



Curriculum Unit

**TRYING TO SEE THE LIGHT:
GEORGIA'S STRUGGLE THROUGH
POST-SOVIET TRANSITION**

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GENERAL BACKGROUND FOR TEACHERS

In the 16 years since the collapse of the Soviet Union and the emergence of 15 independent states within its former boundaries, the pace of transformation has varied significantly not only from state to state, but year to year. For the purpose of this curriculum we will focus on the transformation from a planned to a market economy and how citizens of the new states have attempted to meet their needs and wants in this challenging time of transition.

In December 1991, the Soviet Union officially ceased to exist and with it ended its 75 year experiment with communism and a planned economy. Many citizens in the 15 newly independent states rejoiced at their renewed independence and others around the world hailed the end of the Cold War. What a majority did not anticipate was the years of economic hardship that would accompany the transition from being a part of the Soviet Union's interdependent planned economy to establishing independent market economies. Sixteen years later this transition is still impacting the lives of many citizens. While some citizens have struck it rich and made Moscow home to the world's greatest number of billionaires, many more have seen their careers collapse and their way of life become increasingly more difficult financially. But the extent of this transition is not limited to income; its breadth is quite extensive as people have been forced to find new ways to meet their needs and wants. What citizens once took for granted from jobs to food, electricity and vacations, in many cases became scarce or unavailable.

In this unit, we will look primarily at the situation concerning energy supply in the country of Georgia. It will help students examine the importance of energy in daily life and what happens when traditional modes of supply are suddenly severed or no longer available at previous levels of supply. While we will look primarily at the situation in Georgia, this problem is not unique to Georgia.

TRYING TO SEE THE LIGHT

PART I: INTRODUCTION TO TOPIC

ACTIVITY 1.1 – DEFINING NEEDS AND WANTS

Step One

Begin by leading a class discussion on the definition of needs and wants. Next, divide the students into groups and ask them to spend 15 minutes brainstorming their own needs and wants as well as those of their family and community. Explain that each group should come up with two separate lists, one of needs and the other of wants. After 15 minutes open the discussion to the class and have each group begin sharing their lists. Keep a running list of what is mentioned. How do the students differentiate between a need and a want? As a class, go through the list discussing each item and whether or not it is in the right list and why (what qualifies it as a need or a want?). Next ask students to identify by what means each need and want is met (e.g. money, time, energy, skills, raw materials, etc).

Needs: that which people require to survive.

Wants: that which people desire to improve their quality of life.

Step Two

Next introduce or review the definition of opportunity cost (see definition below). Explain that economics can be viewed as a science of scarcity and choices. It generally assumes that people do not have the resources necessary to satisfy all of their wants and needs and therefore requires that choices be made regarding how the available resources are allocated. As a result, every choice has a cost.

Opportunity Cost: the best alternative given up when making a choice.

To help students better understand this concept ask them to think of opportunity cost as the benefit he/she is refusing when a choice is made, or choosing the benefits of one decision means refusing the benefits of the other. To further demonstrate, give students an example:

- Attend class
- Not attend class

Next, ask students what the benefits of each alternative would be and record it on the board or overhead under each choice. Next explain that because they are in class today, they clearly made the choice to attend class, so the opportunity cost becomes the benefits they refused of not attending class.

Step Three

Ask students to consider the following question: Is energy a need or a want? Then instruct them to walk through their day identifying what activities they perform that require energy. What different types of energy and fuel do these activities require? Do they know where the fuel comes from? How important is energy in their daily lives? Next try the opportunity cost exercise again with the alternatives of driving a car to school or riding the bus.

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Homework Assignment: Ask students to cut out pictures from newspapers and magazines showing energy consumption and bring them to class over the following week to create a collage in the classroom.

ACTIVITY 1.2 – EXAMINING OUR ENERGY SUPPLY

Overview

This activity will introduce students to various energy resources as well as the energy resources of their own state and country.

Step One

As a class review the various types of energy sources: renewable: solar, wind, geothermal, biomass, hydropower, and ocean energy; and nonrenewable: oil, natural gas, coal, and uranium (nuclear). The following web site is a useful start: (<http://www.eia.doe.gov/kids/energyfacts/sources/whatsenergy.html>).

Step Two

Divide the class into ten groups and assign each group one of the following states: Alabama (**Handout #1.A**), Arizona (**Handout #1.B**), Arkansas (**Handout #1.C**), California (**Handout #1.D**), Mississippi (**Handout #1.E**), North Carolina (**Handout #1.F**), Ohio (**Handout #1.G**), South Dakota (**Handout #1.H**), Texas (**Handout #1.I**), and Washington (**Handout #1.J**). Explain that each group must review the energy information for their state, answer the questions on the worksheet (**Handout #2 – Examining Our Energy Supply Worksheet**), and be prepared to present their findings to the class. Direct them to the following Energy Information Administration website that contains official energy statistics from the U.S. Government: <http://tonto.eia.doe.gov/state/>.

Questions:

- 1) Name the state you are reviewing:
- 2) What type of energy resources does this state have?
- 3) What type of energy does this state generate?
- 4) Does this state import energy? If so, what does it import and from where?
- 5) Does this state export energy? If so, what and to whom?
- 6) Does your state consume more energy than it produces?
- 7) Is your state landlocked, or does it have access to water ports? Why might this matter?
- 8) Does your state border another country? Why might this be significant?

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Discuss the following scenario with your group and answer the following questions:

SCENARIO

Imagine that you live in a make-believe country with 50 states similar to the United States of America (even with the same names). In this country, unlike the United States, the economy is centrally planned, meaning the central government determines how resources are produced and allocated throughout the country. Then, overnight your country suddenly breaks apart into 50 independent states and the centrally planned economy collapses. Without central planning there is no way to coordinate the transfer of resources and products between states.

Using the energy information for the state you researched imagine it is now one of these new independent countries and discuss the following questions with your group.

- 1) How might this affect the energy situation in your state?
- 2) Would your state face a shortage or surplus of energy?
- 3) How does the geographical location of your state help or harm your situation?
- 4) What possible solutions do you envision for your situation?

After students have had some time to discuss the questions in their groups lead the class in a discussion about their reactions to this scenario.

ACTIVITY 1.3 – CLASS PRESENTATIONS

Instruct each group to give a five minute presentation to the class about their assigned state. The audience should take notes and come up with at least one question for each presentation.

ADDITIONAL ACTIVITY

The Power Game

http://www.bpa.gov/Corporate/KR/ed/nwpower/power_game.htm

The Power Game gives students a chance to discuss and debate power generation scenarios. The students form teams which operate power companies. The teams are faced with decisions reflecting the real world: economics, environment, government, consumers, weather, and technology. Each team discusses its options and tries to reach a consensus on what strategy to proceed with as it supplies electrical energy. The teacher can decide how and to what degree success should be measured; the real goal is to precipitate a lively discussion of the myriad conflicts and choices made in the power industry. There are two versions of the game: The Power Game and the Power Board Game.

PART II: RESEARCH AND THINKING

ACTIVITY 2.1 – COMPARING ECONOMIC SYSTEMS

Review with your students the concepts and essential differences between a command economy in which resources are allocated according to the central authority and a market economy in which allocations result from individuals making decisions as buyers and sellers.

Capitalism (Market Economy): An economic system in which the ownership of land and natural wealth, the production, distribution and exchange of goods, and the operation of the system itself are determined by private enterprise under competitive conditions rather than government central planning.

Command Economy (Planned Economy): An economic system based on government ownership of all means of production (farms, factories, shops, etc.) and the organization of those assets into firms managed by the state in accordance with output targets and prices fixed by government economic planners. Priority is placed on industrial and military investment over consumer goods and food.

Homework: Assign background readings about the Collapse of the Soviet Union/Communism and Yeltsin era. If you have already covered this material, break the class into two groups and assign everyone to read the BBC country reports for Russia and Georgia, as well as one of the two additional articles. Explain that each group will be expected to give a short presentation about their assigned article.

Reading assignments for all students:

- Russia Country Report:
http://news.bbc.co.uk/2/hi/europe/country_profiles/1102275.stm
- Georgia Country Report:
http://news.bbc.co.uk/1/hi/world/europe/country_profiles/1102477.stm

Reading assignments for each group:

- A decade of economic reform:
<http://news.bbc.co.uk/2/hi/business/1727305.stm>
- Eyewitness: Collapse of the USSR:
<http://news.bbc.co.uk/2/hi/europe/1482624.stm>

ADDITIONAL LESSONS AND ACTIVITIES

Foundation for Teaching Economics

Opportunity Cost: The Soviet Choice for Growth

<http://www.fte.org/teachers/lessons/edsu/edsules1.htm>

This multi-faceted series of lessons looks at opportunity cost and the economic demise of the Soviet Union and its command economy.

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PBS: Frontline World – Russia's Conversion From Communism to Capitalism

http://www.pbs.org/frontlineworld/educators/economics_russia.html

This in-depth lesson uses Russia as a case study and helps students examine the real-world struggles of converting from a command economy to a market economy.

EconEdLink: Economy in Transition – Ukraine

<http://www.econedlink.org/lessons/index.cfm?lesson=EM138&page=teacher>

This lesson asks students to analyze data to explain the relationship between economic freedom and economic growth in transition economies.

Additional resources:

http://edhelper.com/ReadingComprehension_35_331.html

http://www.edhelper.com/ReadingComprehension_35_304.html

ACTIVITY 2.2 – KEY CONCEPTS AND VOCABULARY (CLASSROOM OR HOMEWORK ACTIVITY)

Break the class into groups and distribute **Handout #3 – Terms and Definitions**. Let students know that they will be expected to discuss these terms in class. At least one person in each group should know something about the event, person, or place not just the date.

ACTIVITY 2.3 – FOCUSING ON GEORGIA

GEORGIA BACKGROUND FOR TEACHERS

Roughly the size of North Carolina with a population of 4.5 million, Georgia lies between the Black Sea, Russia, Azerbaijan, Armenia, and Turkey. It is a mountainous country with a rich history influenced by its geographic location as a gateway between Europe and Asia and hence its inclusion in numerous empires from the time of the Greeks and Romans through the Persian, Ottoman, and Soviet Empires. Although Georgia is not rich in oil or gas resources, it does have hydroelectric power sources, forests, minerals, and rich agricultural land. Most significantly, Georgia occupies a strategic position as a transit state for moving Caspian Sea resources to the international market.

Prior to its independence in 1991, Georgia spent most of the 20th century as the Soviet Socialist Republic of Georgia within the Soviet Union. It was integrated into the Soviet Command economy and living standards in the republic were considered to be fairly good with many services provided for free or at highly subsidized rates (like energy and transportation). Nevertheless, Georgia's independence movement gained steam throughout the 1980's and came to a head in April 1989 when Soviet troops used force to disperse an anti-Soviet demonstration resulting in 20 deaths and hundreds of injuries. Two years later in March 1991, an overwhelming majority of the Georgians who turned out for a referendum voted for independence from the Soviet Union and on April 9, 1991, the Supreme Council of the Republic of Georgia proclaimed Georgian sovereignty and independence from the Soviet Union. The USSR was officially dissolved in December of that year.

Sadly, Georgia's early experience with independence was marred by separatist and civil wars in which tens of thousands were killed and over 300,000 Georgians lost their homes and became displaced within the newly independent country or in neighboring countries.

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What had been a gem of the Soviet Union suddenly became a war-torn and impoverished independent state; its supply lines and economic ties to Russia severed with the collapse of the Soviet Union and its command economy. Corruption prospered and was endemic throughout society as citizens and government officials at all levels turned to smuggling, corruption, and bribery to meet their needs and wants, placing Georgia among the top ten most corrupt countries in the world according to Transparency International's Corruption Perception Index. The black market thrived in this environment and according to a 1998 World Bank report, approximately 75 percent of the government's budget was lost to non-payment of taxes.

As a direct result of the collapse of the command economy and increasing corruption, Georgia soon found itself facing severe energy shortages. Its hydroelectric resources were not sufficient to supply the country's needs and cut off from the Soviet supply grid, it was now forced to purchase energy from other countries. As the country moved toward a market economy citizens would now have to pay for services, such as heat and electricity, which were previously provided for by the government.

In this CBA, students have the opportunity to look at how citizens of the new independent states of the former Soviet Union went about meeting their needs and wants in the wake the command economy's collapse. For the purpose of this class, we will focus on energy supply in the country of Georgia. The film *PowerTrip* is highly recommended, as it depicts the challenges faced by a population forced to find new ways to meet their energy needs.

ACTIVITY 2.4 – POWER TRIP THE MOVIE

In class, show students the classroom cut of the documentary film “Power Trip” this edited version runs 55 minutes. Ask students to take notes on what they find surprising or interesting. Before showing the video pass out worksheet (**Handout #4 – PowerTrip the Movie Worksheet**), review the questions with the students and ask if there are any questions. Instruct students to complete the worksheet and prepare for a class discussion during the next class meeting. Worksheet answers are listed in italics.

Note: The video is available on DVD from the Ellison Center for Russian, East European and Central Asian Studies at the University of Washington, Netflix, and at Scarecrow Video.

PowerTrip the Movie – Worksheet Questions and Answers

In 1999 the American multi-national energy corporation AES purchased Telasi, the electricity distribution company for Tbilisi, the capital of the country Georgia. The new entity, AES-Telasi brought together managers trained in the communist command economy with those reared in capitalism to rebuild a broken and previously state-run energy company in a country unaccustomed to paying for electricity. This film follows the challenges faced by the Georgian citizens as well as the global energy company as it attempts to establish a reliable energy supply in a country damaged by war, wrought with corruption, and dependent on Russian energy imports.

- 1) Why are citizens of Tbilisi facing electricity shortages? *Georgia is not energy independent and there are not enough energy resources in the country to supply 24-hour electricity; droughts have depleted Georgia's main domestic source of energy: hydropower; the population is not accustomed to paying for electricity because the government provided it during the Soviet period; there is not enough gas coming from Russia to run gas-generated distribution center generators; corruption; failure to maintain equipment; Azoti and other big industrial customers are using electricity and not paying for it so there is not enough to distribute to paying customers; bribery (people working the switchboards at the dispatch centers are paid to give electricity to some and cut others).*
- 2) Why is electricity connected to hope? *When there is electricity the people feel more secure, the darkness is oppressive and people feel insecure, cold, hungry, and humiliated.*
- 3) List as many activities as you can that depend on electricity: *reading at night, making a phone call, working on a computer, sending a fax, turning on the TV, keeping food refrigerated, taking an elevator, etc.*
- 4) What is AES? *Applied Energy Services, the world's largest independent power company. AES owns \$40 billion worth of power assets in 33 countries.*
- 5) What does AES CEO Denis Bakke state is the mission of his company? *"To steward the resources we have been given in order to meet a need in the world, to serve the world with safe, clean, reliable electricity." To empower people, ask people to voluntarily give up power so that more people can have the ability to make decisions for themselves and create a more fun workplace.*
- 6) What steps does AES take to meet its needs and wants as a multinational corporation? What risks does the company take? *AES purchased Telasi for \$35 million in 1999 and then spent \$60 million re-metering Tbilisi in order to build an AES-Telasi customer relationship in a clearly defined way and ideally make a profit (although this is not explicitly stated). The company risked financial losses, angering the population and government, riots in the streets, and even the lives of its employees.*
- 7) How does the average citizen of Tbilisi meet his/her needs and wants for electricity? What risks does he/she take? *Citizens built their own illegal electricity connections using any type of cable they could find, others bought generators, some paid the electricity bill if they had the money, others bribed the money collectors to keep from being disconnected. Some broke the meters, putting their own locks on the kiosks. Citizens risked electrocution and death by creating their own connections.*
- 8) What does AES discover is happening between the customers and collection? Why might this be happening? *AES discovered that money was being pocketed either by the cashiers/bill collectors, bank, or someone else in the middle. Due to the overall dire economic situation people stole from wherever they could.*
- 9) As one woman explained, "I am not stealing from you; I am stealing from the government." What is significant about this statement? *Some people did not understand the shift from a command economy controlled by the government to a market economy of private enterprise. She*

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believed she was stealing from a corrupt government which she did not support and therefore believed it was not harming anyone. This form of stealing or corruption was not considered by many to be a bad thing.

- 10) Are some Georgians better positioned to meet their needs and wants? Why or why not
Yes, those with connections to the government and/or those who can pay bribes.
- 11) How does the Enron scandal in the U.S. affect AES in Georgia? *Stock prices collapsed and the CEO resigned, then AES was sold to the Russians.*

Bonus questions:

- What was the average monthly wage in Tbilisi: *\$15*
- What was the average monthly residential electricity bill from AES-Telasi: *\$24*
- What was the average monthly bill prior to AES-Telasi: *\$0*
- What was the amount of money AES-Telasi spent improving power lines and meters in Tbilisi: *\$90 million*
- What was the estimated daily loss at AES-Telasi: *\$120,000*
- What was the total loss at AES during its time in Georgia: *Over \$200 million*

After the video, ask students if they have any questions and remind them that they will discuss the film in class during the next session.

ACTIVITY 2.5 – HOMEWORK/ADDITIONAL RESEARCH

Instruct students to use the internet to find additional information about Georgia, AES, and the energy shortages. The resources listed at the end of this unit are a good place to start (see **Handout #6**). Remind students that they should be looking for the following information in their reading:

- What economic problems are faced by the citizens of Tbilisi? By AES?
- What are potential solutions?
- How are the citizens and AES-Telasi attempting to meet their needs and wants given the opportunity cost of each solution?
- What values, beliefs, and rights in each society can you identify that relate to their economies?

ACTIVITY 2.6 – CLASS DISCUSSION QUESTIONS

- Based on what you have learned about the cultures of command and market economies, what examples can you find in the film that represent each?
- How would you describe each society's rights, beliefs and values as they relate to their economies?
- AES claims that its mission is not to just make money, but to facilitate people taking on responsibility. It lists its corporate goals as: integrity, fairness, social responsibility and fun. How does this seem to compare to the system that Georgian managers were accustomed to?
- What happens when these two societies come into contact?

ACTIVITY 2.7 – SMALL GROUP DISCUSSION

After reviewing the answers to the questions above, break the class into groups and have them spend 40 minutes discussing the following questions. Distribute **Handout #5 – PowerTrip Small Group Discussion Questions**.

- 1) What economic problems do the citizens of Tbilisi face?
- 2) What economic problems does the company AES-Telasi face?
- 3) What are some potential solutions to these problems?
- 4) What is the opportunity cost for a Georgian citizen who does not pay for electricity?
- 5) What is the opportunity cost for a Georgian citizen who does pay for electricity?
- 6) What is the opportunity cost for AES if it continues to work in Georgia?
- 7) What is the opportunity cost for AES if it sells to the Russians?
- 8) How does each attempt to meet its needs and wants given the opportunity cost of each solution?
- 9) What values, beliefs and rights of the Georgian society relate to their economy?
- 10) What values, beliefs and rights of AES relate to their economy?
- 11) How do the solutions relate to the values and beliefs of those in each society?
- 12) What solutions are most effective in meeting each society's needs and wants?

SUGGESTED CONCLUDING ACTIVITIES

- Have each student write an essay summarizing what he/she thinks are the main points from their group discussion.
 - Have each student (or groups of students) write a business plan that addresses some of these issues.
 - Have groups of students create a poster that illustrates why the company and the citizens are at odds.
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HANDOUT #1.A – ALABAMA



Alabama Quick Facts:

- Although it produces large amounts of Coal, Alabama relies on deliveries from other States to meet roughly half of State demand.
- Alabama produces natural gas largely from wells offshore in Gulf of Mexico and from coalbed methane deposits, found primarily in the Black Warrior Basin and the Cahaba Coal Field.
- With numerous dams along the Alabama and Coosa Rivers, Alabama is one of the largest hydroelectric power-producing States east of the Rocky Mountains.
- Alabama's soil is well suited for growing switchgrass, making the State a potential site for the installation of bioenergy plants.

OVERVIEW

Resources and Consumption

Alabama is rich in energy resources. The State has considerable conventional and unconventional natural gas reserves, substantial deposits of coal, and numerous rivers capable of hydroelectric generation. Several regions of Alabama are well suited for growing switchgrass, making the State a potential site for the installation of bioenergy plants. With a strong manufacturing base in paper products, chemicals, and textiles, Alabama's industrial sector leads State energy consumption, accounting for nearly one-half of total energy use.

Petroleum

Alabama produces a small amount of crude oil from reserves located in the Black Warrior Basin in the north and the Gulf Coast in the south. Although production has been in decline since the early 1990s, high oil prices have sparked new onshore drilling activity in recent years. To increase production from aging fields, producers have repaired old wells and applied new technology. Two petroleum refineries are located near the Port of Mobile, and a third is located in Tuscaloosa on

the Black Warrior River. A fourth refinery is located in Atmore in the southern part of the State. Alabama markets receive finished petroleum products from Texas and Louisiana through the Colonial and Plantation pipelines. Per capita petroleum consumption in Alabama is about average compared to other States.

Natural Gas

Alabama's annual natural gas production accounts for more than 1 percent of total U.S. output. More than one-half of this production typically comes from offshore wells, and more than one-third comes from coalbed methane deposits (unconventional natural gas found trapped within coal seams) in the Black Warrior Basin and the Cahaba Coal Field. As with oil production, Alabama's natural gas production is in decline and does not satisfy all consumer demand, about three-fourths of which is from industrial users and electric power generators. Consequently, Alabama purchases additional supplies of natural gas transported by pipeline from Louisiana and Texas.

Coal, Electricity, and Renewables

Alabama ranks high among States in electricity generation. Coal is the dominant fuel for electric power generation, typically accounting for more than one-half of the electricity produced within the State. Although Alabama produces large amounts of coal in the northern part of the State, industry consumes most of the State's output. Coal used for electricity generation is shipped in from other States, primarily Wyoming and Kentucky. Alabama is a major nuclear power generator, and in 2005 its two nuclear power plants produced about one-fourth of the electricity generated in the State. The State's nuclear power capacity is expected to expand in mid-2007 when the Tennessee Valley Authority (TVA) restarts a nuclear reactor at its Browns Ferry nuclear power plant that has been idle since 1985. With more than two dozen hydroelectric dams, located mainly along the Alabama and Coosa Rivers, Alabama is the one of the top producers of hydroelectric power east of the Rocky Mountains. Hydroelectric power typically supplies at least 6 percent of State electricity generation.

Due to high demand from the industrial and residential sectors, Alabama's total electricity consumption is high when compared to other States. Alabama's per capita consumption of residential electricity is one of the highest in the country due to high air-conditioning demand during hot summer months and the widespread use of electricity for home heating during generally mild winter months. However, despite high total and per capita electricity demand, Alabama electricity production exceeds consumption and the State exports large amounts of electricity to neighboring States via several high-voltage interstate transmission lines.

Population: 4.6 million (2007); Rank in U.S.: 23

Per capita personal income: \$32,404 (2007); Rank in U.S.: 42

HANDOUT #1.B – ARIZONA



Arizona Quick Facts:

- Arizona's Palo Verde nuclear power plant is the highest capacity nuclear plant in the United States.
- Arizona power plants export large amounts of electricity to neighboring States, particularly to markets in Southern California.
- Arizona's large desert areas offer the highest solar power potential in the country.
- Substantial coal production takes place in the Black Mesa Basin in northeast Arizona.

OVERVIEW

Resources and Consumption

Arizona has substantial coal deposits but few other fossil fuel resources. The coal deposits are concentrated in the Black Mesa Basin in the northeast part of the State. Arizona has one nuclear power plant and extensive solar energy potential. Its large desert areas offer the highest solar power potential in the country, and the Colorado River is a tremendous source of hydropower. While Arizona ranks near the middle of the States in total energy consumption, per capita energy consumption is low, and the State economy is not energy intensive. The transportation sector is the leading energy-consuming sector in the State.

Petroleum

Arizona's annual crude oil production is minimal. Arizona has no refineries and receives its petroleum product supply via two pipelines, one from southern California and the other from El Paso, Texas. In summer 2003, a rupture on the line from El Paso caused an oil spill and shut down the

section between Tucson and Phoenix. The accident caused shortages at Phoenix area motor gasoline fueling stations. A new refinery in Yuma County, Arizona, about 100 miles southwest of Phoenix, has been proposed and is expected to be operational by 2010. The refinery would receive crude oil supplies via a pipeline from Mexico and would ease motor gasoline supply constraints throughout the State. An oxygenated motor gasoline blend is used in the Tucson area during the winter and in Maricopa County (Phoenix) year-round.

Natural Gas

Arizona relies on interstate deliveries to meet most of its natural gas demand. Several major natural gas pipelines from production areas in Texas and the Rocky Mountains supply Arizona markets as they flow west towards southern California. The electric power sector dominates natural gas consumption in Arizona, consuming roughly three-fourths of State supply. Winters are generally mild and almost two-fifths of Arizona households rely on natural gas as their primary energy source for home heating.

Coal, Electricity, and Renewables

Arizona's coal production takes place primarily in the Black Mesa Basin and large volumes of coal move in and out of the State via rail. More than one-third of the coal produced in Arizona is delivered to coal-fired generators in Nevada. The remaining two-thirds, along with coal supplies transported primarily from New Mexico, are consumed at power plants in the State.

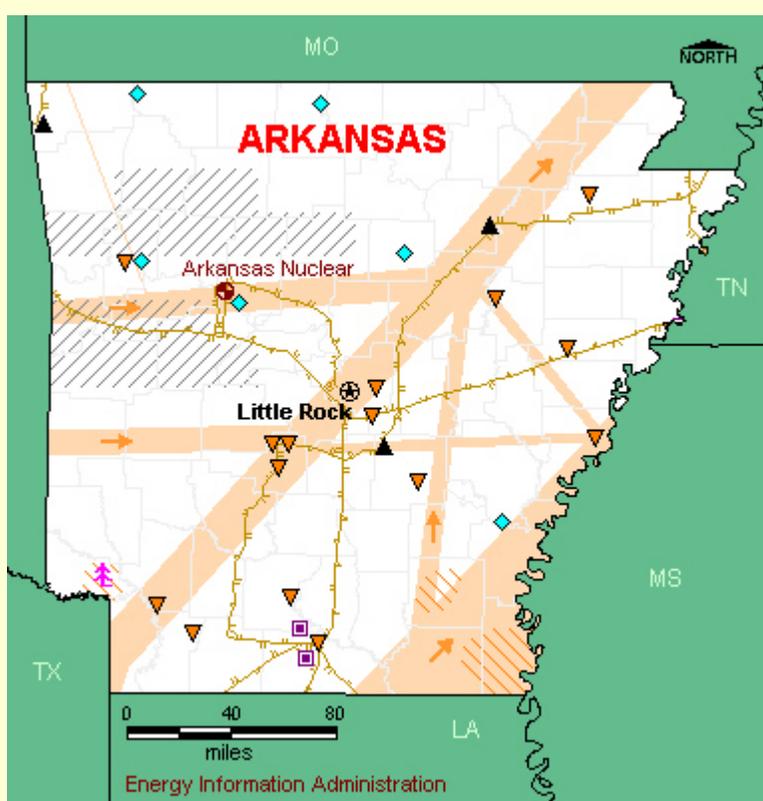
Coal-fired plants supply roughly two-fifths of Arizona's demand for electricity. Natural gas-fired plants and nuclear power supply most of the remainder. Arizona's sole nuclear power plant, the 3-unit Palo Verde plant, provides about one-fourth of the State's total electricity generation. Palo Verde is the Nation's largest nuclear plant and has the second-highest rated capacity of any power plant in the United States. The Glen Canyon and Hoover Dams, both located on the Colorado River in northern Arizona, provide hydroelectric power. Although Arizona leads the Nation in solar power potential, its solar-powered generation facilities are small and the State has not yet developed its solar resource on a large scale. More than one-half of Arizona households rely on electricity as their primary energy source for home heating.

Population: 6.3 million (2007); Rank in U.S.: 17

Per capita personal income: \$33,029 (2007); Rank in U.S.: 40

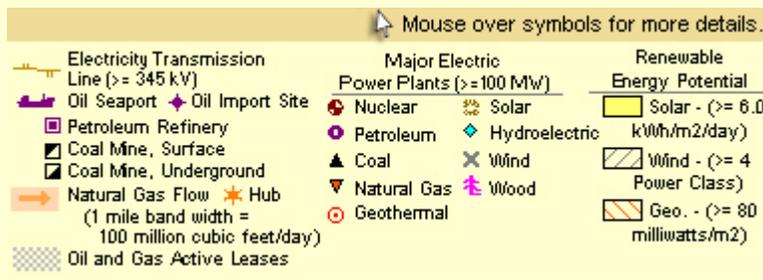
Gross Domestic Product: \$232.5 billion (2006); Rank in U.S.: 19

HANDOUT #1.C – ARKANSAS



Arkansas Quick Facts:

- Coal-fired plants, which supply about one-half of Arkansas's electricity demand, rely entirely on coal deliveries via railcar from Wyoming.
- Arkansas natural gas production accounts for about 1 percent of U.S. output.
- Companies are beginning to extract small amounts of natural gas from coalbed methane deposits in the Arkoma basin.
- Arkansas is one of the few States in the Nation that allow the use of conventional motor gasoline statewide.



OVERVIEW

Resources and Consumption

Arkansas has moderate energy resources. Substantial natural gas reserves are found in the Arkoma basin in western Arkansas and in the Gulf Coastal Plain in the south. Smaller oil reserves and coal deposits are also found in those regions. Several river basins, including the Lower Arkansas River, offer hydroelectric power potential. Areas of the State are also suitable for wind, wood, and wood waste power generation. Per capita energy use is high due in part to an energy-intensive industrial sector, which leads State energy consumption.

Petroleum

Arkansas extracts small amounts of crude oil mostly from stripper wells that produce less than 10 barrels per day in the southern part of the Gulf Coastal Plain of south Arkansas. Arkansas has two refineries located in the same region. Petroleum products are delivered to consuming regions by barge via the Arkansas and Mississippi Rivers. The TEPPCO pipeline also supplies petroleum

products from Texas and Louisiana. Arkansas is one of the few States in the Nation that allow the statewide use of conventional motor gasoline. (Most States require the use of special fuel blends in non-attainment areas.)

Natural Gas

Arkansas natural gas production typically accounts for about 1 percent of annual U.S. output. Most of the State's natural gas production takes place in the Arkoma Basin, although several wells also operate in the Gulf Coastal Plain. In addition to conventional production, companies are beginning to extract small amounts of natural gas from coalbed methane deposits in the Arkoma Basin. Several major natural gas pipelines from Texas, Louisiana, and Oklahoma pass through the State on the way to Midwest and Northeast markets. Industrial sector natural gas consumption in Arkansas has declined in recent years. Until 2001, the industrial sector accounted for more than half of the State's natural gas consumption but this share had fallen to two-fifths by 2005. Almost one-half of Arkansas households use natural gas as their primary energy source for home heating.

Coal, Electricity, and Renewables

Coal and nuclear power are the dominant energy sources used for electricity generation in Arkansas, although natural gas and hydroelectric power are also important energy sources. Coal-fired power plants account for about one-half of the electricity produced within the State, and these plants rely entirely on coal deliveries from Wyoming. The State's only nuclear plant (the dual-unit Arkansas Nuclear One Plant in Russellville) typically generates more than one-fourth of the total electricity generated in the State. Hydroelectric power plants in the White River Basin in the north, along the Arkansas River in central Arkansas, and in the Ouachita River Basin in the south also contribute to electricity supply. About one-third of Arkansas households use electricity as their primary energy source for home heating.

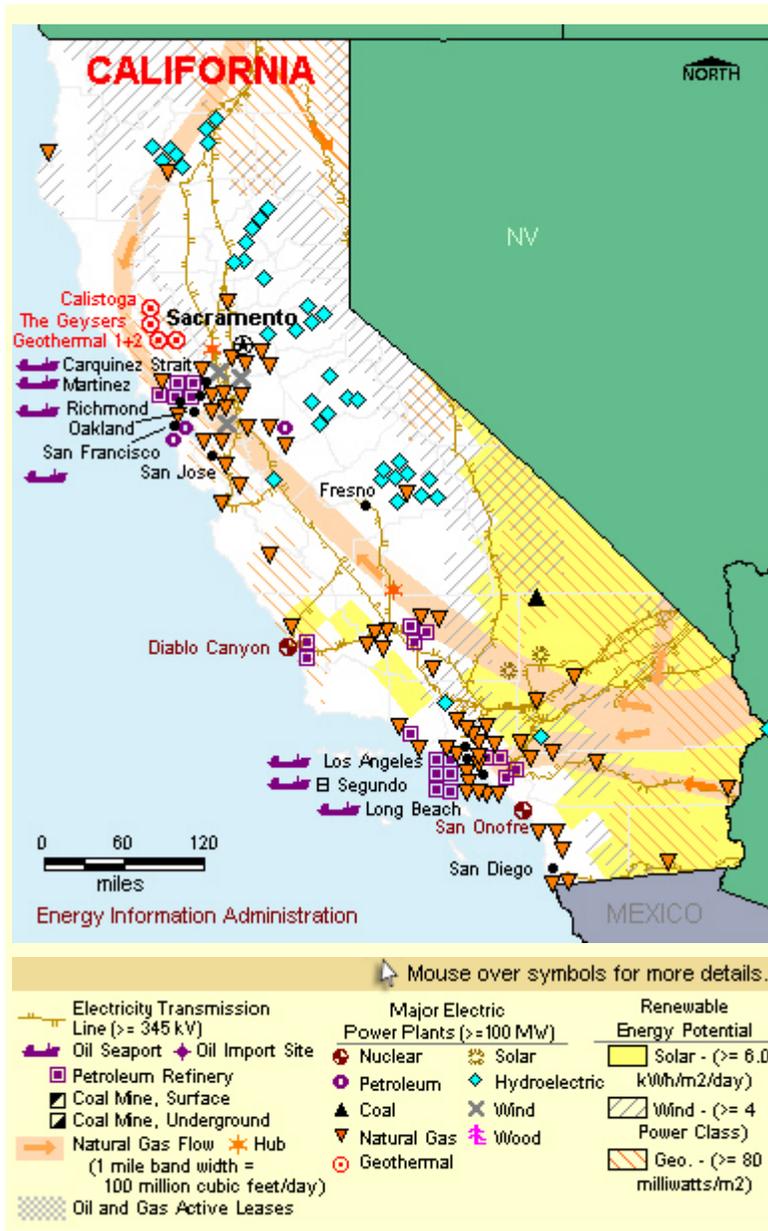
Population: 2.8 million (2007); Rank in U.S.: 32

Civilian Labor Force: 1.4 million (2007); Rank in U.S.: 32

Per capita personal income: \$30,060 (2007); Rank in U.S.: 48

Gross Domestic Product: \$91.8 billion (2006); Rank in U.S.: 34

HANDOUT #1.D – CALIFORNIA



California Quick Facts:

- California ranks third in the Nation in refining capacity and its refineries are among the most sophisticated in the world.
- California's per capita energy consumption is low, in part due to mild weather that reduces energy demand for heating and cooling.
- California leads the Nation in electricity generation from non-hydroelectric renewable energy sources, including geothermal power, wind power, fuel wood, landfill gas, and solar power. California is also a leading generator of hydroelectric power.
- California imports more electricity from other States than any other State.
- In 2000 and 2001, California suffered an energy crisis characterized by electricity price instability and four major blackouts affecting millions of customers.

OVERVIEW

Resources and Consumption

California is rich in conventional and renewable energy resources. It has large crude oil and substantial natural gas deposits in six geological basins, located in the Central Valley and along the Pacific coast. Most of those reserves are concentrated in the southern San Joaquin Basin. More than a dozen of the Nation's 100 largest oil fields are located in California, including the Belridge South oil field, the second largest oil field in the contiguous United States. In addition, Federal assessments indicate that large undiscovered deposits of recoverable oil and gas lie offshore in the federally administered Outer Continental Shelf (OCS), although Federal law currently prohibits oil and gas leasing in that area. California's renewable energy potential is extensive. The State's hydroelectric power potential ranks second in the Nation (behind Washington State), and substantial geothermal and wind power resources are found along the coastal mountain ranges and the east-

ern border with Nevada. High solar energy potential is found in southeastern California's sunny deserts.

California is the most populous State in the Nation and its total energy demand is second only to Texas. Although California is a leader in the energy-intensive chemical, forest products, glass, and petroleum industries, the State has one of the lowest per capita energy consumption rates in the country. The California government's energy-efficiency programs have contributed to low per capita energy consumption. Driven by high demand from California's many motorists, major airports, and military bases, the transportation sector is the State's largest energy-consumer. More motor vehicles are registered in California than any other State, and worker commute times are among the longest in the country.

Petroleum

California is one of the top producers of crude oil in the Nation, with output accounting for more than one-tenth of total U.S. production. Drilling operations are concentrated primarily in Kern County and the Los Angeles basin, although substantial production also takes place offshore in both State and Federal waters. Concerns regarding the cumulative impacts of offshore oil and gas development, combined with a number of major marine oil spills throughout the world in recent years, have led to a permanent moratorium on offshore oil and gas leasing in California waters and a deferral of leasing in Federal waters. However, development on existing State and Federal leases is not affected and may still occur within offshore areas leased prior to the effective date of the moratorium.

A network of crude oil pipelines connects production areas to refining centers in the Los Angeles area, the San Francisco Bay area, and the Central Valley. California refiners also process large volumes of Alaskan and foreign crude oil received at ports in Los Angeles, Long Beach, and the Bay Area. Crude oil production in California and Alaska is in decline and California refineries have become increasingly dependent on foreign imports. Led by Saudi Arabia and Ecuador, foreign suppliers now provide more than two-fifths of the crude oil refined in California; however, California's dependence on foreign oil remains less than the national average.

California ranks third in the United States in petroleum refining capacity and accounts for more than one-tenth of total U.S. capacity. California's largest refineries are highly sophisticated; they are capable of processing a wide variety of crude oil types and are designed to yield a high percentage of light products like motor gasoline. To meet strict Federal and State environmental regulations, California refineries are configured to produce cleaner fuels, including reformulated motor gasoline and low-sulfur diesel.

Most California motorists are required to use a special motor gasoline blend called California Clean Burning Gasoline (CA CBG). In the ozone non-attainment areas of Imperial County and the Los Angeles metropolitan area, motorists are required to use California Oxygenated Clean Burning Gasoline, and the Los Angeles area is also required to use oxygenated motor gasoline during the winter months. By 2004, California completed a transition from methyl tertiary butyl-ether (MTBE) to ethanol as a gasoline oxygenate additive, making California the largest ethanol fuel market in the United States. There are four ethanol production plants in central and southern California, but most of California's ethanol supply is transported by rail from corn-based producers in the Midwest. Some supply is also imported from abroad.

Due to the relative isolation and specific requirements of the California fuel market, California

motorists are particularly vulnerable to short-term spikes in the price of motor gasoline. No pipelines connect.

California to other major U.S. refining centers, and California refineries often operate at near maximum capacity due to high demand for petroleum products. When an unplanned refinery outage occurs, replacement supplies must be brought in via marine tanker. Locating and transporting this replacement gasoline (which must conform to the State's strict fuel requirements) can take from two to six weeks.

Natural Gas

California natural gas production typically accounts for less than 2 percent of total annual U.S. production and satisfies less than one-fifth of State demand. Production takes place in basins located in northern and southern California, as well as offshore in the Pacific Ocean. California receives most of its natural gas by pipeline from production regions in the Rocky Mountains, the Southwest, and western Canada. As with crude oil production, California natural gas production is in decline. However, State supply has remained relatively stable due to increasing amounts of natural gas shipped from the Rocky Mountains. California markets are served by two key natural gas trading centers—the Golden Gate Center in northern California and the California Energy Hub in southern California—and the State has nearly a dozen natural gas storage facilities that help stabilize supply. In part to help meet California's demand for natural gas, several companies have proposed building liquefied natural gas (LNG) import terminals in southern California.

Coal, Electricity, and Renewables

Natural gas-fired power plants typically account for more than one-half of State electricity generation. California is one of the largest hydroelectric power producers in the United States, and with adequate rainfall, hydroelectric power typically accounts for close to one-fifth of State electricity generation. California's two nuclear power plants account for almost one-fifth of total generation. Due to strict emission laws, only a few small coal-fired power plants operate in California.

California leads the Nation in electricity generation from nonhydroelectric renewable energy sources. California generates electricity using wind, geothermal, solar, fuel wood, and municipal solid waste/landfill gas resources. A facility known as "The Geysers," located in the Mayacamas Mountains north of San Francisco, is the largest complex of geothermal power plants in the world, with more than 750 megawatts of installed capacity. California has numerous wind farms in five major wind resource areas, and several new projects are currently under construction. The world's largest solar power facility operates in California's Mojave Desert. Two southern California utilities are planning to build new solar farms, a 500-megawatt facility in the Mojave Desert and a 300-megawatt plant in the Imperial Valley. These proposed plants would dwarf existing U.S. solar generation capacity. To further boost renewable energy use, California's Energy Action Plan includes incentives that encourage Californians to install solar power systems on their rooftops.

Due to high electricity demand, California imports more electricity than any other State. States in the Pacific Northwest deliver power to California markets primarily from hydroelectric sources, while States in the Desert Southwest deliver power primarily from coal- and natural gas-fired sources. Hydroelectric power comes to California primarily through the Western USA interconnection, which runs from northern Oregon to southern California. The system, also known as the Pacific Intertie, is the largest single electricity transmission program in the United States. Although the Pacific Intertie was originally designed to transmit electricity south during California's peak

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summer demand season, flow is sometimes reversed overnight and has occasionally been reversed during periods of reduced hydroelectric generation in the Northwest. California restricts the use of coal-fired generation within its boundaries; however, the Los Angeles Department of Water and Power (LADWP) operates the coal-fired Intermountain power plant in Utah, which delivers three-fourths of its output to LADWP and other California municipal utilities. A recent California law forbids utilities from entering into long-term contracts with conventional coal-fired power producers. Intermountain's existing contracts with southern California cities are set to expire in 2027.

In 2000 and 2001, California suffered an energy crisis characterized by electricity price instability and four major blackouts and caused by a supply and demand imbalance. Multiple factors contributed to this imbalance, including: a heavy dependence on out-of-State electricity providers, drought conditions in the northwest that reduced hydroelectric power generation, a rupture on a major natural gas pipeline supplying California power plants, strong economic growth leading to increased electricity demand in western States, an increase in unplanned power plant outages, and unusually high temperatures that increased electricity demand for air-conditioning and other cooling uses. Following the energy crisis, the California State government created an Energy Action Plan designed to eliminate outages and excessive price spikes. To achieve these goals, the plan calls for optimizing energy conservation, building sufficient new generation facilities, upgrading and expanding the electricity transmission and distribution infrastructure, and ensuring that generation facilities can quickly come online when needed.

Population: 36.6 million (2007); Rank in U.S.: 1

Civilian Labor Force: 18.3 million (2007); Rank in U.S.: 1

Per capita personal income: \$41,571 (2007); Rank in U.S.: 7

Gross Domestic Product: \$1,727.4 billion (2006); Rank in U.S.: 1

HANDOUT #1.E—MISSISSIPPI



Mississippi Quick Facts:

- Mississippi produces oil and gas but not enough to meet high in-State demand.
- A single reactor at the Grand Gulf Nuclear Power Station supplies about one-fourth of the electricity generated within the State.
- A major propane supply hub is located at Hattiesburg, Mississippi, where the Dixie Pipeline has a network of terminals and storage facilities.
- Two liquefied natural gas (LNG) import terminals have been proposed near Pascagoula, Mississippi.
- Mississippi is one of the few States that allow the use of conventional motor gasoline state-wide.

OVERVIEW

Resources and Consumption

Although Mississippi is not as rich in energy as neighboring Louisiana, the State has substantial energy resources. Oil and gas fields are found primarily in the southern half of the State. However, in recent years, new deposits have been discovered in the Black Warrior Basin in the north, and onshore and offshore along the Gulf Coast. Geologists believe that further exploration of those areas could reveal important new oil and gas reserves. Although Mississippi's economy traditionally relied on agriculture, manufacturing has now become the State's largest industry. The industrial and transportation sectors dominate State energy use and per capita energy consumption is high.

Petroleum

Mississippi produces a small amount of crude oil, mostly from wells in the southern half of the State. Mississippi has four oil refineries, which together account for more than 2 percent of total U.S. refining capacity. Mississippi's largest refinery, located along the Gulf Coast in Pascagoula,

processes crude oil imported by marine tanker from Central and South America. The Pascagoula refinery supplies fuel to markets in the South and Southeast, using marine shipments and connections to the Colonial and Plantation pipelines. Mississippi is one of the few States in the Nation that allow the statewide use of conventional motor gasoline. (Most States require the use of specific gasoline blends in non-attainment areas due to air-quality considerations.)

A major propane supply hub is located in Hattiesburg, Mississippi, where the Dixie Pipeline has a network of terminals and storage facilities. About one in five Mississippi households use liquefied petroleum gases (LPG) as their primary home heating fuel, compared with fewer than one in 10 households nationwide.

In January 2007, the U.S. Department of Energy (DOE) chose a group of salt domes in Richton, Mississippi, as a new storage site for the Strategic Petroleum Reserve. Designed to cushion the effects of potential crude oil supply disruptions, the new facility will hold about 160 million barrels of crude oil. The DOE chose this site in part because its inland location makes it less vulnerable to hurricanes.

Hurricane vulnerability is an issue for Mississippi's oil and gas infrastructure, much of which is located along the Gulf Coast. In 2005, Hurricane Katrina caused major damage to the Pascagoula refinery. In addition, power outages in Mississippi affected a Plantation Pipeline pump station, ultimately forcing the line to shut down and causing fuel supply problems throughout the southeastern United States.

Natural Gas

Mississippi's natural gas production is minimal, accounting for less than 1 percent of total U.S. output. In recent years, new wells have been completed at the Mariner Field along the Gulf Coast and at the Maben Field in the Black Warrior Basin. Despite new completions, Mississippi's marketed natural gas production has fallen drastically since 2003, when the State's natural gas wells began producing increasing volumes of non-hydrocarbon gases, such as carbon dioxide, helium, hydrogen sulfide, and nitrogen.

Mississippi's natural gas processing industry has expanded in recent years to serve growing offshore supplies brought in from federally administered Outer Continental Shelf (OCS). Mississippi has one of the largest natural gas processing plants in the United States, Pascagoula, which expanded capacity in 2000 in order to accept natural gas production transported by pipeline from the OCS.

Due primarily to demand from electricity generators and the industrial sector, Mississippi's per capita natural gas consumption is high. To meet demand, Mississippi purchases more than one-half of its natural gas from neighboring States. In the future, Mississippi could begin importing international supplies, as two liquefied natural gas (LNG) import terminals have been proposed near Pascagoula.

Coal, Electricity, and Renewables

Mississippi's electric power production is low, and the State imports electricity from neighboring States in order to satisfy consumer demand. Coal is Mississippi's leading generation fuel, typically accounting for more than one-third of electricity produced within the State. Mississippi's only coal mine, located in Choctaw County, supplies lignite coal to a 440-megawatt mine-mouth power plant that uses clean-coal technology. Mississippi's other coal-fired power plants are fueled by coal shipped primarily from Colorado. Natural gas is the second most important fuel for electricity

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generation, followed by nuclear power, which typically accounts for about one-fourth of the electricity produced in the State. A single large reactor at the Grand Gulf Nuclear Power Station provides all of Mississippi's nuclear power. Mississippi also produces a small amount of electricity from a wood-fired power plant in the eastern part of the State.

Mississippi's residential per capita electricity use is high, due in part to high air-conditioning demand during hot summer months and the widespread use of electricity for home heating during generally mild winter months.

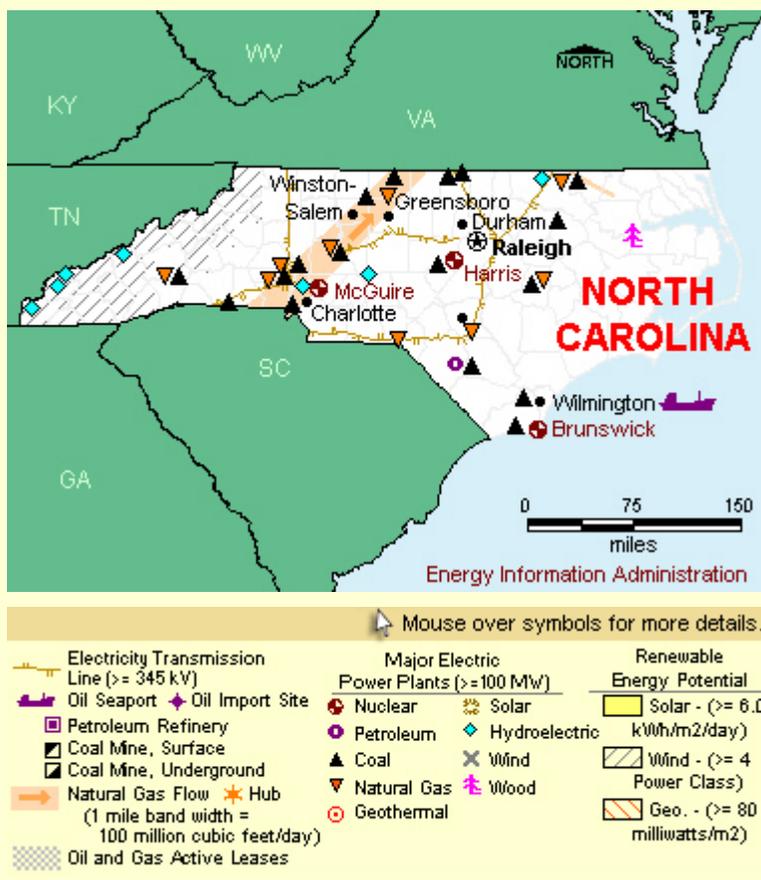
Population: 2.9 million (2007); Rank in U.S.: 31

Civilian Labor Force: 1.3 million (2007); Rank in U.S.: 33

Per capita personal income: \$28,845 (2007); Rank in U.S.: 50

Gross Domestic Product: \$84.2 billion (2006); Rank in U.S.: 35

HANDOUT #1.F – NORTH CAROLINA



North Carolina Quick Facts:

- North Carolina is one of the top nuclear power producers in the United States.
- The Dixie Pipeline, a major supplier of propane to the Southeast, terminates in Apex, North Carolina, where a terminal and above-ground storage tanks are located.
- Several rivers in western and central North Carolina provide hydroelectric power, North Carolina's only substantial energy resource.
- North Carolina's electricity consumption is among the highest in the Nation.

OVERVIEW

Resources and Consumption

North Carolina energy resources include several rivers in western and central North Carolina that provide substantial hydropower resources and high wind power potential off the State's Atlantic Coast. North Carolina's industrial sector leads State energy consumption by a small margin, followed closely by the transportation, commercial, and residential sectors. North Carolina is a leader in the energy-intensive chemical manufacturing industry.

Petroleum

North Carolina acquires all of its petroleum products from other States or from abroad. The Colonial and Plantation pipelines from the Gulf Coast supply the State with petroleum products. The Dixie Pipeline, a major supplier of propane to the Southeast, terminates in Apex, North Carolina, where a terminal and aboveground storage tanks are located. Tankers from other States and other countries deliver petroleum products to the ports of Wilmington and Morehead City.

Natural Gas

Several interstate natural gas pipelines supply North Carolina, including the Transcontinental Gas Pipeline Co. system that originates in the Gulf Coast and passes through the State on the way to major population centers in the Northeast. The industrial sector is the leading natural gas-consuming sector, although consumption from residential and commercial users is also substantial

Nearly one-fourth of North Carolina households use natural gas as their main source of energy for home heating.

Coal, Electricity, and Renewables

North Carolina's electricity production is high. Coal-fired power plants typically account for more than three-fifths of North Carolina's electricity generation, and nuclear power typically accounts for about one-third. Hydroelectric and natural gas-fired power plants produce most of the remainder. North Carolina's coal-fired power plants burn coal shipped primarily by rail from West Virginia and Kentucky. North Carolina is one of the top nuclear power producers in the United States. The State has three nuclear power plants. Hydroelectric power plants located along several rivers in central and western North Carolina produce substantial amounts of electricity. North Carolina's electricity consumption is among the highest in the Nation. As is typical in the South, many North Carolina households (nearly one-half) use electricity as their main energy source for home heating.

Population: 9.1 million (2007); Rank in U.S.: 11

Civilian Labor Force: 4.5 million (2007); Rank in U.S.: 11

Per capita personal income: \$33,636 (2007); Rank in U.S.: 36

Gross Domestic Product: \$374.5 billion (2006); Rank in U.S.: 11

HANDOUT #1.G – OHIO



Ohio Quick Facts:

- Energy consumption in Ohio's industrial sector ranks among the highest in the Nation.
- Ohio has the second-highest refining capacity in the Midwest.
- A proposed pipeline from the Rocky Mountains could increase Ohio's total natural gas supply in the near future.
- In August 2003, a transmission failure in Ohio led to the largest blackout in North American history, affecting over 50 million people.
- Coal typically fuels about nine-tenths of net electricity generation in Ohio.

OVERVIEW

Resources and Consumption

Ohio is rich in coal and offshore wind energy potential but has relatively few other energy resources. The Appalachian basin, which crosses the eastern part of the State, holds considerable reserves of coal and small deposits of oil and gas. Winds offshore on Lake Erie reach the highest energy potential classification. With a large population and a heavily industrial economy, Ohio is among the top States in total energy consumption. The industrial sector dominates energy consumption, largely due to several energy-intensive industries, including chemicals, glass, metal casting, and steel. Energy consumption in Ohio's industrial sector ranks among the highest in the Nation.

Petroleum

Although Ohio's crude oil production is minor, the State has the second-highest refining capacity in the Midwest. Nearly all of Ohio's crude oil output is derived from stripper wells (wells producing fewer than 10 barrels per day) in the eastern part of the State. Ohio's four refineries primarily

depend on crude oil delivered by pipeline from the Gulf Coast and through an oil transportation hub in central Illinois. Ohio has a large network of product pipelines that connect its refineries to markets in Ohio and adjacent States. Ohio's total petroleum demand is high, and Ohioans consume large amounts of motor gasoline and distillate fuel. Ohio is one of the few States in the Nation that allow the statewide use of conventional motor gasoline. (Most States require the use of specific gasoline blends in non-attainment areas due to air-quality considerations.) Although Ohio is not currently a large ethanol producer, several plants are under construction that would place the State high in ethanol-production rankings, and the additive is frequently blended with the State's motor gasoline, making Ohio the top ethanol consumer in the country.

Natural Gas

Ohio produces a small amount of natural gas. Most of its supply is brought in via several major interstate pipelines from western Canada and the Gulf Coast region. Ohio has major natural gas storage capacity, in depleted oil or natural gas reservoirs, that is used to meet peak demand during the winter. Total supply and consumption have slightly declined in recent years, although a proposed natural gas pipeline from Colorado could reverse that trend in the near future. The eastern leg of the Rockies Express Pipeline is expected to be in service by mid-2009 and to terminate in Monroe County, Ohio, near the border with West Virginia. Recent assessments also indicate that there may be significant potential for future coalbed methane production in the State. Ohio natural gas consumption is high, led by the residential and industrial sectors. Nearly seven-tenths of Ohio households use natural gas as their primary source of energy for home heating.

Coal, Electricity, and Renewables

Although Ohio is a moderate producer of coal, it is also a substantial consumer of coal; Ohio's production typically supplies less than one-third of State consumption. Coal mines concentrated in the Appalachian Basin in the eastern part of the State supply less than one-third of State consumption. The remaining coal is brought in primarily by railcar and river barge from West Virginia, Wyoming, Kentucky, and Pennsylvania. Ohio ranks fourth in the United States in coal consumption. Although large amounts of coal are used by industry, its primary use is for electricity generation, and coal fuels close to nine-tenths of Ohio's total generation. Two nuclear plants located along Lake Erie supply most of the remainder of the State's generation.

Although it is one of the Nation's top generators of electricity, Ohio is also among the Nation's top net importers of electricity. Ohio's total electricity consumption is high due primarily to the State's energy-intensive industrial sector, which accounts for two-fifths of the State's electricity consumption. The residential sector consumes around one-third of the State's electricity, with nearly one-fifth of Ohio households relying on electricity as their primary source of energy for home heating. In August 2003, a transmission failure in northeastern Ohio led to the largest blackout in North American history, affecting an estimated 50 million people in the northeastern United States and Canada. Over half a million Ohio homes and businesses lost power during the incident.

Population: 11.5 million (2007); Rank in U.S.: 7

Civilian Labor Force: 6.0 million (2007); Rank in U.S.: 7

Per capita personal income: \$34,874 (2007); Rank in U.S.: 28

Gross Domestic Product: \$461.3 billion (2006); Rank in U.S.: 7

Source: U.S. Department of Energy, Energy Information Administration, "State Energy Profiles," December 14, 2006. Online. <http://tonto.eia.doe.gov/state/index.cfm>

HANDOUT #1.H – SOUTH DAKOTA



South Dakota Quick Facts:

- South Dakota is well positioned to be among the Nation's leading producers of ethanol.
- South Dakota consumes more electricity generated from hydroelectric power than from any other source.
- South Dakota has high geothermal and wind power potential.
- South Dakota is one of the few States that allow the statewide use of conventional motor gasoline. (Most States require the use of specific gasoline blends in non-attainment areas due to air-quality considerations.)

OVERVIEW

Resources and Consumption

South Dakota has few fossil fuel reserves but has substantial renewable energy potential. Small crude oil and natural gas reserves are concentrated in the western corners of the State. South Dakota's renewable energy potential includes flat open areas for wind power, the Missouri River for hydroelectric power, corn produced in the eastern part of the State for ethanol production, and geothermal resources located in the south-central part of the State. As one of the least-populated States, South Dakota has low energy demand.

Petroleum

South Dakota has minimal crude oil production and no refineries. Several petroleum product and liquefied petroleum gas (LPG) pipelines supply South Dakota from neighboring States. Over two-tenths of South Dakota households use LPG as their primary fuel for home heating. South Dakota is one of the few States in the Nation that allow the statewide use of conventional motor gasoline. (Most States require the use of specific gasoline blends in non-attainment areas due to air-quality considerations.) As a leading corn producer, South Dakota is well positioned to be among the Nation's leading producers of ethanol, which is currently produced at several large plants in the eastern part of the State. Additional ethanol plants are currently under construction.

Natural Gas

South Dakota's natural gas consumption is very low, and the State relies on pipeline deliveries from other U.S. States and Canada to meet that demand. Nearly one-half of South Dakota households use natural gas as their primary fuel for home heating.

Coal, Electricity, and Renewables

Electricity in South Dakota is generated primarily by hydroelectric and coal-fired power plants. Hydroelectric power typically supplies about half of the electricity consumed in the State, and three of the State's four largest electricity generation plants are hydroelectric. South Dakota relies on shipments of coal from Wyoming to meet its coal demand. The majority of the State's nonhydroelectric and non-coal electricity is generated from natural gas and wind. South Dakota offers incentives to encourage expansion of renewable sources for electricity generation within the State. Per capita electricity use in South Dakota is near the average for the United States, and about two-tenths of the State's households use electricity as their primary energy source for home heating.

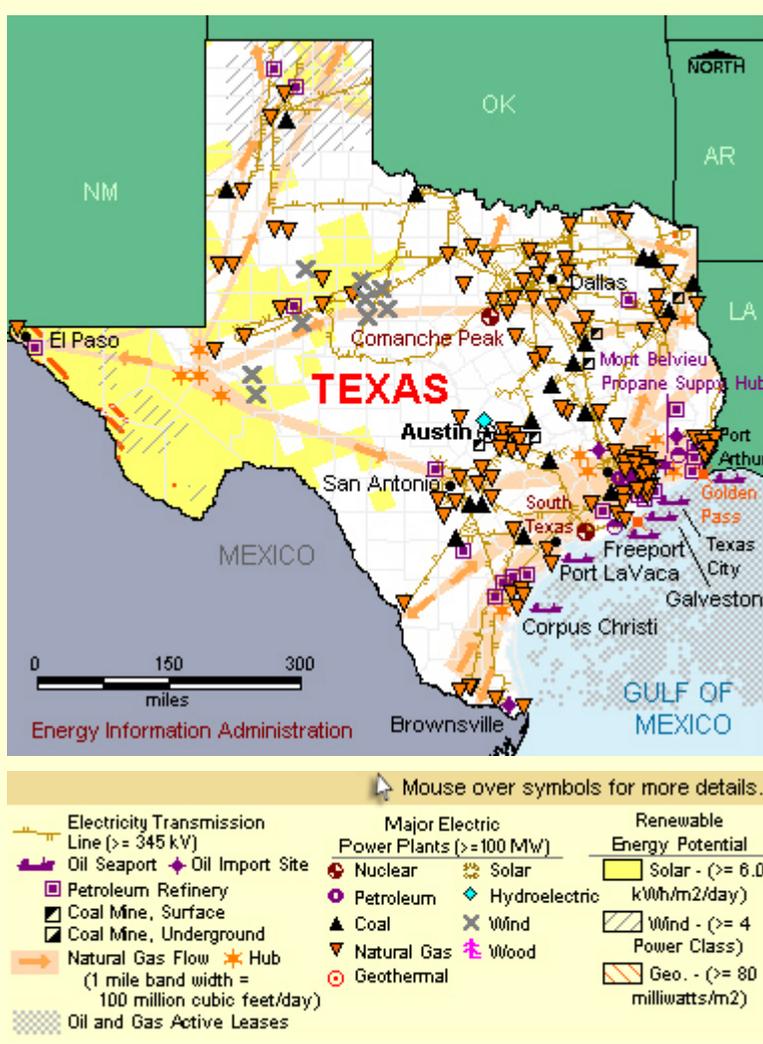
Population: .8 million (2007); Rank in U.S.: 46

Civilian Labor Force: .4 million (2007); Rank in U.S.: 46

Per capita personal income: \$33,905 (2007); Rank in U.S.: 34

Gross Domestic Product: \$32.3 billion (2006); Rank in U.S.: 46

HANDOUT #1.I – TEXAS



Texas Quick Facts:

- Texas is the leading crude oil-producing State in the Nation (excluding Federal offshore areas, which produce more than any single State).
- The State's signature crude oil type, known as West Texas Intermediate (WTI), remains the major benchmark of crude oil in the Americas.
- Texas's 25 petroleum refineries can process more than 4.6 million barrels of crude oil per day, and they account for more than one-fourth of total U.S. refining capacity.
- More than one-fourth of total U.S. natural gas production occurs in Texas, making it the Nation's leading natural gas producer.
- Texas also leads the Nation in wind-powered generation capacity; there are over 2,000 wind turbines in West Texas alone.
- Texas produces and consumes more electricity than any other State, and per capita residential use is significantly higher than the national average.

OVERVIEW

Resources and Consumption

Texas leads the Nation in fossil fuel reserves and in non-hydro-power renewable energy potential. Texas crude oil reserves represent almost one-fourth of total U.S. oil reserves, and Texas natural gas reserves account for almost three-tenths of total U.S. natural gas reserves. Although Texas's oil reserves are found throughout the State in several geologic basins, the largest remaining reserves are concentrated in the Permian Basin of West Texas, which contains more than 20 of the Nation's top 100 oil fields. Similarly, deposits of natural gas are found in abundance in several Texas production basins, with the largest fields heavily concentrated in the East Texas Basin in the northeastern part of the State. Texas's fossil fuel reserves also include substantial deposits of lignite coal, found in narrow bands in the Gulf Coast region, and bituminous coal, found in north central and southwestern Texas. Texas is also rich in renewable energy potential, including wind, solar, and biomass resources. Wind resource areas in the Texas Panhandle, along the Gulf Coast south of Galveston, and in the mountain passes and ridgetops of the Trans-Pecos offer Texas some of the greatest wind power potential in the United States. Solar power potential is also among the highest in the country, with

high levels of direct solar radiation (suitable to support large-scale solar power plants) concentrated in West Texas. Due to its large agricultural and forestry sectors, Texas has an abundance of biomass energy resources. Although Texas is not known as a major hydropower State, substantial untapped potential exists in several river basins, including the Colorado River of Texas and the Lower Red.

Due to its large population and an energy-intensive economy, Texas leads the Nation in energy consumption, accounting for more than one-tenth of total U.S. energy use. Energy-intensive industries in Texas include aluminum, chemicals, forest products, glass, and petroleum refining.

Petroleum

Texas leads the United States in both crude oil production and refining capacity. Texas's first major oil boom began in 1901 with the discovery of the Spindle Top oil field in the upper Gulf Coast basin. Since then, major discoveries have been made in East Texas, West Texas, and offshore in the Gulf of Mexico. Texas oil production increased until 1972, when it peaked at more than 3.4 million barrels per day. Afterward, production declined rapidly, and in recent years Texas crude oil output has fallen to less than one-third of its 1972 peak.

Although Texas oil production is in decline, the State's signature crude oil type, known as West Texas Intermediate (WTI), remains the major benchmark of crude oil in the Americas. Because of its light consistency and low-sulfur content, the quality of WTI is considered to be high, and it yields a large fraction of gasoline when refined. Most WTI crude oil is sent via pipeline to Midwest refining centers, although much of this crude oil is also refined in the Gulf Coast region.

Texas's 25 petroleum refineries can process more than 4.6 million barrels of crude oil per day, and they account for more than one-fourth of total U.S. refining capacity. Most of the State's refineries are clustered near major ports along the Gulf Coast, including Houston, Port Arthur, and Corpus Christi. These coastal refineries have access to local Texas production, foreign imports, and oil produced offshore in the Gulf of Mexico, as well as the U.S. government's Strategic Petroleum Reserve, which operates two large storage facilities in Bryan Mound and Big Hill, Texas. Many of Texas's refineries are sophisticated facilities that use additional refining processes beyond simple distillation to yield a larger quantity of lighter, higher value products, such as gasoline. Because of this downstream capability, Texas refineries often process a wide variety of crude oil types from around the world, including heavier, lower value varieties.

Refineries in the Houston area, including the Baytown refinery, the Nation's largest refinery, make up the largest refining center in the United States. From Houston, refined product pipelines spread across the country, allowing Texas petroleum products to reach virtually every major consumption market east of the Rocky Mountains. This network includes the Colonial Pipeline system (Koch), which is the largest petroleum product pipeline system in the United States and is vital for supplying markets throughout the South and East Coast.

Texas's total petroleum consumption is the highest in the Nation, and the State leads the country in consumption of asphalt and road oil, distillate fuel oil, jet fuel, liquefied petroleum gases (LPG), and lubricants. Texas LPG use is greater than the LPG consumption of all other States combined, due primarily to the State's active petrochemical industry, which is the largest in the United States. Four separate motor gasoline blends are required in Texas to meet the diverse air quality needs of different parts the State, including reformulated motor gasoline blended with ethanol required in the metropolitan areas of Houston and Dallas-Forth Worth. The agriculture-rich Texas Panhandle has several corn- and milo-based ethanol plants that are operational or under construction.

Natural Gas

Texas is the Nation's leading natural gas producer, accounting for more than one-fourth of total U.S. natural gas production. In the early days of Texas oil production, natural gas found with oil was largely considered a nuisance and was often flared (burned off) at the wellhead. Although some Texas cities and towns located near oil fields began using natural gas for energy, it was not until the State banned flaring after World War II that oil producers began to find new markets for natural gas. Two pipelines that once carried crude oil to the East Coast were converted to carry natural gas and a new natural gas pipeline to California was built, setting the stage for strong natural gas production growth in the 1950s and 60s. Texas natural gas production reached its peak in 1972 at more than 9.6 billion cubic feet of annual production. Since then, output has declined steadily to less than three-fifths of that level.

Today, an expansive network of interstate natural gas pipelines extends from Texas, reaching consumption markets from coast to coast, including those in California, the Midwest, the East Coast, and New England. Texas has 10 natural gas market hubs located in both East and West Texas, more than any other State, and its natural gas storage capacity is among the highest in the Nation. Most of Texas's 34 active storage facilities are depleted oil and gas fields converted for storage use, although many sites have also been developed in salt dome formations. These storage facilities allow Texas to store its natural gas production during the summer when national demand is typically lower and to ramp up delivery quickly during the winter months when markets across the country require greater volumes of natural gas to meet their home heating needs. However, due to the growing use of natural gas for electricity generation in the United States, Texas has occasionally withdrawn natural gas from storage during the summer months to help meet peak electricity demand for air-conditioning use.

Texas consumes more natural gas than any other State and accounts for about one-fifth of total U.S. natural gas consumption. Texas natural gas demand is dominated by the industrial and electric power sectors, which together account for more than four-fifths of State use. Because Texas demand is high, and because the State's natural gas infrastructure is well connected to consumption markets throughout the country, several companies have proposed building liquefied natural gas (LNG) import terminals along the Gulf Coast in Texas.

Coal, Electricity, and Renewables

Natural gas-fired power plants typically account for about one-half of the electricity produced in Texas and coal-fired plants account for much of the remaining generation. Although Texas produces a substantial amount of coal from 13 surface mines, including five of the 50 largest in the United States, the State relies on rail deliveries of subbituminous coal from Wyoming for the majority of its supply. Nearly all of the coal mined in Texas is lignite coal, the lowest grade of coal, and all of it is consumed in the State, mostly in arrangements where a single utility operates both the mine and an adjacent coal-fired power plant. Although lower in energy content than other varieties of coal, lignite coal is also low in sulfur, an important consideration in the State's efforts to lower emissions. Texas consumes more coal than any other State and its emissions of carbon dioxide and sulfur dioxide are among the highest in the Nation.

Texas is a major nuclear power generating State. Two nuclear plants, Comanche Peak and South Texas Project, typically account for about one-tenth of the State's electric power production. Until the recent uprating (capacity improvement) of the Number 2 reactor at Palo Verde in Arizona, the two South Texas Project nuclear reactors were the largest in the Nation.

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Although renewable energy sources contribute minimally to the Texas power grid, Texas leads the Nation in wind-powered generation capacity, and substantial new wind generation capacity is under construction in Texas. Texas surpassed California as the country's largest wind energy producer in 2006. Currently, there are over 2,000 wind turbines in West Texas alone, and the numbers continue to increase as development costs continue to drop and wind turbine technology improves. At 736 MW, the Horse Hollow Wind Energy Center in central Texas is the largest wind power facility in the world.

Texas produces and consumes more electricity than any other State. Despite large net interstate electricity imports in some areas, the Texas Interconnect power grid is largely isolated from the integrated power systems serving the eastern and western United States, and most areas of Texas have little ability to export or import electricity to and from other States. Texas per capita residential use of electricity is significantly higher than the national average, due to high demand for electric air-conditioning during hot summer months and the widespread use of electricity as the primary energy source for home heating during typically mild winter months.

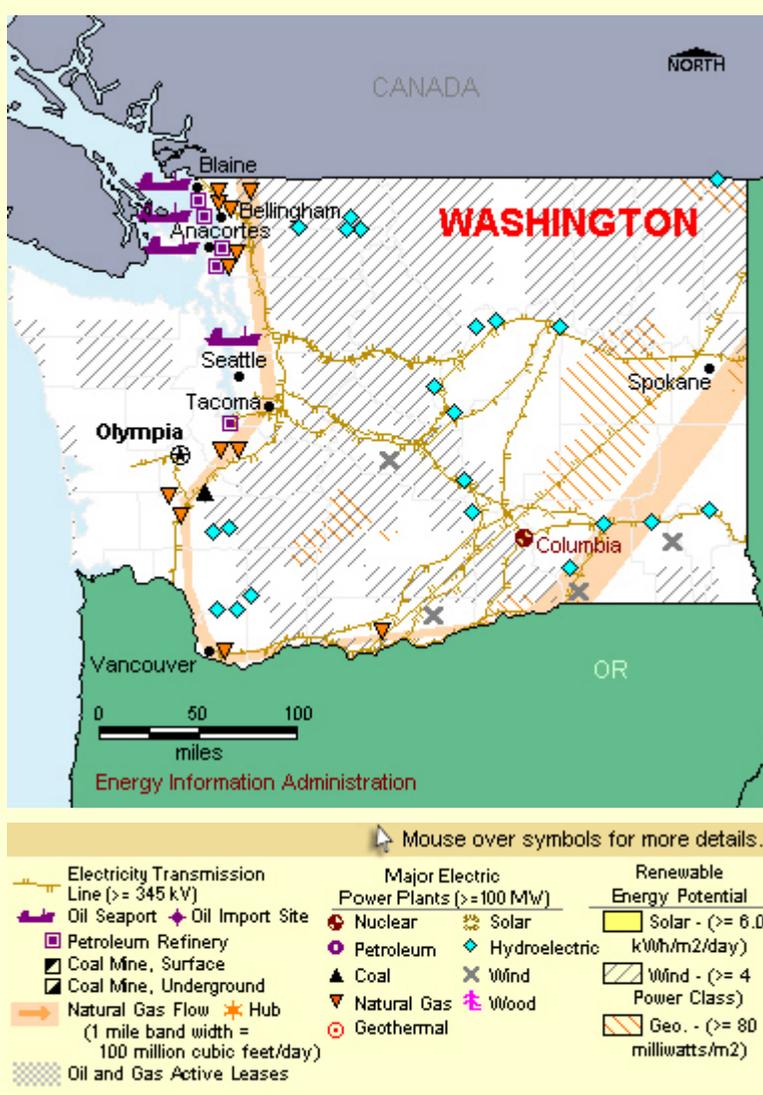
Population: 23.9 million (2007); Rank in U.S.: 2

Civilian Labor Force: 11.6 million (2007); Rank in U.S.: 2

Per capita personal income: \$37,187 (2007); Rank in U.S.: 21

Gross Domestic Product: \$1065.9 billion (2006); Rank in U.S.: 2

HANDOUT #1.J – WASHINGTON



Washington Quick Facts:

- Washington is the leading hydroelectric power producer in the Nation. Hydroelectric power accounts for nearly three-fourths of State electricity generation.
- The Grand Coulee hydroelectric power plant on the Columbia River is the highest capacity electric plant in the United States.
- With five refineries, Washington is a principal refining center for the Pacific Northwest.
- State jet fuel consumption is among the highest in the Nation, due in part to several large Air Force and Navy installations.

OVERVIEW

Resources and Consumption

Washington has few fossil fuel resources but has tremendous renewable power potential. The Columbia and Snake Rivers are immense hydroelectric power resources. The State's western forests offer fuel wood resources, and large areas of the State are conducive to wind and geothermal power development. Washington's population and total energy consumption are relatively high. Transportation is the leading energy-consuming sector in the State, followed by the industrial and residential sectors. Washington is a leader in the energy-intensive forest products industry and is the site of several large U.S. military bases.

Petroleum

Although Washington has no indigenous crude oil production, it is a principal refining center serving Pacific Northwest markets. Five refineries receive crude oil supply primarily by tanker from Alaska. However, because Alaskan production is in decline, Washington's refineries are becoming increasingly dependant on crude oil imports from Canada and other countries. The Trans-

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Mountain Pipeline from Alberta supplies more than one-tenth of Washington's crude oil supply. Washington's total petroleum demand is high. Jet fuel consumption is among the highest in the Nation, due in part to several large Air Force and Navy installations. The use of oxygenated motor gasoline is required in the Spokane area during the winter months.

Natural Gas

Washington relies heavily on natural gas produced in Canada and transported by pipeline to U.S. markets. The Sumas Center, in Canada near the border between Washington and British Columbia, is the principal natural gas trading and transportation hub for the U.S. Northwest. The Northwest Pipeline Corp. system supplies markets in western Washington and Oregon, and the Gas Transmission Northwest line supplies eastern Washington. The residential sector leads Washington's natural gas consumption, followed closely by the industrial and electric power generating sectors. Roughly one-third of Washington households use natural gas as their primary energy source for home heating.

Coal, Electricity, and Renewables

Typically accounting for close to three-fourths of State electricity generation, hydroelectric power dominates the electricity market in Washington. Coal-fired, natural gas-fired, and nuclear powered plants account for roughly equal shares of the remaining generation. Washington is the leading hydroelectric power producer in the Nation, typically generating about twice that of the next leading State. Eight of the State's 10 largest power plants run on hydroelectric power, primarily from the Columbia and Snake Rivers. The 7,079-megawatt Grand Coulee hydroelectric facility, located on the Columbia River, is the largest generating plant in the United States. Grand Coulee's generation capacity is almost twice that of Arizona's Palo Verde nuclear plant, the second-ranked U.S. electric plant. Washington has one large coal-fired plant located near the State's only coal mine in the southwest. Coal production has fallen slightly in recent years due in part to increased hydroelectric production. The State's only nuclear plant, the Columbia Generating Station, is located near the Columbia River in the south-central part of the State, and generates nearly one-tenth of the State's electricity.

Washington State is a major net electricity exporter, supplying electricity to the Canadian power grid, and to U.S. markets as far away as California. The State transmits large amounts of cheaply produced hydroelectric power via the Western USA interconnection, which runs from northern Oregon to southern California. The system, also known as the Pacific Intertie, is the largest single electricity transmission program in the United States. Although the Pacific Intertie was originally designed to transmit electricity south during California's peak summer demand season, flow is sometimes reversed overnight and has occasionally been reversed during periods of reduced hydroelectric generation in the Northwest.

Population: 6.5 million (2007); Rank in U.S.: 14

Civilian Labor Force: 3.4 million (2007); Rank in U.S.: 14

Per capita personal income: \$40,414 (2007); Rank in U.S.: 14

Gross Domestic Product: \$293.5 billion (2006); Rank in U.S.: 14

Source: U.S. Department of Energy, Energy Information Administration, "State Energy Profiles," December 14, 2006. Online. <http://tonto.eia.doe.gov/state/index.cfm>

HANDOUT #2 – EXAMINING OUR ENERGY SUPPLY WORKSHEET

Working in a group, review the energy information for the state you have been assigned and answer the following questions. Be prepared to present your findings to the class. For additional information you can visit the Energy Information Administration website that contains official energy statistics from the U.S. Government. <http://tonto.eia.doe.gov/state/>.

Questions:

- 1) Name of state:
- 2) What type of energy resources does this state have?
- 3) What type of energy does this state generate?
- 4) Does this state import energy? If so, what does it import and from where?
- 5) Does this state export energy? If so, what and to whom?
- 6) Does your state consume more energy than it produces?
- 7) Is your state landlocked, or does it have access to water ports? Why might this matter?
- 8) Does your state border another country? Why might this be significant?

Discuss the following scenario with your group and answer the questions below.

SCENARIO

Imagine that you live in a make-believe country with 50 states similar to the United States of America (even with the same names). In this country, unlike in the United States, the economy is centrally planned, meaning the central government determines how resources are produced and allocated throughout the country. Then, overnight your country suddenly breaks apart into 50 independent states and the centrally planned economy collapses. Without central planning there is no way to coordinate the transfer of resources and products between states.

Using the energy information for the state you researched imagine it is now one of these new independent countries and discuss the following questions with your group:

- 1) How might this affect the energy situation in your state?
- 2) Would your state face a shortage or surplus of energy?
- 3) How does the geographical location of your state help or harm your situation?
- 4) What possible solutions do you envision for your situation?

HANDOUT #3 – TERMS AND DEFINITIONS

Capitalism (Market Economy): An economic system in which the ownership of land and natural wealth, the production, distribution and exchange of goods, and the operation of the system itself are determined by private enterprise under competitive conditions rather than government central planning.

Command Economy (Planned Economy): An economic system based on government ownership of all means of production (farms, factories, shops, etc.) and the organization of those assets into firms managed by the state in accordance with output targets and prices fixed by government economic planners. Priority is placed on industrial and military investment over consumer goods and food.

Cold War: The rivalry that developed after World War II between communist and non-communist countries or the Soviet Union and the United States and their respective allies. During this period the United States and the Soviet Union competed for influence around the world and engaged in a massive arms race. The Cold War concluded with the dissolution of the Soviet Union on December 31, 1991.

Former Soviet Union/Near Abroad: Refers to the 15 states that were once united by the Union of Soviet Socialist Republics (USSR). The countries are: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. When discussing Russia, the “near abroad” refers to the 14 countries (other than Russia) that made up the USSR.

Gazprom: Russia's state-controlled natural-gas monopoly. Until recently the chairman of the board of directors was Dmitri Medvedev, Russia's third president (as of May 2008).

Glasnost: A policy of cultural and social openness in the Soviet Union instigated by General Secretary Mikhail Gorbachev in an effort to move the union closer to true communism. Under *glasnost* (openness) some forms of censorship were abolished and public debates, disclosure of government corruption and crimes were permitted and control over literature and the arts was relaxed. *Glasnost* was part of Gorbachev's larger *perestroika* (restructuring) plan.

Georgia: Country of 4.5 million the size of North Carolina located in the South Caucasus between the Black Sea and the Caspian Sea. Georgia borders Armenia, Azerbaijan, Russia, and Turkey. Once part of the USSR, Georgia gained independence in 1991 and has endured two unresolved separatist wars and a civil war. Georgia hopes to someday join NATO and the EU. Georgian-Russian relations broke down in 2006 resulting in a full embargo by Russia (closed border, no trade no travel). It is a supporter of the War on Terror and has the third largest number of troops in Iraq after the United States and the United Kingdom.

Medvedev, Dmitri: Russia's third president since independence, elected in 2008. Prior to becoming president, Medvedev served as a deputy prime minister under Vladimir Putin and as chairman of Gazprom's board of directors. Medvedev is from outside of St. Petersburg and has a doctorate in law.

Perestroika: The term used by Mikhail Gorbachev to describe his new economic and social policy introduced in the late 1980s. *Perestroika* (restructuring) was implemented to transform the Soviet Unions' stagnant inefficient planned economy. It included greater independence for managers and local officials as well as elections within the Communist party organization. *Perestroika* was not anti-communist but implemented in the hopes of achieving true communism. The plan failed in this regard and by 1991 the system and the union dissolved.

Putin, Vladimir: Russia's second president since independence. Boris Yeltsin appointed Vladimir Putin prime minister in August 1999, handing him the presidency on December 31, 1999. Putin was elected president in 2000 and 2004. He has a background in the KGB and St. Petersburg politics.

Shock-Therapy: Refers to an economic program characterized by the sudden release of price and currency controls, ending of state subsidies, and immediate trade liberalization (as in Russia and other former Soviet countries following the collapse of communism). Also includes large-scale privatization of assets previously owned by the government.

Rose Revolution: In November 2003 citizens of Georgia took to the streets in protest of parliamentary elections they believed to be falsified and called for new elections and the resignation of President Eduard Shevardnadze. On November 24 Tbilisi Mayor Mikhail Saakashvili forced his way into Parliament with a rose in his hand and demanded the president's resignation. The following day President Shevardnadze resigned and new presidential and parliamentary elections were called for early 2004.

Ukraine: A country of 46 million people just slightly smaller than Texas. Ukraine borders Belarus, Hungary, Moldova, Poland, Slovakia, Romania, Russia, and the Black Sea. It gained independence from the USSR in 1991. After Russia, Ukraine was the most important economic component of the Soviet Union and produced about four times the output of the next-ranking republic. Under President Yushchenko, Ukraine has expressed interest in joining NATO and the EU.

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Former Soviet Union/Near Abroad: Refers to the 15 states that were once united by the Union of Soviet Socialist Republics (USSR). The countries are: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. When discussing Russia, the “near abroad” refers to the 14 countries (other than Russia) that made up the USSR.

Yeltsin, Boris: Russia's first president (1992-1999) famous for challenging coup plotters from atop a tank in 1991, ushering in the peaceful end of the Soviet Union. Yeltsin faced many challenges during his presidency. He was considered a close friend of the West but was less popular at home for failing to reign in the chaos that plagued Russia following the break-up of the Soviet Union and market reforms.

ENERGY-RELATED TERMS (Source: EIA, <http://www.eia.doe.gov/>)

Coal: Coal is a combustible black or brownish-black sedimentary rock composed mostly of carbon and hydrocarbons. It is the most abundant fossil fuel produced in the United States. Over 90 percent of the coal used in the United States is used to generate electricity. It's also used as a basic energy source in many industries, including, steel, cement, and paper.

Crude Oil: A mixture of hydrocarbons that exists in liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities.

Electricity: Electricity is a form of energy characterized by the presence and motion of elementary charged particles generated by friction, induction, or chemical change. Electricity is a secondary energy source which means that we get it from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power, and other natural sources, which are called primary sources. The energy sources we use to make electricity can be renewable or non-renewable, but electricity itself is neither renewable or non-renewable.

Liquid Natural Gas: Liquefied natural gas (LNG) is natural gas that has been cooled to about minus 260 degrees Fahrenheit for shipment and/or storage as a liquid. The volume of the liquid is about 600 times smaller than the gaseous form. In this compact form, natural gas can be shipped in special tankers to receiving terminals in the United States and other importing countries. At these terminals, the LNG is returned to a gaseous form and transported by pipeline to distribution companies, industrial consumers, and power plants.

Liquefying natural gas provides a means of moving it long distances where pipeline transport is not feasible, allowing access to natural gas from regions with vast production potential that are too distant from end-use markets to be connected by pipeline.

Natural Gas: Natural gas is a nonrenewable source of energy used primarily for heating and generating electricity. The U.S. produces natural gas from wells within the U.S. but also imports natural gas from abroad. The U.S. imports natural gas via pipeline from Canada and Mexico, but to move natural gas from countries that are further away, the natural gas is turned into a liquid (also called "Liquefied Natural Gas" or LNG) by supercooling and transported as a liquid on tankers before being warmed up and turned into a gas upon arrival in the United States.

Nuclear Energy: Nuclear power accounts for about 19 percent of the total electricity generated in the United States, an amount comparable to all the electricity used in California, Texas, and New York, our three most populous states. A nuclear power plant operates basically the same way as a fossil fuel plant, with one difference: the source of heat. The process that produces the heat in a nuclear plant is the fissioning or splitting of uranium atoms. That heat boils water to make the steam that turns the turbine-generator, just as in a fossil fuel plant. The part of the plant where the heat is produced is called the reactor core.

Petroleum: A broadly-defined class of liquid hydrocarbon mixtures. Included are crude oil, lease condensate, unfinished oils, refined products obtained from the processing of crude oil, and natural gas plant liquids. *Note:* Volumes of finished petroleum products include non-hydrocarbon compounds, such as additives and detergents, after they have been blended into the products. The word petroleum generally refers to crude oil or the refined products obtained from the processing of crude oil (gasoline, diesel fuel, heating oil, etc.) We find petroleum products in every area of our lives. They are easily recognized in the gasoline we use to fuel our cars and the heating oil we use to warm our homes. However, petroleum-based components are also used in plastics, medicines, food items, and a host of other products.

HANDOUT #4 – POWERTRIP THE MOVIE WORKSHEET

In 1999 the American multi-national energy corporation AES purchased Telasi, the electricity distribution company for Tbilisi, the capital of the country Georgia. The new entity, AES-Telasi brought together managers trained in the communist command economy with those reared in capitalism to rebuild a broken and previously state-run energy company in a country unaccustomed to paying for electricity. This film follows the challenges faced by the Georgian citizens as well as the global energy company as it attempts to establish a reliable energy supply in a country damaged by war, wrought with corruption, and dependent on Russian energy imports. Read through the questions below before you watch the movie and then look for the answers in the film.

- 1) Why are citizens of Tbilisi facing electricity shortages?
- 2) Why is electricity connected to hope?
- 3) List as many activities as you can that depend on electricity.
- 4) What is AES?
- 5) What does AES CEO Denis Bakke state is the mission of his company?
- 6) What steps does AES take to meet its needs and wants as a multinational corporation? What risks does the company take?
- 7) How does the average citizen of Tbilisi meet his/her needs and wants for electricity? What risks does he/she take?
- 8) What does AES discover is happening between the customers and collection? Why might this be happening?
- 9) As one woman explained, "I am not stealing from you; I am stealing from the government." What is significant about this statement?
- 10) Are some Georgians better positioned to meet their needs and wants? Why or why not?
- 11) How does the Enron scandal in the U.S. affect AES in Georgia?

Bonus questions:

- 1) What was the average monthly wage in Tbilisi?
- 2) What was the average monthly residential electricity bill from AES-Telasi?
- 3) What was the average monthly bill prior to AES-Telasi?
- 4) What was the amount of money AES-Telasi spent improving power lines and meters in Tbilisi?
- 5) What was the estimated daily loss at AES-Telasi?
- 6) What was the total loss at AES during its time in Georgia?

Using the internet, try to find additional information about Georgia, AES, and the energy shortages. The resources listed at the end of this unit are a good place to start (see **Handout #6**). Be prepared to discuss the following questions in class:

- 1) What economic problems are faced by the citizens of Tbilisi? By AES?
- 2) What are potential solutions?
- 3) How are the citizens and AES-Telasi attempting to meet their needs and wants given the opportunity cost of each solution?
- 4) What values, beliefs, and rights in each society can you identify that relate to their economies?

**HANDOUT #5 – POWERTRIP
SMALL GROUP DISCUSSION QUESTIONS**

Discuss and answer the following questions in your group:

- 1) What economic problems do the citizens of Tbilisi face?
- 2) What economic problems does the company AES-Telasi face?
- 3) What are some potential solutions to these problems?
- 4) What is the opportunity cost for a Georgian citizen who does not pay for electricity? Who pays for electricity?
- 5) What is the opportunity cost for AES if it continues to work in Georgia? If it sells to the Russians?
- 6) How does each attempt to meet its needs and wants given the opportunity cost of each solution?
- 7) What values, beliefs and rights of the Georgian society relate to their economy?
- 8) What values, beliefs and rights of AES relate to their economy?
- 9) How do the solutions relate to the values and beliefs of those in each society?
- 10) What solutions are most effective in meeting each society's needs and wants?

HANDOUT #6 – RESOURCES

Activities/Additional Lessons

EconEdLink: Economy in Transition: Ukraine

<http://www.econedlink.org/lessons/index.cfm?lesson=EM138&page=teacher>

This lesson asks students to analyze data to explain the relationship between economic freedom and economic growth in transition economies.

Foundation for Teaching Economics

Opportunity Cost: The Soviet Choice for Growth

<http://www.fte.org/teachers/lessons/edsu/edsules1.htm>

National Energy Foundation: Energy Internet Scavenger Hunt

http://www.nefl.org/energy_scavenger_hunt.htm

This site features an energy scavenger hunt for the internet. The National Energy Foundation is a nonprofit educational organization dedicated to the development, dissemination, and implementation of supplementary educational materials, programs, and courses.

PBS: Frontline World: Russia's Conversion From Communism to Capitalism

http://www.pbs.org/frontlineworld/educators/economics_russia.html

This in-depth lesson uses Russia as a case study, help students examine the real-world struggles of converting from a command economy to a market economy.

Articles

Caucasus: Azerbaijan, Georgia Turn to Russia for Energy Help

By Michael Lelyveld Boston, 22 November 2000 (RFE/RL)

<http://www.rferl.org/features/2000/11/22112000201349.asp>

Georgia: Electricity Struggle Heats Up

How much will Georgians pay for their electricity - and who should foot the bill? By Nata Alapishvili in Tbilisi (CRS No.165, 06-Feb-03). Institute for War and Peace Reporting.

http://iwpr.net/?p=crs&s=f&o=161667&apc_state=henicrs2003

Kyiv Public Buildings Lead Ukraine's Push for Energy Conservation

World Bank

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/UKRAINEEXTN/0,,contentMDK:20994926%7EpagePK:141137%7EpiPK:141127%7EtheSitePK:328533,00.html>

Transition in Poland

http://news.bbc.co.uk/2/hi/special_report/1999/09/99/iron_curtain/460885.stm

Interviews

Georgian President Confident About Country's Ability to Overcome Energy Crisis

Eurasianet.org

<http://www.eurasianet.org/resource/georgia/hypermail/200011/0027.html>

Source: Georgian Radio, Tbilisi, in Georgian 0601 gmt 20 Nov 00.

Background

BBC: Cold War – Reform, Coup, and Collapse: The End of the Soviet State

http://www.bbc.co.uk/history/worldwars/coldwar/soviet_end_01.shtml

Professor Archie Brown explains the reasons behind the dramatic collapse of the Soviet Union, and examines how such an authoritarian system could be dismantled peacefully.

BBC: Collapse of the USSR 10 Years On

http://news.bbc.co.uk/hi/english/static/in_depth/europe/2001/collapse_of_ussr/default.stm

A look back at the collapse after ten years through eyewitness accounts, a countdown to the collapse timeline, a map with information on how life has changed in the independent states and a photo file.

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BBC: Communism: The End of an Era

http://news.bbc.co.uk/1/hi/english/static/special_report/1999/09/99/iron_curtain/default.htm

The fall of Eastern Europe's Communist regimes was supposed to mark the advent of a new era. In this six part series, the BBC looks at what did - and didn't - happen after the wall came down.

BBC: Collapse of Communism

<http://www.bbc.co.uk/schools/gcsebitesize/history/mwh/ir2/endofthecoldwarrev1.shtml>

A student guide to the collapse of communism and the problems faced by the USSR at home and abroad.

BBC: Country Report: Georgia

http://news.bbc.co.uk/1/hi/world/europe/country_profiles/1102477.stm

BBC: Country Report: Russia

http://news.bbc.co.uk/2/hi/europe/country_profiles/1102275.stm

CIA World Factbook

<https://www.cia.gov/library/publications/the-world-factbook/index.html>

CNN: Soviet Legacy: From Communism through Chaos

<http://www.cnn.com/SPECIALS/2001/russia/index.html>

This 2001 CNN.com in-depth special commemorating the 10-year anniversary of the collapse of the Soviet Union includes reports in three areas: society in transition, the 1991 coup, and culture.

CNN: Turmoil in Russia

<http://www.cnn.com/SPECIALS/1998/09/crisis.russia/>

Background materials and video on the 1998 economic crisis.

Energy Information Administration

<http://tonto.eia.doe.gov/state/>

The Energy Information Administration's (Official Energy Statistics from the U.S. Government) page containing comprehensive State Energy Profiles with detailed data for each state. The site contains data for other countries and regions as well.

Caucasus Region Report: <http://www.eia.doe.gov/emeu/cabs/Caucasus/Background.html>

Russia Report: <http://www.eia.doe.gov/emeu/cabs/Russia/Background.html>

Energy Information Administration

<http://www.eia.doe.gov/kids/>

Energy Kids Page.

EurasiaNet: Georgia Profile

<http://www.eurasianet.org/resource/georgia/index.shtml>

EurasiaNet provides information and analysis about political, economic, environmental and social developments in the countries of Central Asia and the Caucasus, as well as in Russia, the Middle East, and Southwest Asia. The web site also offers additional features, including newsmaker interviews and book reviews.

PBS: Return of the Czar

<http://www.pbs.org/wgbh/pages/frontline/shows/yeltsin/>

This Web site was created to accompany the PBS Frontline documentary, *Return of the Czar*, which examines the failures of U.S. policy and Boris Yeltsin's leadership during Russia's tumultuous 1990s post-Soviet transformation. Online features include excerpts from interviews with political analysts, former Kremlin insiders, Russian scholars and journalists. Material about President Vladimir Putin includes a chapter from his autobiography, *First Person*, and a treatise he wrote in December 1999.

PBS: Independent lens

<http://www.pbs.org/independentlens/powertrip/film.html>

Features background materials on Georgia, AES, and the film *PowerTrip*, and includes a Q&A with film director Paul Devlin.

World Bank

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/GEORGIAEXTN/0,,menuPK:301751~pagePK:141159~piPK:141110~theSitePK:301746,00.html>

World Bank country page for Georgia.