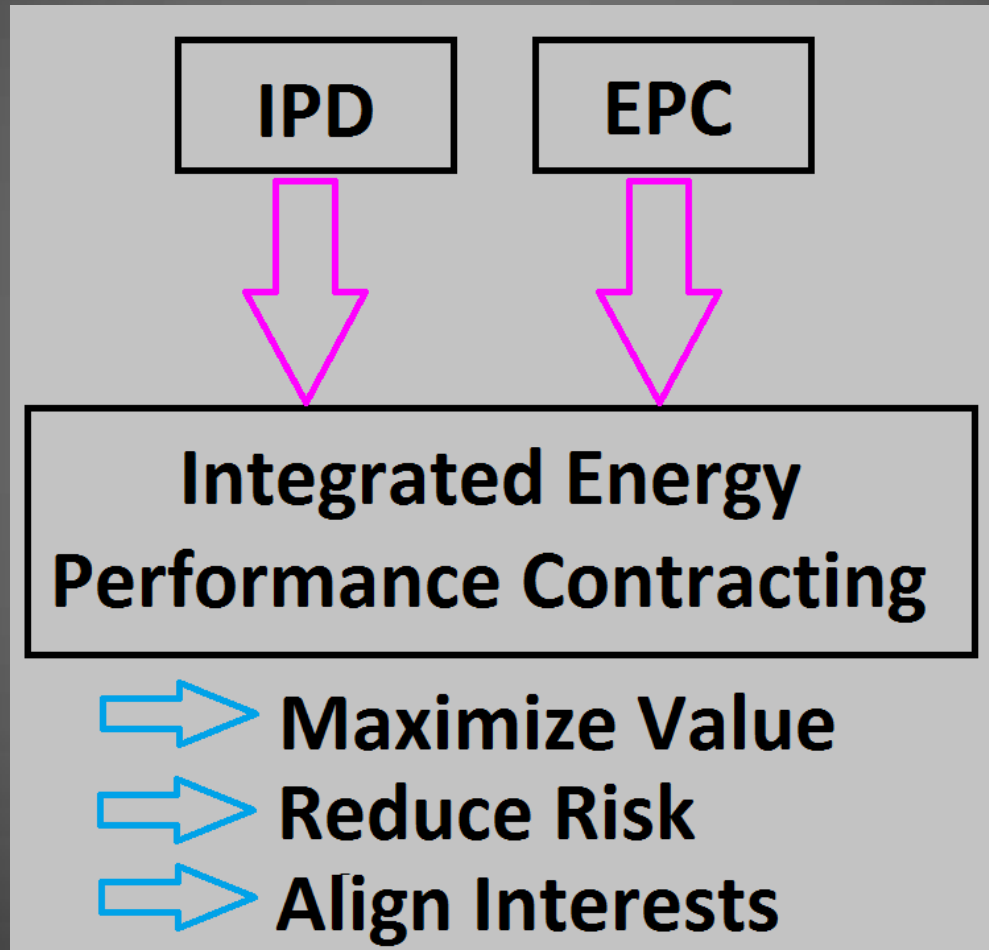


# STRATEGIC APPROACH TO BUILDING RETROFITS:

INTEGRATED ENERGY  
PERFORMANCE CONTRACTING  
(IEPC)

# LEARNING OBJECTIVES



# LEARNING OBJECTIVES

- 1) You will learn about Integrated Project Delivery.
- 2) You will learn about Energy Performance Contracting.
- 3) You will learn about the IEPC Model.
- 4) You will learn about deep energy retrofits, and aims to generate highest overall value while remaining cost-effective for building owners.

# MAIN TAKEAWAY



# MAIN TAKEAWAY



Sometimes, all it takes is a  
different perspective!

# INTEGRATED PROJECT DELIVERY

## Definition:

IPD is a project delivery approach that **integrates people, systems**, business structures and practices into a process that **collaboratively harnesses** the talents and insights of all participants **to optimize the results**, increase value to the owner, reduce waste, and maximize efficiency **through all phases** of design, fabrication, and construction.

- AIA National

# STATISTICS

- An *Economist* article from 2000 identifies:  
**30% waste** in the US Construction industry.
- A *US Bureau of Labor Statistics* study shows:  
A decreasing productivity in Construction since 1964... while other industries have increased productivity by over 200%.

# STATISTICS

- A 2004 Construction Industry Institute / Lean Construction Institute study suggests:  
As much as 57% of time, effort and material investment in construction projects does not add value to the final product, as compared to a figure of only 26% in the manufacturing world.



# PRINCIPLES OF IPD

- 1. Mutual Respect and Trust**
2. Mutual Benefit and Reward
3. Collaborative Innovation and Decision Making
4. Early Involvement of Key Participants
5. Early Goal Definition
6. Intensified Planning
7. Open Communication
8. Appropriate Technology
9. Organization and Leadership

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Mutual Benefit and Reward

Early Involvement of Key Participants

Early Goal Definition

Intensified Planning

Organization and Leadership

Appropriate Technology

**CONTRACTUAL**

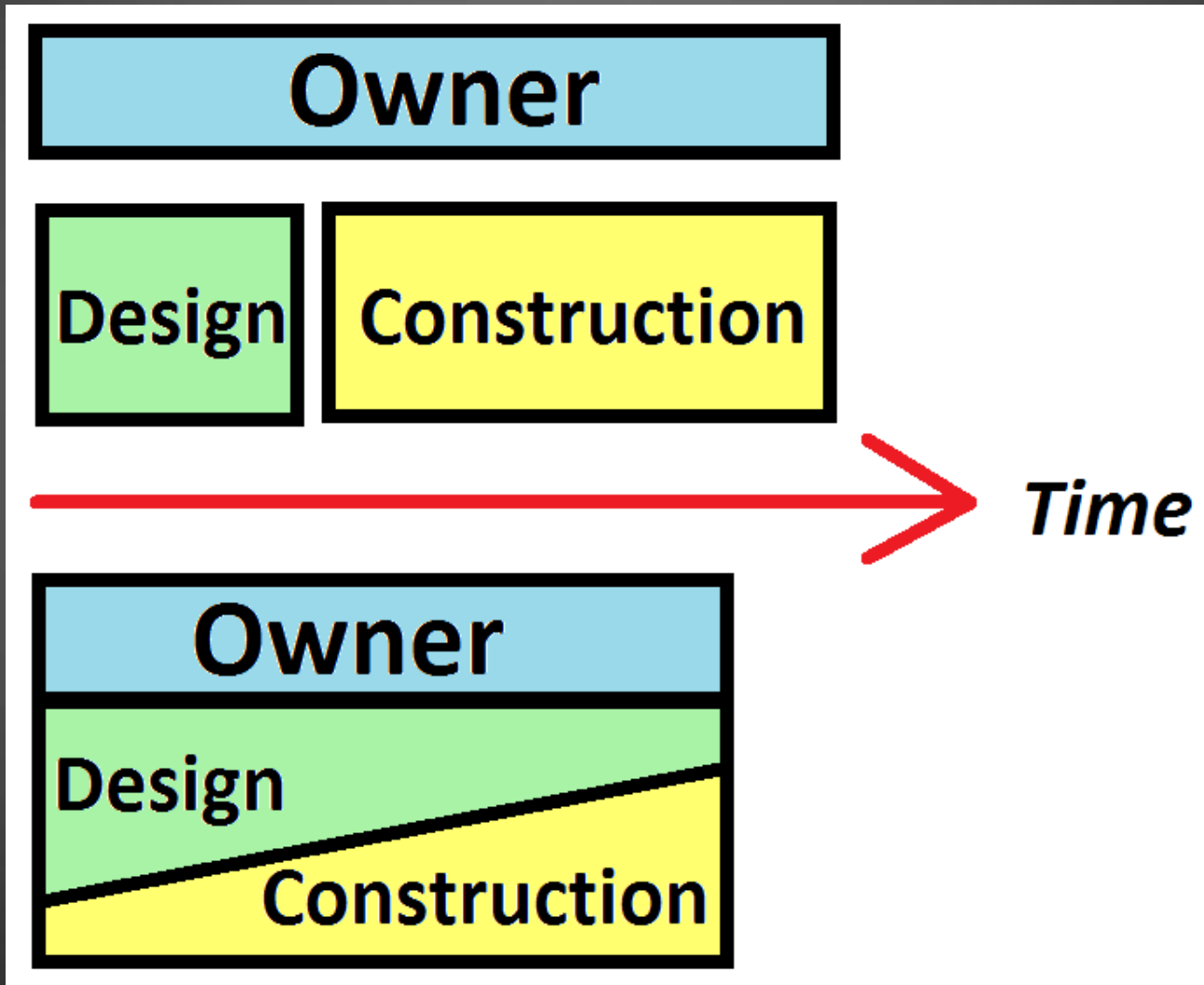
**BEHAVIORAL**

Open Communication

Mutual Respect / Trust

Collaborative Innovation

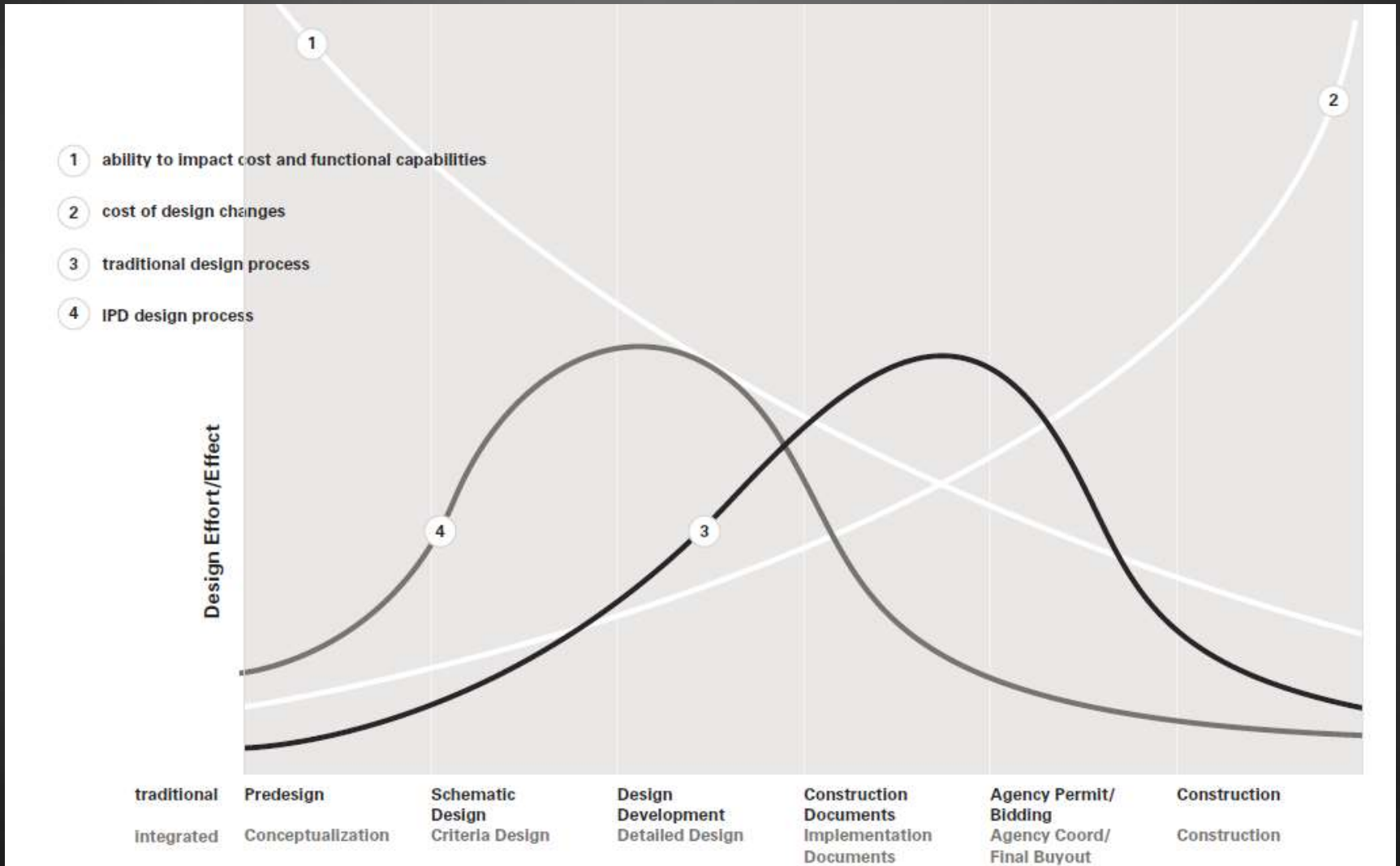
# ROLES / RESPONSIBILITIES



# MEASURING OUTCOMES

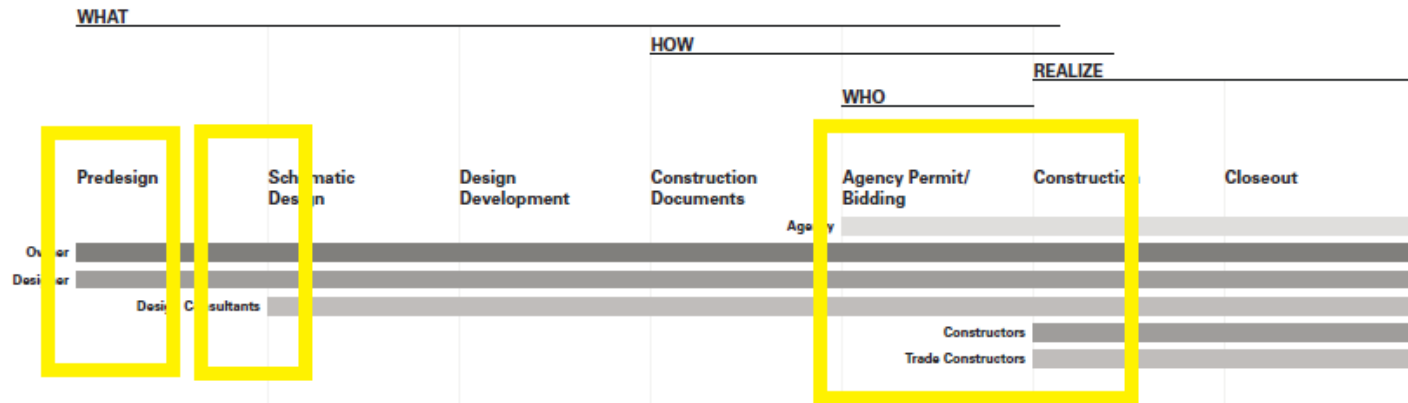
- Goals and Standards
- Project Cost
- Project Schedule
- Project Quality
- Operational Performance
- Sustainability

# PROJECT EXECUTION

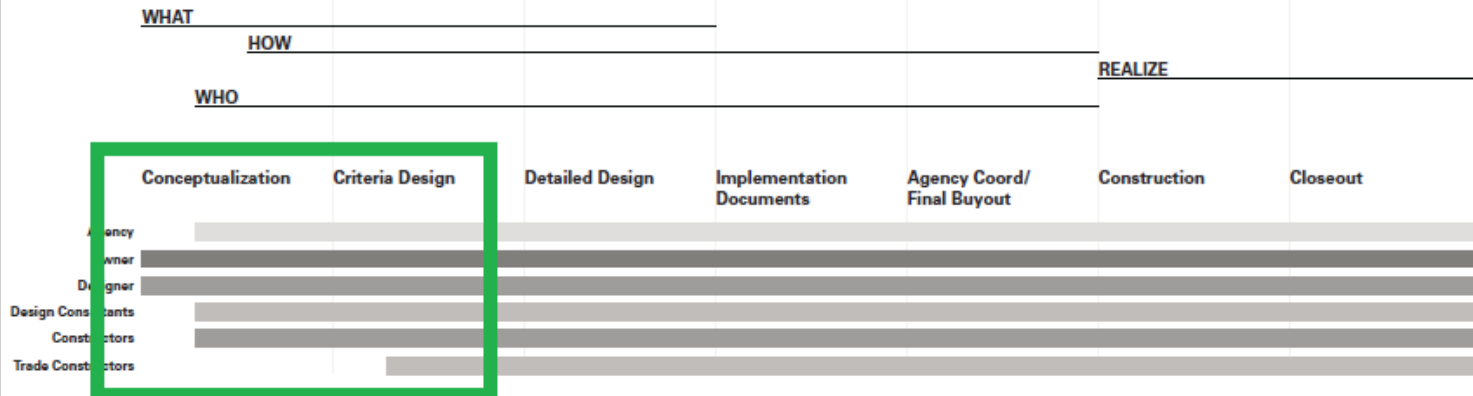


# PROJECT EXECUTION

## ○ Traditional Design Process

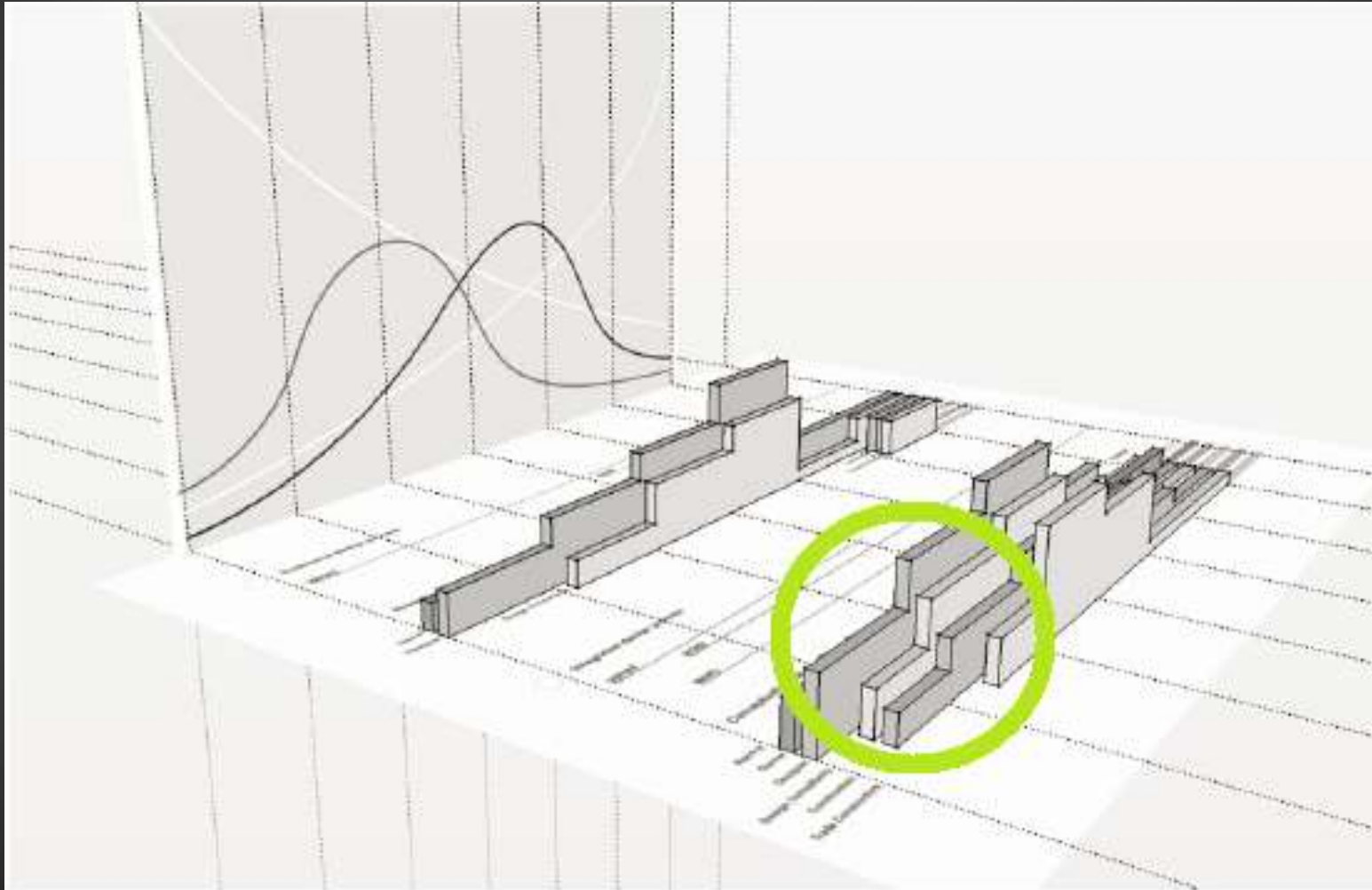


## ○ Integrated Design Process



*From the AIA California Council*

# PROJECT EXECUTION



# RISK AND COMPENSATION

Traditional Project Delivery		Integrated Project Delivery
<i>Individually managed, transferred to the greatest extent possible</i>	<b>Risk</b>	<i>Collectively managed, appropriately shared</i>
<i>Individually pursued, minimum effort for maximum return; usually first-cost based</i>	<b>Compensation/ Reward</b>	<i>Team success tied to project success; value-based</i>



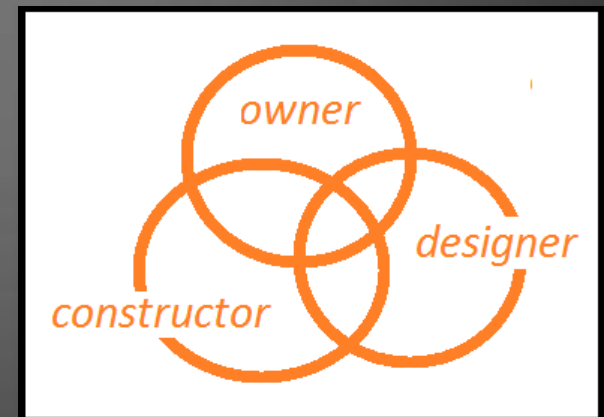
# CONTRACTS

## Multi-Party Agreement (MPA):

- Parties bound together by single agreement
- Tailored to support team environment
- Decisions seek **“Best for Project”** outcomes
- Compensation tied to project, not individual success

## 3 general forms have emerged:

- Project Alliances
- Single Purpose Entities
- Relational Contracts

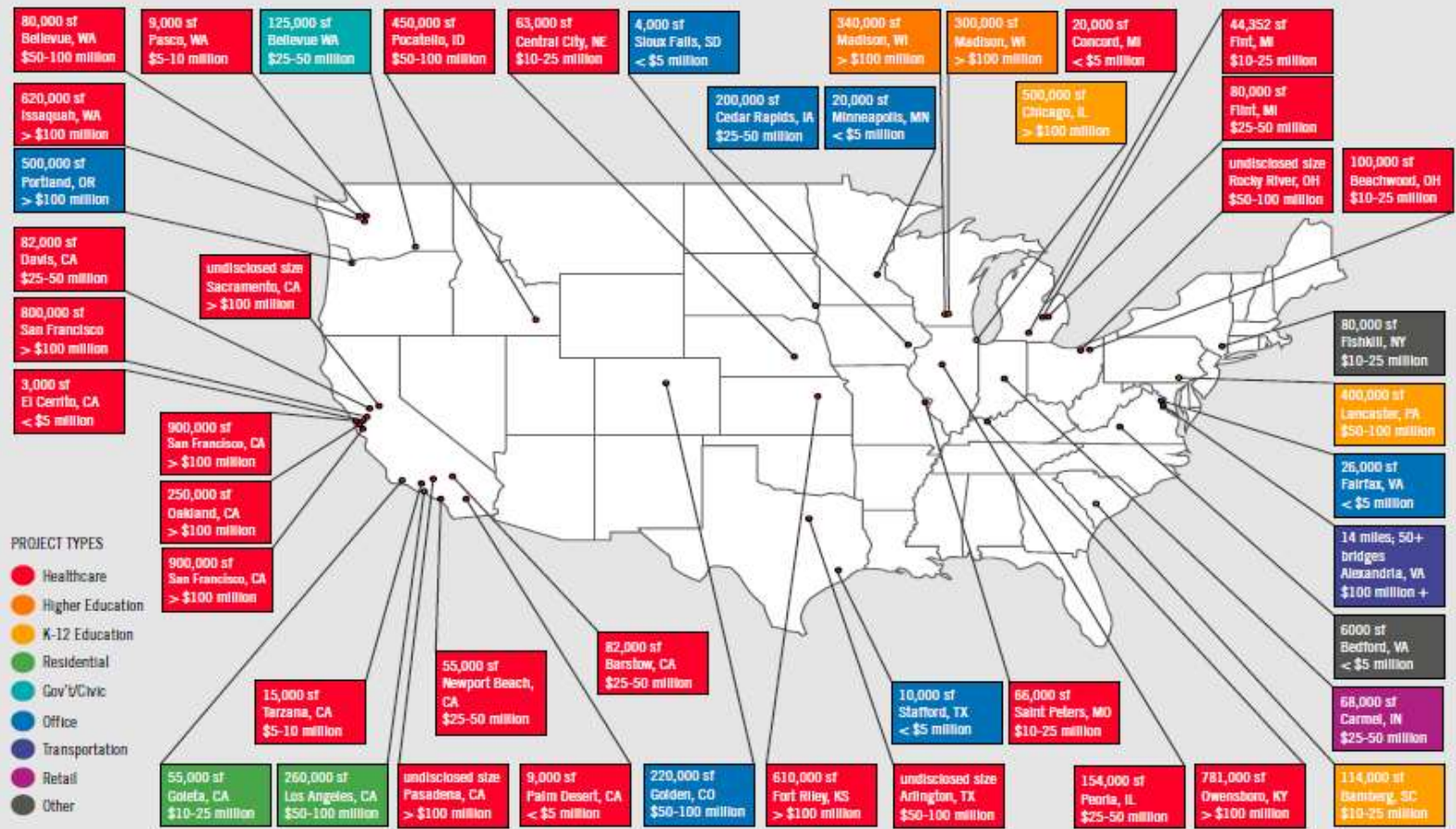


# IPD in the US

## SEPTEMBER 2010 AIA SURVEY OF PROJECTS NOW USING OR PLANNING TO USE AN IPD AGREEMENT

Survey done for the AIA/AIA-MN/UMN 2011 IPD Case Studies [www.aia.org/ipdcasestudies2011](http://www.aia.org/ipdcasestudies2011).

Map drawn by Kai Salmela under the direction of Renée Cheng, University of Minnesota



# ENERGY PERFORMANCE CONTRACT

## Definition:

Partnership between a client and an energy service company (ESCO). The ESCO conducts a comprehensive energy audit of facilities and **identifies improvements to save energy**. In consultation with the agency/client, the **ESCO designs and constructs** a project that meets the agency's needs. The **ESCO guarantees** that the improvements will generate **energy cost savings** to pay for the project over the term of the contract (up to 25 years). After the contract ends, all additional cost savings accrue to the client.

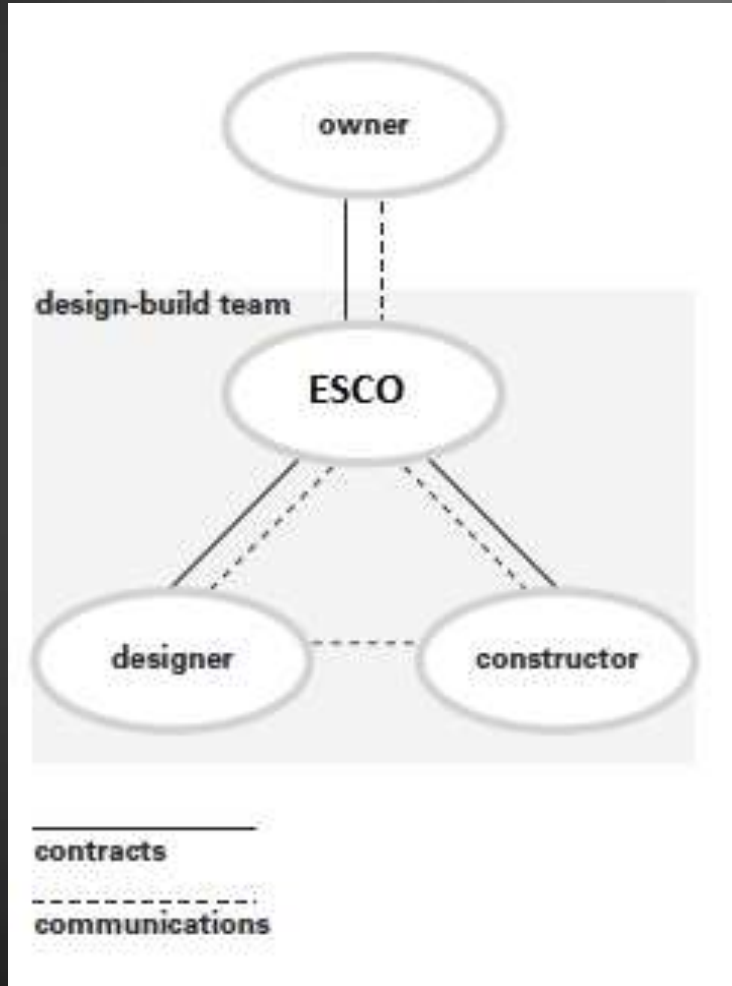
# ADVANTAGES

- Helps agencies meet goals:
  - Energy efficiency
  - Renewable energy
  - Water conservation
  - Emissions reduction

# ADVANTAGES

- Infrastructure improvements
- Healthier and safer environments
- Grants and subsidies available
- Guaranteed results
- Potential 3<sup>rd</sup> party financing
- Flexible and practical contract/  
procurement processes.

# STRUCTURE



The ESCO might also have in-house design and construction capabilities.

# SELECTION PROCESS

QUALITATIVE

QUANTITATIVE

# SELECTION PROCESS

- Based on team's approach, methodology and experience
- Compensation schedule:
  - \$/sq.ft for the audit
  - Design and CM fees
    - Often a **% of Construction Costs**



# WHAT HAPPENS

Professionals are paid  
to **SPEND**, not to **SAVE**.

# WHAT HAPPENS

- Limited time to think!
  - Higher implementation costs
  - Less savings captured
- Focus on low-hanging fruits and simple ECMs
- Few deep energy retrofits
- Limited accountability on project performance

# EXAMPLE



Material and Labor: \$900 k

Design Fee: 10%

CM Fee: 10%

Total Cost: \$1,080,000

**Design: \$90,000 / \$150/hr = 600 hours**

**2 engineers, roughly 8 weeks ---- LIMITED RISK**

**Pay Back Period: 10 years**

# INTEGRATED ENERGY PERFORMANCE CONTRACTING

- A combination of two models:
  - Energy Performance Contracting
  - Integrated Project Delivery

# INTEGRATED ENERGY PERFORMANCE CONTRACTING

Deep intervention in a building does not represent a major technical challenge per se.

A key obstacle is finding an appropriate contractual model that aligns stakeholders' interests, optimizes overall project value, and embraces the whole building for the entire life cycle of the project.

# LIKE the **EPC** MODEL

- Focuses on retrofit of existing buildings
- Energy savings are guaranteed
- Grants and subsidies are available

# LIKE the IPD MODEL

- Interests are aligned
- Systems are considered as a whole
- Substantial time and effort for feasibility studies and design
- Lean management practices
- Pursuit of innovation
- Team involved throughout project
- Captures the full value of a project

# SELECTION PROCESS

QUALITATIVE

QUANTITATIVE



# SELECTION PROCESS

- Based on team's approach, methodology and experience
- Priority given to project which best meets client's needs:
  - Highest Net Present Value
  - Lowest \$/ton of avoided CO2
  - Combination of factors (schedule, future EUI, asset renewal, renewables)

# EXAMPLE – Solution #1



Material and Labor: \$900 k

Design Fee: 10%

CM Fee: 10%

**Total Cost: \$1,080,000**

**Design:**  $\$90,000 / \$150/\text{hr} = 600$  hours

2 engineers, roughly 8 weeks ---- **LIMITED RISK**

# EXAMPLE – Solution #2



Material and Labor:

Design Fee:

CM Fee:

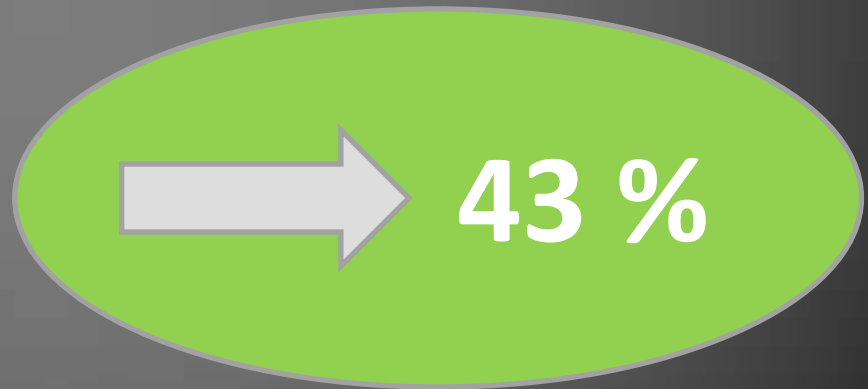
**Total Cost: \$ 500,000**

\* SAME SAVINGS AS SOLUTION #1

# EXAMPLE – Solution #2



Material and Labor: \$350k  
Design and CM fees: \$150k  
Total Cost: \$ 500,000



\* SAME SAVINGS AS OTHER SOLUTION

# Mount Sinai Beth Israel Brooklyn



# Mount Sinai Beth Israel Brooklyn

- Main drivers: \* Boiler replacement
  - \* Reduce energy costs
- Highlights:
  - Fully integrated project
  - Cost savings in excess of \$550,000 /year
  - ECMs included: Steam to hot water conversion, cogen, lighting, BMS and AHU upgrades.
  - **Energy Star rating went from 50 to 88**

# MONTREAL BIODOME



## Project Results

Energy bills

↓ **52%**

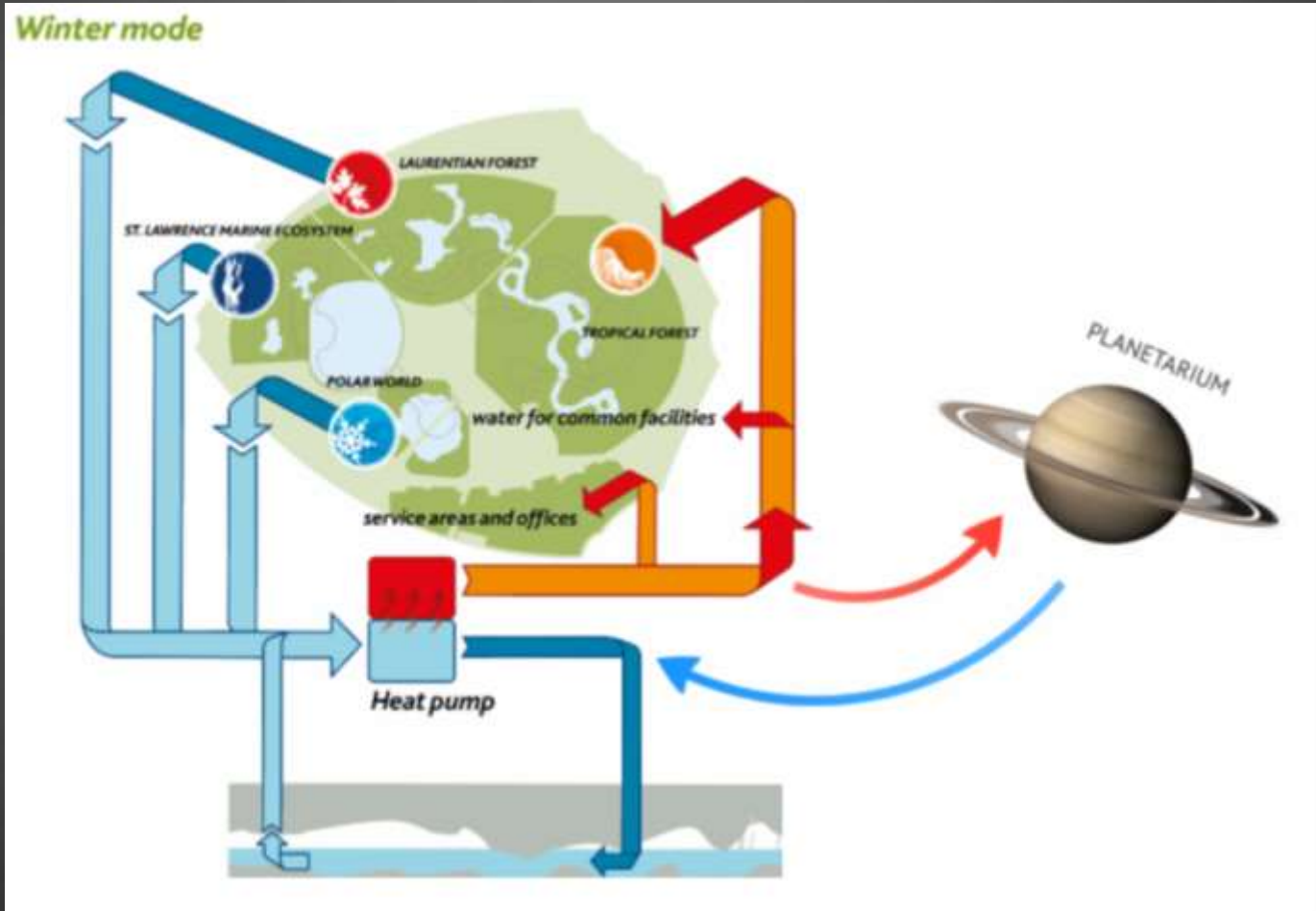
GHG Emissions

↓ **80%**

Energy Consumption

↓ **55%**

# MONTREAL BIODOME





# MONTREAL BIODOME

## Reasons why the client chose IEPC:

- Easier to Manage
- Less Risk
- Guaranteed Performance Metrics
- Quality and Value Over Low Cost
- Choice of Subcontractors
- Long Term Vision
- Optimization

# U.S. NAVY — Harvard Business Review (June 2014)

## The Situation:

- ❑ Taxpayers bore the brunt of cost-plus contracts that gave industry no incentive to hold down prices.
- ❑ With costs rising unsustainably for a new destroyer, they terminated production after three ships in favor of building more-advanced versions of the DDG-51.

# U.S. NAVY — Harvard Business Review (June 2014)

We tested two versions and liked both, but the proposed costs were too high, so we made the two shipyards compete against each other.

When their bids came back:

- price had been cut by 40%;
- we were able to buy 10 of each version (one more than planned)
- and still save \$3 billion.

# U.S. NAVY — Harvard Business Review (June 2014)

## The Solution:

- ❑ We made fixed-price contracts the norm.
- ❑ We introduced more competition.

- Raymond Ewin Mabus Jr.  
Secretary of the U.S. Navy since 2009

# IN CONCLUSION

- To capture the full value of energy retrofits, a new contractual model is needed.
- IEPC is a model that combines the advantages of both IPD and EPC.
- Interests of team members need to be aligned to maximize cost-effectiveness.
- It is not sustainable to pay professionals a percentage of construction costs.



**Enjoy the rest  
of your day!**

- Melissa Goyette

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