

LIGHTFAIR International 2020

Provider Number - Z136

Owning the Code

Course Number:

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Course Description

Lighting has delivered dramatic energy reductions over the past 20 years, more than any other technology. We are reaching diminishing returns on effecting further reductions. California's lighting codes are quickly becoming too complex and difficult to implement, don't represent the interests of all stakeholders, and now must focus on adapting to the changing energy infrastructure and the rapid integration of information and data technology into the industry. The only way to achieve this is through a coalition of government, NGOs, manufacturers, contractors, specifiers, and owners. As the world's fifth largest economy, California has a unique opportunity to continue its tradition of successful energy and environmental regulation.



Learning Objectives

At the end of the this course, participants will be able to:

1. Examine the history of California lighting codes and how they have both responded to and driven the evolution of innovation in design and technology.
2. Explore models and best practices for successful stakeholder engagement that strengthen the impact and effectiveness of the code making process.
3. Investigate strategies for evolving California code to be able to adapt to future changes in the energy infrastructure, utility business model, and information and controls technology
4. Explain how lighting code can lead efforts to incentivize technology development in integrated controls, advanced storage, renewables and smart grid





Owning the Code



IALD

Tradeshow
May 3-7

Conference
May 5-7

Las Vegas Convention Center
Las Vegas, NV, USA



Big Ideas

1. Codes & standards are created by a complex and interdependent network of organizations
2. The balance between government, NGOs and private sector requires constant maintenance: much of this process is broken and needs fixing
3. You must participate

How Lighting is Officially Regulated

Passed into law by a governing body having jurisdiction:
Federal, State, Local

Adopted into law by a governing body: Model codes, Model ordinances



Codes

- Electrical safety (National Electrical Code)
- Code required listings and certs (UL standards, certified testing labs)
- Energy efficiency (IECC, ASHRAE/IES 90.1, CA Title 24 Part 6)
- Sustainability (IGCC, ASHRAE/IES 189.1, CA Title 24 Part 1)
- Life safety – egress (IBC, CA Title 24 Part 2)
- Regs for Elevator, Hospital, School, ATMs



Rules Developed by AHJs

- EPA (Energy Star)
- DOE (Lighting Facts)
- OSHA (special regulations for certain industries e.g. ports and longshoring)
- Special regulations for certain industries (e.g. railroads)
- FAA (aviation lights)
- USCG (nautical lighting)
- California Coastal Commission



Lighting Facts Per Bulb	
Brightness	820 lumens
Estimated Yearly Energy Cost	\$7.23
<small>Based on 3 hrs/day, 11¢/kWh Cost depends on rates and use</small>	
Life	1.4 years
<small>Based on 3 hrs/day</small>	
Light Appearance	
Warm 2700 KCool	
Energy Used	60 watts

State & Local Laws & Ordinances

Reach codes

Outdoor lighting

- Dark Sky regulations
- Anti light trespass regulations
- Anti glare regulations
- Safety and security requirements (minimum illuminance)

Products/Appliances

- California Title 20

BAYREN



What are “Quasi-regulations?”

Never passed into law by a law-making body

Not within the jurisdiction of rule-making bodies

Often not subject to normal legal scrutiny

- Anti-trust?
- Independent?
- Influential?
- American National Standards Institute (ANSI) certified?



Product Standards



Recommended Standards or Design Practices



Some Industry Specific Standards

- AASHTO and FHWA (Street lighting)
- API (Petrochemical)
- Television requirements for sports
- SEPTED (security and safety lighting)



FHWA

AASHTO



Standards for Specific Purposes

Design Lights Consortium (DLC)

- Certified to DLC standards
- Essentially governs retrofit industry

American Medical Association (AMA)

Utility Incentives and Rates



Rules & Suggestions from Government Orgs



Industry Orgs Promoting “Standards”

Human Centric Lighting (HCL)

LRC/UL Circadian Lighting

USGBC LEED

Living Buildings WELL Standard



How About Title 24?

- Title 24 of the California Code of Regulations (20CCR & 24CCR)
Part 6 of the CA State Building Code
- Developed by the California Energy Commission
(created by the 1974 Warren Alquist Act)
- Requires all regulations to be cost effective, available from multiple sources, and have demonstrated impact
- Tri-annual revisions developed in an open public process

CA T24 Public Process

- Formal series of events lasting about 2 years
- Informal public workshops
- Formal code change proposals submitted
- Series of public hearings to discuss proposals
- Draft language developed by staff and posted for comment
- Comments must be answered but not agreed upon
- Final language posted for comment (limited mostly to minor edits)
- Adoption by CEC at a formal business meeting
- Code typically takes effect January 1 on each 3 year cycle

Trouble in River City



California Stakeholders' Laments



Designer:
I hate T24!
Just let me
design!



Contractor:
We'll just do
the minimum
possible for
compliance,
but now even
that's getting
too
complicated.



**Officials &
AHJs:**
We don't have
time or
resources to
enforce the
codes.



Manufacturer:
We don't get
enough notice
or info on
codes to
comply.



**Energy
Code Geek:**
I give
feedback
but don't
even know
if it makes a
difference.

What's Broken- Risks for Regulatory Failure

- Complexity & Inaccuracies in Current Code
- Overregulation & Micromanaging Milliwatts
- No requirements for actual energy monitoring and reporting
- Unprepared for decentralization, electrification, and IoT
- Non Compliance (Willful or otherwise)
- Stifling of Innovation and Growth
- Regulatory Capture – Corporations Eclipse Government
- More Inequality & Inefficiency
- More Environmental Degradation
- Compromised Energy Security
- Erosion of Faith in Government

Who "Owns" Title 24?

1978-1999

CEC Staff,

IES Regional
Energy
Committee

2000-2019

CEC Staff,

Statewide Utility
Consortium

2020-?

CEC Staff?

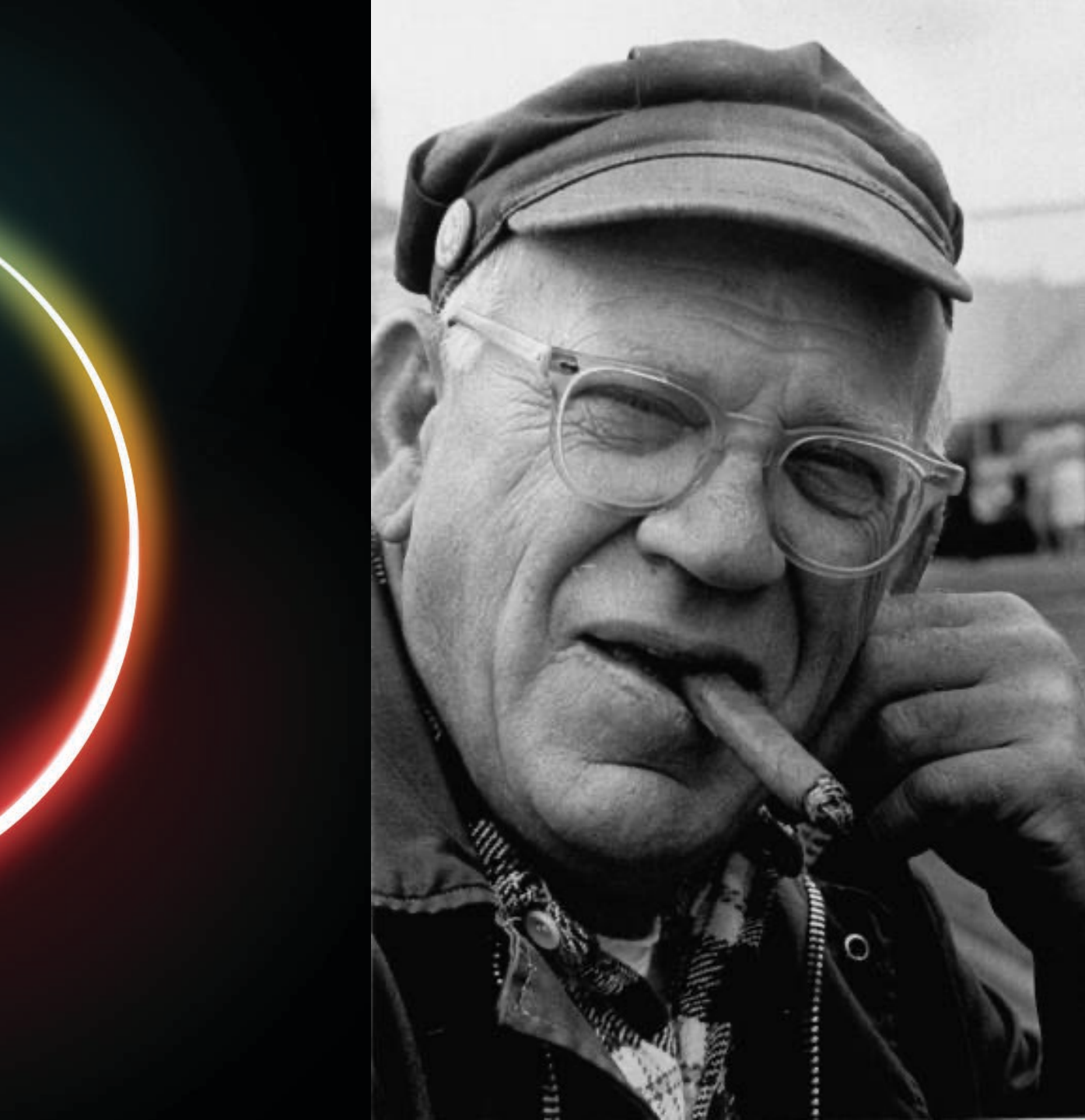
IES and/or
IALD?

Manufacturers?

CEA?

Statewide Utility
Consortium?

Stakeholders?




*Every great cause begins as a movement, becomes a **business**, and eventually degenerates into a **racket**.*

In a time of drastic change it is the learners who inherit the future.

The learned usually find themselves equipped to live in a world that no longer exists.

- Eric Hoffer

- 
- Codes & standards facilitate big transformations
 - We need to recalibrate the values behind codes
 - Markets and technology are driving significant transformation in our energy infrastructure
 - You must participate



Owning Regulatory Transformation



The Refrigerator Story: A Continuing Tale of Win-Win & Scale



Source: Energy Innovation

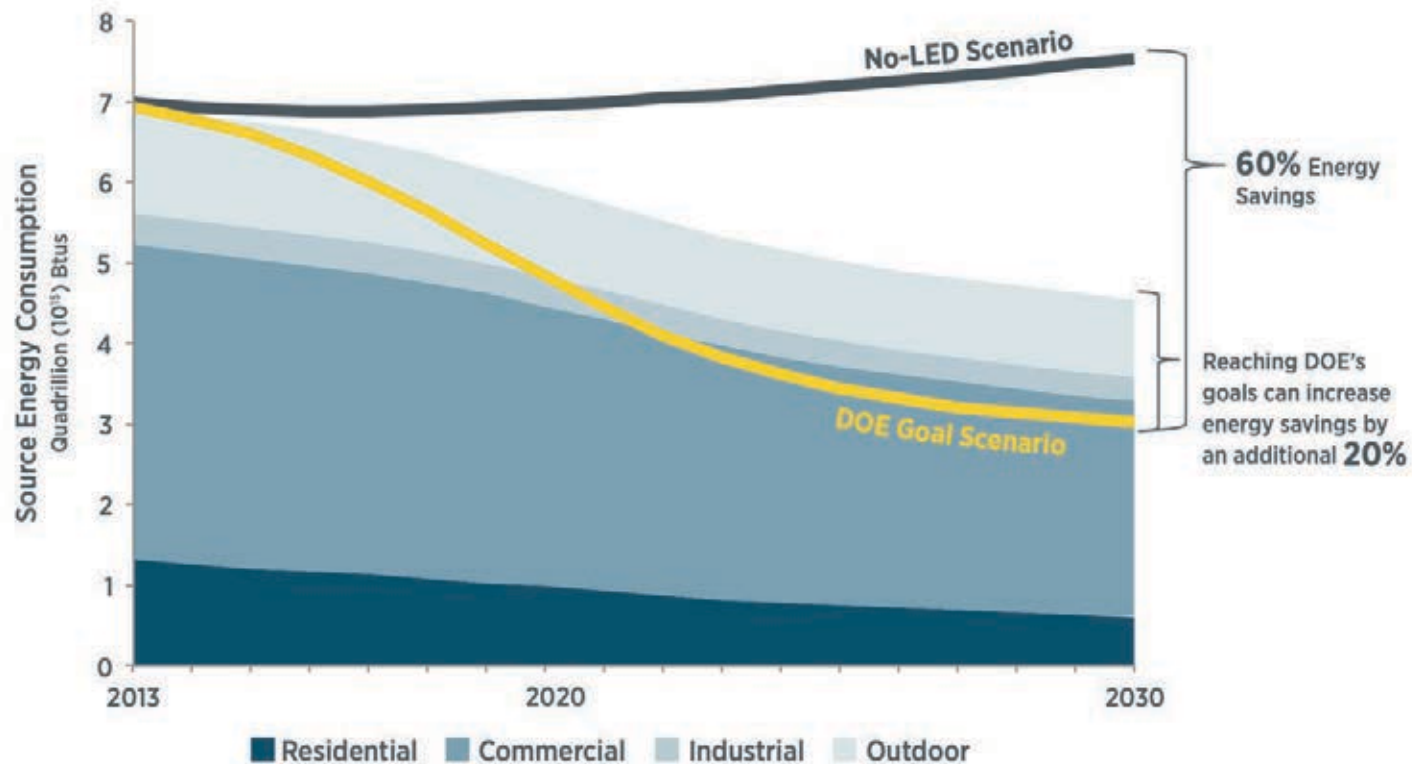


The Smog Story: Continuous Improvement





The SSL Story: Mission Accomplished



By 2030, SSL will reduce electric lighting energy by half, or 3,000 trillion Btus, worth \$26 billion 2018 USD

Equivalents:

- Energy use of 24M homes
- GHG reduction of 180 million metric tons
- taking 38M cars off road.



The LEED Story: Mixed Results



Pros:

1. Created a new model to replace traditional building practices
2. Increased awareness of energy efficiency
3. Useful templates and standards for government

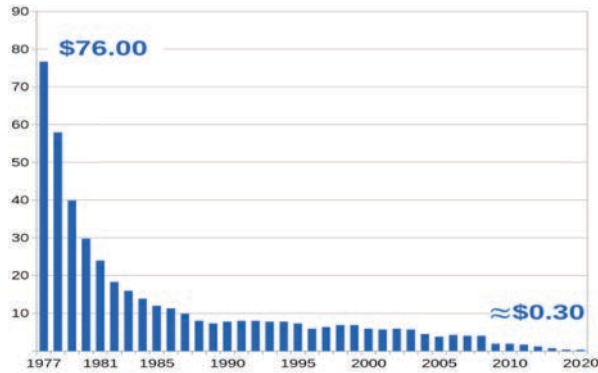
Cons:

1. Certification became a big business
2. Greenwashing
3. Glacial pace of industry change
4. Many glass boxes certified
5. We're still mostly not **MEASURING ACTUAL ENERGY USE !**

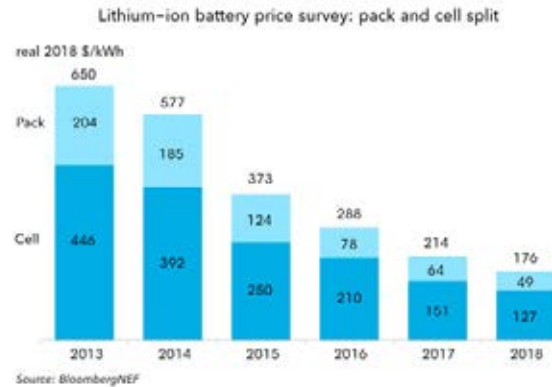
Owning the Market



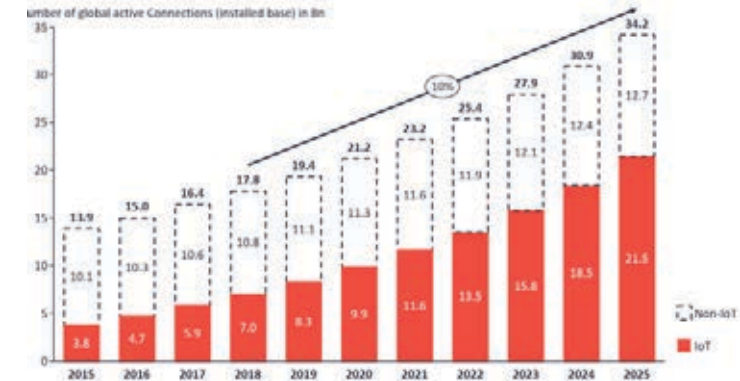
Market Forces Converging



Rapidly decreasing PV price: \$/W



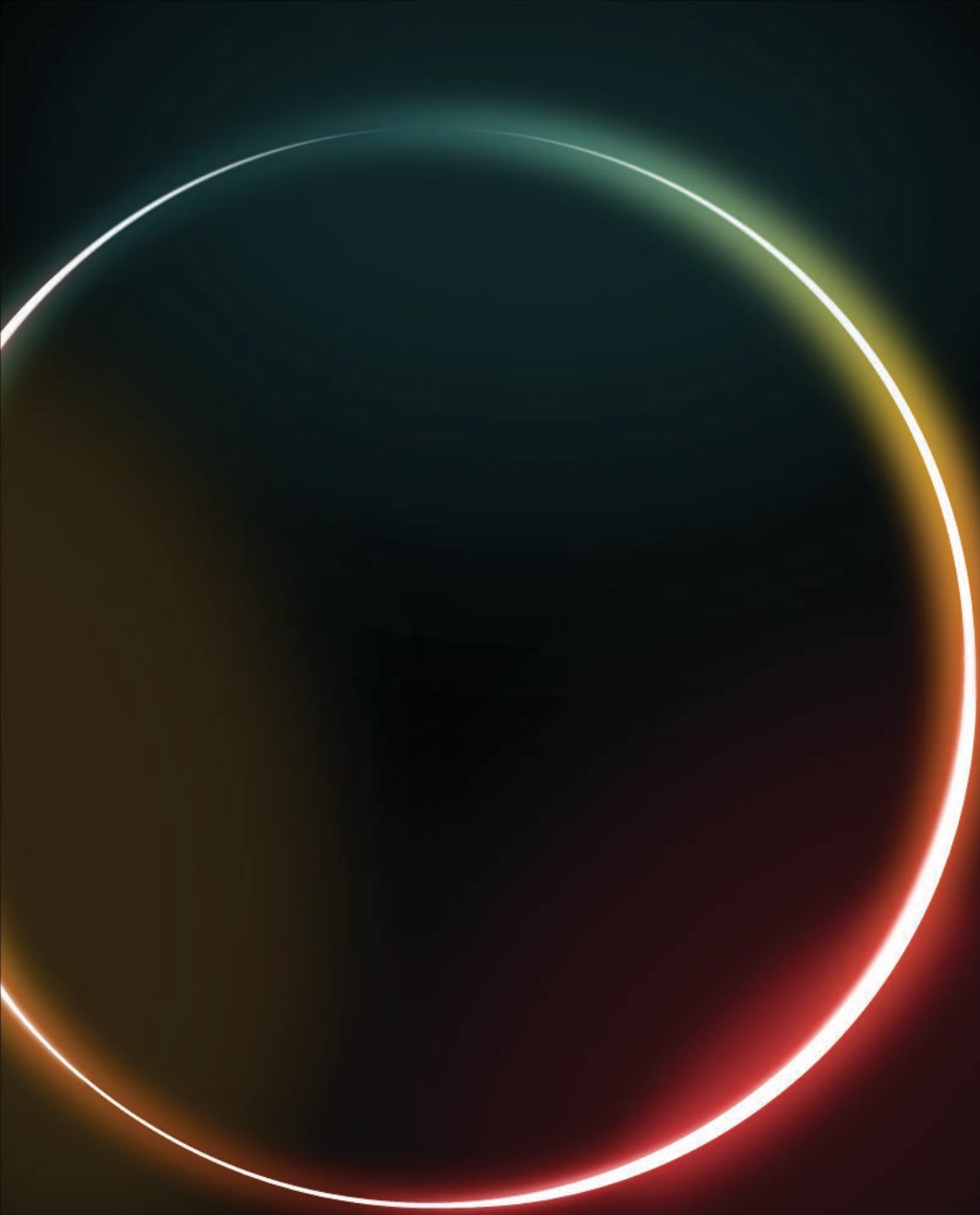
Rapidly decreasing Battery storage price: \$/kWh



Rapidly increasing global device connections: (Bn)

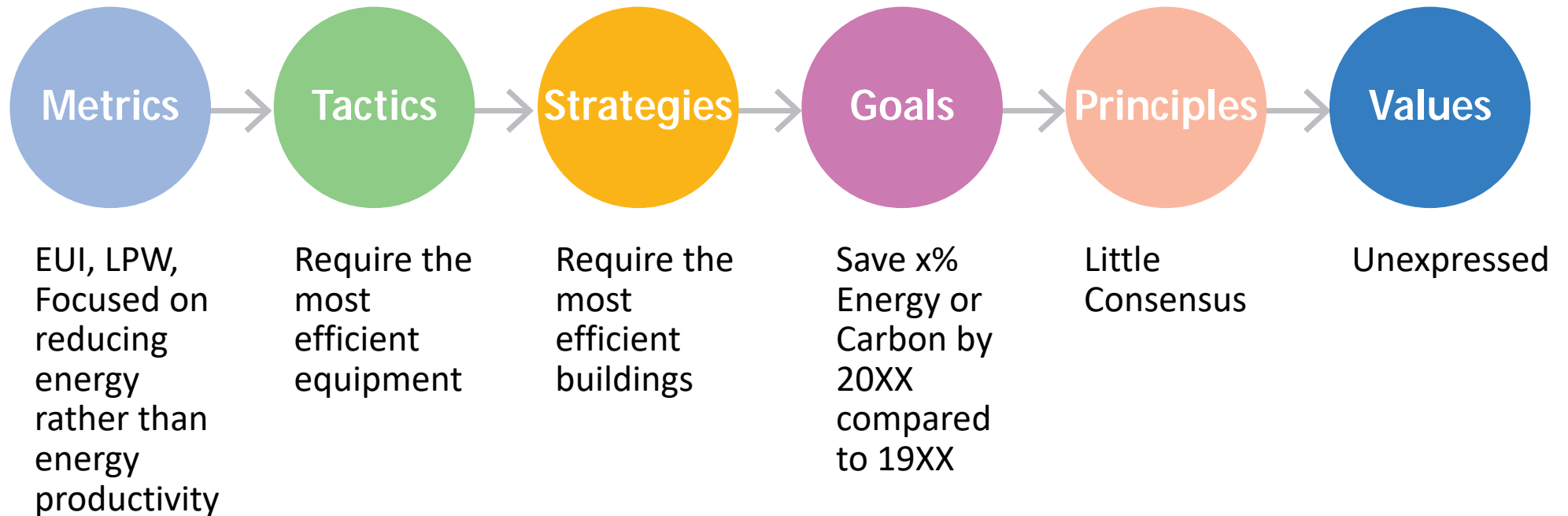
"Fossil Fuels are Toast"
-Tony Seba





Owning Values

Typical Benchmarking Sequence of Regulation



Values Based Transformational Sequence



Owning the Future



4 Scenarios for the Future of Lighting

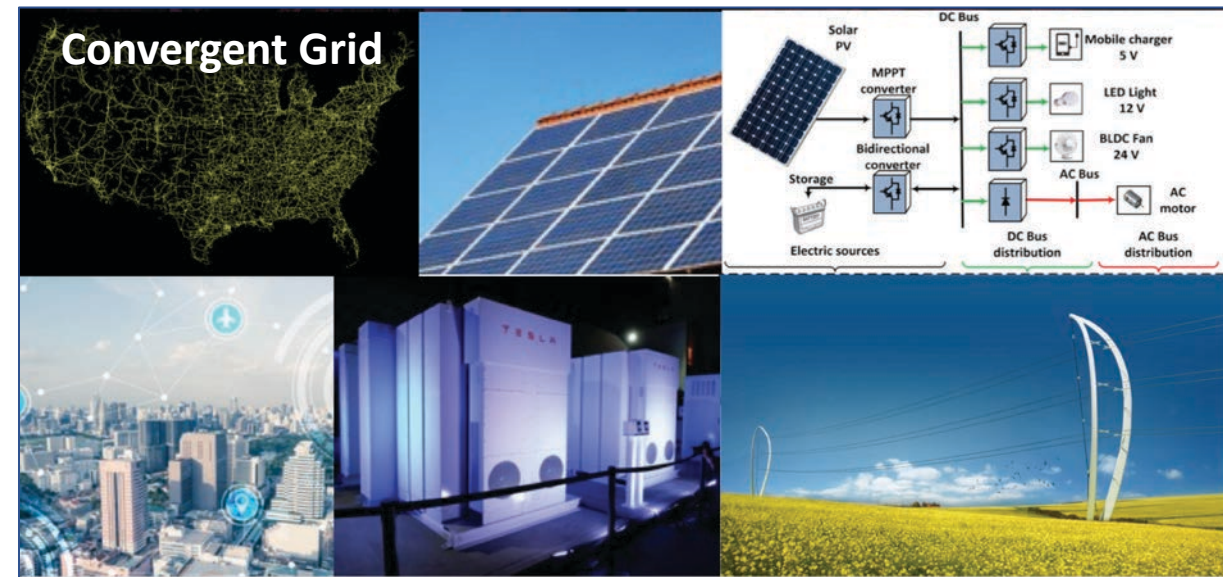
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Human-Free Lighting



Convergent Grid



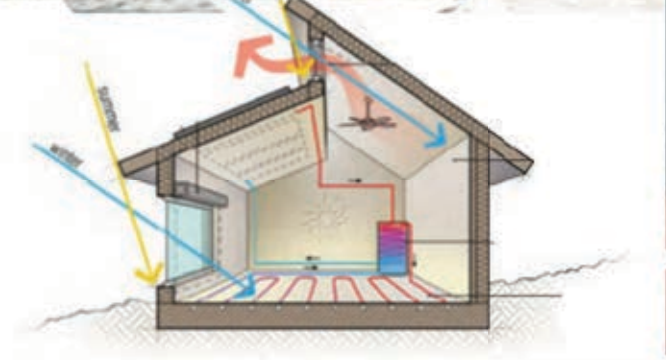
Bioenlightenment





What We Need Regulation to Facilitate

- Evidence based decisions & management
- Biomimetic & Biogenic design
- Clean Air & Water
- Maximizing Site & Local resources
- Beauty & Delight
- Intelligent adaptation
- Job Creation
- Closed Loop Systems
- Distributed, Resilient, Secure Energy



The Civic Grid



What We're Already Working on

- Code Evolution
- Outcome Based Policy
- Electrification/Decarbonization
- Unified Controls

...beyond simply fixing what's broken



Forces of Change

- Distributed, Renewable, Connected, Resilient, Intelligent, Reliable, Affordable Energy
- Innovation at the Grid Edge
- Low Voltage DC
- Modular, Portable, Flexible Systems
- Biomimetic Design
- Integrated Building Systems- HVAC, Lighting, Security, Water, Communications
- Building Internet of Things (BloT)



What Roles Will Lighting Play?

- Controls Innovation
- Systems Integration Innovation
- Building Envelope Innovation
- Health & Environmental Quality
- Energy Use Behavior

Thank You

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lightfair.



Discussion Questions

What happens to lighting when there's no more efficiency left to capture?

How can better regulation create jobs?

How do we move beyond "less bad" and fixing what's broken?