U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Federal Energy Management Program

2005 Energy

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The Solutions Network

Energy Strategies for an Unpredictable Future:

Some California Successes

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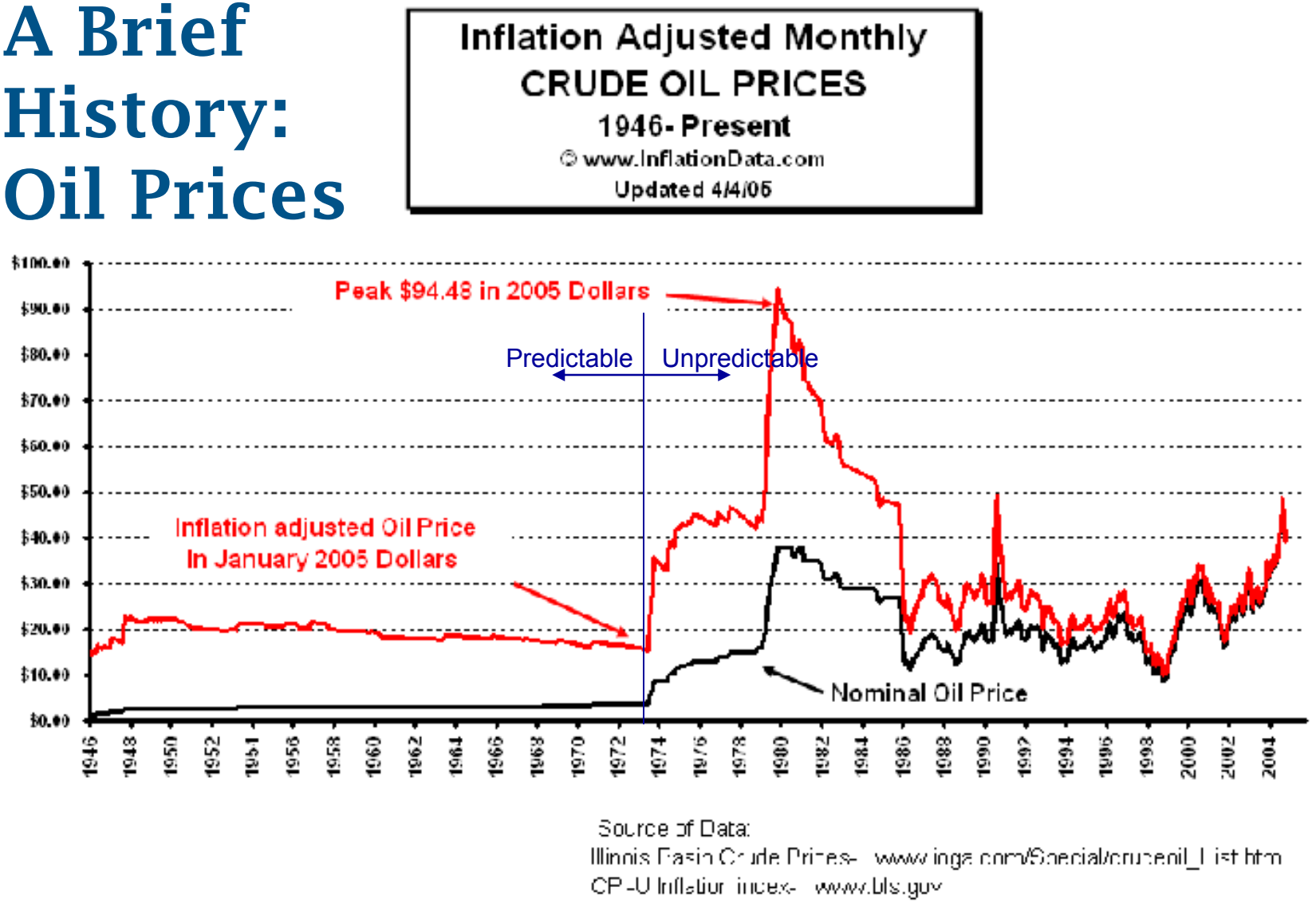
A Brief History: Oil Prices



Oil Price Predictability

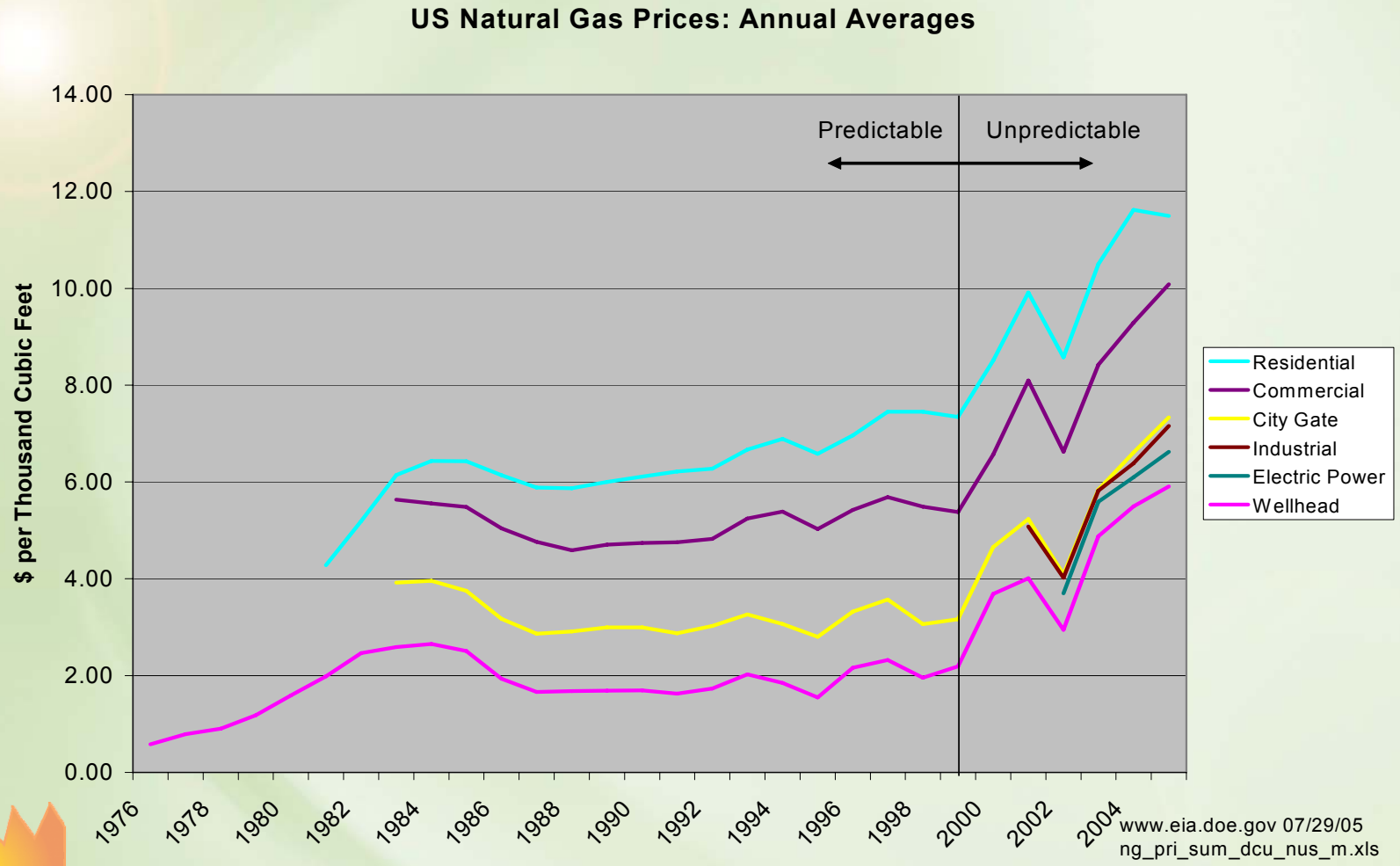
Pre-1973

- Highly predictable

Post-1973

- Utterly unpredictable
  - 1973: $17 per barrel (Constant 2005 $)
  - 1981: $94 per barrel
  - 1986: $20 per barrel
  - 1991: $50 per barrel
  - 1998: $10 per barrel
  - 2005: $60 per barrel

Historical Natural Gas Prices



Natural Gas Price Predictability And Correlation with Oil

- Pre-2000: gas prices largely predictable.
- Post-2000: gas prices unpredictable, but strongly correlated with oil.

Why?

- Consumption interchangeability?
- Production interchangeability?
- Imports and LNG?
- Or no real reason at all?

Markets Do Get It Wrong

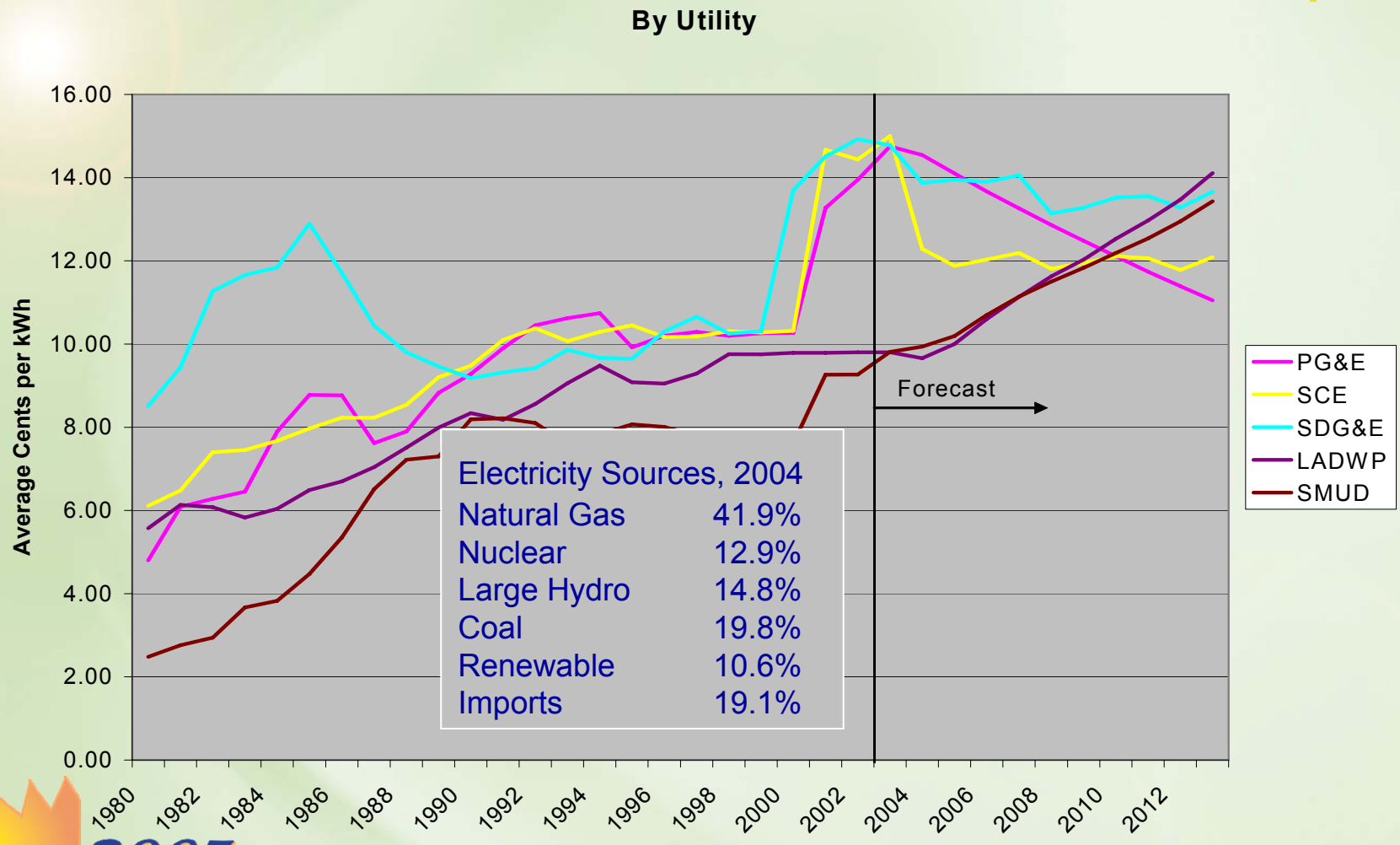
NYMEX Natural Gas Futures

Purchase Date: Future Date and Price	Oct. 2, 2003 ($/MMBtu)	Aug. 4, 2005 ($/MMBtu)
Sep. 2005	$4.489	$8.340
Jan. 2006	$4.944	$9.597
Oct. 2009	$4.527	$6.828

www.nymex.com

- Has anything fundamentally changed?
- Markets are myopic
  - Markets failed to predict the price increases, and they will fail to predict a price drop too.

California Electricity Prices



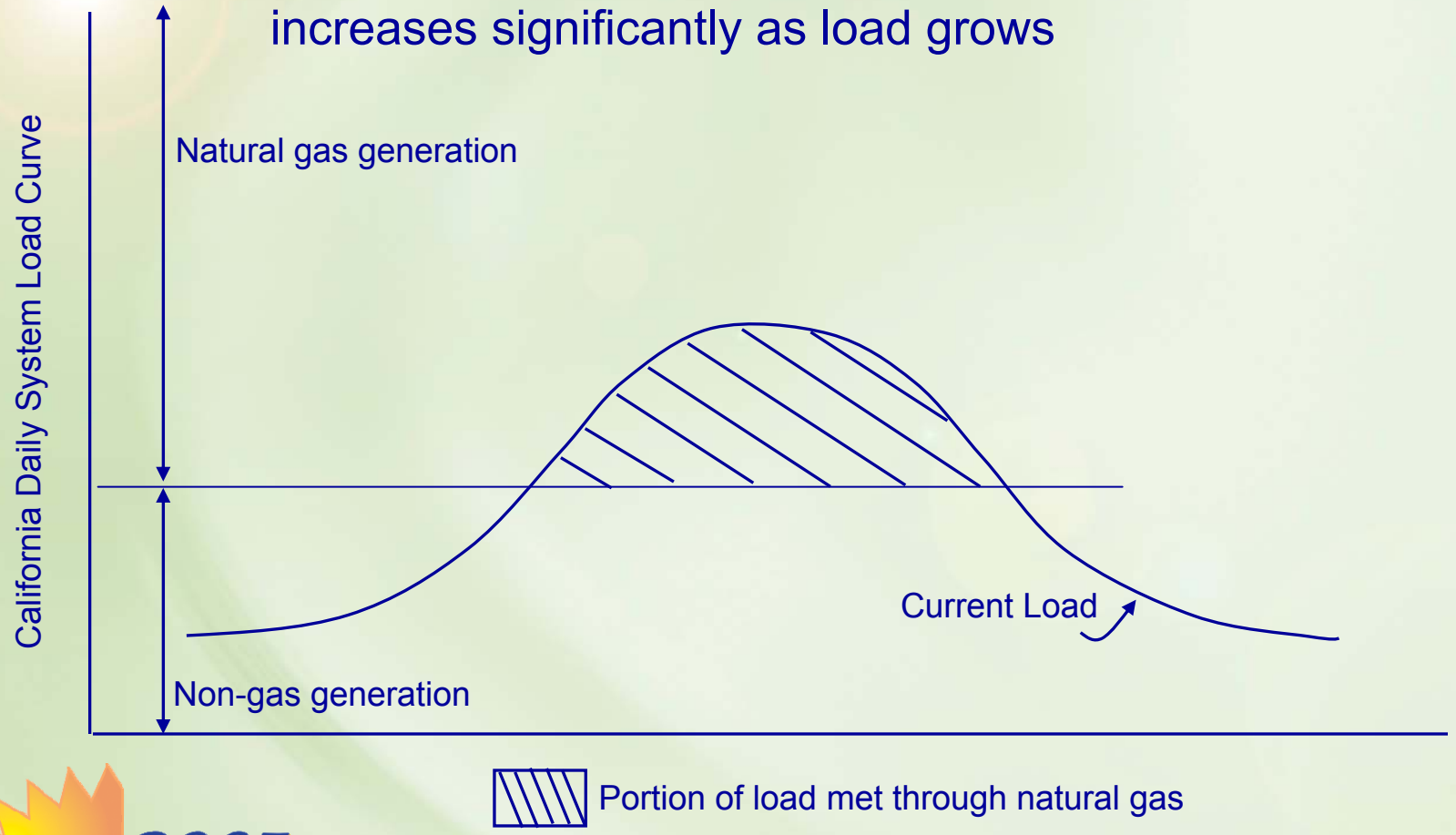
Source: California Energy Commission 2003, 2004

Likely Effect of Natural Gas on California Electricity Prices

- Coal and nuclear constraints
- Large hydro constraints
- Transmission constraints
- Renewables impact still unclear
- Natural gas for most new load
- High gas prices mean high electric prices
- Unpredictable gas prices mean unpredictable electric prices

The Increasing Impact of Natural Gas on CA Electricity

- Proportion of electric load served by natural gas increases significantly as load grows



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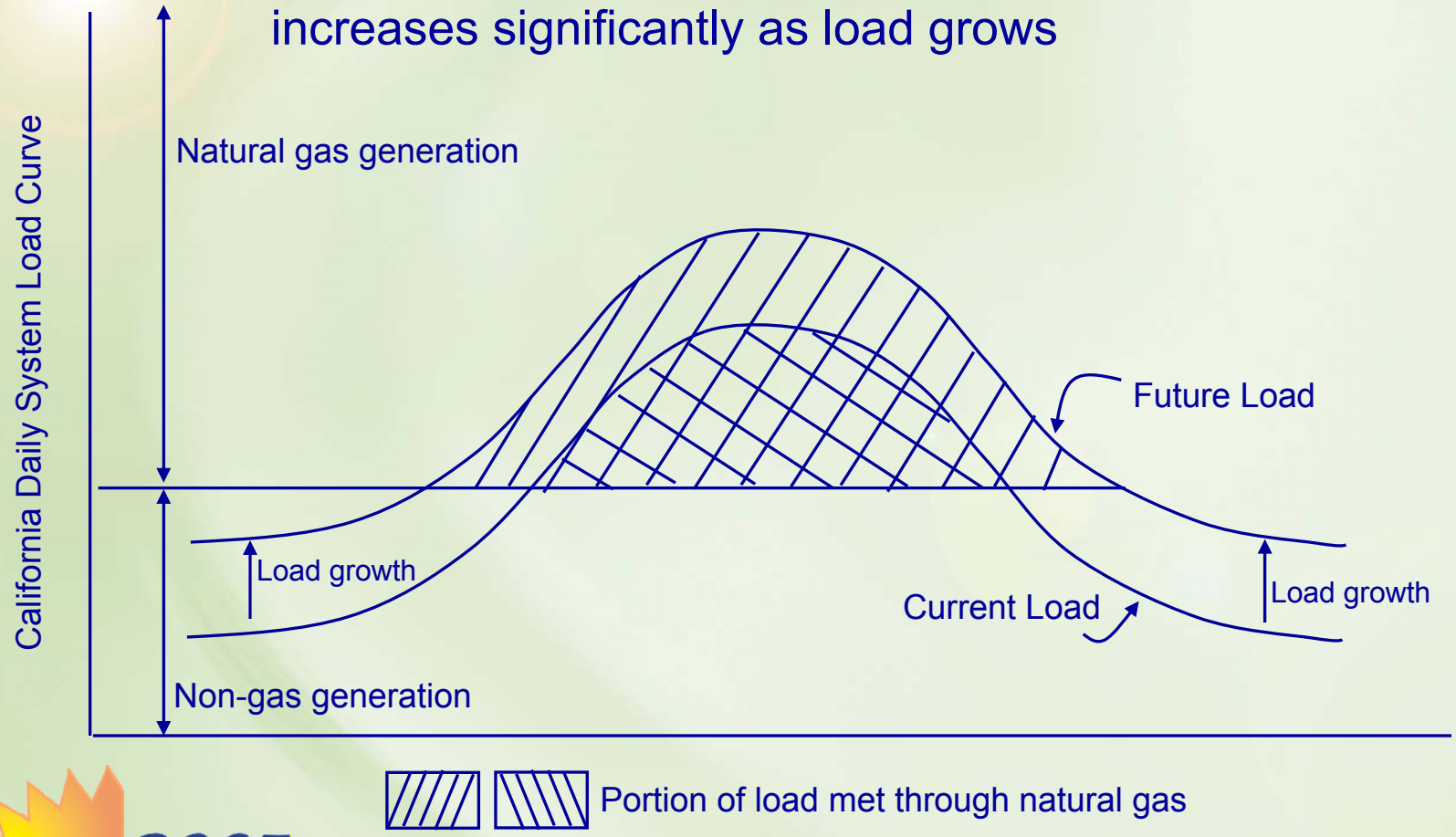

We Can't All Be This Man

Fair Use Public Figure photo. Source: www.nationmaster.com/encyclopedia/George-Soros

We Can't All Be This Man

George Soros

Overnight, earned more than $1 billion speculating against the British Pound in 1992. Single-handedly ejected the UK from the European Exchange Rate Mechanism. Dubbed "the man who broke the Bank of England".

So what should the rest of us do?

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When the Future is Uncertain, Do as the Financial Markets Do:

DIVERSIFY YOUR PORTFOLIO.

HEDGE YOUR RISKS.

Financial Portfolio

- Stocks
- Bonds
- Cash
- Real Estate

Energy Portfolio

- Energy Efficiency
- Cogeneration
- Solar
- Demand Response

Energy Efficiency

Energy efficiency almost always makes sense.

- Lowest cost energy resource.
- Natural hedge against energy price changes.
  - Price increase: energy efficiency becomes more cost-effective.
  - Price decrease: energy bills decline and savings are still achieved.
- Facility infrastructure improvements.
- Occupant comfort and health improvements.
- Greatest environmental benefits.

Cogeneration

Important part of a well-diversified portfolio.

- Hedges against electricity price increases.
- In today's high gas price environment:
  - Low spark spread may be very temporary.
  - Think long term.
    - What made sense a few years ago?
    - What is likely to make sense in a few years?
- Look for high heat loads.
- Look for additional/secondary benefits.
  - Standby, backup, environmental, tax.

Solar Photovoltaics

It's not just about simple payback.

- Hedge fuel costs.
  - Zero fuel cost for 25+ years.
- Natural peaking resource.
  - Protects against high gas and electric prices.
    - CA dependence on natural gas for peaking power.
  - Critical peak pricing in California.
- Tax benefits
  - Investment tax credit, accelerated depreciation.
  - 3rd party own-operate model.

Demand Response

Prepare for the Future.

- Market slowly moving toward real-time pricing
  - Greater volatility
  - Higher peak prices
- Critical peak pricing
- Keep an eye on demand bidding and incentive programs
- Establish EMS price responsiveness capability

California Success Case Studies

Foothill-De Anza Community College District

- Comprehensive energy efficiency 1998-2000
- Demand response system 2001-2002
- Microturbine cogeneration (pools) 2004-2005
- Solar photovoltaics 2004-2005
- Total electricity (kWh) reduction ~50%
- Environmental benefit = > 2000 acres of trees

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California Success Case Studies

Alameda County

- Comprehensive energy efficiency 1993-2001
- 1 MW solar photovoltaics 2001
- Demand response system 2001
- 1 MW fuel cell cogeneration 2004-2006
- Total utility demand reduction = ~ 2500 kW
- Environmental benefit = > 1000 acres of trees

Photo Courtesy of PowerLight Corp.


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