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*The World's sustainability is our scientific responsibility and we
must share knowledge to share in a sustainable World*

THE NEED FOR A LANGUAGE TO ALLOW FOR AN UNDERSTANDING OF THE RELATIONSHIPS OF ENERGY, WATER AND COMMUNICATION

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Content

Scientific responsibility to preserve our Planet

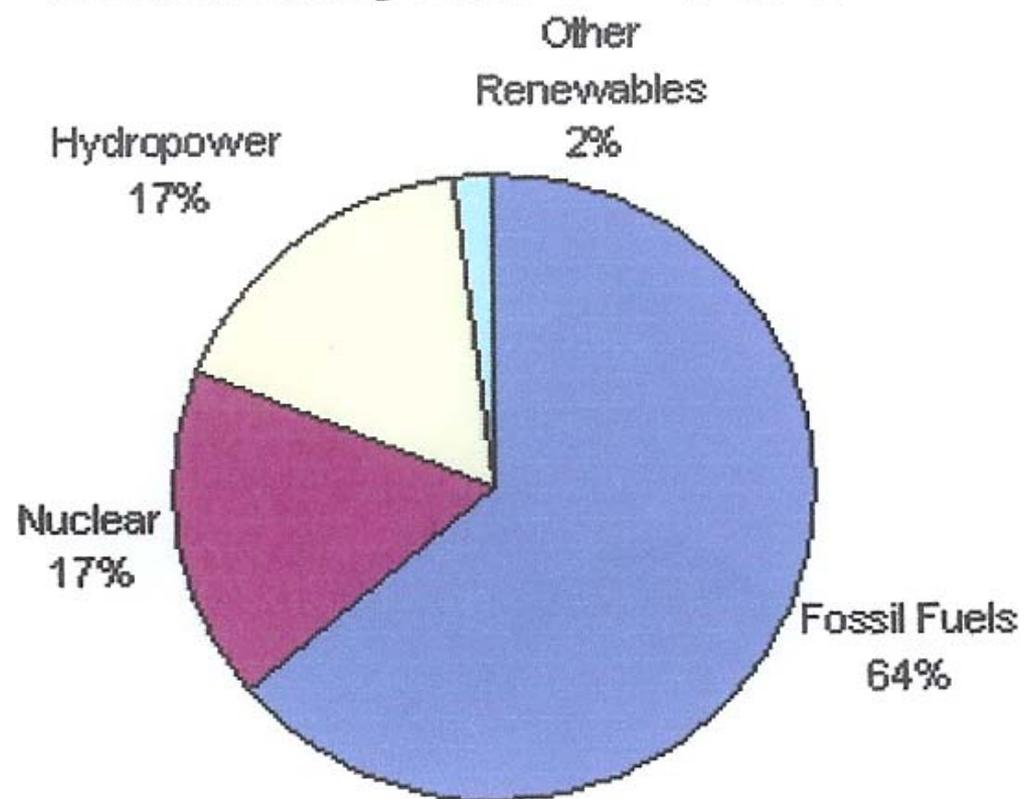
*Integration problems which need to be addressed by
scientific community*

Relationships between energy, water and communications

Types of energy sources:

- **Solar energy - priority**
 - **Nuclear - priority**
 - **Waste - priority**
- **Wind – semi-priority**
- **Wave – semi-priority**
- **Bio-energy - questionable**
- **Hydrogen – questionable**
- **Hydroelectric – non priority**
 - **Coal & oil - eliminate**

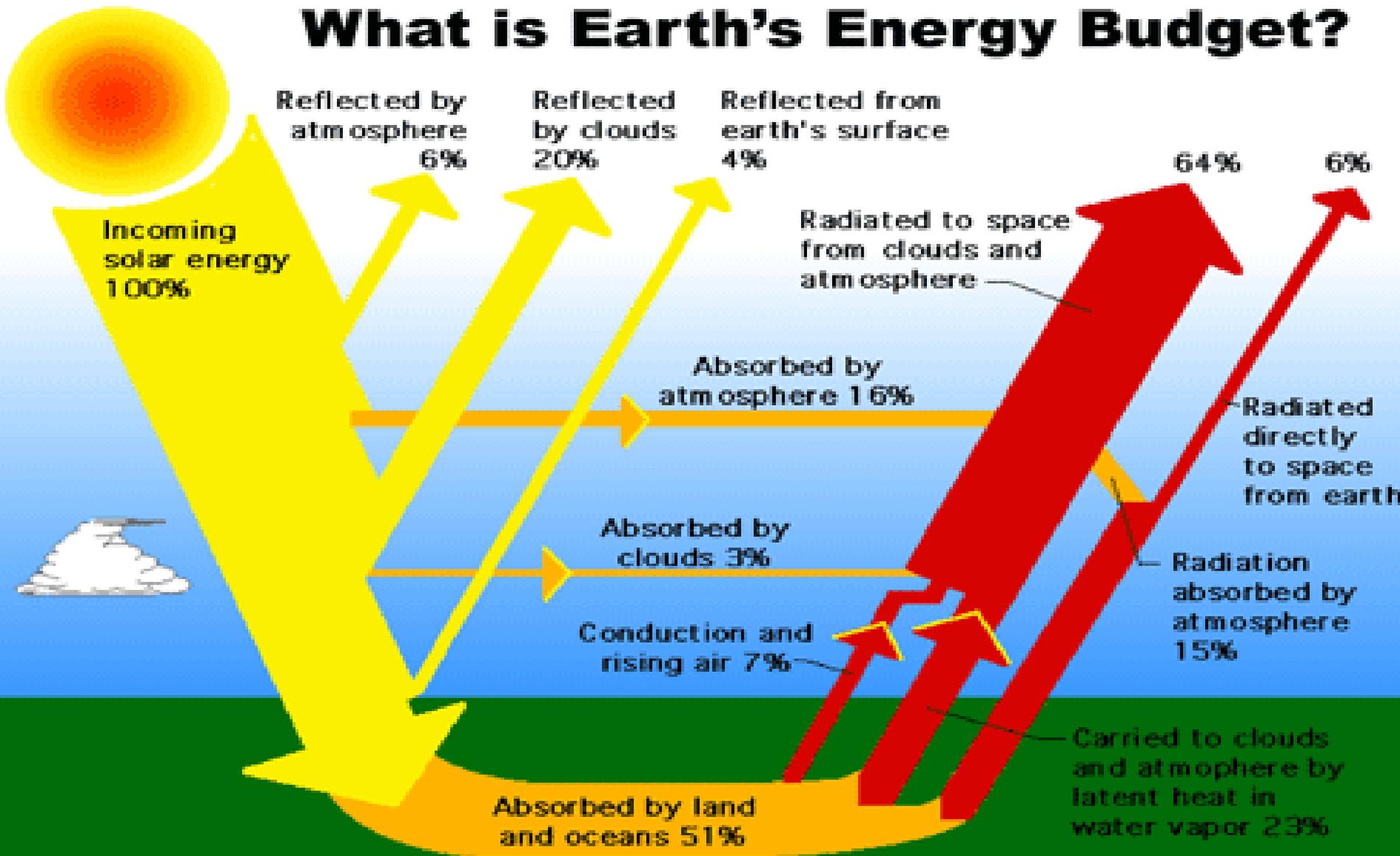
World Electricity Generation by Type, 2001



Sources: Worldwatch with data from IEA, World Energy Outlook 2002 (Paris: 2002).

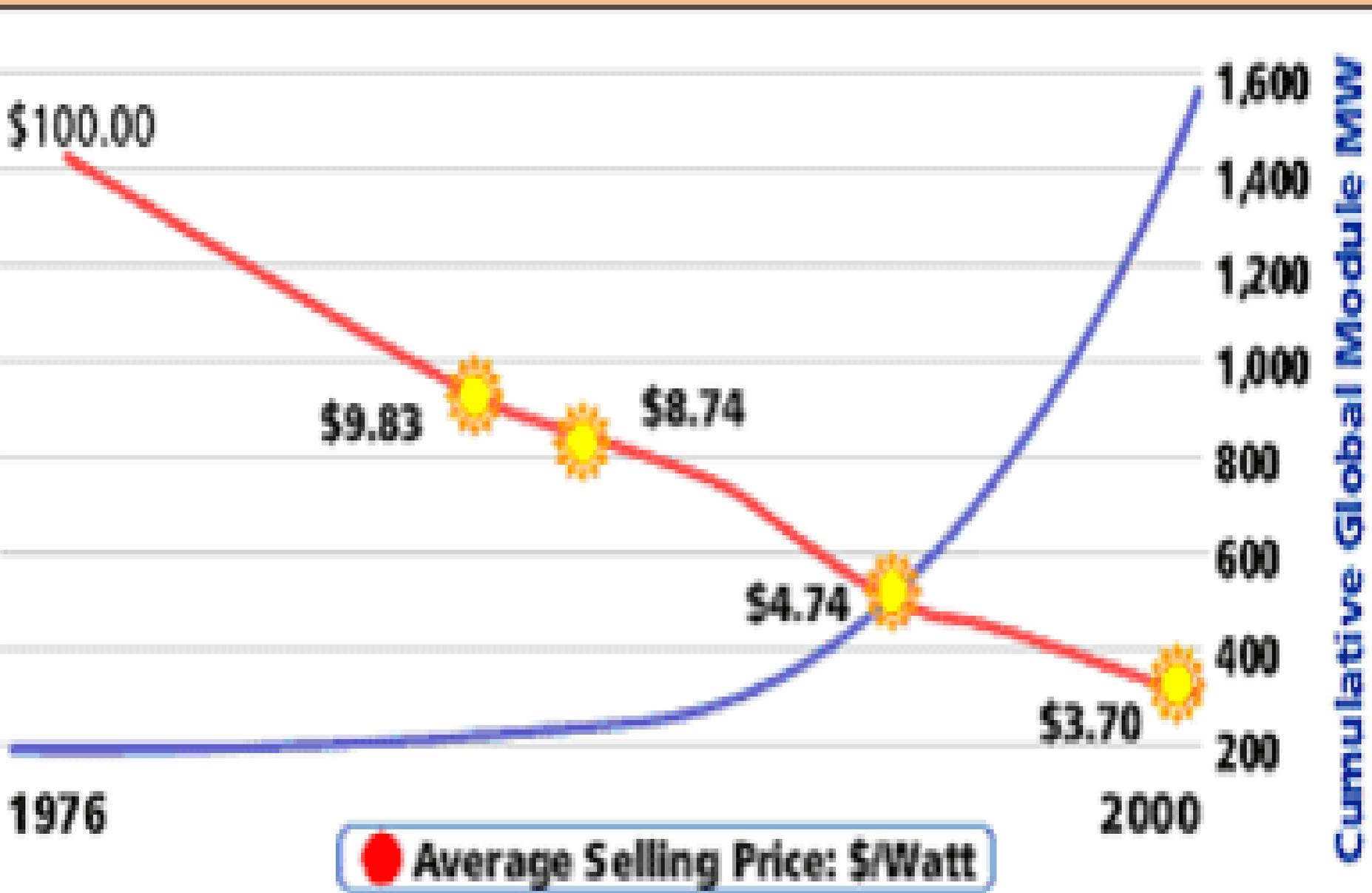
Safer-cleaner energy: beyond the current boundaries

What is Earth's Energy Budget?



PV Module Volume/Price Analysis:

Each cumulative production doubling drops the price by about 20%



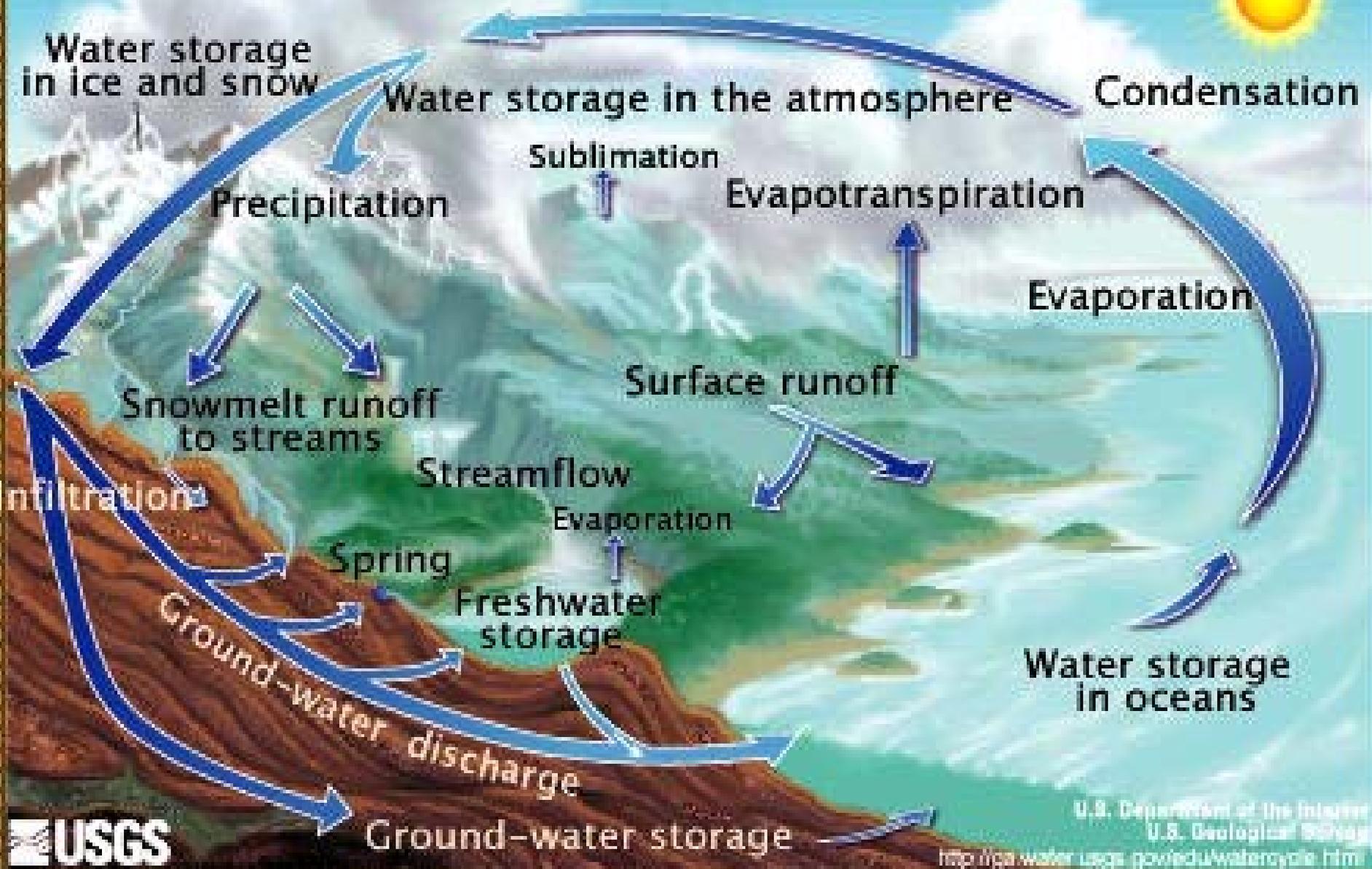
Nuclear reactors at the Hanford site along the Columbia river



Palo Verde's (Arizona) cooling towers rely on recycled sewage effluence. More than 20 billion gallons of this water are recycled every year!



The Water Cycle



Typical Hydroelectric Dam

Reservoir

Intake

Penstock

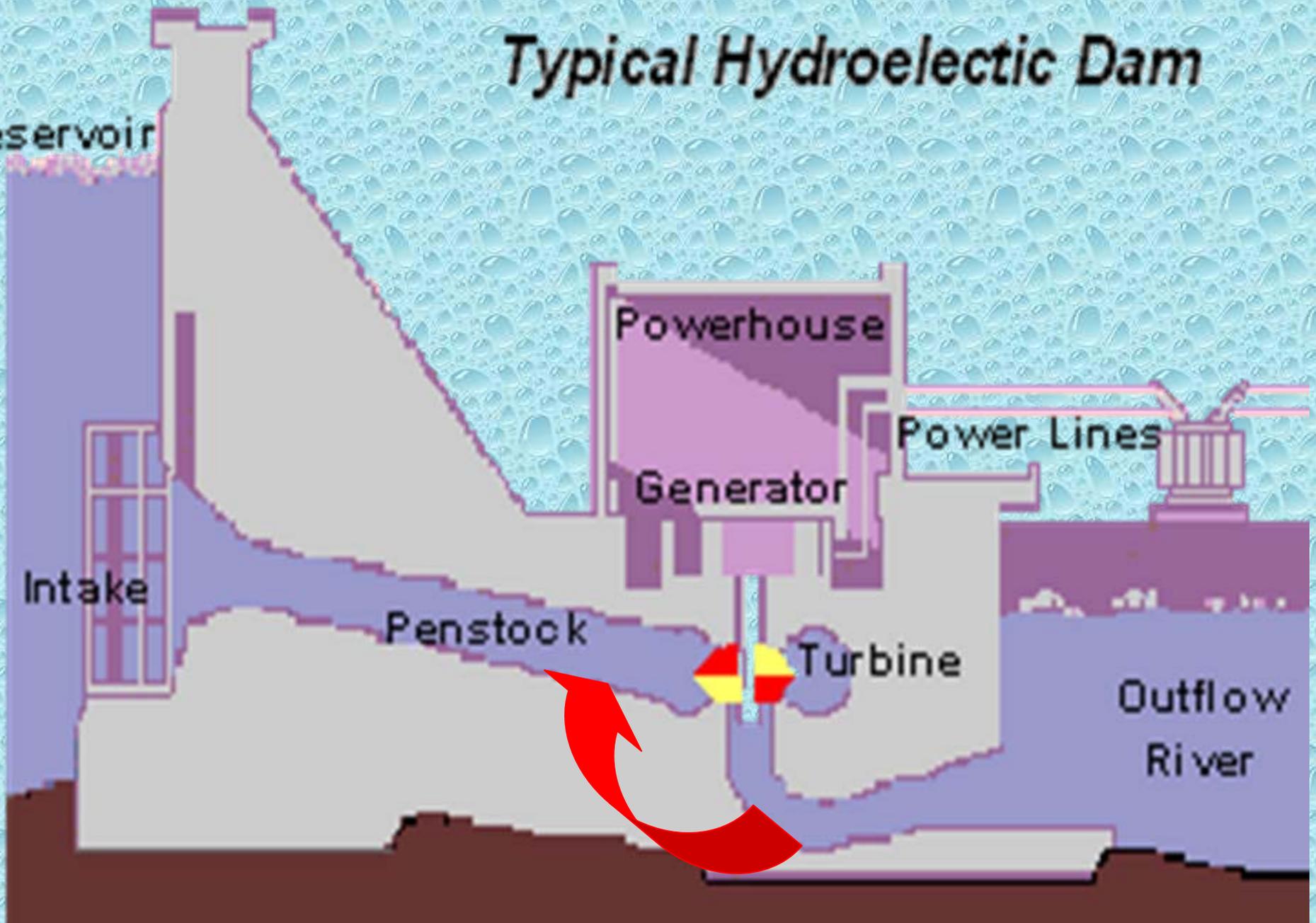
Powerhouse

Generator

Power Lines

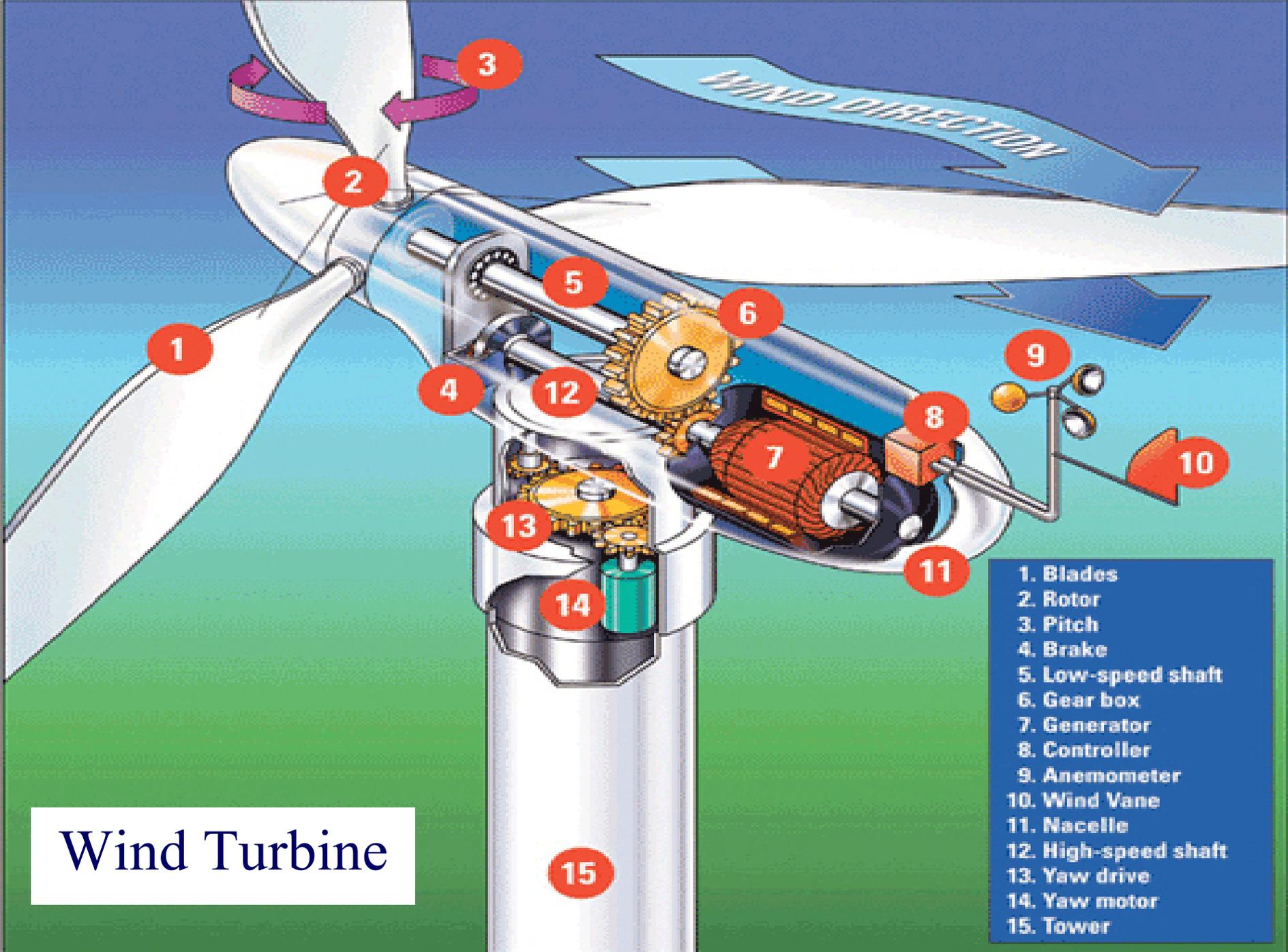
Turbine

Outflow
River



Wind Farm





Wind Turbine

- 1. Blades
- 2. Rotor
- 3. Pitch
- 4. Brake
- 5. Low-speed shaft
- 6. Gear box
- 7. Generator
- 8. Controller
- 9. Anemometer
- 10. Wind Vane
- 11. Nacelle
- 12. High-speed shaft
- 13. Yaw drive
- 14. Yaw motor
- 15. Tower

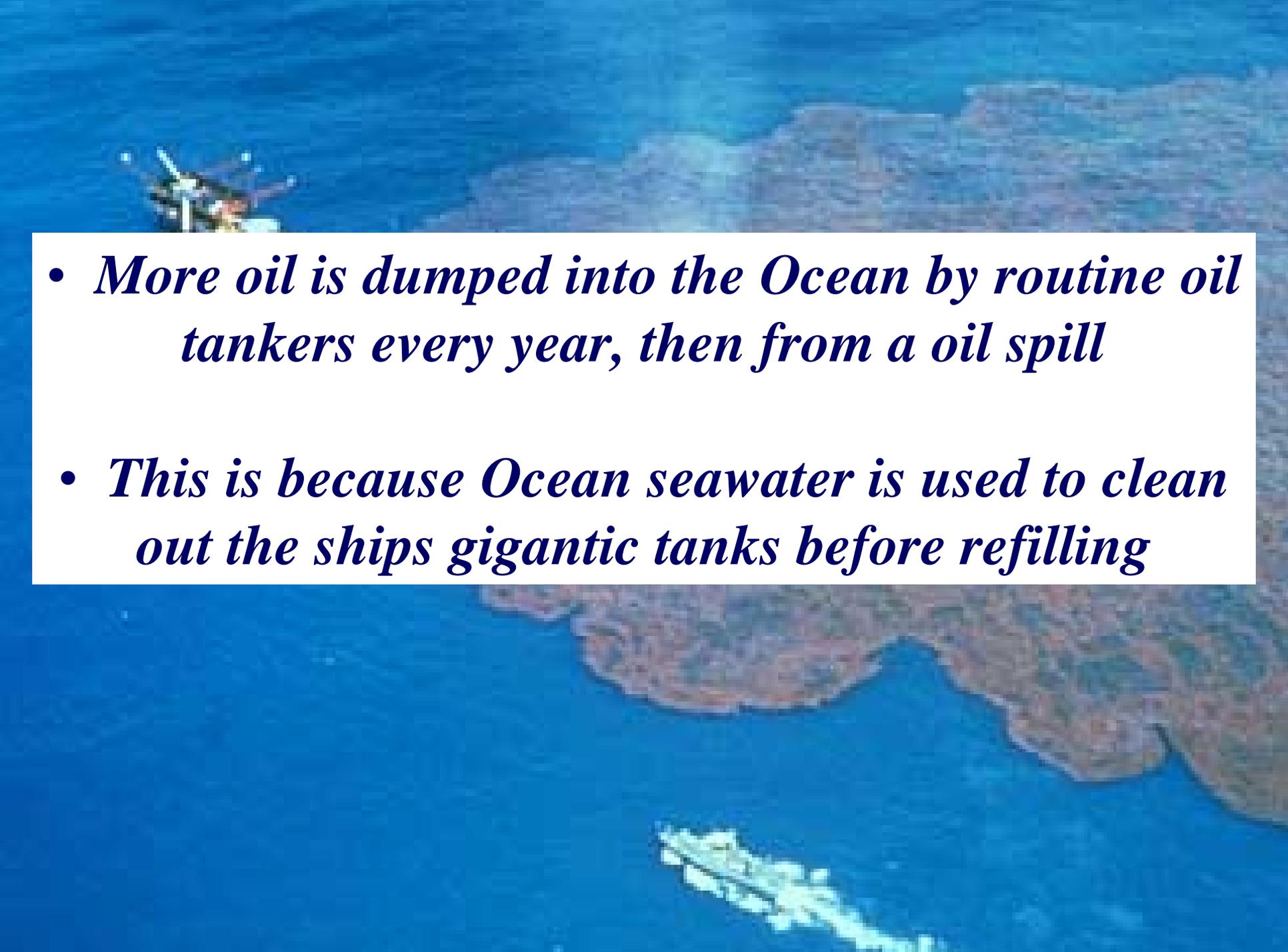
Power Density

- With future outputs up to 1.0MW and load factors in the range 25-30%
- Power density is up to 10 times greater than floating devices alleging better use of available resource



le Rager Fuller, NSF

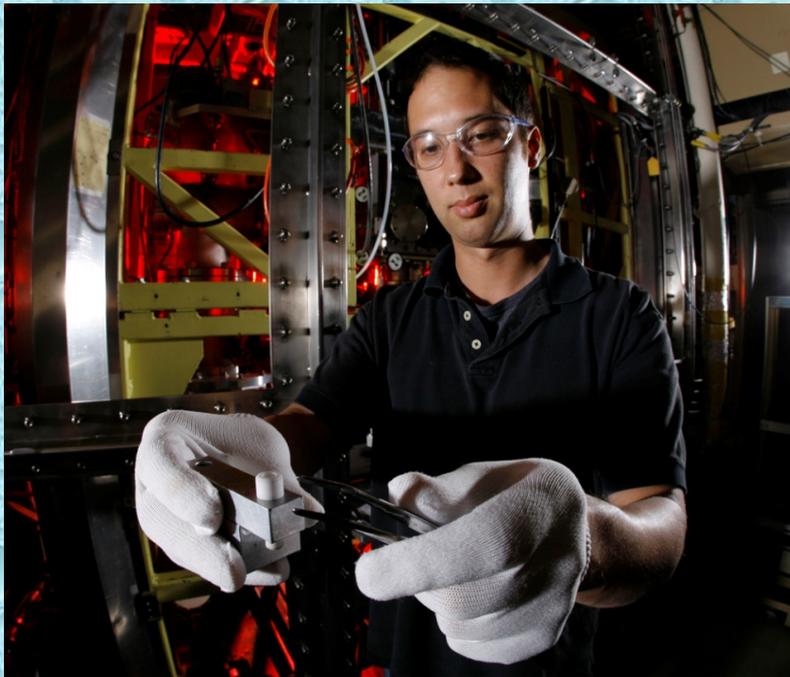


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- An aerial photograph of an oil tanker at sea. The ship is positioned in the upper left quadrant of the frame. A large, irregular spill of dark, viscous oil is visible in the water, extending from the ship towards the right and bottom of the image. The water is a deep blue, and the surrounding landmasses are visible in the background, showing a mix of green and brown terrain. The text is overlaid on a white rectangular background in the center of the image.
- *More oil is dumped into the Ocean by routine oil tankers every year, then from a oil spill*
 - *This is because Ocean seawater is used to clean out the ships gigantic tanks before refilling*

What Year?	Where did it occur?	What tanker was it?	How much oil did it spill (in tons)?
1983	The Persian Gulf	Nowruz Oil Field	600,000
1983	South Africa	Castillo De Belluer	250,000
1988	The Monongahela River	Storage Tank	3,800,000
1993	Off The Shetland Islands	Braer	26,000,000
1996	Off SW Wales	Sea Empress	18,000,000
2001	Galapagos Islands	Jessica	240,000



Hydrogen



Present

Carrying oil to various countries!



Future?

Will the return trip soon be carrying water as an exchange?

The Management Questions?

A Fact:

Global trends of increasing population, increasing natural resource consumption, and decreasing natural resource availability (including freshwater) have pushed many systems to an important tipping point

Is water a foundation for human prosperity?

A Fact:

Adequate, high quality water supplies provide a basis for the growth and development of human social, economic, cultural and political systems

Are water problems geo-politically destabilizing?

A Fact:

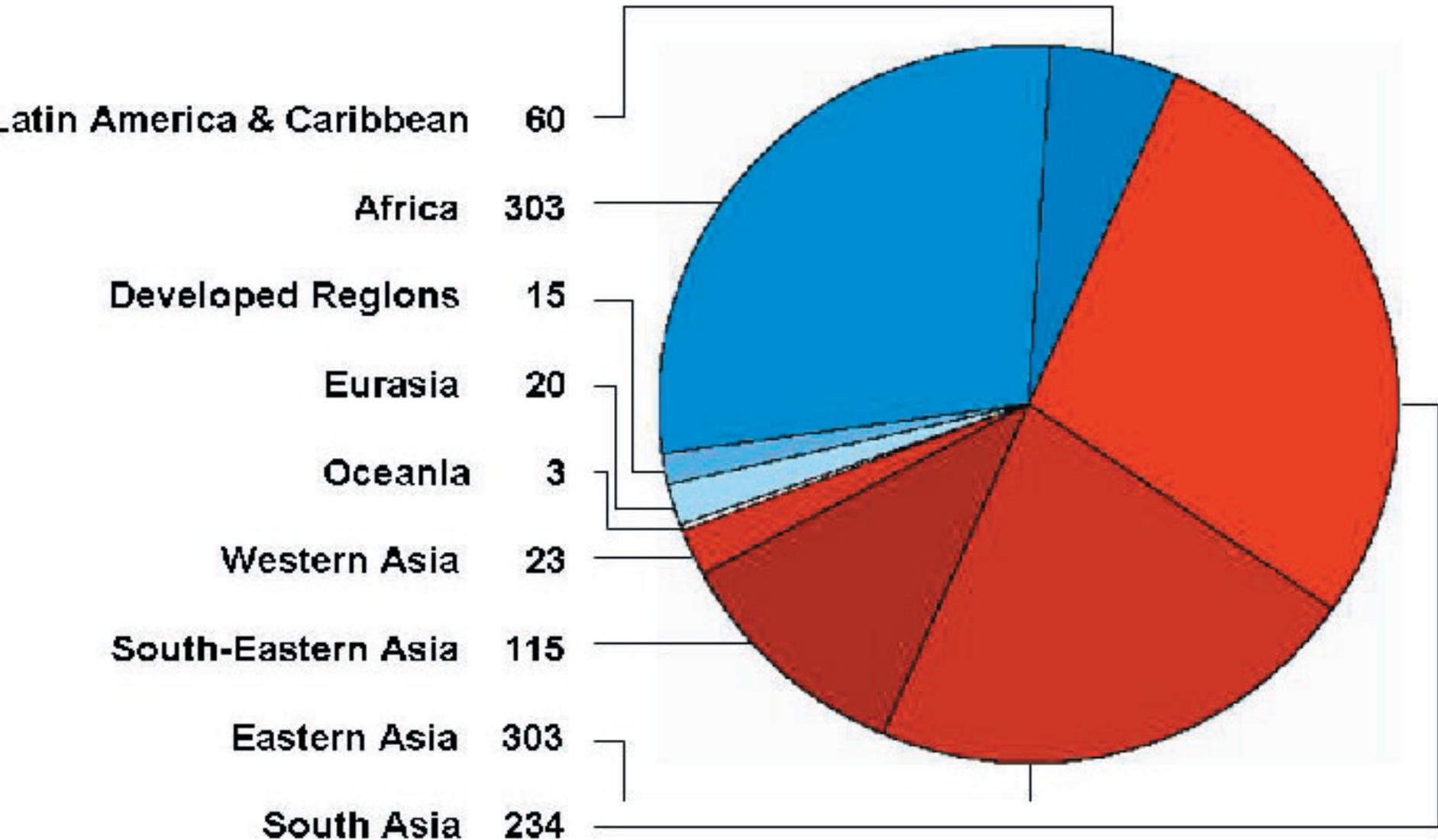
Water scarcity and poor water quality have the potential to destabilize isolated regions within countries, whole countries, or entire regions sharing limited sources of water

In the years ahead, will instability or conflict related to water supplies likely take these forms?

(1) domestic unrest caused by the inability of governments to meet the food, industrial, and municipal needs of its citizens

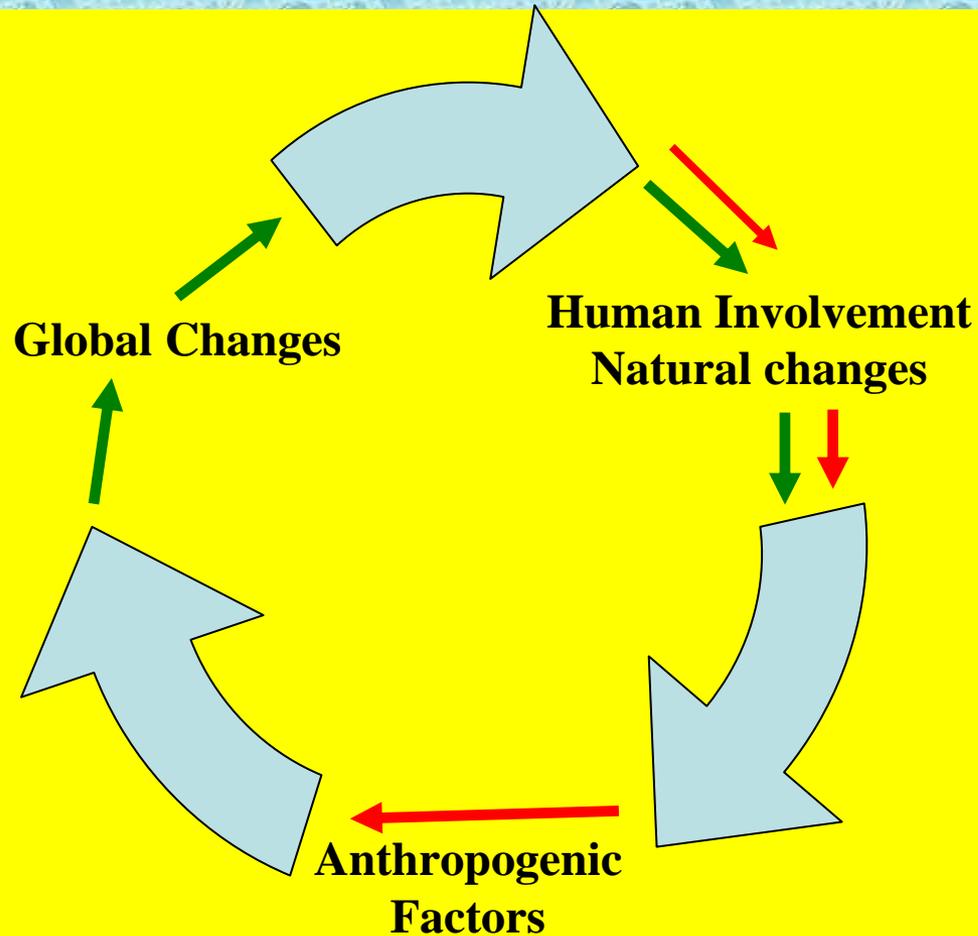
(2) hostility between two or more countries - or regions within a country - possibly leading to greater insecurity or conflict, caused by one party disrupting the water supply of another

Population without improved drinking water sources by region in 2002 (millions)

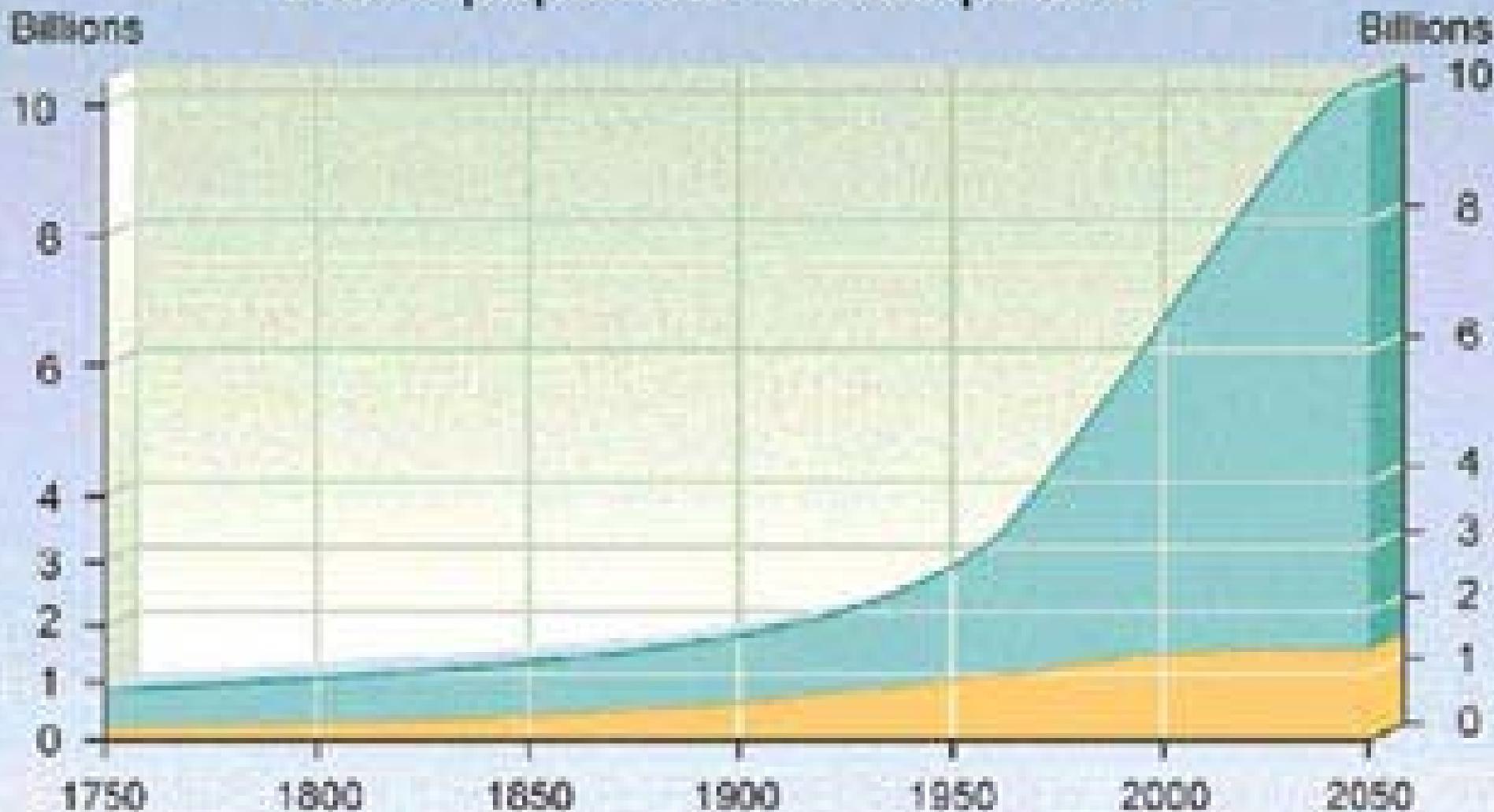


The “Vicious” Circle

«Порочный» круг



World population development

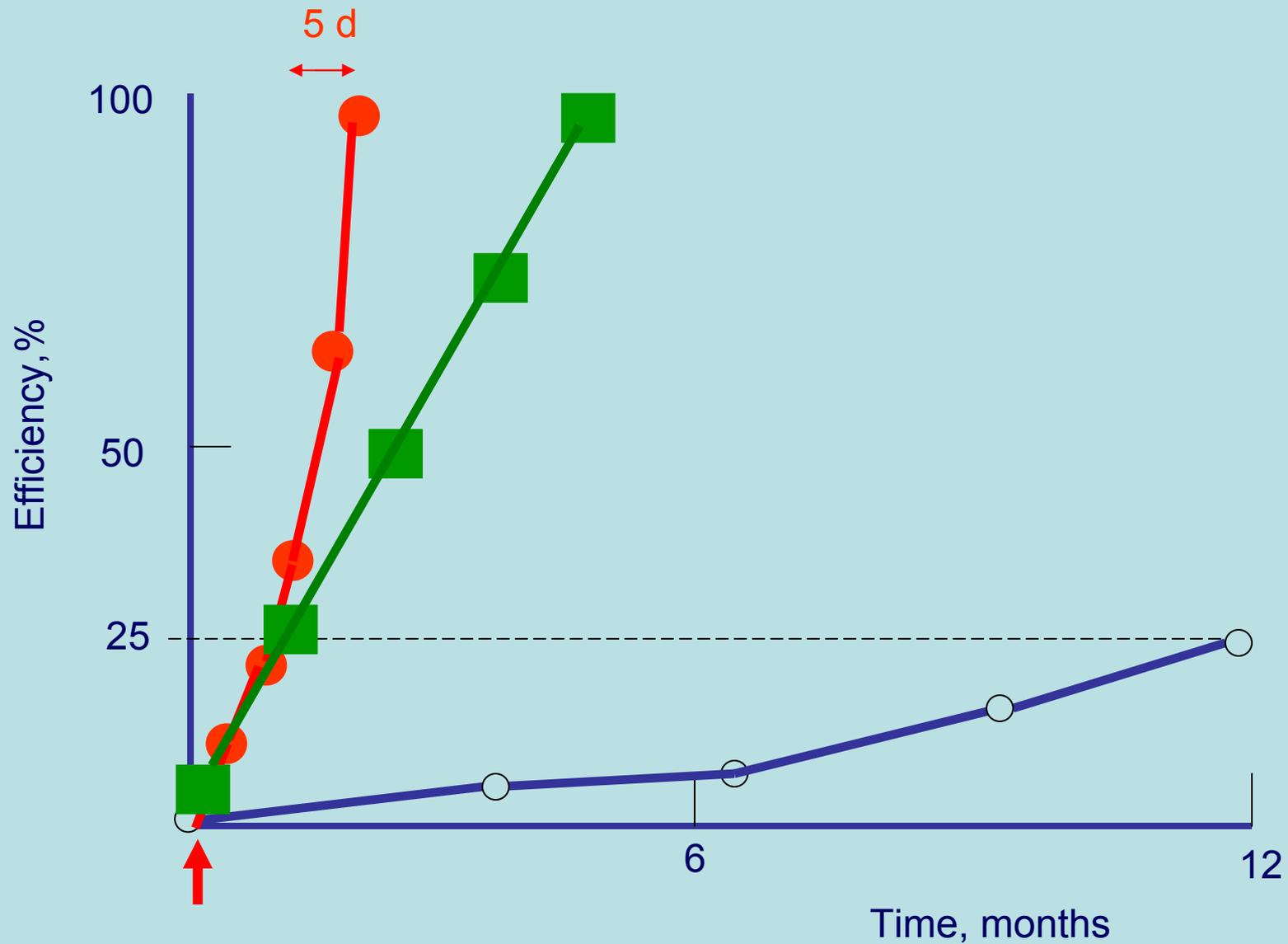


- Developing countries
- Industrialized countries

Water Scarcity and Water Stress

- In 1995, over 400 million people lived in countries experiencing water stress or water scarcity
 - By 2025, 4 billion people will live in countries where constraints on water supply will give rise to serious social, public health, economic, and environmental problems

Machine efficiency, social efficiency or both?



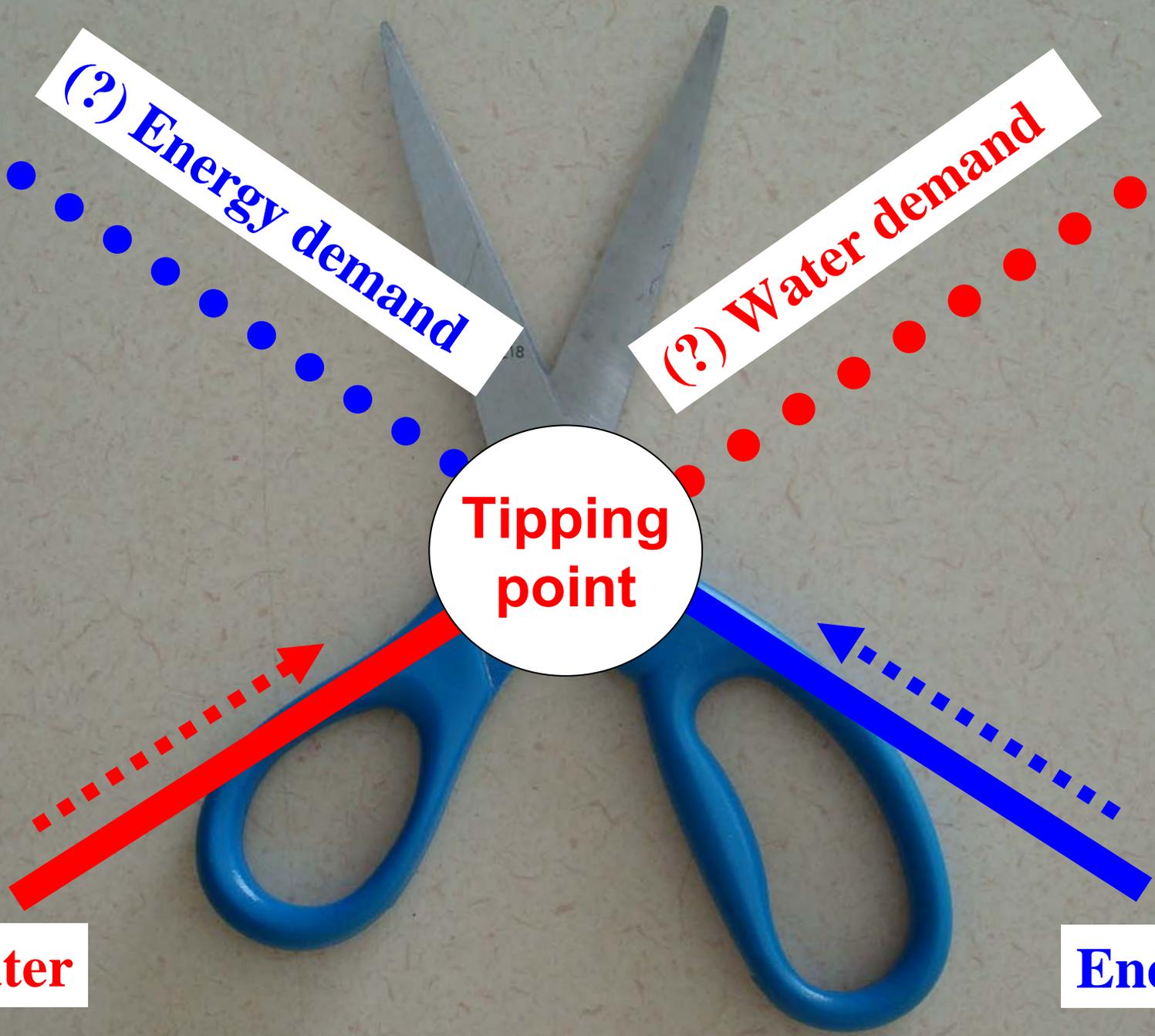
(?) Energy demand

(?) Water demand

Tipping point

Water

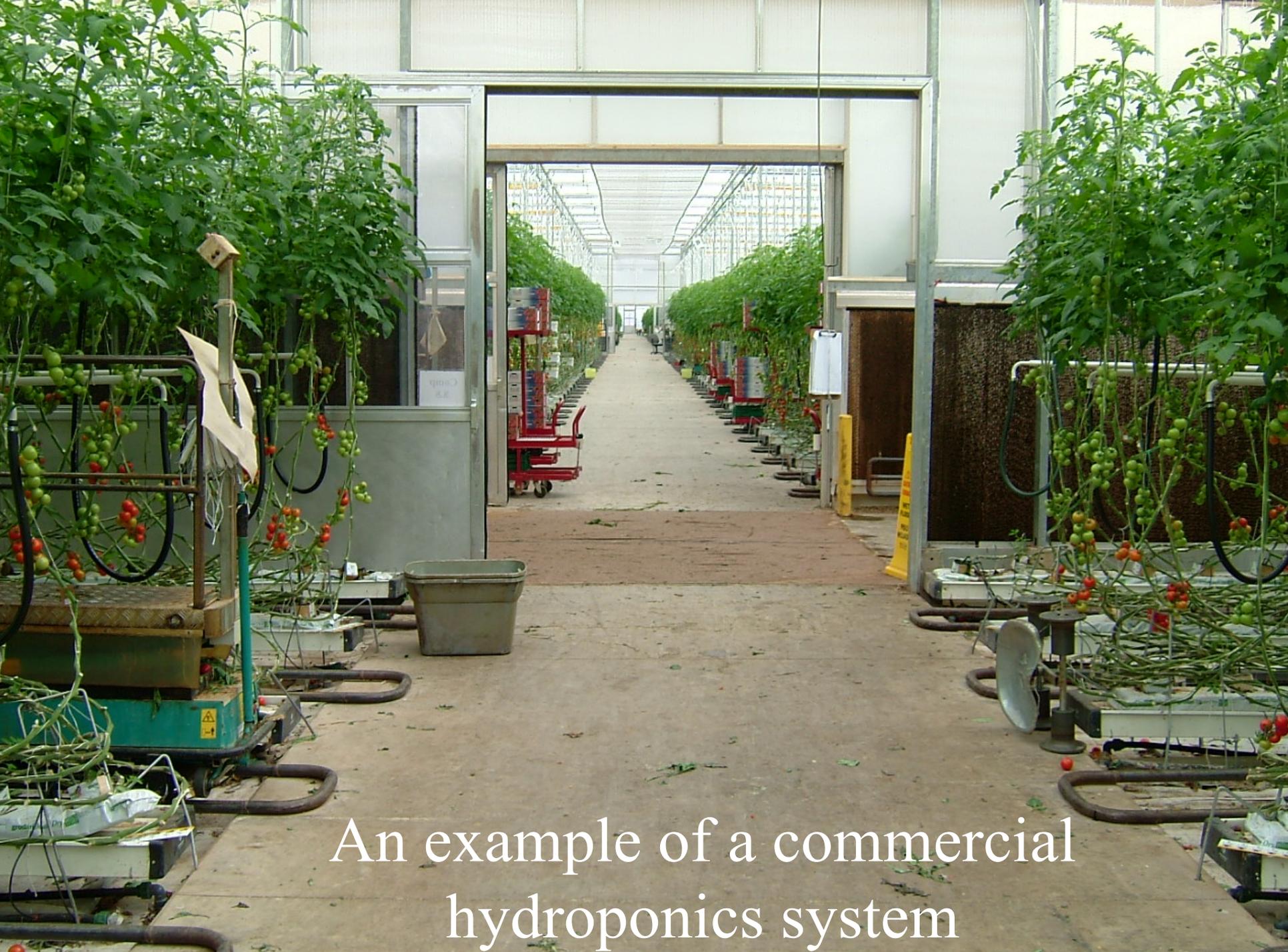
Energy



	<i>volume</i> <i>(1 000 km³)</i>	<i>% of</i> <i>total water</i>	<i>% of</i> <i>total freshwater</i>
Salt water			
Oceans	1 338 000	96.54	
Saline/brackish groundwater	12 870	0.93	
Salt water lakes	85	0.006	
Inland waters			
Glaciers, permanent snow cover	24 064	1.74	68.7
Fresh groundwater	10 530	0.76	30.06
Ground ice, permafrost	300	0.022	0.86
Freshwater lakes	91	0.007	0.26
Soil moisture	16.5	0.001	0.05
Atmospheric water vapor	12.9	0.001	0.04
Marshes, wetlands*	11.5	0.001	0.03
Rivers	2.12	0.0002	0.006
Incorporated in biota*	1.12	0.0001	0.003
Total water	1 386 000	100	
Total freshwater	35 029		100

Cleaner-safer food sources





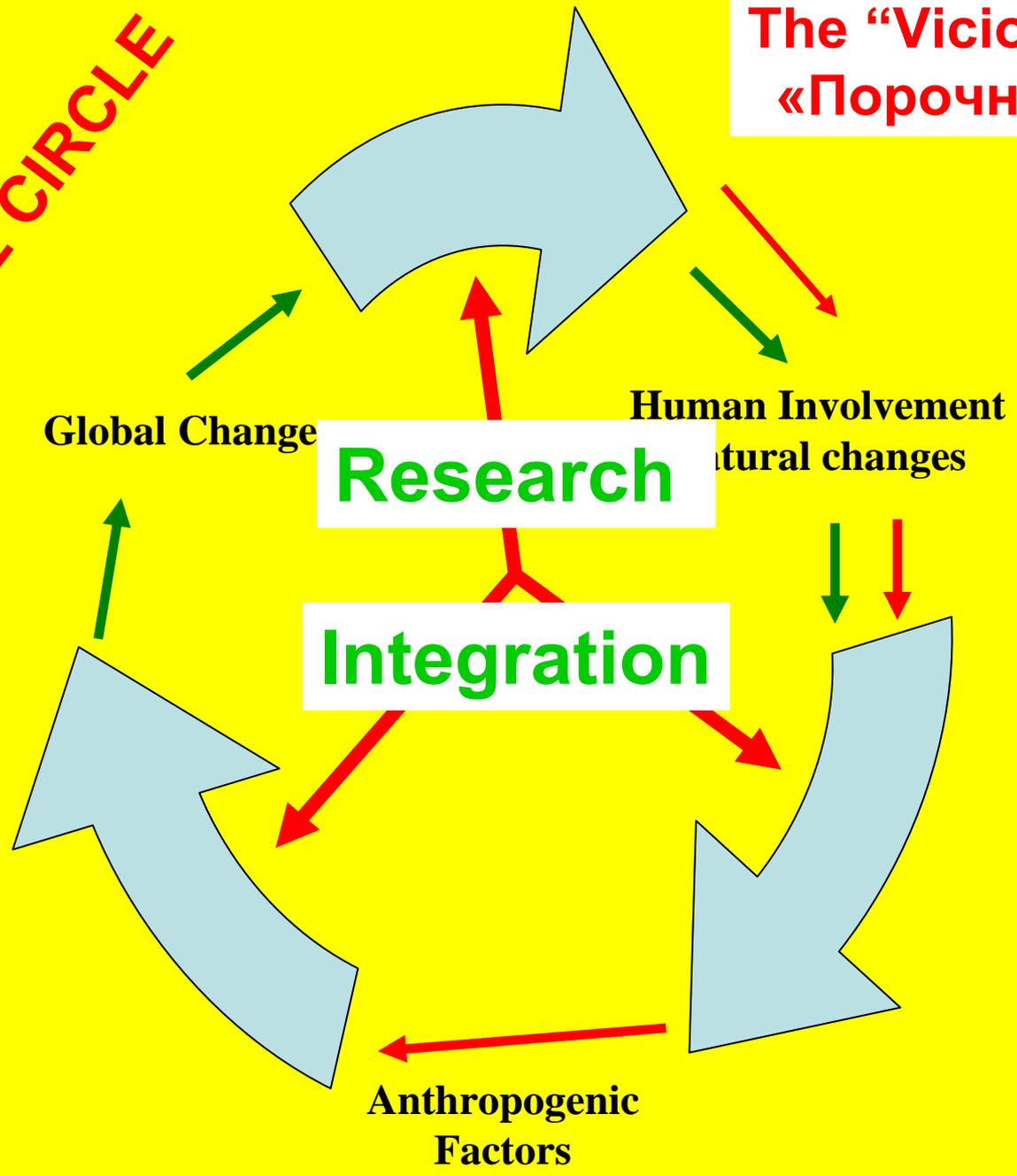
An example of a commercial hydroponics system

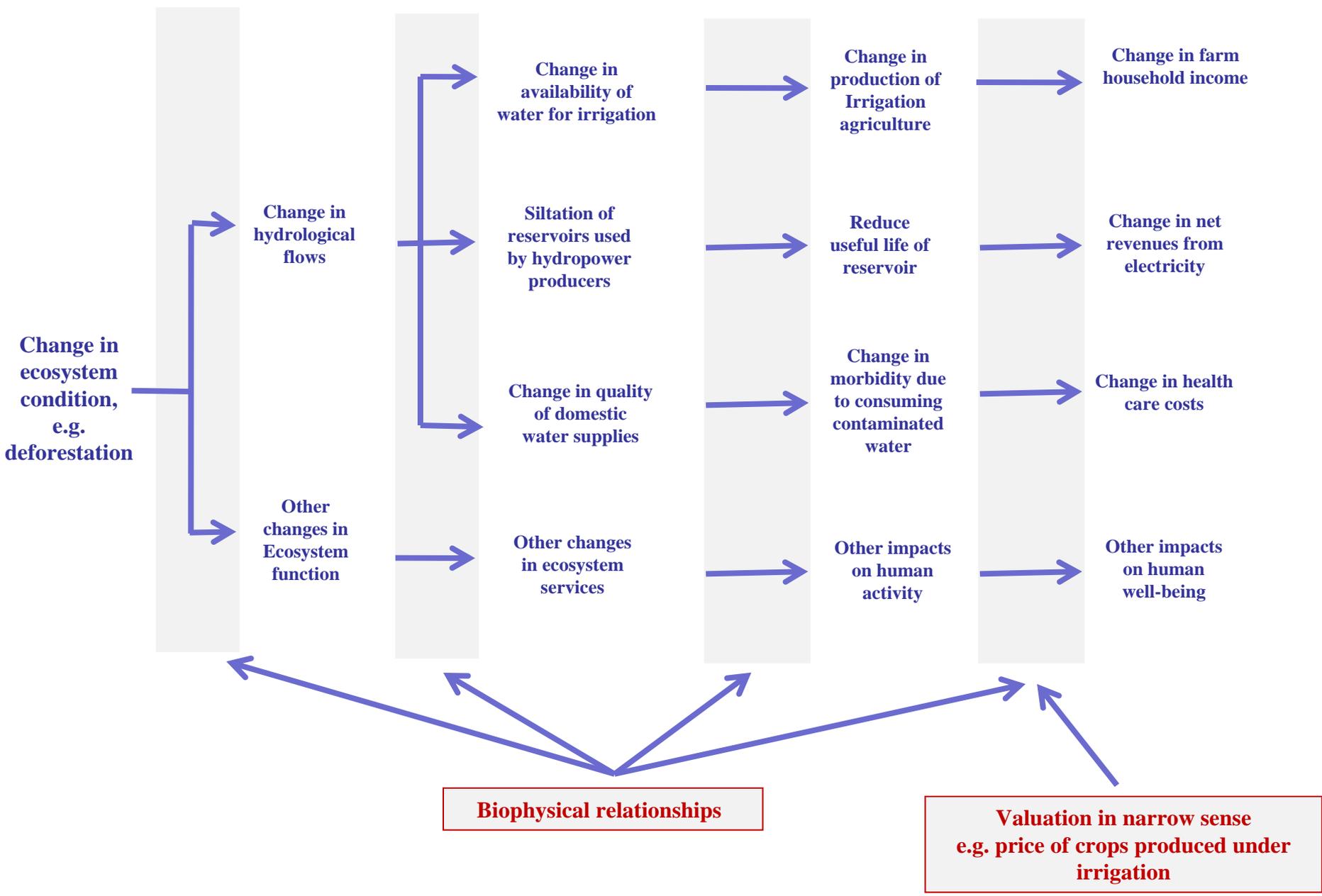


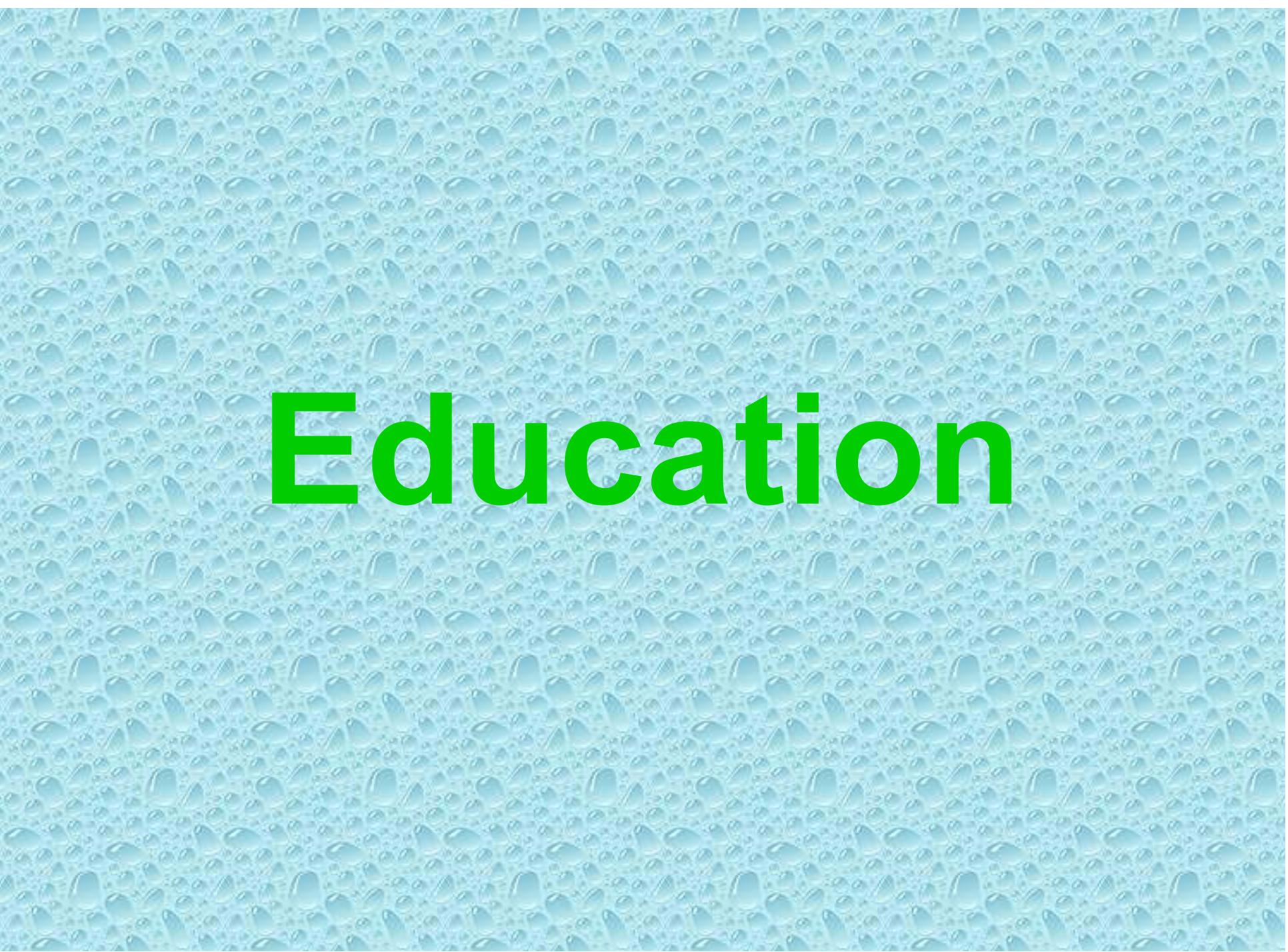
Use less water and minimal environmental impact

**The “Vicious” Circle
«Порочный» круг**

BREAKING THE CIRCLE







Education

GENERAL CONCLUSION

*Solutions must be innovative, revolutionary,
and self-sustaining*

Решения должны быть нововведенческие, революционные
и само-устойчивые

Innovative solutions must be found and employed that replace steady, incremental rates of progress with dramatic, revolutionary changes. These solutions must be designed to be self-sustaining over the long-term

GENERAL CONCLUSION

Sustainable strategies must include diversity and multi-institutional partnerships

Долговременная устойчивая стратегия должна включать разнообразие и быть поли-общественным партнерством, наделенным законным статусом

No single government agency, non-governmental organization, corporation, international organization, or academic institution can provide all the required expertise or coordinate a sufficiently integrated response to meet the nature and scope of the challenge we face

Partnerships across social organizations are necessary for both developing and implementing sustainable solutions

“...The different interests involved make these problems difficult to resolve at the political level, but without the help of scientists it will not be possible to resolve them at all. Without the solutions that science can offer, there would not be any basis for addressing these challenges.

And the reverse is also true: the more effectively we promote scientific and technological efforts..., the greater the hope that not only will we be able to develop and provide a decent life for millions of people, but that we will be able to preserve our planet itself “

Vladimir Putin

President of Russia

*Concluding Remarks at the
Global Energy Prize Award Ceremony*

09.06.2007



**Our Responsibility is to Ourselves
Our Children
Our Society
and Our PLANET**

The Planet's Future Is In Your Hands!!!

Будущее Планеты в Ваших Руках!!!



Many thanks for your attention!

Большое спасибо за внимание!