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Clean and Abundant Energy for Sustainability



Peace and Prosperity through Hydrogen Economy, Sustainability & World Federation

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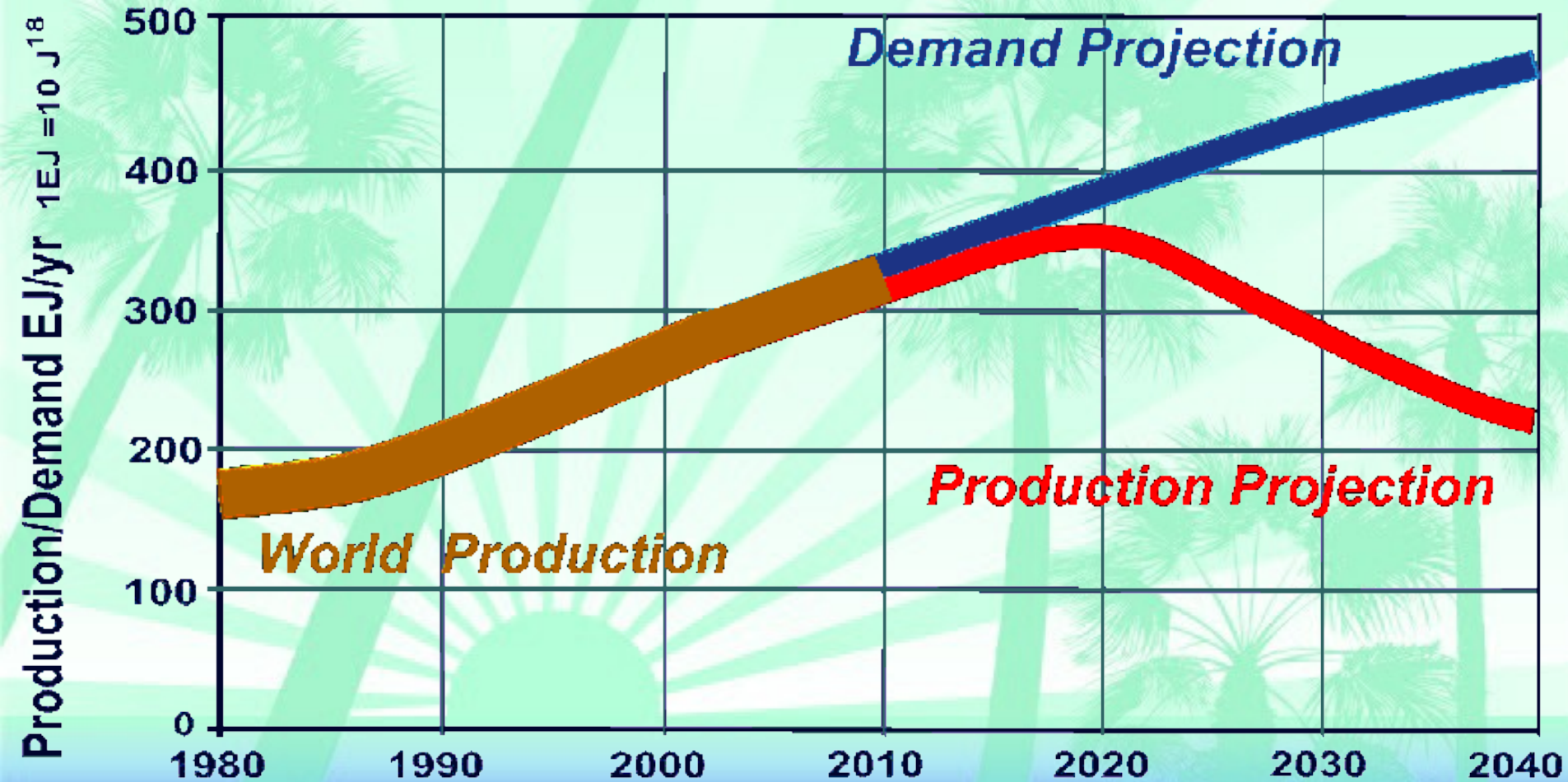


Problems Facing Humankind

- **Depletion of Fossil Fuels**
- **Global Environmental Problems**
- **Depletion of Resources**
- **Growing Population & Food Shortages**
- **Growing Gap Between North & South**
- **International Conflicts and Wars**



FLUID FOSSIL FUEL PRODUCTION/DEMAND (petroleum and natural gas)





RIO EARTH SUMMIT CONCERNS

- **Global warming**
- **Climate change**
- **Ozone layer depletion**
- **Acid rains**
- **Pollution**
- **Oxygen depletion**
- **Oil spills**
- **Surface mining**





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ENVIRONMENTAL DAMAGE DUE TO FOSSIL FUEL CONSUMPTION (2008 \$/GJ)

| Types of damage | Coal | Petroleum | N. Gas |
|-----------------------------------|--------------|------------------|---------------|
| on Humans | 5.22 | 4.25 | 3.14 |
| on Animals | 0.77 | 0.63 | 0.45 |
| on Plants and Forests | 2.03 | 1.64 | 1.22 |
| on Aquatic Systems | 0.27 | 1.58 | 0.17 |
| on Man-Made Structures | 1.68 | 1.35 | 1.01 |
| other Pollutants Costs | 1.47 | 1.19 | 0.89 |
| by Strip Mining | 0.74 | - | - |
| by Climatic Change | 2.09 | 1.70 | 1.26 |
| by Sea Level Rise | 0.48 | 0.39 | 0.29 |
| Total Environmental Damage | 14.75 | 12.73 | 8.43 |

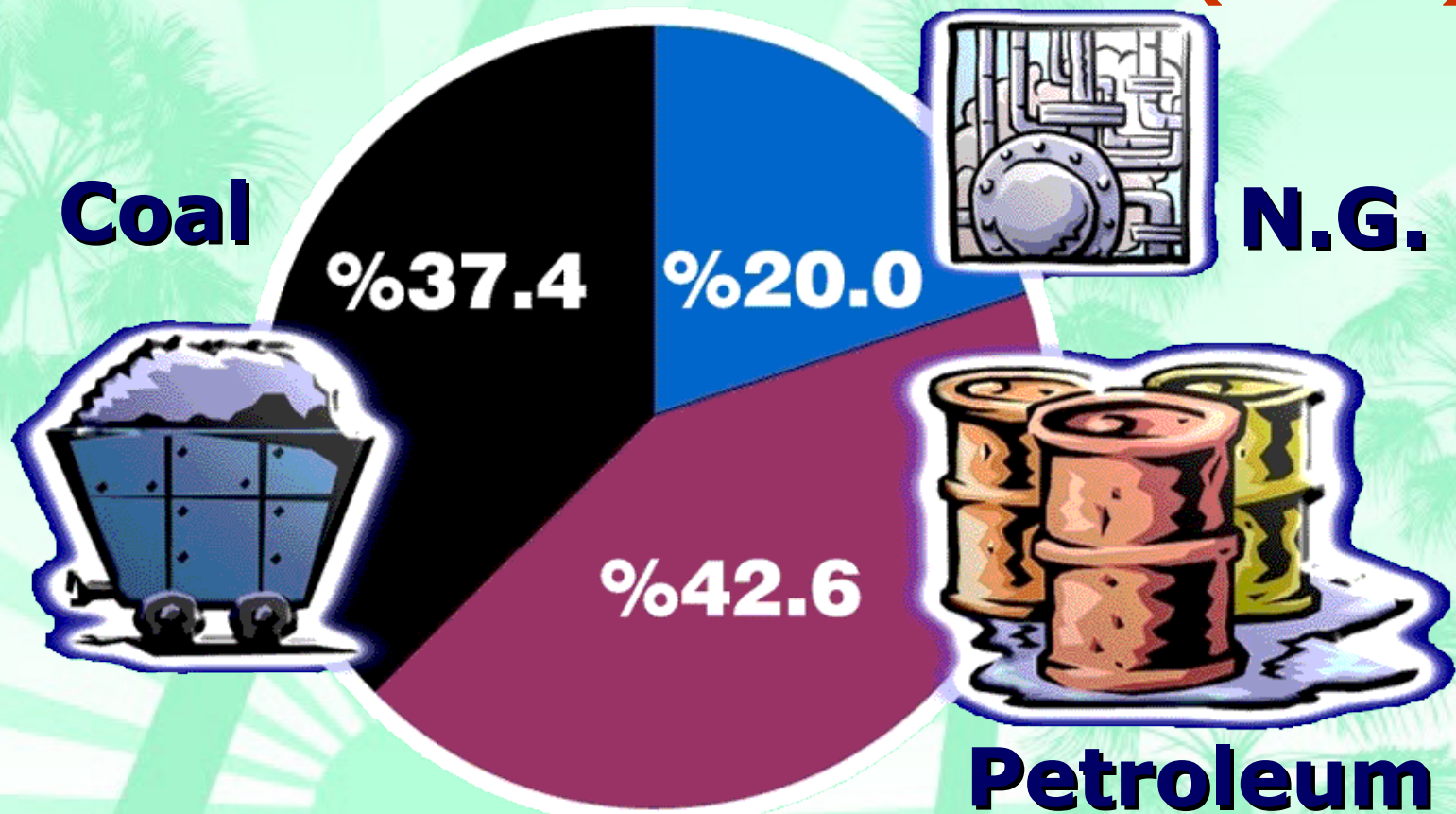


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ENVIRONMENTAL DAMAGE DUE TO FOSSIL FUELS CONSUMPTION (2008)



World Annual Loss: \$ 6 trillion



New Primary Energy Sources Being Considered

- **Nuclear fission (breeders)**
- **Nuclear fusion**
- **Solar**
- **Wind**
- **Ocean-thermal**
- **Ocean currents**
- **Tides**
- **Geothermal**





Drawbacks of New Primary Energy Sources

- 1. Intermittently available (solar, wind, tides)**
- 2. Available away from consumption centers**
- 3. Not transportable (all except nuclear)**
- 4. Not storable (all except nuclear)**
- 5. Not a fuel for transportation**



Conclusion:

An intermediary is required as a link between energy sources and consumer, and it should be a synthetic fuel.

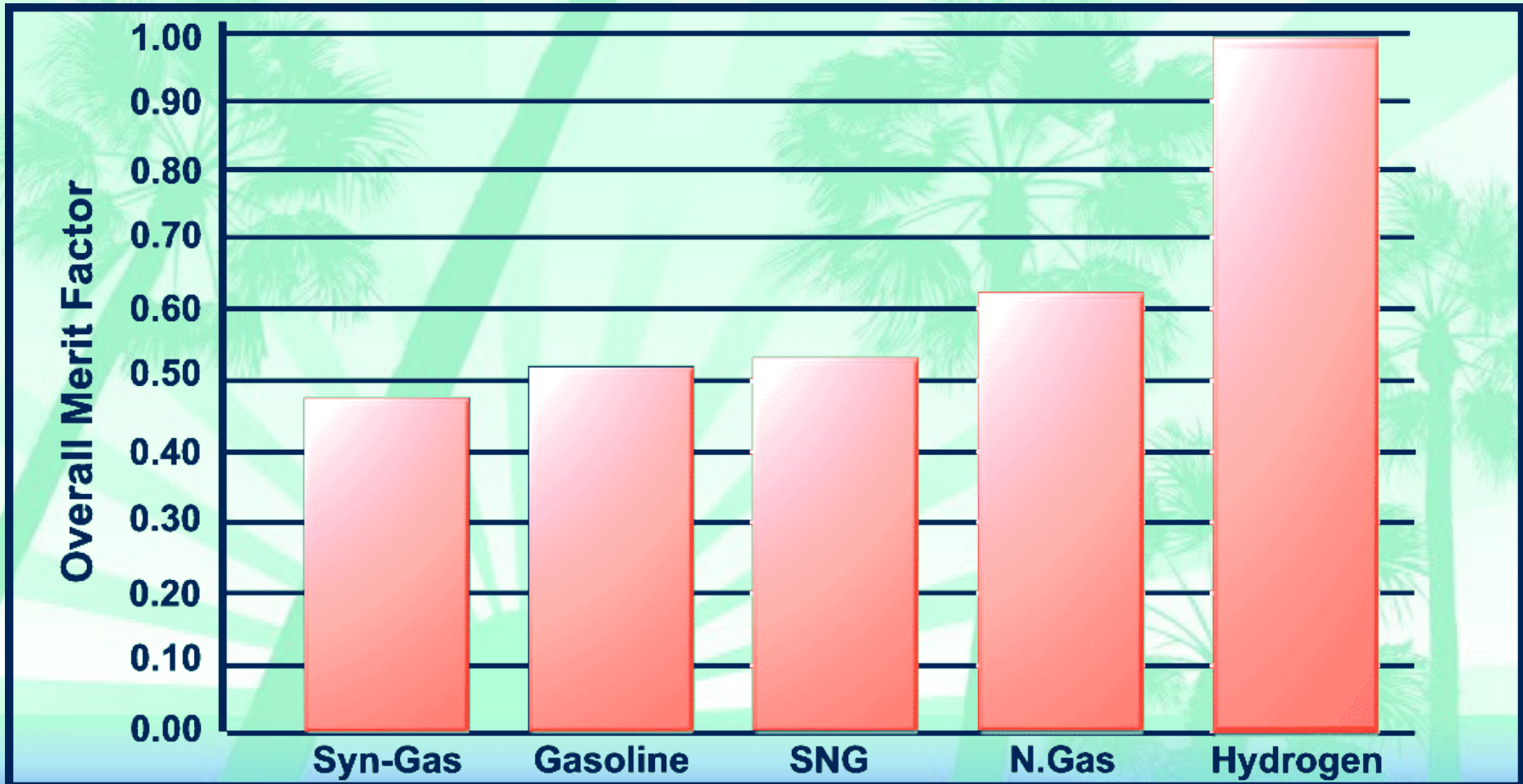


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Overall Merit Factor





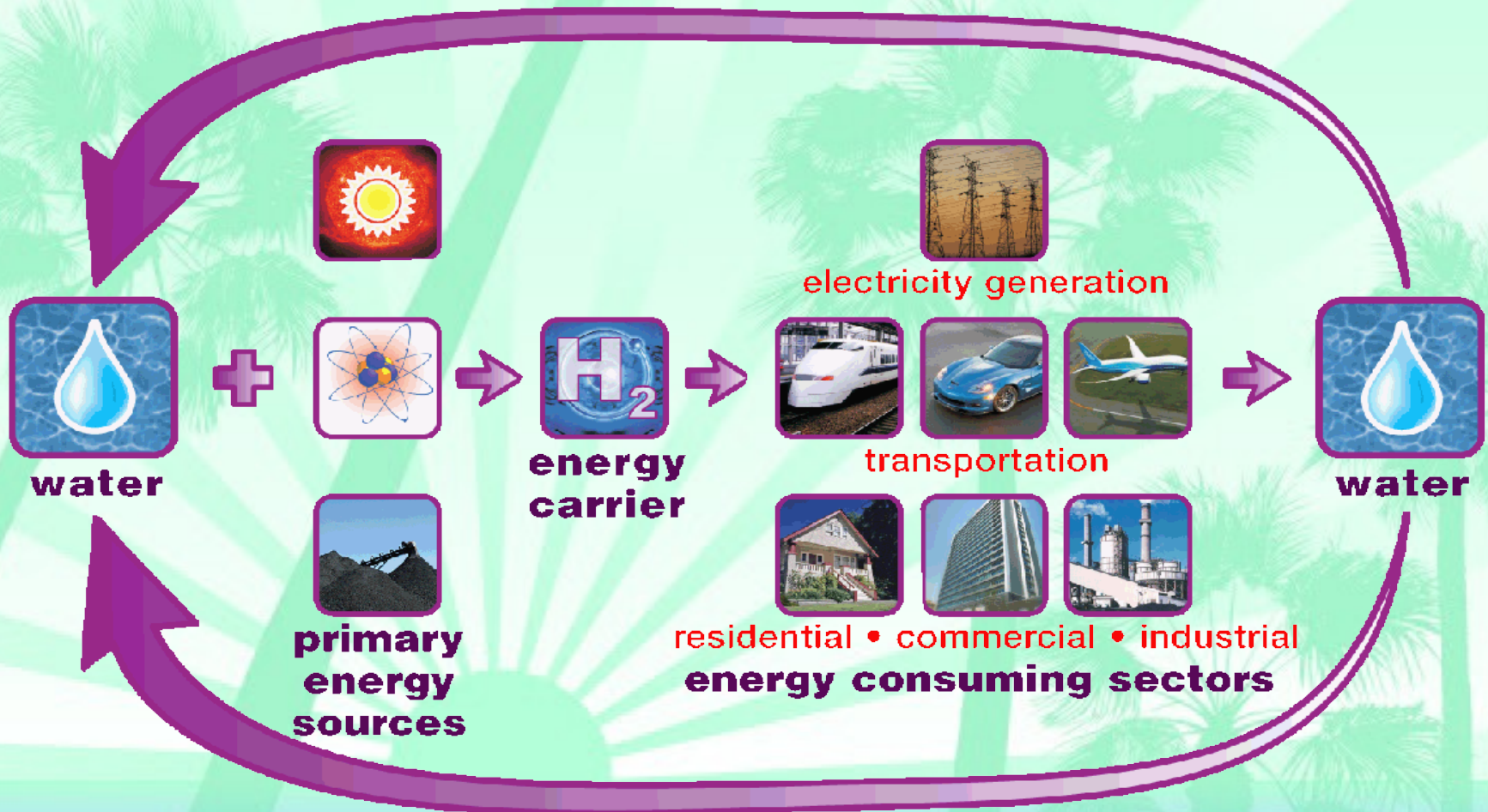
Advantages of Hydrogen

- **Lightest fuel**
- **Cleanest Fuel**
- **Most Efficient Fuel**
- **Best transport Fuel**
- **Best medium for large scale storage of renewable energies**
- **Best medium for large scale long distance energy transportation**





Hydrogen Energy System



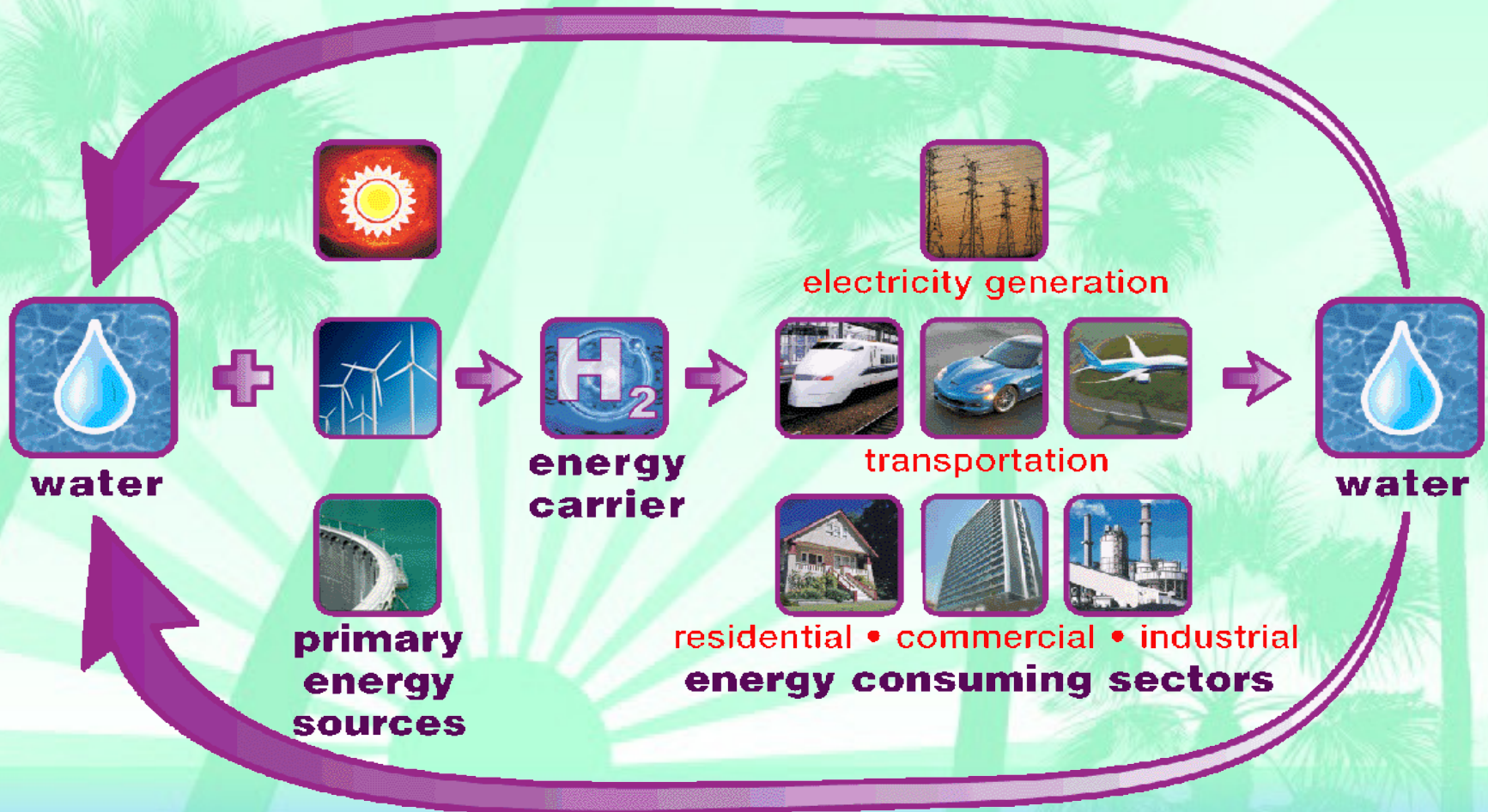


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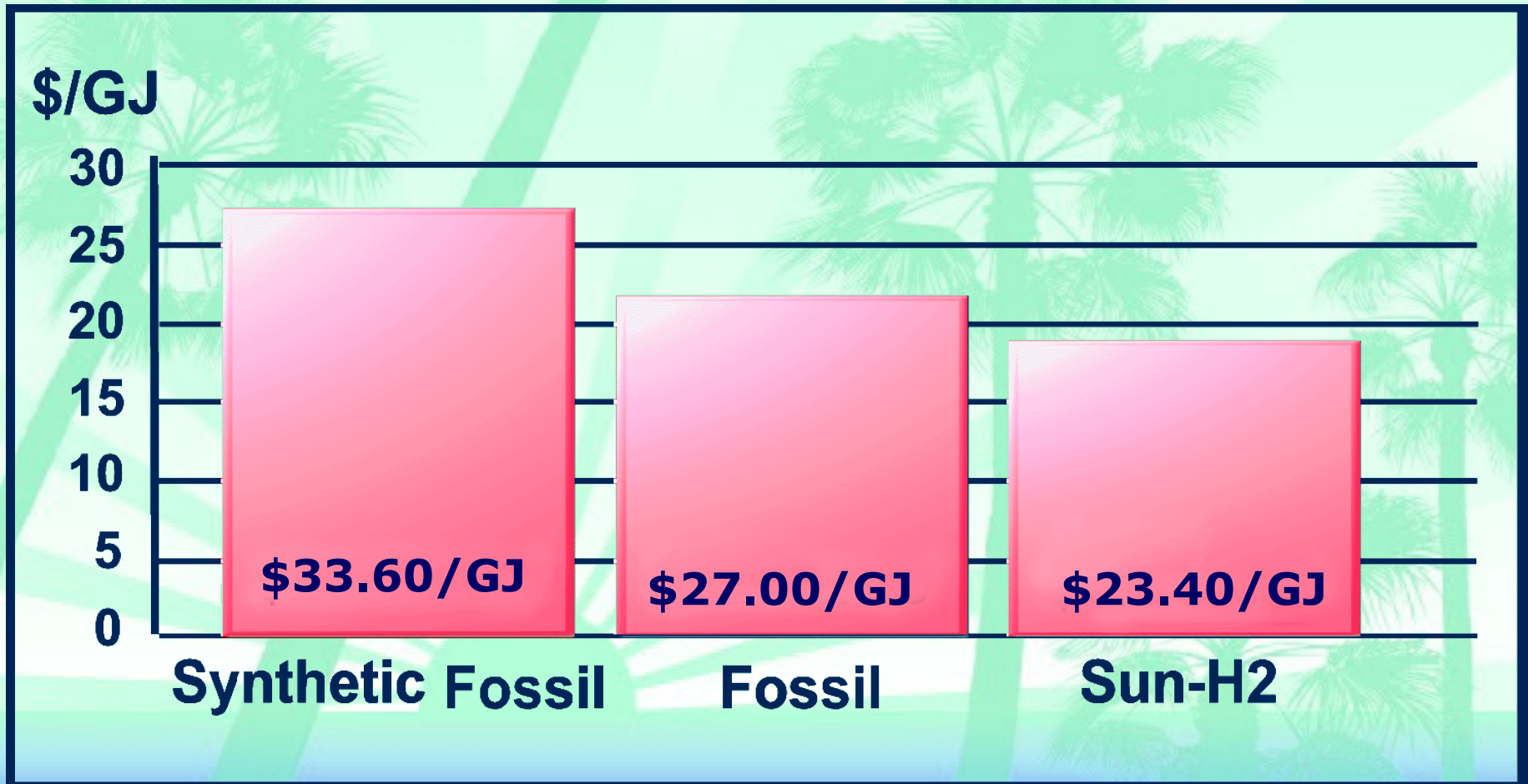


Ultimate Hydrogen Economy: Renewable Hydrogen Energy System





ECONOMIC COMPARISON OF ENERGY SYSTEMS (2008)





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HYDROGEN ENERGY SYSTEM PERMANENT & ELEGANT SOLUTION TO RIO EARTH SUMMIT CONCERNS

- ✓ **No greenhouse gases**
- ✓ **No ozone depleting chemicals**
- ✓ **No acid rain ingredients**
- ✓ **No pollutants**
- ✓ **No oxygen depletion**
- ✓ **Clean environment for biodiversity**
- ✓ **High utilization efficiency conserving resources**
- ✓ **Abundant energy for economic development**
- ✓ **Higher quality of life leading to zero population growth**



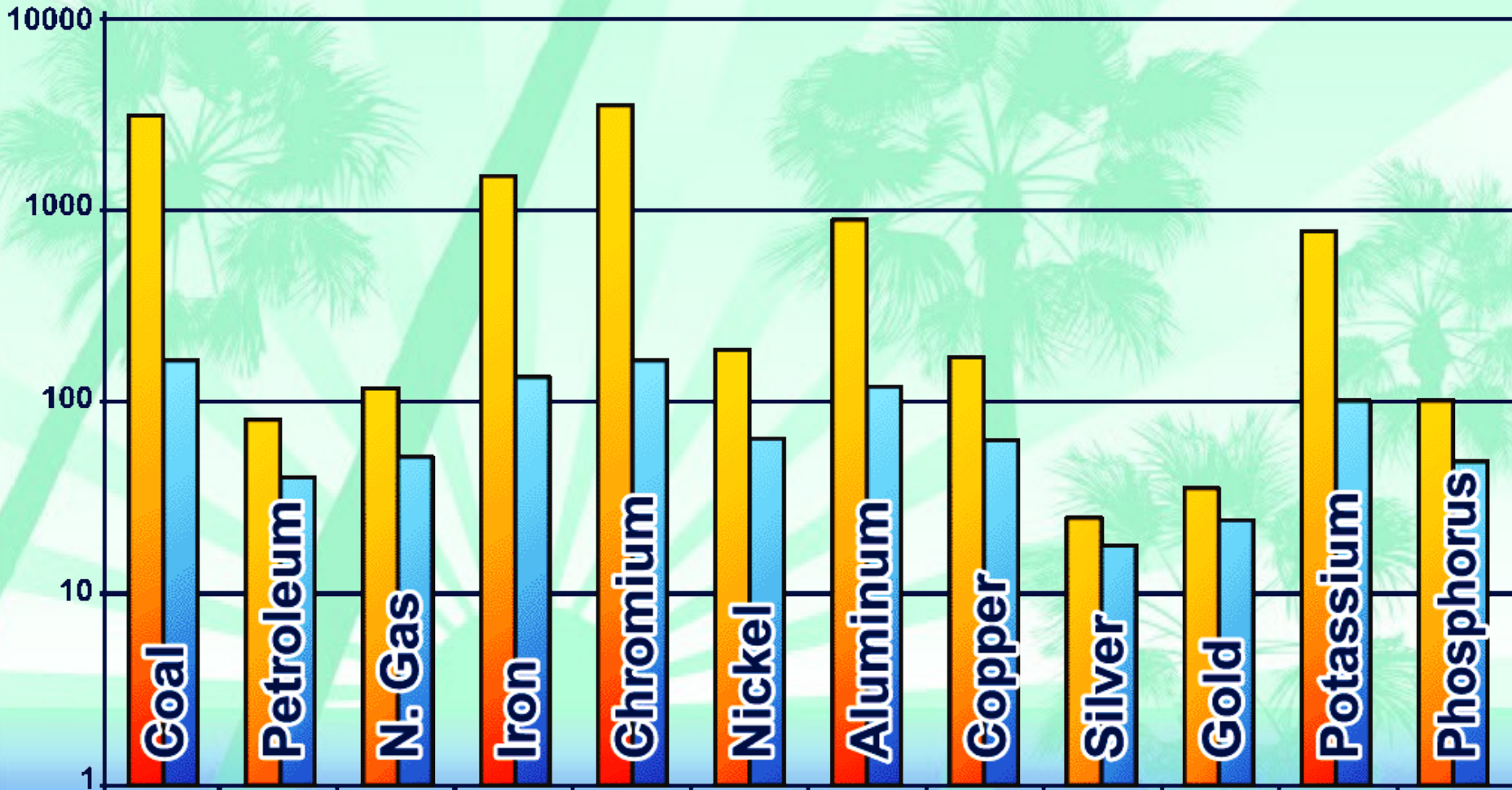


Some Basic Resources Lifetimes

Years to Depletion

Constant Consumption

3% Annual Increase





Present Economic System

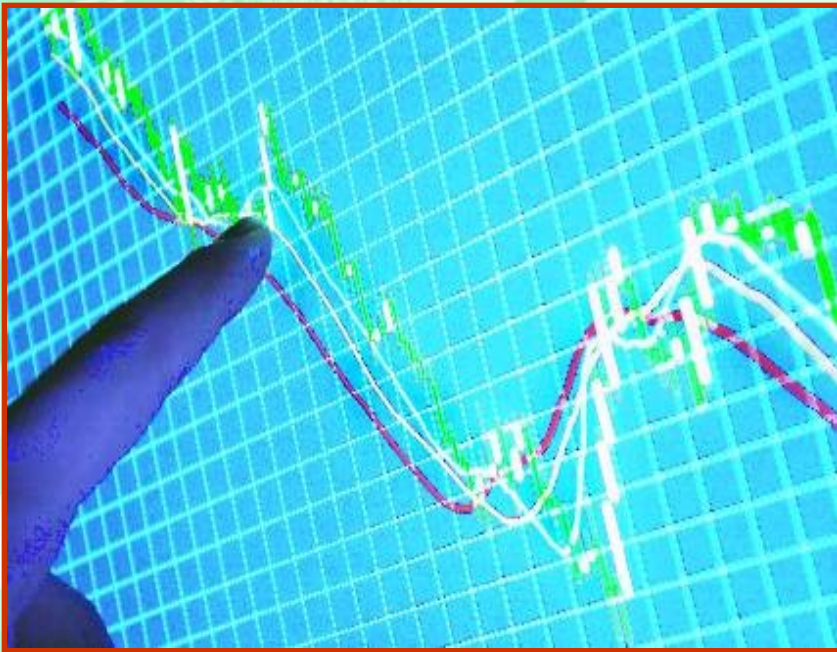
P.E.S. Costing = Depreciation

+ Materials

+ Energy

+ Labor

+ Maintenance





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Sustainability Economics

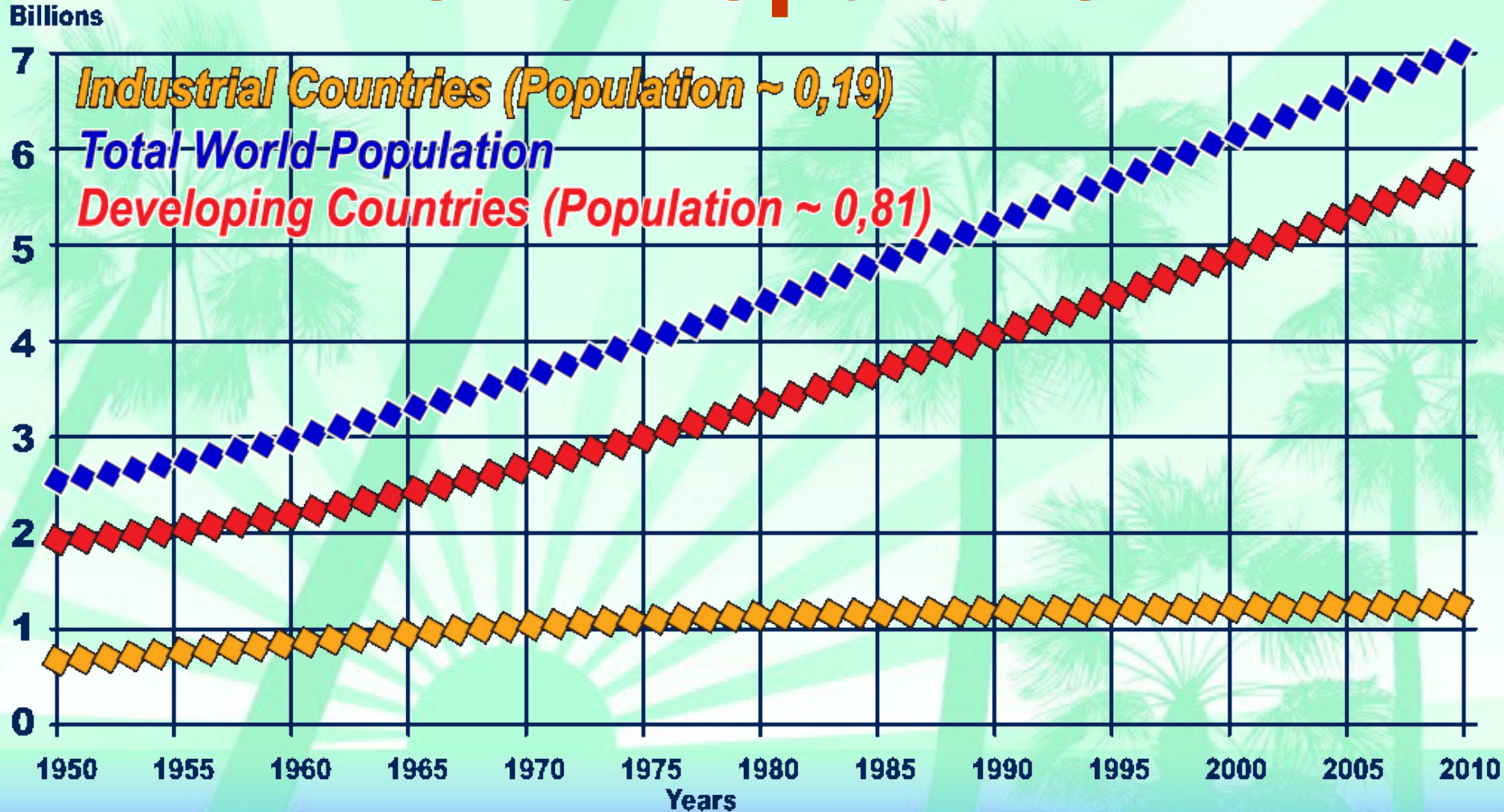
S.E. Costing = P.E.S. Costing



- + Environmental damage**
- + Penalty for lost resources**
- + Decommissioning cost**
- Bonus for recyclability**

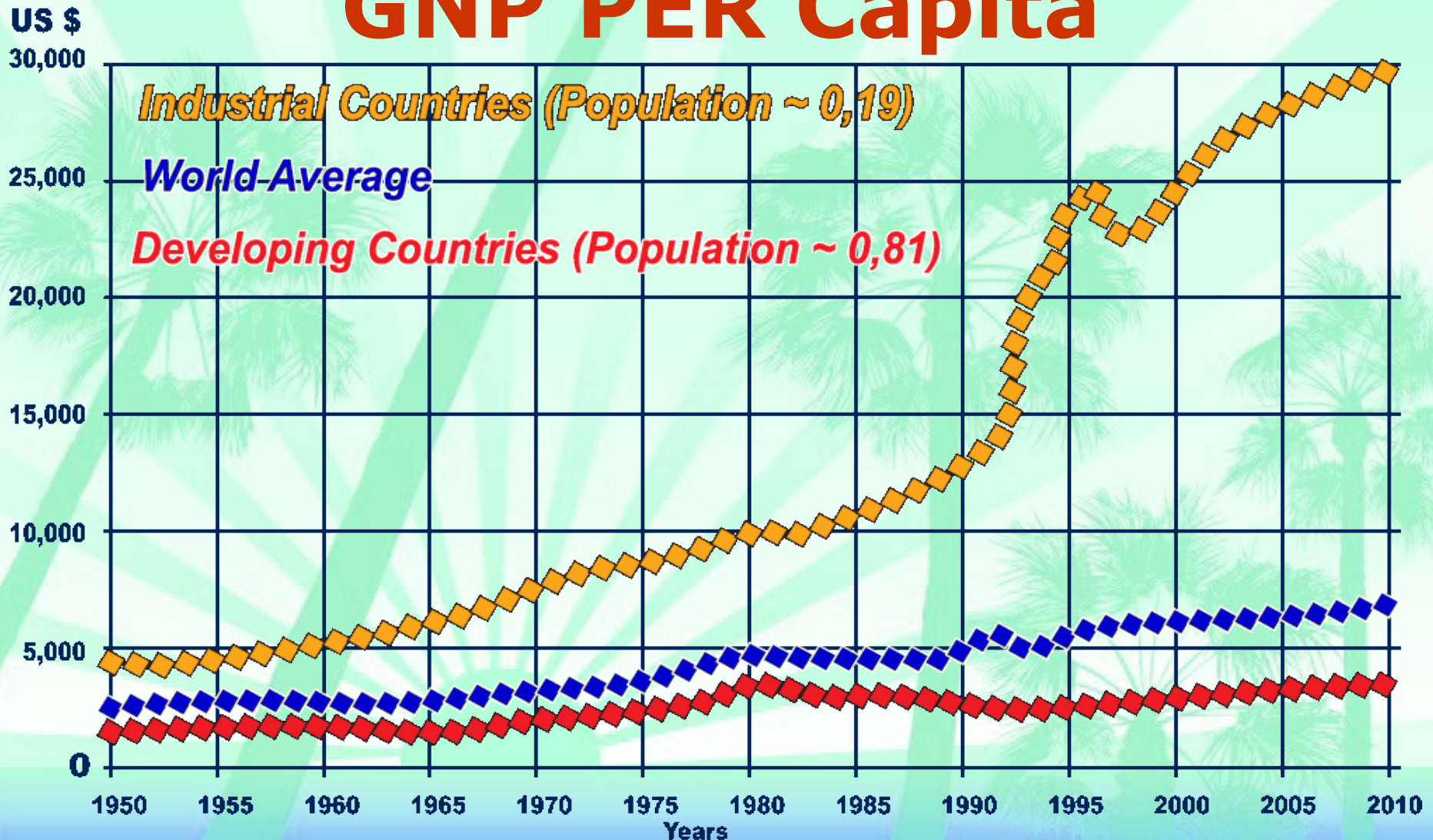


World Population



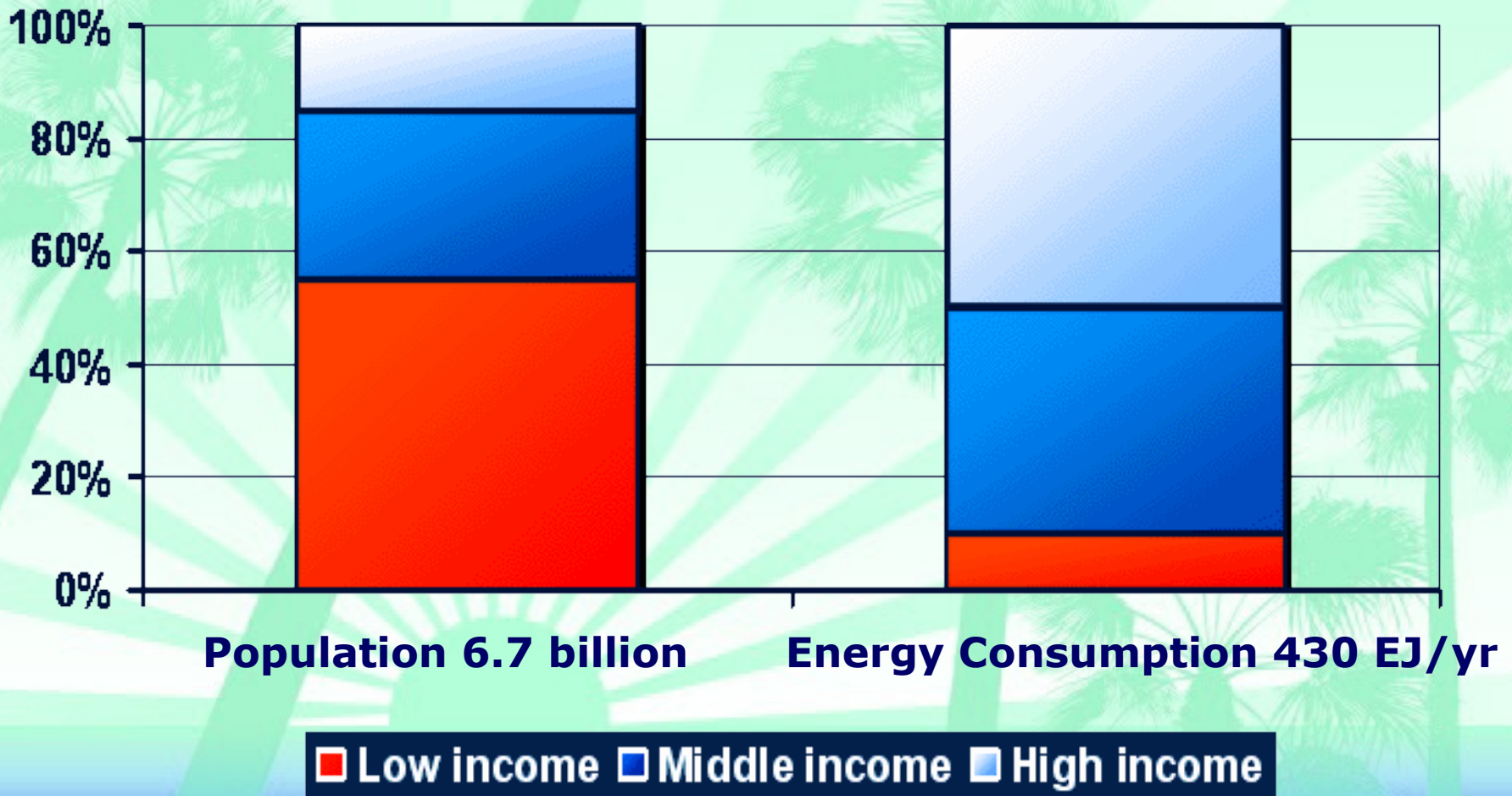


GNP PER Capita



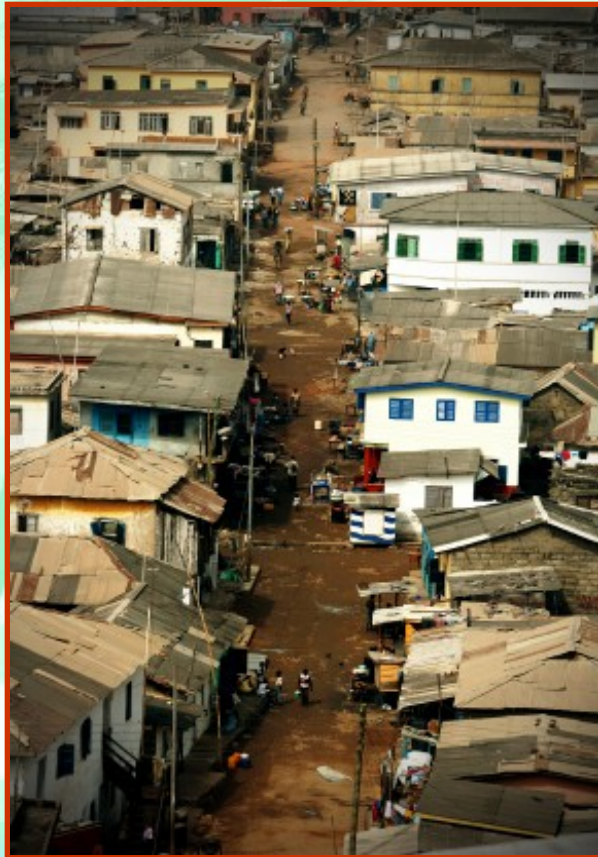


World Population and Energy Consumption (2008)





Aggravation in South



- **Unemployment**
- **Poverty**
- **Crime**
- **Corruption**
- **Political Instability**
- **Totalitarian Governments**
- **Brain Drain**



Aggravation in North



- **Increasing refugees**
- **Need to strengthen borders**
- **Welfare expenditures**
- **Effect on unemployment**
- **Need to increase assistance to South**



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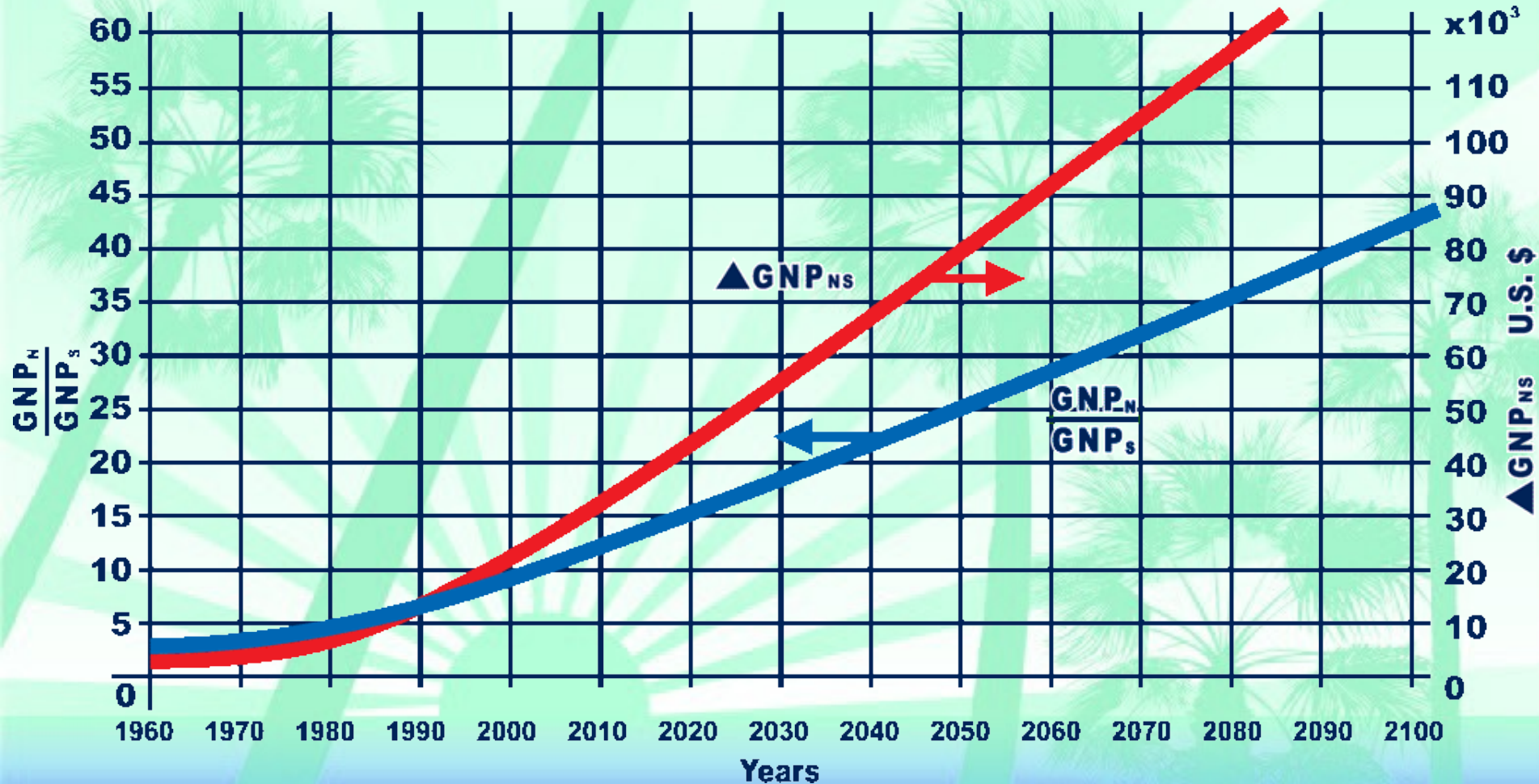
Present Assistance to South by North



- **By loans**
- **By investing**
- **By know-how**
- **By grants**

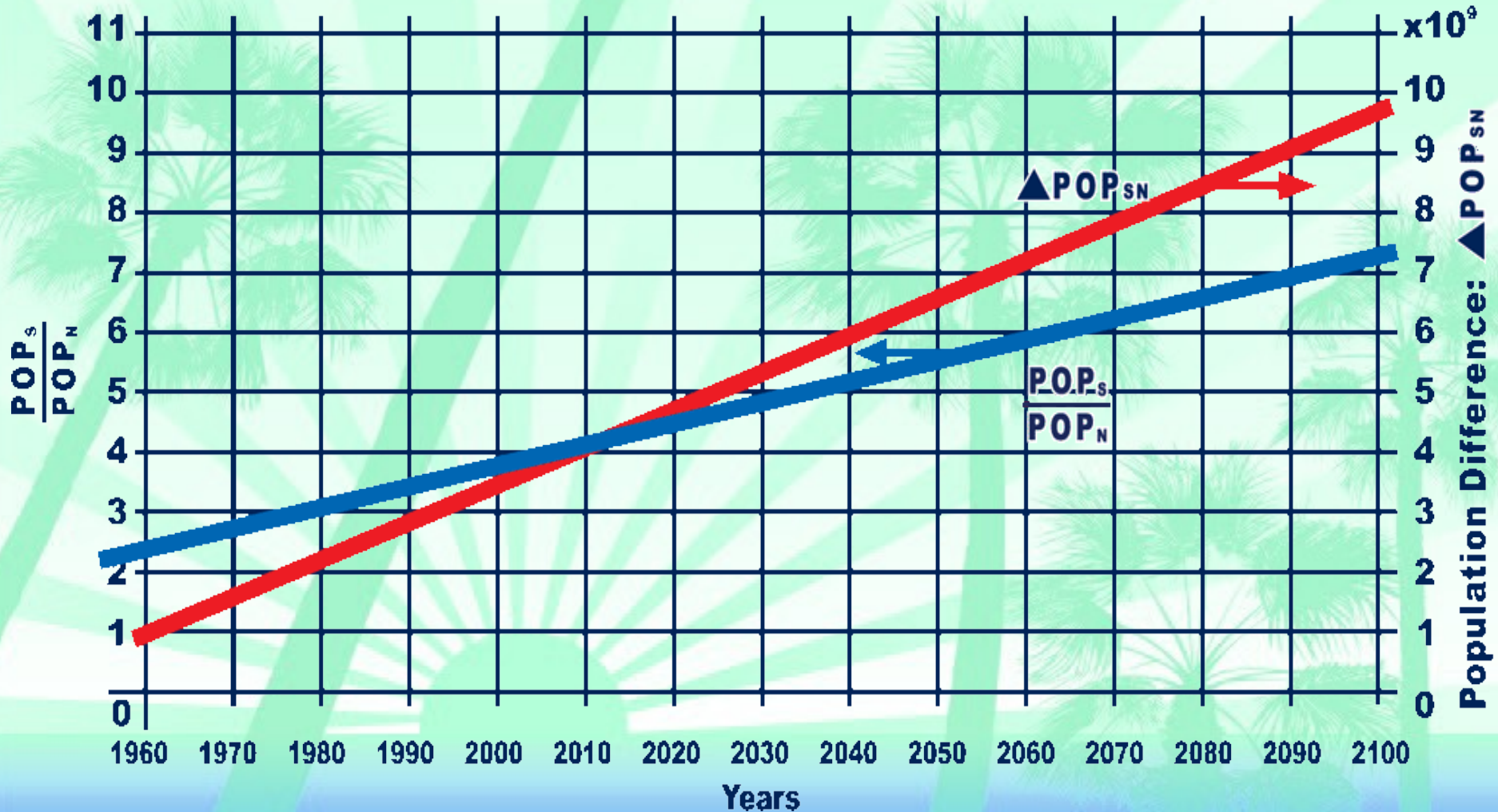


GNP Forecast for North and South





Population Forecast for North and South





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Population Earth could Support



**Income
Level**

**Earth's
Population**

**Percentage of
2008 Population**

High

2 Billions

30%

Medium

5 Billions

75%

Low

40 Billions

590%



Reasons for food shortage

- **Growing population**
- **Soil erosion**
- **Water misuse**
- **Increasing temperatures**
- **Surface mining**





Alleviating food shortage: International actions

**Country having
food shortage**

**Negotiating
with**

**Countries having
agricultural land**

China

India

Libya

Saudi Arabia

South Korea



Australia, Brazil, Russia

Paraguay, Uruguay

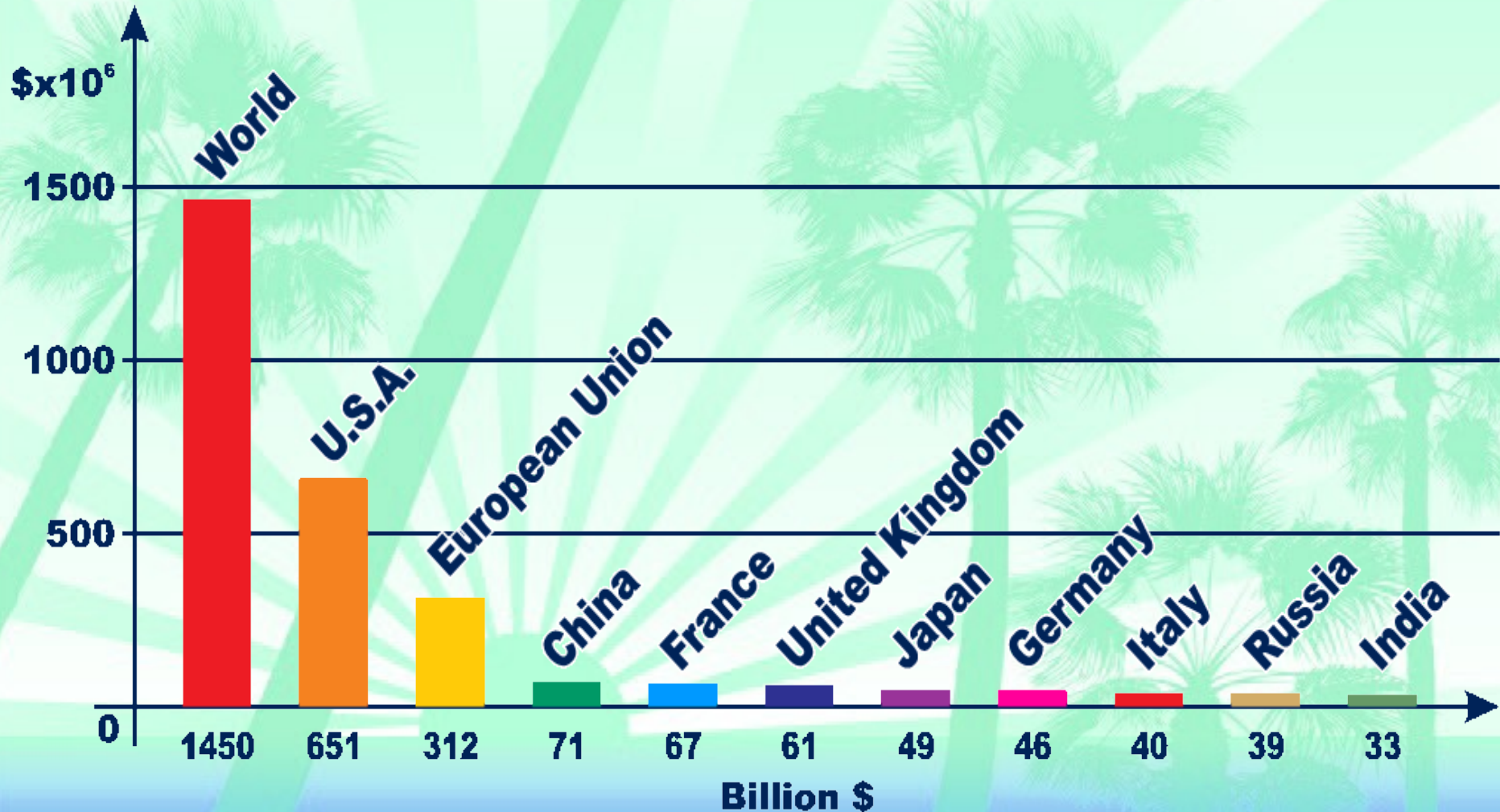
Turkey, Ukraine

South Africa, Turkey, Ukraine

Madagascar, Russia, Sudan



Annual Defense Budgets (2008)





Global Problems to be Solved

- **Energy**
- **Environment**
- **Depletion of resources**
- **North – South gap**
- **Growing population**
- **Food shortage**
- **International conflicts & wars**



Conclusion:

**Global problems call for global solutions,
i.e., World Federation!**



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World Federation

REGIONAL UNIONS



- **European Union**
- **NAFTA**
- **South America & Caribbean**
- **Arab League**
- **Sub Saharan Union**
- **Russian Federation**
- **Central & South Asia**
- **China & Mongolia**
- **East Asia & Australasia**

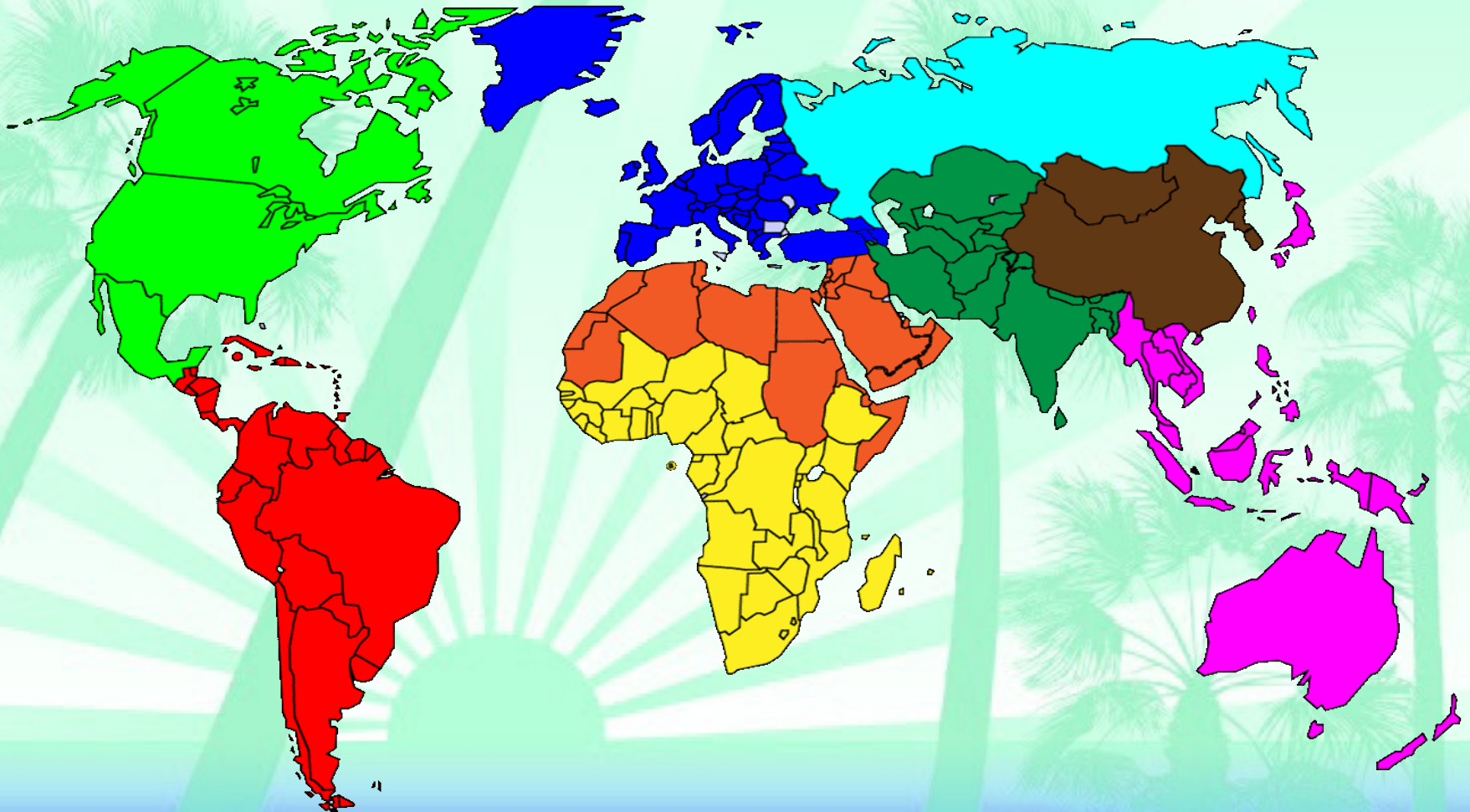


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Map of World Federation





Benefits of World Federation

- **Permanent & clean energy system i.e., Hydrogen Economy**
- **Clean Environment (saving 6 Trillion \$/yr)**
- **Sustainability Economics**
- **No mass destruction weapons, armies & wars (saving 3.5 Trillion \$/yr)**
- **Development of South**
- **No food shortage**
- **Zero population growth**



Conclusion:

Resulting in Peace and Prosperity!



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Thank you for your attention!

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