"How Urban Landscapes would be shaped up in the future"

India Green Building Congress

"Futuristic Green Habitats & Technologies"

Chennai

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“How Urban Landscapes would be shaped up in the future”

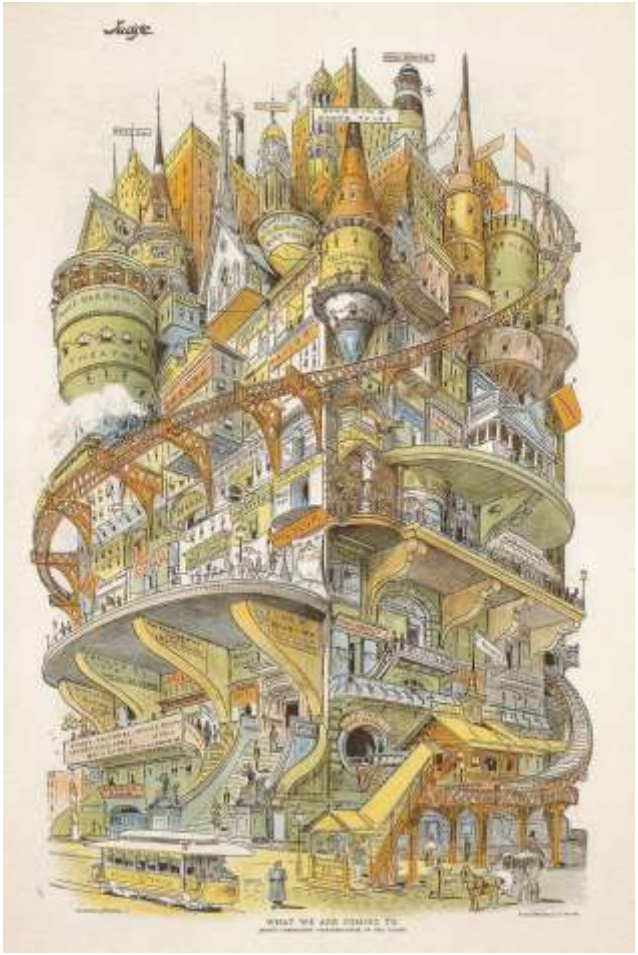
1. **Visions of the Future**

2. **How Do We Get There?**

   Technologies

   Policies

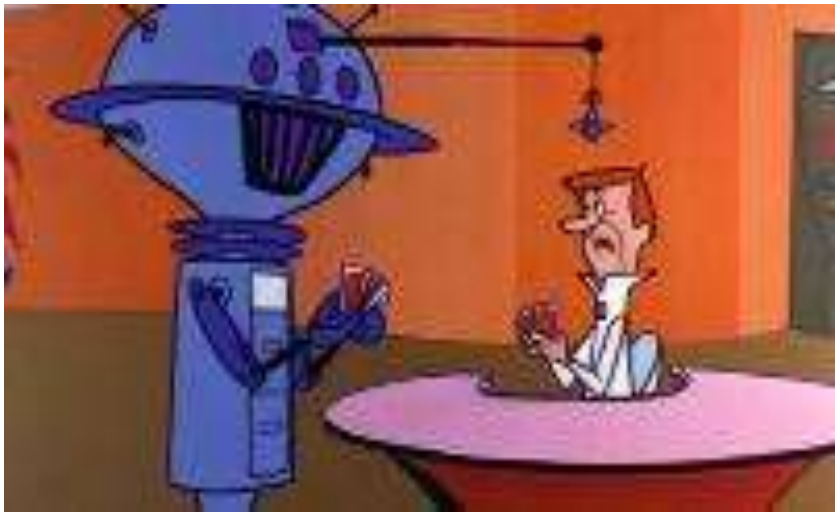
Visions of the Future



- **What We Are Coming To (1895, Grant E. Hamilton for the Judge Magazine)**

- This city has its own railway system, school, telephone exchange, armory, theatre, saloon, fire department, meat market and everything that a usual settlement has.

Visions of the Future



Visions of the Future - Now

Dezhou, China: Energy Grid

Coal-crazed China may seem like an unlikely environmental booster, but it's betting on a green future in this northern Chinese city. Here, farmland and forest have been bulldozed to create an industrial zone dubbed the Solar Valley. The city is so committed to sun power that more than 80 percent of buildings have solar water heaters. (Dezhou is the world's largest producer of the devices) Streets are lit by solar lights, and luxury apartments—eco-friendly, of course—are outfitted with solar-heated pools.

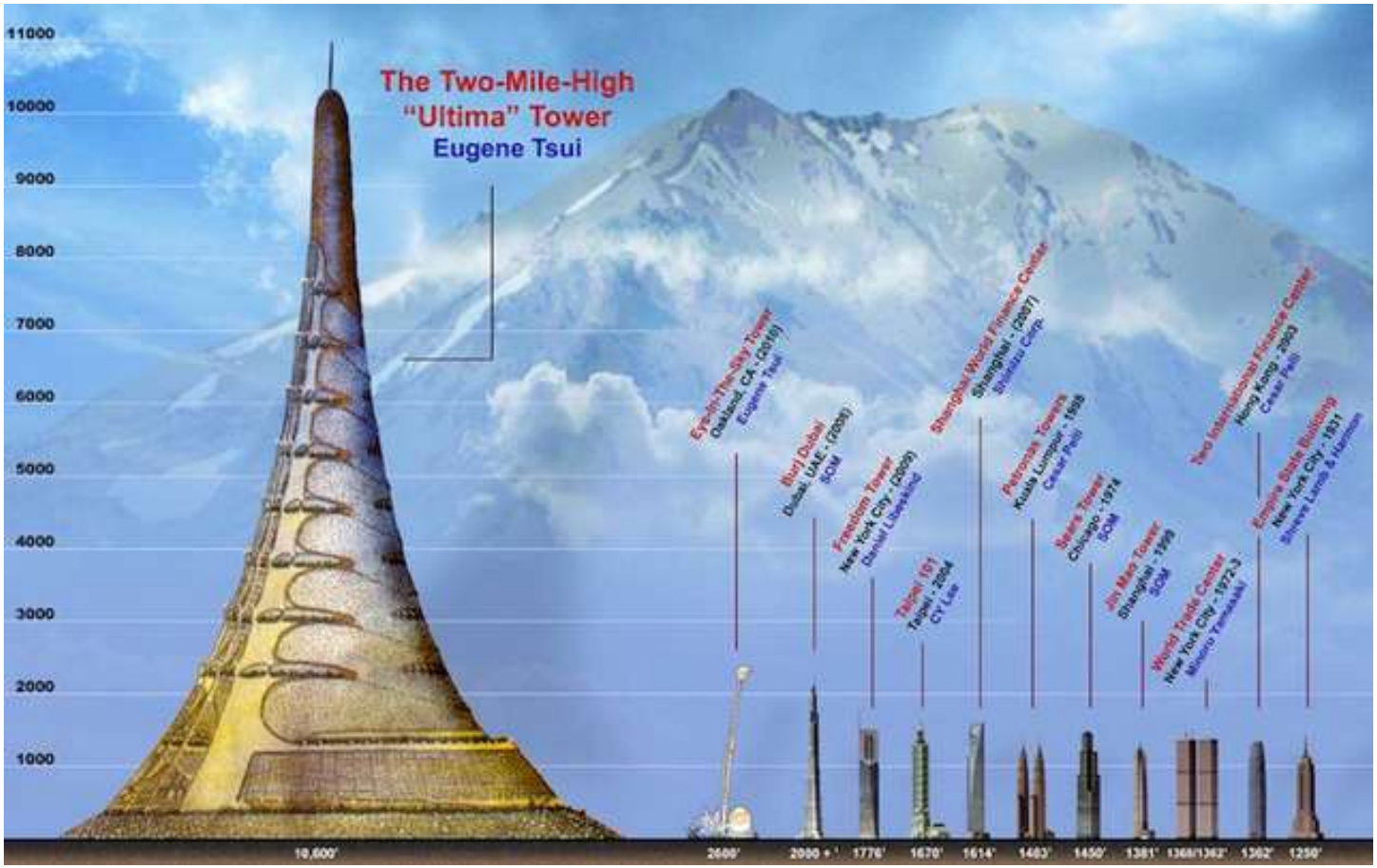
Taichung, Taiwan: Floating Observatories

Next year in Taiwan's third largest city, construction is set to begin on this skyscraper shaped like a tree trunk. The eight "leaves" are super-lightweight, helium-filled observational decks that glide up and down the side of the building, providing bird's-eye views of the city and the Taiwan Strait. Besides being visually stunning, the building—which is slated to house offices, restaurants, and a museum—will also be outfitted with green technologies such as solar cells, wind turbines, a rainwater recycling system, and a geothermal power plant in the basement.

The Shimizu Mega-City Pyramid (over Tokyo Bay, Japan, designed by Dante Bini and David Dimitric in 2003)

It would be 14 times higher than the Great Pyramid at Giza – 6574 ft or 2004 m – and would house almost one million people. The structure would be composed of 204 smaller pyramids on eight layers.

Ultima Tower (Eugene Tsui, 1991)



This 10,560 ft high (3,218.7 m) tower would cost US$150 billion and would have a huge, 6000 ft (1,828.8 m) diameter at the base. One million people would live here on 500 stories.

Burj Khalifa, Dubai

The world's tallest building opened in early 2010 and remains one of the most talked-about structures. Why? Not only is the Burj Khalifa the world's tallest building (2,716.5 feet), it's also the tallest free-standing structure, with the highest number of stories, the highest occupied floor, the highest outdoor observation deck, and an elevator with the longest travel distance in the world. Then there's the show-stopping architecture: a tower comprising three elements arranged around a central core, inspired by the spider lily and courtesy of Skidmore, Owings & Merrill with consulting designer Adrian Smith. A Y-shaped floor plan shows off views of the Persian Gulf, and when seen from above, the building echoes the onion dome motif prevalent in Islamic architecture.

- **Saadiyat Cultural District, Abu Dhabi on Saadiyat Island** Launch Date: 2015 (the Louvre).

- A new 'city' is coming up on an island close to Abu Dhabi called Saadiyat. On this island, Abu Dhabi Tourism Authority is constructing a mixed commercial, residential, and leisure project and it is expected to be completed in 2020. The island will house a **Louvre Museum**, a **Guggenheim Museum**, a world-class **Performing Arts Centre** and a **Concert Hall**.

- Five Pritzker Prize-winning architects. In the works: the Zayed National Museum, a Foster + Partners design of tilted steel towers inspired by the flight of a falcon; the Jean Nouvel–designed Louvre Abu Dhabi in a domed building perforated with a lattice design that filters sunlight; the Guggenheim Abu Dhabi, whose madcap look is pure Frank Gehry; and a Performing Arts Centre of swooping, sinuous lines from Zaha Hadid. The Louvre is slated to open first, and the entire island will eventually house about 145,000 people.

How Do We Get There?

ADVANCED TECHNOLOGIES

-SOPHISTICATED SENSORS, CONTROLS
-ENERGY MANAGEMENT SYSTEMS
-ADVANCED WINDOWS AND INSULATION
-SOLID STATE LIGHTING
-BUILDING INTEGRATED PV

Advanced sensors, controls, and whole building energy management systems

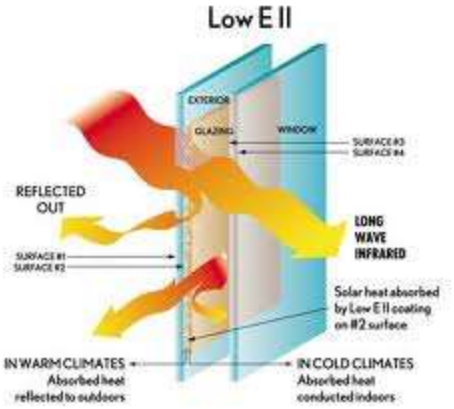

Thursday, January 6
$0.00
0.1 kW
$0.01
5:30 pm
78°
62°
Control4

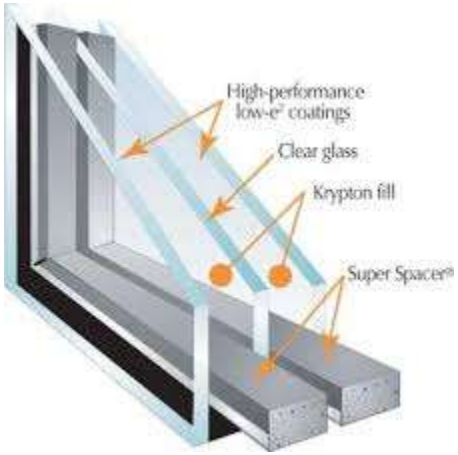

ENERGY MANAGEMENT SYSTEMS

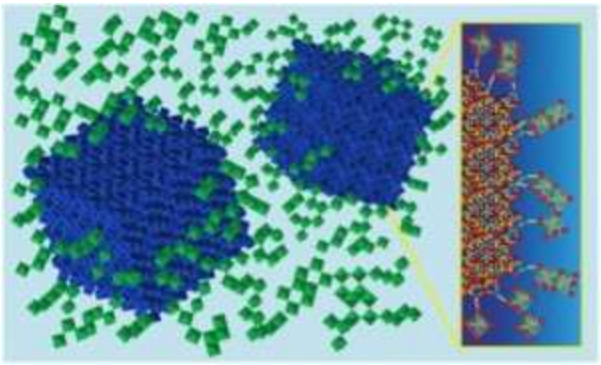

Room
64 °F outdoor
11:49 am
Energy Monitor
Rate This Hour: $0.07
Cost Today: $3.61
Cost This Month: $147.62
Estimated Bill: $419.05
Days Left In Cycle: 24.60
7528
watts
$0.53/hr
Energy Monitor
My History
Energy Manager
Message Center
Energy Account: Active
Power Sensor: Online
Internet: Online


nest
72

Sophisticated Windows



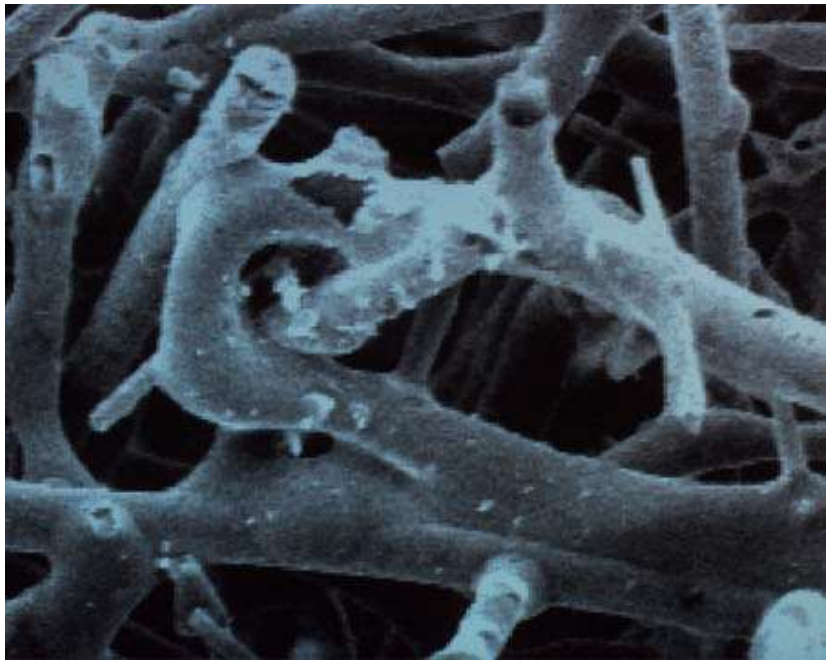




<u>Nanocrystals</u> of indium tin oxide (shown here in blue) embedded in a glassy matrix of niobium oxide (green) form a composite material that can switch between NIR-transmitting and NIR-blocking states with a small jolt of electricity. A synergistic interaction in the region where glassy matrix meets nanocrystal increases the potency of the electrochromic effect.

Nano Insulation

New generation of polymer aerogel has strength, flexibility, durability and light weight



Advanced Lighting

Building Integrated PV

How Do We Get There?

POLICY

Guidelines
San Francisco Example
ISO and LEED
Demonstrate ZEB

Policies Can Lead to The Concept of Zero Energy, Low Carbon, Green and Eco-Cities

"Everything is a resource…nothing is waste."

Bill McDonough

1. **Integrating Energy Technologies**

   Municipal "waste" is a resource → Biofuels and Power

   Buildings as Power Plants → Solar, Geothermal Heat Pumps

2. **Applying Advanced Technologies**

   Zero or Positive Energy Buildings, Zero Water, Zero Waste

   Industrial Processes, Municipal Operations

   Smart Transportation and Integrated Urban Design

Eco-cities Guidelines

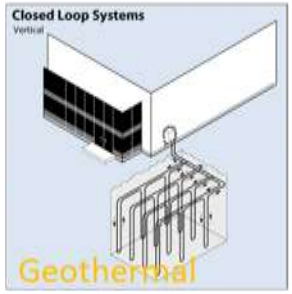
1. Integrate existing stock, future availability and accessibility of all resources, sectors, components and subsystems and their interconnection for ***comprehensive energy planning*** for the city and surrounding communities
2. Develop efficient, ecologically responsible and ***compact mixed-use communities*** with walkable, bikeable and transit oriented transport reducing vehicle miles travelled
3. Design and maintain residential, commercial and public buildings with gradually improving ***green building standards***
   - Construct all new government buildings showcasing green guidelines
   - Designate and incentivize near-zero energy townships and development zones
   - Progressively incorporate improving green guidelines in development regulations

Sources: bustler.com, calacademy.org, sfweekly.com, newyorkcityfeelings.com

Eco-cities Guidelines

4. Promote city and customer utilized ***renewable energy*** based on local resource availability, including;
   - photovoltaics,
   - solar thermal,
   - wind,
   - geothermal,
   - biofuels
   - co-generation,
   - landfill gas or waste -water methane
   - local smart grid for integration


Concentric Solar Thermal



Geothermal


Rooftop Wind


Solar Photovoltaics


Solaire - Building Integrated PV

Smart Grid Applications

5. Establish ***clean and efficient public/private transportation*** services interconnected with neighborhood no-emission pooled vehicles using locally produced renewable fuels


Metro


Bus Rapid Transit System

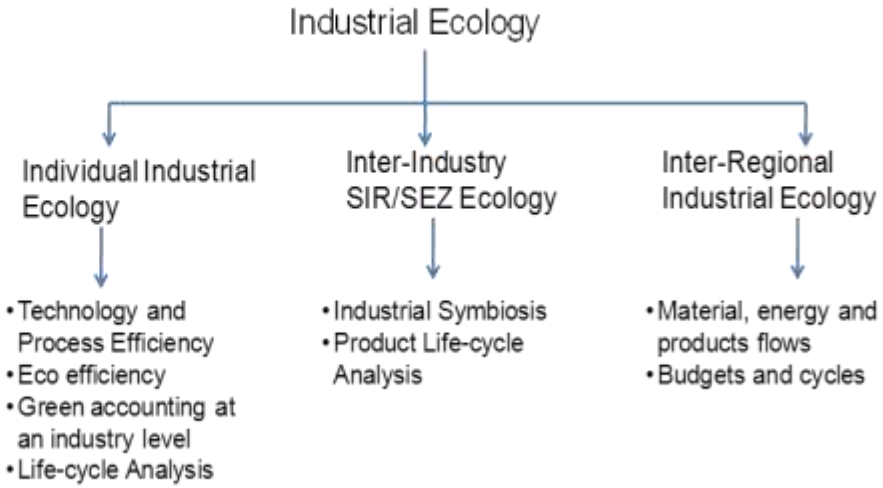
Plug-in Hybrids


Shared Bikes

Sources: gadhia-solar.com, eere.doe.gov, avinc.com, oe.energy.gov, mmrdamumbai.org, ahmedabadbrts.com

Eco-cities Guidelines

6. Encourage ***industrial symbiosis***, energy efficiency and green accounting at firm/industry/zone/regional level



7. Promote energy efficiency and distributed energy/electricity/heat generation from ***water supply, waste water and solid waste systems***; including maximum water and waste recycling

Solidwaste methane to energy

Waste-water methane to energy

8. Establish management frameworks for ***effective operation*** of urban infrastructure and services and develop frameworks for ***continuous improvements*** in the plans based on the performance of actual systems

Sources: eere.energy.gov, methanetomarkets.org, suratmunicipal.org

Eco-City Projects in San Francisco

Candlestick Point
Hunters Point Shipyard
Treasure Island

San Francisco's Newest Sustainable Neighborhoods

Clean Energy & Green Buildings

Goals:

- ***Renewable Energy: 100% Renewable by 2020***
- ***Energy Efficiency: Reduce 400,000 tons CO_2/year***

- **Municipal electricity (170 MW) = 100% renewable**
- **20 MW solar PV (2500 installations, incl. 5 MW Sunset Res.)**
- **3 MW methane from wastewater treatment**
- **8,200 small/med businesses & multifamily buildings**
- **Reduced energy consumption by 45 MW**
- **Saved SF residents & businesses $30 M on utility bills/yr**
- **LEED Gold required for all new construction, lg. retrofits**

Treasure Island (CCI) & Hunters Point Developments

Clean Transportation

Goals:

- ***<u>Carbon neutral</u> transportation system by 2030***
- ***20% trips by bicycle by 2020***
- **100% of public transit is electric or B20 biodiesel**
- **Largest municipal electric fleet in country**
- **Largest municipal biodiesel (B20) fleet in country**
- **78% taxis run on alternative fuels**
- **7% trips by bike**

Zero Waste

Goal: Zero waste by 2020

ACTIONS:

- **Curbside recycling & composting**
- **Mandatory recycling of construction & demolition debris**
- **Banned plastic bags in supermarkets & drugstores**
- **Banned styrofoam**
- **Banned bottled water in City departments**
- **Mandatory recycling & composting (Oct '09)**

78% diversion rate ⇨ ***100%***

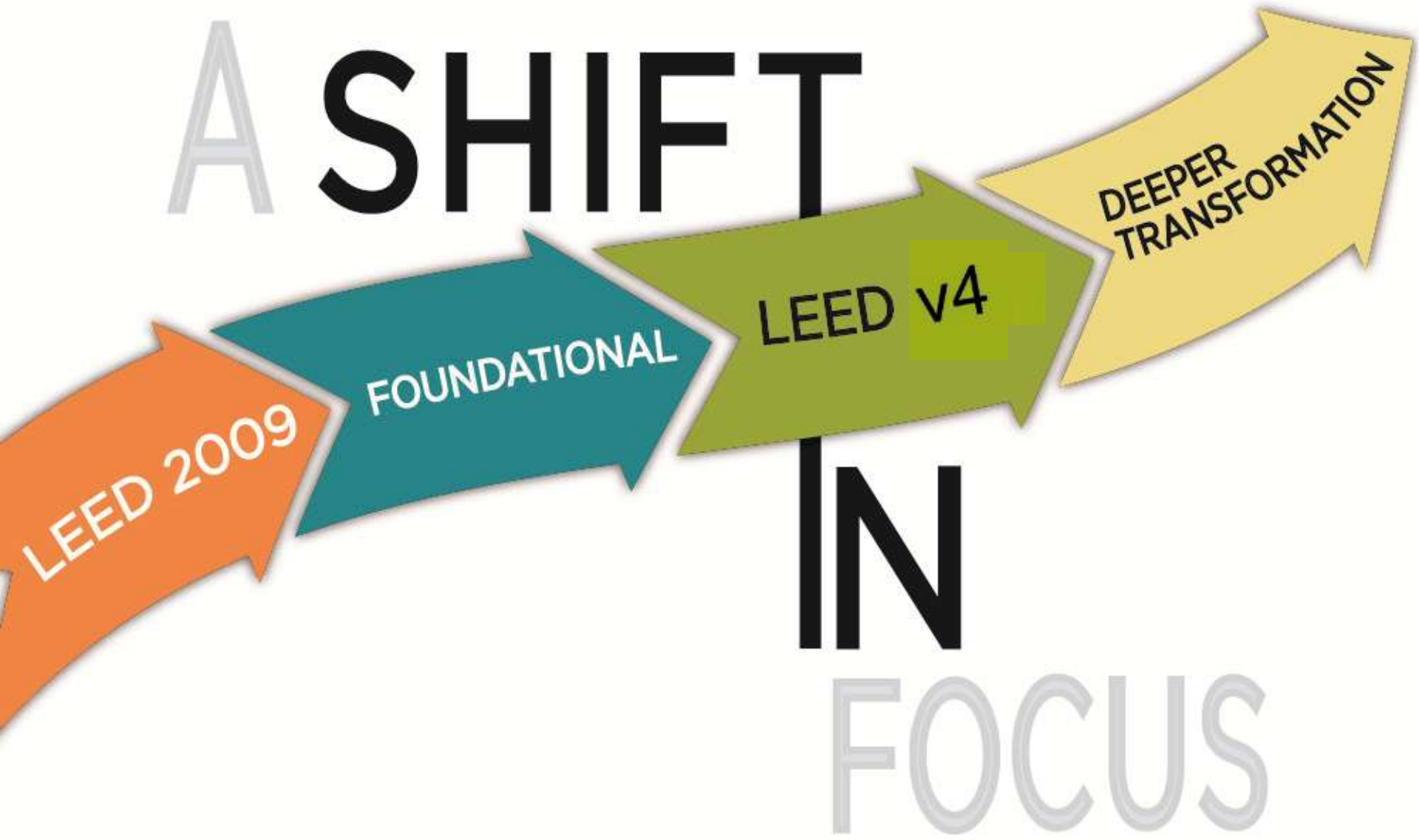
Benefits to Cities

- Reduce energy costs for the government…and citizens
- Reduce urban pollution and resulting improved health
- Mitigate global climate change
- Assistance in achieving the National and City Energy Goals
- Reduce power grid congestion
- Help assure reliable energy supplies
- Foster economic development
- Produce jobs in new and emerging technologies
- Increase community pride and reputation

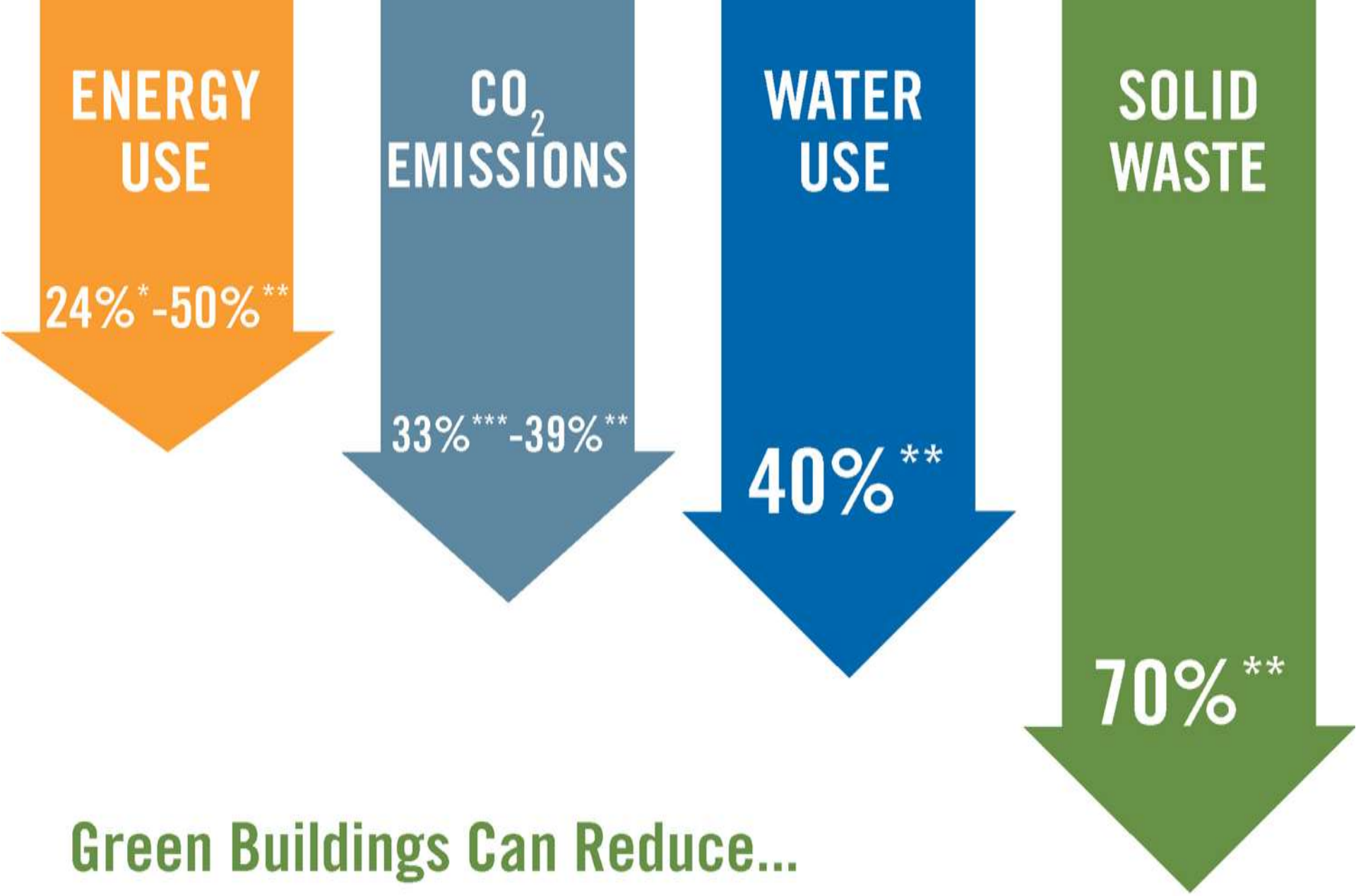
ISO 50001
Energy Management

- Develop a policy for more efficient use of energy
- Fix targets and objectives to meet the policy
- Use data to better understand and make decisions about energy use
- Measure the results
- Review how well the policy works, and
- Continually improve energy management.

Join Companies like Bentley Cars and Schneider Electric
to save money, conserve resources and tackle climate change.


A SHIFT IN FOCUS
LEED 2009
FOUNDATIONAL
LEED v4
DEEPER TRANSFORMATION

LEED v4



Green Buildings Can Reduce...

* Turner, C. & Frankel, M. (2008). Energy performance of LEED for New Construction buildings: Final report.
** Kats, G. (2003). The Costs and Financial Benefits of Green Building: A Report to California's Sustainable Building Task Force.
*** GSA Public Buildings Service (2008). Assessing green building performance: A post occupancy evaluation of 12 GSA buildings.

You Are Cordially Invited

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Singapore BCA Zero Energy Building

http://www.bbc.co.uk/news/business-24134984

Resources You Can Use

WWW.USGBC.ORG

WWW.SFENVIRONMENT.ORG

HTTP://WWW.ISO.ORG/ISO/HOME/STANDARDS/MANAGEMENT-STANDARDS/ISO50001.HTM

HTTP://WWW.BBC.CO.UK/NEWS/BUSINESS-24134984

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