FOSSIL FUELS AND HUMAN PROSPERITY

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GHG & ENERGY REALITIES

- Fossil fuels are the driver of economic growth & jobs.
- Economic value of fossil fuels is ~ $2 trillion dollars/yr. just for U.S.
- Proposals to drastically reduce GHG emissions in coming years would devastate economies of U.S. & world.
- 2015 Paris Agreement: "Limit global temperature increase to no more than 2°C above current levels." To achieve this: Reduce GHGs to 80-95% **below 1990 levels** by 2050, beginning in 2020.
- EU committed to reduce GHGs to 80-95% < 1990 levels by 2050; USA "committed" to reduce GHG emissions 80% < 1990 level by 2050.
- These emissions reductions are impossible – ludicrous.

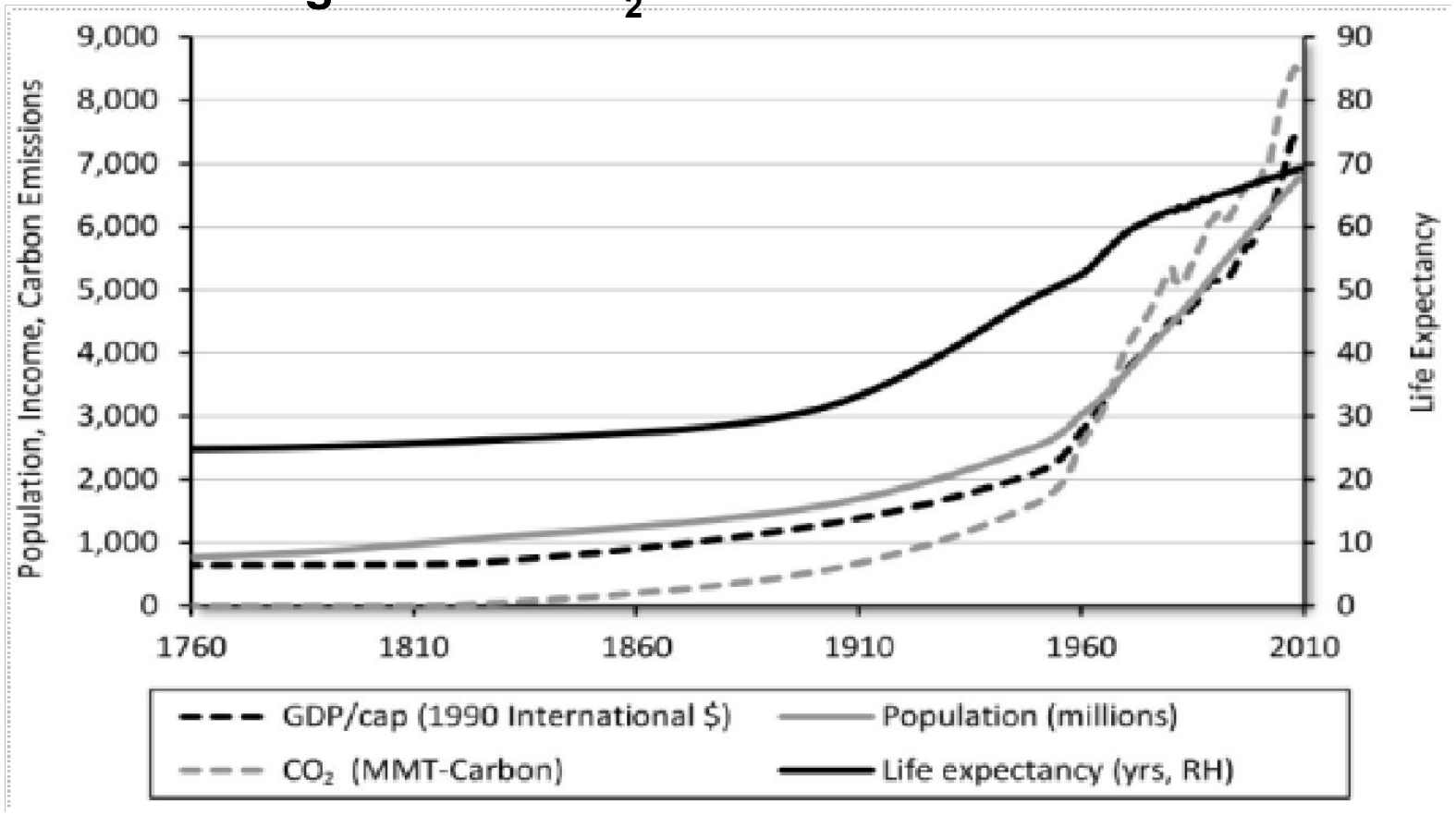
FOSSIL FUELS = MODERN CIVILIZATION

- Fossil fuels:
  - -- Facilitated successive industrial revolutions (including 21st century)
  - -- Created modern world
  - -- Permit current high quality of life
- Over past 250 years:
  - -- Global life expectancy increased > 2X
  - -- Population increased 8X
  - -- Incomes increased 11X
- CO_2 concentrations increased from ~ 320 ppm CO_2 to ~ 400 ppm (from 0.032% of the atmosphere to 0.040%)

"Ours is a high energy civilization based largely on fossil fuels." Dr. Vaclav Smil

FOSSIL FUELS = GROWTH & PROSPERITY

Global Progress and CO_2 Emissions From Fossil Fuels

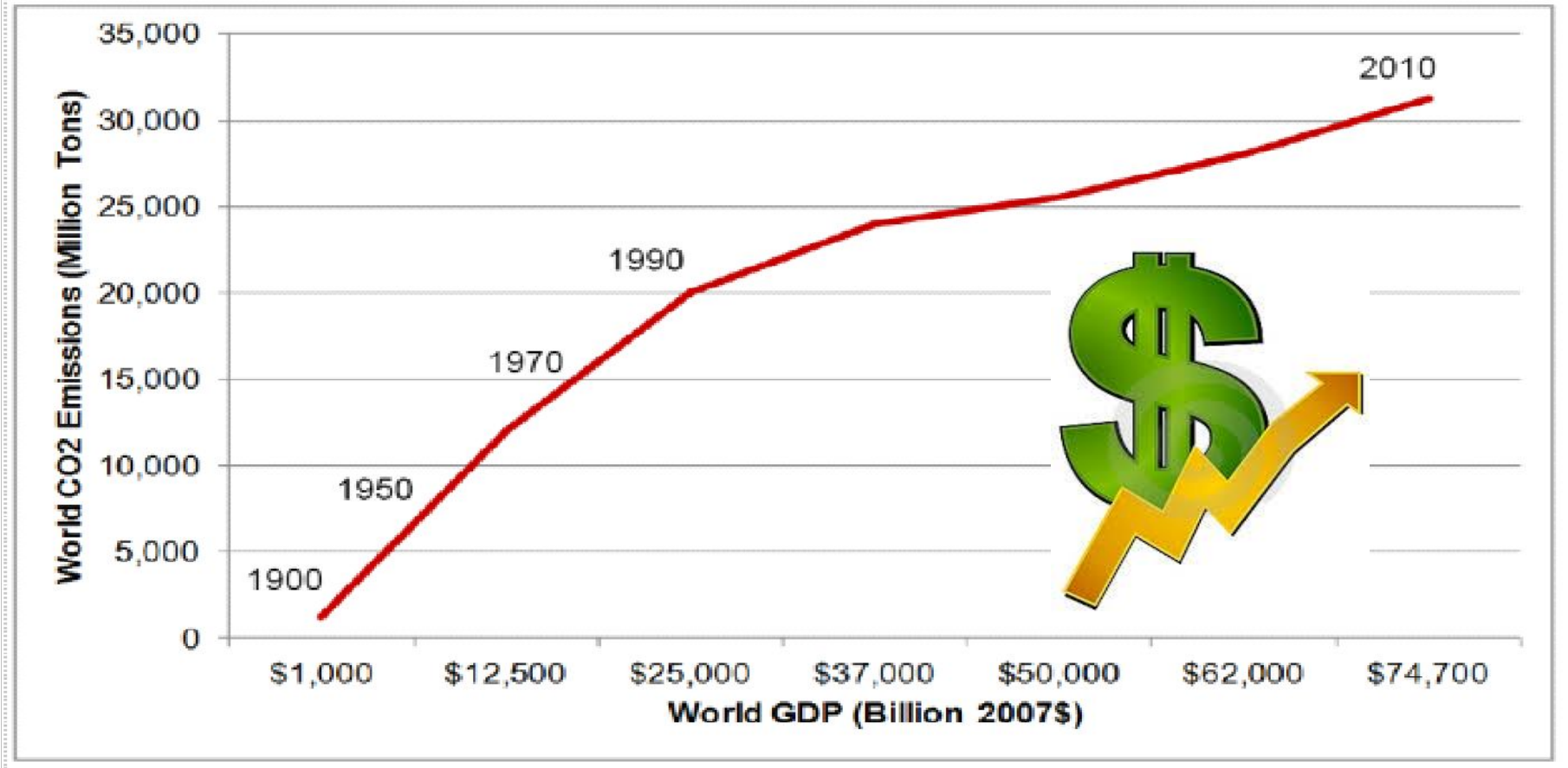


Source: Indur Goklany.

"The economic system is essentially a <u>system for extracting, processing, and transforming energy</u>." Professor Robert Ayres

CLOSE LINK BETWEEN CO_2 & GDP

Relationship Between World GDP and CO_2 Emissions

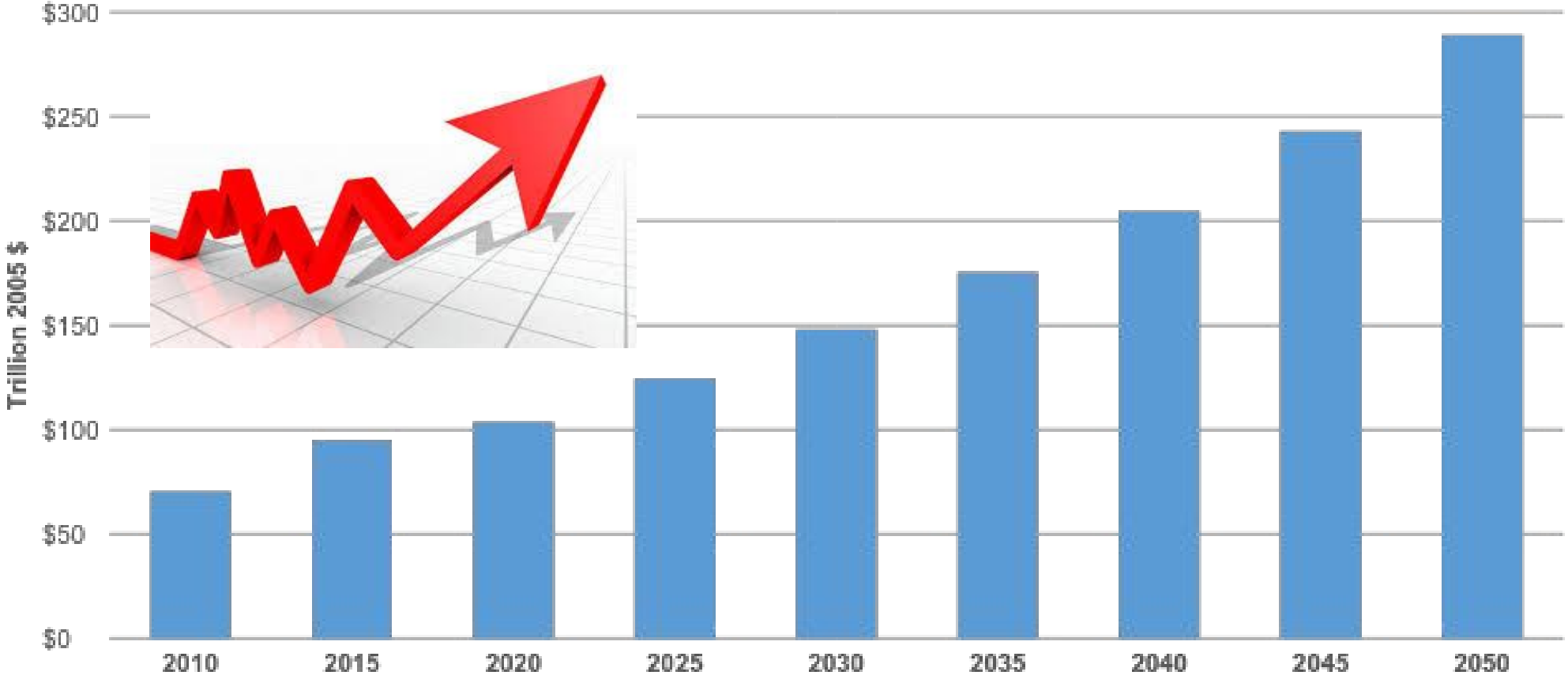


Source: U.S. Energy Information Administration, International Energy Agency, U.S. Bureau of Economic Analysis, and Management Information Services, Inc.

"Access to energy is <u>absolutely fundamental in the struggle against poverty</u>." Rachel Kyte, vice president, World Bank

GLOBAL GDP INCREASES 3X THROUGH 2050

World GDP Forecast Through 2050
(Based on EIA Reference Case)

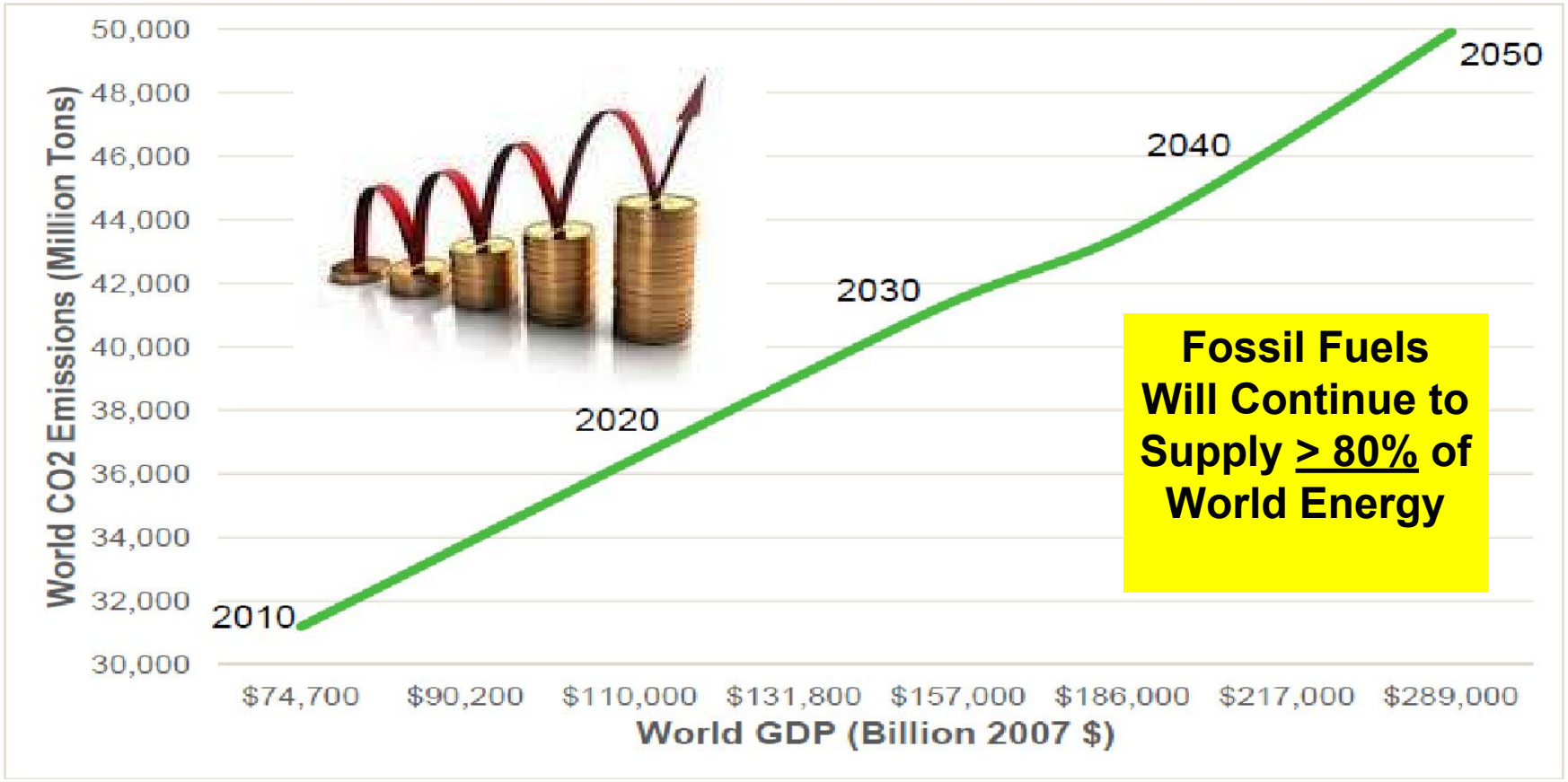


Source: U.S. Energy Information Administration and Management Information Services, Inc.

In 2050, fossil fuels still provide > 80% of world energy

CONTINUED LINK BETWEEN GDP & CO_2

Forecast Relationship Between World GDP and CO_2 Emissions
(EIA Reference Case)



Renewable energy will be able to supply only a small % of world energy.

SUMMARY OF ENERGY-GDP ELASTICITY ESTIMATES

Yr. Published	Author	Type of Energy	Elasticity Est.
2010	Lee and Lee	Energy and electricity	-0.01 and -0.19
2010	Brown and Huntington	Oil	-0.01 to -0.08
2010	Baumeister, Peersman, and Robays	Oil	-0.35
2009	Blumel, Espinoza, and Domper	Energy and electricity	-0.085 to -0.16
2008	Kerschner and Hubacek	Oil	-0.03 to -0.17
2008	Sparrow	Electricity	-0.3
2007	Maeda	Energy	-0.03 to -0.075
2007	Krishna Rao	Energy	-0.3 to -0.37
2007	Lescaroux	Oil	-0.1 to -0.6
2006	Rose and Wei	Electricity	-0.1
2006	Oxford Economic Forecasting	Energy	-0.03 to -0.07
2006	Considine	Electricity	-0.3
2006	Global Insight	Energy	-0.04
2004	IEA	Oil	-0.08 to -0.13
2002	Rose and Yang	Electricity	-0.14
2002	Klein and Kenny	Electricity	-0.06 to -0.13
2001	Rose and Ranjan	Electricity	-0.14
2001	Rose and Ranjan	Energy	-0.05 to -0.25
1999	Brown and Yucel	Oil	-0.05
1996	Hewson and Stamberg	Electricity	-0.14
1996	Rotemberg and Woodford	Energy	-0.25
1996	Joutz and Gardner	Energy	-0.072
1996	Hooker	Energy	-0.07 to -0.29
1995	Lee, Ni and Ratti	Oil	-0.14
1995	Hewson and Stamberg	Electricity	-0.5 and -0.7
1982	Anderson	Electricity	-0.14
1981	Rasche and Tatom	Energy	-0.05 to -0.11

Average elasticity is about - 0.15.

6 WAYS TO ESTIMATE ECONOMIC VALUE OF FOSSIL FUELS

1. ***Comparison of LCOEs:*** Compare estimates of levelized cost of electricity (LCOE) of fossil fuels v. alternative energies.
2. ***Existence Impacts:*** Estimate value of economic activity attributable to low cost & high reliability of fossil fuels.
3. ***Historical Relationships:*** Compare historical relationships between electricity costs or per-capita energy consumption & GDP & other prosperity measures.
4. ***Bottom-up Estimates:*** Use data on cost of existing & new production capacity & transmission to estimate cost of reducing reliance on fossil fuels.
5. ***Macroeconomic Models:*** Estimate impacts of policies designed to reduce use of fossil fuels on GDP, jobs, & economic growth.
6. ***Model as Tax Increase:*** Model harmful energy policies as tax increases.

BOTTOM LINE: FOSSIL FUELS DRIVE ECONOMY & JOBS

All 6 methods yield similar results:

- Fossil fuels currently deliver economic benefits to U.S. of at least $1.8 trillion/yr. & create > 15 million jobs.
- Use of fossil fuels in 2050 will be worth 42% of global GDP: ~ $125 trillion (2016 $).
- Artificially reducing dependency on fossil fuels would be costly: Trillions $ GDP & millions of jobs annually.

Thus: Fossil fuels are essential to world economy & jobs.

"Energy is the 'oxygen' of the economy and the life-blood of growth." World Economic Forum

UNRECOGNIZED CONSEQUENCES OF GHG REDUCTIONS

- Two **critical factors are not recognized**:

1. All 2050 forecasts ***already include*** massive energy efficiency & decarbonization; they are not "business as usual"
2. Emissions reductions recommended, **80-95% < *1990 levels* compared to 2050 forecast emissions**, are draconian.

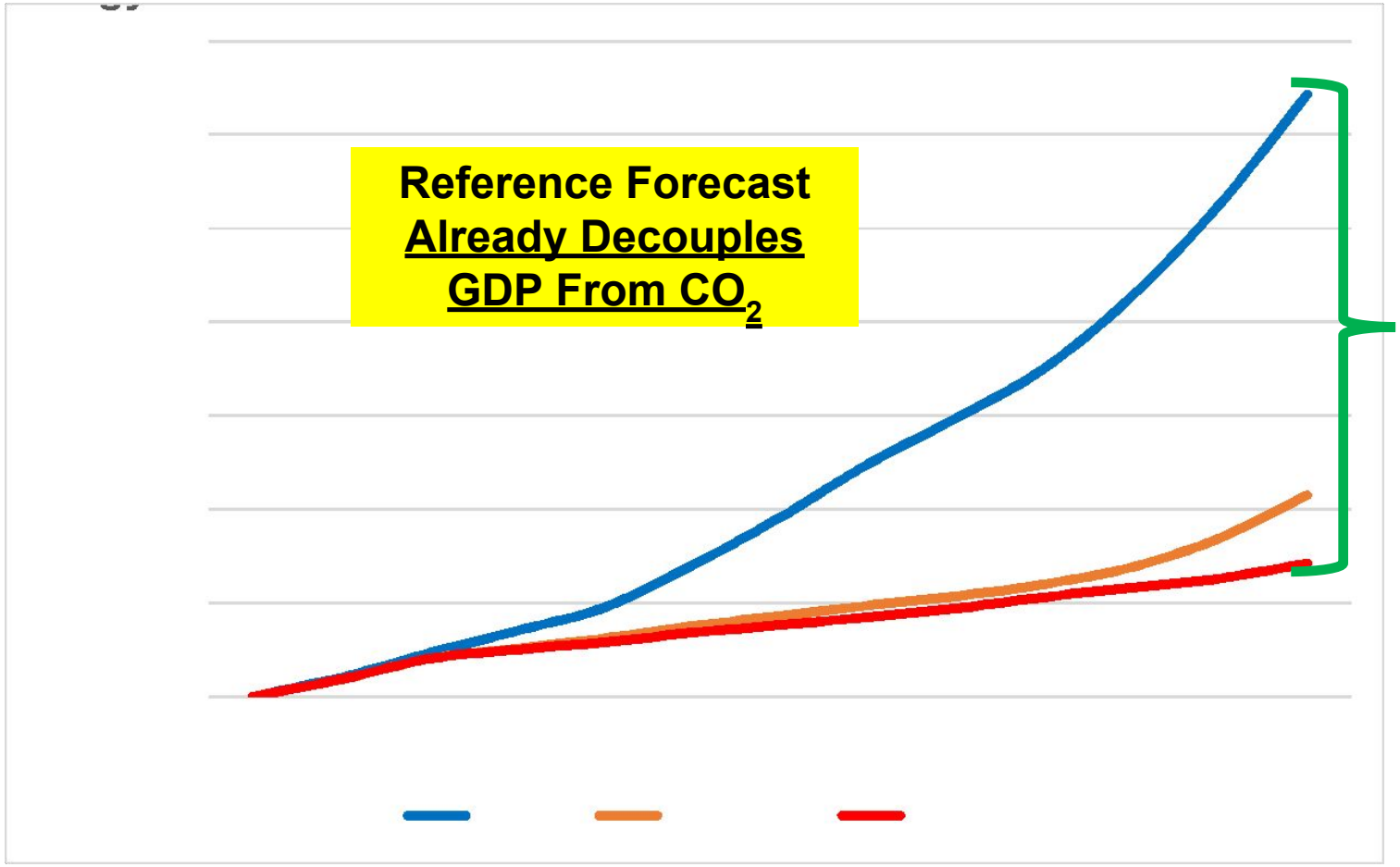
- Reducing 2050 CO_2 emissions by this magnitude would within 30 years reduce world per capita GDP to only **~ 4% of what it is otherwise forecast to be**.

- Would reduce 2050 world per capita GDP to < that of UK in 1800 or of that currently in world's poorest nations.

"Energy use and output are tightly coupled, with energy availability playing a key role in enabling growth. Professor David Stern

1. FORECASTS ALREADY INCLUDE MASSIVE DECARBONIZATION

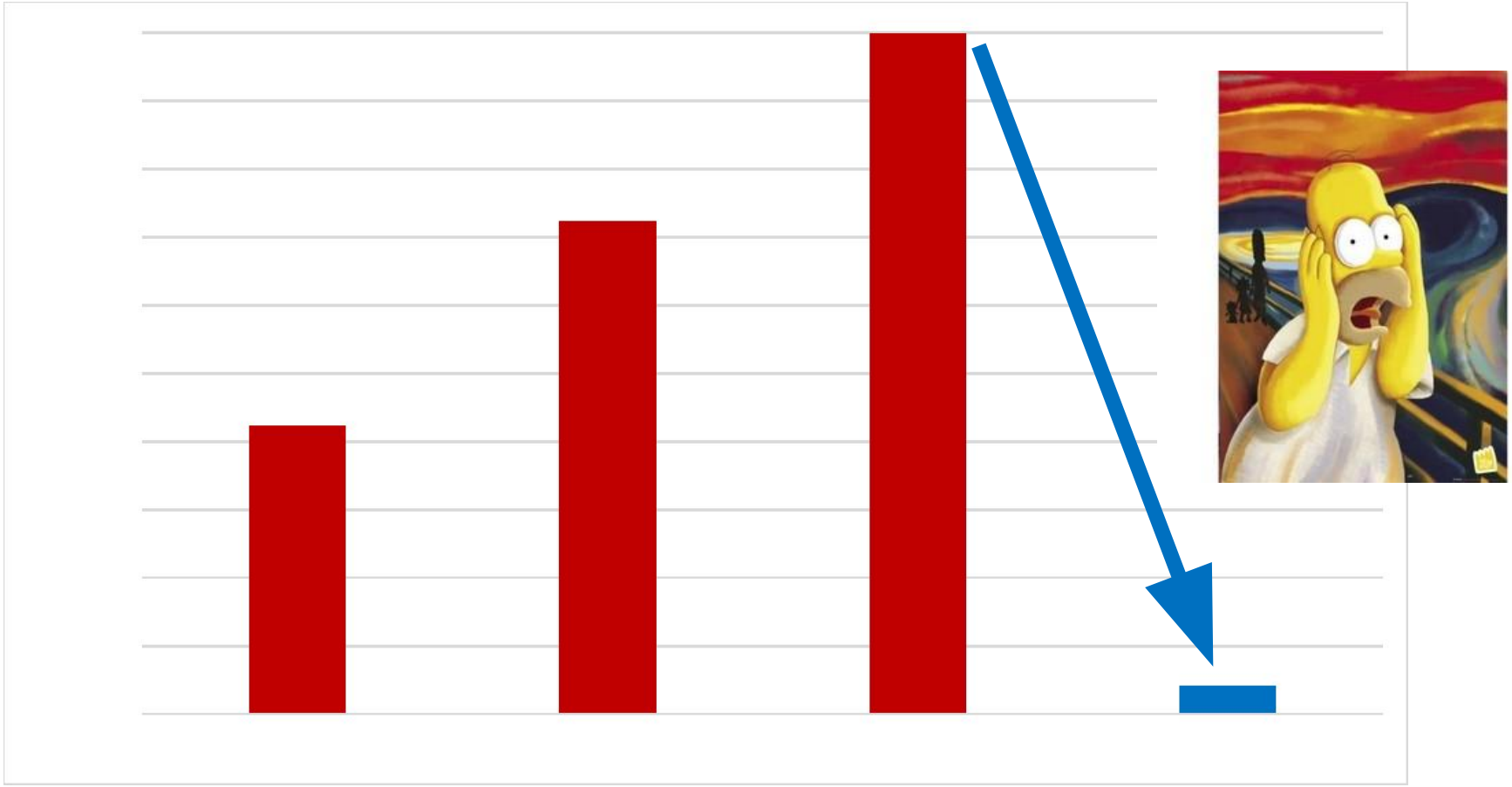
Reference Case Forecast of GDP, Energy, and CO_2 Emissions



Source: U.S. Energy Information Administration and Management Information Services, Inc.

2. EMISSIONS REDUCTIONS ARE DRACONIAN -- LUDICROUS

Emissions Reductions Required Are <u>96% < Forecast 2050 Levels</u>



Source: Management Information Services, Inc.

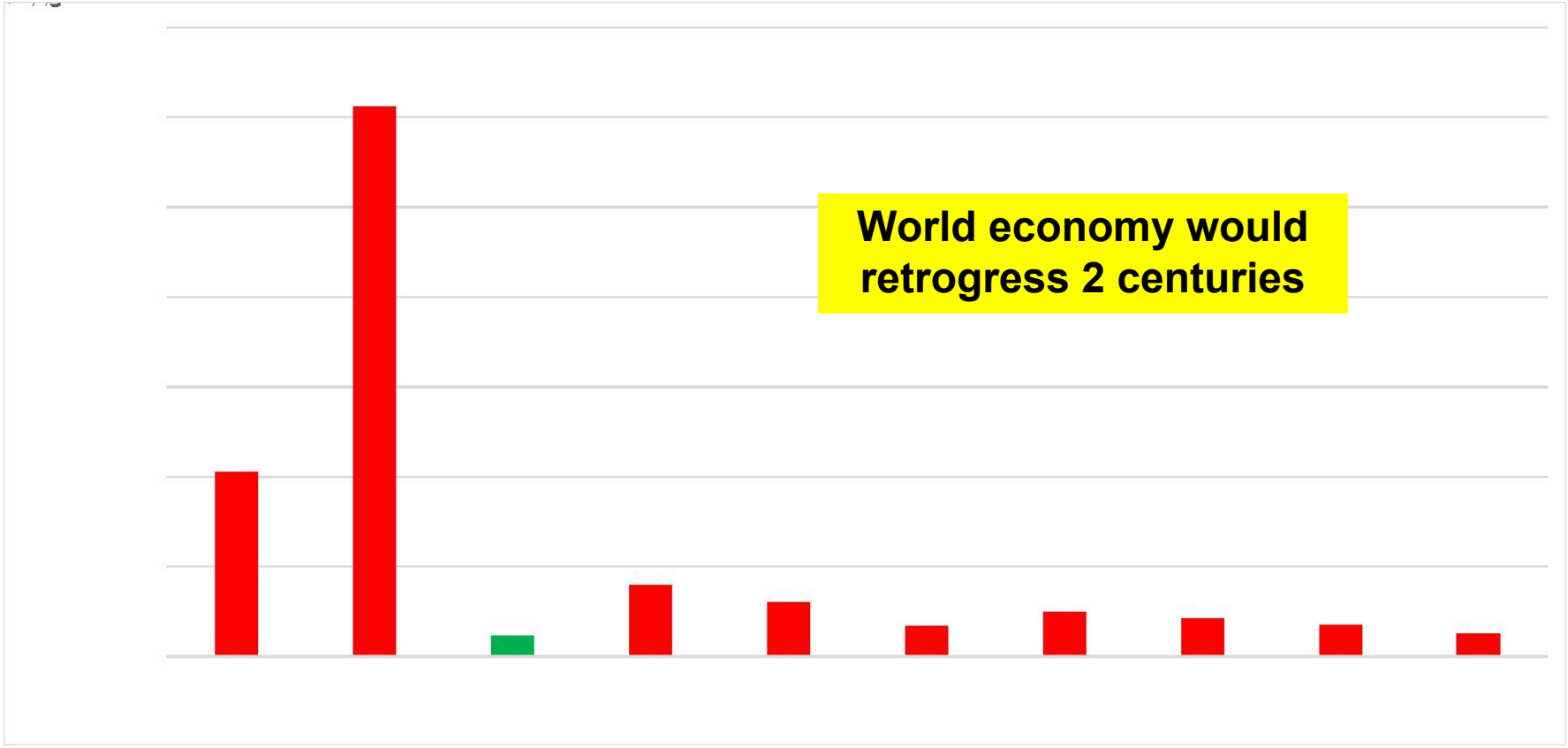
"<u>If you could pick just one thing to reduce poverty, by far you would pick energy.</u>" Bill Gates

REAL IMPLICATIONS OF GHG REDUCTION GOALS

- To reduce GHGs to 80% < 1990 levels by 2050 will **require that GHGs in 2050 be 96% < they are currently forecast to be in 2050**.
- Relationship between GDP growth & CO_2 emissions is still critical.
- Thus, ***to achieve GHG reduction goal will require world 2050 GDP be reduced to ~ 4% of what it is projected to be in 2050***.
- EIA's reference case forecasts world GDP in 2050 to be $292 trillion (2005$).
- UN "medium" 2050 population forecast is 9.55 billion.
- Thus, world per capita GDP in 2050 will be ~ $30,600.
- 4% of this is ~ $1,200.
- That is, 2050 world GDP would be ~ $12 trillion instead of $292 trillion, & per capita **world GDP will be ~ $1,200 instead of $30,600**

WHAT DOES 2050 PER CAPITA WORLD GDP OF $1,200 INSTEAD OF $30,600 IMPLY?

Per Capita GDP Implications of the 2050 CO_2 Reduction Goal



Sources: U.S. Energy Information Administration, CIA, and Management Information Services, Inc.

Reducing CO_2 emissions to 80% < 1990 levels by 2050 implies reducing 2050 CO_2 emissions (& GDP) to ~ 95% < 2050 forecast levels.

IMPACT ON U.S. INCOMES

U.S. 2050 Median Household Income Would be $3,700 Instead of the Forecast $92,000.

Sources: U.S. Energy Information Administration. U.S. Census Bureau, and Management Information Services, Inc.

U.S. 2050 incomes would be reduced to well <u>below current poverty levels</u>.

CONCLUSIONS

- **Fossil fuels essential for economic growth & jobs.**
- Close relationship between fossil fuels and world economies will continue.
- **To reduce 2050 GHGs to 80-95% < 1990 levels implies world 2050 living standards would be reduced to levels of 1800s**.
- All economic gains of industrial revolution & later would be nullified.
- **Instead of people enjoying living standards of the 2050s, they would have to endure living standards of the 1850s**.
- Average **world per capita GDP would be reduced to levels currently < those of the most impoverished nations**, such as Bangladesh, Haiti, North Korea, and Yemen.
- These are the **real implications** of "reducing GHGs to 80-95% < 1990 levels by 2050."
- They are so **draconian** as to be infeasible and impossible, and are truly **ludicrous**.
- **THIS CANNOT BE ALLOWED TO HAPPEN**.

REPORT AVAILABLE

ECONOMIC AND SOCIAL IMPLICATIONS OF
UN PARIS 2015 GLOBAL GHG REDUCTION MANDATES

Management Information Services, Inc.

2015