Is London's City Hall Green?

photo: Tono Eguchi

A lecture by Bruce Haglund
Department of Architecture Chair
University of Idaho

OR
Is Sustainability Sufficient?

Children's Museum, Rome

WORLD·WATCH
VISION FOR A SUSTAINABLE WORLD

What is sustainability, anyway?

Humanity can only exist as a part of a larger life of the earth…
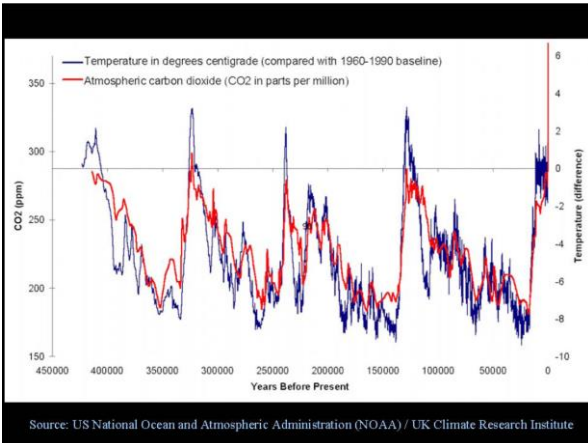
WORLDWATCH
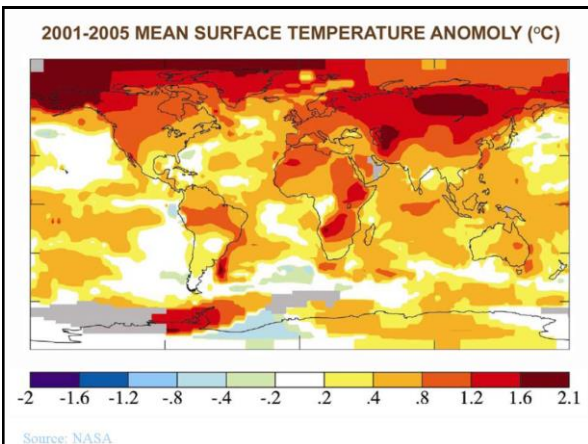INSTITUTE

Standard Definition

- To provide for the needs of today without compromising the needs of future generations.

  _____

- Is this good enough?

  "Nothing is more boring" than sustainability, William McDonough, FAIA, has said. **"Are you proud if your marriage is 'sustainable'?"** We need to do more than conserve resources, many observers contend, aiming instead to renew ecosystems and increase biodiversity.

  NASA Sustainability Base
  William McDonough

Temperature in degrees centigrade (compared with 1960-1990 baseline)
Atmospheric carbon dioxide (CO2 in parts per million)

Source: US National Ocean and Atmospheric Administration (NOAA) / UK Climate Research Institute

2001-2005 MEAN SURFACE TEMPERATURE ANOMOLY (°C)

Source: NASA
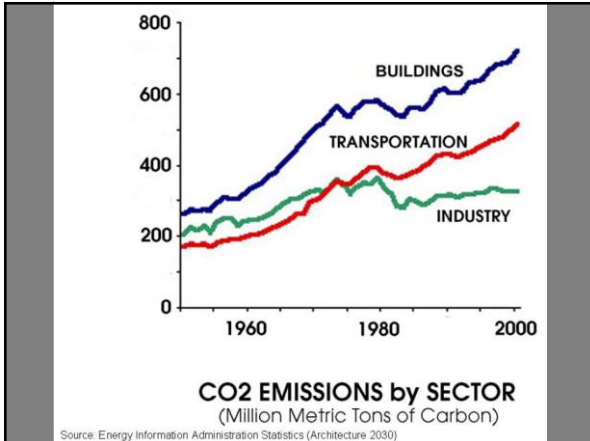
February 26, 2014

One of the Warmest Januaries Ever. Really.
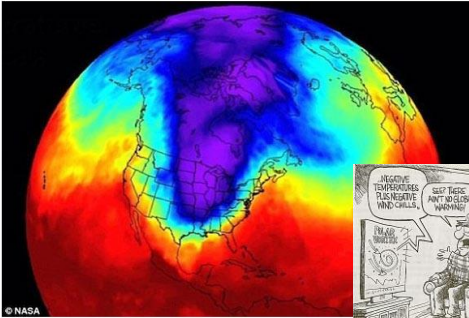
Don't let the cold in parts of the US this January fool you. Globally, **January 2014** ranked as the fourth warmest since 1880, according to NOAA data.

CO2 EMISSIONS by SECTOR
(Million Metric Tons of Carbon)
Source: Energy Information Administration Statistics (Architecture 2030)

City of Seattle's Rationale

Building materials and design, construction techniques, and building operations and maintenance all have environmental impacts that can be minimized.

Sustainable building merges sound, environmentally responsible practices to look at the environmental, economic and social effects of a built project as a whole. The entire life-cycle of the built environment is examined (planning, design, construction, operation and maintenance, and demolition or disassembly).

Buildings consume or are responsible for:
40% of the world's total **energy** use,
30% of raw **materials** consumption,
25% of timber harvest,
35% of the world's CO_2 **emissions**,
16% of fresh **water** withdrawal,
40% of municipal **solid waste** destined for local landfills, and
50% of ozone-depleting **CFCs** still in use

Sustainable Portland Scorecard

Scorecard

Sustainable Portland Commission
1120 SW Fifth Ave
Portland, OR 97203
503-823-7224

Scores are defined as better/worse than average when they are at least one half a standard deviation away from the mean score of the comparison cities.

Caution:
Most indicators are measured on a metropolitan level, but some are central city only. Please see footnotes

* Data represents central city only, not the metropolitan area.
** The measures are described in more detail in the following section.

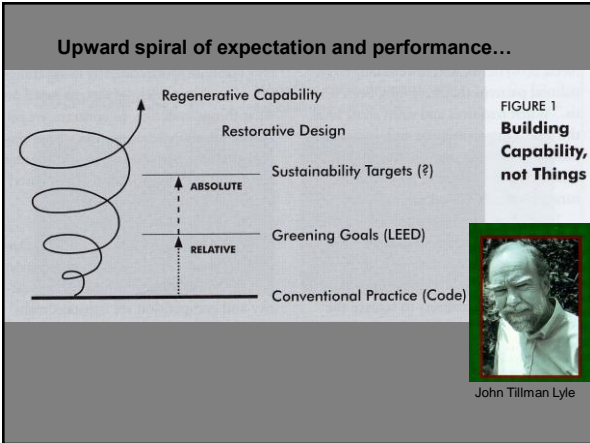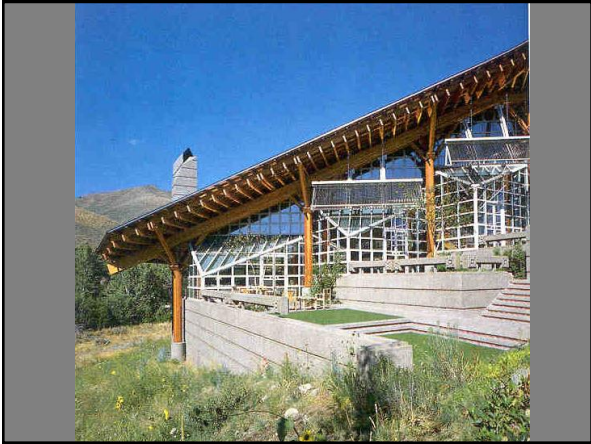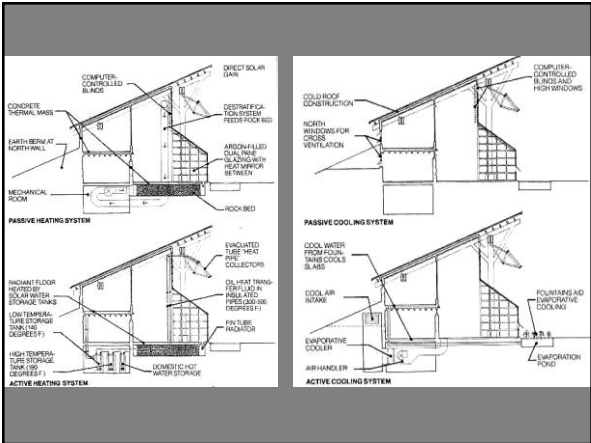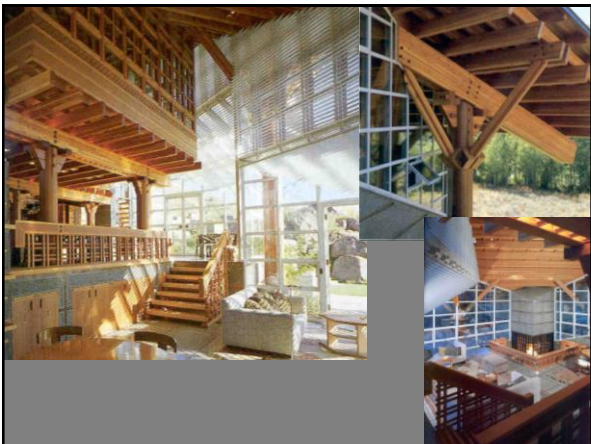| Topic	Air Quality	Global warming	Transportation	Transportation	Congestion	Toxic releases*	Tree canopy*	Recycling rate*	Poverty rate*	Home ownership	Central city employment	Central city housing
Measure**	Days with poor air quality	Per capita CO₂ emissions	Per capita vehicle miles traveled	Change in per capita vehicle miles traveled	Index comparing peak and free-flow traffic	Total releases of toxic chemicals	Percent of city covered by tree canopy	Percent of waste recycled	Percentage of population living in poverty	Percent of household owning their home	Employment growth in central city relative to suburbs	Percent of metropolitan building permits in the central city
Range in selected cities	0-26 days	17.5 - 22.5 metric tons	21.1-29.9 miles	1.7% - 34.7%	1.05 - 1.45	.26-7.0% million lbs	14%-62%	15% - 45%	12.8%-22.6%	53.2%-73.6%	-7% - 15.4% city-suburban differential	1.6%-59.8%
Austin	**0**	**+**	**-**	**-**	**0**	**+**	**+**	**0**	**0**	**-**	**+**	NA
Charlotte	**-**	NA	**-**	**-**	**0**	**-**	NA	**0**	**+**	**+**	**+**	**+**
Cincinnati	**0**	NA	**0**	**-**	**0**	**+**	**+**	NA	**-**	**+**	**-**	**-**
Denver	**+**	**0**	**+**	**0**	**0**	**+**	**0**	NA	**0**	**0**	**-**	**0**
Kansas City	**0**	NA	**-**	**0**	**+**	**+**	NA	NA	**0**	**0**	**0**	**-**
Minneapolis	**+**	**0**	**0**	**0**	**0**	**-**	**-**	NA	**0**	**+**	**-**	**-**
Phoenix	**-**	NA	**+**	**+**	**0**	**+**	NA	**-**	**0**	**0**	**-**	**+**
Portland	**+**	**+**	**+**	**-**	**-**	**-**	**+**	**+**	**0**	**-**	**+**	**0**
Sacramento	**0**	NA	**+**	**+**	**0**	**+**	**-**	NA	**-**	**-**	**0**	**-**
Seattle	**+**	NA	**0**	**+**	**-**	**-**	NA	**+**	**0**	**0**	**+**	**0**

TOP SCORERS

Sustainable Cities 2012

| Local Government | Community Initiatives | Buildings | | Energy Water Utilities & Public Benefits Program | Transportation |

Boston Rank #1 TOTAL SCORE: **76.75**
11/15   9.5/10   21.5/29   15.75/18   19/20

Portland Rank #2 TOTAL SCORE: **70**
13.75/15   7.5/10   14.5/29   14.75/18   19.0/20

New York Rank #3 TOTAL SCORE: **69.75**
10.5/15   9/10   22/29   15.25/18   13/20

San Francisco Rank #3 TOTAL SCORE: **69.75**
13/15   8/10   17/29   15.75/18   16/20

Seattle Rank #5 TOTAL SCORE: **65.25**
10.75/15   6/10   22.5/29   14.75/18   11.25/20

Austin Rank #6 TOTAL SCORE: **62**
9.75/15   9/10   21.5/29   10.75/18   11/20

POLICY CATEGORIES
Click on a category name below to see how the top cities fared in these categories.

Local Government   Community   Buildings   Utilities   Transportation

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Bottom Line

Studies by Heschong-Mahone
•in retail 20-40% increase in sales
•in schools 5% increase in learning

Studies by AIA
•in offices 15% less absenteeism

Or triple bottom line?
•economic
•environmental
•social

Royal Arcade, London

World Peace

Real security has to do with the connections between the health of democratic institutions, the fair distribution of wealth, military power, and the protection of soils, forests, and biological diversity.
—David Orr

US Green Building Council's LEED   www.usgbc.org

SUMMARY MATRIX

◄ Ove Arup & Partners
vs.
Arup Associates ▼

SPeAR

Beyond the boundaries

Malcolm Wells' Wilderness-Based Checklist for Design and Construction Revisited

Malcolm Wells' Wilderness-Based Checklist for Design and Construction
© M. Wells 1969

Project:

	-100 always	-75 usually	-50 sometimes	-25 a bit	25 a bit	50 sometimes	75 usually	100 always	
destroys pure air									creates pure air
destroys pure water									creates pure water
wastes rainwater									stores rainwater
produces no food									produces its own food
destroys rich soil									creates rich soil
wastes solar energy									uses solar energy
stores no solar energy									stores solar energy
destroys silence									creates silence
dumps its wastes unused									consumes its own wastes
needs cleaning and repair									maintains itself
disregards nature's cycles									matches nature's cycles
destroys wildlife habitat									provides wildlife habitat
destroys human habitat									provides human habitat
intensifies local weather									moderates local weather
is ugly									is beautiful

negative score 1500 possible   positive score 1500 possible

final score:

www.sbse.org

They say you're a dreamer…

I painted this view of Sagamore Bridge to remind us of our grandparents' selfishness. They dug a ship canal right through Cape Cod…. and then built a one-species bridge across it! Animal and plant migrations that had occurred for millennia were abruptly ended. But no one thought about those things in 1935.

Now we do. Now we have no excuse for such self-centeredness. Wild life bridges over highways are beginning to appear. Now it's canal time. A living bridge will help pay down our vast debt to the silent world.

Malcolm Wells, Architect, Underground Art Gallery
673 Satucket road, Brewster, Massachusetts

…you're not the only one…

Over I-70 in Colorado

I-90 wildlife bridge, Snoqualmie Pass

SBSE Retreat @ Tadoussac 1999

Upward spiral of expectation and performance…

Regenerative Capability

Restorative Design

Sustainability Targets (?)

ABSOLUTE

Greening Goals (LEED)

RELATIVE

Conventional Practice (Code)

FIGURE 1
Building Capability, not Things

John Tillman Lyle

PASSIVE HEATING SYSTEM

COMPUTER-CONTROLLED BLINDS
DIRECT SOLAR GAIN
CONCRETE THERMAL MASS
DESTRATIFICATION SYSTEM FEEDS ROCK BED
EARTH BERM AT NORTH WALL
ARGON-FILLED DUAL PANE GLAZING WITH HEAT MIRROR BETWEEN
MECHANICAL ROOM
ROCK BED

PASSIVE COOLING SYSTEM

COLD ROOF CONSTRUCTION
COMPUTER-CONTROLLED BLINDS AND HIGH WINDOWS
NORTH WINDOWS FOR CROSS VENTILATION

ACTIVE HEATING SYSTEM

RADIANT FLOOR HEATED BY SOLAR WATER STORAGE TANKS
EVACUATED TUBE HEAT PIPE COLLECTORS
OIL HEAT TRANSFER FLUID IN INSULATED PIPES (300-500 DEGREES F.)
LOW TEMPERATURE STORAGE TANK (140 DEGREES F.)
HIGH TEMPERATURE STORAGE TANK (190 DEGREES F.)
FIN TUBE RADIATOR
DOMESTIC HOT WATER STORAGE

ACTIVE COOLING SYSTEM

COOL WATER FROM FOUNTAINS COOLS SLABS
COOL AIR INTAKE
FOUNTAINS AID EVAPORATIVE COOLING
EVAPORATIVE COOLER
AIR HANDLER
EVAPORATION POND

Arch 464 Score Distribution Scatter Charts

Note: Site Score   -450
       Bldg Score   650

Overall, since this project only focuses on heating and cooling systems, I don't consider it a sustainable project despite its positive score.
—Mimi Tugaoen

While I feel that this building definitely deserves recognition for its use of passive and active sustainable techniques, the fact that it uses 81% less energy than a typical 8,600 sqft house and produces no energy should earn it a negative score.
—Luke Vannoy

It is an icon for regeneration because of the amount of good publicity it has received and the fame that awards have given it. …they will associate good and beauty with sustainable architecture.
—Nathan Fox

Most of Sim van der Ryn's principles for ecological design are ignored as well as John Lyle's. This is a classic example of David Orr's social trap of bigger is better … I think the home is an affront to regenerative design.
—Taze Fulford

The cost and size are ridiculous for the program and, aside from solar and ventilation issues, it's a typical house. The architect needs to address long-term impact on the site and methods of regeneration, not simply curtailment of energy costs.
—Curtis Banger

Welcome to City Hall

www.arup.com
www.architectureweek.com

ARCHITECTUREWEEK
THE NEW MAGAZINE OF DESIGN AND BUILDING

The GLA building was completed in May 2002.

Foster's New City Hall

"It seemed initially that the new city hall would be slightly out of context, given its location near historic landmarks."
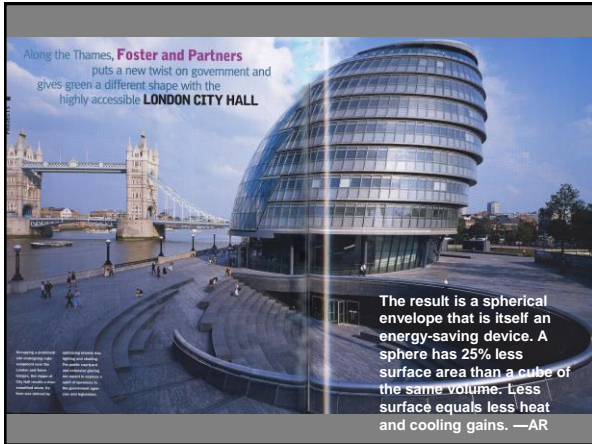—AW

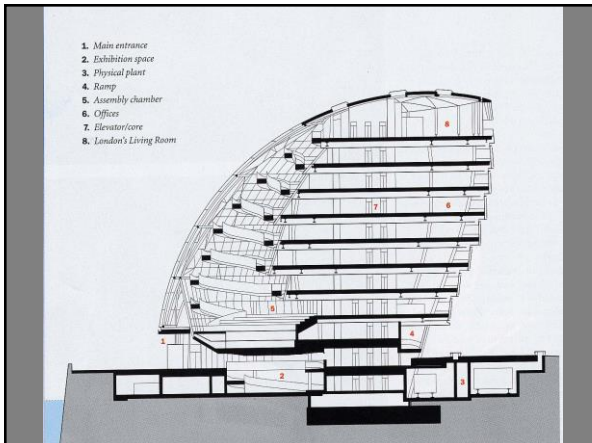No. 136, 26 February 2003

ARCHITECTURAL RECORD

SEEKING THE SHAPE OF GREEN
Foster and Partners' Design
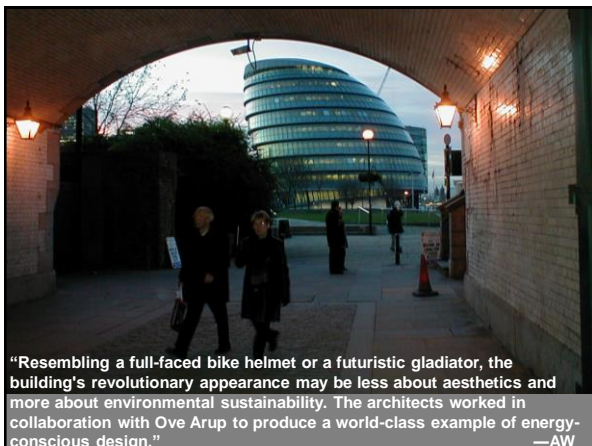for London City Hall

"Its shape was devised to minimize the surface area exposed to direct sunlight while still admitting daylight. The southern overhangs allow each floor to shade the one beneath it but make the structure seem a bit tipsy."
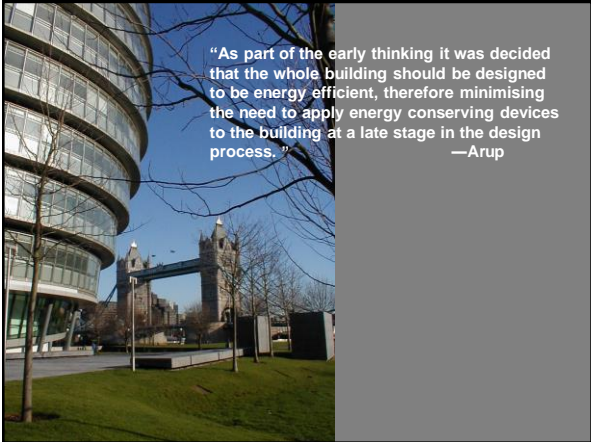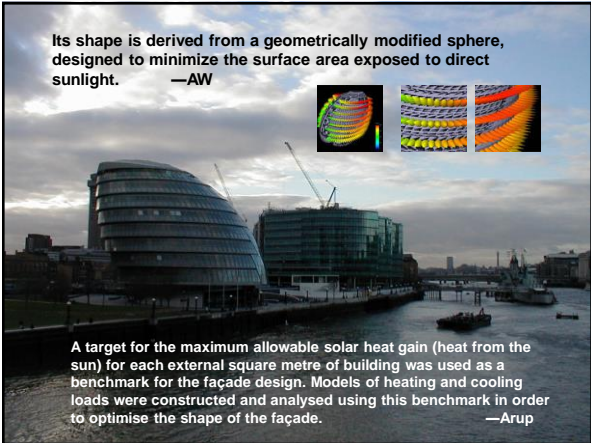—AR 02/03

Special Presentation
Nine Proposals to Rebuild the World Trade Center
Will New York Rise to the Challenge?

Along the Thames, **Foster and Partners** puts a new twist on government and gives green a different shape with the highly accessible **LONDON CITY HALL**

The result is a spherical envelope that is itself an energy-saving device. A sphere has 25% less surface area than a cube of the same volume. Less surface equals less heat and cooling gains. —AR

1. Main entrance
2. Exhibition space
3. Physical plant
4. Ramp
5. Assembly chamber
6. Offices
7. Elevator/core
8. London's Living Room

"Resembling a full-faced bike helmet or a futuristic gladiator, the building's revolutionary appearance may be less about aesthetics and more about environmental sustainability. The architects worked in collaboration with Ove Arup to produce a world-class example of energy-conscious design." —AW

"As part of the early thinking it was decided that the whole building should be designed to be energy efficient, therefore minimising the need to apply energy conserving devices to the building at a late stage in the design process. "   —Arup

Its shape is derived from a geometrically modified sphere, designed to minimize the surface area exposed to direct sunlight.   —AW

A target for the maximum allowable solar heat gain (heat from the sun) for each external square metre of building was used as a benchmark for the façade design. Models of heating and cooling loads were constructed and analysed using this benchmark in order to optimise the shape of the façade.   —Arup

ENERGY CONSERVATION STRATEGIES

Minimum surface area faces the summer sun

Building form provides self-shading in summer

Openable windows to perimeter of office areas

Maximum sunlight reaches the river walk

Chamber oriented due north to minimize solar impingement

Fresh air   Exhaust air

Heat exchanger

• Spherical form minimizes surface area reducing heat loss and heat gain
• Responsive cladding system: Shading relates to building orientation
• Intergrated energy-circulation system
• Passive cooling with chilled beams
• Chamber can be naturally ventilated
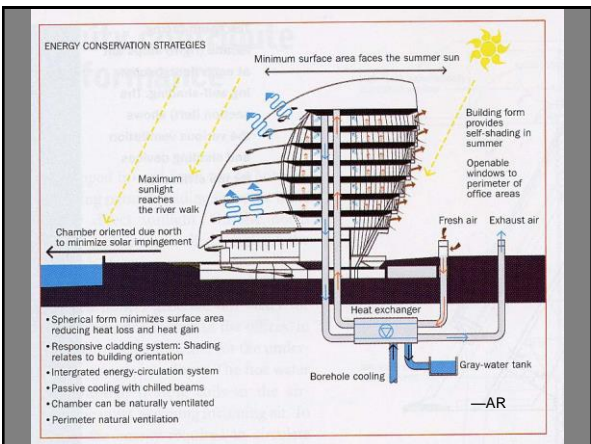• Perimeter natural ventilation

Gray-water tank

Borehole cooling

—AR

"From the outset of the design Arup, working with architects Foster and Partners, have strived to make the building a world-class example of energy conscious design." —Arup

"The north facade, which will receive minimal direct solar heat gain, has unshaded glazing. The south facade inclines so that each floor shades the offices below." —AW

"On the north side, where there is no direct sunlight, the glazing is clear." —AR

Theoretically the natural ventilation works like this!
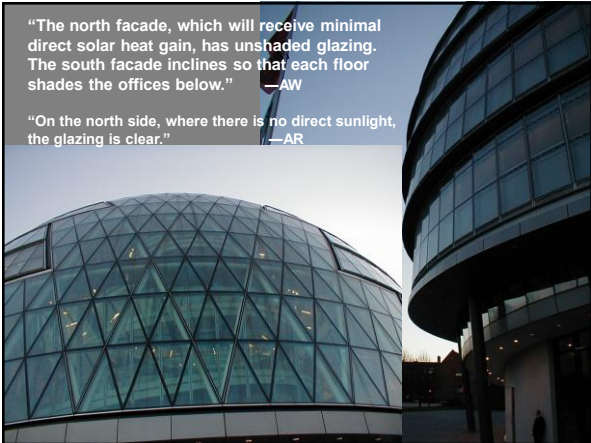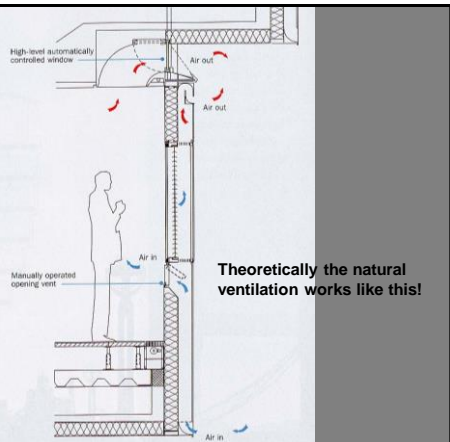
"The building has an integrated system of environmental controls to minimize energy use. It is expected to consume 75 percent less energy on mechanical systems than a typical air-conditioned office building." —AW

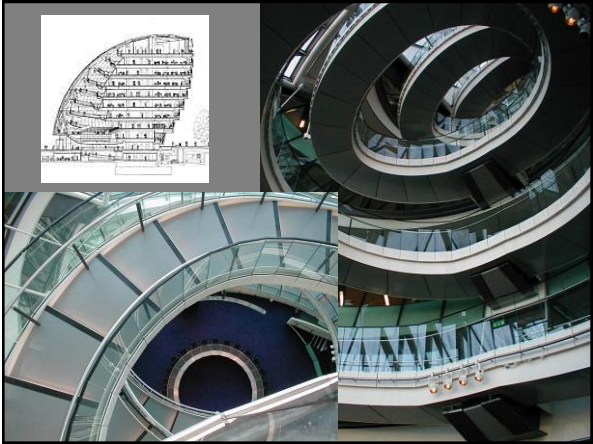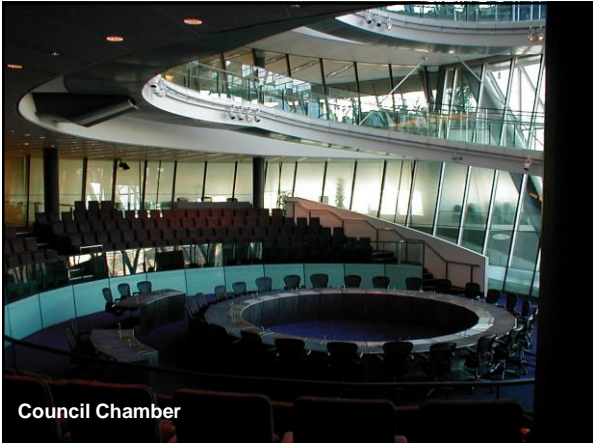**"Many of the building elements, including floor tiles and rubber doormats, are made from recycled materials."** —AW

"The main feature of the interior is an 800-yard- (730-meter-) long spiral ramp/ staircase curving through all ten above-grade stories to the top of the building. This is open to the public, allowing citizens to view GLA activities." —AW

Council Chamber

London's Living Room

"A geodesic lattice framework, referred to as a "diagrid structure," supports the building and is, in effect, the largest radiator in London. Most of the horizontal steel elements, each 12 inches (300 millimeters) in diameter, have hot water running through them to heat the atrium space, making extra fittings or pipework unnecessary."   —AW

"Each of the infill panels is unique in shape and size. They have been laser-cut with data supplied from the same computer model used to design the building, ensuring a high degree of accuracy." —AW

"Ventilation air enters offices through grilles in the floor. When the vents in the facade are open, local cooling and heating systems are deactivated to minimize energy waste."   —AW

21

The south-facing facade (right) steps out at each floor, becoming self-shading. The section (left) shows the various ventilation and shading devices for the offices.

HOMEWORK: Explain the rationale for your rating of the dichotomy "serves as an icon for the apocalypse" to "serves as an icon for regeneration."

While it is helpful for Foster to consider and incorporate some elements of "green design," this building, seems to contribute consumes more resources (and contribute less) than a so-called "icon for regeneration" would. ultimately, this building cost a great deal of money and resources, and contributes little but a new bump" in the london skyline.

HOMEWORK: Explain the rationale for your rating of the dichotomy "serves as an icon for the apocalypse" to "serves as an icon for regeneration."

it looks like an egg therefore it is quite literally an Icon of regeneration and as far as I know it is making an effort towards a regenerative architecture so it would be helpful so the regenerative deal if more buildings followed its lead

2009 Update: Improved Park Setting