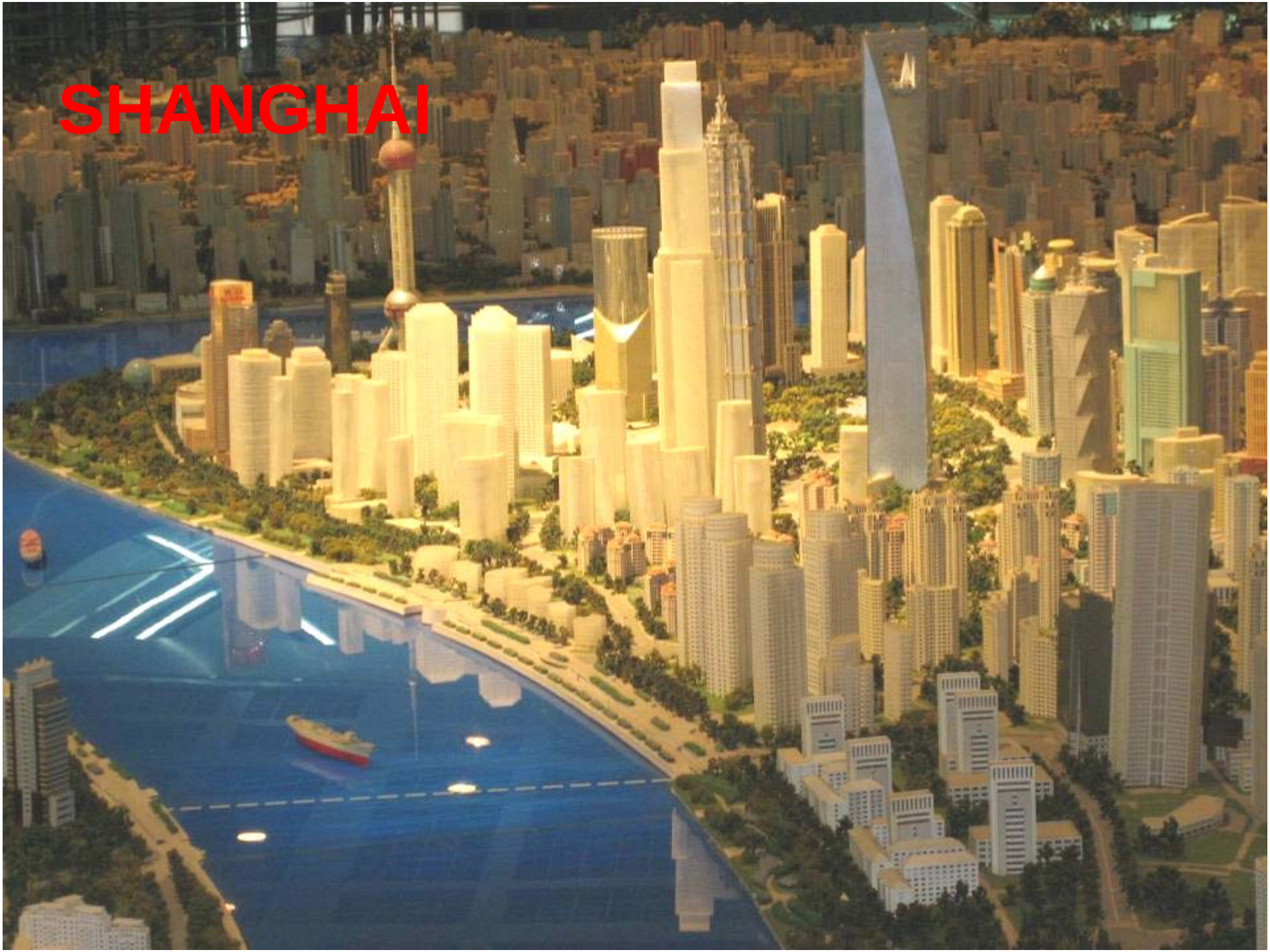
Climate Change & the Built Environment

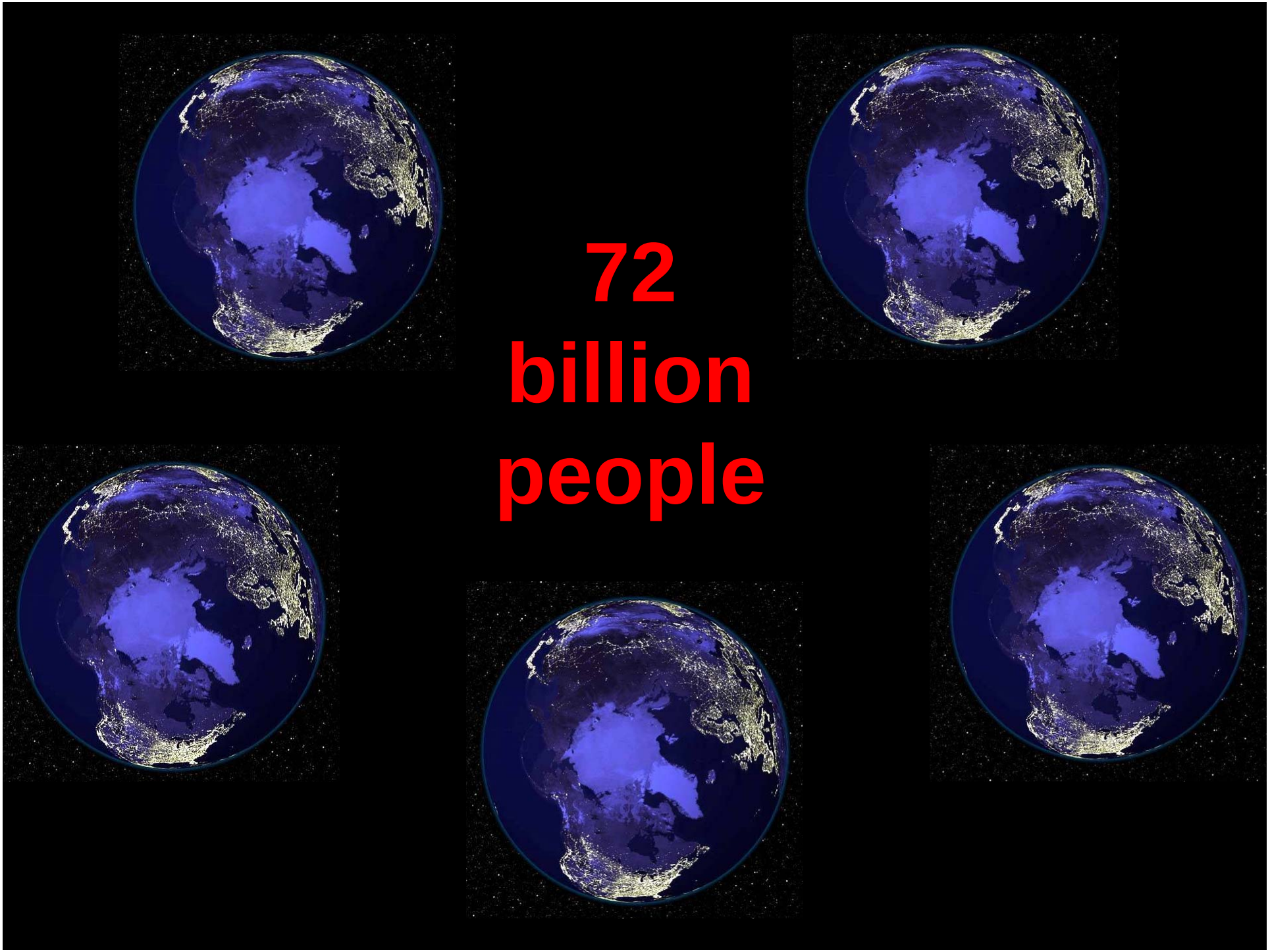
Marc Porat


DALLAS


SHANGHAI

GUJARAT

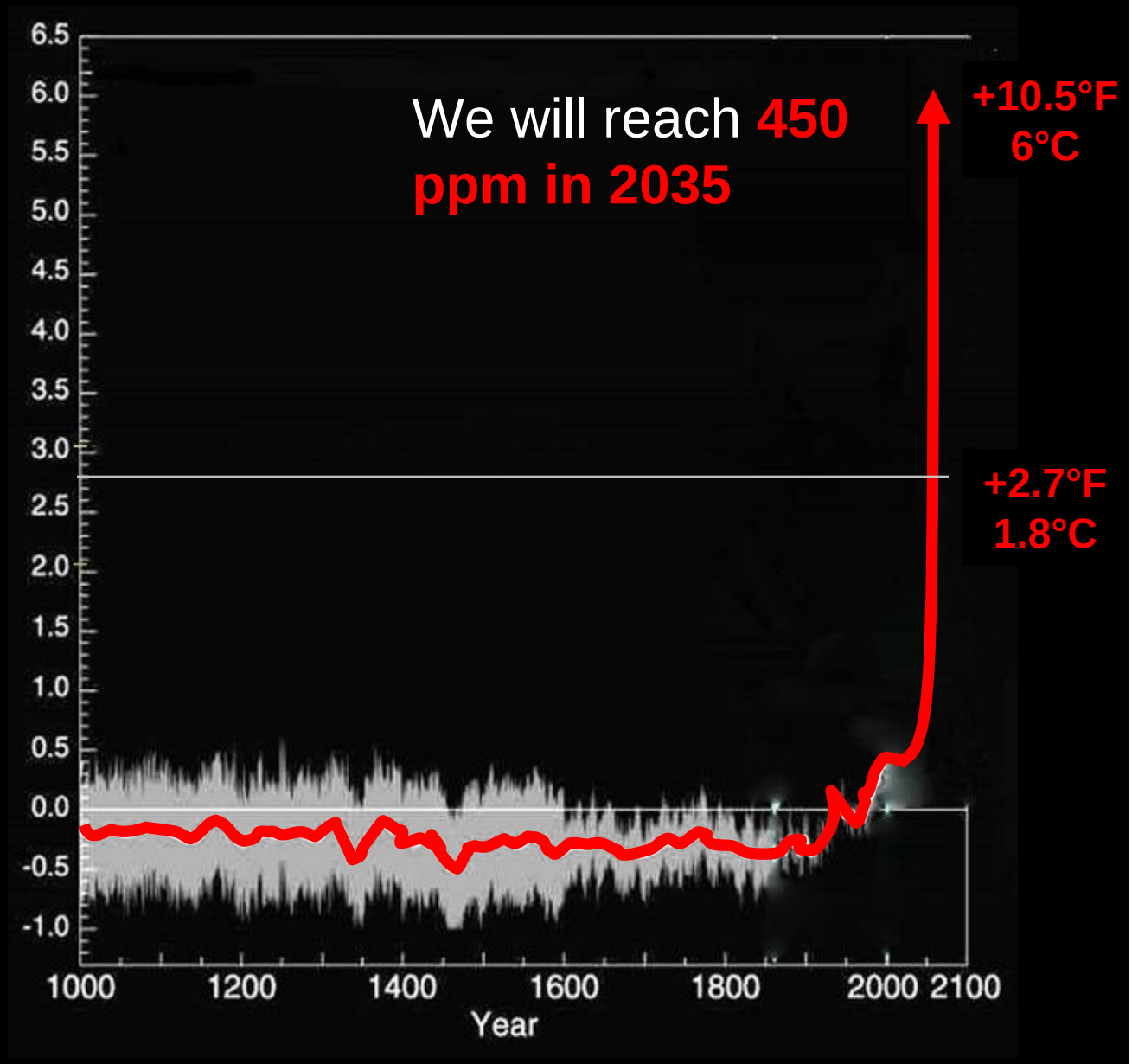
DUBAI


72
billion
people

We are at **385 ppm**

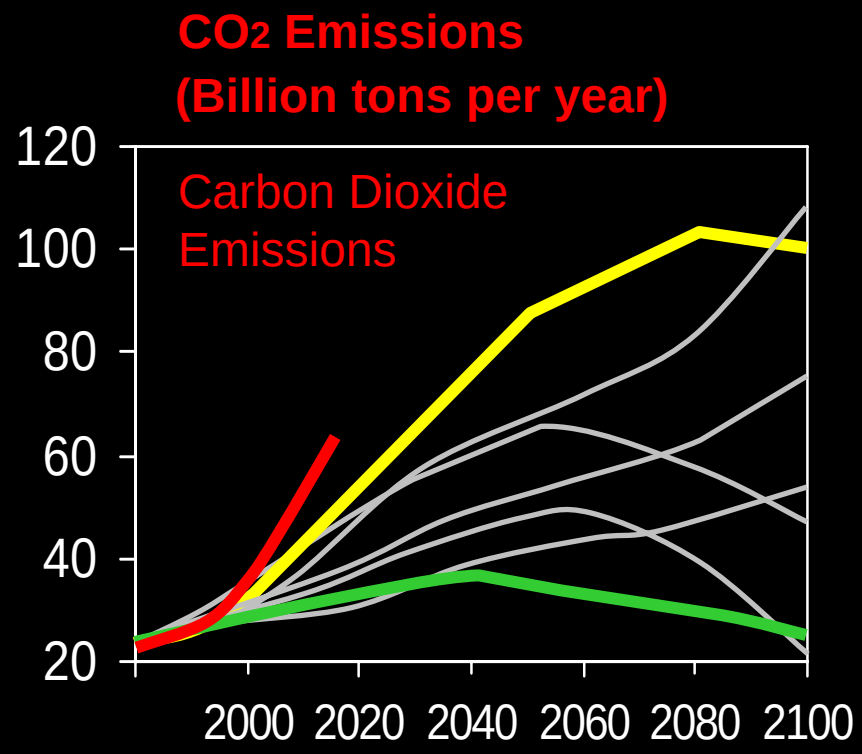
Increasing at **+2.5 ppm** annually

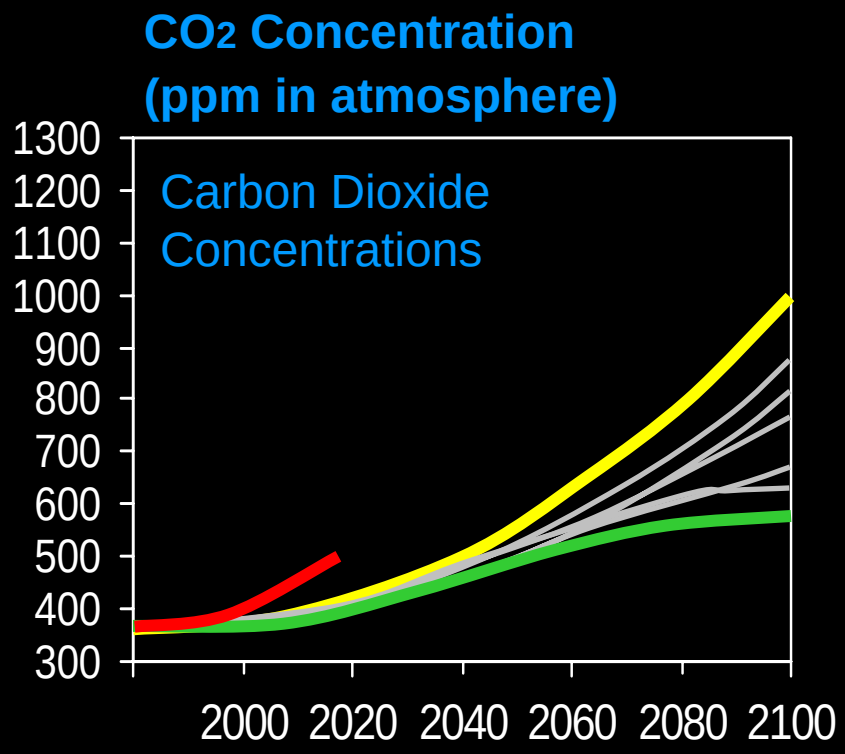
At **450 ppm** CO2 "we will trigger potentially irreversible glacial melt & sea level rise out of humanity's control"



Source: UN Intergovernmental Panel on Climate Change (IPCC)

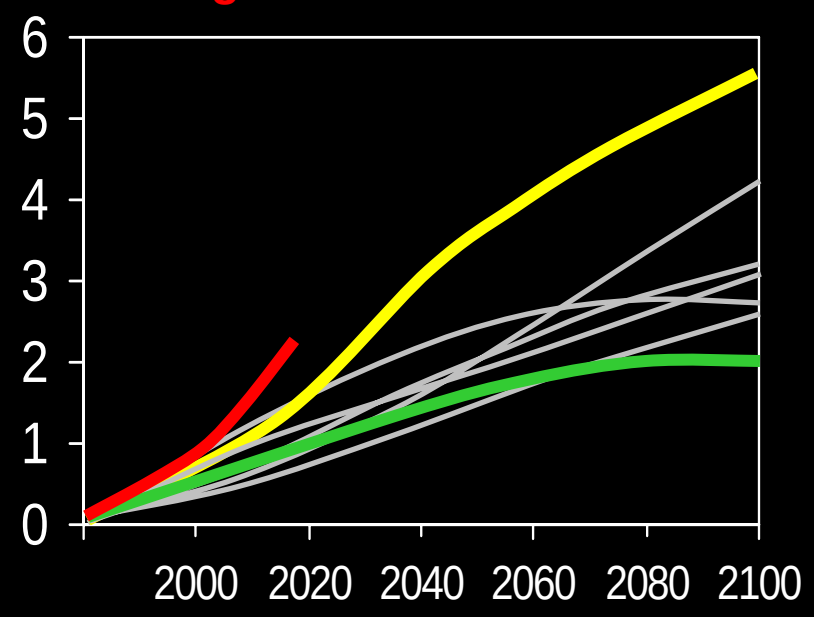
As CO2 increases…

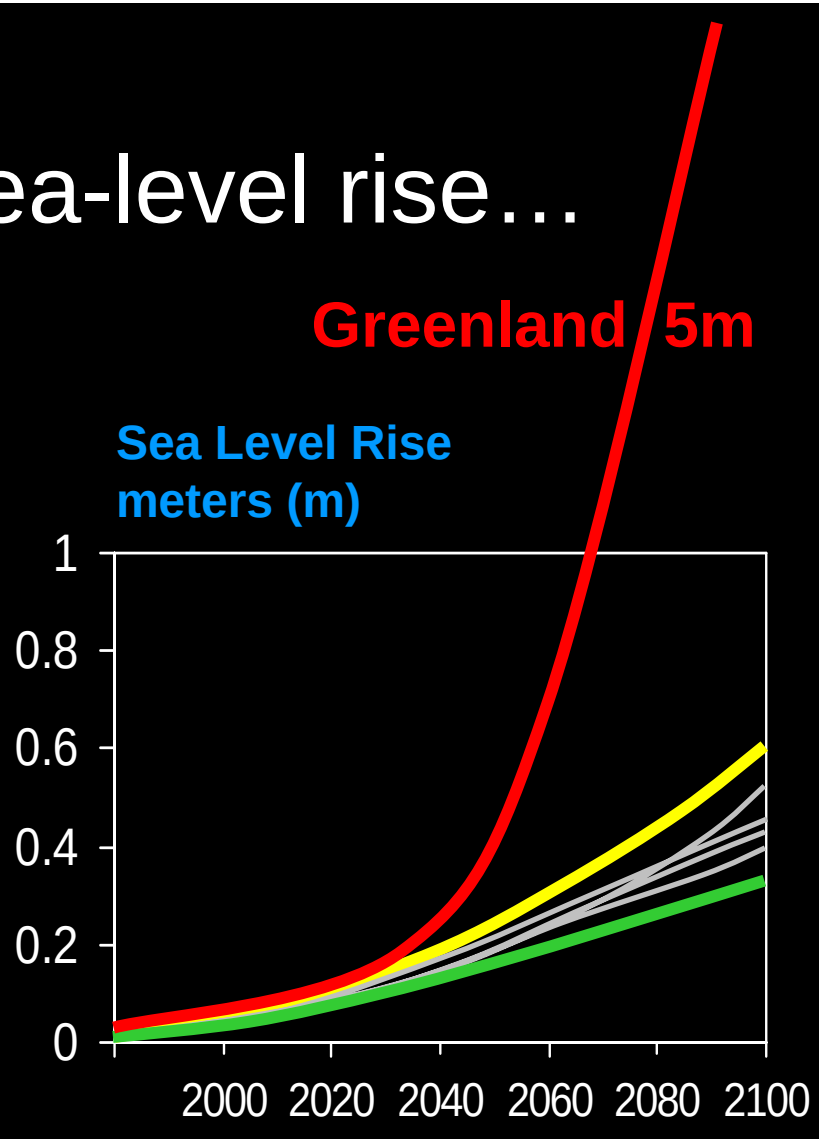




Source: UN Intergovernmental Panel on Climate Change (IPCC)

Temperature & sea-level rise…





Source: UN Intergovernmental Panel on Climate Change (IPCC)

750,000 Toyota Prius drivers save 2.35M MT of CO_2 per year

1 CFPP in 1 year

Sources: U.S. EPA, Toyota, CalStar analysis

Wal-Mart investing $500M in 7 years to reduce energy & CO_2 by 20%

1 CFPP in 1 month

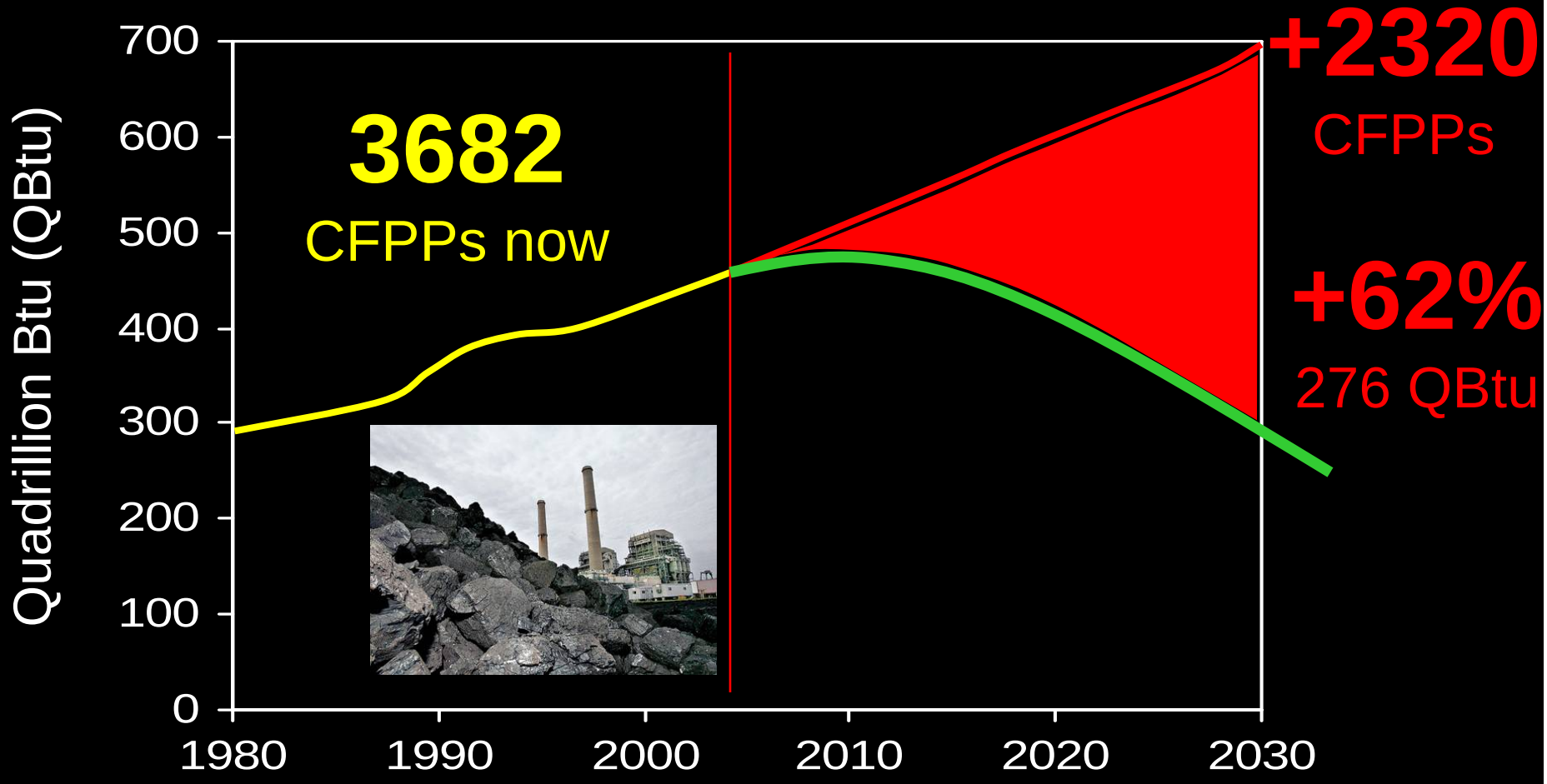
Source: Architecture 2030

Home Depot planting 300,000 trees to absorb CO_2…

1 CFPP in 10 days

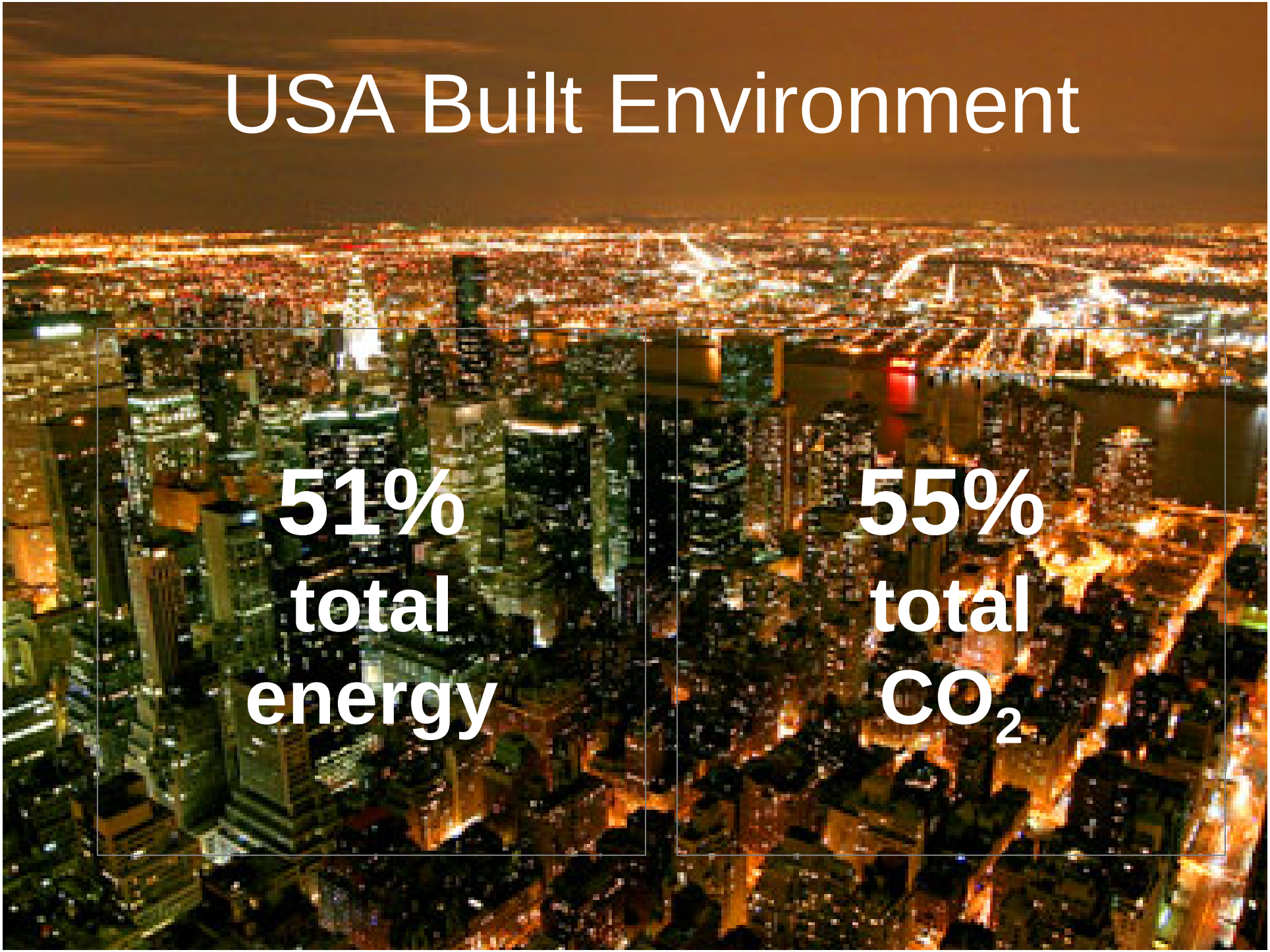
Source: Architecture 2030

Worldwide Energy Demand & Coal

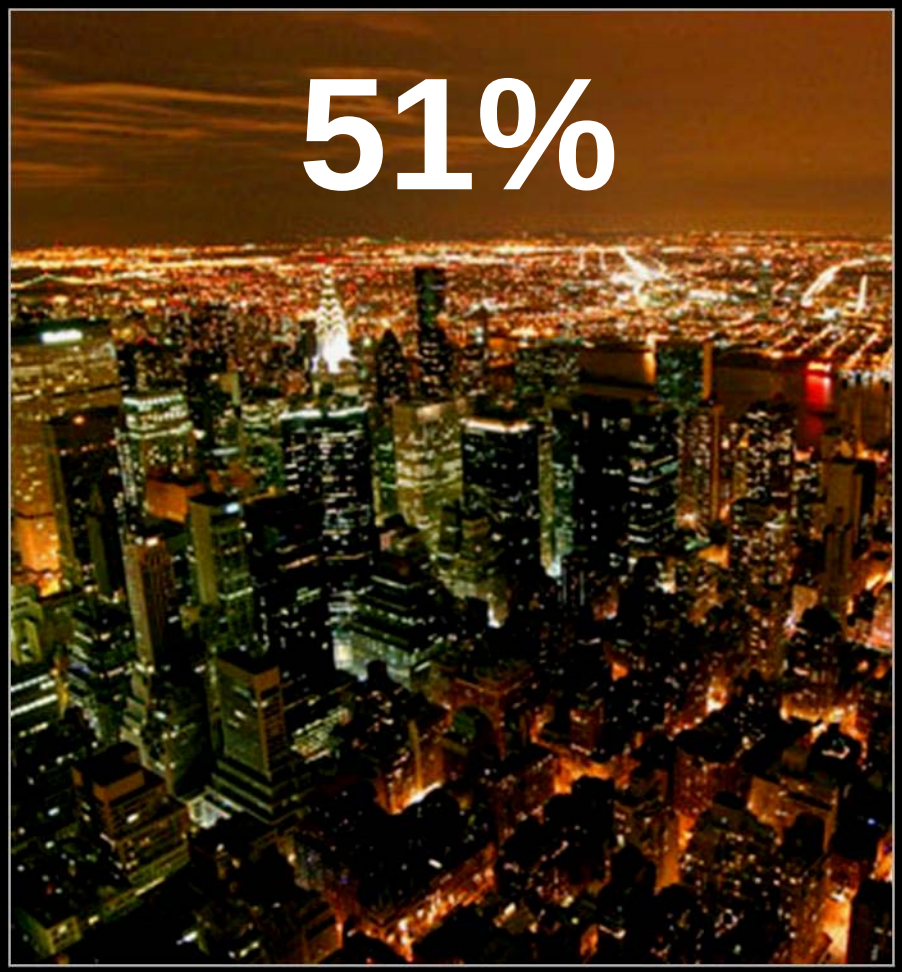


Sources: Architecture 2030, U.S. Energy Information Agency & CalStar analysis

USA Built Environment



USA Energy Demand



Built Environment

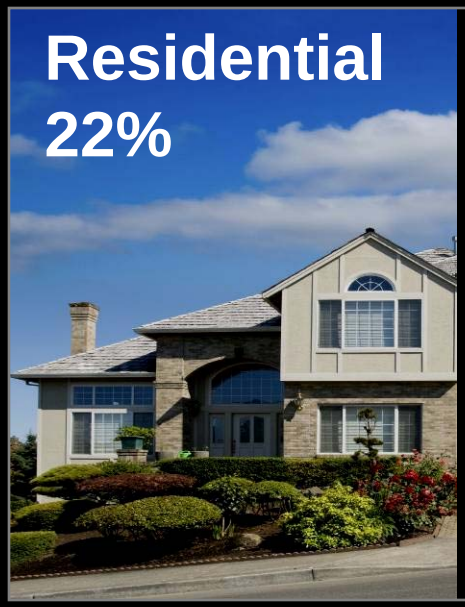
Transport

Industry

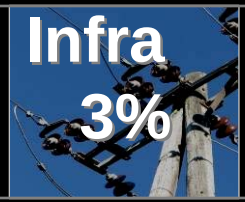
Source: EIA, CalStar analysis

USA Energy

Built Environment 51%



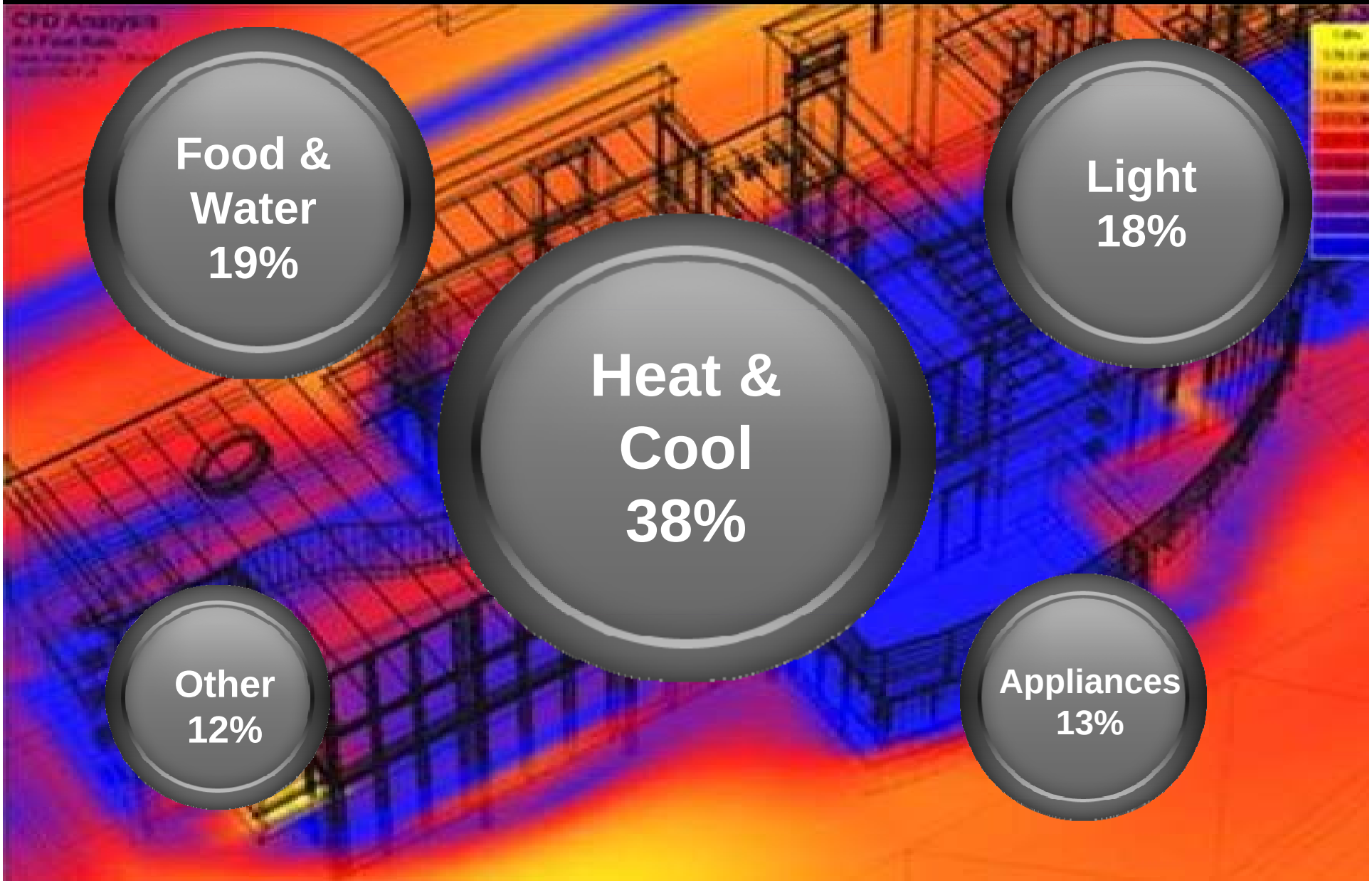
Operations 39%



Materials 12%

Source: EIA, CalStar analysis

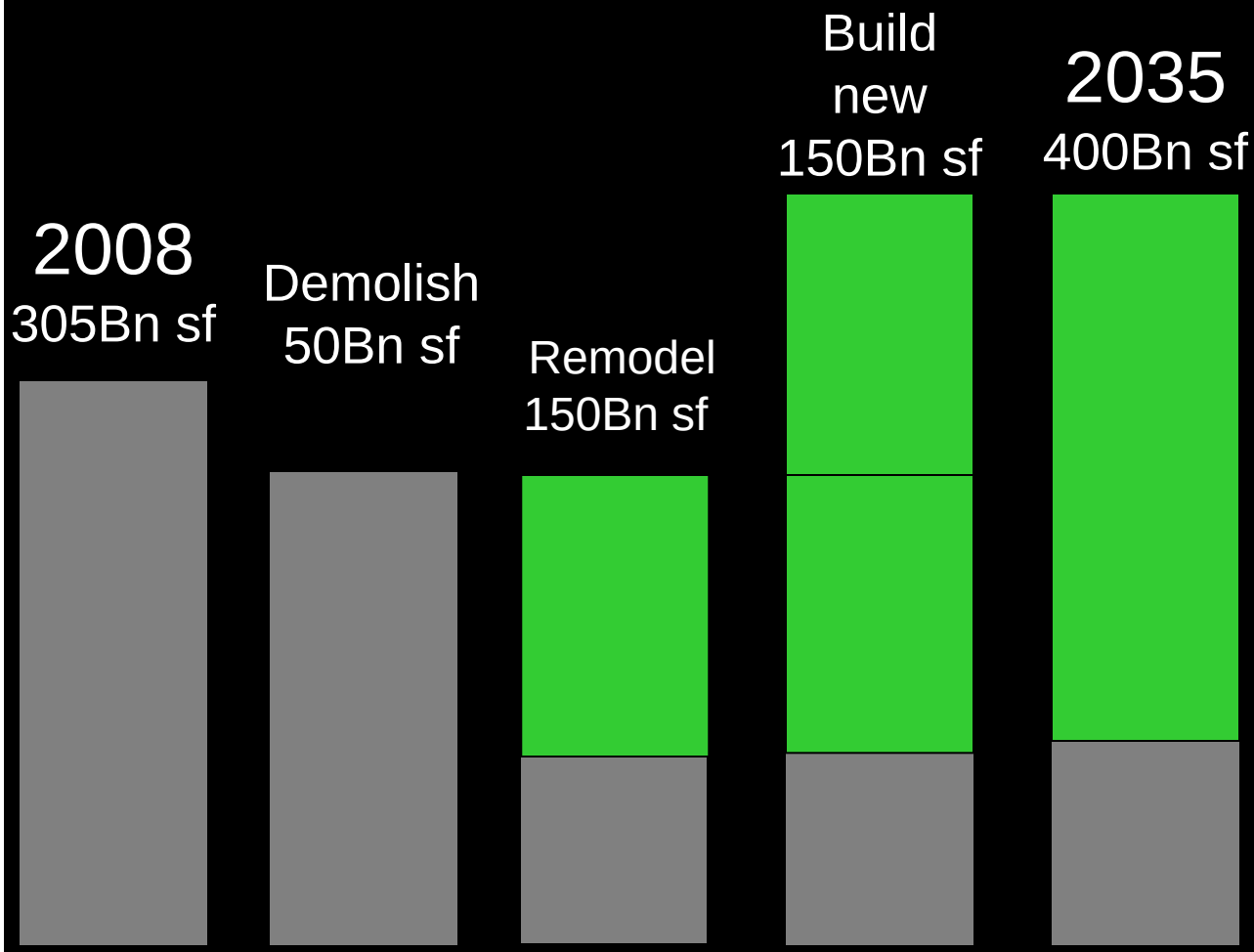
The Problem



Half of USA Electricity from Coal

Transportation 1%

USA Construction Cash Flood: 2035



75% touched

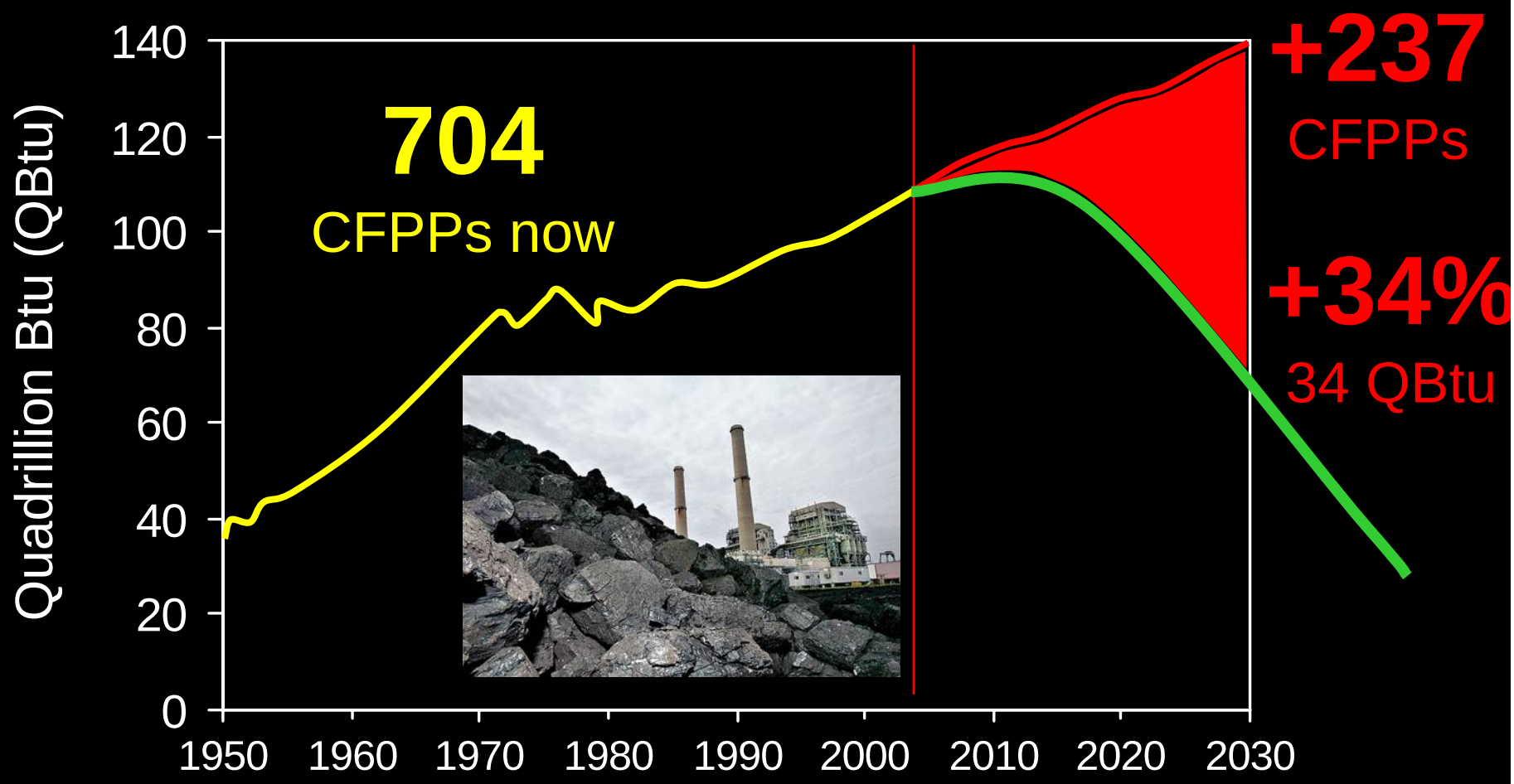
$30T new construction

+

$10T renovate

U.S. Building Inventory

USA Energy Demand & Coal



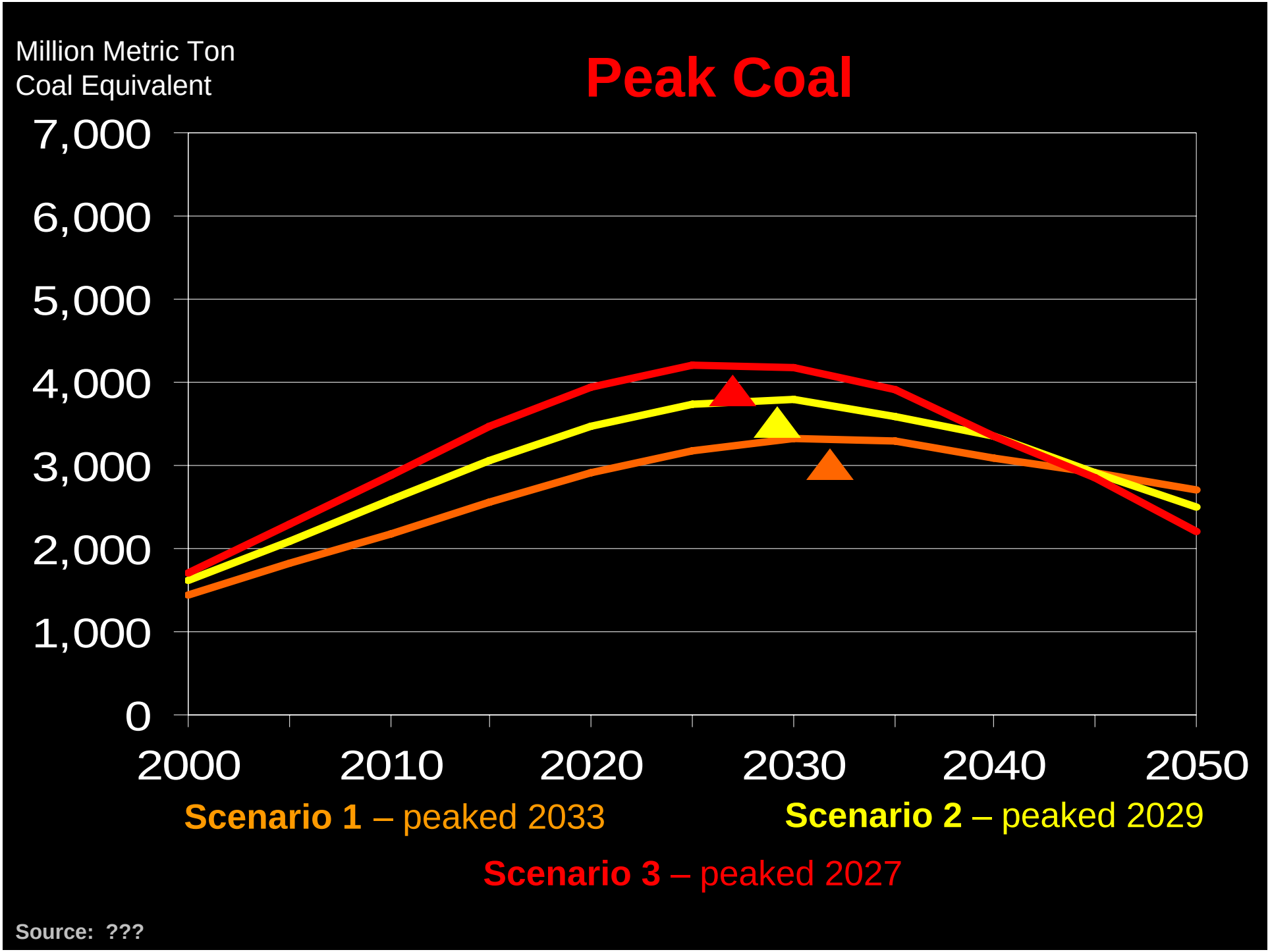
Sources: Architecture 2030, U.S. Energy Information Agency & CalStar analysis

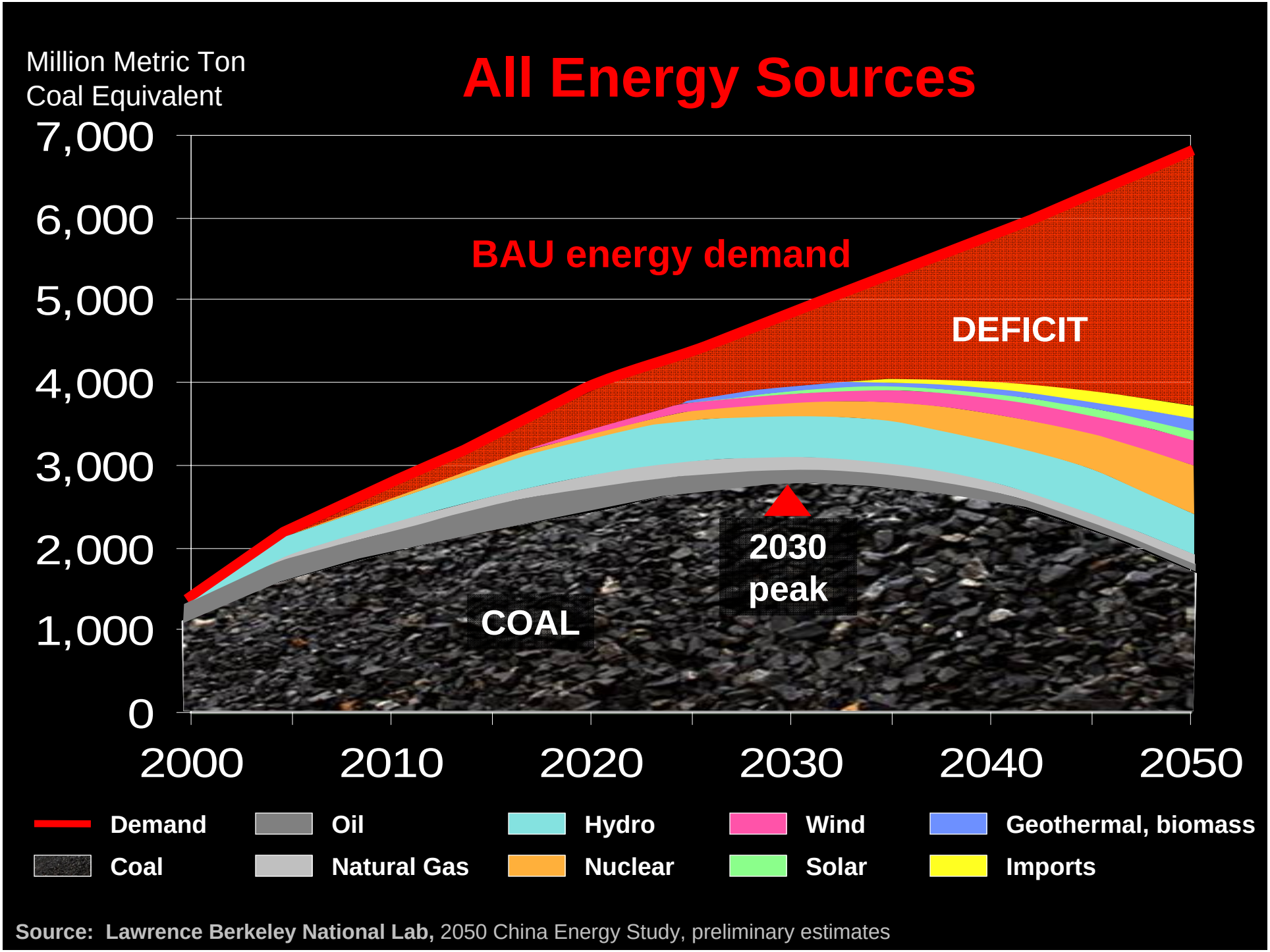
CHINA 2020

New Urban
350 million

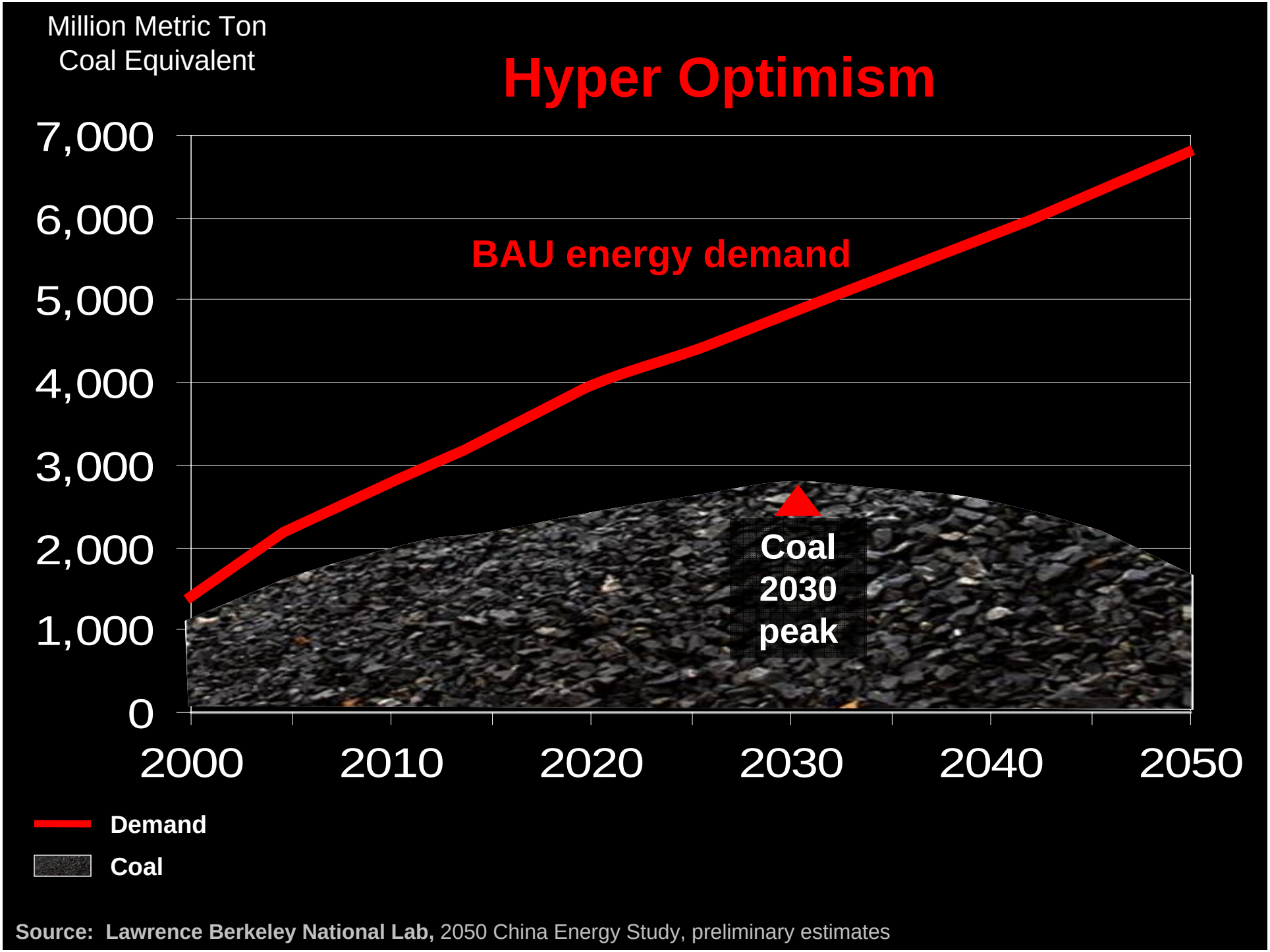
+

New Rural
250 million

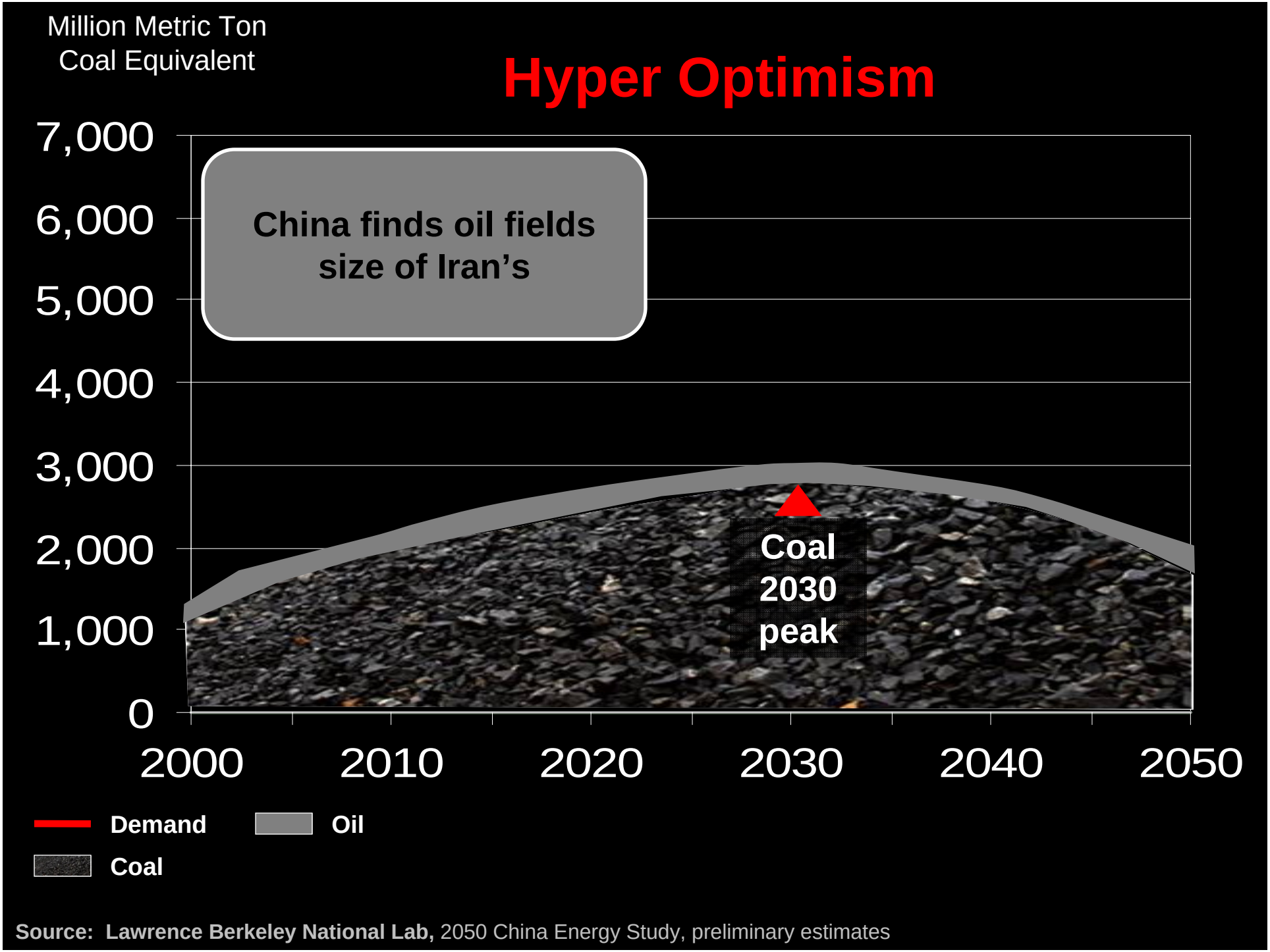

Million Metric Ton
Coal Equivalent
Peak Coal
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2000
2010
2020
2030
2040
2050
Scenario 1 – peaked 2033
Scenario 2 – peaked 2029
Scenario 3 – peaked 2027
Source: ???



Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

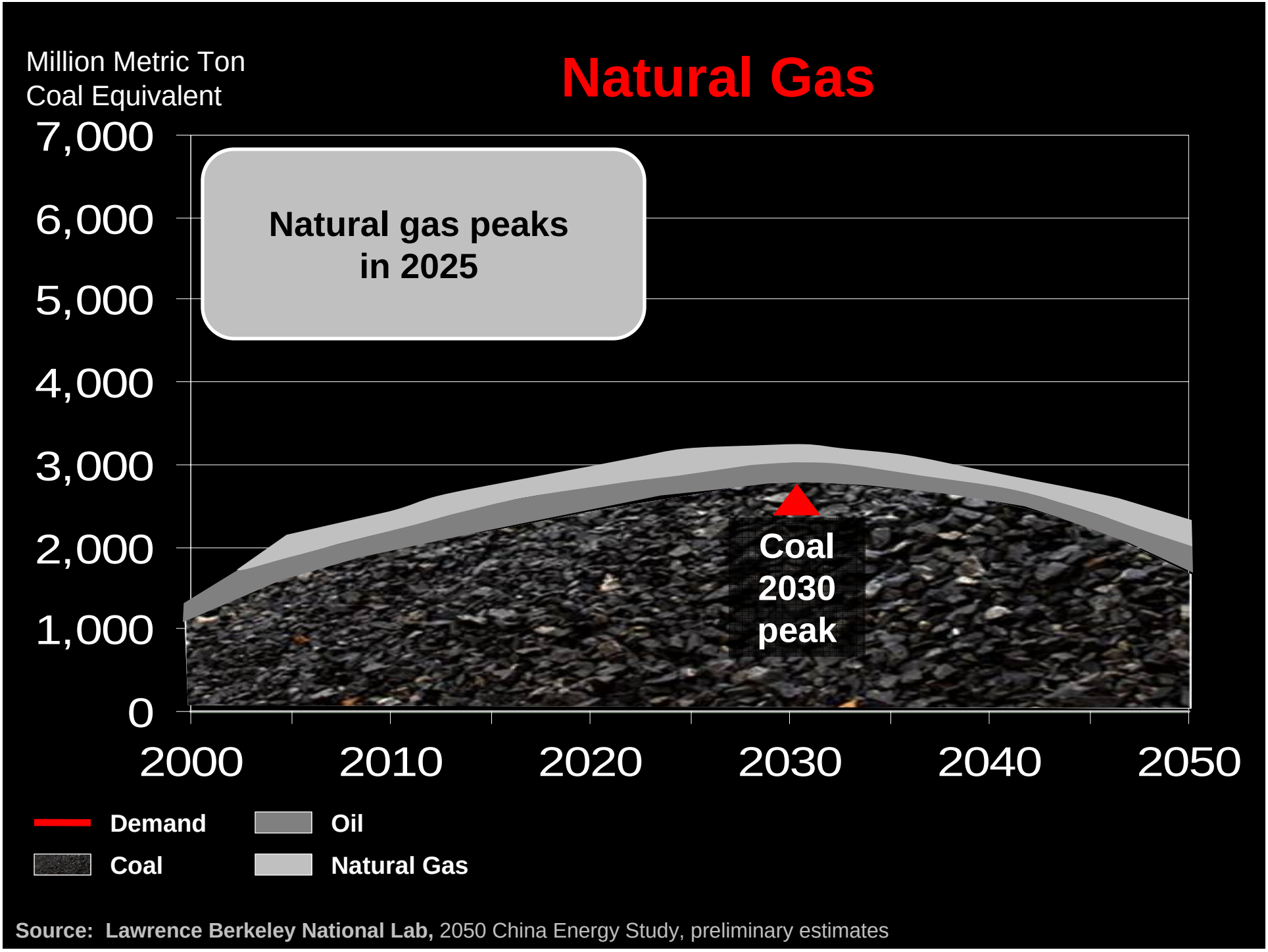


Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates



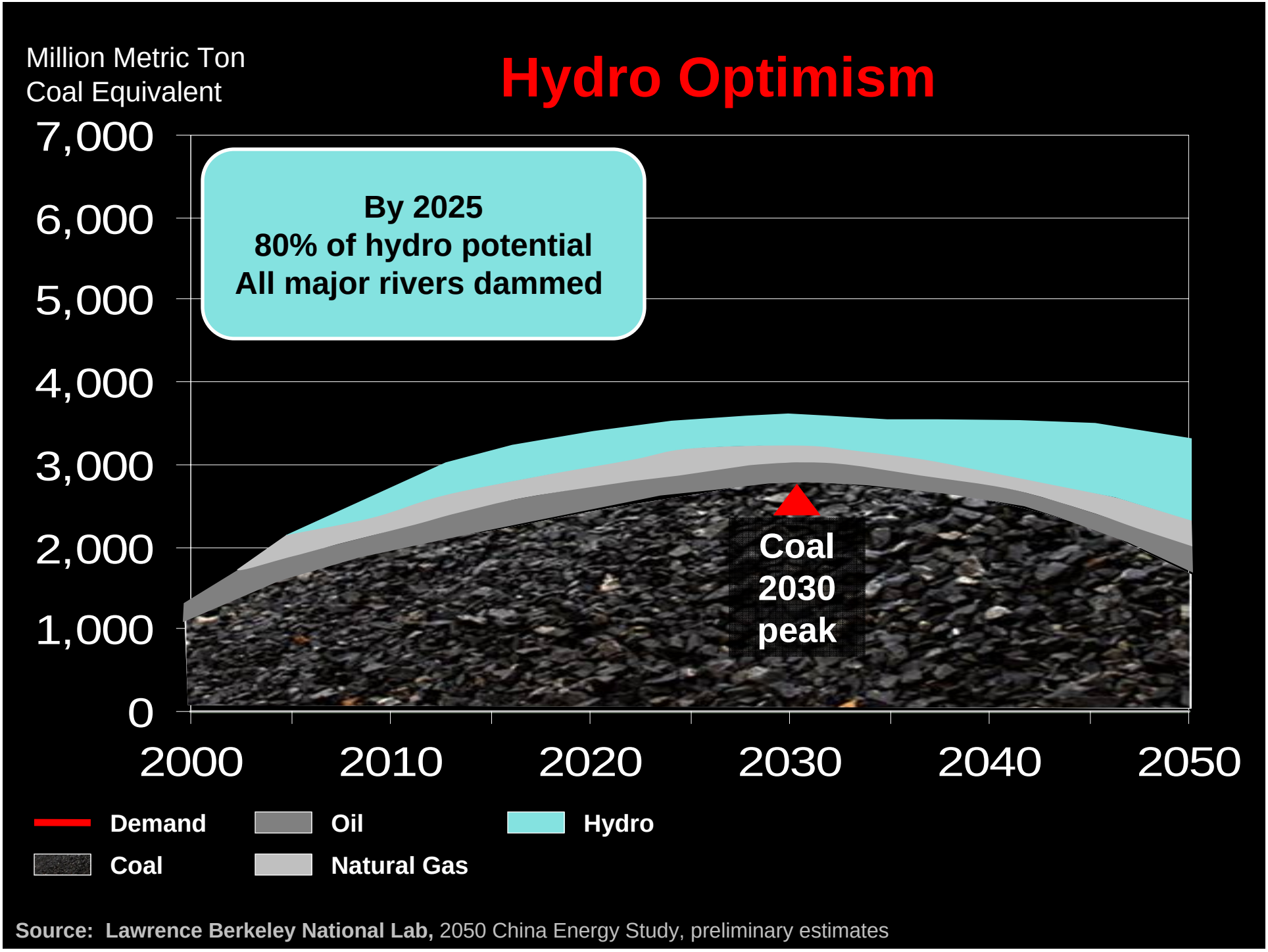
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Natural Gas



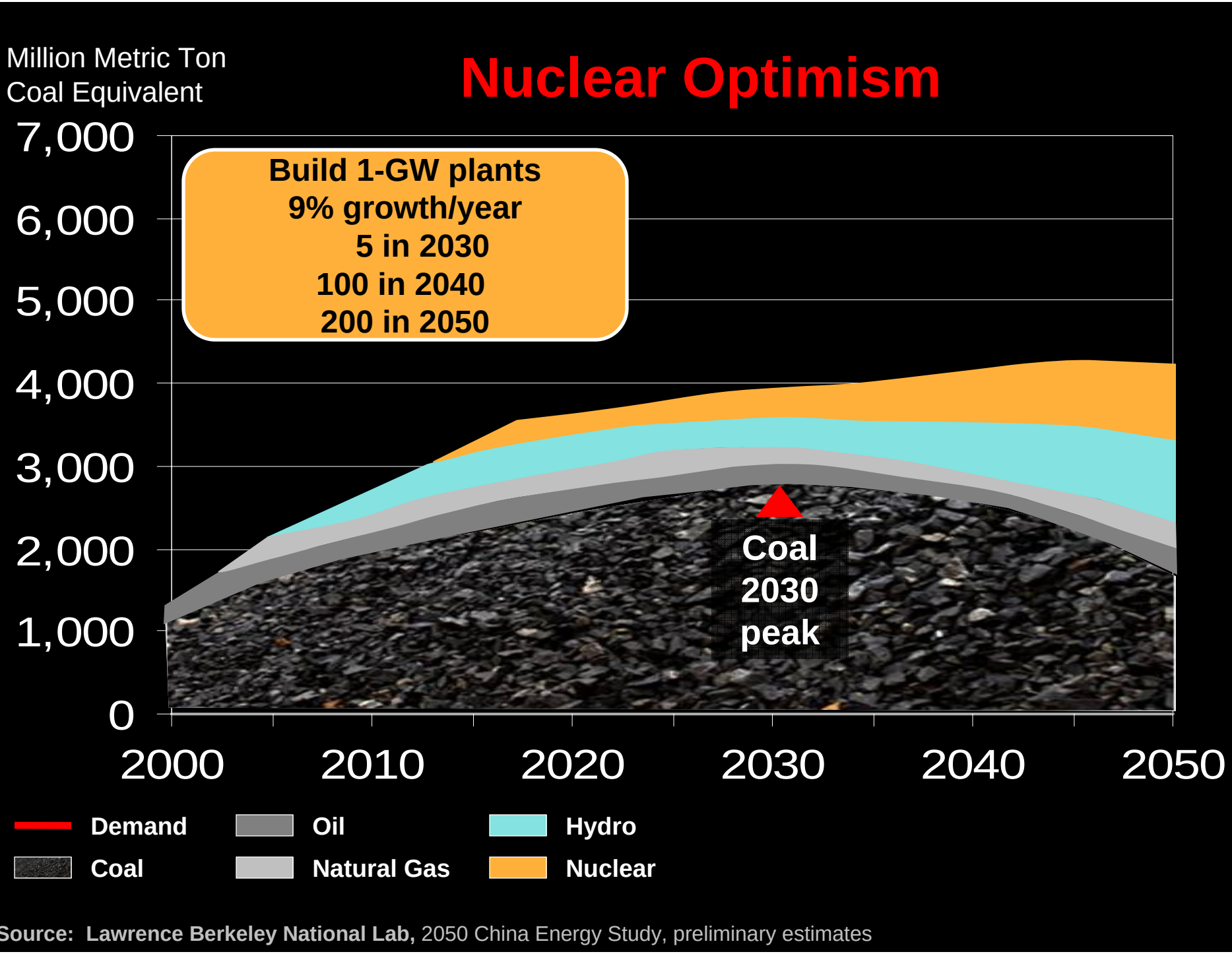
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Hydro Optimism



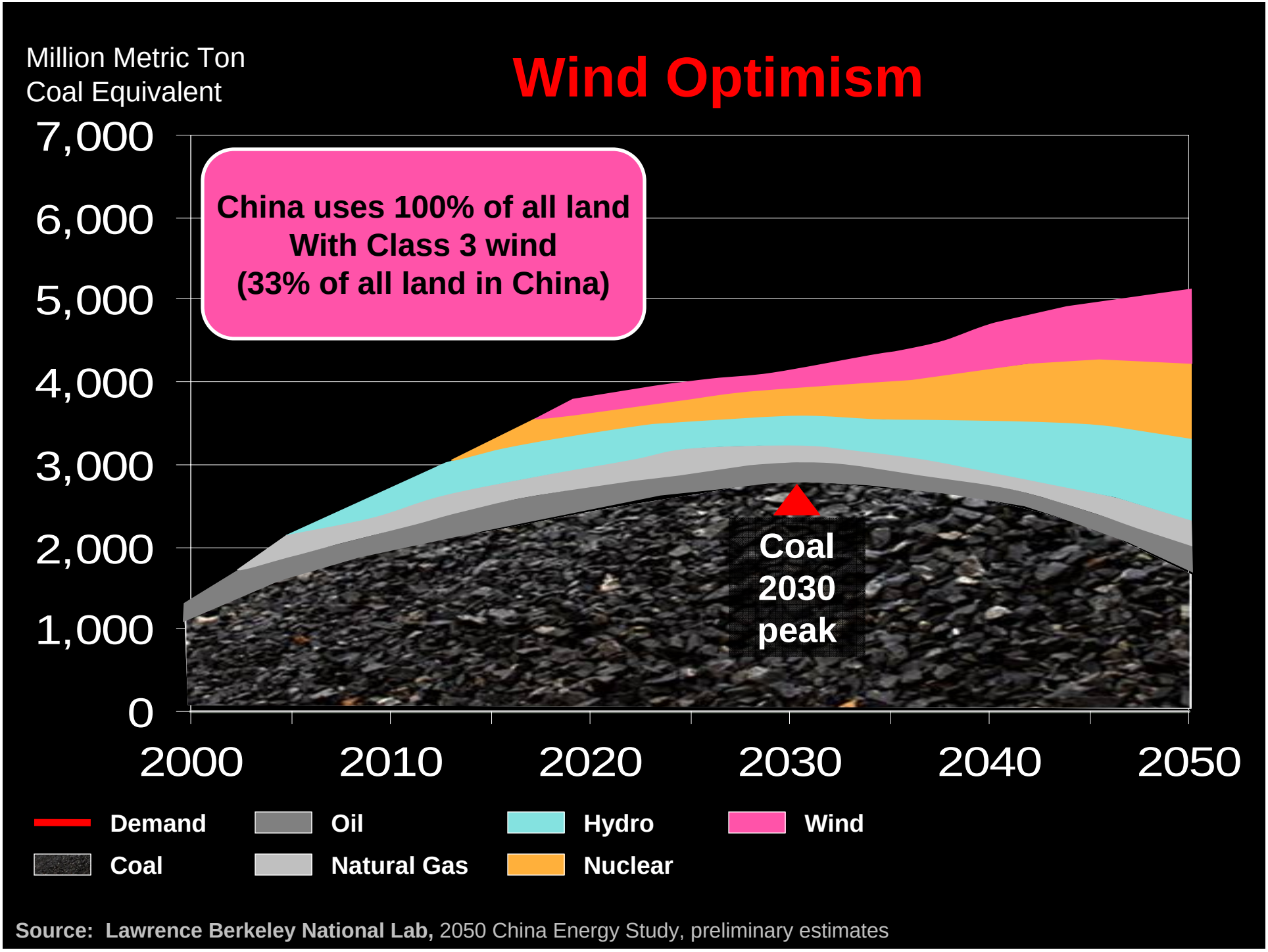
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Nuclear Optimism



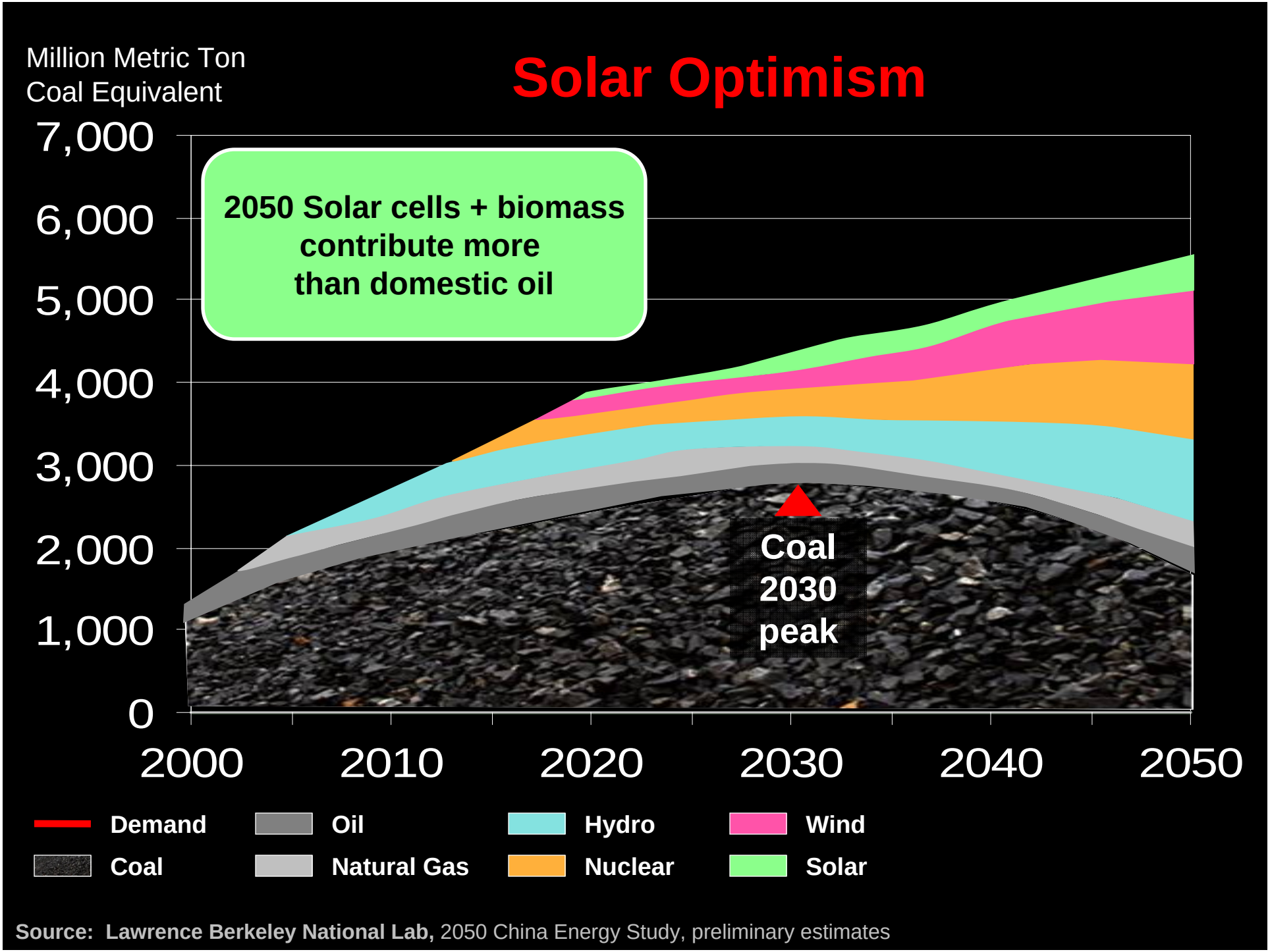
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Wind Optimism



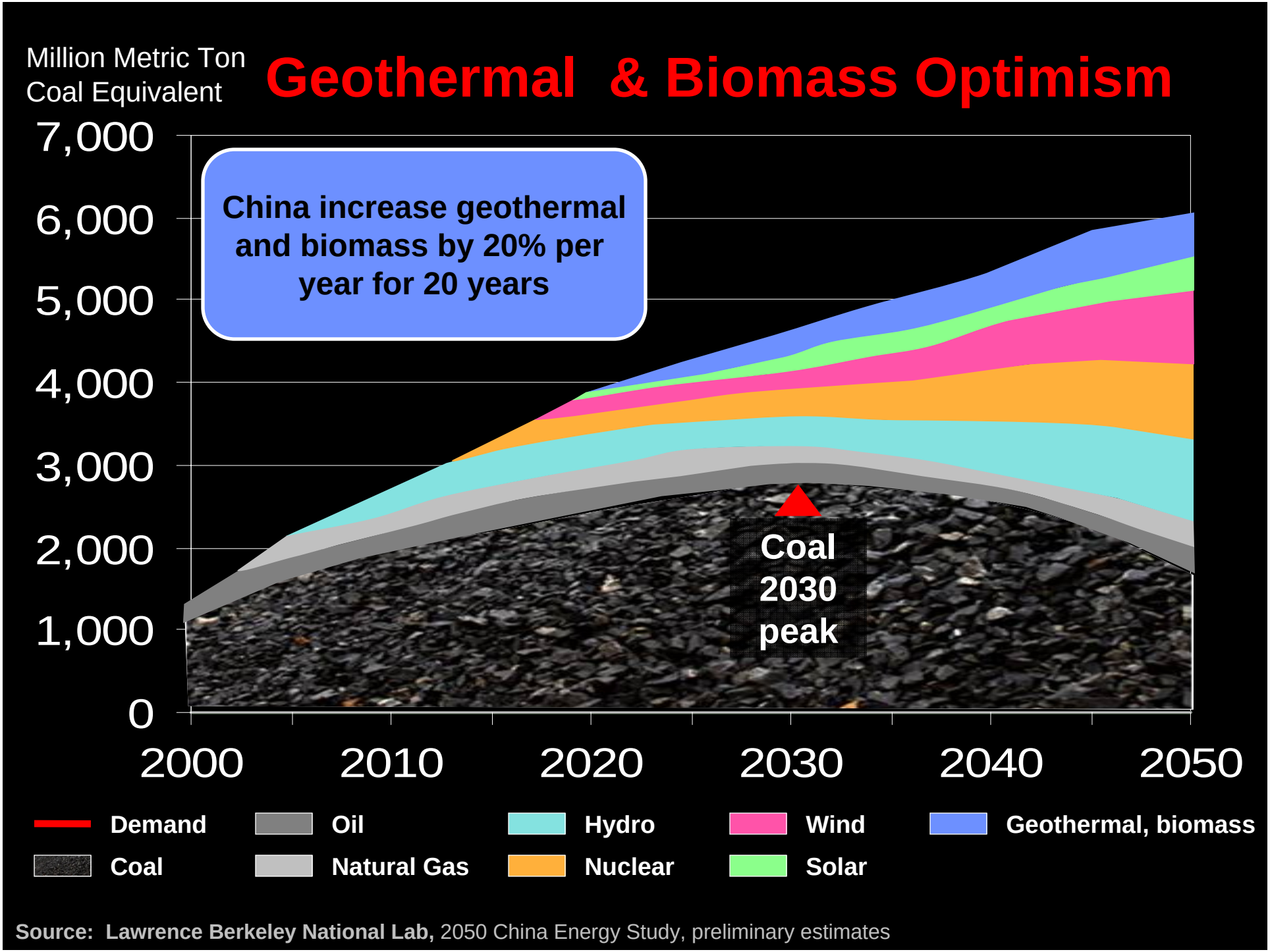
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Solar Optimism



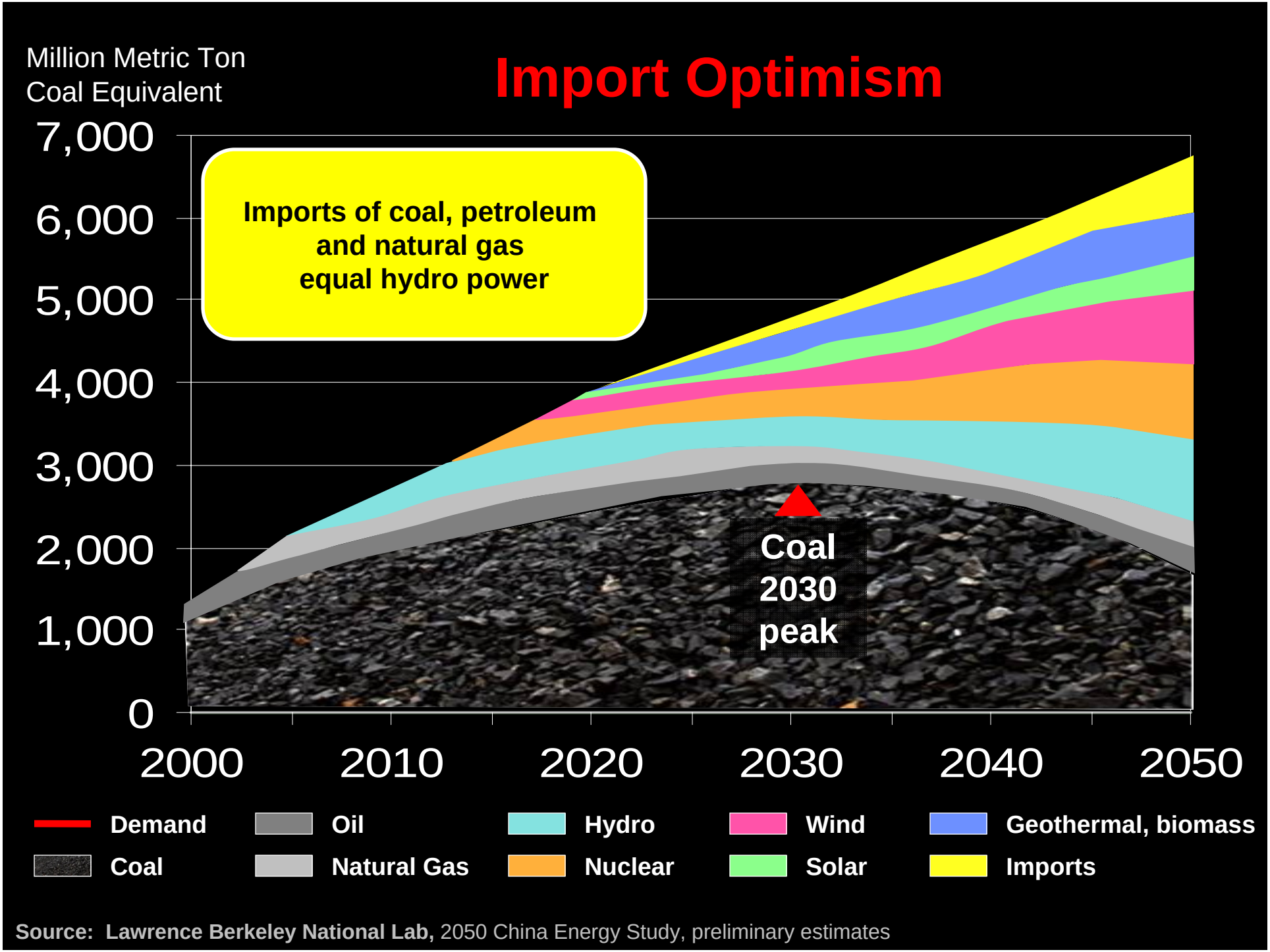
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Geothermal & Biomass Optimism



Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Import Optimism



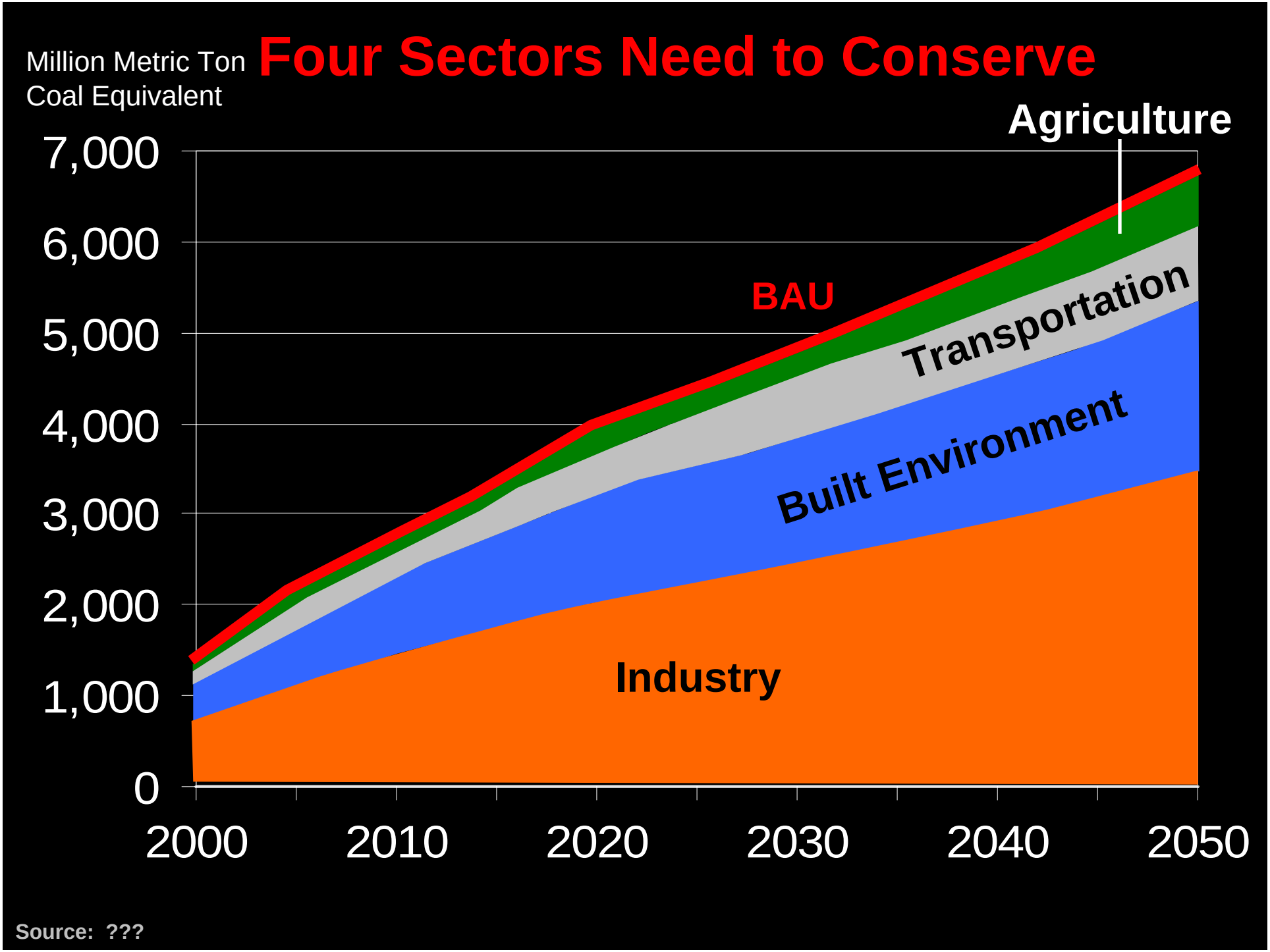
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

Harmonious Society

Danger path

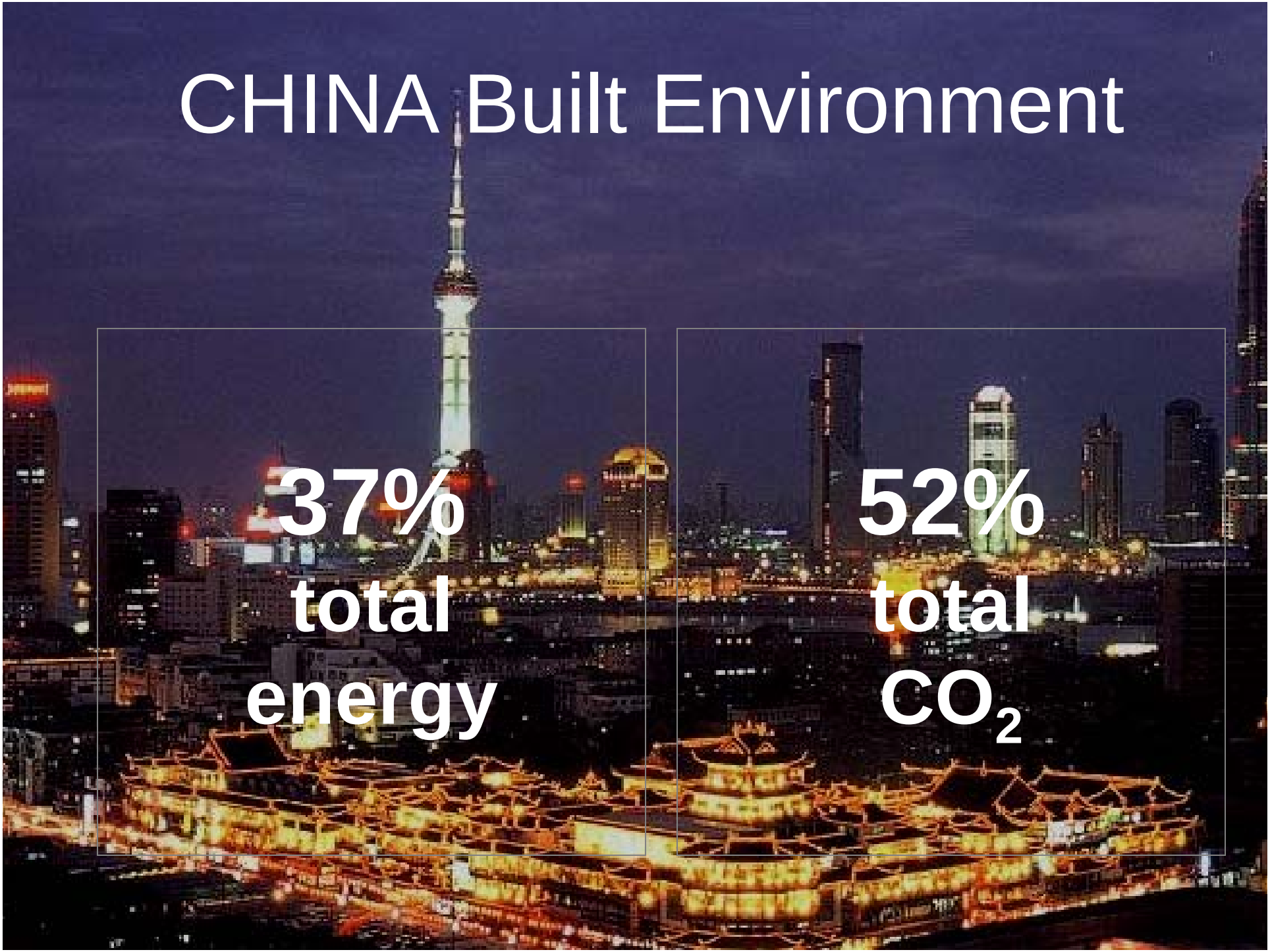
Green path

Four Sectors Need to Conserve



Source: ???

CHINA Built Environment



China Energy Demand

Built Environment

Industry

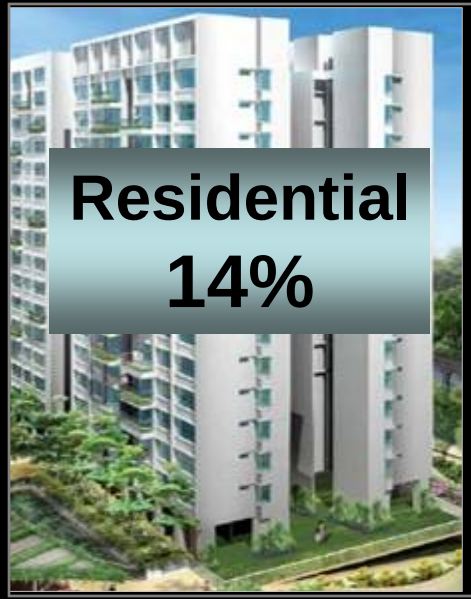
Transport

Agr

Source: LBNL

China Energy & Built Environment

Built Environment 37%

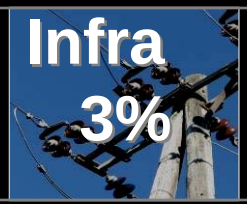


Residential 14%

Commercial 9%

Operations 23%

Buildings 11%



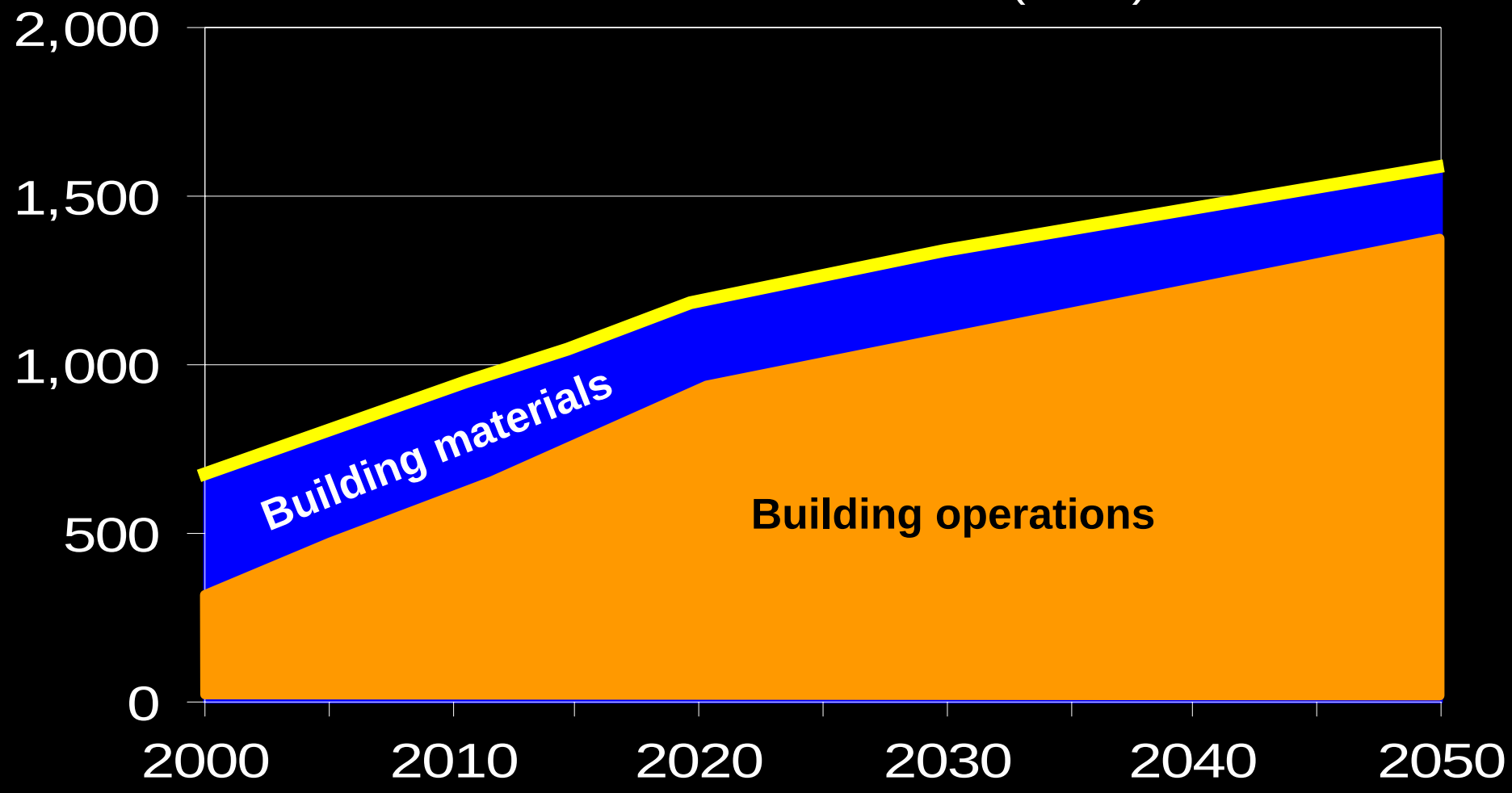
Infra 3%

Materials 14%

Source: EIA, CalStar analysis

China Built Environment

Business As Usual (BAU)

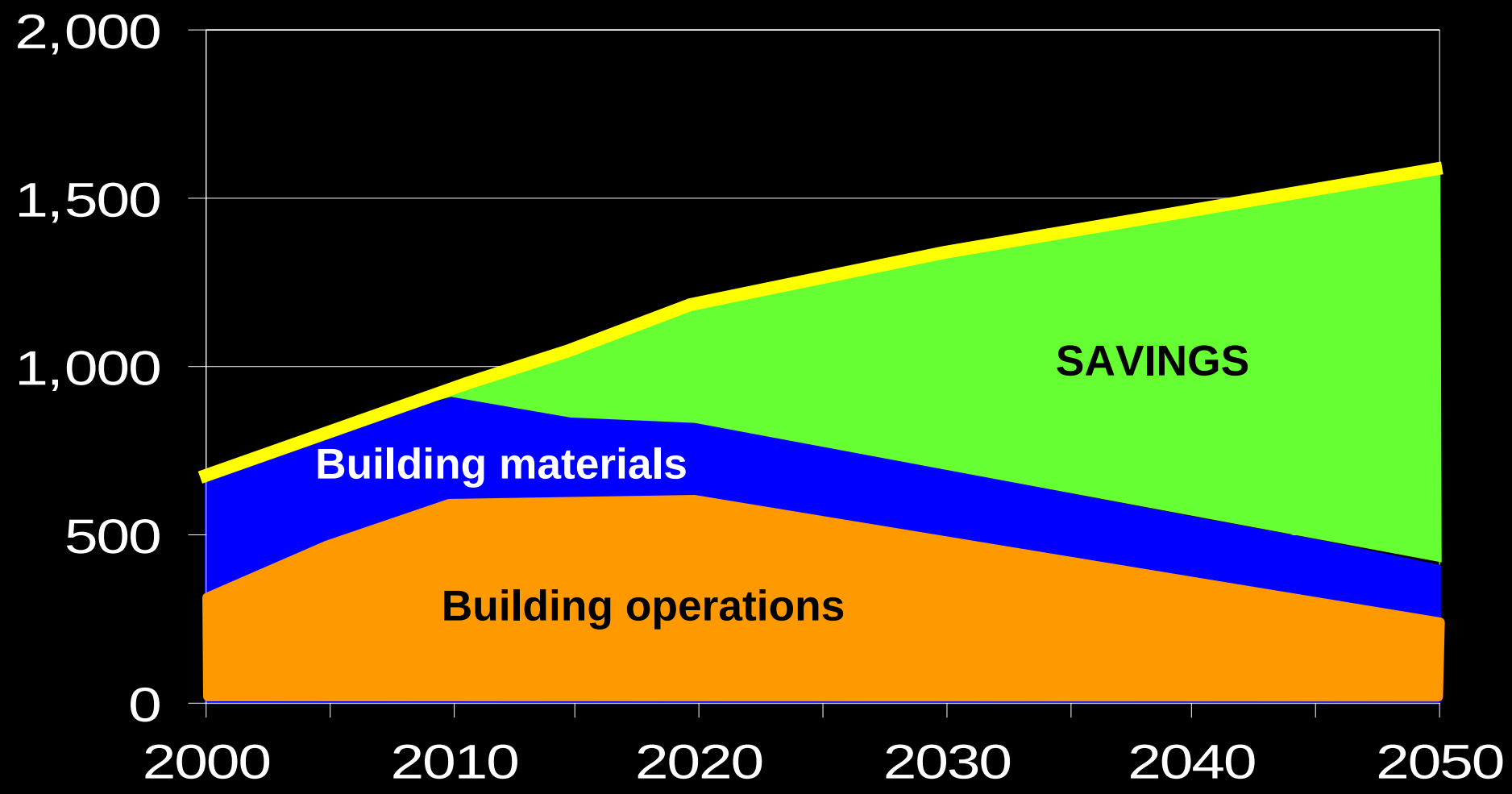


Materials: cement, steel, glass, bricks, wood

Operations: cooling, heating, lighting, appliances

Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

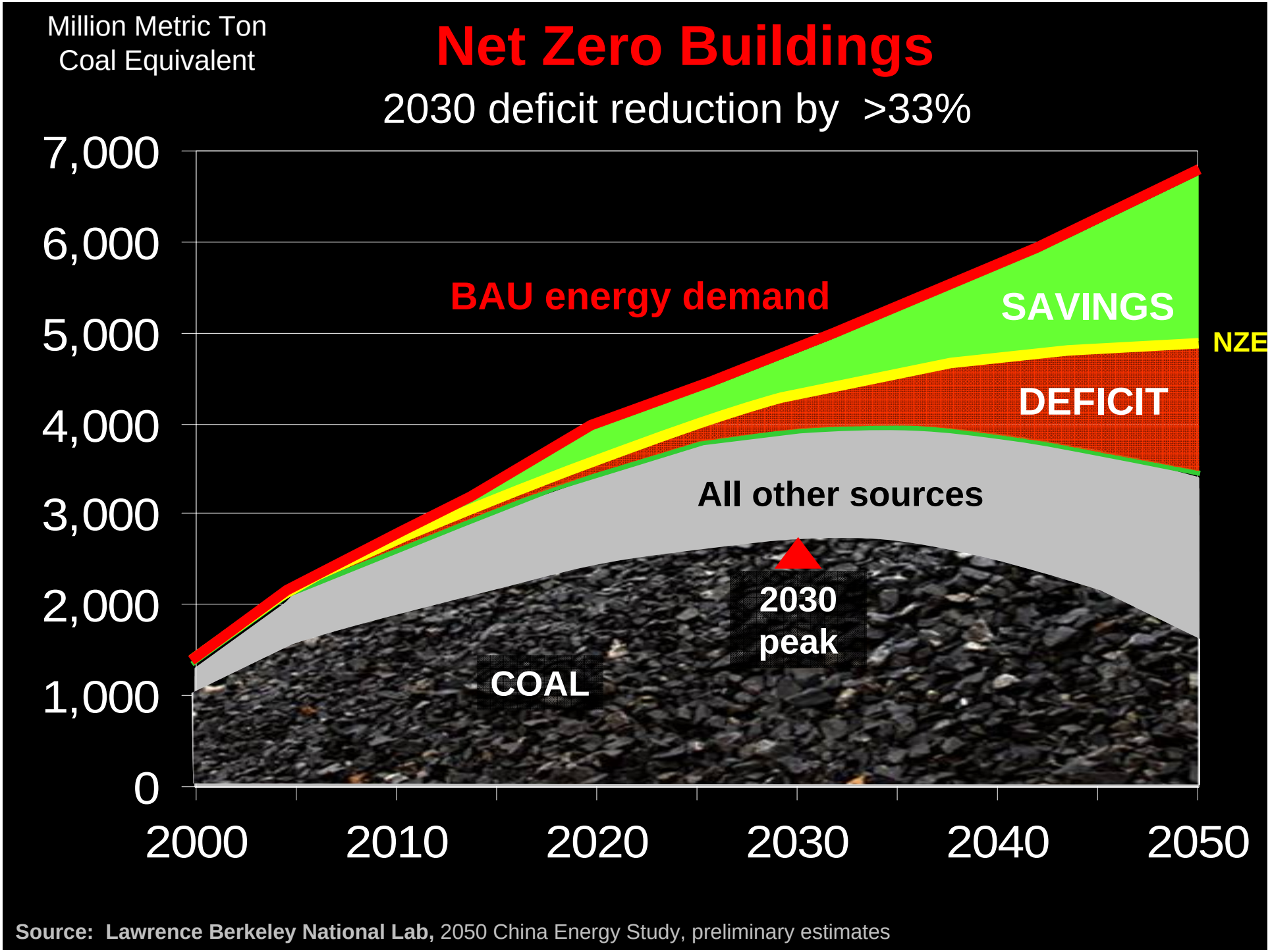
Net Zero Energy (NZE)



Materials: cement, steel, glass, bricks, wood

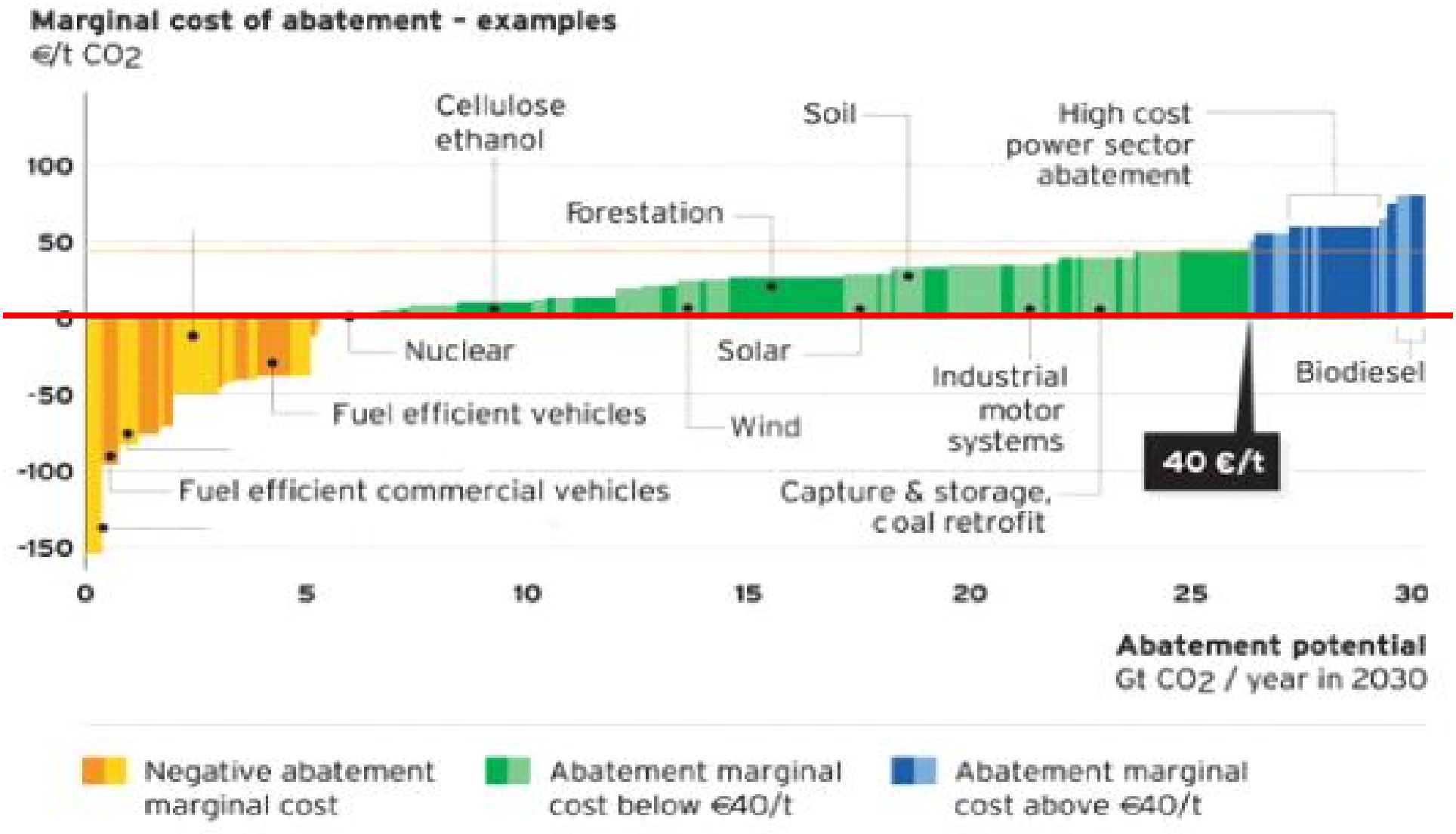
Operations: cooling, heating, lighting, appliances

Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates


Million Metric Ton
Coal Equivalent
Net Zero Buildings
2030 deficit reduction by >33%
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
BAU energy demand
SAVINGS
NZE
DEFICIT
All other sources
2030
peak
COAL
2000
2010
2020
2030
2040
2050
Source: Lawrence Berkeley National Lab, 2050 China Energy Study, preliminary estimates

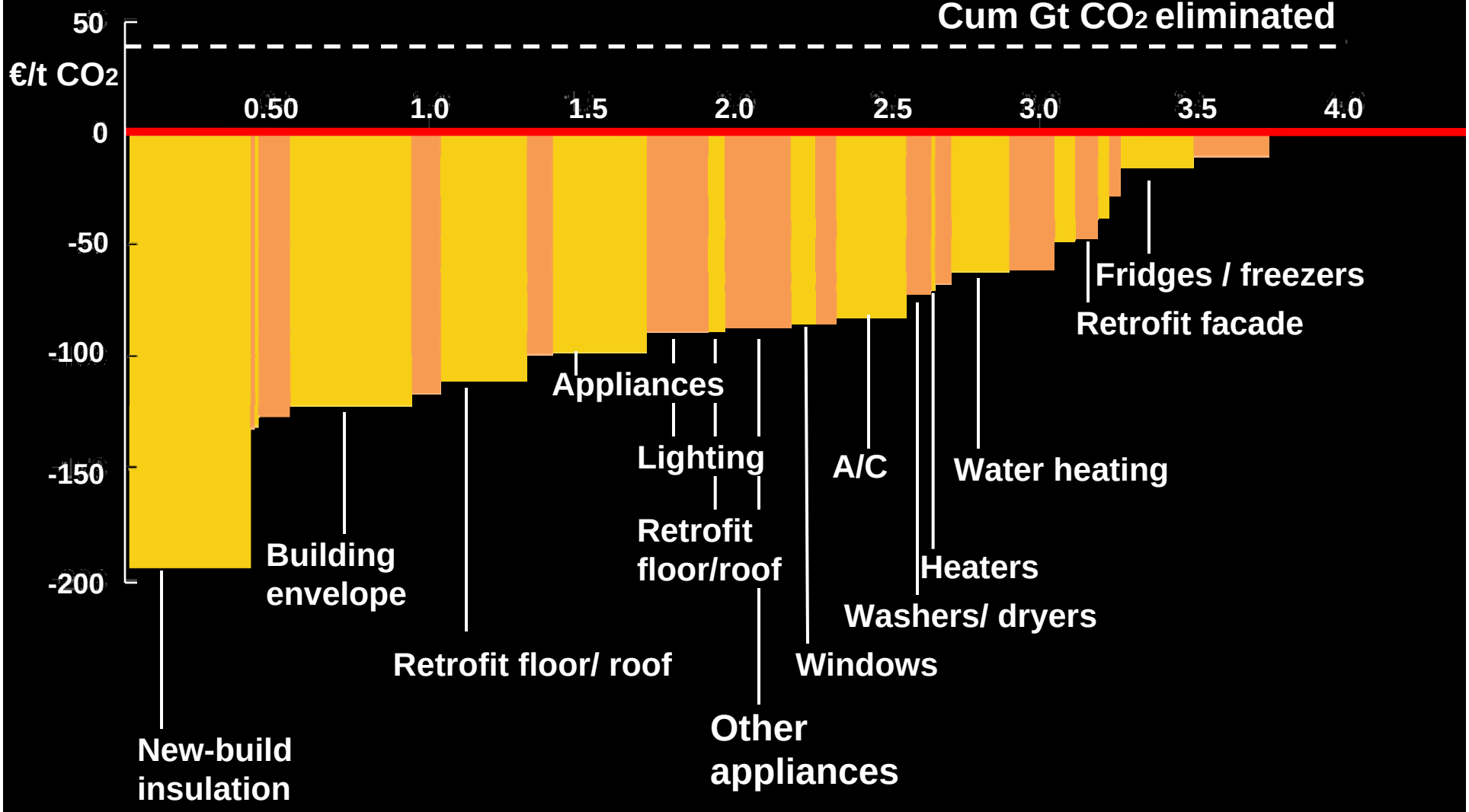

Everything
in the built environment
can be reinvented

Eliminate 27B tons of CO_2



Sources: Vattenfall, McKinsey & Co.

4B tons of CO_2, negative cost



…all green building materials & technologies

Sources: Vattenfall, McKinsey & Co.


Serious
Materials

Serious Snapshot

QuietRock®

Quiet enables urbanization and density
Quiet walls, floors, ceilings, windows, doors

EcoRock ®

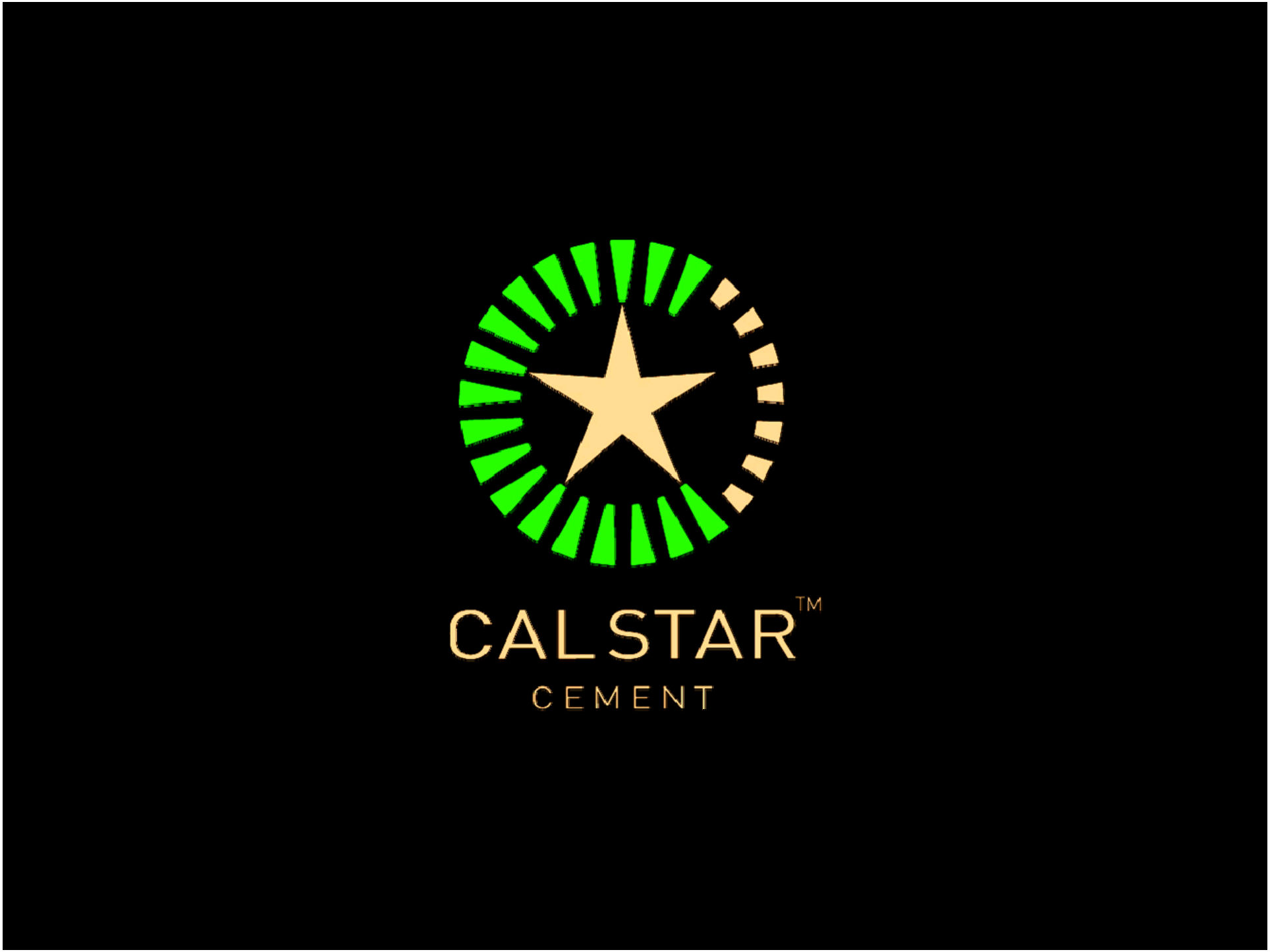
Eco reduces CO2 and embodied energy
Drywall with 95% less CO2

ThermaProof ® Windows

Thermal envelope, R-15
Same rating as exterior wall

R-15 Windows

Save 38%
of building
energy bill


CALSTAR™
CEMENT

Cement

Portland cement, 8% of CO_2
2.5 billion tons/year
$150B world market
Industry stuck
Same since 1824

Automobiles ~ Cement

Billion Tons CO_2

2.8 BT

700M autos x 4T

~

2.4 BT

2.6BT cement x 0.9

CHINA

49% of world Cement

1.2 billion tonnes

CalStar Products

HELIOTRICITY

Electric Buildings

100 watts
per m^2

North, South
East, West

ZETA Communities

Zero Energy Technology & Architecture

Zero Energy Technology & Architecture

	$/sf	Utility bill/yr	Tons CO_2/yr
ZETA	$150	$0	0
Conventional	$200	$1,960	9

Make a Difference

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