

Peak Global Oil Production

Melissa Ahern, MBA, Ph.D.
Northwest Climate Change Center



The New Big Game: Reduce fossil fuel use ASAP

✦ Why the urgency?

- Climate Change—timing worse than previously suspected
- Oil Depletion—timing worse than previously suspected

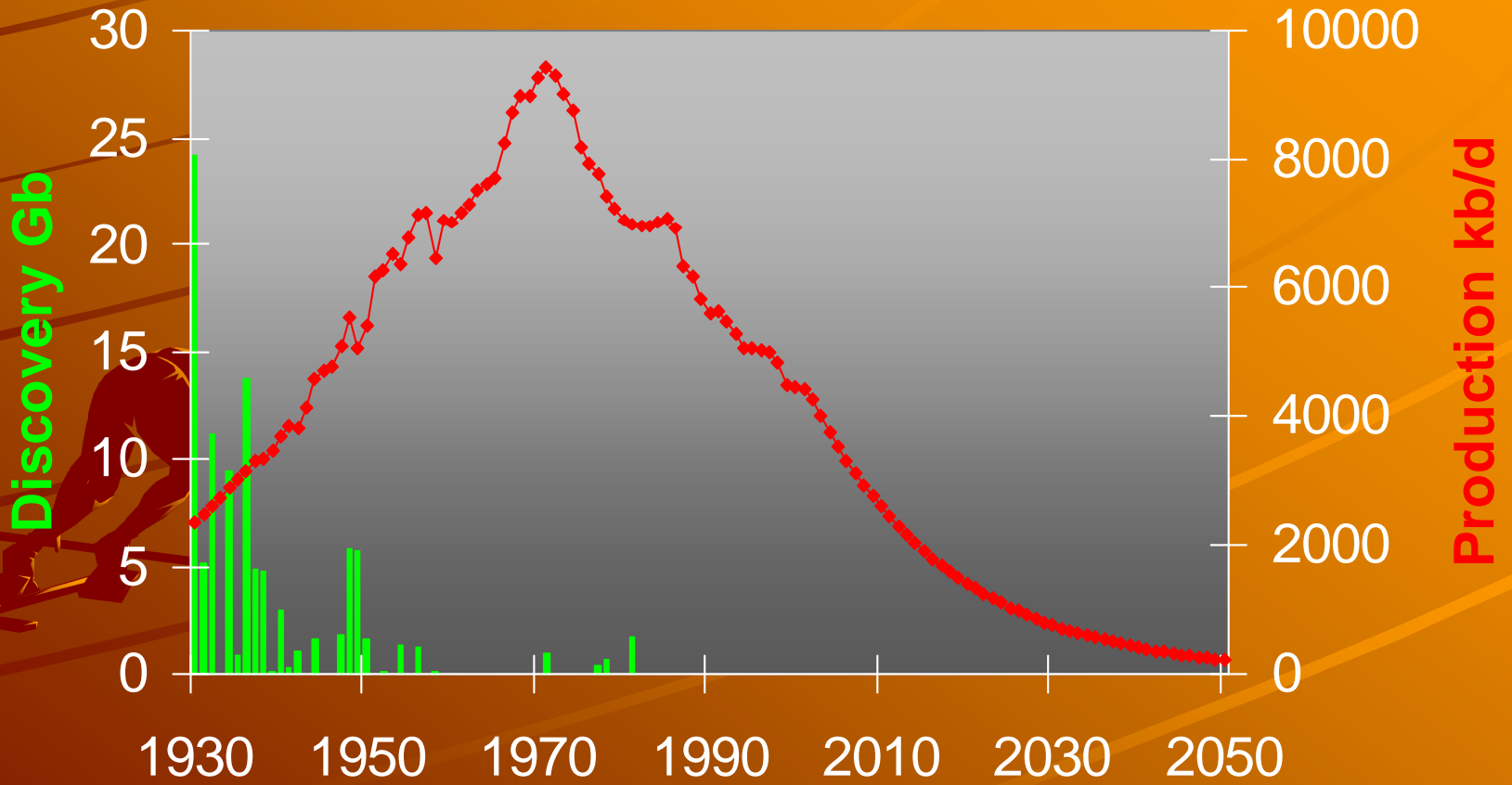


Peak Oil

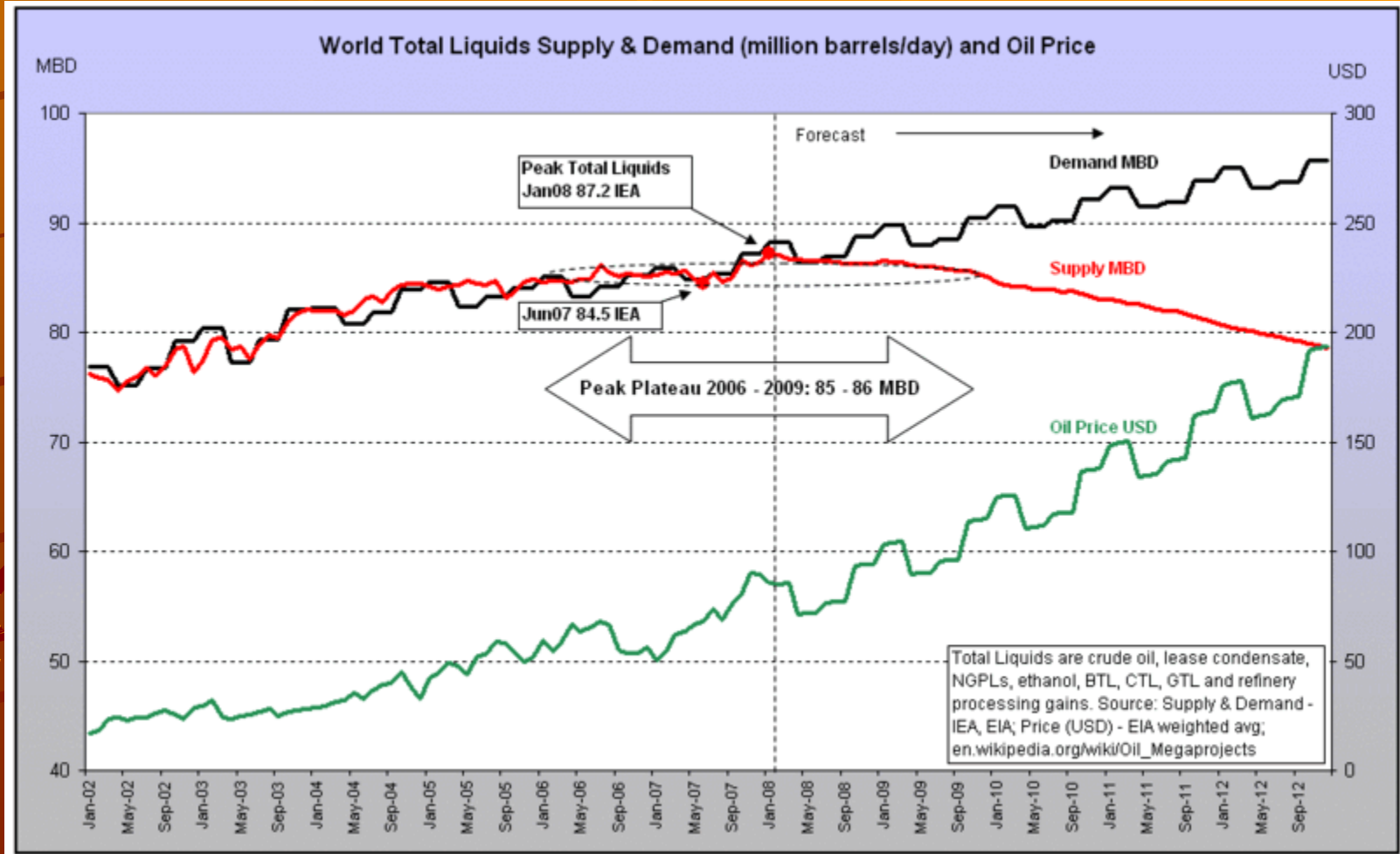
- ✦ *Growing consensus*
 - *Peak conventional oil now*
 - *Peak exported oil now*
 - *Peak liquids by 2012*



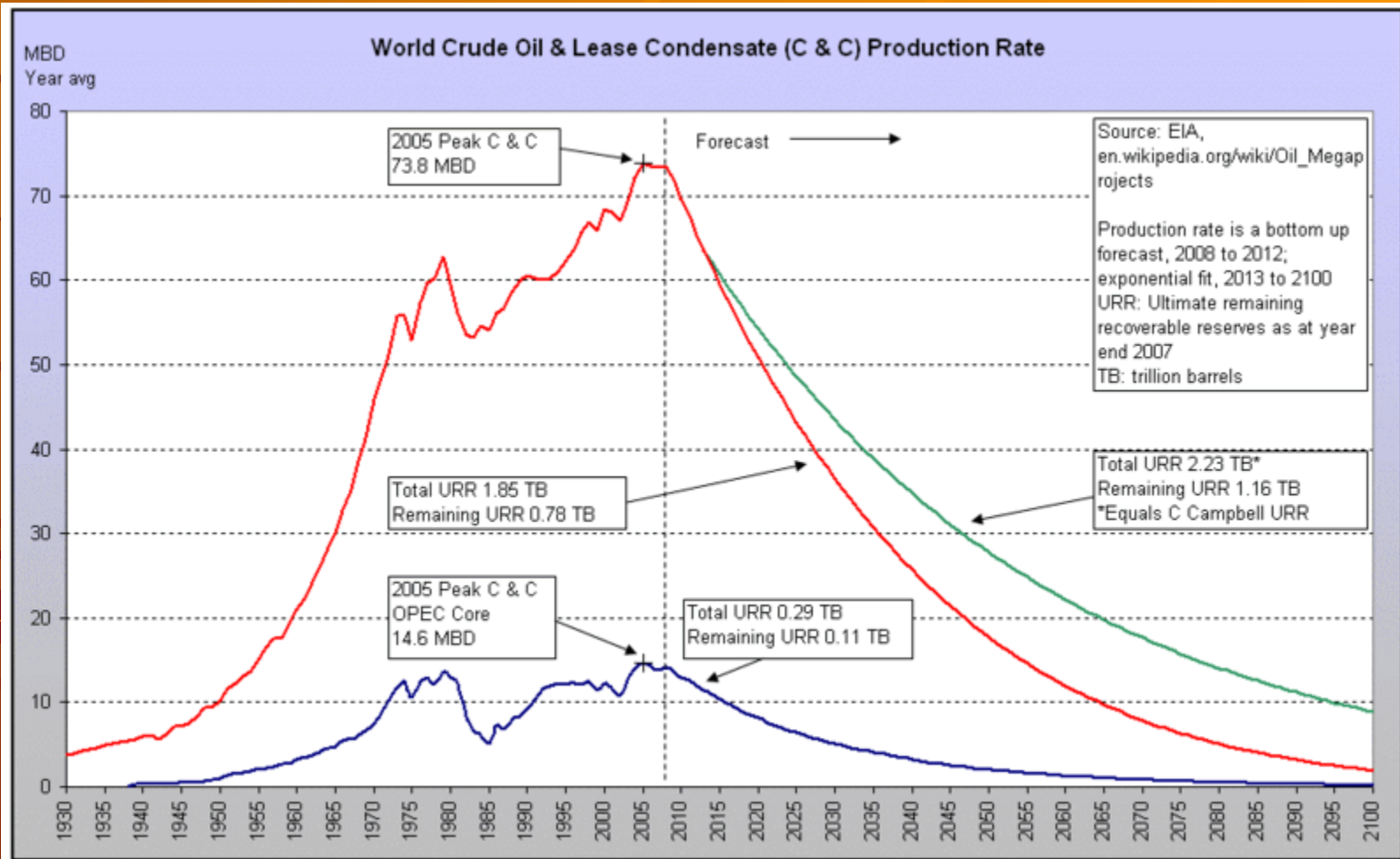
US-48



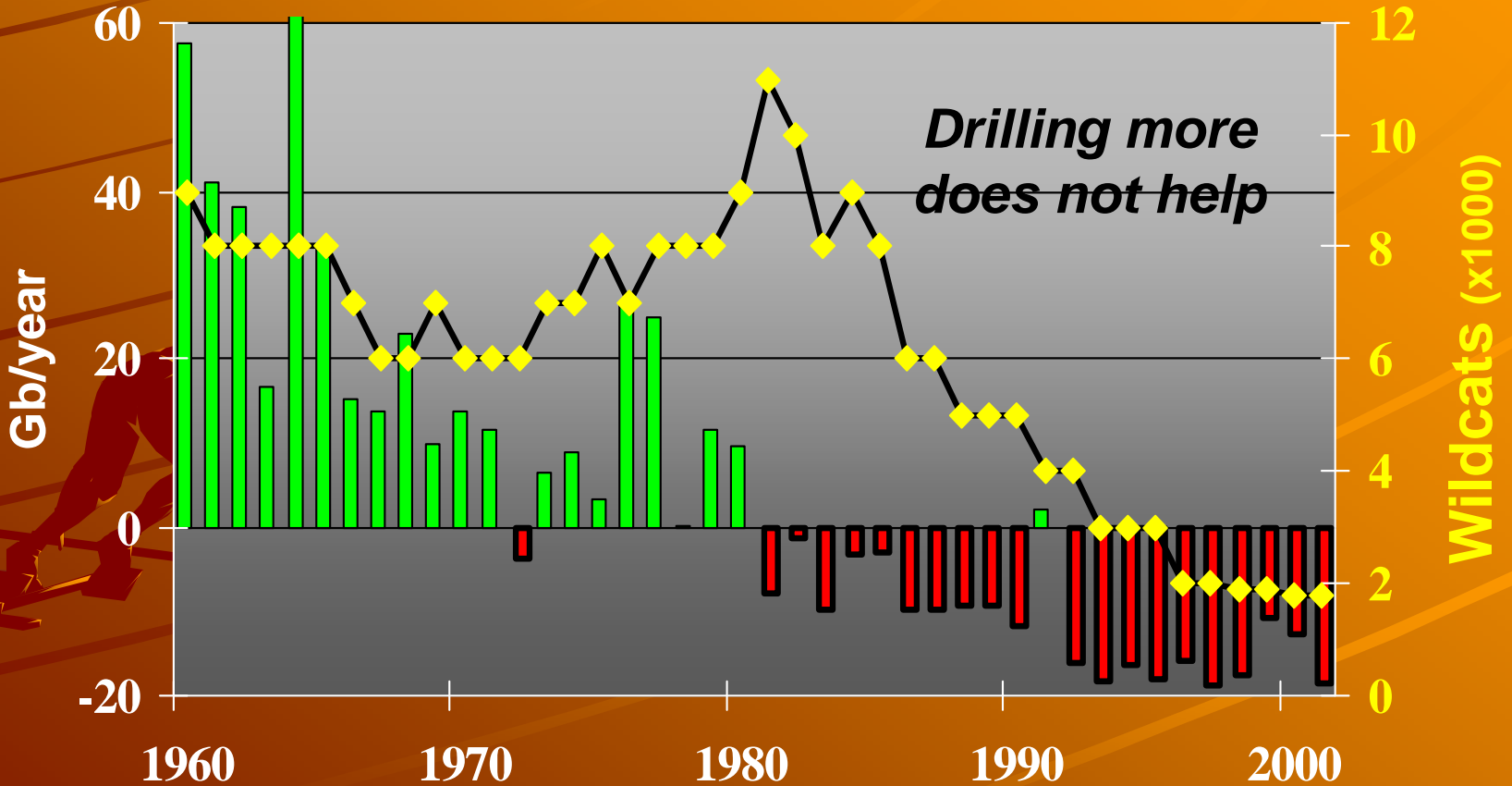
World Peak Total Liquids



World Peak C & C



The Growing Gap between Discovery and Consumption



Oil is a non-renewable resource

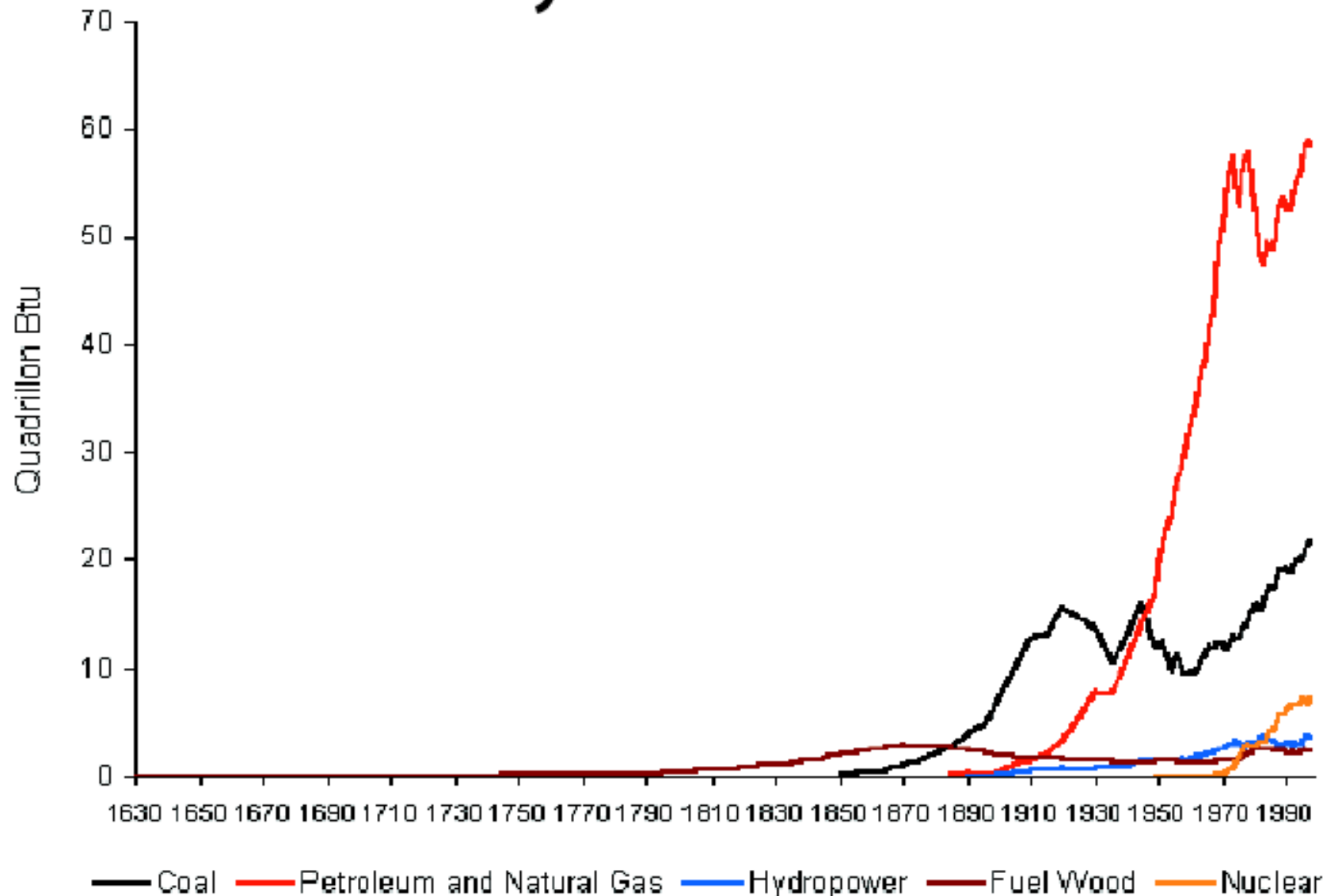
- ✦ Geophysics of oil depletion
 - Flow rates slow over time
 - Light sweet to sour heavy over time
 - Growing water cut
- ✦ Costs rise as oil deeper in field



Current Global Energy Mix

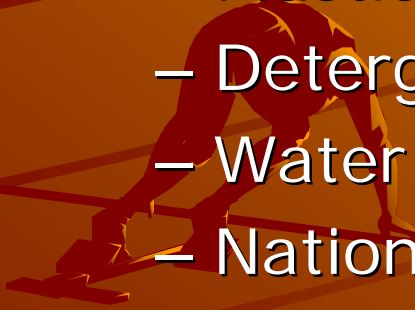
- ◆ Oil: 36%
- ◆ Coal: 27%
- ◆ Natural gas: 23%
- ◆ Nuclear: 6%
- ◆ Hydro: 3%
- ◆ Biomass: 4%
- ◆ Wind, solar, geothermal, biofuels 1%

US Consumption of Energy By Resource

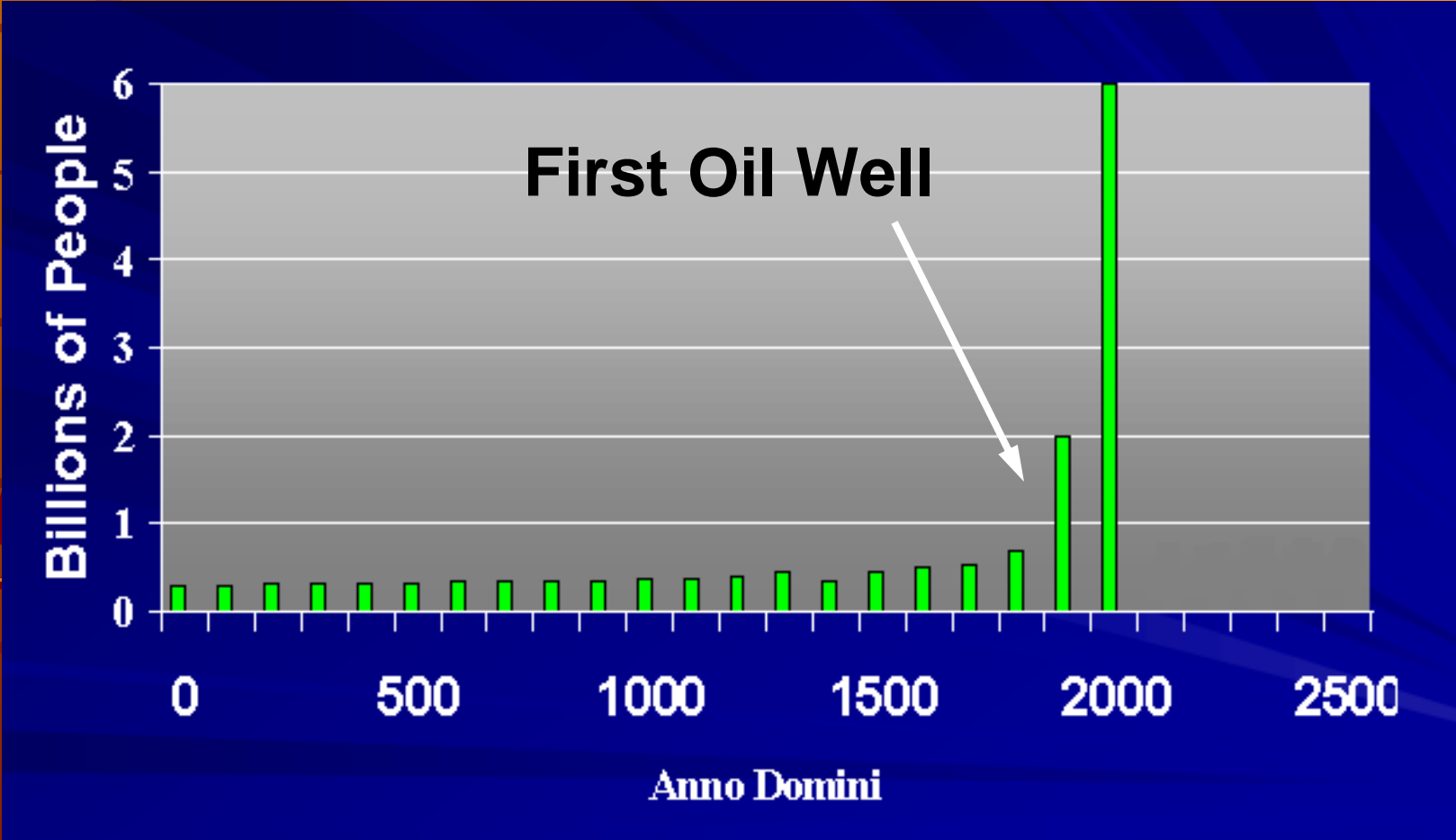


How do we use Petroleum?

- Transportation sector (65%) (gasoline, diesel fuel, jet fuel, asphalt, other)
- Pharmaceuticals
- Agricultural products (oil-based pesticides)
- Plastics, fabrics, paint, ink
- Detergent, glycerin, vitamins and additives
- Water distribution
- National defense
- Home heating
- Food production



Population



Oil demand inelastic

- ◆ 80-95% of all transport on the planet depends on oil products.
- ◆ Transport accounts for 70% of oil use
- ◆ All petrochemicals are produced from oil
- ◆ 99% of lubrication is done with oil products
- ◆ 95% of our goods transported using oil
- ◆ 99% of our food involves oil or gas for fertilizers, agri-chemicals, tilling, cultivation and transport

Timing of Peak

◆ Supply

- Depletion rate (about 4% currently)
- Rate of new discoveries
- Time to bring discoveries into production

◆ Demand



	A. Dhabi	Iran	Iraq	Kuwait	N. Zone	S. Arabia	Venezuela
1980	28	58	31	65	6.1	163	18
1981	29	58	30	66	6.0	165	18
1982	31	57	30	65	5.9	164	20
1983	31	55	41	64	5.7	162	22
1984	30	51	43	64	5.6	166	25
1985	31	49	45	90	5.4	169	26
1986	30	48	44	90	5.4	169	26
1987	31	49	47	92	5.3	167	25
1988	92	93	100	92	5.2	167	56
1989	92	93	100	92	5.2	170	58
1990	92	93	100	92	5.0	258	59
1991	92	93	100	95	5.0	259	59
1992	92	93	100	94	5.0	259	63
1993	92	93	100	94	5.0	259	63
1994	92	89	100	94	5.0	259	65
1995	92	88	100	94	5.0	259	65
1996	92	93	112	94	5.0	259	65
1997	92	93	113	94	5.0	259	72
1998	92	90	113	94	5.0	259	73
1999	92	90	113	94	5.0	261	73
2000	92	90	113	94	5.0	261	77
2001	92	90	113	94	5.0	261	78
2002	92	90	113	94	5.0	259	78
2003	92	126	115	97	5.0	259	78
2004	92	126	115	99	5.0	259	77

Poor Data, Poor Forecasting

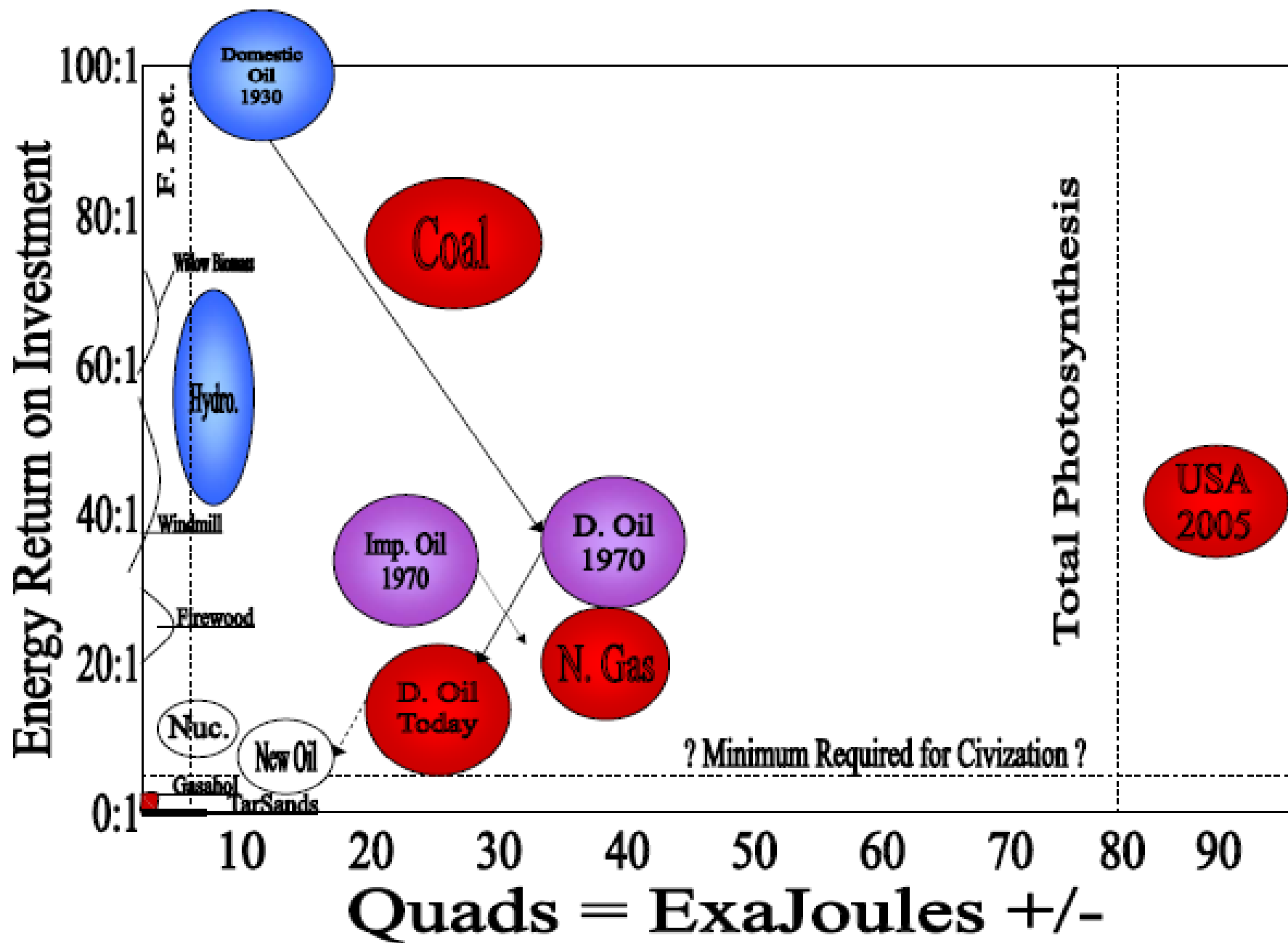
- ✦ IEA overstated discoveries by 70% over last 10 years
- ✦ Decline rates higher than predicted



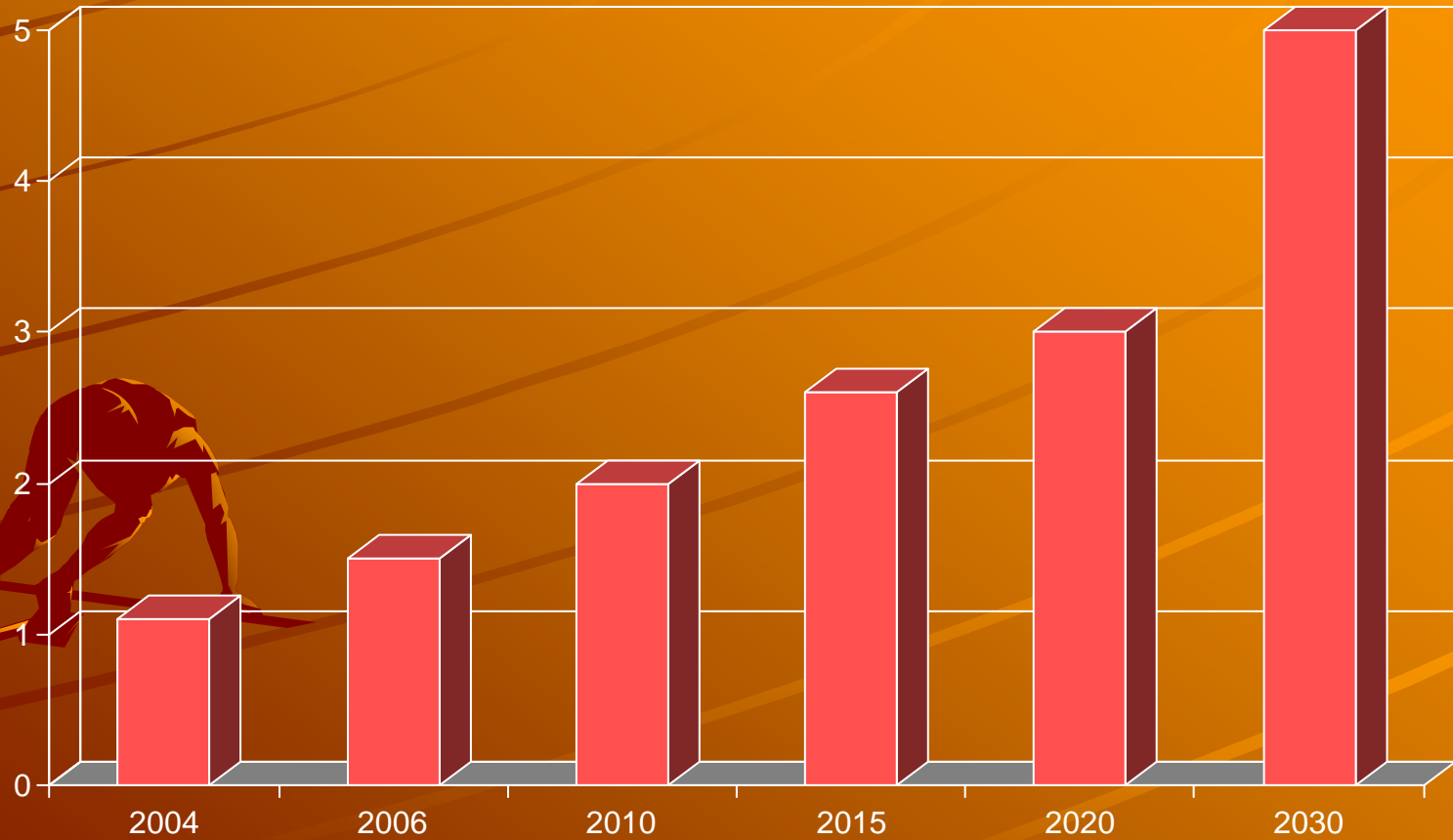
Alternatives: Low EROI

- ✦ Fossil fuels required to bring alternatives on line
 - mine raw materials
 - build, distribute, maintain alternatives

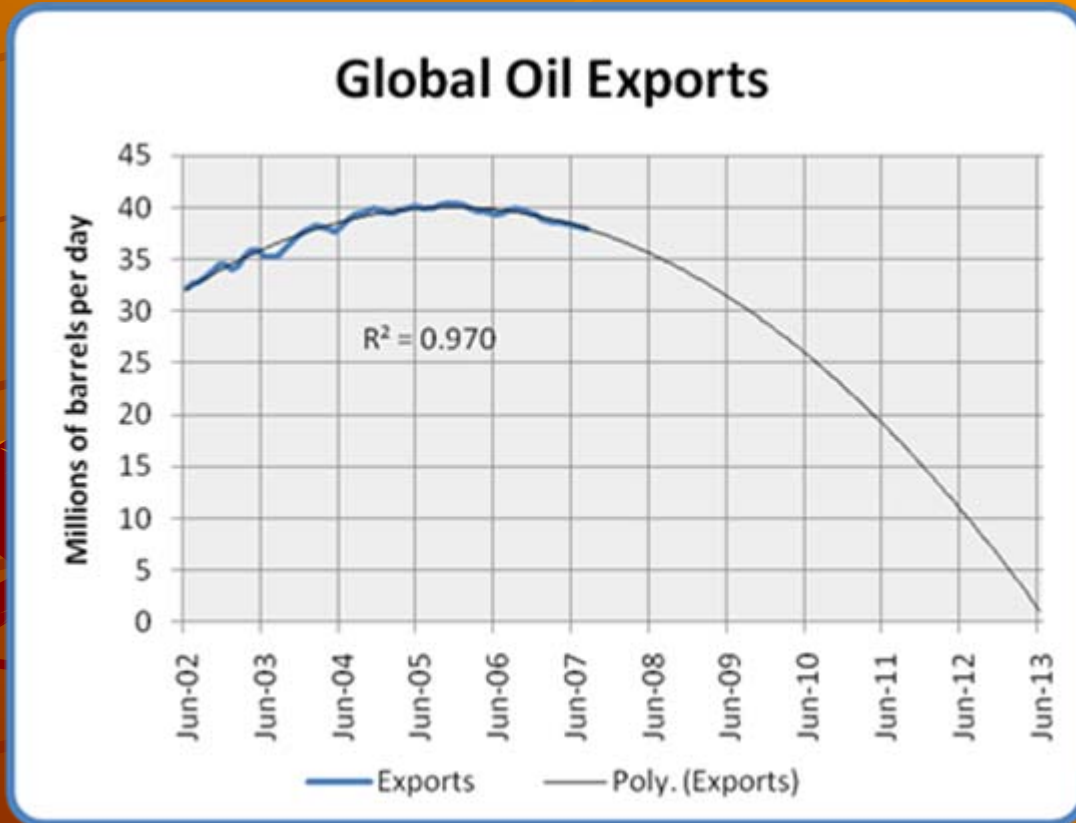




Projected Oil Sands Production –MMb/day (Suncor)



Peak Export Problem



Troubling economics

- ✦ 3% decline in global oil production means global recession highly likely



Coal

- ◆ Much of what remains is lower grade bituminous and lignite.
- ◆ High CO₂ emissions



What to do?

- ◆ Reduce dependence on liquid fuel
- ◆ Reduce CO2 emissions
- ◆ Create local and regional economies
- ◆ Conservation, conservation, conservation!!!
- ◆ Sense of urgency

Reducing liquid fuels

- ✦ Electric transportation using renewable electricity sources
- ✦ Focus on conservation as first “source” of new electricity
 - Lightbulb initiative



Reducing CO2 emissions

- ✦ Electric transportation using renewable electricity
- ✦ Initiatives to conserve electricity
 - Spokane Light-Bulb Change-Out
- ✦ Reduction in fossil fuel use overall

