

HTTTR (HT³R)

High Temperature Test and Teaching Reactor

Partners

**UT System (UTPB)/General Atomics/
Permian Basin (Midland, Odessa, Andrews)**

**Proposed Location In
Andrews County, Texas**

www.utpb.edu/ht3r

The Team Members

- Grant Billingsley – Midland
- Kirk Edwards, Nick Fowler – Odessa
- Andrews County Officials
- General Atomics – Mike Campbell San Diego,
Mark Haynes Washington DC

The Team Members-Cont.

UT System

- Mr. Barry Burgdorf, General Counsel, UT System
- Dr. Teresa Sullivan, Exec V.C. UT System
- Dr. Charles Sorber, UT System, Special Advisor
- Dr. John McClure, UTEP College of Engineering
- Dr. Juan Sanchez, V. P. for Research, UT Austin
- Dr. Ron Elsenbaumer, V. P. for Research, UT Arlington
- Dr. David Daniel, President, UT Dallas
- David Watts, James Wright, Jack Ladd, Kay Bivens – UTPB
- Bill Christian – Washington DC

How did we get here?

- The US has two scalable solutions to reduce foreign oil consumption – Synthetic fuels (Synfuels) and Hydrogen & Both can be generated using new high-temperature gas reactors!
- Only Nuclear is capable of no CO/CO₂
- Yet, no new nuclear plants permitted since 1976!
- Other nations are moving rapidly ahead

**WE NEED A NEW VISION OF RENEWED
RESEARCH AND EDUCATION IN THE
UNITED STATES**

How did we get here!

- James Wright (UTPB) and Harold Agnew (General Atomics) worked together at Los Alamos in New Mexico
- Agnew is a Current Director and Past CEO of General Atomics
- Their collaboration made this idea into a reality

General Atomics (GA)

Who are They?

(Short Presentation to follow this one)

- Built more research and test reactors worldwide (60+) than anyone else – with no major events ever reported

Why Nuclear Sciences?

The Fact of the Matter!

The Fission of **1 Atom of Uranium**

Produces 10,000,000 Times

(10 million Times!!)

The Energy Produced by

The Combustion of **1 Atom of Carbon**

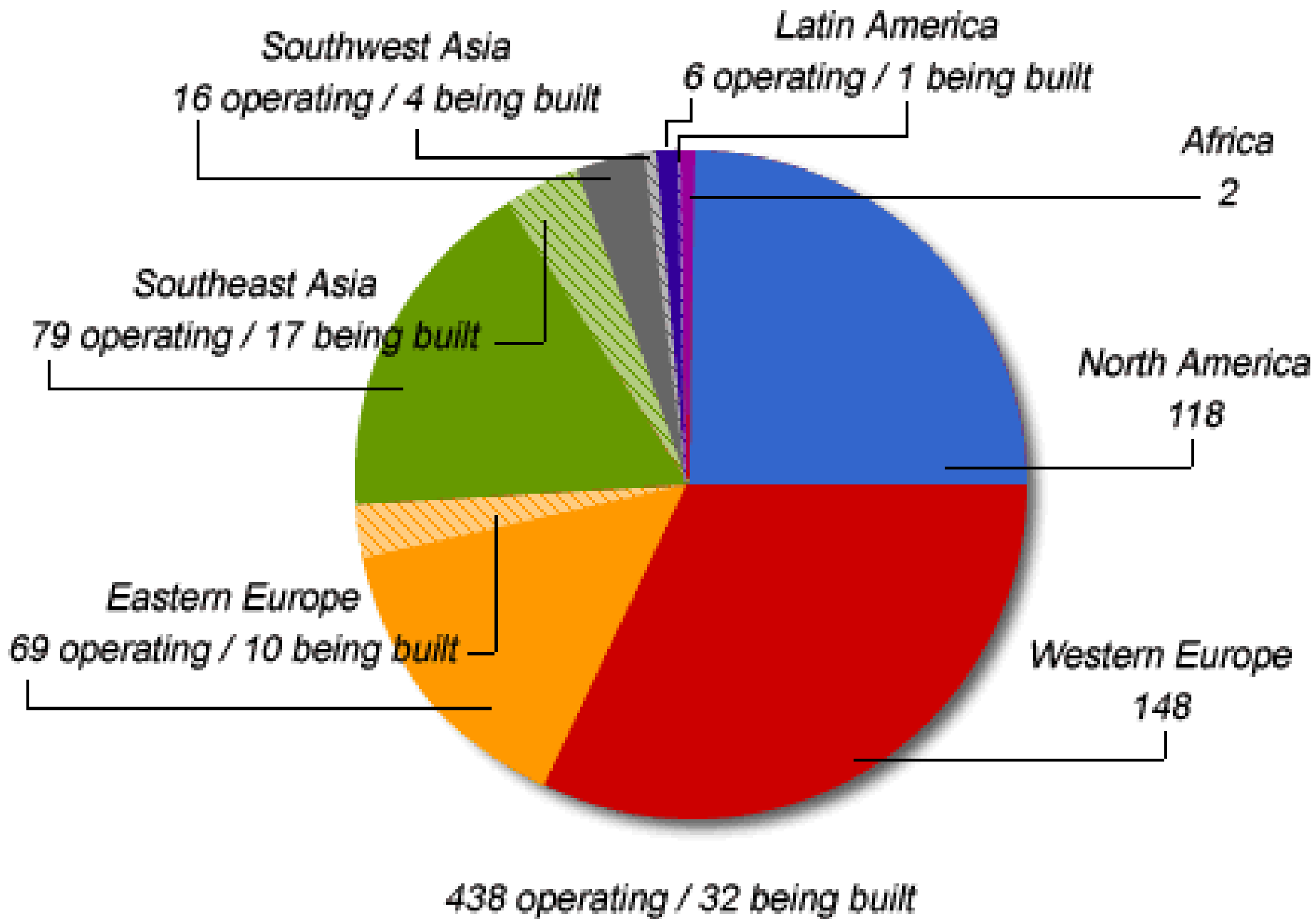
Why Nuclear Sciences?

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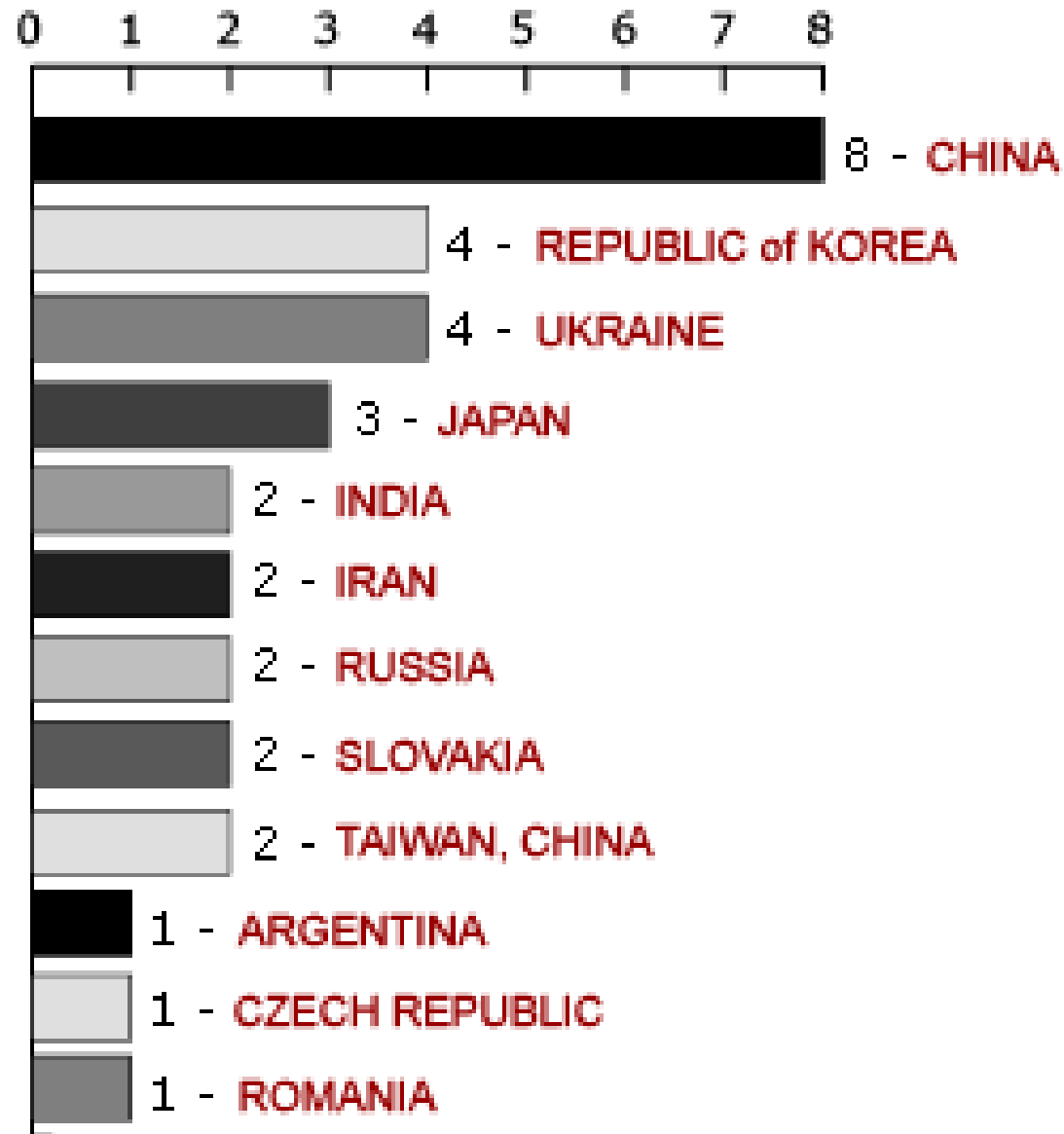
- Using “Breeder” Reactors, the World Can Reach & Sustain Our Standard of Living, for **Billions of Years!** J. McCarthy, Stanford U

The US Must Find a Better Way to Utilize Nuclear Energy – The Rest of the World Seems to Be!

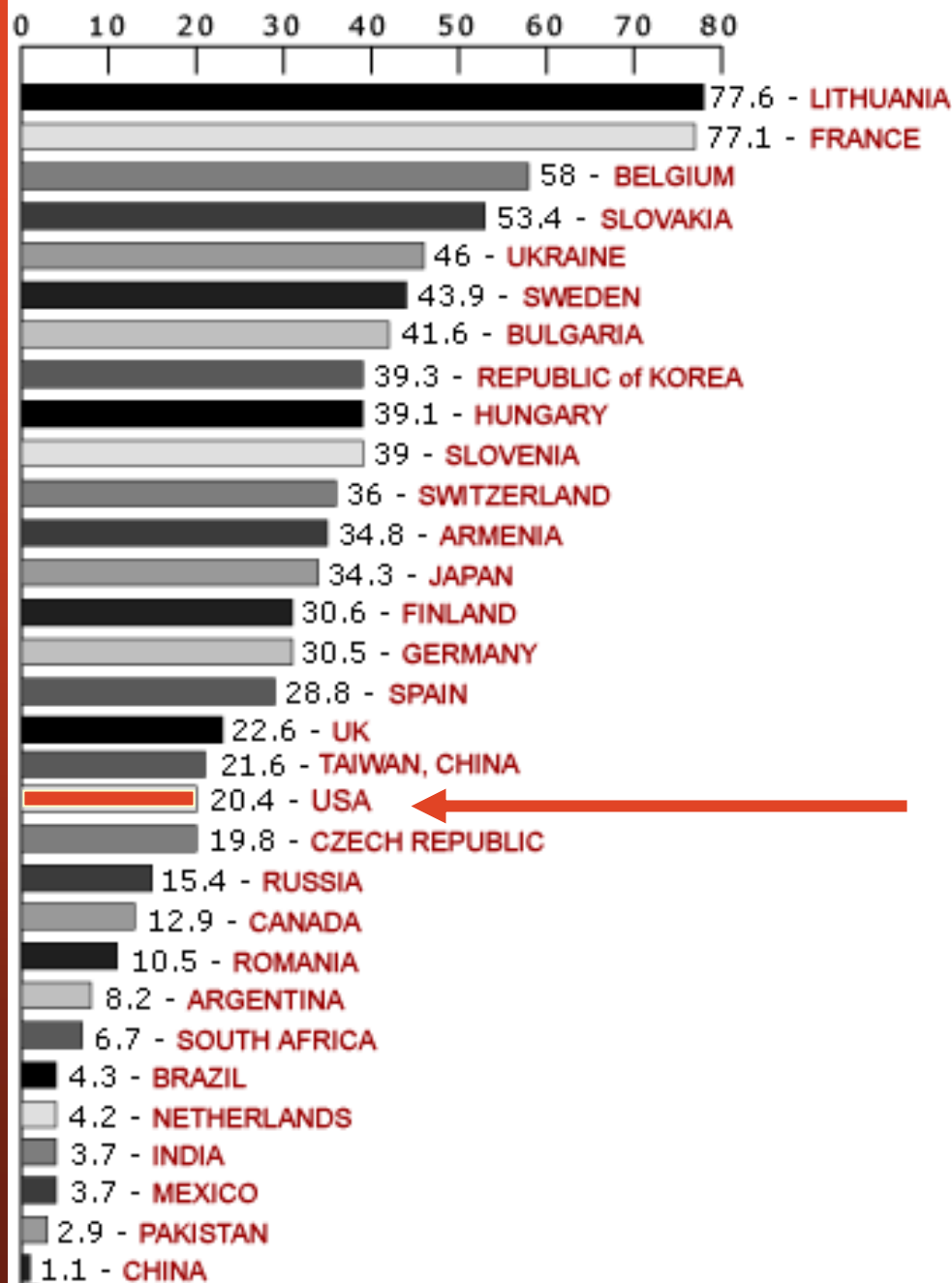
NUCLEAR POWER PLANTS BY REGION



NUCLEAR POWER PLANTS UNDER CONSTRUCTION WORLDWIDE

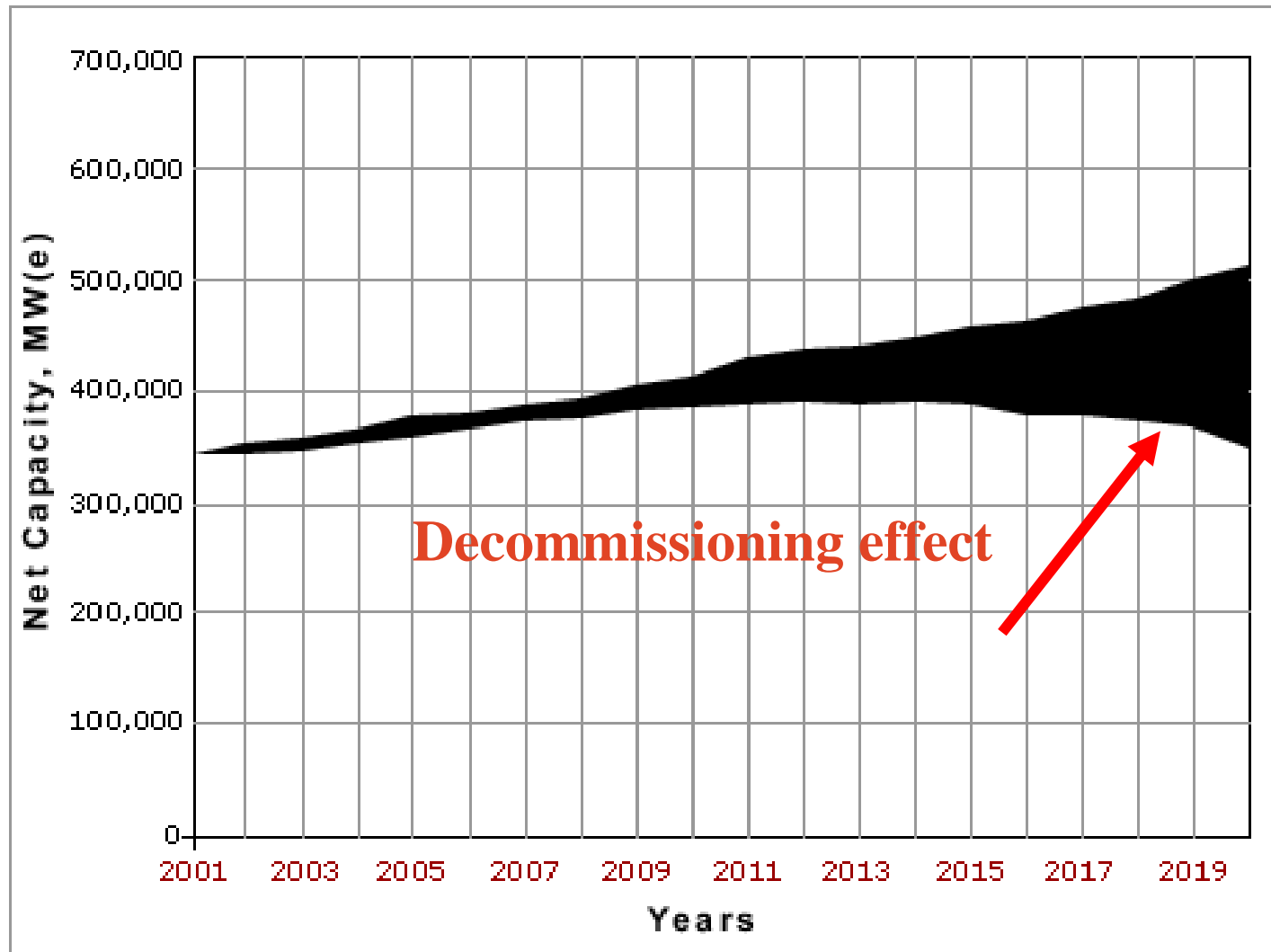


NUCLEAR SHARE OF ELECTRICITY GENERATION IN 2001

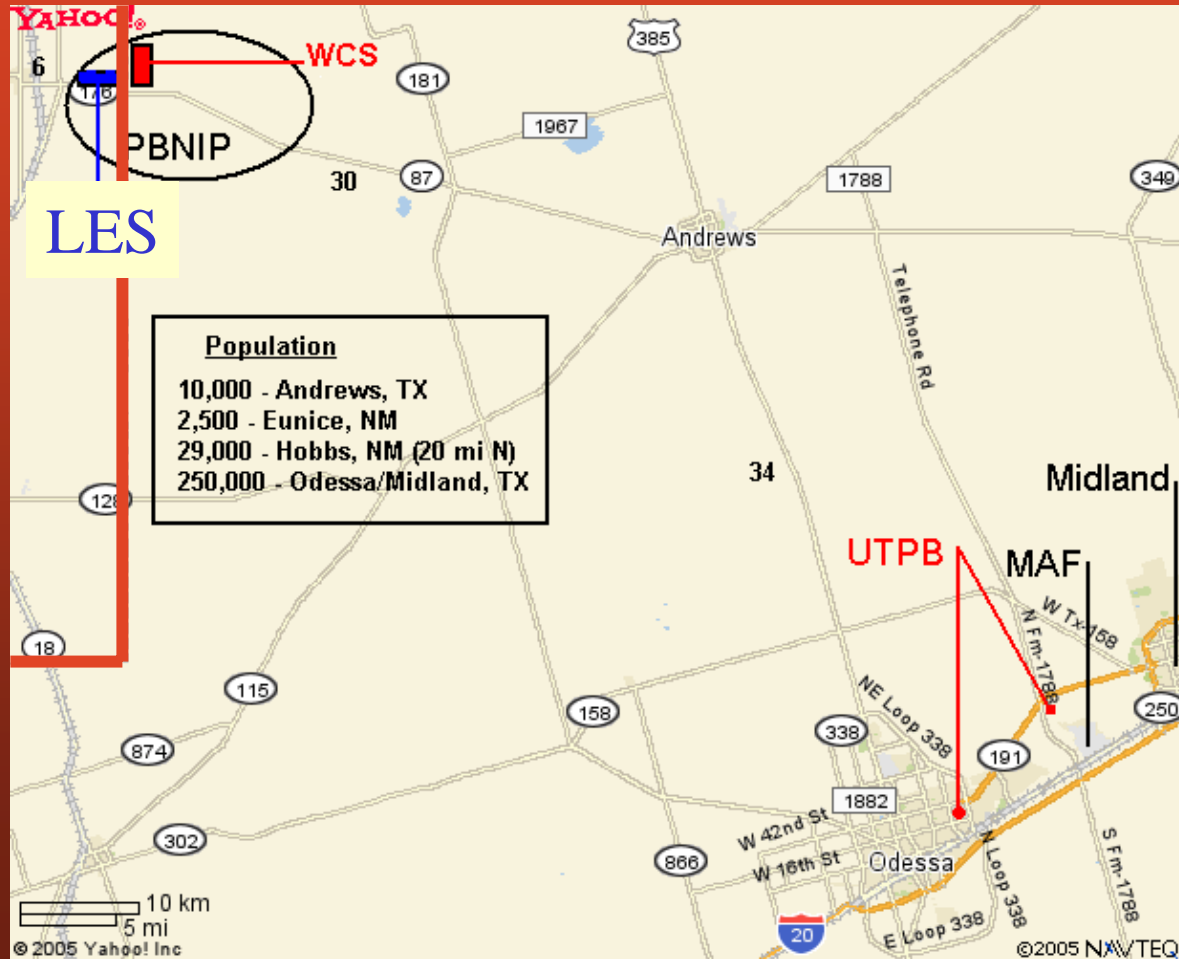


NUCLEAR POWER OUTLOOK UP TO 2020
(net plant capacity, worldwide)

Year	Total Net Capacity MW(e)	
	Low	High
2001	353,300	353,300
2002	358,440	360,980
2003	361,300	365,230
2004	361,970	370,640
2005	366,940	376,870
2006	367,390	380,560
2007	369,230	383,970
2008	369,810	390,660
2009	371,890	397,020
2010	378,380	405,610
2011	378,470	412,710
2012	381,720	426,620
2013	380,670	432,550
2014	380,870	438,500
2015	380,560	451,310
2016	373,800	462,170
2017	370,840	480,680
2018	367,850	489,210
2019	362,160	497,670
2020	354,220	509,450



Why Andrews County?



WCS - Waste Control Specialists Facility – Andrews County

July 2004



July 2005

Texas/New Mexico State Line

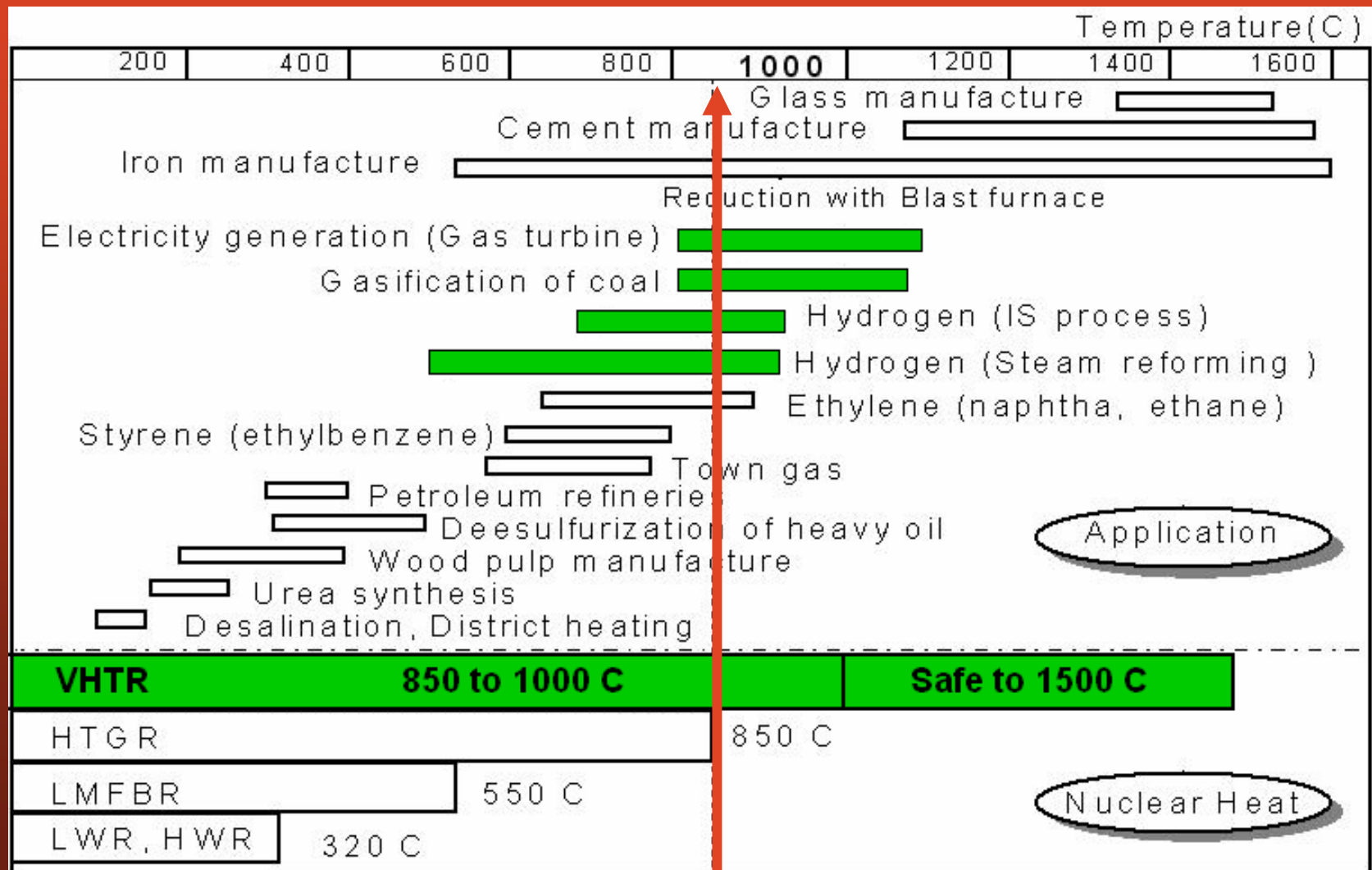
Today's U.S. Reactors

- Single Purpose – Only Electricity Generation
- Generate ~20% of US Electricity
- 1950's Technology (Water Cooled – which is the Source of most Past Reactor Problems)
- Aging US Nuclear Infrastructure (104 Plants)
 - 31 to be Decommissioned before 2020
 - 42 to be Decommissioned 2020 to 2029
 - 24 to be Decommissioned 2030 to 2039
 - 7 to be Decommissioned 2040 to 2044

Generation IV Information Forum

- Representatives of 10 Countries met in 2000
- Reactor Requirements for the Future
 - ✓ Economical to Operate
 - ✓ Enhanced Safety
 - ✓ Minimize Waste
 - ✓ Proliferation Resistant
 - ✓ High Temperature

Why High Temperature? Process Heat Applications

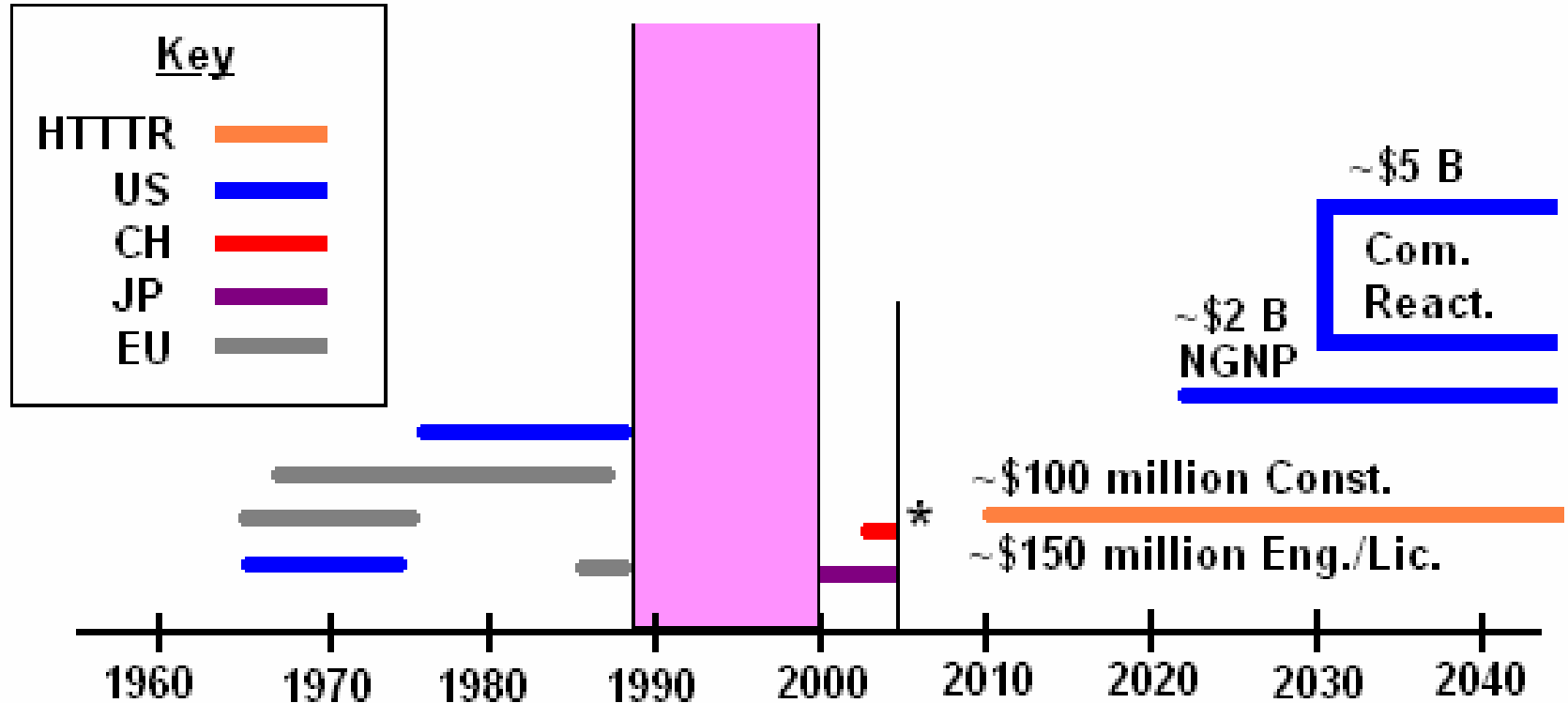


The HT³R

Uses Nearest-Term GEN IV Reactor Technology:

- High-Efficiency Electricity Production (Gas Turbines Using Brayton Cycle)
- High-Temperature Process Heat for Hydrogen (& Synfuel) Production
- Intrinsically Safe due to Reactor Design & Natural Cooling mechanisms.

HT³R: The Logical Stepping Stone! (5% the Size of the Larger NGNP)



HT³R Research Goals

- Start Educational & Industrial Infrastructure for VHTR
- Provide further feasibility support for the larger NGNP
- Develop Methods to “Burn” WGP (222.5 mt) and HEU (1300 mt) Removed From Nuclear Weapons
- Further Reduce Waste From Reactors
- Obtain up to 55% Efficiency in Electricity Generation
- Obtain Synfuel and Hydrogen Efficiently & Economically Using Process Heat
- Eliminate CO₂ Emissions (Power Gen.)

Texas Needs HT³R!

- Unique in the World
- Help Ensure Texas Leads Development of New Nuclear & Hydrogen Technologies
- Up to \$400 million in Construction
- Provide up to \$40 million/year Operating Budget Plus 20 to 100 Visiting Scientists per Year for Up To 50 Years
- Strengthen the New Texas Nuclear Industry
- Create NASA-like Economic Development

Why are we here today?

- Educate Midland, Odessa and Andrews to this outstanding project and raise necessary funds for the Pre Conceptual Design– *underway*
- “*TEAM*” together 5 major Texas educational Institutions – UTPB, UT Austin, UTEP, UT Arlington, UT Dallas and Sandia National Lab
- Get political support for the project - local, Austin and Washington

Pre-Conceptual Design (PCD)

- Required by Feds!
- Joint UT System/GA
- Cost – \$3 million
- Funding Sources
 - ✓ Public Entities
 - ✓ Endowments
 - ✓ Individuals
- Structure
 - ✓ Evaluate all Components
 - ✓ Design Calculations
 - ✓ Physical Arrangement
 - ✓ Project Schedule
 - ✓ Project Cost
 - ✓ Answer what if Questions!

Historically a High Probability of Federal Funding with a Technically Strong PCD!

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NEXT – GENERAL ATOMICS PRESENTATION

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