

**Global Energy and
Sustainable
Development
Strategy in the XXI
century**



PLAN

 INTRODUCTION

 Alternative energy sources

 **BASICS OF KAZAKHSTAN'S ECOLOGICAL ENERGY STRATEGY**

 **ECOLOGICAL ENERGY FUTURE: A STRATEGY FOR THE XXITH CENTURY**

 **G-global project and energy-saving strategies**

 **Water-is a strategic resource in the XXI century**

 **Water managment**



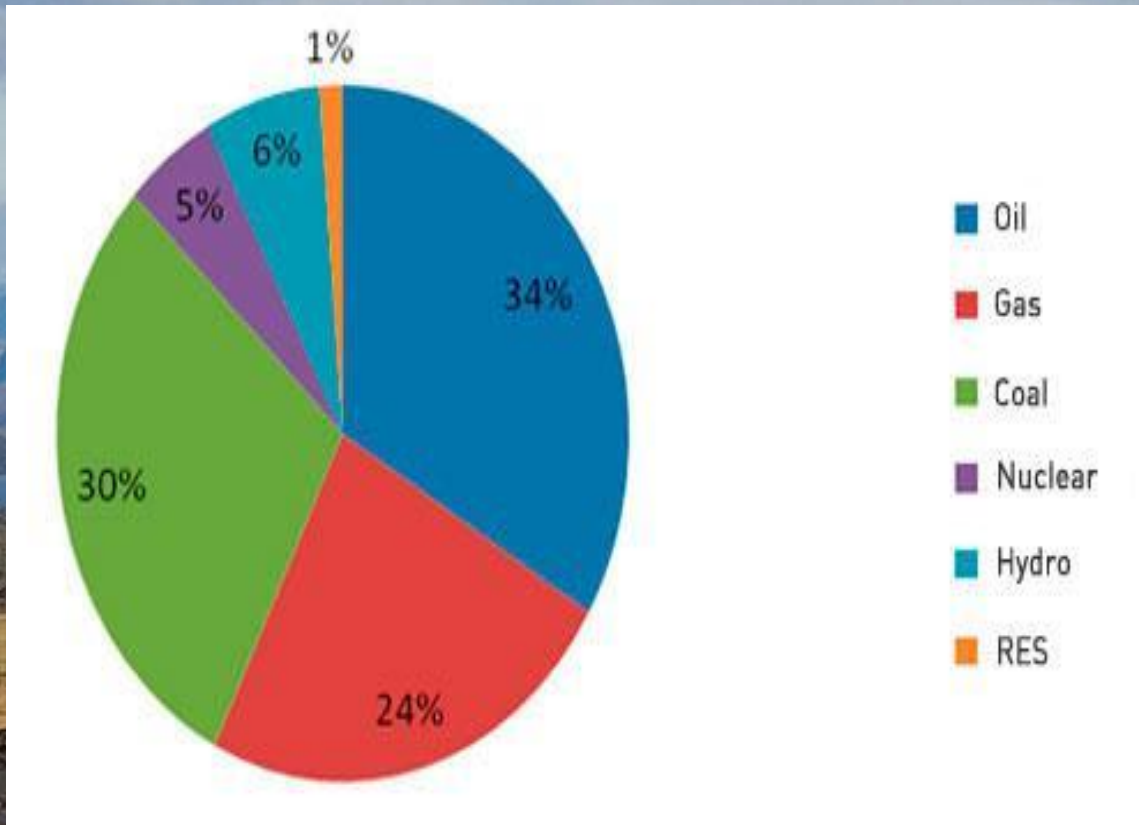
INTRODUCTION

The world is currently undergoing a transformation the complexity of which has only become clear of late. The notion that the availability of non-renewable energy resources is limited and its end is on the horizon has become generally accepted. The awareness of the need to address environmental and climatic changes on the planet and their impact on living conditions has become widespread alongside.

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ENERGY SOURCES IN THE XXI CENTURY



Environmental impact of electricity generation:

The **environmental impact of electricity generation** is significant because modern society uses large amounts of electrical power. This power is normally generated at power plants that convert some other kind of energy into electrical power. Each system has advantages and disadvantages, but many of them pose environmental concerns.



Environmental impacts of power

The amount of water usage is often of great concern for electricity generating systems as populations increase and droughts become a concern.





MOST ELECTRICITY TODAY IS GENERATED BY BURNING FOSSIL FUELS AND PRODUCING STEAM WHICH IS THEN USED TO DRIVE A STEAM TURBINE THAT, IN TURN, DRIVES AN ELECTRICAL GENERATOR.



NUCLEAR POWER PLANTS DO NOT BURN FOSSIL FUELS AND SO DO NOT DIRECTLY EMIT CARBON DIOXIDE; BECAUSE OF THE HIGH ENERGY YIELD OF NUCLEAR FUELS, THE CARBON DIOXIDE EMITTED DURING MINING, ENRICHMENT, FABRICATION AND TRANSPORT OF FUEL IS SMALL WHEN COMPARED WITH THE CARBON DIOXIDE EMITTED BY FOSSIL FUELS OF SIMILAR ENERGY YIELD.

ENVIRONMENTAL POWER - REPLACEMENT OF CONVENTIONAL ENERGY



ALTERNATIVE ENERGY SOURCES

By 2050, one-third of the world's energy will need to come from solar, wind, and other renewable resources.

Who says? British Petroleum and Royal Dutch Shell, two of the world's largest oil companies. Climate change, population growth, and fossil fuel depletion mean that renewables will need to play a bigger role in the future than they do today.



- **Alternative energy** is any energy source that is an alternative to fossil fuel.
- These alternatives are intended to address concerns about such fossil fuels. it causes less pollution too.
- The nature of what constitutes an alternative energy source has changed considerably over time, as have controversies regarding energy use.
- An alternative source of energy is a renewable resource.



- Renewable energy is the energy source which, according to human scale, are inexhaustible
- The basic principle of the use of renewable energy is extracted from its permanent place in the environmental processes and the provision of technical use.
- Renewable energy is derived from natural resources such as sunlight, water currents, wind, tides and geothermal heat, which are renewable.



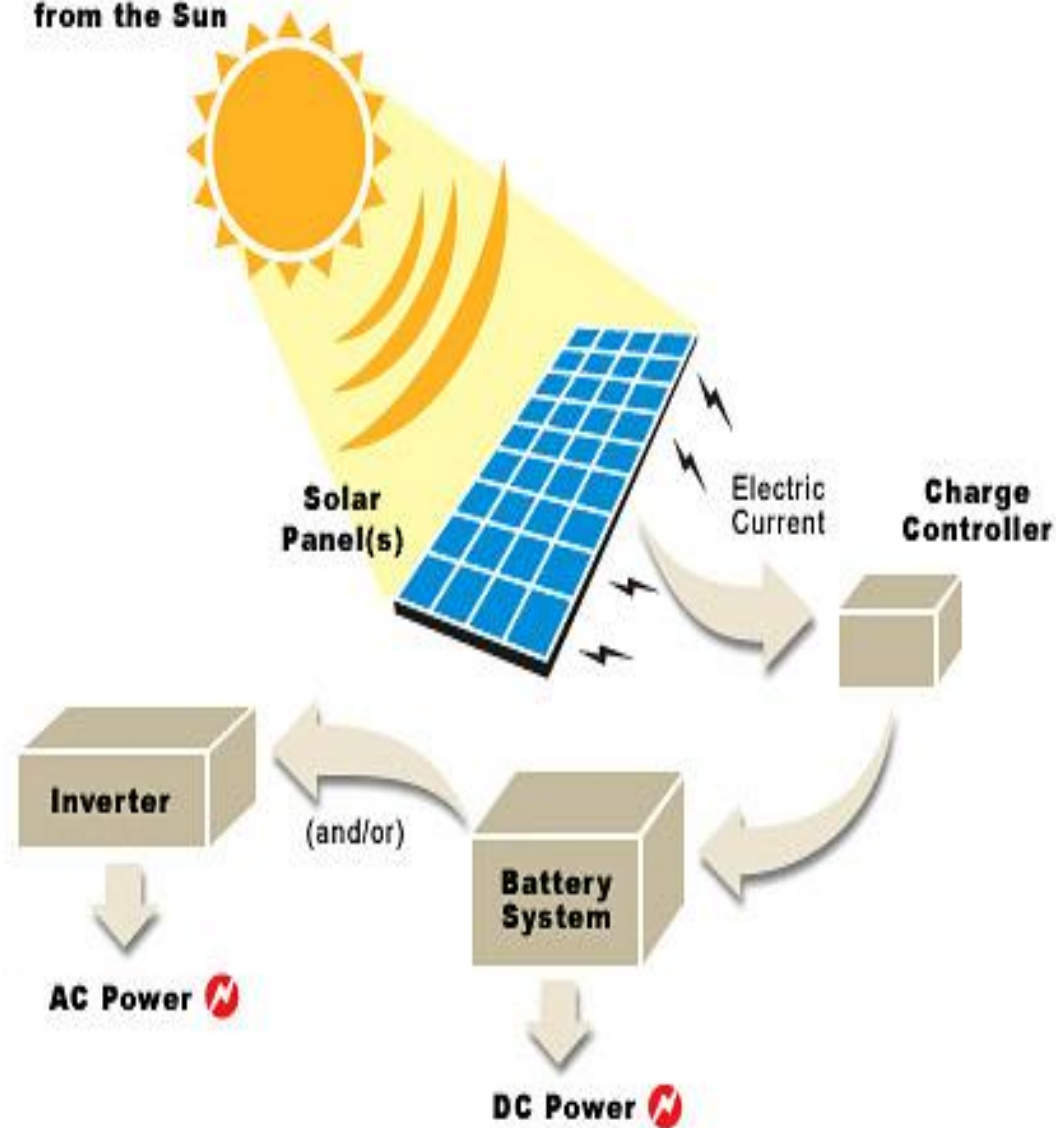
RENEWABLE ENERGY SOURCES

- Wind energy
- Water power
- The energy of the tides
- Wave energy
- The energy of sunlight
- Geothermal energy
- Bioenergetics



Solar Power

Solar Irradiance
from the Sun

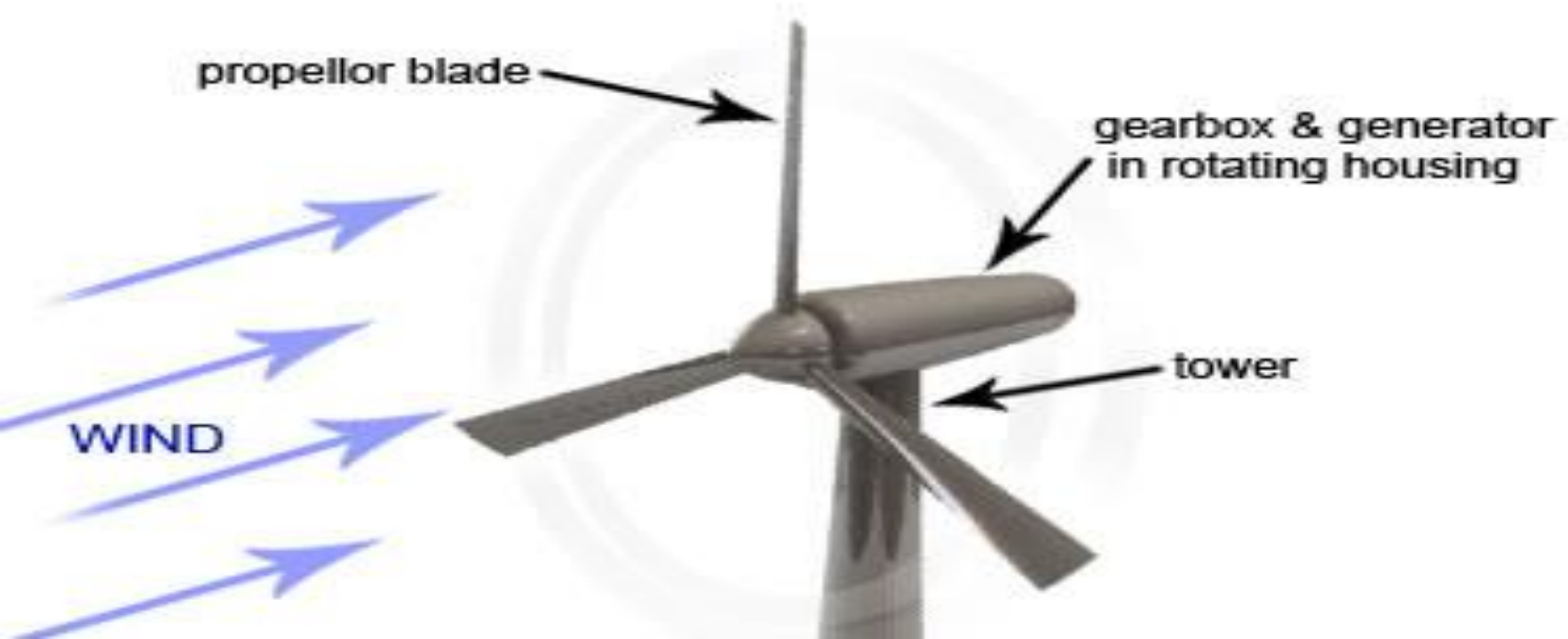


WIND POWER



Wind power, as an alternative to burning fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, and uses little land. The net effects on the environment are far less problematic than those of nonrenewable power sources


ALTERNATIVE ENERGY SOURCES: WIND POWER



Basics of Kazakhstan's ecological energy strategy

In the President's address to the nation concerning the national strategy up to 2030, the principles of the policy to be pursued in regard to the use of the country's energy resources were mentioned under Priority 5.

“Kazakhstan possessed enormous reserves of natural resources, especially energy-producing ones. The oil and gas deposits under our country's soil put us among the ranks of world top-10 reserve holders. Kazakhstan also possesses large reserves of coal, uranium, gold and other valuable commodities. We have a big potential for the use of wind and solar energy.



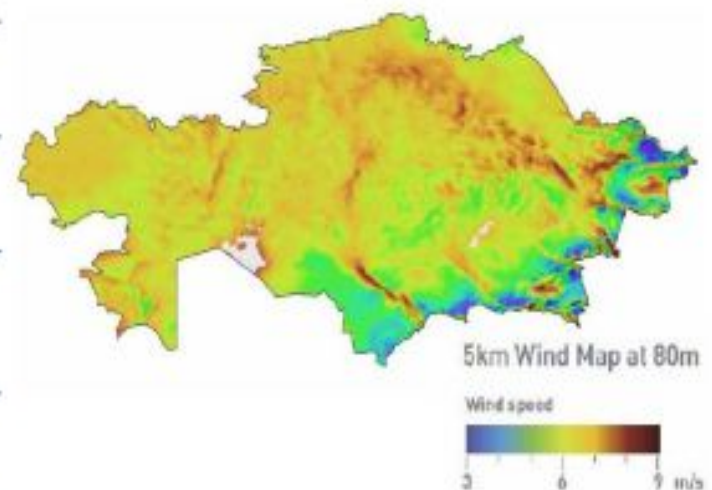
1. Renewable Energy Resource

Environmentally-friendly
for the common good.

- ❖ Main direction of Kazakhstan alternative industry focuses on commercialization of clean energy and renewable energy development.
- ❖ Potential production amount of Kazakhstan's renewable energy(wind power, solar power) was already approved by UNDP.
- ❖ Favorable energy resource for renewable energy generation are wind, solar, bio, geothermal heat and small hydro power.

• Wind energy resource

Potential	Annual 1.8 TWh
Main wind direction	Northeast, Southwest
Annual average wind speed	More than 50% of territory – 4~5m/s [in 30m height] More than 10 places - 8~10m/s
Favorable place	Djungar Gates (East side of Kazakhstan) - 525W/m ² Chylyk Corridor(South side of Kazakhstan) - 240W/m ²



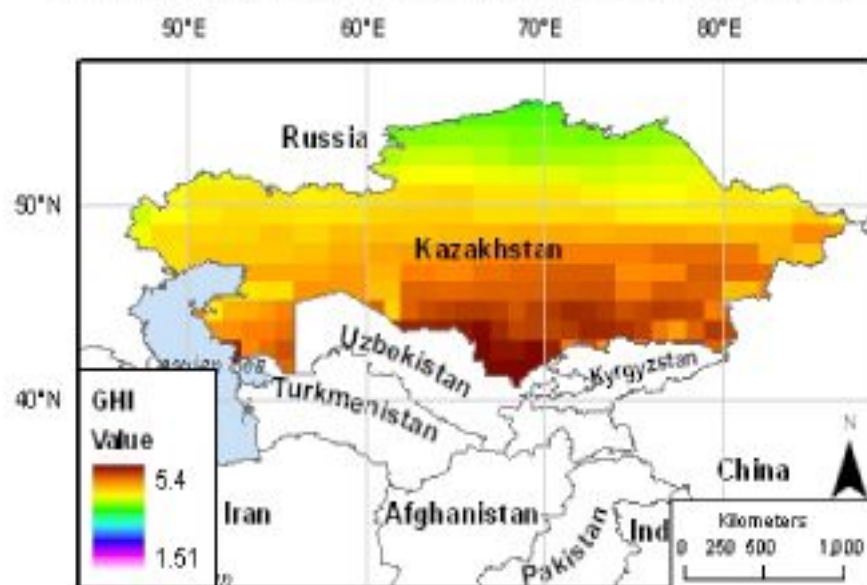
1. Renewable Energy Resource

Environmentally-friendly
for the common good.

● Solar energy resource

Average insolation duration	2,200~3,000hr/yr
Average insolation	1,300~1,800kW/m ² /yr
Remarks	World's second largest Silicon (main raw material of solar cell) reserve amount

<Kazakhstan Solar Global Horizontal Irradiation>

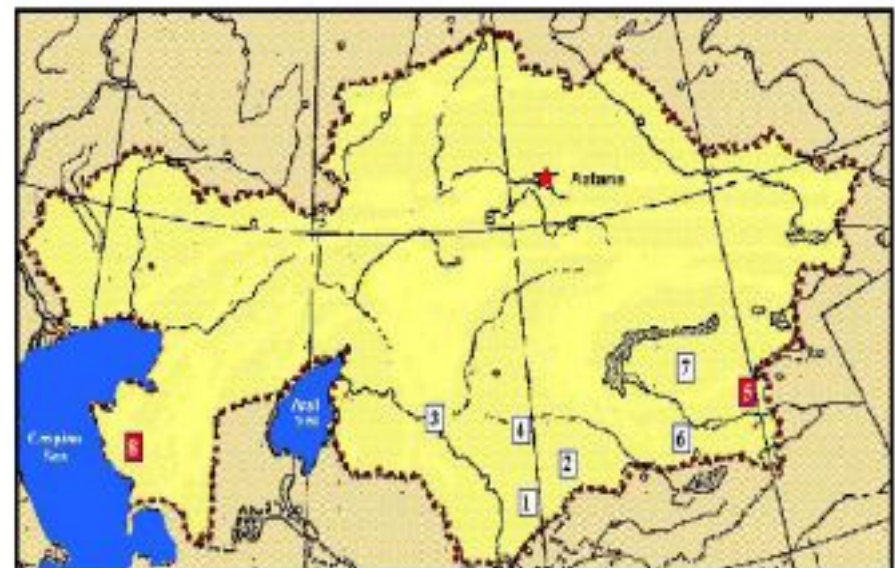


(Source : NASA)

● Geothermal energy resource

Potential	520MWt(Free flow) 4300MWt(Pumping OP.)
Favorable place	Near by Amaty : 80~120 °C, 3000m Chimkent : 80 °C, 2000m

<Main thermal water areas in Kazakhstan>



1. Renewable Energy Resource

Environmentally-friendly
for the common good.

• Biomass

Potential	<ul style="list-style-type: none">● lumber : 200,000 T.O.E● Residue from agriculture : 87GWh● Animal waste : 52,000T.O.E
Remarks	<ul style="list-style-type: none">- Since 2008, "BIOHIM" started biomass fuel(bioethanol) business in Kazakhstan.- The current concentration level of ethanol in bio fuel in market is 5 ~7%. (92-octane)- Not only Kazakhstan and also other European nations started export the bio fuel.

• Hydrological Power

Potential	170,000 GWh, 13~15% is occupied.
Remarks	<ul style="list-style-type: none">● Among the total energy resource, hydro-power 14.6%. It has second largest portion, next to coal.- 73% of hydro power is produced from Irtysh river, Itil river and Sirdaryo river (located in east Kazakhstan)- Currently the new hydro power plants are planned to be constructed in Mainak(300MW), Semipalatinsk(78MW) and Kerbulak(50MW).- there are 450 small size hydro power plants are existed. But, more than 90% of plants are closed. If those were opened again, Kazakhstan could have more than 6billion kWh power production ability.

A glasswing butterfly (Glossy-winged butterfly) is perched on a green leaf. The butterfly has transparent wings with dark brown borders and a white patch on the hindwing. The text "G-global project and energy-saving strategies" is overlaid in a light green font.

G-global project and
energy-saving
strategies

- The Global Energy and Economical Strategy, which was initiated by N. Nazarbayev offered to the world innovative theoretical and practical approaches of solution of global and regional energy and ecological problems that were supported at the Rio+20, were adopted by the world community for implementation, and in this connection, they require further scientific development.



STATEMENTS OF THE PRESIDENT OF KAZAKHSTAN N.A.NAZARBAYEV



Last year I proposed to create a group of countries G-Global, as a complement to the mechanism of G-20, in order to create an international economic policy and seek global anti-crisis solutions. Today, G-Global is an international virtual platform at Astana Economic Forum, established by the Association "Eurasian Economic Club of Scientists".

FROM THE SPEECH OF THE
PRESIDENT OF KAZAKHSTAN IN
CAMBRIDGE UNIVERSITY ON
26.07.2012



G-GLOBAL PROJECT AND ENERGY-SAVING STRATEGIES

- G-Global - a feature-rich platform to create the conditions for the international expert community for interactive, open and public debate, a debate on the global economy. The project aims to discuss and develop mechanisms to resolve the global financial crisis and aims to dramatically expand the number of participants in search of anti-crisis solutions
- The success of the forthcoming international exhibition EXPO 2017 “Future Energy” depends largely on the active participation of citizens in the implementation of energy-environment concept of modernity, presented by the President Nursultan Nazarbayev as a formula for sustainable development of the civilization in XXI century.

GOALS AND OBJECTIVES:

Consolidate the efforts of the world community in understanding the global challenges of civilizations and the creation of effective solutions for the progressive development of the world economy

ADVANTAGES:

- To integration with social networks, focusing on business professional communication
- An unprecedented interaction with the site of the Astana Economic Forum and harmonious transition to the offline mode with the continuation of the debate during the forum
- Unique Intelligent software platform: 21 Nobel laureates, members of the Astana club of Nobel laureates, have contributed to the development of G-Global



G-GLOBAL is five principles:

- 1 evolution and rejection of revolutionary change in policy
- 2 justice, equality, consensus
- 3 global tolerance and trust
- 4 global transparency
- 5 constructive multilateralism



Simple Strategies to Maximize Energy Savings



- 1) Use programmable thermostats (properly)
- 2) Implement lighting changes
- 3) Turn off computers and other equipment at the end of the day
- 4) Form an employee green team
- 5) Check interiors and exteriors for damage
- 6) Find underperforming equipment (and replace it)
- 7) Join or start a local green business council

« I'm not an environmentalist. I'm an Earth warrior.».

~Darryl Cherney, quoted in
Smithsonian, April 1990





Efficient energy use, sometimes simply called **energy efficiency**, is the goal to reduce the amount of energy required to provide products and services.





Water Resources

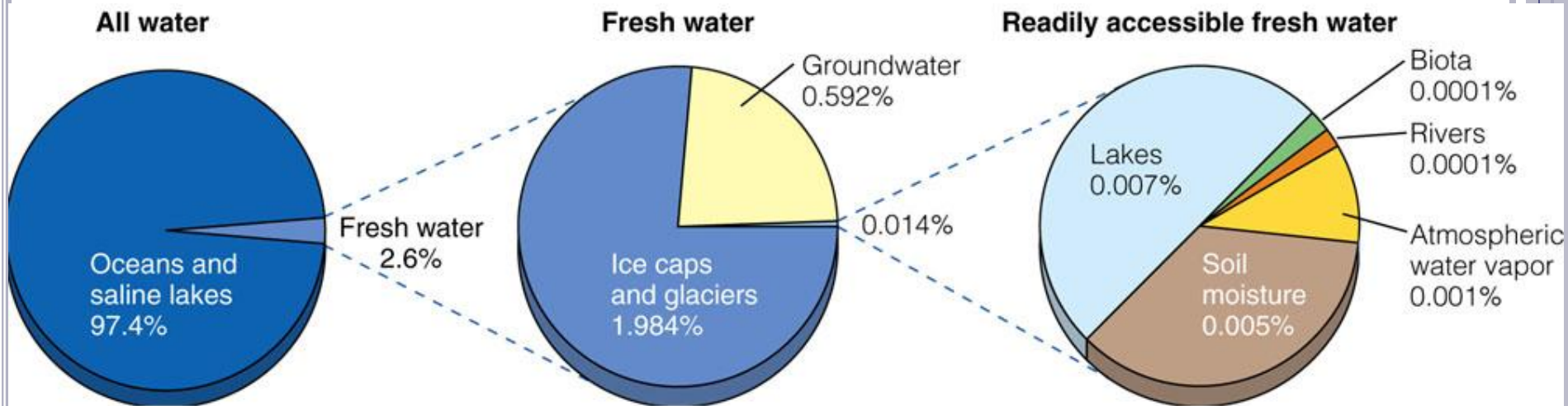


WATER IS A STRATEGIC RESOURCES IN 21TH

- • **Water resources** are sources of water that are useful or potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities. The majority of human uses require fresh water.
- 97 percent of the water on the Earth is salt water and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps.



SUPPLY OF WATER RESOURCES



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Small fraction (.014%) is readily available for human use



SOURCES OF WATER

- ▶ Rainwater;
- ▶ Surface water
 - Impounding reservoir
 - River and streams
 - Tanks, Ponds and lakes
- ▶ Ground water
 - Sallow well
 - Deep well
 - Spring



USE OF WATER RESOURCES

Humans directly or indirectly use about 54% of reliable runoff

Withdraw 34% of reliable runoff for:

- Agriculture – 70%

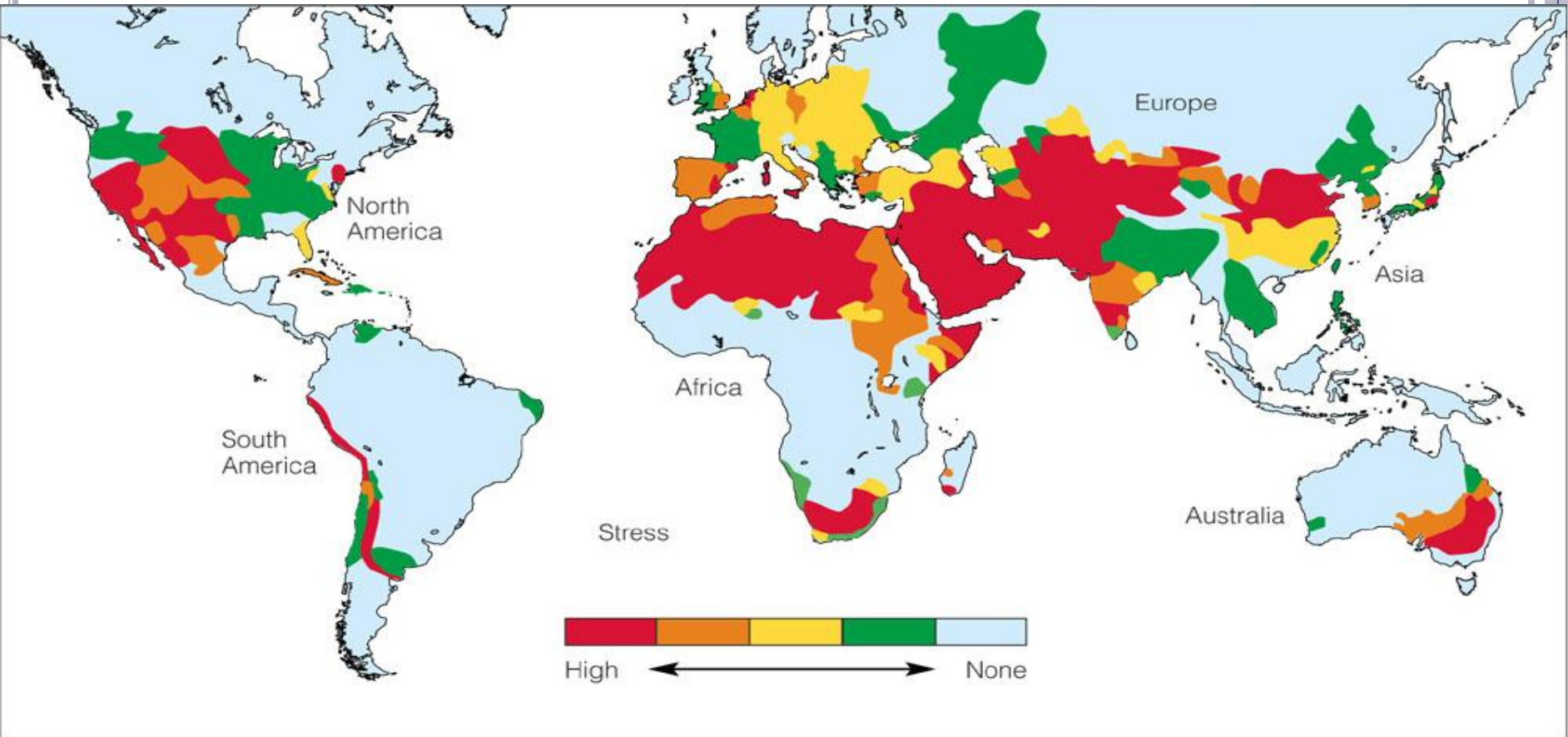
Leave 20% of runoff in streams for human use:

transport goods, dilute pollution, sustain fisheries

- Industry – 20% Could use up to 70-90% of the reliable runoff by 2025



WATER CONFLICTS: GLOBAL

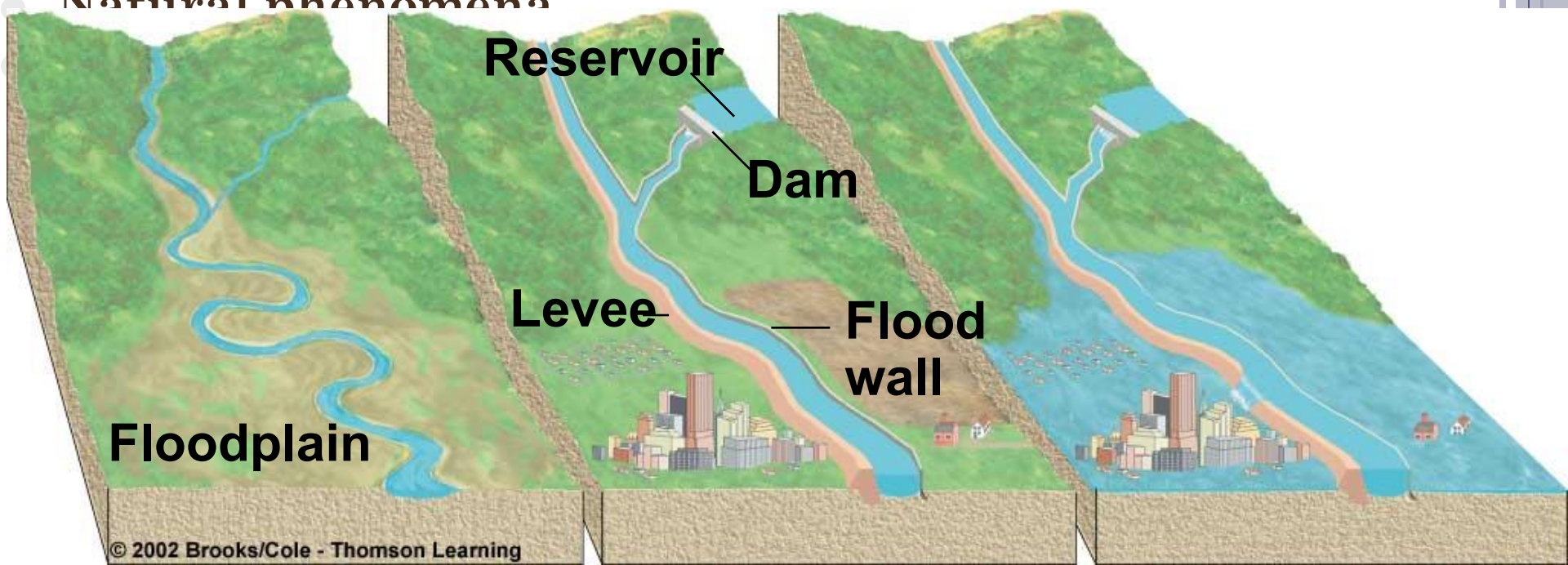


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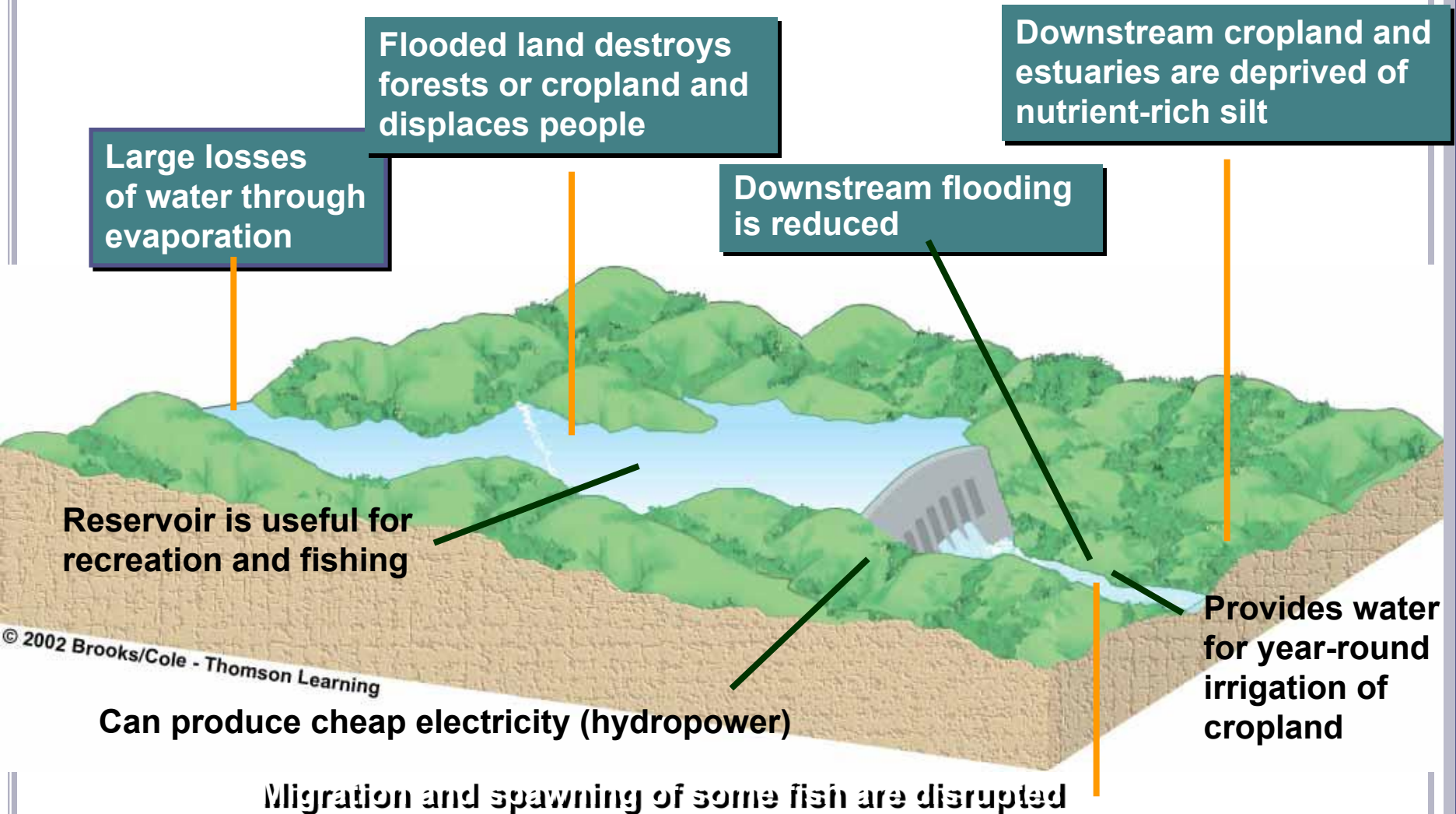
Two main factors for water shortage: dry climate and too many people. Many people live in hydro poverty – can't afford clean water.

Too Much Water: Floods

Natural phenomena



USING DAMS AND RESERVOIRS TO SUPPLY MORE WATER: THE TRADE-OFFS



SOLUTIONS

SUSTAINABLE WATER USE

- Not depleting aquifers
- Preserving ecological health of aquatic systems
- Preserving water quality
- Integrated watershed management
- Agreements among regions and countries sharing surface water resources
- Outside party mediation of water disputes between nations
- Marketing of water rights
- Raising water prices
- Wasting less water
- Decreasing government subsidies for supplying water
- Increasing government subsidies for reducing water waste
- Slowing population growth



It is estimated that 22% of worldwide water is used in industry. Major industrial users include hydroelectric dams, thermoelectric power plants, which use water for cooling, ore and oil refineries, which use water in chemical processes, and manufacturing plants, which use water as a solvent. Water withdrawal can be very high for certain industries, but consumption is generally much lower than that of agriculture.



WATER RESOURCE MANAGEMENT

- **Water resource management** is the activity of planning, developing, distributing and managing the optimum use of **water resources**. It is a sub-set of **water cycle management**. Ideally, water resource management planning has regard to all the competing demands for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. As with other **resource management**, this is rarely possible in practice



- Water is an essential resource for all life on the planet. Of the water resources on Earth only three percent of it is fresh and two-thirds of the freshwater is locked up in ice caps and glaciers. Of the remaining one percent, a fifth is in remote, inaccessible areas and much seasonal rainfall in monsoonal deluges and floods cannot easily be used. At present only about 0.08 percent of all the world's fresh water is exploited by mankind in ever increasing demand for sanitation, drinking, manufacturing, leisure and agriculture.



WATER IN THE FUTURE:

- One of the biggest concerns for our water-based resources in the future is the sustainability of the current and even future water resource allocation. As water becomes more scarce the importance of how it is managed grows vastly. Finding a balance between what is needed by humans and what is needed in the environment is an important step in the sustainability of water resources.



CONCLUSIONS


Basic conditions for an ecological energy policy to be successful in the course of the XXIst Century include:

- each and every country should have enough energy resources at its disposition needed for its national economic development;
- the balance between the shares of conventional and renewable energy resources on national levels should be kept intact;
- consumption patterns of energy should be kept under control with the aim to use available provisions as efficiently as possible;
- nations should assume joint responsibility regarding climate changes;
- energy resources for future generations should be secured;
- interstate cooperation in maintaining the balance between ecological constraints and energy needs should be enhanced.



CONCLUSION

The present XXI century is an epoch of strengthening integration of civilizations, their dialogue and partnership for solution of emerging global problems faced by the mankind. It may be stated definitely that the modern world of the beginning of XXI century is a world of local civilizations demonstrating their spatial variety of historical heritage and modern being of the mankind. In the period not later than the middle of the century the gap in economical parameters between countries should be reduced to the extent allowing all states having an opportunity for securing a high level of human potential development. This is a very difficult task; it is connected with considerable growth of the world gross product and solution of major tasks both on the global level and, what is particularly difficult, in each country.



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