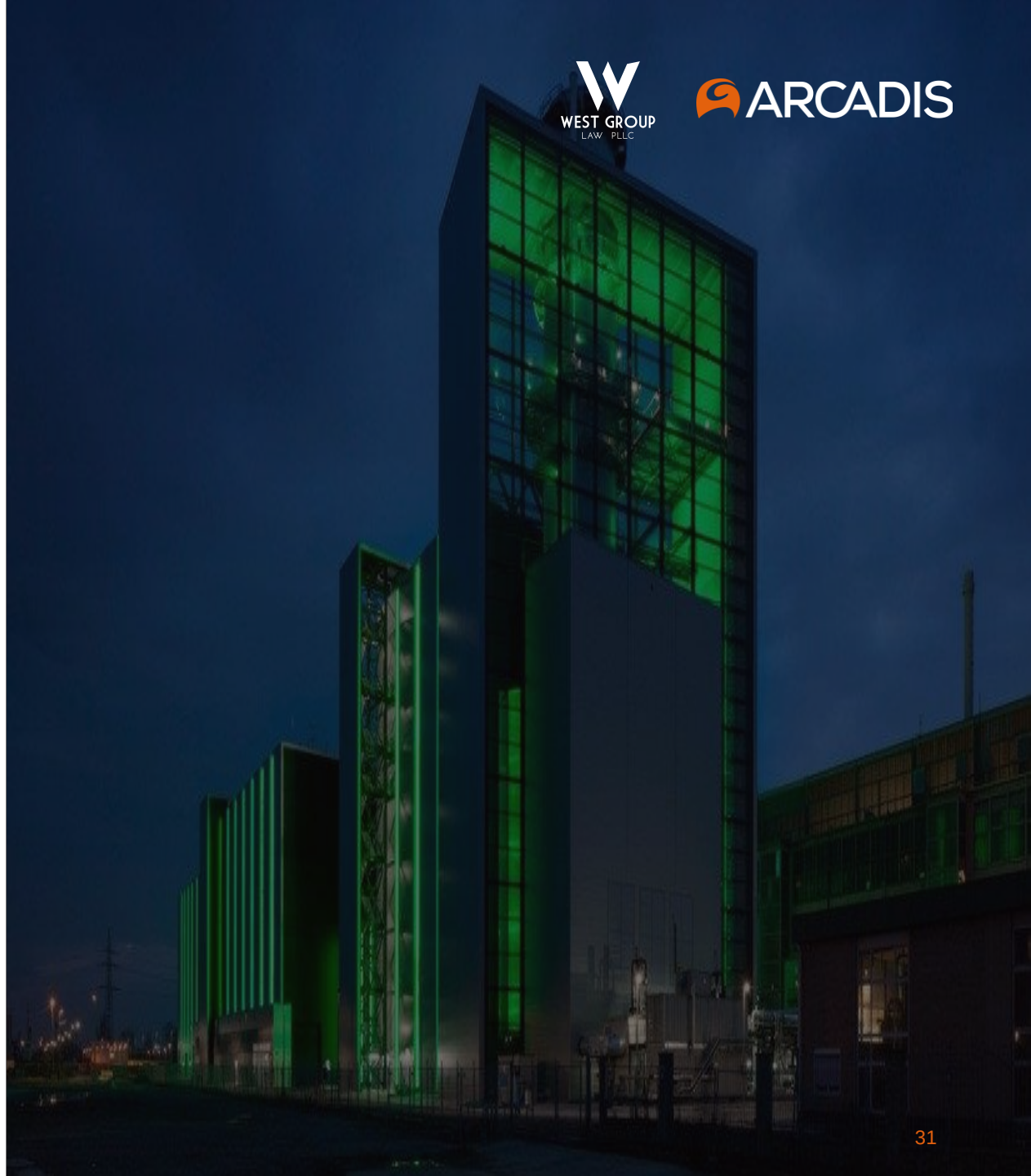
- Rhode Island “stretch Code”
- Other key state codes
  - California
  - Colorado
  - Virginia



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Green Building – The Green in Green Why LEED in non-codified states?

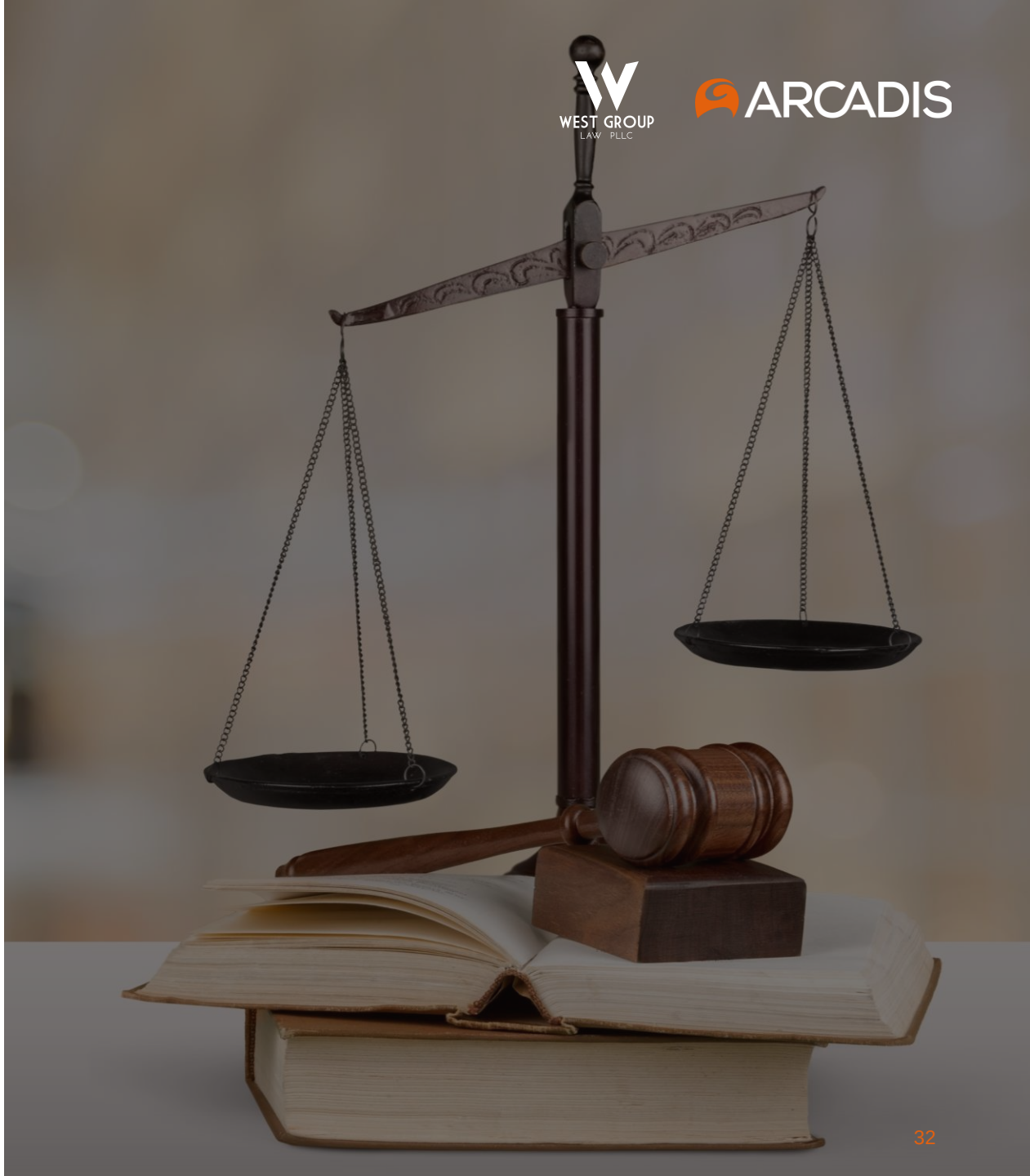
- Voluntary basis
- Guides construction or reconstruction
- of a building
- Beneficial ends
  - Use less energy/water
  - Less negative impact on the environment
  - High level of occupant health/safety/Comfort



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Procurement Authority for Sustainable Practices

- State Law
- Home Rule Authority
- Special Legislation



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Mechanics of Sustainable Procurement – The Offering

- Project Overview, Description & Objectives
- Scope of Services
- Description of Existing Facilities
- Performance Requirements/Energy Source Restrictions
- Evaluation Criteria
- Reference Documents
- Life Cycle Analysis
- Carbon Footprint Analysis
- Forms/Appendices



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Mechanics of Sustainable Procurement

- Include conceptual design criteria
  - Performance specifications
  - Technical specifications (General)
- Identify key business terms
  - Term sheet
  - Contract principles
  - Negotiable/non-negotiable terms
- Draft agreement
- Pricing Form
- Proposal Bond
- Form of guaranty



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Evaluation Criteria

Standards that measure how well proposal meets requirements, needs and expectations of the project

- Experience and Qualifications – similar scope, size and purpose
- Demonstrate understand project
- Technical/Business Approach
- Price proposal
- Adherence to instructions and requirements/completeness of response
- Ability and willingness to meet all of the responsibilities and performance guarantees
- Selection not based solely on economics, but is a factor in the evaluation process



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Energy Performance Contracting

– Overview

- Contract with an Energy Service Company (ESCO) to provide:
  - Comprehensive set of energy (and water) conservation measures (ECMs)
  - Renewable energy and distributed generation measures.
- Contract contains a guarantee that the resulting savings will finance the project costs.

Demand Side



Production Side



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Energy Performance Contracting - ECMs

Energy Conservation Measures: Demand-side

Capital improvements to buildings equipment, devices, materials, and/or software to be installed at the site, such as

- Heating
- Air Conditioning
- Hot Water
- Fans & Pumps
- Lighting
- Equipment
- Facility Alterations
- Building Envelope
- Building Controls

- Training programs on newly installed systems
- Operation and Maintenance Services [optional]



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The Performance Phase

– Measurement and Verification

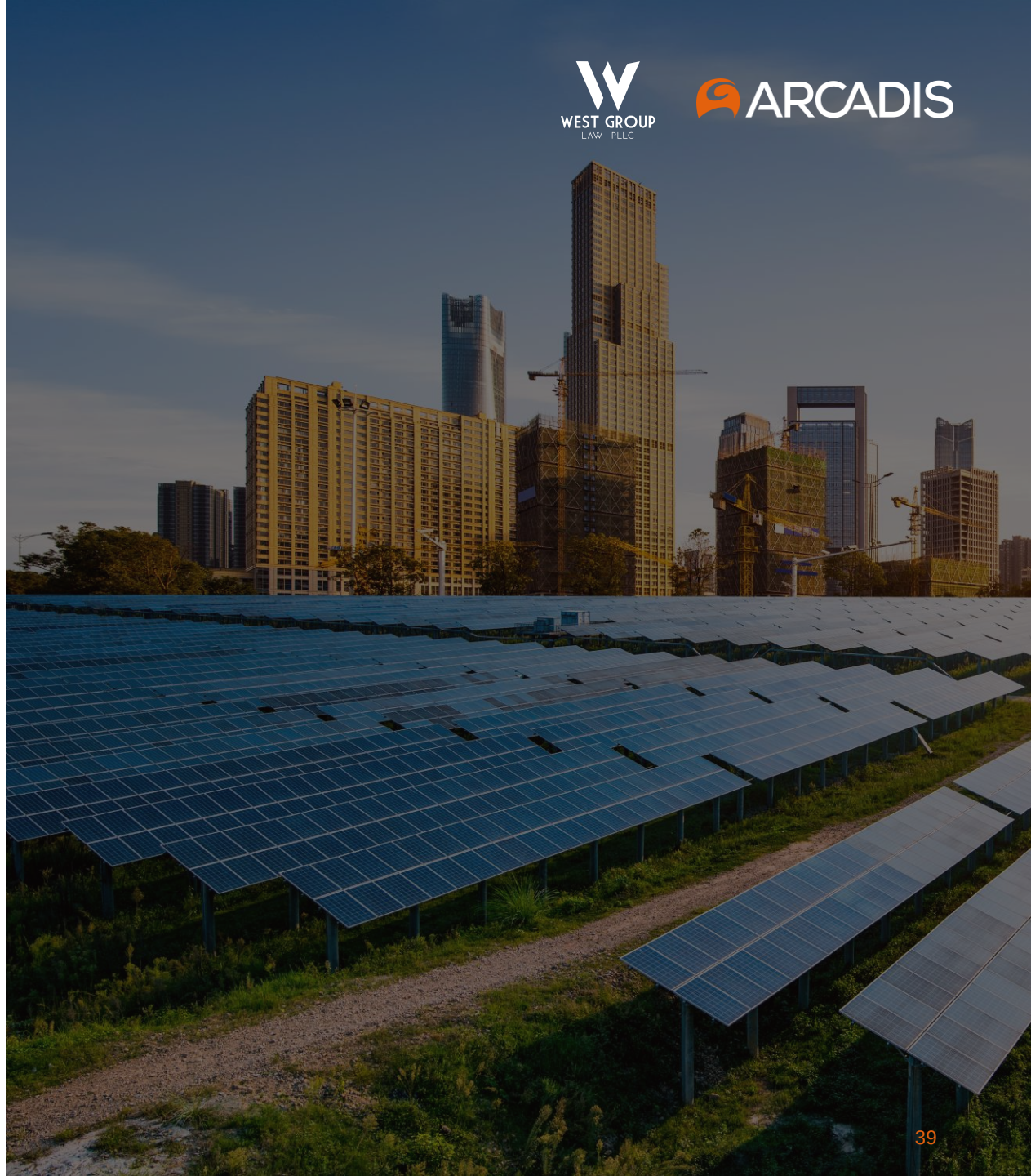
- Is the system doing and saving what it was supposed to?
  - Measurement and Verification (M&V) of savings is the operative cornerstone of the contract's savings guarantee.
  - M&V are ongoing processes during the term of the agreement to ensure that the entire project cost is paid for my the energy savings
  - ESCO will be contractually obligated to ensure energy savings will finance the project costs



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Energy Performance Contracting

- Demand Side Reductions
- Existing Facilities
- Savings Guarantees
- Minimum Performance
- Public Private partnership



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5. Case studies

Case Study – Local Legislative Option

- Fossil Fuel Free Demonstration
- The City of Cambridge has adopted an ordinance that will require future buildings to be fossil fuel free. City Council voted to approve the act on August 7, 2023. The Massachusetts Department of Energy Resources (DOER) approved Cambridge's ordinance in December 2023, and it will go into effect on March 22, 2024.
- The new ordinance will impact:
  - new buildings, and
  - existing buildings that undergo a major renovation
- Exceptions from the new rules were made for some building and equipment types. You can read the full act here.

- Why are we doing this?
  - The state legislature created a program for ten communities to implement fossil fuel free requirements, and Cambridge is one of the ten communities allowed to participate.
  - Making buildings fossil fuel free means healthier homes and workplaces.
  - It will help Cambridge reach our climate goals.

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Case Study – Ruijgoordweg 80

Amsterdam, Netherlands

Arcadis is contributing to the circular economy by writing a tender for the circular dismantling of an office building, Ruijgoordweg 80, on behalf of the Port of Amsterdam.

Client

- Port of Amsterdam

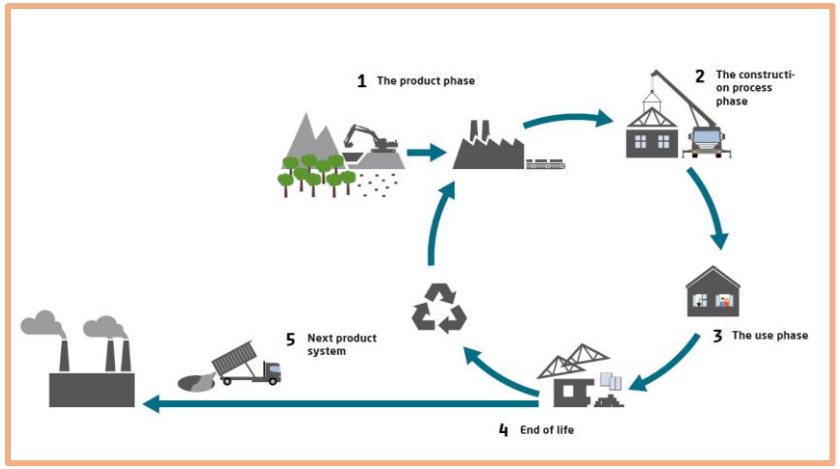
U.S. Places Technical Advisory Services

- Sustainability
- Project Management
- Process & Contract Management

Project data

- Date: October 2022 – February 2024





The Challenge

The Port of Amsterdam is enhancing its port area to improve accessibility and efficiency while developing for future sustainability. The port focuses on recycling various types of waste and fostering circular initiatives to reuse materials effectively. An office building on Ruijgoordweg is being preserved rather than linearly demolished to align with these sustainability goals.

The Solution

Port of Amsterdam asked Arcadis to develop a tender for the circular demolition of a well-maintained office building with the goal of maximizing the reuse of high-quality building materials. Arcadis created a tender that emphasizes material reuse and circularity, assessing contractors based on their approach to using and recycling materials.

They designed a **Plan of Approach** and a **Scorecard** to evaluate and incentivize contractors for their circular practices, even allowing those with higher bids but better reuse strategies to win the contract. Arcadis also provided project management and oversight to ensure that the demolition adhered to circular economy principles.

The Impact

Four themes emerged that were of great importance to the client:

1. Circularity
2. Energy and CO2
3. Knowledge sharing and safeguarding
4. Project management

Of these themes, special attention was paid to **circularity**: circular dismantling offers a great opportunity to reduce waste while sustainably building infrastructure for the future.

6. Q/A



7. Contact us

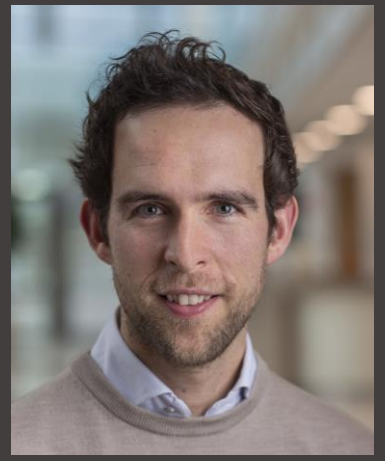


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Thank you
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