



Energy Inventory Teacher Reference

Energy Inventory – Building Profile Section

The questions in this section will help you understand how much energy your school uses and where that energy use is most concentrated.

Note: Teachers interested in energy education should contact Project NEED for curriculum resources and technical assistance. [Click here to visit the NEED website.](#)

Inventory Questions	Ideas for School Improvement	Resources	Connections to KY Core Content 4.1
1 What percentage of the school is air-conditioned?	Use the calculator in the resources section of this inventory to discover how energy use in your school affects the environment.	NEED Energy Infobooks http://www.need.org/EnergyInfobooks.php	Primary
2 Does this school have a kitchen that does daily food preparation?	Based on your findings, make recommendations that will reduce energy use in the school.	Try this energy use calculator http://hes.lbl.gov/	SS-EP-3.1.1 Students will describe basic economic concepts related to scarcity (e.g., opportunity cost, productive resources—natural and human, limited resources) and explain why people cannot have all the goods and services they want. DOK 1
3 How many of the following appliances/machines are found in your building? A. Copiers B. Printers C. Computers with monitors D. Refrigerators/Freezers E. Televisions F. Dishwashers G. Stoves/Ovens Vending machines	Implement at least one of your recommendations. Based on your findings of the costs of energy related utilities, make a presentation to your site based council describing how the school could reduce consumption of energy by at least 5%.	Energy facts from the US DOE http://www.eia.doe.gov/kids/energyfacts/index.html More energy facts plus an energy footprint quiz http://resources.yesican-science.ca/energy_flow/energy_menu.html The energy star website http://www.energystar.gov/index.cfm?c=news.nr_news Calculate how much pollution your energy source emits http://www.infinitepower.org/calc_carbon.htm?	PL-EP-3.3.01 Students will identify consumer actions (reusing, reducing, recycling) that impact the environment. DOK 1 Fourth Grade SS-04-3.1.1 Students will explain how individuals and groups in regions of Kentucky make economic decisions based on their limited productive resources (natural, human, capital). DOK 2
4 List the names of your energy providers for: A. Heating B. Cooling C. Hot water D. Electricity E. Other energy-related utility	Conduct research on how your school can use conservation to save energy and protect the environment. Develop and carry out an educational plan, (e.g. brochure, PowerPoint, fact sheets) to help other students learn how to save energy at school.	Conduct a home energy check up http://www.ase.org/content/article/detail/971 Learn how recycling saves energy http://www.dep.state.pa.us/dep/deputate/airwaste/wm/RECYCLE/FACTS/benefits3.htm	PL-04-3.3.01 Students will identify and describe consumer actions (reusing, reducing, recycling) that impact the environment. DOK 2 Fifth Grade SS-05-3.1.1 Students will describe how individuals and groups in regions of the United States make economic decisions based on limited productive resources (natural, human, capital)
5 What was the cost of energy-related utilities for your school or district in the previous school year? (If this breakdown is not available, use the following average percentages for schools in our climate zone to figure approximate amounts for the total annual bill: 19% of the utility bill is for heating, 9% is for cooling, 29% for lighting and 21% for electrical appliances.) Heating A. Cooling B. Hot water C. Electricity D. Other energy-related utility			PL-05-3.3.01 Students will describe consumer actions (reusing, reducing, recycling) and identify ways these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste). DOK 2 Sixth Grade SS-06-3.1.1 Students will explain and give examples of how scarcity requires individuals, groups, and governments in the present day to make decisions about how productive resources (natural resources, human resources and capital goods) are used. DOK 2 PL-06-3.1.01



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6	What percentage of this year's school budget is dedicated to energy-related utilities?				Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy). DOK 2
7	How much money did your school spend on energy-related utilities per student last year?				Seventh Grade
8	<p>What was the consumption of each energy source last year? Indicate total and per student consumption with their units.</p> <p>A. Electricity B. Natural Gas C. Gasoline/Diesel Fuel D. Other energy source</p>				<p>SS-07-3.1.1 Students will explain and give examples of how scarcity required individuals, groups, and governments in early civilizations prior to 1500 A.D. to make decisions about how productive resources (natural resources, human resources and capital goods) were used. DOK 2</p> <p>SC-07-4.6.2 Students will</p> <ul style="list-style-type: none"> • describe where energy comes from (and goes next) in examples that involve several different forms of energy: heat, light, motion of objects, and chemical. • Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object. <p>PL-07-3.3.01 Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy). DOK 2</p> <p style="text-align: center;">Eighth Grade</p> <p>SS-08-3.1.1 Students will explain and give examples of how scarcity required individuals, groups, and the government in the United States prior to Reconstruction to make decisions about how productive resources (natural resources, human resources and capital goods) were used. DOK 2</p> <p>SC-08-4.6.2 Students will</p> <ul style="list-style-type: none"> • describe or explain energy transfer and energy conservation; • evaluate alternative solutions to energy problems. <p><i>Energy can be transferred in many ways, but it can neither be created nor destroyed.</i></p> <p style="text-align: center;">High School</p>



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				<p>SC-HS-4.6.1 Students will</p> <ul style="list-style-type: none"> • explain the cause and effect relationships between global climate and energy transfer; • use evidence to make inferences or predictions about global climate issues. <p>Global climate is determined by energy transfer from the Sun at and near Earth's surface. DOK 3</p> <p>SC-HS-4.6.7 Students will</p> <ul style="list-style-type: none"> • explain real world applications of energy using information/data. • evaluate explanations of mechanical systems using current scientific knowledge about energy. <p>The universe becomes less orderly and less organized over time. Thus, the overall effect is that the energy is spread out uniformly. For example, in the operation of mechanical systems, the useful energy output is always less than the energy input; the difference appears as heat. DOK 2</p> <p>SC-HS-4.6.9 Students will</p> <ul style="list-style-type: none"> • describe the connections between the functioning of the Earth system and its sources of energy (internal and external). • predict the consequences of changes to any component of the Earth system. <p>Earth systems have sources of energy that are internal and external to the Earth. The Sun is the major external source of energy. Two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from Earth's original formation. DOK 3</p> <p>SC-HS-4.7.2 Students will</p> <ul style="list-style-type: none"> • evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction; • justify positions using evidence/data. <p>Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected. DOK 3</p> <p>SC-HS-4.7.5 Students will</p> <ul style="list-style-type: none"> • predict the consequences of changes in resources to a population; • select or defend solutions to real-world problems of population control. <p>Living organisms have the capacity to produce populations of infinite size. However,</p>
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				<p>behaviors, environments, and resources influence the size of populations. Models (e.g., mathematical, physical, conceptual) can be used to make predictions about changes in the size or rate of growth of a population. DOK 3</p> <p>SS-HS-3.1.1 Students will give examples of and explain how scarcity of resources necessitates choices at both the personal and societal levels in the modern world (1500 A.D. to present) and the United States (Reconstruction to present) and explain the impact of those choices. DOK 2</p> <p>SS-HS-5.3.6 Students will explain how the second half of the 20th century was characterized by rapid social, political, and economic changes that created new challenges (e.g., population growth, diminishing natural resources, environmental concerns, human rights issues, technological and scientific advances, shifting political alliances, globalization of the economy) in countries around the world, and give examples of how countries have addressed these challenges. DOK 2</p> <p>PL-HS-3.3.01 Students will compare consumer actions (reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources</p>
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Energy Inventory – Conservation Section

This section helps students and staff members learn techniques for saving energy and money in the school environment. Many of these practices can also be applied at home for even more energy savings.

Inventory Questions	Ideas for School Improvement	Resources	Connections to KY Core Content 4.1	
9	What sources of energy/fuel are used at your school (e.g., cooling is provided by electricity generated by burning coal, mowing needs gasoline produced from fossil fuels)?	<p>School Building Energy Survey http://www.eia.doe.gov/kids/classactivities/SchoolBuildingSurveyIntermediate.pdf</p> <p>From Alliant Energy Company, general info for students, teachers and parents on renewable energy, includes diagrams and photos http://www.powerhousekids.com/stellent2/groups/public/documents/pub/phk_ee_re_index.hcsp</p> <p>Tips from the U.S. Department of Energy on how to landscape to save energy http://www.eere.energy.gov/consumer/your_home/landscaping/index.cfm/mytopic=11920</p> <p>Dr. E's Energy Lab: games and info on renewable energy http://www1.eere.energy.gov/kids/</p> <p>Info about trees and energy savings http://www.powerhousekids.com/stellent2/groups/public/documents/pub/phk_ee_001510.hcsp</p> <p>An article in the American School Board Journal about how schools can save energy. http://www.asbj.com/199901/0199coverstory.html</p> <p>How using your thermostat wisely can save energy http://www.care2.com/channels/solutions/home/295</p> <p>Conservation tips for kids from Alliant Energy http://www.powerhousekids.com/stellent2/groups/public/documents/pub/phk_ee_se_index.hcsp</p> <p>Energy facts including ideas for energy conservation http://www.eia.doe.gov/kids/energyfacts/saving/efficiency/savingenergy_secondary.html</p>	Primary	
10	How many energy sources used by your school are renewable?			<p>MA-EP-1.3.1 Students will analyze real-world situations to identify the appropriate mathematical operations, and will apply operations to solve real-world problems with the following constraints:</p> <ul style="list-style-type: none"> • Add and subtract whole numbers with three digits or less; • Multiply whole numbers of 10 or less; • Add and subtract fractions with like denominators less than or equal to four; and • Add and subtract decimals related to money. <p>DOK - 2</p>
11	Is the landscaping on the school grounds used in ways to enhance energy efficiency (e.g., evergreen trees on north and west sides of building to provide a windbreak, deciduous trees on south and east sides to provide shade during hotter seasons and allow sun to warm the building during colder seasons)?			<p>PL-EP-3.3.01 Students will identify consumer actions (reusing, reducing, recycling) that impact the environment. DOK 1</p> <p>SC-EP-4.6.2 Students will describe evidence of the sun providing light and heat to the Earth.</p> <p>Simple observations and investigations begin to reveal that the Sun provides the light and heat necessary to maintain the temperature of Earth. Based on those experiences, the conclusion can be drawn that the Sun's light and heat are necessary to sustain life on Earth. DOK 2</p>
12	Are the furnace and ventilation filters cleaned or replaced regularly per manufacturer's recommendations?			<p>SS-EP-3.1.1 Students will describe basic economic concepts related to scarcity (e.g., opportunity cost, productive resources—natural and human, limited resources) and explain why people cannot have all the goods and services they want. DOK 1</p>
13	What are your school's guidelines for thermostat temperature settings?			Fourth Grade
			<p>MA -04-1.3.1 Students will analyze real-world situations to identify the appropriate mathematical operations, and will apply operations to solve real-world</p>	



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14	What percentage of appliances/machines is located at least 5 feet from a thermostat?			<p>problems with the following constraints:</p> <ul style="list-style-type: none"> • Add and subtract whole numbers with four digits or less; • Multiply whole numbers with two digits or less; • Divide whole numbers with three digits or less by single-digit divisors (with or without remainders); • Add and subtract fractions with like denominators less than 10; and • Add and subtract decimals through hundredths. <p>DOK – 2</p>
15	What percentage of machines and lights is turned off at night or when not in use?			<p>PL-04-3.3.01 Students will identify and describe consumer actions (reusing, reducing, recycling) that impact the environment. DOK 2</p> <p>SC-04-4.6.2 Students will</p> <ul style="list-style-type: none"> • analyze data/evidence of the Sun providing light and heat to earth; • use data/evidence to substantiate the conclusion that the Sun’s light and heat are necessary to sustaining life on Earth. <p>Simple observations, experiments and data collection begin to reveal that the Sun provides the light and heat necessary to maintain the temperature of Earth. Evidence collected and analyzed should be used to substantiate the conclusion that the sun’s light and heat are necessary to sustain life on Earth. DOK 3</p>
16	What percentage of doors are closed when classes are in session to prevent heating or air-conditioning from escaping into infrequently used hallways?			<p>SS-04-3.1.1 <i>Students will explain how individuals and groups in regions of Kentucky make economic decisions based on their limited productive resources (natural, human, capital).</i> DOK 2</p> <p style="text-align: center;">Fifth Grade</p>
17	Are energy conservation measures in place for after school hours, evening activities, and vacations? (e.g., Is there a building schedule for use after hours? Is there a schedule for setting temperatures back after school hours?)			<p>MA-05-1.3.1 Students will analyze real-world situations to identify the appropriate mathematical operations, and will apply operations to solve real-world problems with the following constraints:</p> <ul style="list-style-type: none"> • Add, subtract, multiply, and divide whole numbers (less than 100,000,000); • Add and subtract fractions with like denominators through 16, with sums less than or equal to one; and • Add and subtract decimals through hundredths. <p>DOK - 2</p>
18	<p>What other energy saving measures are used by the school? (Please answer yes or no for each)</p> <p>A. Stoves preheated no more than 15 minutes prior to use</p> <p>B. Lamps in vending machines turned off when school is not in use (e.g., refrigerator coils vacuumed)</p> <p>C. Appliances cleaned and checked regularly</p> <p>D. High grade Insulation</p> <p>E. Windows and doors sealed to prevent air infiltration</p> <p>F. Building design features such as</p>			<p>PL-05-3.3.01 Students will describe consumer actions (reusing, reducing, recycling) and identify ways these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste). DOK 2</p>



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	<p>day lighting</p> <p>G. Motion sensors on lighting</p> <p>H. Replacement of older equipment with more energy efficient models</p> <p>I. Unoccupied areas of the building have different temperature settings</p> <p>J. Outside air conditioning unit in shade</p> <p>K. Use compact fluorescent light bulbs</p> <p>L. Use power management software on computers</p> <p>M. Other</p>			<p>SC-05-4.6.2 Students should understand that the Sun is a major source of energy for changes on Earth's surface. The Sun loses energy by emitting light. A tiny fraction of that light reaches Earth, transferring energy from the Sun to Earth.</p> <p>SS-05-3.1.1 Students will describe how individuals and groups in regions of the United States make economic decisions based on limited productive resources (natural, human, capital). DOK 2</p> <p style="text-align: center;">Sixth Grade</p> <p>MA-06-1.2.1 Students will estimate to solve real-world and/or mathematical problems with whole numbers, fractions, decimals, and percents, checking for reasonable and appropriate computational results. DOK - 2</p> <p>PL-06-3.3.01 Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy). DOK 2</p> <p>SC-06-4.6.2 Students will describe <ul style="list-style-type: none"> • the effect of the Sun's energy on the Earth system; • the connection/relationship between the Sun's energy and seasons. <p>The Sun is the major source of energy for Earth. The water cycle, winds, ocean currents, and growth of plants are affected by the Sun's energy. Seasons result from variations in the amount of the Sun's energy hitting Earth's surface. DOK 3</p> <p>SS-06-4.4.4 Students will explain how individual and group perspectives impact the use of natural resources (e.g., urban development, recycling) in the present day.</p> <p style="text-align: center;">Seventh Grade</p> <p>MA-07-1.2.1 Students will estimate to solve real-world and/or mathematical problems with fractions, decimals, and percents, checking for reasonable and appropriate computational results. DOK - 2</p> <p>PL-07-3.3.01 Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy).</p> </p>
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				<p>DOK 2</p> <p>SC-07-4.6.2 Students will</p> <ul style="list-style-type: none"> • describe where energy comes from (and goes next) in examples that involve several different forms of energy: heat, light, motion of objects, and chemical. • Explain, qualitatively or quantitatively, that heat lost by hot object equals the heat gained by cold object. <p style="text-align: center;">Eighth Grade</p> <p>MA-08-1.2.1 Students will estimate to solve real-world and/or mathematical problems with rational numbers, checking for reasonable and appropriate computational results DOK – 2</p> <p>PL-08-3.3.01 Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy). DOK 2</p> <p>SC-08-4.6.2 Students will</p> <ul style="list-style-type: none"> • describe or explain energy transfer and energy conservation; • evaluate alternative solutions to energy problems. <p>Energy can be transferred in many ways, but it can neither be created nor destroyed. DOK 3</p> <p style="text-align: center;">High School</p> <p>MA-11-1.2.1 Students will estimate solutions to problems with real numbers (including very large and very small quantities) in both real world and mathematical situations, and use the estimations to check for reasonable computational results.</p> <p>PL-HS-3.3.01 Students will compare consumer actions (reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources; reducing water, air, and land pollution; reducing solid waste; conserving energy; greenhouse effect, slowing global warming). DOK 3</p>
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				<p>SC-HS-4.6.1 Students will</p> <ul style="list-style-type: none"> • explain the relationships and connections between matter, energy, living systems, and the physical environment; • give examples of conservation of matter and energy. <p>As matter and energy flow through different organizational levels (e.g., cells, organs, organisms, communities) and between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change. DOK 3</p> <p>SC-HS-4.7.2 Students will</p> <ul style="list-style-type: none"> • evaluate proposed solutions from multiple perspectives to environmental problems caused by human interaction; • justify positions using evidence/data. <p>Human beings live within the world's ecosystems. Human activities can deliberately or inadvertently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected. DOK 3</p> <p>SC-HS-4.7.5 Students will</p> <ul style="list-style-type: none"> • predict the consequences of changes in resources to a population; • select or defend solutions to real-world problems of population control. <p>Living organisms have the capacity to produce populations of infinite size. However, behaviors, environments, and resources influence the size of populations. Models (e.g., mathematical, physical, conceptual) can be used to make predictions about changes in the size or rate of growth of a population. DOK 3</p> <p>SS-HS-3.1.1 Students will give examples of and explain how scarcity of resources necessitates choices at both the personal and societal levels in the modern world (1500 A.D. to present) and the United States (Reconstruction to present) and explain the impact of those choices. DOK 2</p> <p>SS-HS-5.3.6 Students will explain how the second half of the 20th century was characterized by rapid social, political, and economic changes that created new challenges (e.g., population growth, diminishing natural resources, environmental concerns, human rights issues, technological and scientific advances, shifting political alliances, globalization of the economy) in countries around the world, and give examples of how countries have addressed these challenges. DOK 2</p>
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Energy Inventory – Administrative Section

Schools and school districts must comply with energy related laws as well as deal with budgets. This section helps students learn more about those policies.

Inventory Questions	Ideas for School Improvement	Resources	Connections to KY Core Content 4.1
19	Does the school or district have a written energy policy?	<p>Kentucky Energy Efficiency Program for Schools (KEEPS) http://www.kppc.org/KEEPS/index.cfm</p> <p>Energy Quest is the award-winning energy education website of the California Energy Commission. It has interactive visuals and a thorough listing of Energy Education Resources for Teachers and Parents, including lesson plans, books, and web links. http://www.energyquest.ca.gov/</p> <p>Kentucky's program for energy efficient schools http://www.energy.ky.gov/dre3/education/schbldgs.htm</p> <p>A Texas school works with the district energy manager to reduce energy use. http://www.seco.cpa.state.tx.us/sch-gov_ed.htm</p> <p>The energy star home page http://www.energystar.gov/</p> <p>How students in California teamed up to reduce energy consumption http://www.ase.org/content/article/detail/3119</p> <p>Links to energy curriculum http://eelink.net/cgi-bin/mega-wrap-htdig2.py?config=treo&restrict=&exclude=zz&words=energy</p> <p>Contact Kentucky Project NEED</p> <p>Kentucky NEED Project Contact: Karen Reagor, Executive Director PO Box 176055 Covington, KY 41017 Tel: (859) 578-0312 Fax: (859) 578-0316 Email: kreagor@need.org NEED website - http://www.need.org</p>	Primary
20	Does the school or district have an energy manager?		Fourth Grade
21	Does the administration encourage the purchase of Energy Star equipment?		Fifth Grade
22	Does your school have a student energy team that monitors or promotes energy conservation in school?		Sixth Grade
23	How is energy part of each grade's curriculum?		Seventh Grade
24	Who conducted this Energy Inventory (e.g., Mrs. Watt's 5 th grade class with assistance from Mr. Clean, head custodian, Mrs. Century, accountant, and the local rural electric cooperative)?		



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				<p>PL-07-3.3.01 Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy). DOK 2</p> <p style="text-align: center;">Eighth Grade</p> <p>PL-08-3.3.01 Students will describe consumer actions (reuse, reduce, recycle) and explain how these actions impact the environment (e.g., conserving resources, reducing pollution, reducing solid waste, conserving energy). DOK 2</p> <p>SC-08-4.6.2 Students will</p> <ul style="list-style-type: none"> ● describe or explain energy transfer and energy conservation; ● evaluate alternative solutions to energy problems. <p>Energy can be transferred in many ways, but it can neither be created nor destroyed. DOK 3</p> <p style="text-align: center;">High School</p> <p>SC-HS-4.6.1 Students will</p> <ul style="list-style-type: none"> ● explain the relationships and connections between matter, energy, living systems, and the physical environment; ● give examples of conservation of matter and energy. <p>As matter and energy flow through different organizational levels (e.g., cells, organs, organisms, communities) and between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change. DOK 3</p> <p>PL-HS-3.3.01 Students will compare consumer actions (reuse, reduce, recycle, choosing renewable energy sources, using biodegradable packaging materials, composting) and analyze how these actions impact the environment (e.g., conserving resources; reducing water, air, and land pollution; reducing solid waste; conserving energy; greenhouse effect, slowing global warming). DOK 3</p> <p>SS-HS-3.1.1 Students will give examples of and explain how scarcity of resources necessitates choices at both the personal and societal levels in the modern world (1500 A.D. to present) and the United States (Reconstruction to present) and explain the impact of those choices. DOK 2</p>
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				<p>SS-HS-5.3.6 Students will explain how the second half of the 20th century was characterized by rapid social, political, and economic changes that created new challenges (e.g., population growth, diminishing natural resources, environmental concerns, human rights issues, technological and scientific advances, shifting political alliances, globalization of the economy)</p>
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