

Extrapolating the past

VS.

Inventing the future

“when the train of history hits a curve,
the intellectuals fall off.”

- Karl Marx

...when conventional wisdom makes no sense



Should fever be reduced in critically ill patients: “there were seven deaths in people getting standard treatment and only one in those allowed to have fever...”

...at which point the study was halted due to ethical concerns

“All progress depends on the unreasonable man”

- George Bernard Shaw

“Human salvation lies in the hands of the creatively maladjusted”

- Martin Luther King

experts reality check?

“Heavier-than-air flying machines are impossible”

- Lord Kelvin, President, Royal Society, 1895

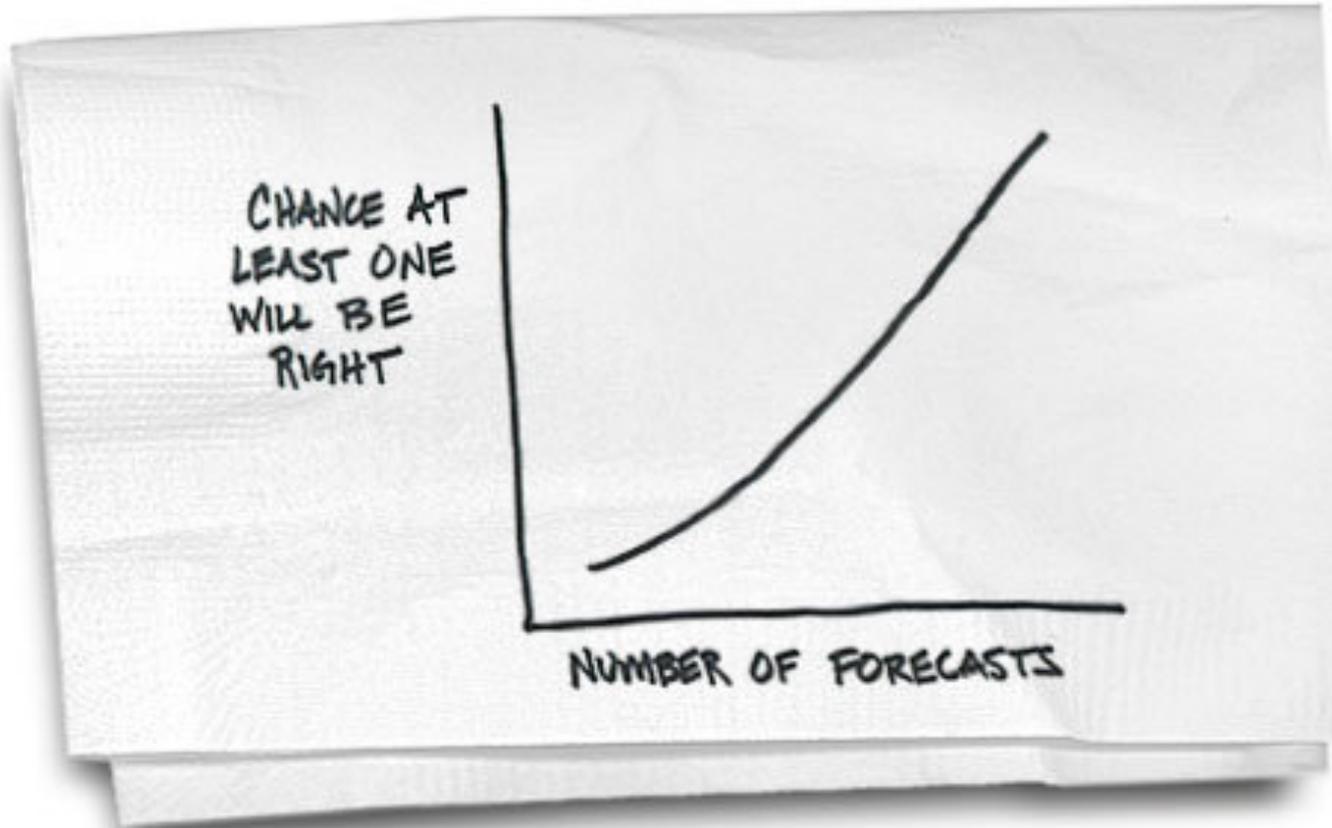
“The telephone has too many shortcomings to be seriously considered as a means of communication.”

- Western Union Internal Memo, 1876

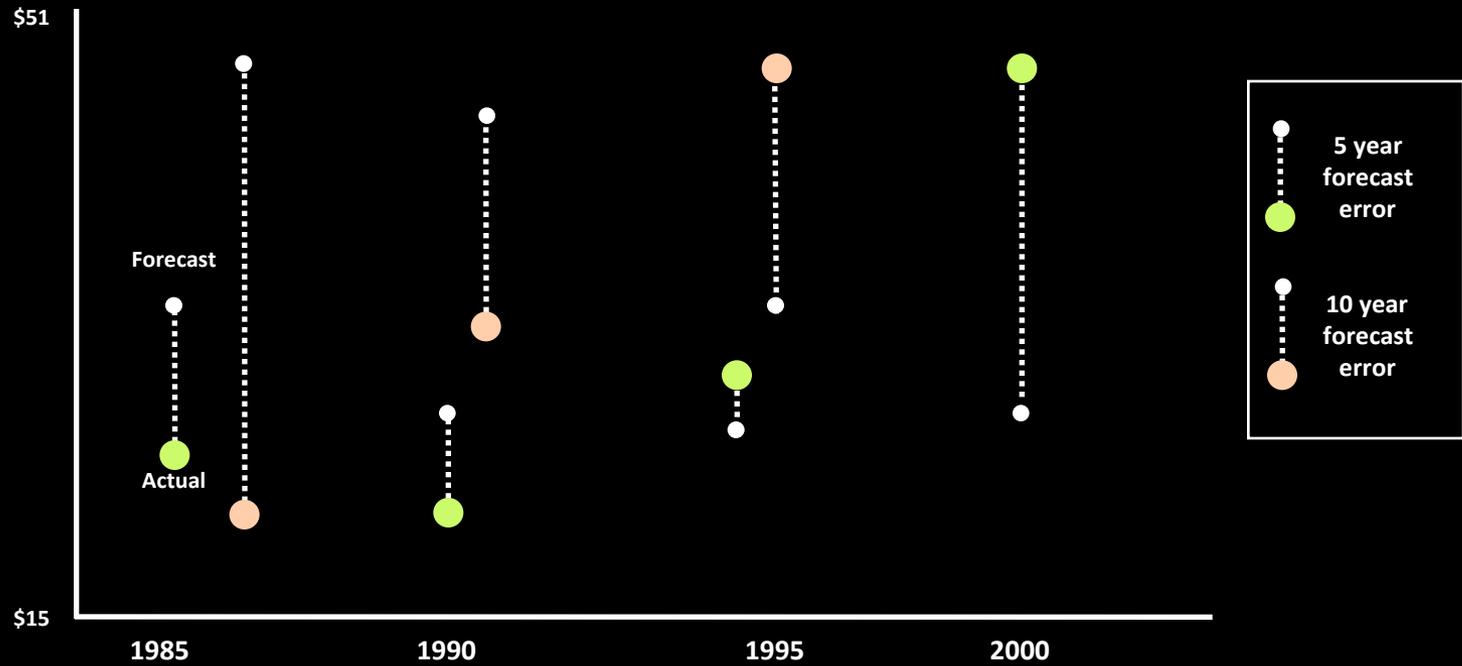
“There is no reason for any individuals to
have a computer in their home”

- Ken Olsen, President, Chairman and Founder of DEC, 1977

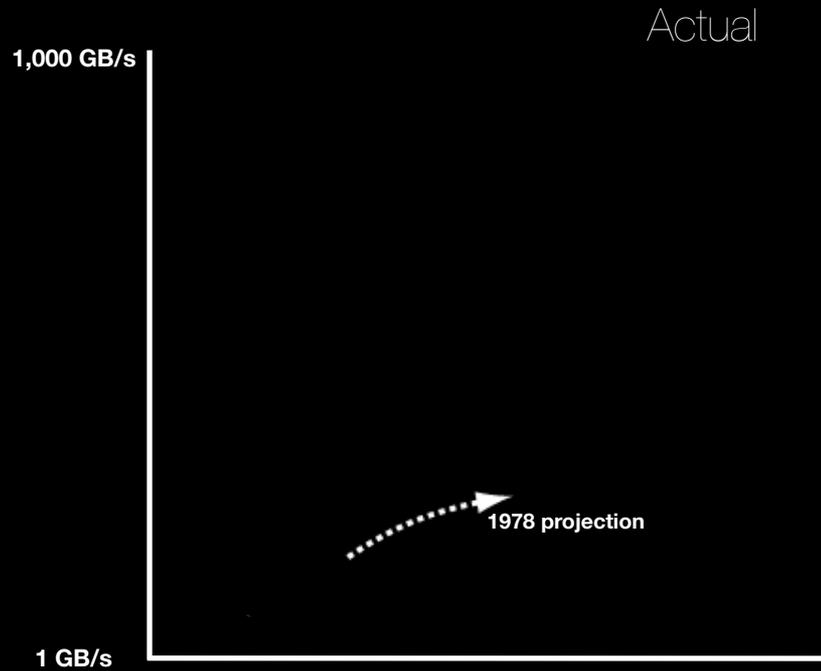
...forecasting



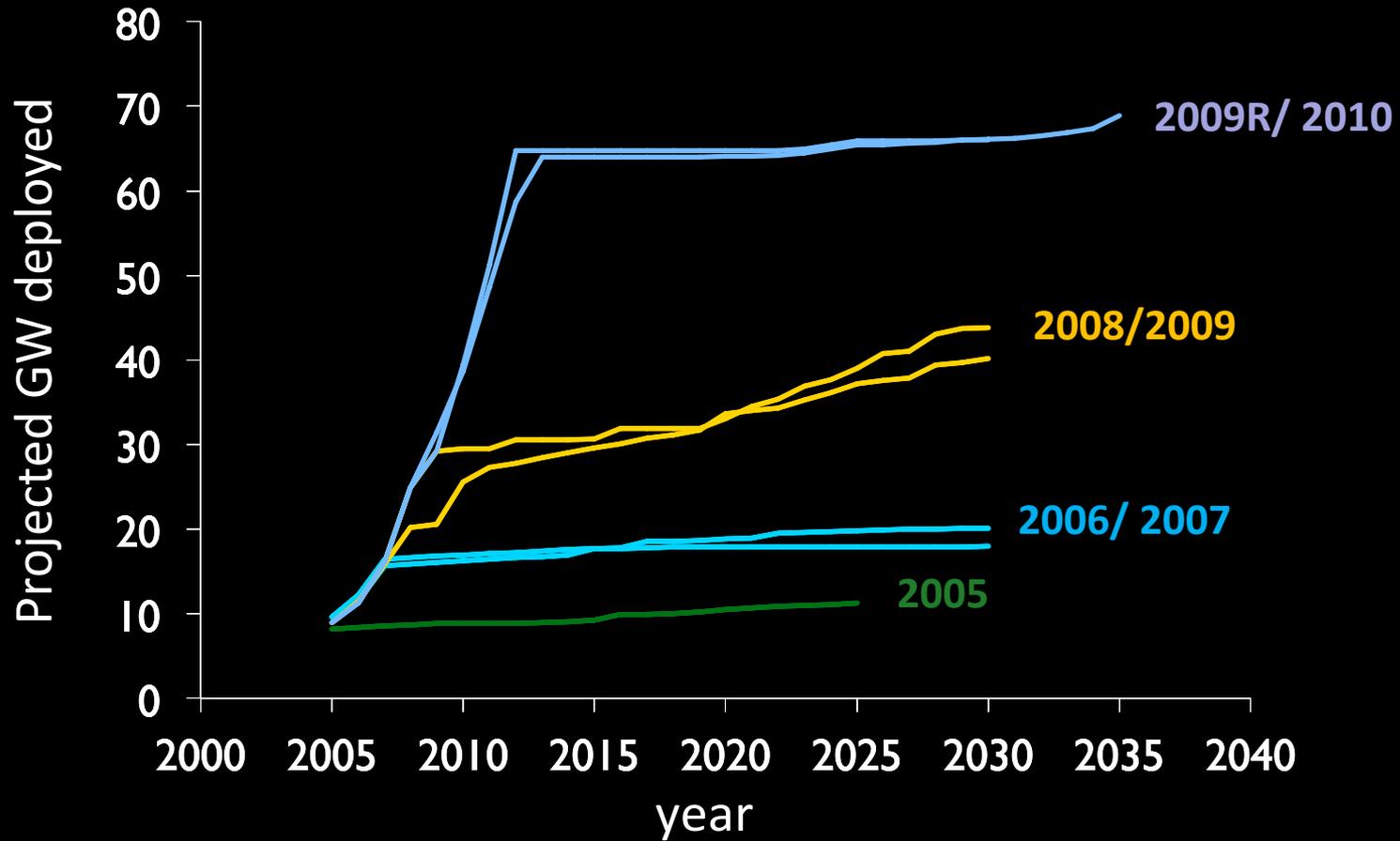
oil price forecasts (1985-2005)



telecommunications: actual vs. forecast demand



Changing with the wind: EIA wind forecasts

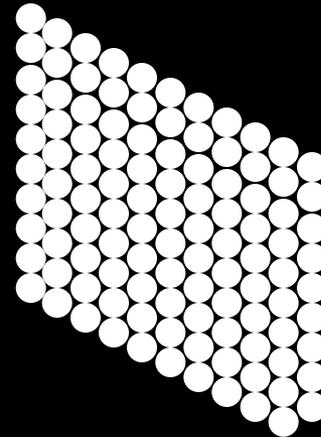


Mckinsey : US mobile subscribers

1980 forecast for 2000



forecast



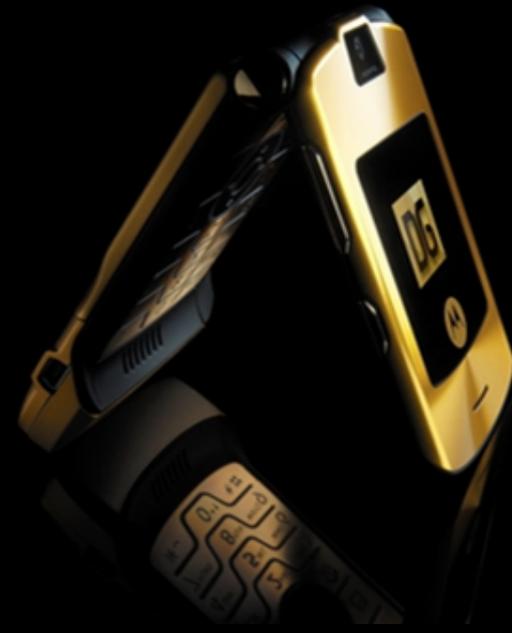
actual

yesterday's technology, tomorrow's forecast

1980's phone:



year 2000 phone:

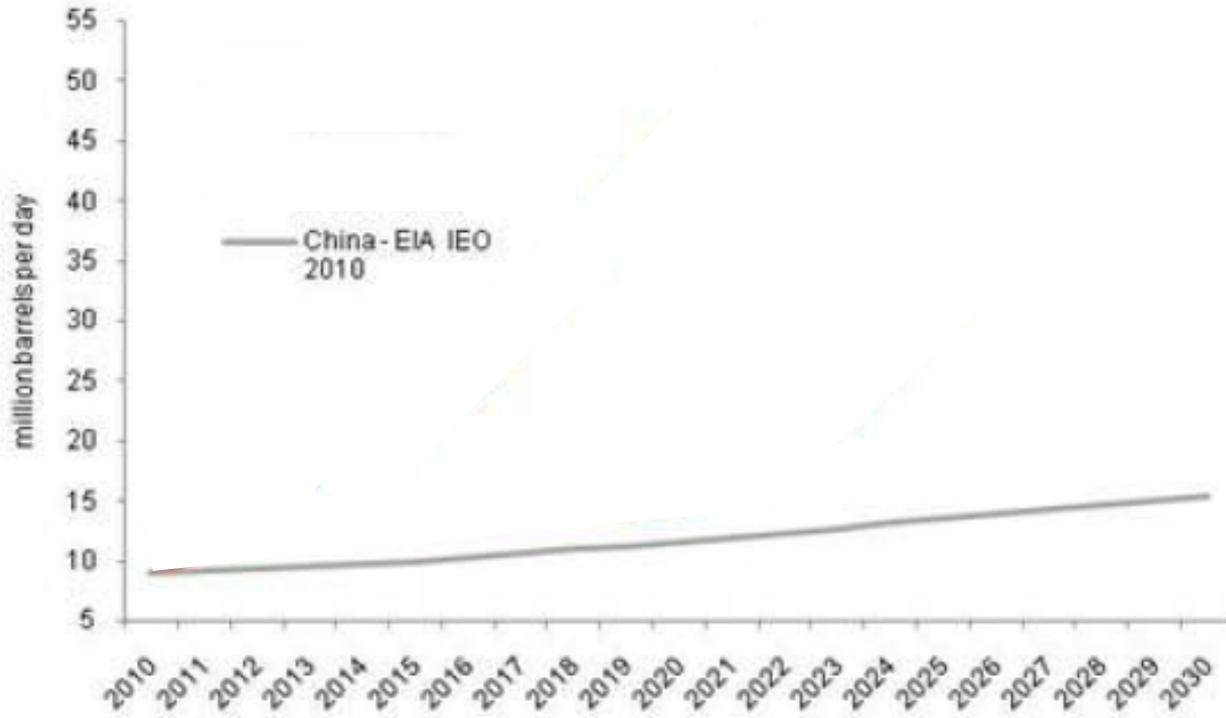


quantitative modeling **flaws**

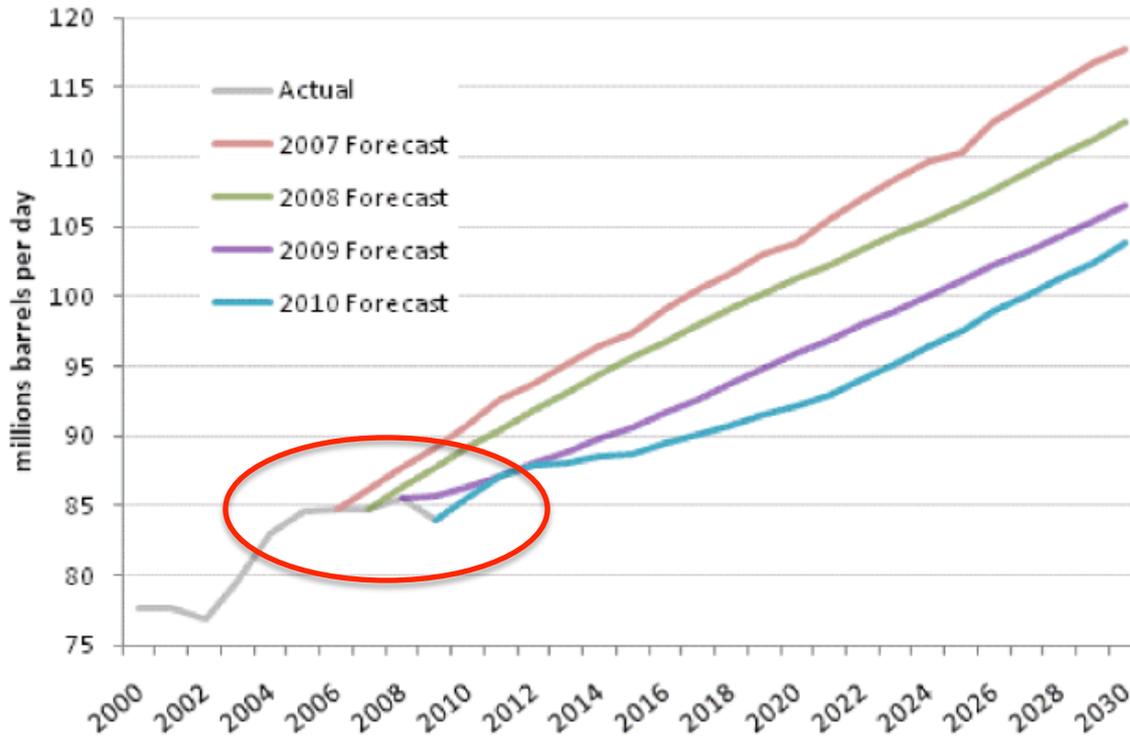
models with given inputs are precise but inaccurate

- chasing “false precision”; chasing 3rd order effects
- input the measurable, ignore the immeasurable
- obscured embedded assumptions

China's oil demand, EIA vs. ??



EIA production forecasts trending down



EIA Forecasts of World Petroleum Liquids Production to 2030

Source: EIA IEO - 2007-2010

the folly of predictions: tetlock study

hundreds of experts.

80,000+ “expert” forecasts & 20+ years

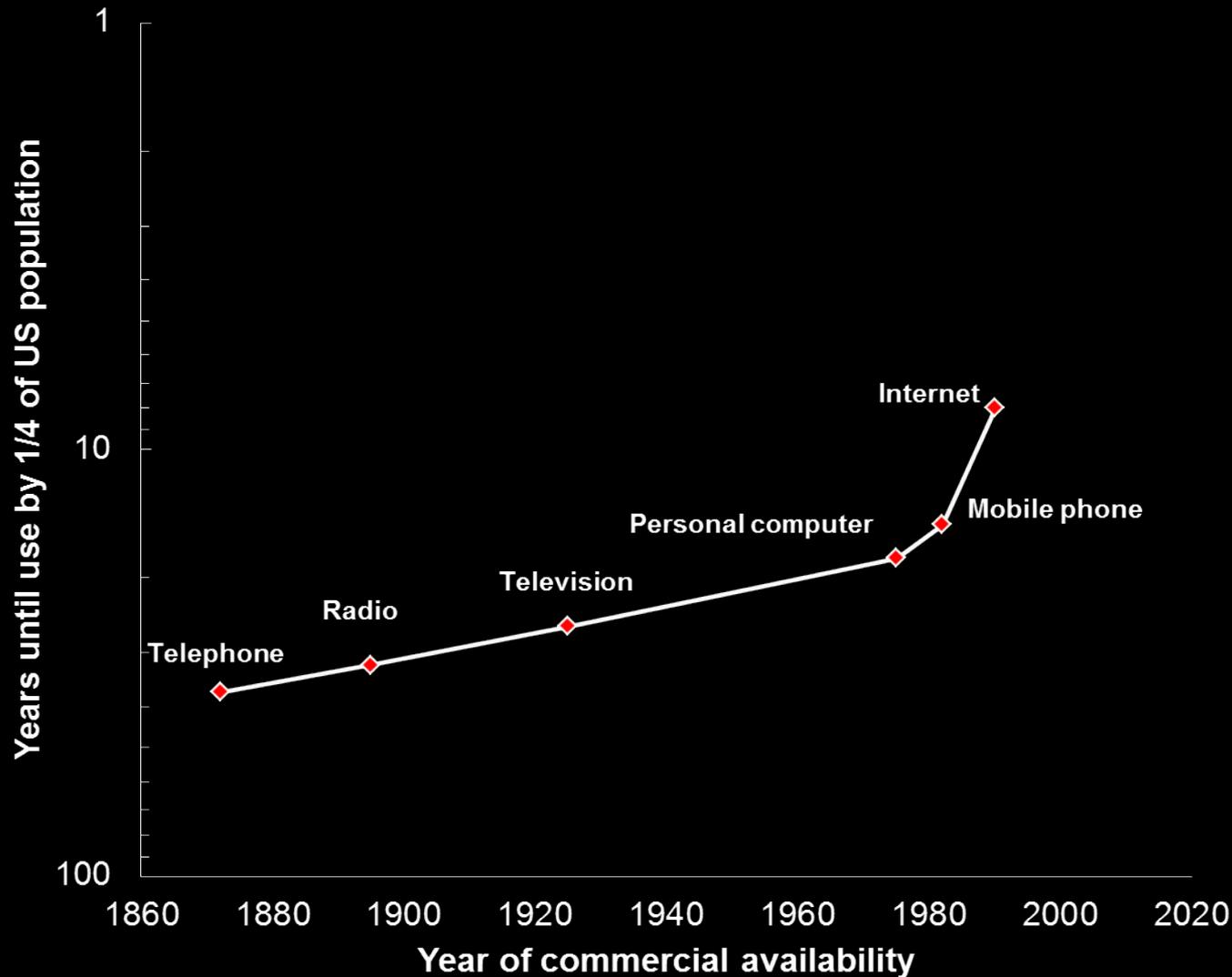
**results: experts are poorer forecasters than dart-
throwing monkeys**

why?

“... experts were much tougher in assessing the validity of information that undercut their theory than they were in crediting information that supported it.”

- Tetlock

... and its getting even harder to predict



Recommended reading list

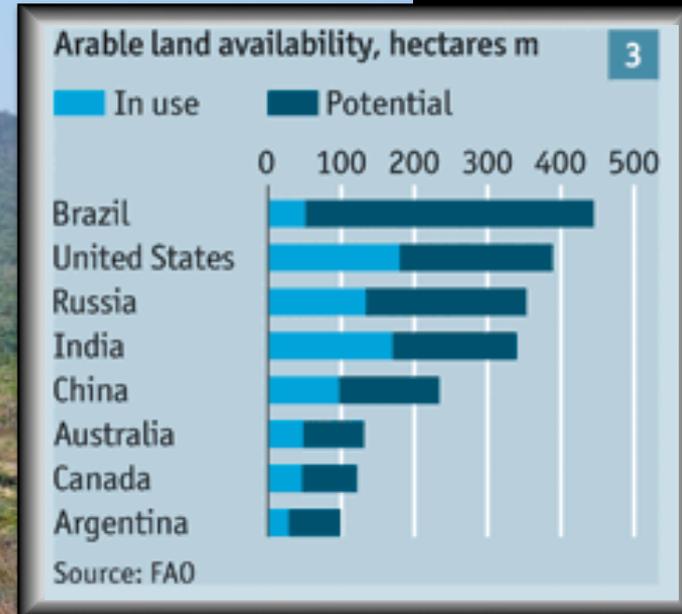
“Expert Political Judgment” – Dr. Philip Tetlock

“Predictioneer’s Game” – Bruce Bueno de Mesquita

“How We Decide” – Jonah Lehrer

so how do we pick?

...Brazilian Cerrado – evolution of a bread basket



the father of the Green Revolution thought these soils were never going to be productive. They seemed too acidic and too poor in nutrients...

...More arable land has been *created* in Brazil than is under cultivation in the US and India combined

irrational ideas: “green bikinis”

eco bikini from niksters

by Maureen @ 11:57 am

[1 comment »](#)



It's time to add some eco sizzle to your collection of eco swimwear. This two-piece Eco-Bikini from Nikster features a Bandeau-style top, and Brazilian-cut bottom with white ruffles. Created with soy, organic cotton and spandex fabrics.

made in the old US of A
\$100.00 @ nikster.com

Related: [previously on altCon](#)

[eco swimsuits - green is sexy](#)

[hemp on the beach](#)

[Ashley Paige - eco chic](#)

inconsistent ideas: electric cars



“extrapolation of the past”

VS.

“inventing the future”

redefining swans



“black swan”

...rarity, extreme impact,
and retrospective
(though not prospective)
predictability

“relevant scale” solutions for

... oil

... coal

... materials

... (efficiency of oil & coal use)

kior

“a million year crude production cycle reduced to minutes
and market competitive?”

Ecomotors

“Engine that delivers 50%+ vehicle efficiency for lower cost?”

caitin

“no new functional thermodynamic cycle for cooling has
been implemented in decades...
... but new lower cost HVAC at 80% less electricity”

soraa

“no-compromise 80% more efficient pay-for-itself
lighting”

calera

“ ... turning problem carbon dioxide into a
feedstock for building materials”

...batteries

Next Generation Li-ion?

Different ions?

Quantum-nano-thingamajigit?

...agriculture

Sugar & protein from cellulose?

Precision agriculture?

Bio-nitro-thingamajigit?

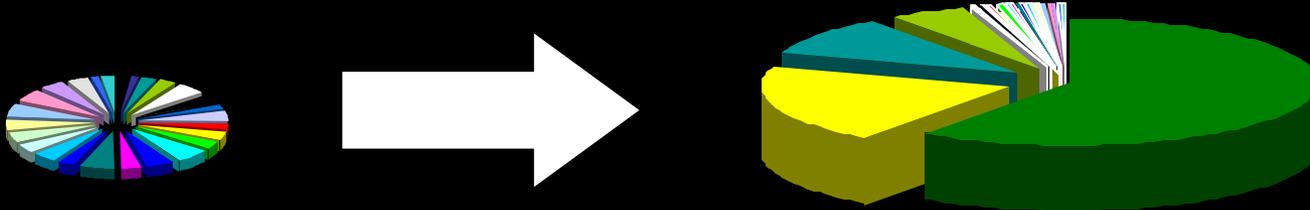
path to black swans...

more shots on goal!

winners take (almost) all =investment viability

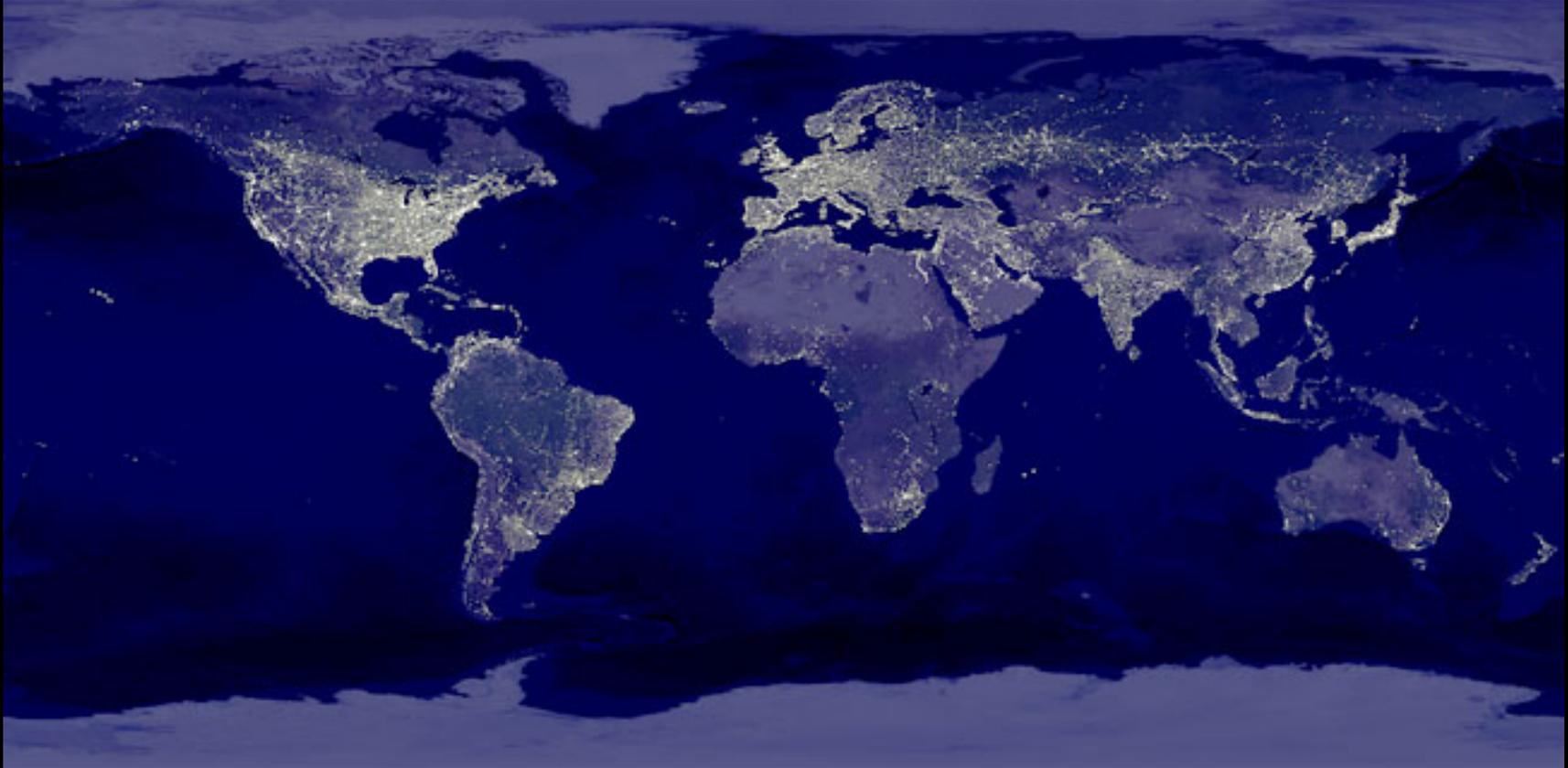
5 years out, the group's
market cap has grown...

Starting Industry Structure



But leaders far exceed the also-rans

...when 5B people live like 500M do today



...the sources of innovation

- Google, Facebook, Twitter : Fox, NBC, CBS
- Amazon : Walmart
- First Solar : Shell & BP Solar
- Cree : GE
- DNA Sequencing

...the **power** of ideas & entrepreneurship

NASA vs. the X-Prize (billions vs. millions)

telecom goliaths vs. the internet (free long distance)

Human Genome Project vs. the entrepreneur

...imagine the possible

artificial leaves to produce energy?



resource multipliers

computational design of materials

nanostructured materials

synthetic biology / artificial cells / artificial enzymes

non-chemistry batteries

resonance

nuclear

better agronomy

.....

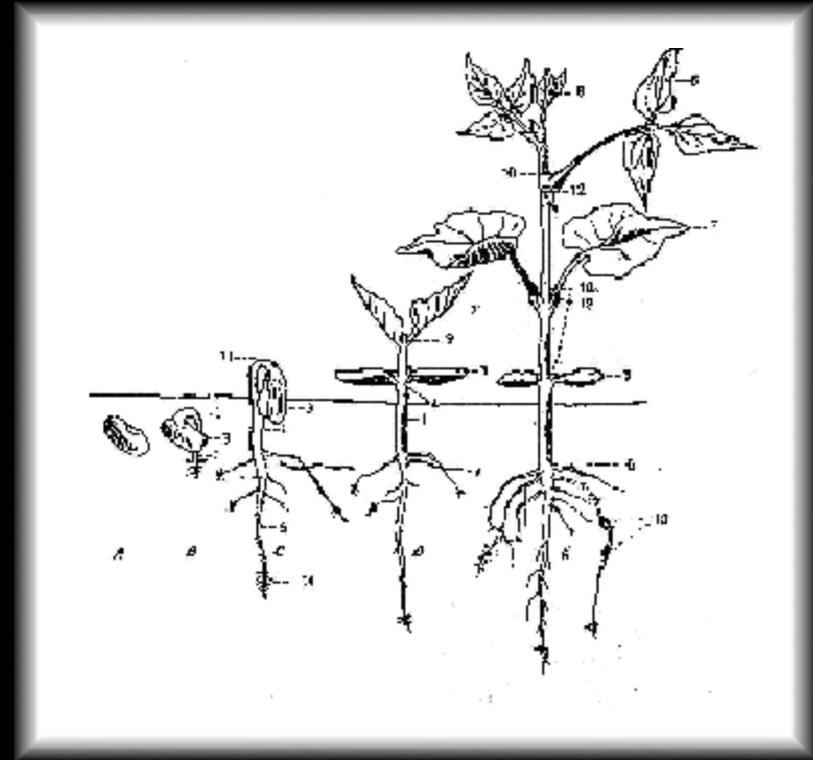
the perennial advantage



the **polyculture** advantage



an underground revolution



...engineering roots to maximize local ecosystems?

The 2nd green revolution!

Supercrops: fixing photosynthesis?

Less chlorophyll? → yields +30%

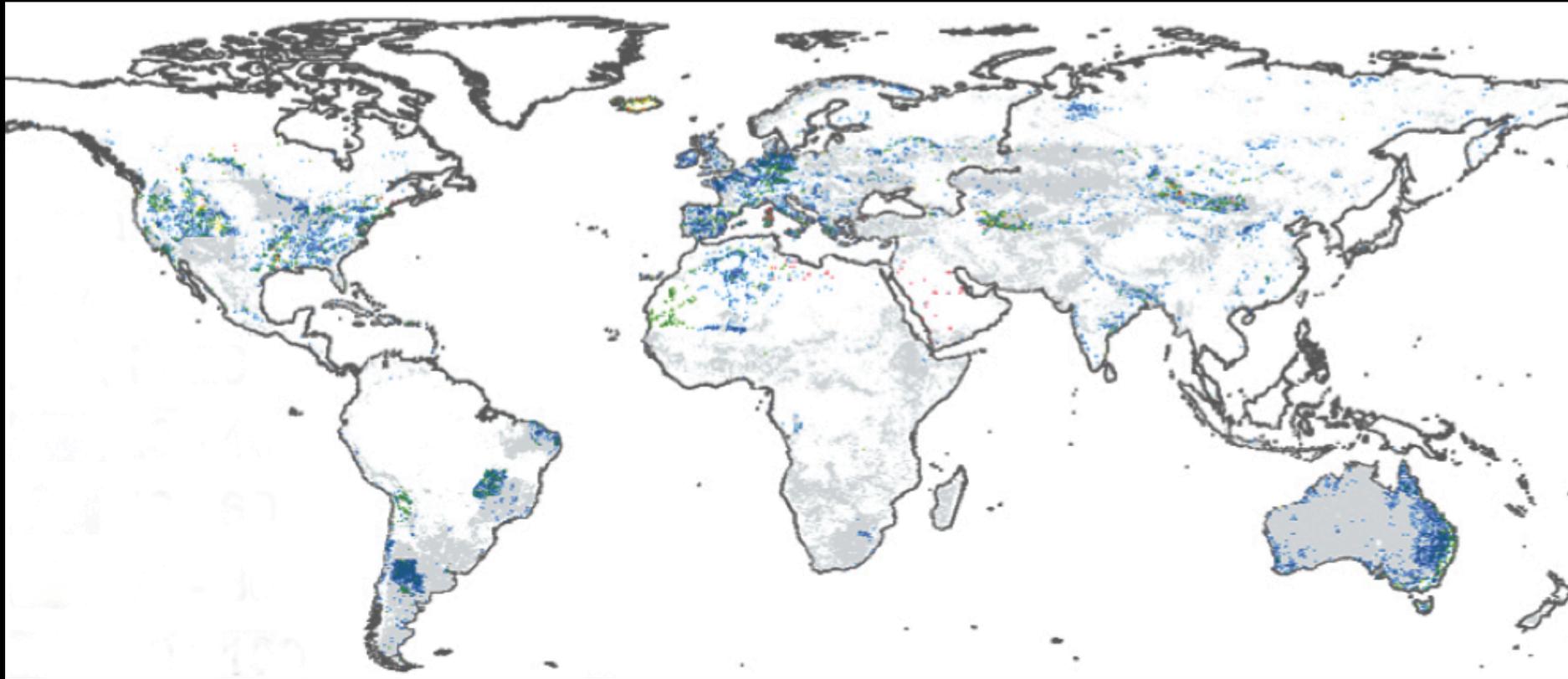
Better rubisco for CO₂ uptake? → yields +??%

Convert C₃ plants to C₄ → yields +25%



.... Black plants?

one billion acres...



Area - % former agriculture land abandoned

1 – 20%

20 – 40%

40 – 60%

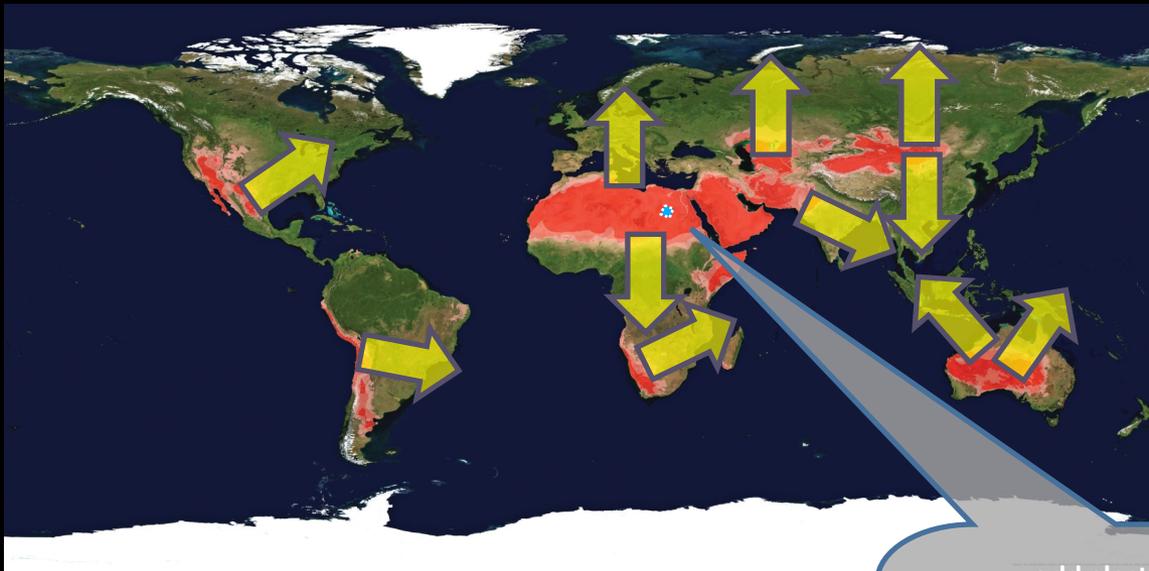
60 – 80%

80 – 100%

another billion acres?

deserts as solar farms

→ 3000 km



world electricity demand
(18,000 TWh/y)

can be produced from

300 x 300 km²

=0.23% of all deserts

distributed over "10 000" sites

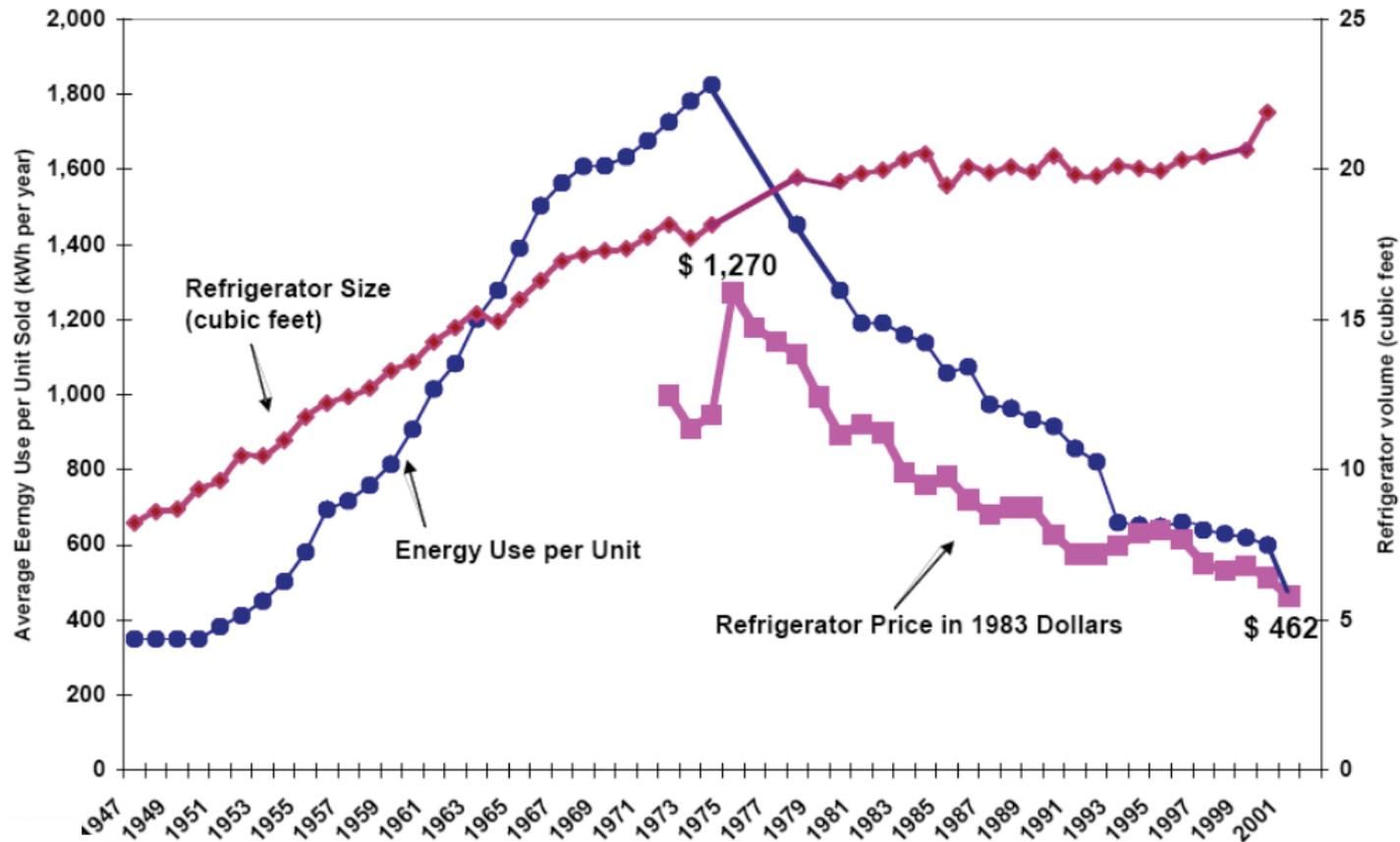
yet another billion acres...

Geothermal?

negawatt energy savings!

negabarrel energy efficiencies!

... the “Rosenfeld” effect



refrigerator costs AND energy use continued to decline!

as surely as...

1985: **NOT** a PC in every home

1990: **NO** email for grandma

1995: **NOT** the internet

2000: **NO** pervasive mobile

2005: **NO** facebook / iphone

2010+: reason for optimism

to predict the future,
invent it!

“...every strategic inflection point [is] characterized by a ‘10X’ change ...”

“There’s wind and then there is a typhoon, there are waves and then there’s a tsunami”

- **Andy Grove**

The New Green: “Maintech not Cleantech”

... oil

... coal

... materials

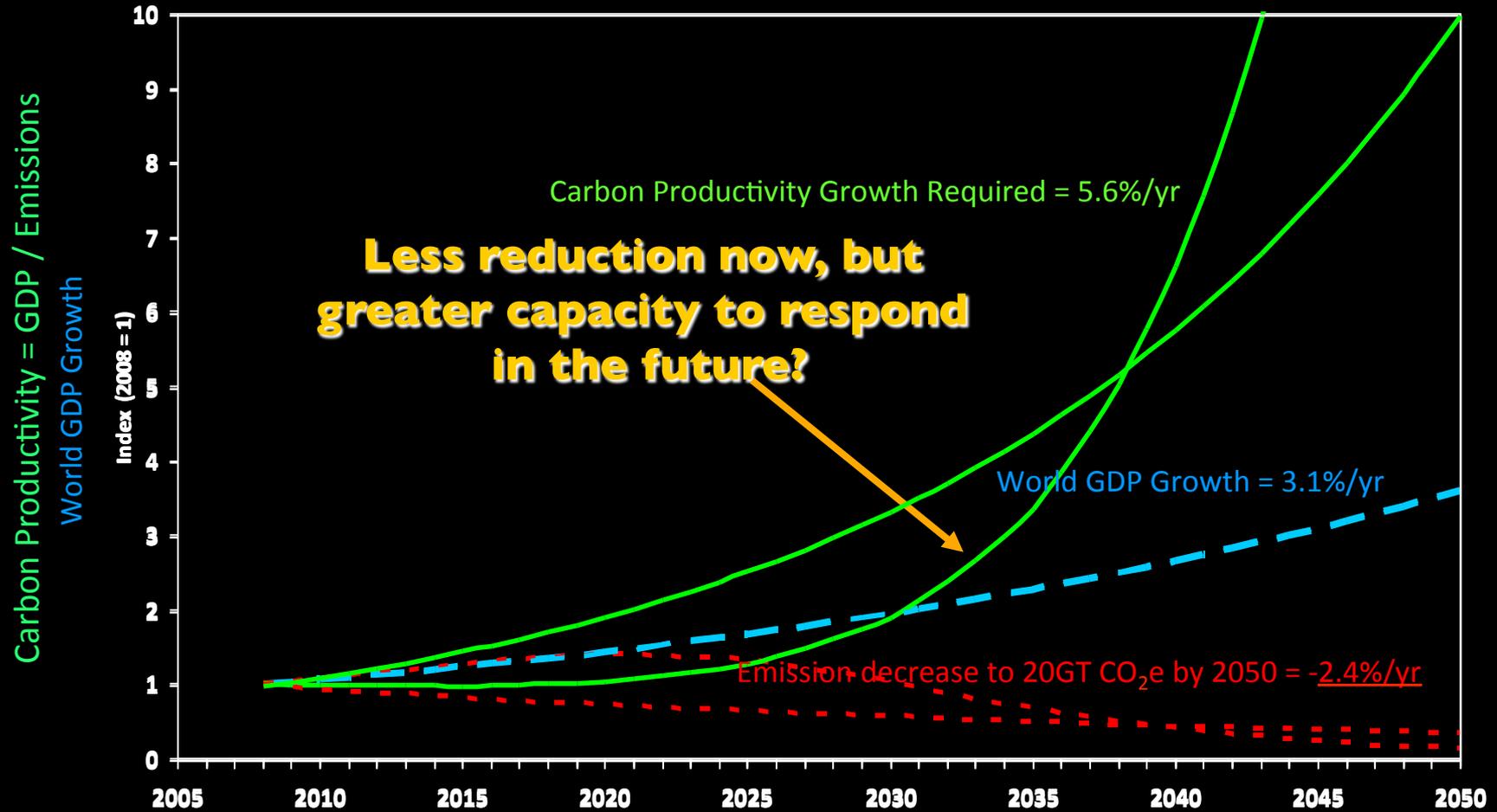
... efficiency

Reinvent the infrastructure of society

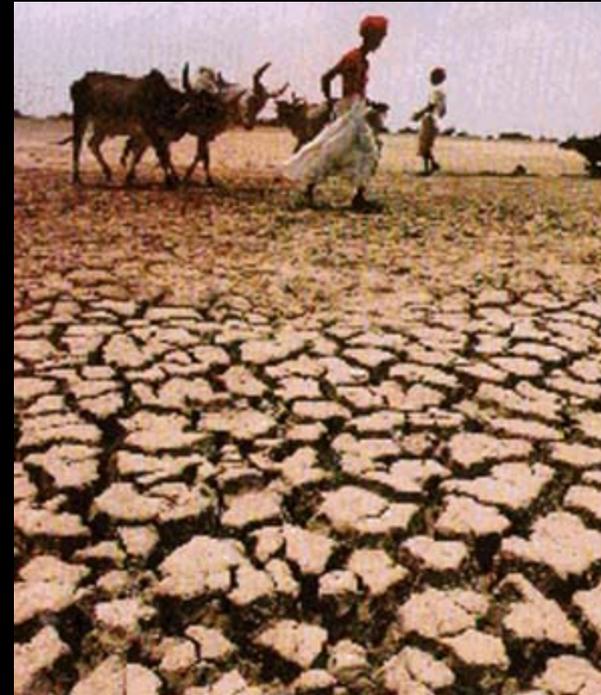
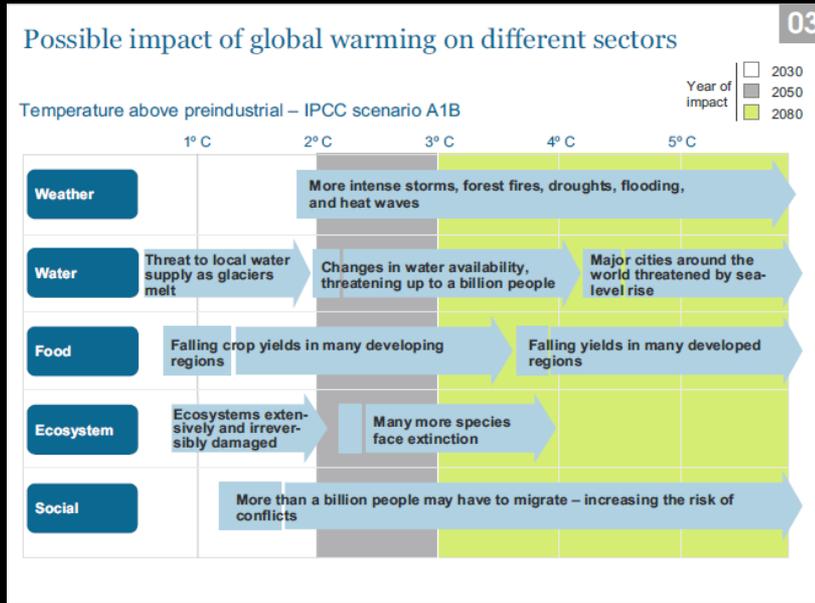


vs. acceptance + adaption cost

carbon reduction capacity: 10X increase in carbon productivity!

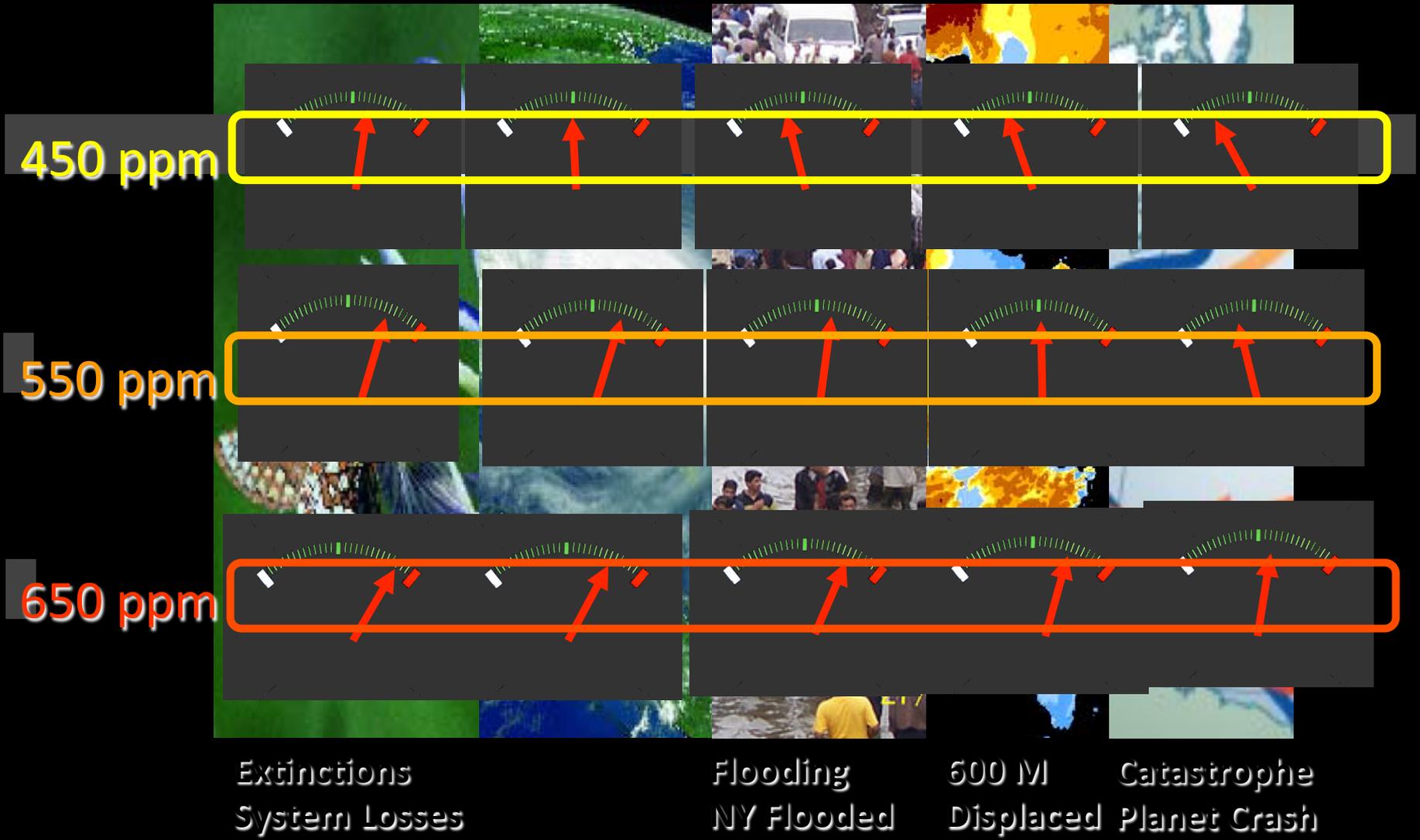


...cleantech is insurance against risk



Could be 1% to 12% of GDP -> \$500B-\$5T/year at stake... or more?

Safe or Not?



Extinctions
System Losses

Flooding
NY Flooded

600 M
Displaced

Catastrophe
Planet Crash

... defeatism or action?

We insure our homes

Why not our planet?



comments?

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