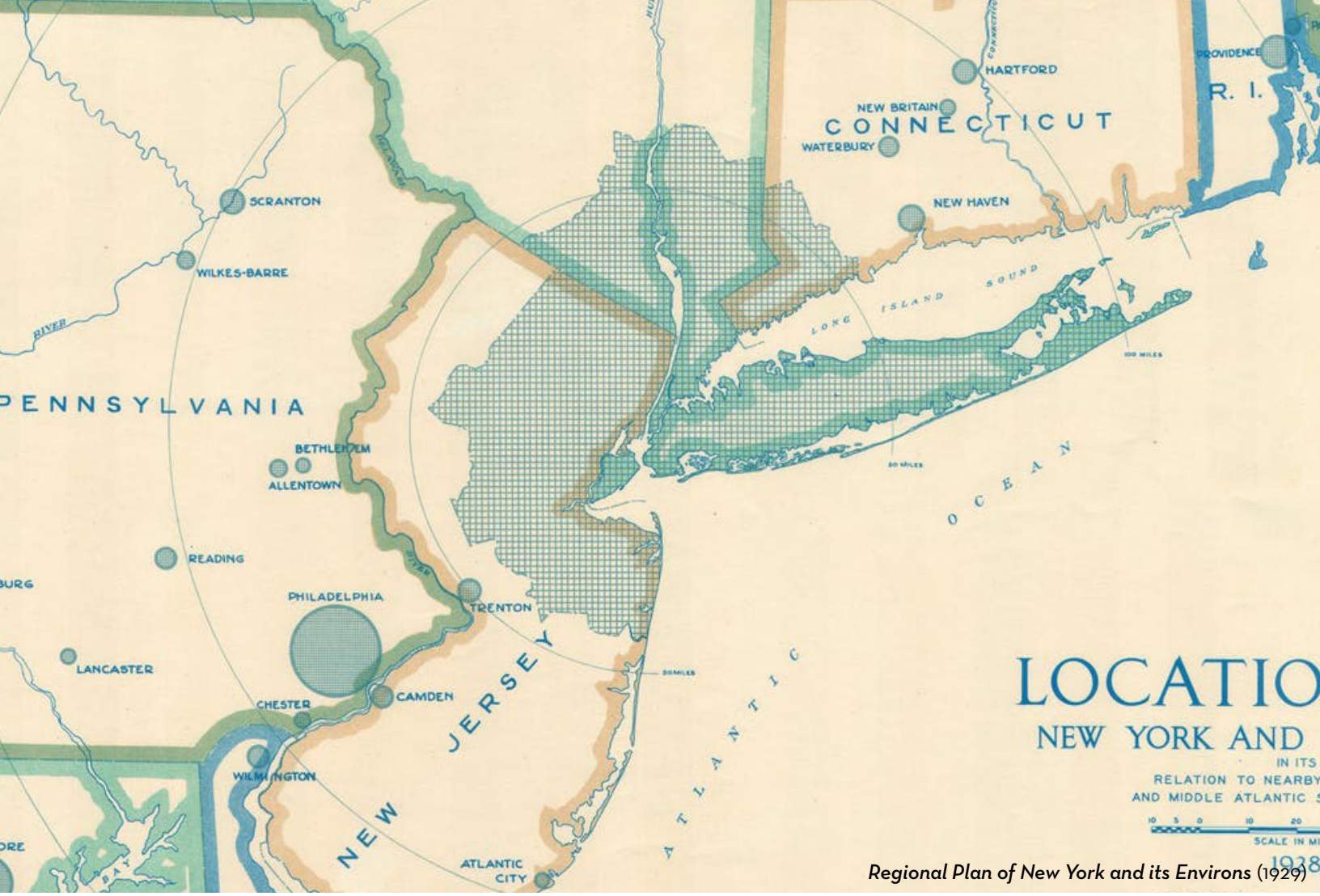


Regional Plan of New York and its Environs (1929)

UNIT 3

Energy & the history of the region

The energy of development in Long Island, New York, and the region

Energy is fundamental to human life, enabling basic biological functions, and allowing human societies to expand. Agrarian societies use the energy of livestock to expand their food production and fuel sources like firewood and animal oils to survive in a wider range of contexts. Cooking broadens the range of edible food, while heat and light make more climates habitable. For 17th- and 18th-century colonial settlements on Long Island, competition for the source of these energies — land for agriculture and logging, as well as access to the ocean for fishing and whaling — drove the establishment of the property rights system that permanently changed the island's terrain and geography.

In an industrializing society, energy-dense resources such as coal and petroleum allow population growth beyond the limits of previous agricultural production. The availability of these fuels triggers the invention of technologies that enable the mass-production of commodities. In this context, energy also makes possible travel and transportation beyond previous limits, and so allows industrial societies to cover greater territory, with more regular contact between further-flung settlements driving trade and exchange. Thus, in 19th-century North America, energy drove both westward expansion and the urbanization of the greater New York region.

Ultimately, the use of these energy sources to power industrial production and individual consumption both enables and requires the creation of large-scale infrastructure. In 20th-century North America, the result was the connection of urban industrial centers to suburban settlements via systems of energy distribution serving individuals and families. For Long Island and Jones Beach, the new availability of energy catalyzed the development of transportation networks, residential settlements, and parklands that define the geography of the present day.

In this Unit, students work with primary historical documents including maps, governmental records, historical images, and quantitative data to analyze the impact of energy on the development of the regional geography surrounding Jones Beach. Creative and critical writing activities allow students to apply historical insights to contemporary contexts and so examine how not only energy infrastructure but also conceptual frameworks have been handed down through the last 400 years of human presence on Long Island and Jones Beach.

Objectives

Critically assess the limitations of historical archival materials and the biases of historical documentation.

Parse and interpret historical documents, making inferences about context and broader societal trends.

Read maps, including historical maps, and critically evaluate the biases, omissions, and implicit ideologies of cartographic materials.

Analyze and draw conclusions from quantitative data pertaining to population growth and economic activity at different moments in history.

Analyze how novel technologies and economic systems shape regional geographies through networks of trade and transportation and new modes of environmental exploitation.

Make ethical assessments of the outcomes of different historical systems of economy and energy consumption.

Observe and interpret contemporary geography and lifestyles on Long Island in order to assess how historical events and trends continue to impact their lives in the present day.

Learning standards

The materials in this Unit correspond with the following New York State P-12 Science Learning Standards and elements of the New York State Grades 9-12 Social Studies Framework.

Social Studies Framework

Practices | A1 A2 A5 A6 A7 B1 B2 B3 B4 B5 B7 C1 C2 C3 C4 C5 C6 D1 D2 D3 D4 D5 D6 E1 E2 E4 E6 F3 F6 F7 F8

Themes | GEO TECH TCC SOC GOV CIV ECO

More information:

nysed.gov/curriculum-instruction/k-12-social-studies-framework

Key terms

Canarse
Lenape
Montauk
Munsee
Shinnecock
Sachem
Mercantilism
Navigation companies
Dutch West India Company
Fort Amsterdam

Improvement
Agrarian economy
Companion planting
Monoculture
Barter system
Gristmill / sawmill
Draught animals
Drift whale
Whaling Designe

Coal seam
Anthracite coal
Bituminous coal
Coke
Beehive oven
Steam engine

Industrialization
Industrial revolution
Capitalism
Commodity
Means of production
Strike

Manufactured gas
Dynamo
Arc light
Alternating Current
Direct Current
Incandescent light bulb

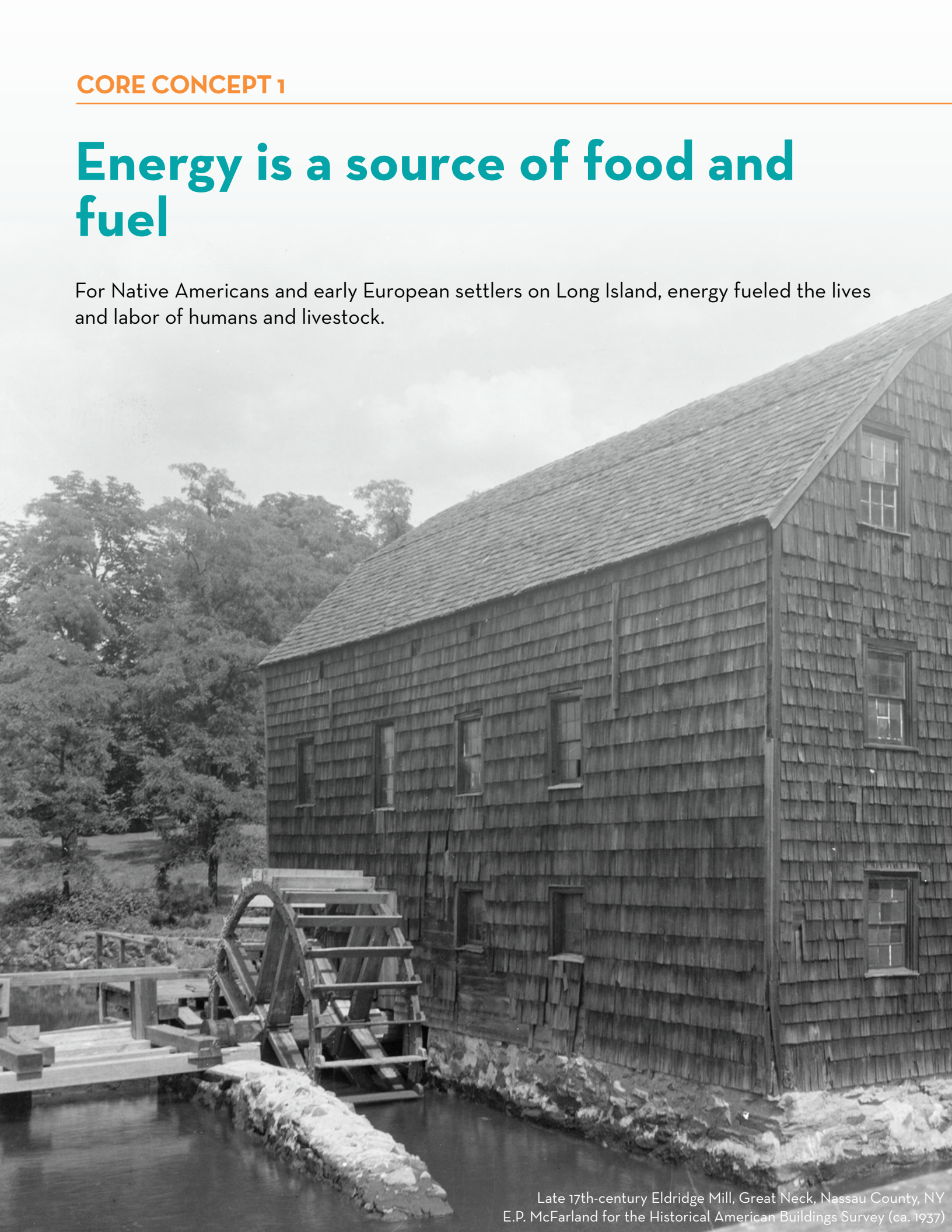
Economy of scale
Natural monopoly
Utility
Electrification
Assembly line production
Fordism

Urbanization
Suburbanization
Robert Moses
New Deal
Great Depression
Levittown

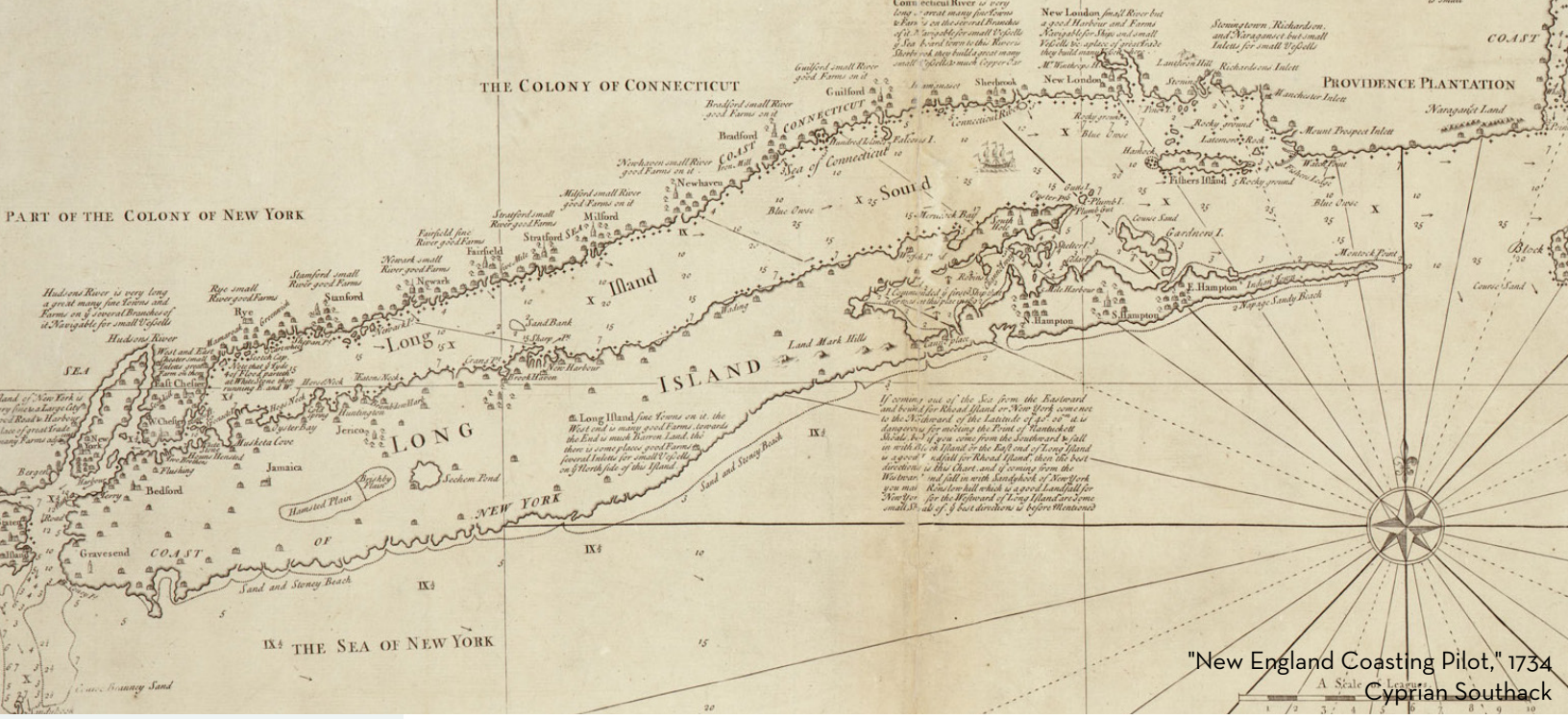
CORE CONCEPT 1

Energy is a source of food and fuel

For Native Americans and early European settlers on Long Island, energy fueled the lives and labor of humans and livestock.



Late 17th-century Eldridge Mill, Great Neck, Nassau County, NY
E.P. McFarland for the Historical American Buildings Survey (ca. 1937)



"New England Coasting Pilot," 1734
Cyprian Southack

Energy sources and imperial expansion

What was the role of energy in society before the invention of electricity and the advent of fossil fuels? This Core Concept focuses on early European colonization in what is now Long Island and New York State. In this historical context, energy is conceptualized as something human beings need in order to survive: it comes first and foremost in the form of food that allows human bodies to sustain themselves and reproduce. Energy is also the feed provided to livestock or working animals in order to increase agricultural capacity, the water and wind that power mills, and the fuel that makes survival possible in a greater range of environments, whether firewood to heat spaces and enable cooking, or fats and oils that provide sources of light. But when energy and human survival are linked, the sources of energy — land for logging and agriculture; animals or plants from which oils can be derived — easily become a source of conflict between peoples.

First, students use primary historical documents to explore how early European settlers encountered the land and water in present-day Long Island as sources of energy in these senses. Philosophical texts of the time provide a framework to consider how new concepts of private property enabled the dispossession of Indigenous peoples, and gradually gave rise to patterns of development that reverberate today.

Next, early colonial whaling practices are a framework for investigating the transition of whale oil from a commonly-held resource to a privately-owned commodity. Students work with primary documents from the early colonial archive to evaluate how the colonial "whaling designe" adhered to or diverged from the private property model, and then later industrialized. Finally, students return to the present to consider contemporary food systems and geographies of agriculture, investigating the agricultural strengths of New York State and imagining how a more localized food system would impact their immediate surroundings and daily life.

Considering critical history

Use the interactive map tool built by enrolled Shinnecock Nation member and artist Jeremy Dennis to explore Native American group distributions and sites of historical significance on Long Island. Then, read the excerpt from the article by John A. Strong entitled, "The Thirteen Tribes of Long Island: The History of a Myth."

Why was there disagreement about the social structure of Native American life on Long Island before the arrival of European colonists?

Why is it important to attempt to reconstruct this history, more than 300 years later?

What methods might historians today use to reconstruct this history?

Through the rest of this Unit, students should bear in mind what factors influence the availability and type of historical sources that exist and how that, in turn, affects the narratives of history that are deemed factual. When dealing with primary sources, they should assess documents critically, rather than take them at face value, and consider how the motivations and social position of the creator of a given historical document affect what information it contains, as well as the historical record as a whole.

In general, access to the written historical record has been limited for women, people of color, people with disabilities, and other minorities. In particular, many, if not most, Native American cultures have had a primarily oral history tradition, particularly in the era before European contact. This means that written descriptions of North America at the point of colonization are filtered almost exclusively through the perspective of Europeans, whether describing what they encountered upon arrival in North America, or transcribing stories told to them by Indigenous people pertaining to the time before European settlement.

Sources

Jeremy Dennis | On This Site

jeremynative.com/onthissite/

From "The Thirteen Tribes of Long Island: The History of a Myth," John A. Strong, *The Hudson Valley Regional Review*, Vol. 9 (1992)

How did the prevailing "conventional wisdom" about the "thirteen tribes" of Long Island become entrenched in the historical literature? Most of the "tribal" names with which we are now familiar do not appear to have been recognized[…]

PRIMER

Give students a few minutes to respond, either alone or in small groups. Then move into the next activity by inviting students to share their answers.

For full activity materials, see:

Unit 3 Appendix Pages 2-5

AT THE CENTER

Groups working with the curriculum on site can begin by viewing the Shaping the Shoreline exhibit in the South Gallery.

Energy, agriculture, and property

How did Long Island begin?

The place known today as Long Island formed over tens of thousands of years of geological and climate processes. In a process of cyclical melting and freezing over the course of about 60,000 years, advancing and retreating glaciers shaped the land through the deposition of rocks and sediment as well as the accumulation of meltwater in hollows left in the glaciers' wake. Ridges called moraines give the island its distinctive topography, and depressions left by glacial lakes are the floor of the Long Island Sound and the Hudson River Valley. From 10,000 to 2,200 years ago, rising sea levels due to global ice melt filled in the Sound and the Great South Bay, creating the Island's now iconic shoreline. The barrier islands, including the original island on which Jones Beach State Park was built, formed 4,000 years ago due to the deposition of sediment by ocean currents.

Archaeological evidence indicates that the area now known as Long Island has been inhabited by human beings for at least 11,000 years. Some archaeologists believe that Paleo-Indians may have been present in the area up to 5,000 years earlier, but any physical evidence confirming that would likely now be underwater, as rising sea levels would have pushed original coastal communities inland. Whenever they arrived, these original inhabitants, known by archaeologists as Paleo-Indians, would have been descendants of the people who originally crossed the Bering Strait from Eurasia, more than 30,000 years ago.

BREAK OUT

Long Island today

Use the Google Earth online tool to investigate the contemporary geography of Long Island. Consider:

What is noticeable about the geography of Long Island today?

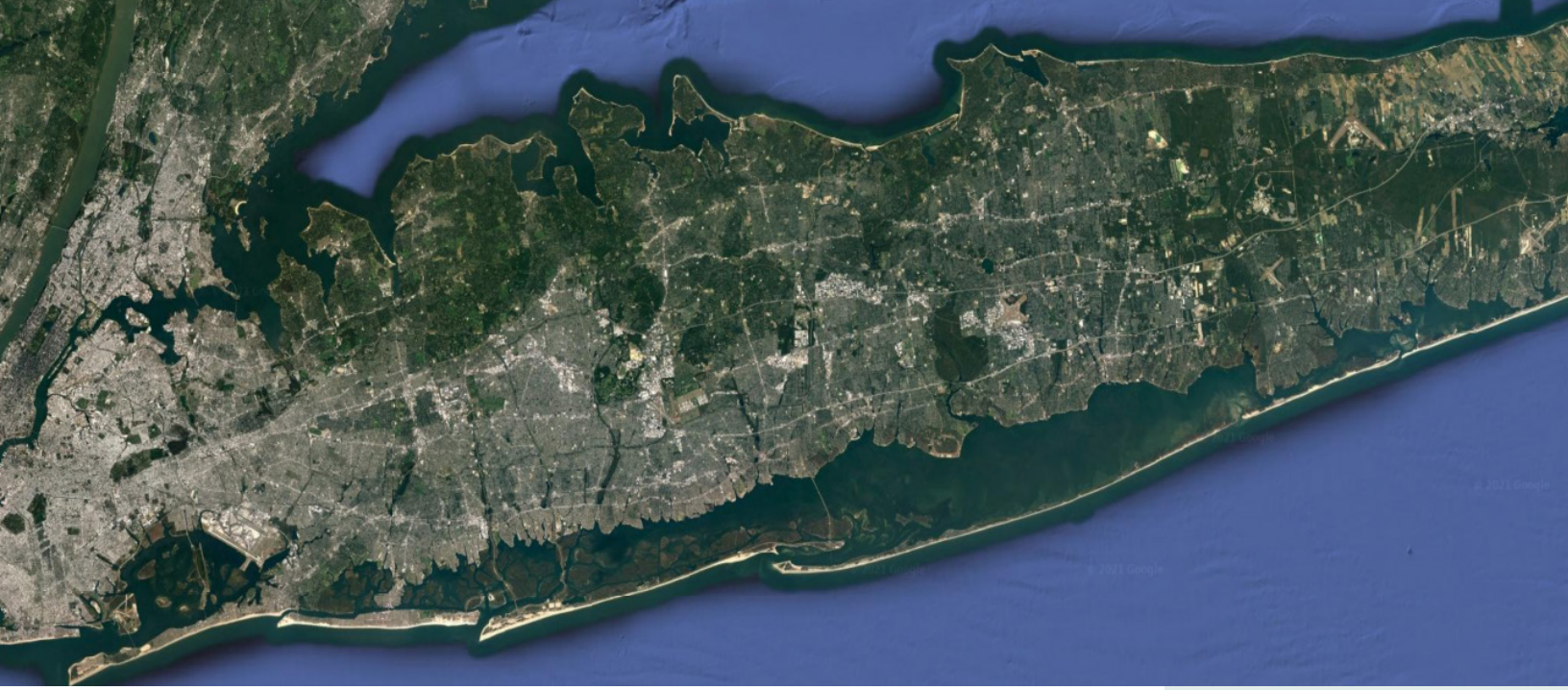
Where are green spaces? Where are agricultural lands and parklands? Where are highways and major roads? Where are settlements relative to one another, relative to green space, and relative to water?

What might this geography have looked like 100, 200, or 500 years ago? What might have changed or stayed the same?

Source

Google Earth | Long Island, New York

earth.google.com/web/search/Long+Island,+New+York/



Europeans first arrived in present-day New York in the 16th century, a time in Native American history that scholars call the Woodland Period. European colonization of North America marked the beginning of a new system of property rights throughout the continent, including on Long Island. The right to live on and use a given piece of land was transferred through buying and selling. Records called land deeds, patents, and titles marked the sales and provided formal evidence that could be drawn upon when conflicts arose. This system has carried forward to the present day, and shapes the contemporary geography of Long Island and that of most of the rest of the world. But before colonialism, the island was likely held and maintained in a different way.

Many early historians of Long Island — which Native peoples called Paumanauke or Sewanhackey — describe thirteen "tribes" that lived on the island at that time. But according to contemporary historians, the concept of "tribes" — formalized and distinct political systems with clearly bounded territories — likely does not accurately reflect the structures of and relationships between the groups who inhabited Long Island before the advent of European colonization. The Native American peoples on the island were likely organized into village systems, connected by kinship and cultural practices. Before European arrival, the area around present-day Jones Beach was likely occupied by peoples who spoke an Algonquin language similar to that spoken in what is now western Connecticut. Communities including the Merricks, the Massapequas, and the Secatogues are reported by 20th-century historians to have had large settlements along the Northern edge of the Great South Bay.

Today, the only Federally recognized Native American tribe on Long Island is the Shinnecock Nation, comprised of 12 Algonquian-speaking tribes. The Shinnecock Reservation is located on 800 acres adjacent to present-day Southampton, though the traditional Shinnecock lands spanned a much larger area. In addition, the Unkechaug Nation maintains the 55-acre Poospatuck Reservation, near Mastic, and is recognized by the State of New York as well as Native nations across the United States and Canada.

In the pre-colonial era, how did Native American peoples on Long Island obtain the energy they needed to survive?

Native American villages in Long Island were often established along the coast, where fish and mollusks were a primary source of food. The interior of the island was dense forest, which groups used as hunting grounds, sometimes creating clearings in the forest in order to drive game into concentrated areas where they could hunt more easily. These hunting and foraging lands were often held in common by multiple groups, and groups would join together during the hunting season to share both the labor and the spoils of the hunt.

Native American villages across North America often included common planting areas, where they would grow crops using a companion planting method. Flat-topped mounds of soil would be built about 12 inches high and 20 inches wide. Maize (corn) seeds would be planted in the center, and, after the maize had grown to about six inches tall, squash and beans would be planted around the maize. The three crops mutually encouraged one another, with the maize stalk supporting the growth of the beans, the beans providing nitrogen to the soil, and the squash spreading across the ground to deter pests and prevent the growth of weeds. Altogether, the crops provided most of the nutrients that the human body needs to function: complex carbohydrates, fatty acids, and amino acids.

For the Native American peoples of Long Island, whales were likely another important resource. Related coastal groups in present-day Connecticut, Massachusetts, and Maine were depicted by early colonizers engaging in whale hunts as a spiritual practice. Physical and archival evidence from Long Island is limited, but suggests that the Montaukket people believed in a whale spirit or deity, whom they honored by feasting on the fins and tails of the Atlantic Right Whales that swam close to the southern shore. But it would be European colonists who most intently exploited Right Whales as a natural resource.

During the era of European colonization, as settlers took over more and more land, hunting and gathering territories shrunk, and Native American communities became more rooted in one place and dependent on horticulture. Today, Native peoples on Long Island remain connected to the land and ocean, and continue traditional practices of fishing, crabbing, and clamming.

AT THE CENTER

On-site groups can anchor this discussion with the video exhibit that explores the Shinnecock Indian Nation coastal resiliency project. The video is part of the Shaping the Shoreline exhibit in the South Gallery.

Present-day members of Shinnecock Indian Nation connect with the ocean
Sean Hanley and G. Anthony Svatek

European colonization of New York and Long Island

REVIEW

The first European to explore present-day New York and Long Island was Giovanni da Verrazzano. In 1524, Verrazzano, under contract for the King of France, sailed north along the east coast of North America from Florida to New Brunswick via New York Bay and Long Island. The first permanent European settlements on Manhattan were built about 100 years after that, when Dutch settlers under the auspices of the Dutch West India Company established farms and Fort Amsterdam near the tip of the island. However, Long Island had previously been claimed by the English, and the first English settler established a homestead on Gardiner's Island, near present-day East Hampton, in 1637. From that point forward, colonists originating in New England colonies, including New Haven, Connecticut and Lynn, Massachusetts, founded settlements on the eastern half of the island, including at present-day Southold, East Hampton, and Southampton, while Dutch settlers spread into present-day Brooklyn and Queens. In 1673, the English ceded control of the island to the Dutch, though the settlers in the eastern towns resisted. In 1674, the whole of present-day New York State became English, but again those settlers, culturally connected to the Connecticut and Massachusetts Bay colonies, resisted becoming part of the New York colony. By 1683, the present-day borders of New York had been formally established under the colonial government of New York, under the auspices of the English colonial government.

Why did European settlers approach energy and the environment differently?

At the time of European colonization of North America, a shift was underway in European culture. The Enlightenment and the Scientific Revolution, then in their early stages, advanced new concepts of the supremacy of scientific reason and individual rights. Enlightenment philosophers argued that man should view nature as something to be studied, tamed, and rationalized. Land was to be parsed and described in terms of potential benefits to human — meaning white and European — prosperity. Meanwhile, the transition from feudalism to mercantilism put the power to colonize and settle North America in the hands of private companies that were contracted by royal sovereigns. The companies loaned individuals money to enable passage and the establishment of homesteads in the New World. As farming increasingly became a private enterprise, farmers would work to extract as much product from their land as possible in order to repay their creditors and to compete in growing regional and inter-continental export economies. European farmers made use of grazing livestock as sources of food and as working animals for the purposes of tilling fields and transporting crops across distances, including to markets.

From this perspective, the "uncultivated" lands of Indigenous North America represented an enormous opportunity for profit. Some writers at the time even justified the cultivation of land as a sacred duty for Christians; to them, leaving the land in the possession of those who did not exploit it to the maximum extent represented a kind of sin.

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 6-9

Document analysis

From John Locke, *Second Treatise of Government,* "Chapter V. Of Property" (1689)

God, when he gave the world in common to all mankind, commanded man also to labour, and the penury of his condition required it of him. God and his reason commanded him to subdue the earth, i.e. improve it […]

From Daniel Denton, "A Brief Description of New-York, with the Places Thereunto Adjoining, Formerly Called the New Netherlands, &c." (1670)

[...] strangely they have decreast by the Hand of God, since the English first setling of those parts for since my time, where there were six towns, they are reduced to two small Villages, and it hath been generally observed, that where the English come to settle, a Divine Hand makes way for them [...]

How do these two texts justify Europeans' colonization of North America?

How does Denton describe the flora, fauna, terrain, and peoples of New-York? What does he focus on, and how does he characterize things as good or bad?

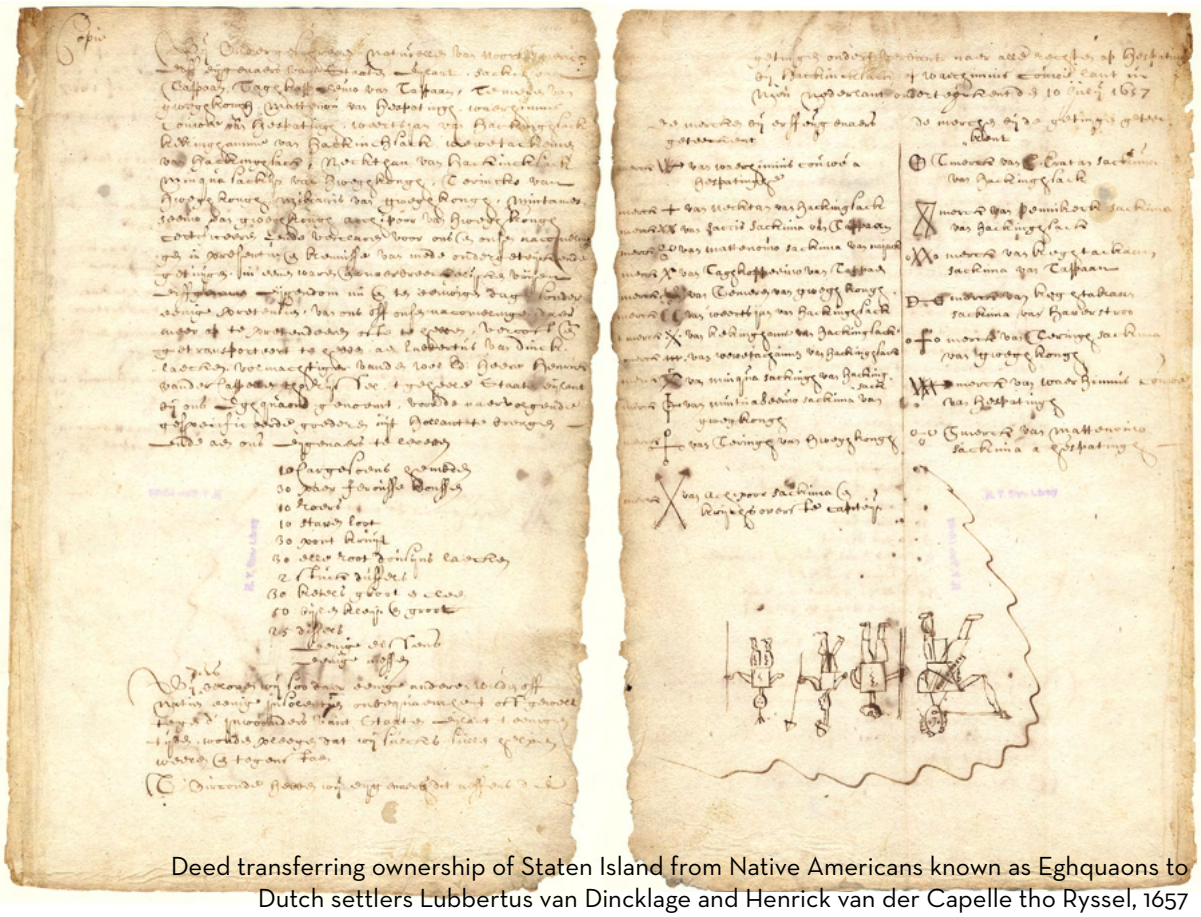
How would Denton's value judgments serve the interests of colonizers? What effect would they have on the Native peoples?

This text from English philosopher John Locke encapsulates the philosophy of improvement and its relevance to European settlers in North America at the time. An early description of the New York colony embodies similar themes. It comes from Daniel Denton, a British colonist who lived on Long Island, in the towns of Hempstead and Jamaica, in the 1650s and '60s. In 1670, Denton published A *Brief Description of New-York, with the Places Thereunto Adjoining, Formerly Called the New Netherlands, &c.*, which was intended to serve as a promotional document that would entice people in England to move to and settle in New York.

Denton combs the landscape for objects and qualities that are useful for English settlers, like hay, timber, and "good soyle." He presents these things in favorable relation to their English counterparts to make the case for emigration. Meanwhile, Native Americans are not considered real "Inhabitants" of the island, and Denton describes their decreasing numbers — in fact a result of violence, displacement, and novel diseases introduced by European settlers — in language that makes the English seem naturally entitled to the land.

In European colonial expansion throughout the world, new concepts of "land ownership" and "property" were imposed by settlers, often in the context of attempting to "purchase" land from the Indigenous peoples who previously inhabited it. In one famous local instance, Dutch settlers "bought" the island of Manhattan from a band of Munsee-speaking Lenape people for the value of 60 Dutch guilders. Other records reflect deal trading tracts of land for goods, like clothing or tools.

It is very unlikely that the Native Americans present at the earliest encounters with the Dutch and English shared the Europeans' conception of property rights. Rather, scholars today believe that Native American parties to these "sales" would have understood themselves to be accepting trade goods in exchange for permission to use the land, but not transferring ownership of the land to individual Europeans and their heirs in perpetuity. Over time, as the meaning of the sales became clear, some Native Americans cooperated in the European property system, and some leaders even took on enforcement roles. Weakened by disease and frightened by news of Europeans massacring nearby Native communities, Native Americans on Long Island capitulated to Dutch and English authority in order to limit or prevent harm to their people, or to increase their own power within the colonial system. In exchange for loyalty, English settlers appointed a Montauk sachem (leader) named Wyandanch as ruler of all the Native Americans in Eastern Long Island. Wyandanch used threat of force to assert his authority over the Shinnecock, and in colonial documents, he is listed as a cosignatory on several deeds transferring Shinnecock land to the English.



Deed transferring ownership of Staten Island from Native Americans known as Eghquaons to Dutch settlers Lubbertus van Dincklage and Henrick van der Capelle tho Ryssel, 1657
Courtesy of New York State Archive

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 10-12

Document analysis

Indian Deed for Land on Long Island, 1636 | From *Documents Relating to the Colonial History of the State of New York, Vol. III* (1883)

We, Director and Council of New Netherland etc etc., herewith testify and declare, that to-day […] they have transferred, ceded, surrendered […]

Confirmation by the Indians of the Sale of Hempstead, 1643. | From *Documents Relating to the Colonial History of the State of New York, Vol. III* (1883)

Know all men by these Presents that Wee the Indians of Marsapege, Mericock and Roakaway […] Doe by these presents Ratifie and Confirme to them […]

Order regarding the granting of Patents, 1638 | From *Documents Relating to the Colonial History of the State of New York, Vol. III* (1883)

Divers freemen request, by petition to the Council, conveyance of the lands which they are cultivating at present […]

What do these documents show, and what do they omit?

Who do they affect? What ethical problems do they pose?

The first document, one of the oldest surviving New York land deeds, details the "sale" of land in present-day Brooklyn to Dutch settlers by a group of Lenape. The tract comprised 3,600 acres in what is today known as Flatlands but the name of which, in 1636, was transliterated as "Casteteuw," and believed to be derived from a Munsee word meaning "where grass is cut." The second document, seven years later, represents the affirmation and reaffirmation by previous Indigenous "owners" that they have relinquished their claim and received the agreed-upon price. Other deeds in the archive describe the purchase and negotiated ownership of "meadows," which colonists used to graze cows. The third document describes the transfer of land ownership from the Dutch West India Company to a group of settler farmers. A plan for payment after a ten-year grace period is established.

These documents do not reflect the history of European settler attacks on Native communities, including, according to some historians, near present-day Fort Neck, just north of what is now Jones Beach State Park. Letters and first-person accounts explicitly document attacks on Native American communities by New Netherland colonists at present-day Pound Ridge, New York, in 1644 and by Connecticut colonists at present-day Mystic, Connecticut, in 1637. Around 500 Native American adults and children were killed in each event. Consider: how might experiencing attacks directly or hearing about violence against elsewhere in the region have impacted the decisions of Native people in Long Island who were party to these contracts?

Map analysis

What does this map show?

Why are farms, mills, and forts located where they are?

What names are recognizable? How do you think this early European settlement influenced the present geography of New York and Long Island?

This Dutch map shows private homesteads alongside Dutch West India Company fortifications, quarters of enslaved persons, and a number of grist- and saw-mills, which would have been collectively held. In western Long Island, European settlers grazed livestock on common meadows, established private gardens and orchards, and harvested firewood from the forest in the middle of the island. Meanwhile, to the East, settlers developed fisheries. Throughout the region, settlers were constantly negotiating lines between private property and commonly-held resources as they attempted to meet their needs for energy in the form of food and fuel, to compete in new export markets where their agricultural and hunting products were highly valued, and to expand their capacity through the use of mills and other technology.

Note "Mareckewich" (Marechkawieck) and three other Native American villages, "Techkonis," "Keskachane," and "Wichquawanck," located in present-day Brooklyn. Each village site is marked by a longhouse, perhaps representing a single public house. The longhouse structure was most common among the Munsee-speaking Delaware communities in present-day New Jersey and western Long Island.

Source

"Manatus Gelegen op de Noot Riuier" ("Manhattan lying on the North River," also known as the Manatus Map), creator unknown, 1639

BREAK OUT

For full activity materials, see:

Unit 3 Appendix

Pages 13-14

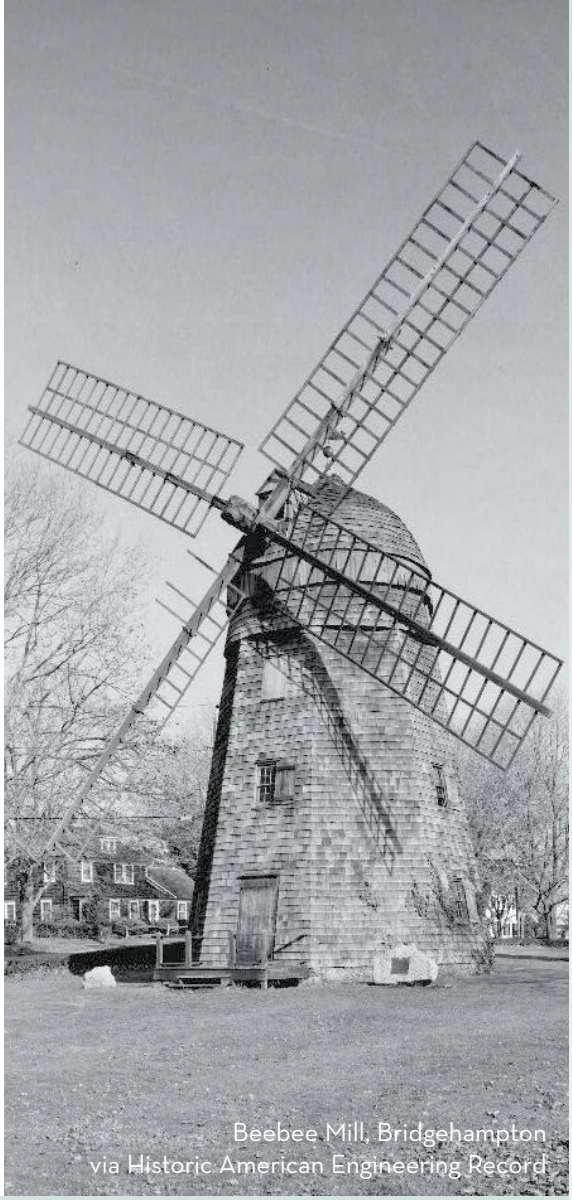
Freeke's Mill
Historic and Antiquarian Scenes by Thomas Field (1868)

Mills were an early form of energy infrastructure in Europe, North America, and elsewhere, and a notable exception to the private property framework. Mills made use of the naturally-occurring kinetic energy of wind and water in order to grind wheat and corn into flour or meal, or to operate a saw to turn downed trees into firewood and timber.

The effort required to erect and maintain a mill encouraged collectivization. Water mills were often established by building a dam to create a millpond, in which water from a stream or tide would collect, ready to be released whenever the mill was required to run. These ponds had to be maintained through dredging. Millstones were enormous stone wheels that had to be quarried, transported to the appointed site, and installed. The mills operated on a barter system. Adult male members of a given community would be drafted to these tasks and in exchange their families would be able to use the mill to grind wheat, oats, and corn. The community member who built and operated the mill would be entitled to repayment by the community in the form of landholdings or a percentage of the grist.

The investment and capacity that these structures represented made them strategically important both in the establishment of settlements and in conflicts over land. Brouwer's Mill, also known as Freeke's Mill, was the first mill to operate in New Netherland, having been established on Gowanus Creek, a tidal estuary, in 1645. Residents of the town of Breukelen repeatedly dredged canals to keep water flowing to the mill, which operated continuously until the Revolutionary War. During the battle of Brooklyn, Americans in revolt ordered that the mill and its stores be burned so that the British could not commandeer them.

On Long Island, mills were used to grind grain into flour and meal, saw wood, and pump water. The tidal ebb and flow was an invaluable resource to the operators of water mills, which were common until the 19th century. But the consistent sea breeze that has long been fundamental to the island's many ecosystems, and that today forms the basis of New York's renewable energy expansion, made windmills especially productive. Many windmills on Long Island survived into the 20th century, adapting as new resources and technologies became available. The Beebee Windmill in Bridgehampton, Long Island, exemplifies energy technology in transition. The wooden mill building, constructed in 1820, contains traditional millstones, driven by large wooden blades that catch the wind. But iron gear components and a steam engine hookup, added in the second half of the 19th century, demonstrate the growing importance of coal in the Industrial Revolution.



Beebee Mill, Bridgehampton
via Historic American Engineering Record

LEARN MORE

See 1.2 for discussion of the mechanical energy of windmills, as well as a schematic drawing of the Beebee Windmill in Bridgehampton, Long Island.

See 3.2 for discussion of increasing access to iron and steam as a result of explanding coal mining in the northeastern United States.

Discussion

In what ways were mills similar to present-day forms of energy infrastructure?

In what ways were they different?

BREAK OUT

"Improvement" and the "whaling designe"

Whales, especially at the eastern end of Long Island, are another example of an energy resource that complicated the private property frameworks of early Colonial America. Whale blubber was a valuable food source. Baleen, used in clothing, and whale oil, derived from blubber and used for heat and lighting, fetched high prices in local and international markets. But whaling was a big enough job to require cooperation. How would colonists reconcile the need to work together with their desire to profit from the whales?

Whales were first hunted in Europe by the Basque, off the coast of the Iberian Peninsula in the 11th century. The English began whaling off the coast of Norway in the 16th century, establishing the methods with which settlers in colonial New England were likely most familiar. Some of the earliest "organized" whale fishery in North America took place on Long Island. Jones Beach itself was the site of a whaling station established by Major Thomas Jones, an English settler who owned 6,000 acres near present-day Massapequa. Jones built the first brick house on Long Island and in 1700 established a whaling station off the barrier island where the State Park is now located.

European settlers on Long Island came up with systems for dealing with "drift whales," which were typically pilot whales that became stranded on the beaches along the southern coast of Long Island. A system for distributing the whales, called the "whaling designe" was worked out between the young settlements over the course of years, and the rules were gradually enshrined in the early colonial archive. At sea, North Atlantic Right Whales could be hunted by groups of two boats, each carrying six men, who would secure the whales with ropes attached to harpoons and gradually tire them out until they could be killed with spears. Over time, whaling came to be more regimented and professionalized, involving more complex machinery and able to be conducted over greater distances. Eventually, Right Whales were hunted almost to the point of extinction, but in recent years their population has rebounded.

Whaling, both in its more ad hoc and industrialized forms, heavily depended on the expertise of Native Americans, who were recognized as skilled hunters. Native Americans employed in whaling had special privileges and protections in recognition of their important contributions to the industry.

Instructions

Read the longer selection from John Locke and discuss the following questions.

What is property, according to Locke?

What makes something an individual's property?

How does Locke conceptualize waste?

What is the role of money in Locke's moral system?

Then, assign each group member responsibility for a single primary document in Set A. For each primary document, assess:

What purpose does the document serve?

Who is writing (or speaking) in it? Whose voice is not heard?

Who does it affect? Who is included or excluded?

What does it show? What does it hide or fail to explain?

Have each group member summarize their document to their group-mates. Then, together, discuss the following question:

How does the early colonial whaling practice fit into, or not, the moral system outlined by Locke?

During the discussion, it may be helpful to consider:

Who owned the whales? How was ownership negotiated or established?

Who did the work of processing the whales, and how do they do it? Did the people who did the work reap the benefits?

How was productivity measured? Was it to do with usefulness, or something else?

Then, examine the documents in Set B together. Analyze the documents:

In what way is whaling more "industrialized" by the 18th century? How does the process of whaling in this era differ from the earlier "whaling designe"?

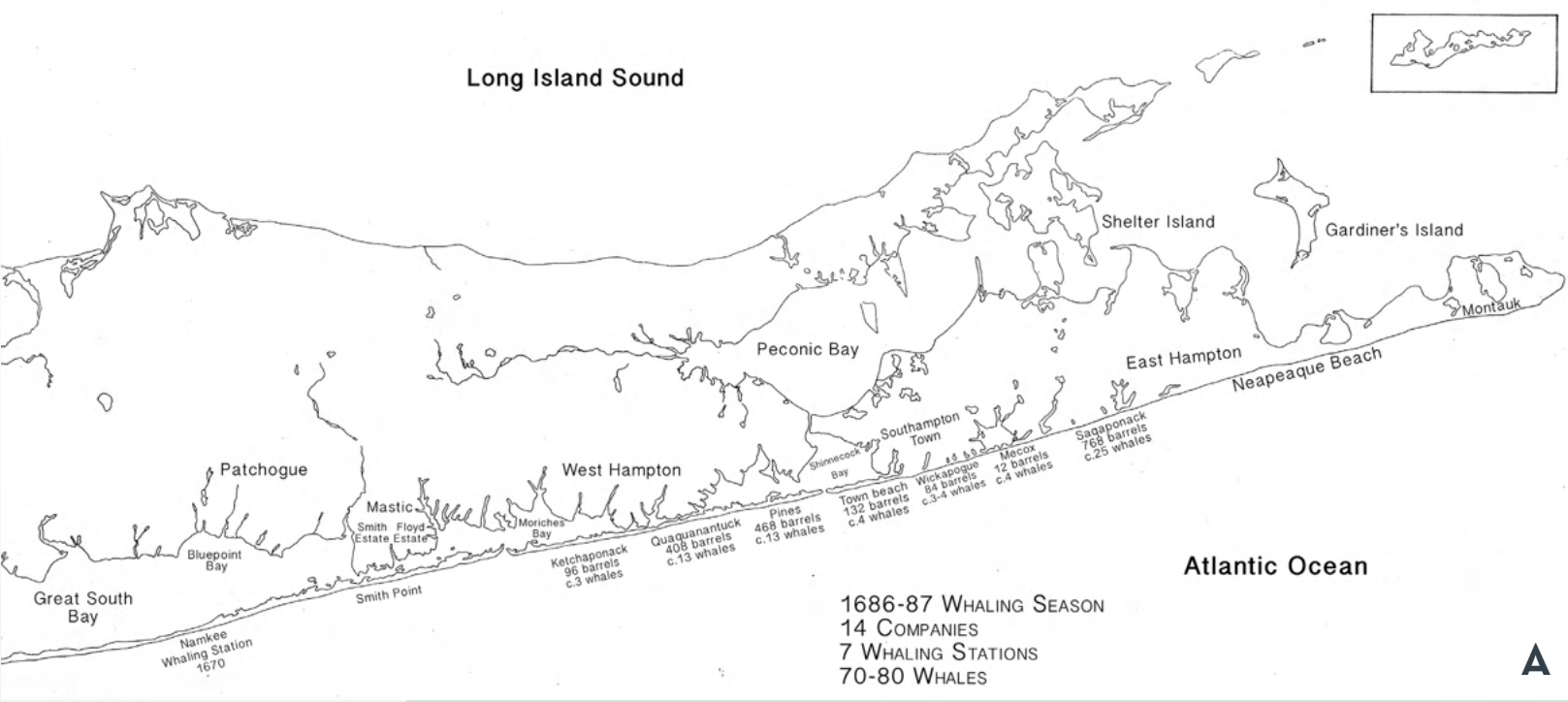
Who is involved? What kind of work do they do? How are they compensated? What risks do they take?

Who owns the products of whaling? How is ownership established?

Does this seem fair? Why or why not?

For full activity materials, see:

Unit 3 Appendix
Pages 15-29



Set A

A | Map showing Whaling Stations along the south shore of Long Island and numbers of whales taken in 1687. By Jeremy Dennis, via Long Island History Journal

From John Locke, *Second Treatise of Government*, "Chapter V. Of Property," 1689

God, who hath given the world to men in common, hath also given them reason to make use of it to the best advantage of life, and convenience. […]

Declarations, 1644-1645 | Quoted in *The Early History of Southhampton, LI, New York* by George Rogers Howell (1866)

March 7, 1644. Yt is ordered by this present Court that yff by the providence of God there shall bee hencefoorth within the bounds of this plantacon any whale or whales cast up for the prevention of Disorder […]

Wyandanch–Lion Gardiner deed, 1659 (East Hampton, New York) | Quoted in *Living With Whales* by Nancy Shoemaker (2014)

July 28, 1659. Be it known unto all men by this present writing that I Wiandance Sachem of Pawmanack or Long Island, and with my sone Weeayacomboun, have sold unto Lyon Gardiner, his heyres executors, or assigns, I say I have sold all the bodys and bones of all the whales that shall come upon the land […]

Declaration, 1672 | Quoted in *The Early History of Southhampton, LI, New York* by George Rogers Howell (1866)

Whereas it was represented unto his Honor ye Governor that a certaine difference had arisen between John ffinch of Huntington & severall persons of Oyster-Bay concerned in the Whale- ffishing Design […]

An Order about Whales, 1672 | *From Documents Relating to the Colonial History of the State of New York, Vol. III* (1883)

Whereas I am given to understand, That there hath been great Abuse by ye neglect of ye Officers of severall Townes upon Long-Island in not makeing Enquiry into or securing his Royal Highness his part of Drift Whales or Great ffish cast upon ye Beach or Shoare according to ye Directions in ye Law […]

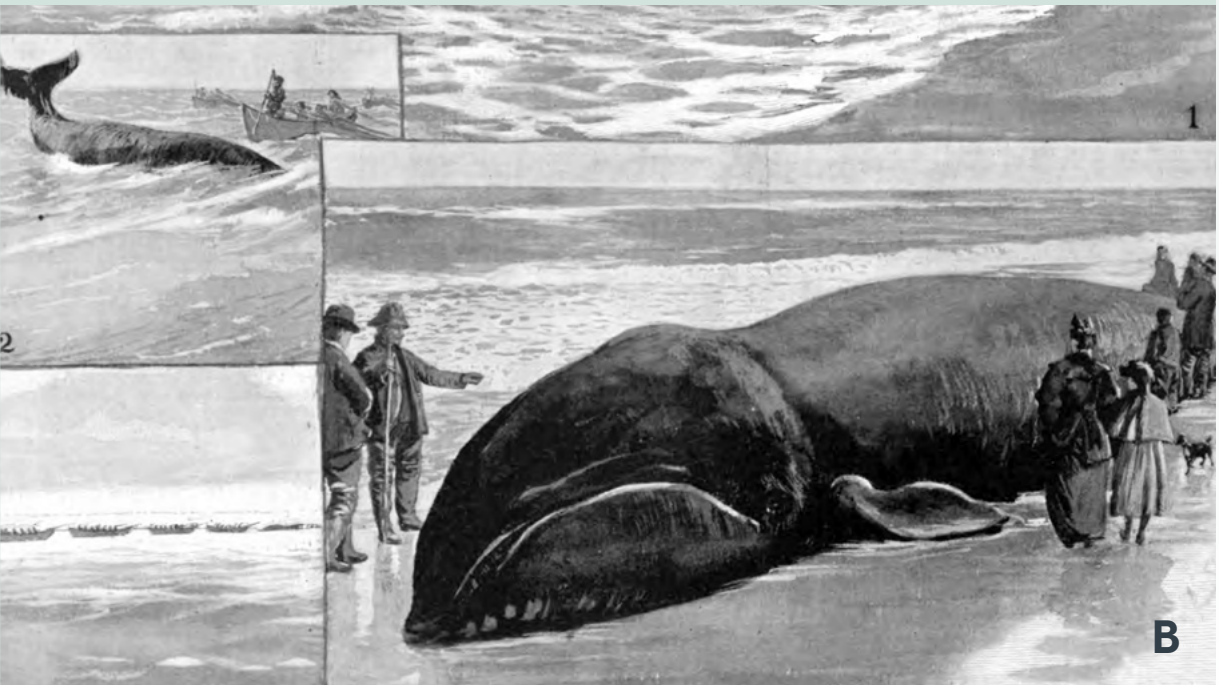
Declaration, 1672 | Quoted in *History of the American Whale Fishery*, by Alexander Starbuck (1878)

Whereas there was an ordinance made at a Towne-Meeting in South Hampton upon the Second Day of May last relating to the Regulation of the Whale ffishing and Employment of the Indyans therein […]

Quoted in *Imagining the Past: East Hampton histories* by T. H. Breen (1989)

"April 14, 1675: we the aforesaid Indians do engage ourselves to go to sea from year to year at all seasonable times for these our Copartners a whale killing […]

Set B



Commodity	1768 Quantity	1768 Value	1769 Quantity	1769 Value	1770 Quantity	1770 Value	1771 Quantity	1771 Value	1772 Quantity	1772 Value
From northern colonies										
Bread & flour (tn)					0.60	6				
Deerskins (lb)			104,116	10,050	145,821	14,392	209,042	20,420	103,120	10,468
Fish, dried (qn)	11,696	5,556	13,321	6,607	12,082	6,174	11,362	5,783	16,952	8,502
Grain, wheat (bu)	45	10			39	8	40	9	5,940	1,443
Iron										
bar (tn)			0.57	8			19.57	294		
pig (tn)							186.39	900	200.72	1,016
Naval stores										
pitch (bbl)	55	24					13	5		
tar (bbl)			393	126	20	7			5	2
turpentine (bbl)									5	3
Oil, whale (tn)	690.36	8,284	309.14	3,710	918.47	11,022	2,342.71	28,113	815.44	9,785
Potash (tn)	8.13	178	35.20	772	41.19	1,153	35.71	1,101	65.12	1,478
Rum, West Indian (gal)							13,500	1,364		
Wood products										
pine boards (1K ft)	167	225	271	366	203	325	180	290	220	374
staves and headings (1K)	265	723	337	1,008	78	237	243	764	188	599
Total, northern colonies		*15,000*		*22,647*		*33,324*		*59,043*		*33,670*

C

B |"Whaling off Amagansett, Long Island" by Tappan Adney for *Harper's Illustrated Weekly*, April 10, 1897

C | Table adapted from *Shipping, Maritime Trade, and the Economic Development of Colonial North America* by James Shepherd (1972)

Excerpt from The Whale Oil Trade, 1750-1775 by Richard C. Kugler (1980)

Not only were oil and baleen early used as commodities of trade; once the beaver pelts and furs of the New England hinterland were exhausted, whale oil alone emerged to take their place as the foremost source of sterling earned in direct trade with England. […]

Account by J. Hector St. John de Crèvecoeur, ca. 1760s | Quoted in *Living With Whales* by Nancy Shoemaker (2014)

The vessels most proper for whale fishing, are brigs of about 150 tons burden, particularly when they are intended for distant latitudes; they always man them with thirteen hands, in order that they may row two whale boats […]

Food, energy, and geography today

Though the world we live in includes many more sources of energy than were available to Native Americans or European colonists in the 17th and 18th centuries, food is still one of our primary energy needs. The systems that allow us to meet those needs still shape the geography of our world.

As the table of exports from *Shipping, maritime trade, and the economic development of colonial North America* demonstrates, European colonization marked the beginning of an era of globalized food production, consumption, and distribution. Today, the food grown in any given place rarely reflects the energy needs of the people who live there. Rather, when food is bought and sold in a global market, agricultural land use across the world is determined in part by what crops the climate and terrain of a place best support. For instance, fruits like bananas and mangoes grow well in tropical climates. Current and historical political relationships between countries also come to bear on which places produce what kinds of food.

In recent decades, the local food movement, also known as the "locavore" or "slow food" movement, has advocated for a return to more regional forms of agriculture. Under that model, regions would grow food according to the needs of their population, and people would only eat food grown within a certain distance — for instance, a day's drive or train journey.

Instructions

Use the interactive digital resources to investigate the import and export relationships between global regions and how these relationships shape the geography of the world.

Then read the report from the Office of the New York State Comptroller on the state of agriculture in New York.

Reflect in writing on the positive possibilities and potential drawbacks of a local food system. Consider:

Which regions of the world appear to import the most food? What do they import?

Which regions export the most? What do they export?

Which regions have seen the largest growth in amount of land used for agriculture ("cropland") and for grazing from 1600 to today?

Which have seen the least growth?

For full activity materials, see:

Unit 3 Appendix
Pages 30-31

Why might these different rates of growth have occurred?

What are New York State's present-day agricultural strengths and weaknesses? Which regions or countries of the world also have those strengths and weaknesses?

What do you think are New York's comparative advantages and disadvantages when competing with global agricultural producers?

What are two ways that policymakers in Long Island and New York State could help encourage the growth of a local food system?

How would your life and daily eating habits be affected by the growth of a local food system?

When you think about your daily eating habits, what's missing from the picture painted by these data?

Sources

International Center for Tropical Agriculture | Where our food crops come from

blog.ciat.cgiar.org/origin-of-crops/

Our World in Data | Countries by agricultural production; land use

ourworldindata.org/agricultural-production

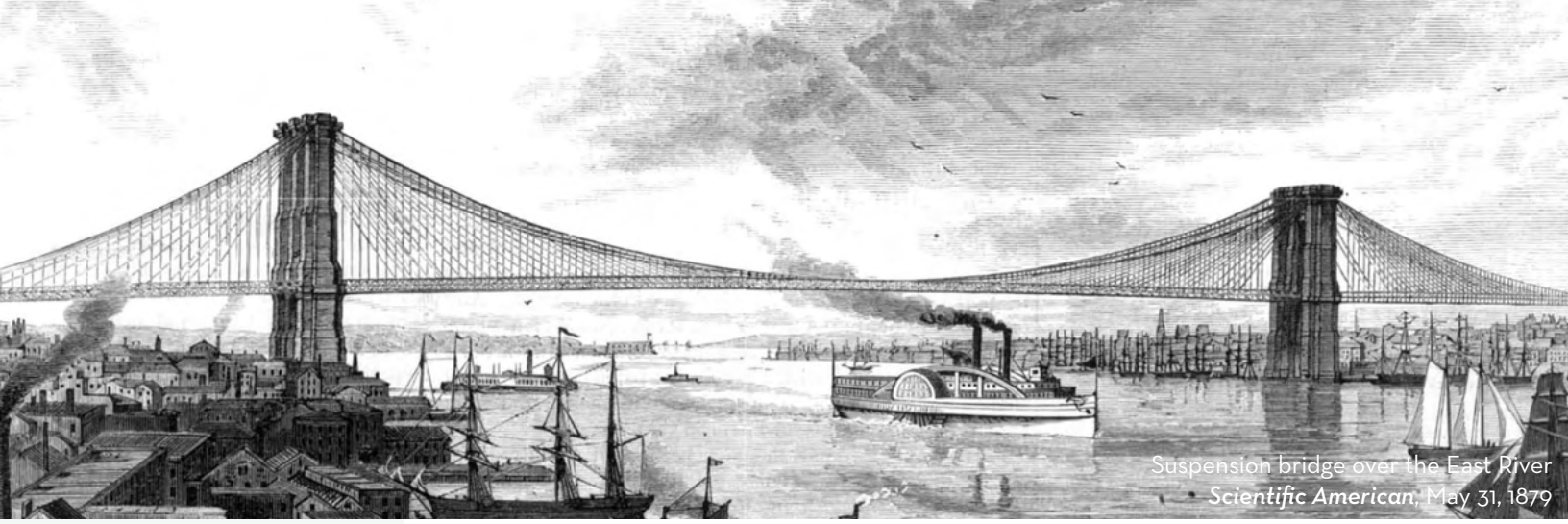
ourworldindata.org/land-use

"A Profile of Agriculture in New York State," Office of the New York State Comptroller: Thomas Di Napoli, Comptroller, August 2019

CORE CONCEPT 2

Energy enables industry and creates connections

With the Industrial Revolution, access to new sources of energy catalyzed technological advancement, regional transportation networks, and social change.



Suspension bridge over the East River
Scientific American, May 31, 1879

From industry to urbanization

How did Long Island go from thick forests and smallholdings to a bustling, well-connected metro area? It started with coal. This Core Concept explores the transition from an agrarian to an industrial economy through the lens of energy: what new forms of energy made possible, and the transformations they produced. In the story of Energy and Us, industrialization marks a fundamental shift in how individuals and societies understand and use energy, a shift which continues to reverberate through social life, human geography, and the natural environment. Coal would also eventually lead to the invention and expansion of the nation's electrical infrastructure. (Today, more than 200 years after the initial expansion of the US coal industry, New York State no longer uses coal to produce electricity.)

The discussion begins by connecting the relationship between energy and economy to the geographical factors affecting the pace of industrialization in the 19th century United States. Then, students analyze historical maps, census data, and photographs to explore how the availability of coal catalyzed regional transportation networks that in turn triggered waves of migration both into and within the young United States. Students work with primary documents that present arguments for and against industrialization at different points over the course of the century. With these documents, students draw connections between the environmental impacts of the growing industrial economy, the ideals and arguments invoked in service of the expansionist project, and the inequalities that industrialization created and amplified.

The acceleration of energy extraction and industrial activity had profound effects on daily life in the New York metro region. In an investigation activity, students examine documents pertaining to the distribution of manufactured gas in mid-19th-century New York City, as an early example of infrastructure supporting individual energy consumption. Students analyze maps of land-use in the city in order to deduce what effects broadly available street lighting might have had in the developing urban environment. Finally, students bring their analysis into the present in a creative writing activity, reflecting on the interplay of energy, economy, and timekeeping in their daily lives.

What is industry?

What does the word "industrialization" mean?

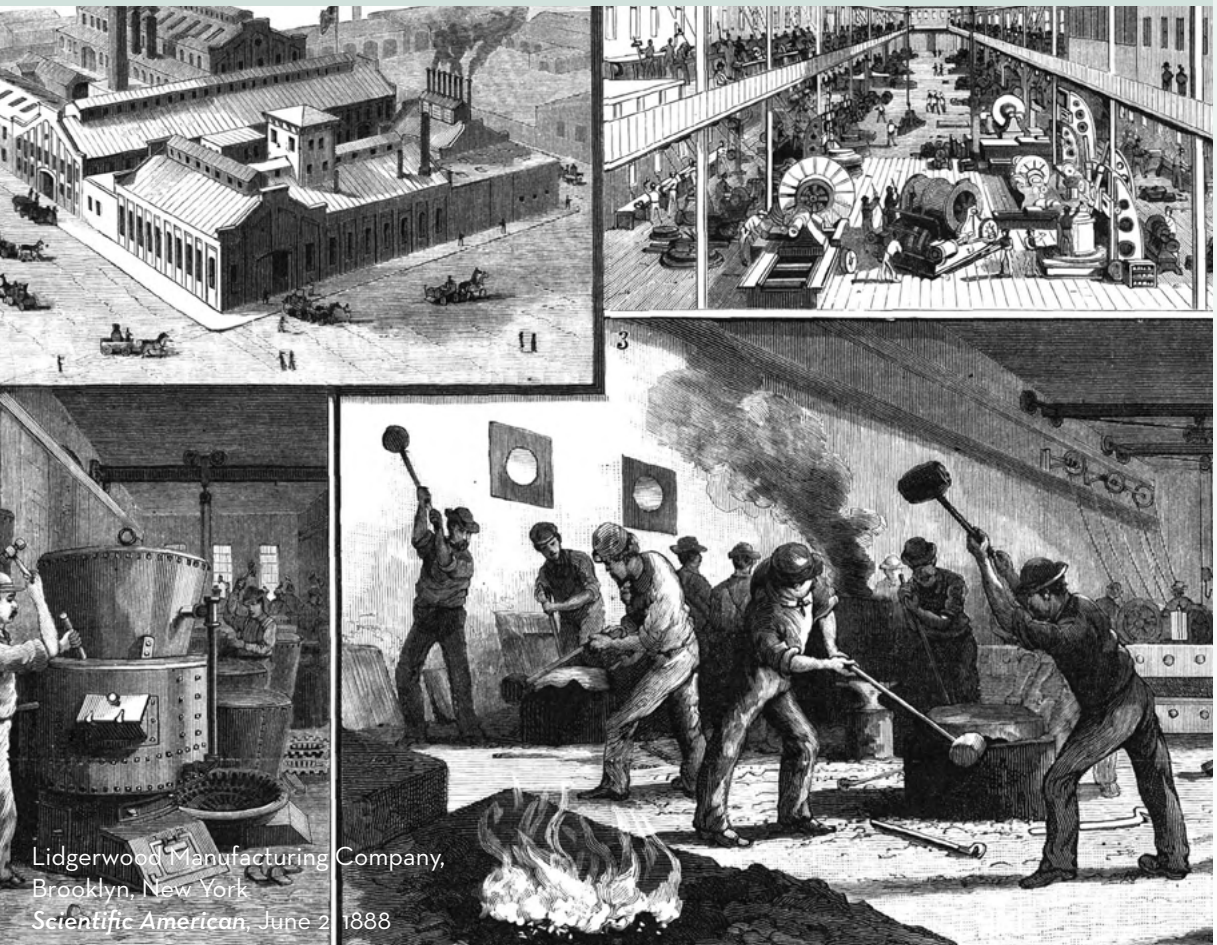
What spaces in my community are "industrial"?

What happens in those spaces? What characteristics do they share?

Where are they in relation to other things in the community?

Industrialization refers to the transition from an agrarian economy — one based on farming — to an industrial economy in which the manufacture and trade of goods drives economic growth. The term is most often used in relation to a specific period in the history of Europe and North America known as the Industrial Revolution, but it can also be understood as a process occurring at various scales, locations, and points in time — even today.

Industrialization has historically been made possible by the emergence of new resources and capacities in tandem, including new basic materials, especially metals like iron and steel; new energy sources like coal and oil; new tools and networks that use energy sources to mine, transport, and transform these materials; and new labor processes organized around machines that use these transformed materials and energy sources to produce goods. Industrialization can also be studied in terms of how these changes affect life expectancy and lifestyles, economic systems, geography, philosophy, art, and science. The history of industrialization in the region surrounding Jones Beach — the northeastern part of what is now the United States — is a case study for exploring those dynamics.



Lidgerwood Manufacturing Company, Brooklyn, New York
Scientific American, June 2, 1888

PRIMER

Give students a few minutes to respond, either alone or in small groups. Then move into the next activity by inviting students to share their answers.

AT THE CENTER

Groups working with the curriculum on site can begin by viewing the Geography of Power exhibit in the South Gallery.

Energy and industry

Where did industrialization come from?

The process of industrialization was gradual and piecemeal, with many developments building on top of each other, including new access to raw materials, energy sources, technologies, and labor. "Progress" was not a straight line. For instance, we might be used to thinking of factories as a hallmark of industrial production. But in England, the textile industry first developed factories along waterways in rural areas, used machines made from wood and leather belting that ran on water power, and relied on the labor of children and young women recruited from nearby farms. By the 1840s, with the growing availability of coal and the refinement of the steam engine, textile factories had moved into urban areas, incorporating metal machinery and the labor of adult men.

The United States, relative to England, was slow to adopt new energy sources. In the United States, in 1850, wood still composed 91 percent of fuel consumed, while coal was only 9 percent. The next half-century would be transformational: by 1895, coal made up 65 percent, and wood 30 percent, of the country's fuel base. (Coal peaked as an energy source in 1910, as 77 percent of the fuel base.) Before the 1840s and '50s, factories in the US were mainly owned by textile companies, and almost exclusively ran on water power and wooden machinery rather than steam and iron machinery. This was in part due to the cost of raw materials: the vast majority of American manufacturers at the time relied on imported iron, and the majority of iron produced in the US was made in small-scale forges. The discovery of domestic coal made the production of iron much more economical and a transition to iron machinery followed. Subsequently, migration to and within the country provided the workforce that allowed industrialization to accelerate.

The adoption of new technologies of production and new sources of energy was encouraged by the capitalist market system in which these industries already operated. Within such a system, those who own the materials and machinery used to produce commodities that are sold on the market generate profit by selling things for more than it costs to produce them. Technologies and innovations that lower costs by lessening the quantity of materials or labor required to produce the same amount of goods can therefore increase profits. For instance, in the early industrial era, iron machinery was stronger and more durable than machinery made from wood and leather, while coal could boil water and create steam much faster than wood. If (hypothetically) a quantity of coal produced three times as much steam as the same quantity of wood, or an iron machine could last three times as long as a wooden one, then coal and iron allowed manufacturers to produce three times as much for the same amount of investment — so long as those resources were as easy to acquire as wood. Thus, capitalists had incentives to develop mining processes and transport networks that made iron and coal accessible as possible.

Annual energy consumption per head of population (megajoules)

	Human	Draught animals	Firewood	Wind	Water	Coal	Total
1561-1571	4,373	6,210	6,324	59	162	2,039	19,167
1600-1609	4,161	4,647	4,729	85	152	3,153	16,925
1650-1659	4,521	4,802	3,849	153	156	6,772	20,253
1700-1709	4,789	5,744	3,939	238	173	14,719	29,602
1750-1759	4,519	5,113	3,429	427	198	21,403	35,089
1800-1809	4,233	3,471	1,877	1,282	111	41,373	52,347
1850-1859	3,564	2,633	118	1,280	89	88,779	96,462

Document analysis

How are absolute energy consumption and per capita energy consumption related?

From these data, what would you extrapolate about the changes in population in England and Wales during this period?

What do these trends suggest about the relationship between energy sources like coal ("fossil fuels"), efficiency, and expansion?

These tables depict, roughly, the beginning of the English Industrial Revolution. In the 16th and early 17th centuries, human and animal labor was the primary form of energy consumed in English society. Since humans and animals both derive their energy from food, this meant that population was limited by agricultural productivity, which is to say, by the amount of farmland, the climate, and the efficiency of farming methods. Then, in the 17th century, the consumption of coal began to increase. (So did the volume of wind energy consumed, primarily due to the growing number and size of sailing vessels; windmills did not significantly contribute.) In parallel, the total and per-capita amount of energy consumed grew exponentially. On average this suggests an increase in what we call "standard of living": more food was produced and made available, while increased manufacturing made goods like textiles and iron tools more available. The newly available energy source, coal, and industrial processes that employed coal have a clear role in driving this increase in consumption. Per capita consumption of coal and wind were the only categories to increase significantly over the period, while per capita consumption of human and draught animal labor, in fact, decreased, suggesting that farming methods became more efficient.

Source

Tables from "Energy and the English Industrial Revolution" by EA Wrigley, published in *Philosophical Transactions of the Royal Society* (2013)

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 32-33

What is coal, and what was its role in industrialization?

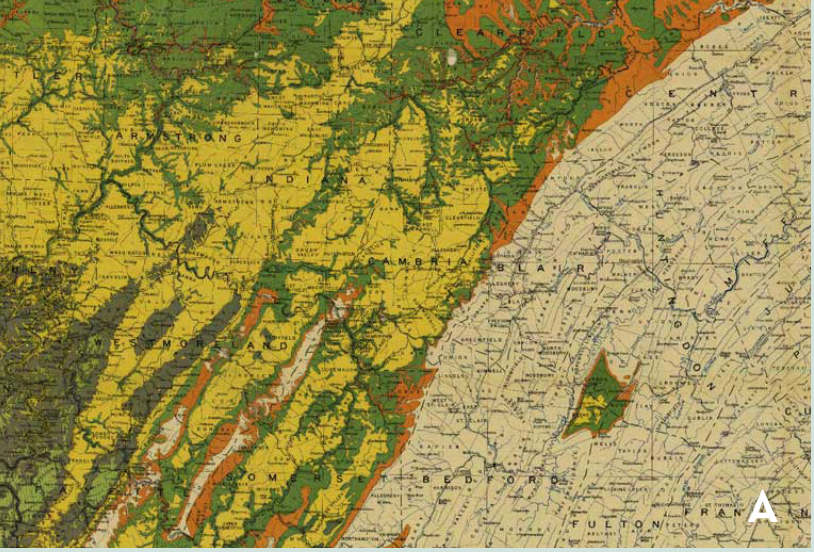
Coal is a black rock formed from the ancient compressed remains of plant matter, which occurs in continuous layers in the earth. In Pennsylvania, the layers of coal, known sometimes as "seams," range in thickness from several inches to 10-12 feet thick. Different kinds of coal are categorized by their physical properties, which result from the different ways they formed over millions of years.

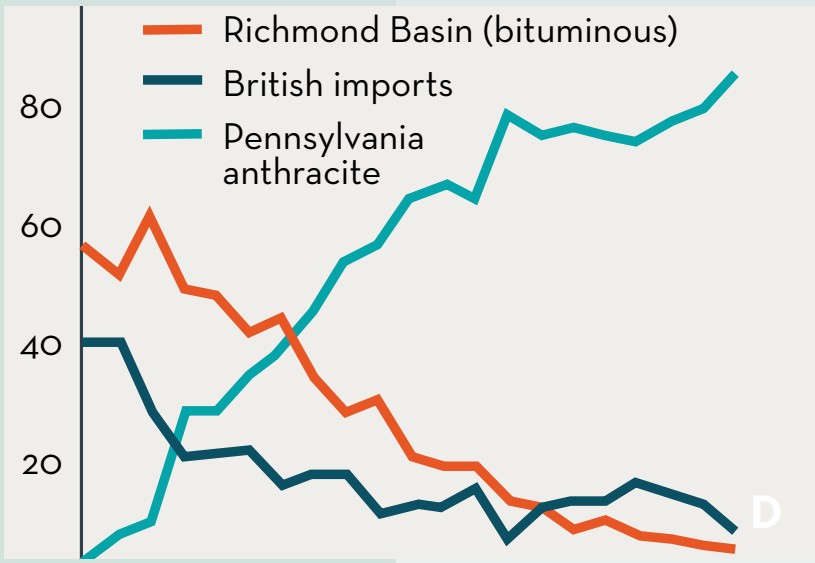
Bituminous — a relatively soft, cool-burning kind of coal — was discovered in the Appalachian Basin in the late 18th century. It was first extracted from drift mines in the Pittsburgh coal seam and transported by canoe to the nearby military garrison. By 1830, the city of Pittsburgh consumed more than 400 tons of bituminous coal per day for domestic and light industrial use. However, transporting this coal east over the Allegheny Mountains was at first very expensive. Through the 1820s, Eastern Seaboard cities still imported coal from Europe at a high cost that meant industry relied more on charcoal and water-powered machinery.

But there was another kind of coal in Pennsylvania: anthracite coal, a harder material of up to 95 percent carbon that burned hotter, cleaner, and slower than bituminous. So-called "stone coal" could also be found in coalfields in the eastern part of the state, rather than hidden behind the Allegheny Mountains. With the creation of a network of canals that connected the coal fields to the cities on the Eastern Seaboard, Pennsylvania anthracite became a cheaper and more efficient energy source than wood, charcoal, or imported coal, especially for domestic uses.

Meanwhile, anthracite made iron-manufacture and steam-powered machinery economically viable along the East Coast from the 1840s onward. The new availability of iron allowed the canals to be gradually replaced by railways, making Pennsylvania anthracite even more accessible. Then, railways began to extend into other bituminous coal fields in Maryland, Ohio, and Illinois. As the railroad network was established, domestic bituminous was more easily accessible for East Coast manufacturers than anthracite. But it still did not burn as hot.

A process of turning softer, cooler-burning bituminous into a higher-carbon product called coke using beehive ovens became prevalent after the Civil War. Coke burned hot enough for use in the production of steel and other industrial processes. From the 1870s, coke production accelerated rapidly due to the proliferation of beehive ovens throughout the coal regions. The number of beehive ovens increased from 200 in 1870 to almost 31,000 in 1905. That year, nearly 18 million tons of coke were produced in Connellsville district (a bituminous coal seam near Pittsburgh) alone. One observer remarked: "the year's production would make up a train so long that the engine in front of it would go to San Francisco and come back to Connellsville before the caboose had gotten started out of the Connellsville yards!" However, the process of producing coke with beehive ovens emitted noxious fumes that killed surrounding vegetation and filled the sky with smoke. By the turn of the 20th century, new ovens had been designed that captured the byproducts of coke production and collected them for other uses.





Document analysis

What do you notice about the relationship between the topography (distribution and elevation of land) of this area and the kinds of coal that are available?

What do you notice about the relationship between topography and canal or railroad routes?

According to the graphs, what is the relationship between overall coal production and anthracite and bituminous production, respectively?

The documents show the process of industrialization in North America through the lens of coal production. From the 1830s onward, the discovery of anthracite coal in Eastern Pennsylvania made coal accessible to Eastern Seaboard cities, which encouraged domestic coal production to accelerate. From the 1860s onward, the availability of coal encouraged the expanded production of iron, which allowed the railroad network to grow and consumption of both kinds of coal to rapidly increase. But new methods for turning bituminous coal into hotter-burning coke caused bituminous production to outstrip anthracite production in the decades after the Civil War.

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 34-37

The first map shows the distribution of bituminous and anthracite coal in Pennsylvania, and the second shows the topography of the Allegheny mountains separating Western Pennsylvania from the Eastern Seaboard. These mountains were the primary obstacle to industrial expansion prior to the discovery of anthracite. The third map shows the early network of canals and railroads delivering anthracite from Eastern Pennsylvania to Philadelphia and New York during a moment of transition. (Baltimore, also well-connected, is out of frame.) Canals are drawn as thick blue lines, and railroads as thin red lines. Note that canals follow naturally-occurring waterways in some places, and that railroads run alongside canals elsewhere. In some places, both railroads and canals chart a circuitous route, reflecting topographical obstructions or an inability to obtain right of way through private purchases or government intervention.

Sources

A | "Map of the coal fields of Pennsylvania," James D. Sisler, Commonwealth of Pennsylvania, Department of Environmental Resources, Bureau of Topographic and Geologic Survey (1929)

B | "Topographical Map of Pennsylvania, Colored for the Principle Geological Formations," J. Peter Lesley, in *Historical sketch of geological explorations in Pennsylvania and other states*, Geological Survey of Pennsylvania (1876)

C | "Map of the canals and railroads for transporting anthracite coal from the several coal fields to the city of New York," by William Lorenz for J. Dutton Steele, eng. (1856)

D | Charts from "The US Coal Industry in the Nineteenth Century," by Sean Patrick Adams, essay for Economic History Association (2003)

Jeffrey Beall

How did the availability of this energy source affect the development of technology and labor processes?

As in other instances when new energy sources have become available, this period of industrialization saw a mutualistic relationship between energy source availability and technological innovation. Machines that made use of coal rapidly proliferated. But as the supply of raw materials led to technological innovation and expanded production, the demand for materials increased. Thus, machines that could be used to access and refine the energy sources more effectively also proliferated, gradually supplementing or replacing human labor. But energy source extraction remained labor-intensive. For instance, coal had to be processed for market, the rocks broken into smaller pieces and filtered to remove impurities. The invention of coal processing machines made the process more efficient, but human workers were still required to manage the mechanical apparatus. These workers were frequently children: the so-called "breaker boys." It was hazardous work, and breaker boys frequently lost fingers and limbs to the machines; others suffered lung diseases from inhaling coal dust. The use of child labor in coal processing did not end in the United States until the 1920s, with the passage of strict child labor laws.

New reserves of anthracite coal and new furnace technologies also provided a new, inexpensive way to manufacture iron. Together, these led to a proliferation of steam engine technologies, while the new capacity to forge iron also led to a boom in metalwork and the production of machine parts, weapons, and railway components. Parts that had previously been made out of wood and leather belting were replaced with more durable iron, while steam gave more power than water or wind power to the engines of northeastern factories or southern agricultural mills processing sugar, flour, rice, and cotton. The growing availability of coal also encouraged the development of the glassworks and paper-making industries, which both required high heat in their production processes. Processes like distillation and sugar-refinery, which also both required reliable heat sources, were scaled up to become factory enterprises once anthracite coal was widely available. Meanwhile, technological advancement gradually reached into every corner of daily life. The growth the of iron and coal industries allowed for the development, manufacturing, and distribution of smaller-scale machinery like stoves, bicycles, and medical technologies.

But American lives were not only remade by the new availability of consumer goods. Industrialization also required new kinds and quantities of labor to keep mines and factories producing raw materials and manufactured goods. Meanwhile, under capitalism, survival needs like food, housing, and healthcare were also sold on the market, so people who did not own the means of production — the machines powering mines and factories — sold their labor for wages in order to survive. Meanwhile, owners were incentivized to pay workers as little as possible, in order to lower costs and maximize profit. Inequality and tensions grew between those who owned the steam engines and power looms, and those who migrated to work in the mills and mines.

114,335.—Coal Scuttle.—J. C. Parrish, Petersburg, Va.
114,336.—Stove.—J. S. Peckham, Utica, N. Y.
114,337.—Play Pipe.—E. L. Perry, New York city.
114,338.—Valve.—George Pierce, Boston, Mass.
114,339.—Hydraulic Apparatus.—P.E. Powers, Genoa, Nev.
114,340.—Shoes.—W. F. Prusha, E. L. Wales, Marlborough, Mass.
114,341.—Polisher.—P. F. Randolph, Jerseyville, Ill.
114,342.—Chimney.—W. Richards, London, England.
114,343.—Trap.—J. H. Richardson, Westport, Mo.
114,344.—Slide Valve.—A. K. Rider, New York.
114,345.—Clothes Line.—J. Ripley, Cincinnati, Ohio.
114,346.—Saw Guide.—A. Rittenhouse, Smithville, Ohio.
114,347.—Plumber's Water Boiler.—A. R. Robb, Brooklyn.
114,348.—Pipe Wrench.—E. H. Robbins, Pittsfield, Mass.
114,349.—Car Heater.—H. R. Robbins, Baltimore, Md.
114,350.—Paper Cutter.—T. C. Robinson, Boston, Mass.
114,351.—Dust Pan.—Thomas F. Rooney, Chicago, Ill.
114,352.—Tobacco.—A. S. Rosenbaum, New York city.
114,353.—Car Coupling.—S. S. Sartwell, Camden, N. Y.
114,354.—Polish.—H. A. and R. G. Sawyer, Milwaukee, Wis.
114,355.—Mats.—C. S. Schenck, New York city.
114,356.—Iron Furnaces.—E. G. Scovil, St. John, Canada.
114,357.—Sled Knee.—C. Shaw, Milledgeville, Pa.
114,358.—Gas Machine.—W. A. Simonds, Boston, Mass.
114,359.—Stave.—Wm. Sisson, Fulton, N. Y.
114,360.—Canister.—W. H. Smith, Portland, Conn.
114,361.—Oil Tank.—H. E. and G. S. Snyder, Williamsport

114,453.—Stove Damper.—Ernest Lohsand, La Porte, Ind.
114,454.—Securing Dental Fillings.—C.H.Mack, Portland, Oregon.
114,455.—Spindle Step Box.—L. Maish, Minneapolis, Minn.
114,456.—Fruit Box.—Joshua H. Marvil, Laurel, Del.
114,457.—Wash Boiler.—D. McCleary, Allegheny City, Pa.
114,458.—Wheel.—R. W. McClelland, Springfield, Ill.
114,459.—Sail Hank.—Wm. E. Meyer, New York city.
114,460.—Elevator.—Charles E. Moore, Boston, Mass.
114,461.—Buckle.—John H. Morris, Paxton, Ill.
114,462.—Washer and Wringer.—J. H. Murray, Kirkwood, N. Y.
114,463.—Grain Separator.—W. A. Myers, York, Pa.
114,464.—Washing Fluid.—E. H. Neill, San Francisco, Cal.
114,465.—Puddling Furnace.—J. Neville, Brooklyn, N. Y.
114,466.—Sleigh Heater.—Alfred Norton, Kokomo, Ind.
114,467.—Nozzle Stopper.—J. H. Noyes, Abington, Mass.
114,468.—Rolling Paste.—C. A. Oehl, New York city.
114,469.—Chill Castings.—James Oliver, South Bend, Ind.
114,470.—Enameling Boot Heels.—C. H. Orcutt, Leominster, Mass.
114,471.—Lantern.—John Orphy, Buffalo, N. Y.
114,472.—Plow and Marker.—O. M. Pond, Independence, Iowa.
114,473.—Lubricator.—J. M. Porter, Frostburg. Md.
114,474.—Nut Lock.—P. F. Randolph, Jerseyville, Ill.
114,475.—Life Preserving Trunk.—L.Rebstock, Hollidaysburg, Pa.
114,476.—Bending Machine.—G.J.Riblet, Bootheville, W.Va.

BREAK OUT

Archival investigation

The last few pages of each historical issue of *Scientific American* are devoted to newly issued patents and advertisements. Using the online archive, investigate the advertisements in a single issue published between 1860 and 1899. Consider:

What do you notice about the kinds of inventions being patented and advertised?

What materials or technologies do these inventions depend on?

What can you glean about American society at this moment in time, based on this document?

Source

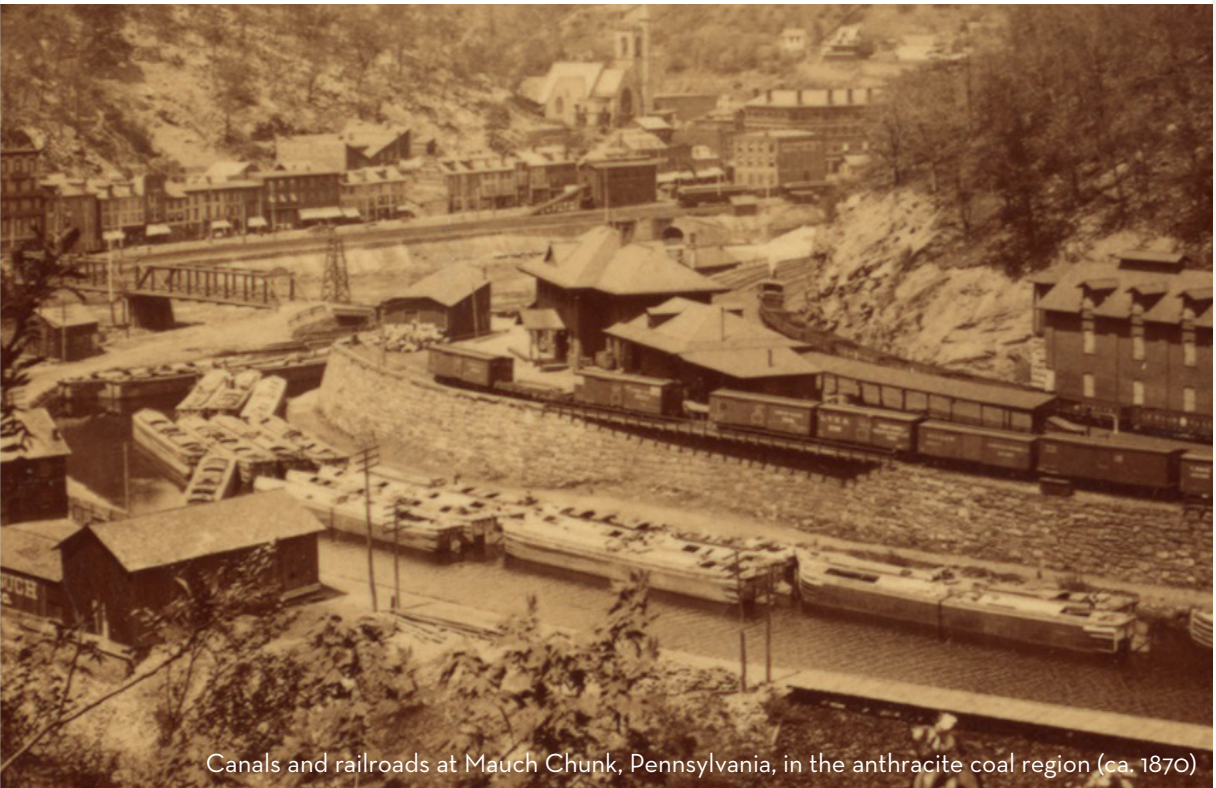
The Internet Archive | Scientific American (1845 - 1909)

archive.org/details/scientific-american-1845-1909

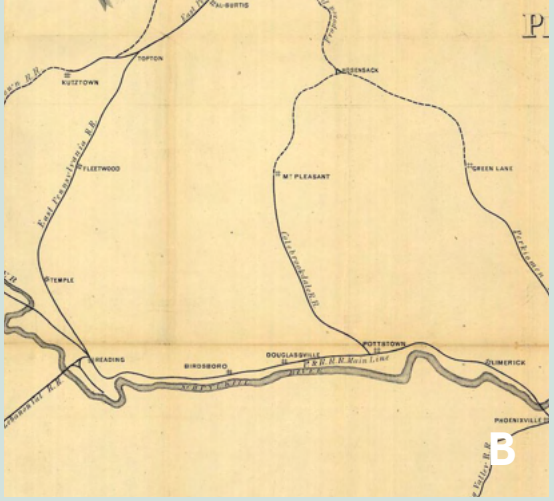
What was the effect of industrialization on the human geography of the region?

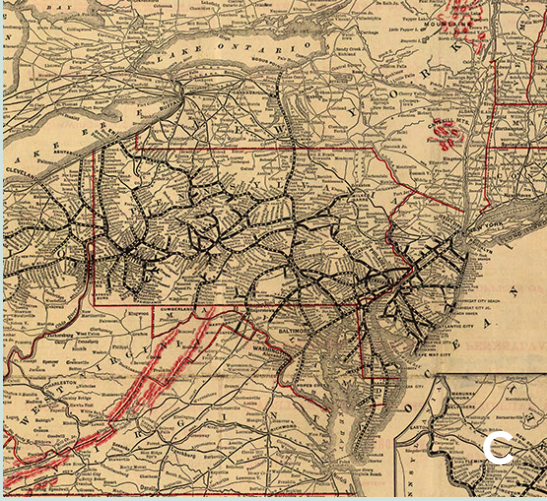
Canals owned by "navigation companies" — and dug by hundreds of thousands of workers, with thousands of casualties — facilitated the transportation of coal from mines in eastern Pennsylvania to urban centers like New York, Philadelphia, Baltimore, and other seaboard cities, where it could be used for industrial production. Freight was transported on flatboats, pulled along by teams of mules, horses, and oxen, or later on boats powered by steam engines. The system of canals was extensive, measuring almost a thousand miles in Pennsylvania at its peak. But the broader availability of iron and coal, as well as the dominance of the steam engine, laid the groundwork for a network of railroads extending into coal country and beyond. By 1871, around 45,000 miles of track had been laid and by 1900, the network had grown to 215,000 miles across the country.

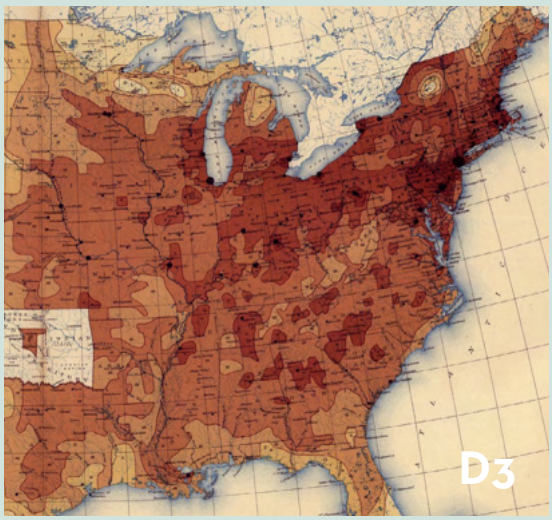
Not only coal was conveyed along these routes. At mining, coke-production, and iron-smelting sites, new towns and cities were established, drawing individuals and families eager for work. And changes to the geography of settlement were not limited to coal country. First canals and later railroads made it newly possible to transport agricultural products and timber from West to East, and goods for sale from East to West. People, too, were newly mobile along these routes. Over the course of the 19th century, the population of the United States grew and spread, enabled by new transportation routes and government programs that encouraged settlement in the west. Meanwhile, government officials, legal declarations, and local actors pushed Native Americans west too, displacing communities onto shrinking reservations. Those who remained on their land through the Westward Expansion were forced to assimilate, through the violent dispossession of their hunting lands and coercive schooling that separated Native children from their families and traditional ways of life.



Canals and railroads at Mauch Chunk, Pennsylvania, in the anthracite coal region (ca. 1870)







BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 38-44

Document analysis

How does the regional railroad network change between 1850 and 1873?

How does the population change over 100 years from the end of the Revolutionary War to the beginning of the 20th century?

Where is population growth most concentrated? What could account for this?

The railroad network expanded enormously over the 1850s and 1860s, with new, smaller lines branching out from the earlier main lines. The census maps show how population density moved in response to these new networks of transport. Note that in Figure D3 ("Population Distribution, 1870–1880"), pink sections represent Native American reservations. The Indian Removal Act, passed in 1830 under President Andrew Jackson, resulted in the wholesale dispossession and displacement of Native Americans from the South and Mid-Atlantic regions into western reservations over the course of the 1830s and '40s. This displacement enabled the spread of non-Native populations into the evacuated regions, which can be seen in Figure D2 ("Population Distribution, 1830-1860").

Sources

A | "Sketch illustrating the positions of the commercial cities and towns of the Eastern, Middle and Western States with the principal existing and proposed lines of communication," creator unknown (ca. 1850)

B | "Sketch map of the Philadelphia and Reading Rail Road and its branches, May, 1873," by T.V. Fay for the P&R RR (1873)

C | Detail from "General map of the Pennsylvania Railroad and its connections" by Allen, Lane & Scott for the Pennsylvania Railroad (1893)

D1-4 | Plates from Statistical atlas of the United States, based upon the results of the eleventh census, by Henry Gannett for the U.S. Department of the Interior Census Office (1898)

E | "Rank of States and Territories by Population at each census, 1790-1890," from *Statistical atlas of the United States, based upon the results of the eleventh census*, by Henry Gannett for the U.S. Department of the Interior Census Office (1898)

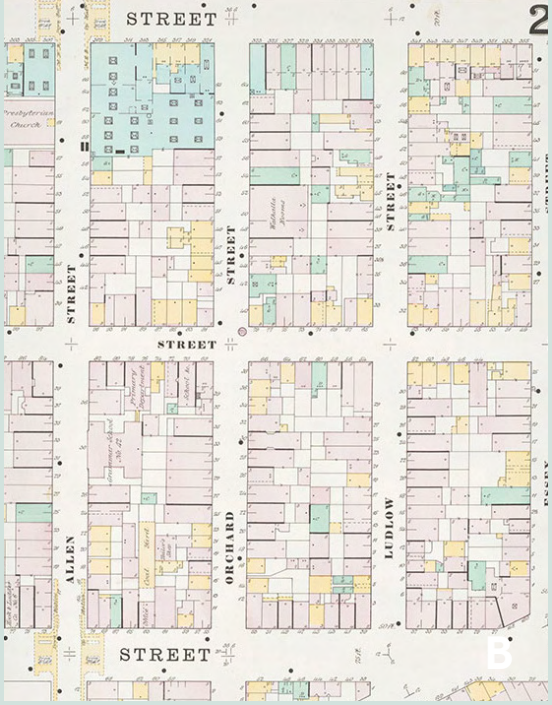
What was the effect of industrialization on Long Island and New York City?

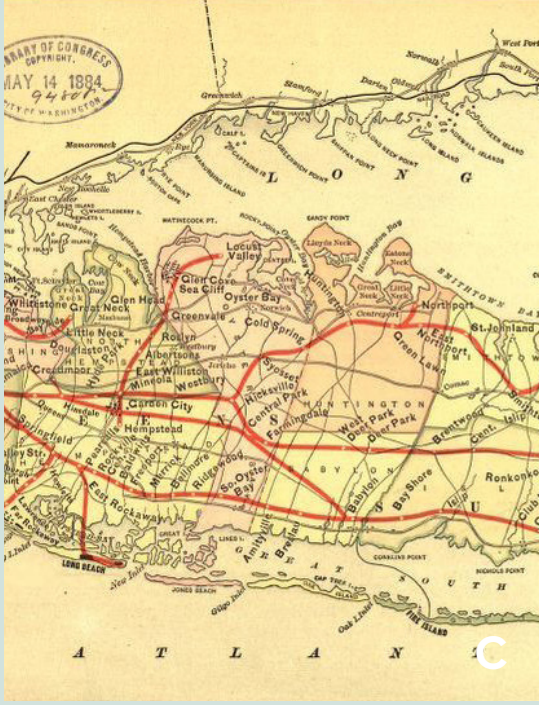
Even as the population spread westward, industrialization triggered a simultaneous trend towards urbanization. Manufacturing was increasingly conducted in large, urban factories rather than in smaller, rural workshops. Factory workers often moved within the United States from rural areas to urban centers, and many immigrated from Europe. As the urban population grew, rural areas newly connected to cities by railroads and canals came to be seen as resources for the inhabitants of the cities. Undeveloped lands, including the forested land in the middle of Long Island, were subjected to this logic and transformed into sectors of agricultural productivity.

New York City, the "Golden Door" to the United States, experienced a particularly enormous population boom in the second half of the 19th century. Families from Ireland, Italy, Russia, and Eastern Europe arrived in droves, fleeing famine or persecution and seeking economic opportunity. The city also grew outward, expanding to the north following the Commissioners' Plan of 1811, which established Manhattan's gridded streets. Meanwhile, the lower portion of Manhattan Island, closest to the ports and the railway termini, became industrial centers for the production of garments, paper, glass, and other consumer goods.

Total & foreign-born population, New York

Year	Total	Foreign-born
1790	33,131	-
1800	60,515	-
1810	96,373	-
1820	123,706	5,390
1830	202,589	17,773
1840	312,710	-
1850	515,547	235,733
1860	813,669	383,717
1870	942,292	419,094
1880	1,206,299	478,670
1890	1,515,301	639,943
1900	3,437,202	1,270,080
1910	4,766,883	1,944,357
1920	5,620,048	2,028,160
1930	6,930,446	2,358,686
1940	7,454,995	2,138,557
1950	7,891,957	1,784,206





BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 45-48

Document analysis

What drove population growth in New York and the whole country?

How does the route of the Long Island Rail Road indicate the motivations behind the line? What do the texts suggest about these motivations?

Immigrants flocked to the United States to work in booming manufacturing and mining industries or take advantage of the resultant western expansion to establish small farms. Most immigrants from Europe passed through Ellis Island and New York City, and many stayed there, settling in Lower Manhattan close to the factories where they worked and the centers of the ethnic or religious communities that supported their assimilation. Insurance maps from the period show how the city initially responded to the influx of new residents by dividing up existing buildings into smaller and smaller parcels, resulting in crowded, dark, and unsanitary tenement apartments. Meanwhile, undeveloped land in the surrounding region, including Long Island, was reframed as an agricultural resource that could support industry by feeding the people that labored in the factories. The railroads increased the reach of the city, conscripting farther areas into this supporting role.

The Long Island Railroad was first established in 1832 as a link between the East River and the village of Jamaica. It later expanded to link New York City and the steamboat ferry to Boston, which departed from the eastern tip of Long Island. The LIRR was not initially intended to serve the local populations of Long Island, which were established primarily along the shore; rather, the train cut straight down the middle of the island. After the establishment of the train line along the Connecticut coast to Boston in the late 1840s, the LIRR primarily provided local service between Long Island communities and the city, and additional branches were added to access the north and south shores in the 1860s and 1870s.

Sources

A | "Total and Foreign-born Population New York City, 1790 – 2000," compiled by New York City Department of City Planning: Population Division

B | Detail from Insurance Maps of the City of New York, by Perris & Browne (1889)

C | "Map of Long Island showing the Long Island Railroad," creator unknown, for the Long Island Railroad (ca. 1884)

Statement by Henry V. Poor, editor of American Railroad Journal, 1852 | Quoted in Hunt's Merchants' Magazine and Commercial Review Vol. 27

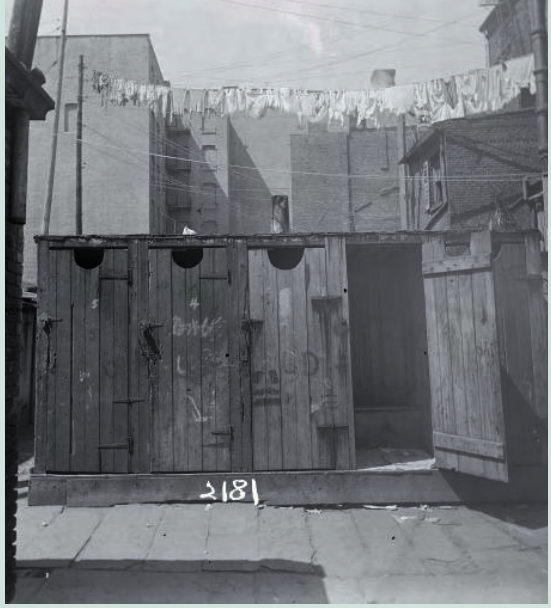
The city of New York is now accessible from every part of New England (with the exception of the eastern part of Maine) and the State of New York […]

From *The Quality of the "Wild Lands" of Long Island* by Thomas Schnebly, 1860

[…] as much land as would subserve for domestic purposes was only cultivated, thus confining their farming to a few acres, whilst the great body of their lands, grown up with "heavy timber" and under growth almost impenetrable […]

How were the changes wrought by industrialization received by different parts of American society?

In this era of rapid expansion, improvements were unequally distributed and people disagreed about whether to welcome or resist the societal transformations underway. To some, industrialization was synonymous with progress, the fulfillment of a destiny that would allow humankind to fulfill its greatest potential. To others, the spread of industrial technologies threatened traditional ways of life. Xenophobia flourished as cities came to be seen as hotbeds of sinfulness and vice. Even those without anti-immigrant sentiments were concerned about the impact of industrialization and urbanization on the American soul. Religious revivalists and utopian thinkers, including the Transcendentalists, warned against the growing dominance of technology and advocated a return to a more agrarian or pastoral lifestyle. In New York, social reformers started religious Settlement Houses and social service organizations to encourage moral conduct and assimilation; others prescribed public parks to treat the spiritual sickness they saw growing among the urban poor. Frederick Law Olmsted, the designer of Central Park and numerous other parks in the region, as well as an early supporter of the National Parks system, famously lamented the "softening of the brain, paralysis, palsy, monomania, or insanity, mental and nervous excitability and moroseness, melancholy and irascibility" that he said was a product of urban life.



BREAK OUT

Archival investigation

Use the digitized collections of The Museum of the City of New York and the New York Public Library to explore housing conditions at the turn of the 20th century. Consider:

What do you notice about these spaces and the people living in them?

How are these spaces different from the homes of your family and friends? How are they similar?

If you were a social activist in the late 19th century, based on these documents, what minimum housing standards would you advocate for?

Sources

Museum of the City of New York | Highlights: Jacob A. Riis

collections.mcny.org/Explore/Highlights/Jacob-A--Riis/

New York Public Library Digital Collections | Photographic negatives of the New York City Tenement House Department

digitalcollections.nypl.org/collections/photographic-negatives-of-the-new-york-city-tenement-house-department

For the workers themselves, industrialization led both to exploitation and empowerment. Laborers who moved to cities to work in factories and migrated to rural towns to mine coal found work that was mechanized and relentless. The men operated large, complex, dangerous machinery and furnaces, or spent long hours inside dark mines, breathing toxic coal dust. In the South, enslaved African-Americans suffered violence and humiliation as they picked cotton — brutal work to feed the ravenous mills and textile factories of the North. In Manhattan, immigrant women crammed into sweatshops by the dozens, turning cotton cloth into garments that would be sold to well-to-do wives of businessmen uptown. Children often worked long hours in unsafe conditions, too.

Meanwhile, the men who owned the factories, mines, railroads, and banks became wealthy, living in glamorous houses in the upper reaches of Manhattan. These so-called "Robber Barons" sometimes used their wealth to manipulate legal systems to their benefit. Cornelius Vanderbilt, who made his fortune from the control of shipping networks, famously said: "Law? What do I care for law? Hain't I got the power?" John Pierpont Morgan, a banker who profited from the railroads, steel manufacture, and coal mining, was reportedly even more blunt: "I owe the public nothing." In the beginning of the 20th century, the children of these first-generation industrialists would retreat to the north shore of Long Island, also known as the "Gold Coast," where they built elaborate mansions on private estates.

Mineworkers at Mauch Chunk, Pennsylvania, in the anthracite coal region (ca. 1870)

But the same networks and geographical changes that followed and fed industrialization also allowed people to push back against exploitation. In New York, the concentration of immigrant factory workers in the tenement neighborhoods of Lower Manhattan led to the formation of community organizations and labor unions. These groups advocated for improvements to living conditions, like building codes and minimum dwelling requirements, as well as rights and protections for laborers, including the 40-hour workweek, weekends, and fire-code protections in factories. Though many of the strikes and other collective actions that won these rights did not occur until the early 20th century, the development of Lower Manhattan as a center of employment and housing for industrial workers in the 19th century laid the groundwork.

Throughout the region, railroad workers similarly used geography to organize their resistance. The railroad industry, perhaps the most dramatic example of the transformational powers of energy and industrialization, was also the site of some of industrialization's greatest inequities. After the Civil War, the railroad industry boomed, becoming the second largest source of employment in the country after agriculture. In 1873, the bubble burst, leading to a 65-month-long financial crisis. Many companies laid off workers and cut wages, and unemployment grew to 14 percent in 1876. In 1877, as railroad companies threatened to cut wages by 10 percent, a series of strikes swept through the railroad network. Workers blocked passenger and freight trains, many of which carried coal and iron. More than 100,000 railway workers, along with coal miners and others laborers, supported the strikes. They destroyed tracks and bridges, and set fire to train cars and depot buildings. The strikes were violently ended by armed militias and the National Guard, but companies made concessions to their workers in the years that followed.

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 49-52

Document analysis

What devices do those who favor industrialization use to make their arguments? What are their aspirations?

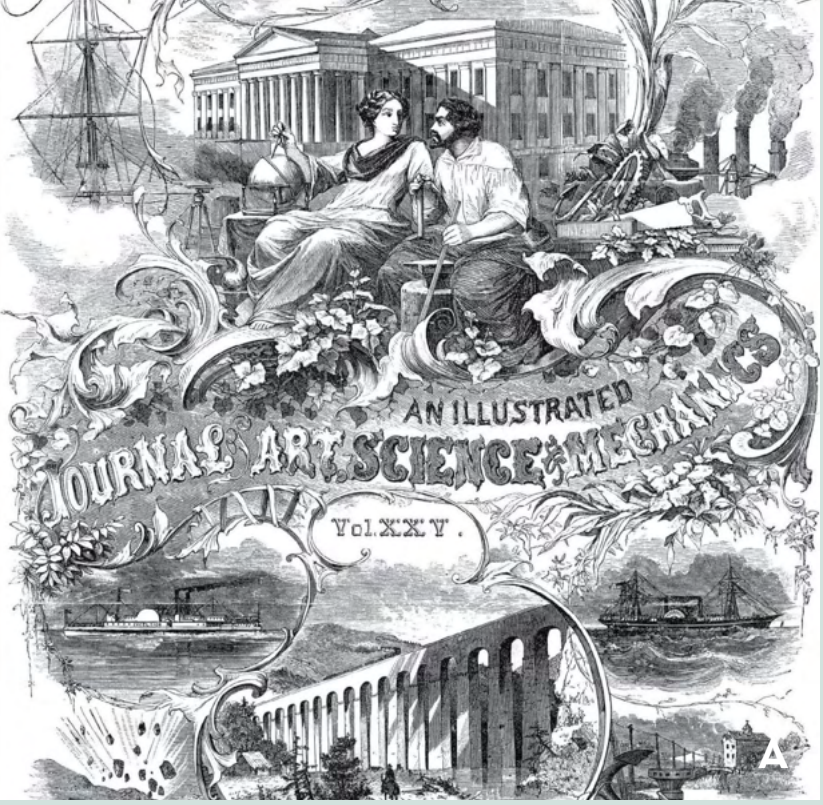
What devices do industrialization's opponents use? What are their concerns?

What elements of these aspirations and concerns can you identify in present-day American culture and daily life?

Sources

A | Cover of ***Scientific American***, July 1, 1871

B | "The protectors of our industries," cartoon by Bernhard Gillam, published by Keppler & Schwarzmann (1883)



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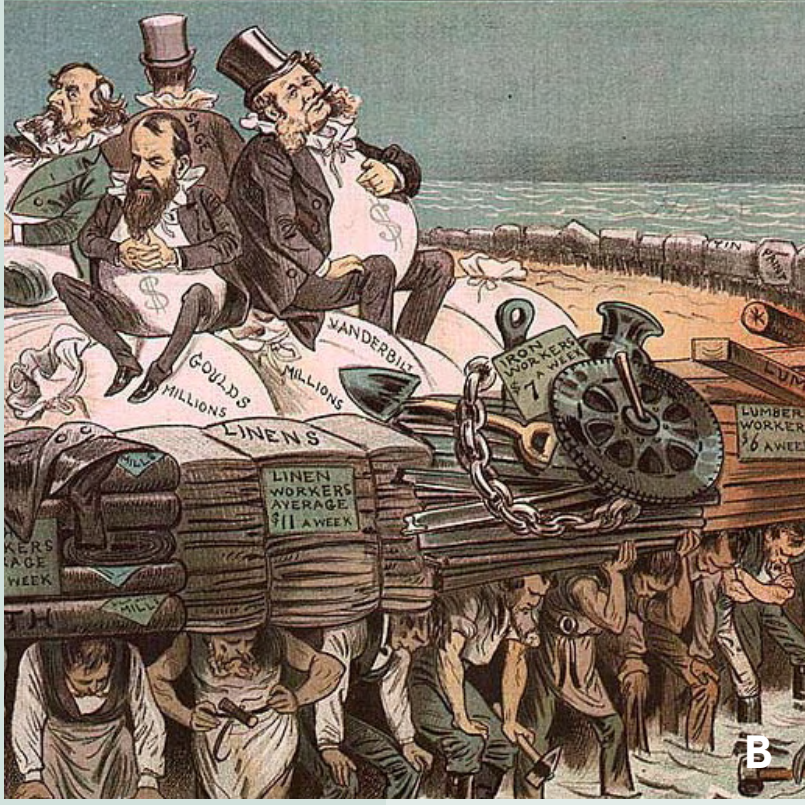


B

"Moral View of the Railroads," By Rev. B. C. Alken, D. D., Pastor of the First Presbyterian Church, delivered on the occasion of the opening of the Cleveland and Columbus Railroad, February 23, 1851 | Quoted in *Hunt's Merchants' Magazine and Commercial Review*

[…] The truth is, there is a providence in mechanical invention as well as in all the affairs of men. And when God has purposes to accomplish by this invention, he arouses some active spirit to search for the laws already in existence […]

From "The American Scholar," by Ralph Waldo Emerson, delivered to the Phi Beta Kappa Society in Cambridge, Massachusetts, August 31, 1837

Man is not a farmer, or a professor, or an engineer, but he is all. Man is priest, and scholar, and statesman, and producer, and soldier. […]

From *Labor Standard* Vol. 3, no. 12 (28 July 1877)

Strike and live! Bread we must have! Remain and perish! Be it understood, if the Baltimore and Ohio Railroad Company does not meet the demands of its employees at an early date, the officials will hazard their lives and endanger their property, for we shall run their trains, and locomotives into the river […]

AT THE CENTER

Groups working with the curriculum on site can begin by viewing the Geography of Power exhibit in the South Gallery.

Lighting the city

As the city grew and became denser, and as industrialization progressed, urban geography also changed in response. Powerful energy sources became more available both for industrial and individual purposes. Households used hearths and grates to burn anthracite coal for heating and cooking, but the new availability of coal led to another, more dramatic change: the creation of urban infrastructure for lighting public and private spaces. After 1823, gas made from coal, called manufactured gas, was used to light both street lamps and many domestic lamps, replacing the oil that had been used since the earliest English and Dutch settlements.

Coal was brought to the city in trains and barges, and then conveyed to plants where gas was "manufactured" using a carbonization process similar to the one that produced coke for industrial use. Then, manufactured gas was conveyed to homes and business through pipes underneath roads. With the advent of electrical lighting in the late 19th century, gas companies refocused their efforts towards providing gas for heating and cooking in homes.

Instructions

For full activity materials, see:

Unit 3 Appendix
Pages 53-56

Examine and analyze the documents attached, considering the following questions:

What do you notice?

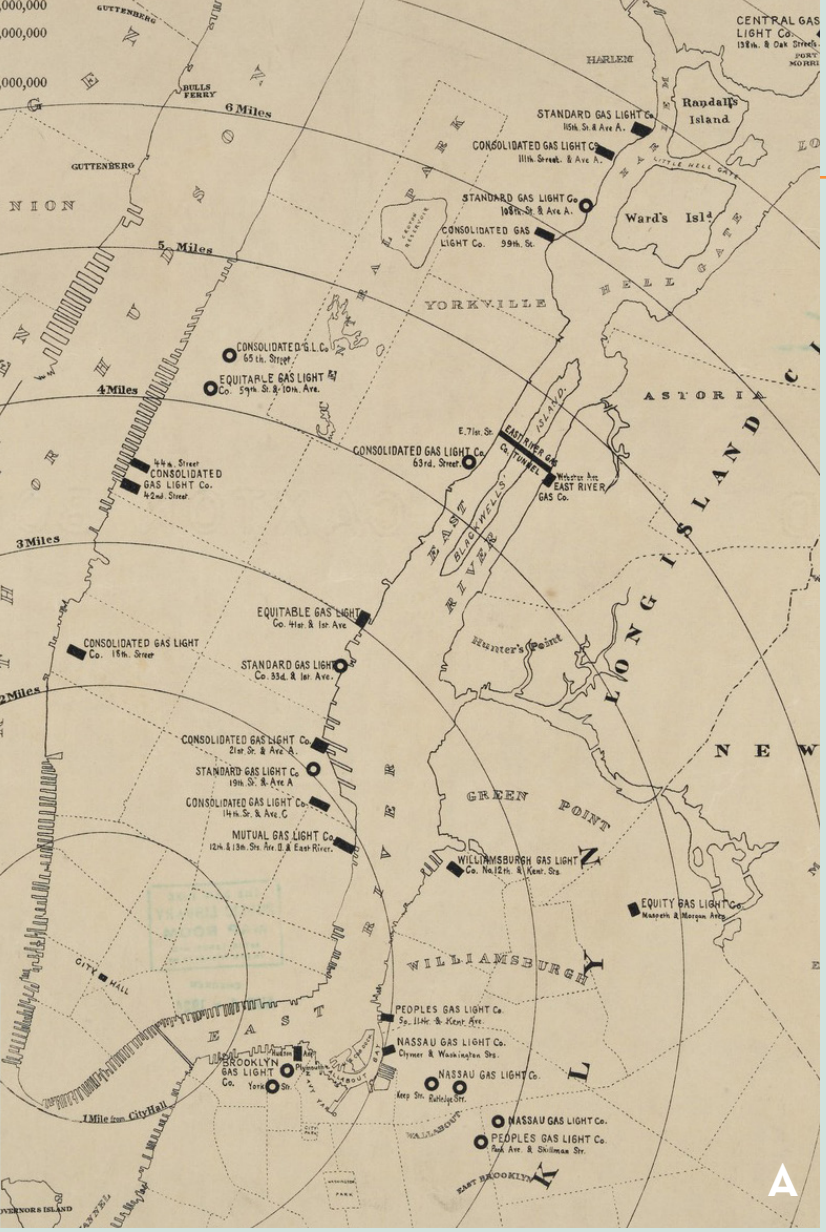
Where are different land uses in the city in relation to one another? How does the form of the city reflect the new availability of non-organic energy sources?

How would you predict coal and manufactured gas would change the lives of people living in the city? How would they change the ways different people and groups related to one another?

How do you think the introduction of energy distribution systems impacts the future development of the city? What would be newly possible and what would be no longer possible?

Then, imagine you are a local politician in New York City in the year 1823, when the New York Gas Light Company has been granted a 30-year exclusive franchise from the city to lay underground gas pipes in the area south of Grand Street. But some New Yorkers are suspicious of the new technology, concerned about how installing gas infrastructure might disrupt their neighborhoods, or fear that bringing manufactured gas into homes could be dangerous.

Pick a side in the debate, then write a short speech appealing to your constituents.



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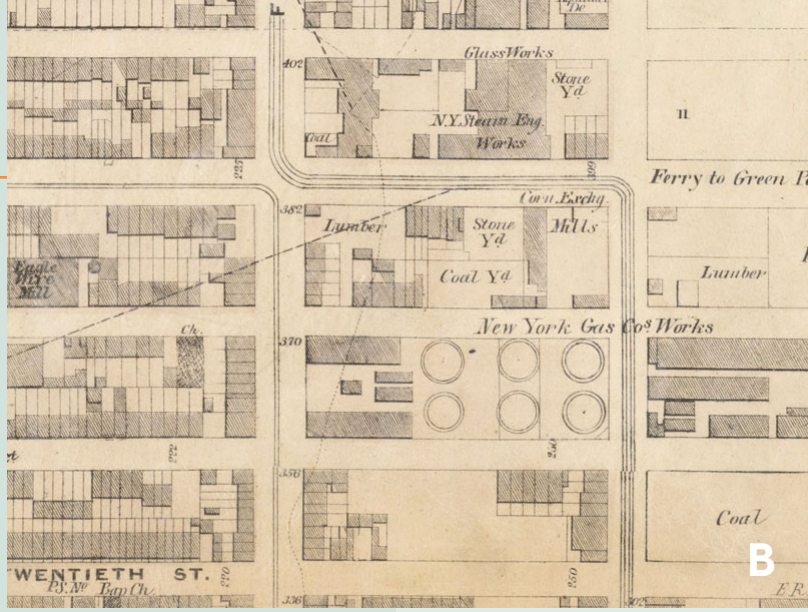


B


C

Sources

A | "Map showing location of works and holders New York and Brooklyn gas companies" by E.C. Brown for *Progressive Age* (1893)

B | Detail from "Plan of New York City, from the Battery to Spuyten Duyvil Creek" by Matthew Dripps (1867)

C | "A characteristic election scene — reading a memorandum from an election bulletin," creator unknown (1876)

Energy and time in modern life

One major impact of industrialization in general, and the expansion of the railroads in particular, was the standardization of time. Before the Industrial Revolution, timekeeping was primarily a local enterprise that related agricultural work to the rising and setting sun. But in order to keep to regular schedules, railroad companies needed a way to standardize timekeeping across long distances; eventually, this led to the establishment of regional time zones. Other industrialists found standardized timekeeping useful too, particularly as a strategy for controlling their workers. Meanwhile, Progressive social reformers who sought to improve what they saw as immorality in poor urban communities supported the development of the public school system, which relied heavily on timekeeping to instill pupils with discipline. Later, when workers would organize to demand labor rights and protections, timekeeping would play a role: limited working hours were a central goal for the early labor movement. In 1886 striking laborers won the right to an eight-hour workday that has lasted to the present. The benefits of industrialization were also often described in terms of time saved by machines and manufactured goods.

Instructions

For full activity materials, see:

Unit 3 Appendix
Page 57

Reflect on your own relationship to timekeeping, labor, and energy. Write a journal entry that explores the role of timekeeping in your daily life. Consider:

When have you been most and least aware of the passage of time?

How does your awareness of time passing impact how energetic you feel? Does it change what you feel capable to do?

How does your awareness of time shape your experience of geography? Does it change where you feel you can or want to go?

What saves you time? How is energy involved in that?

Do you think timekeeping has had more positive or negative impacts on modern society?

CORE CONCEPT 3

Energy shapes public infrastructure and private life

Electrification and the development of the automobile together drove an outward expansion from the urban core, plus large public works that enabled individual energy consumption.

Cars approaching Jones Beach State Park on its opening day, August 4, 1929
Courtesy of New York State Archive

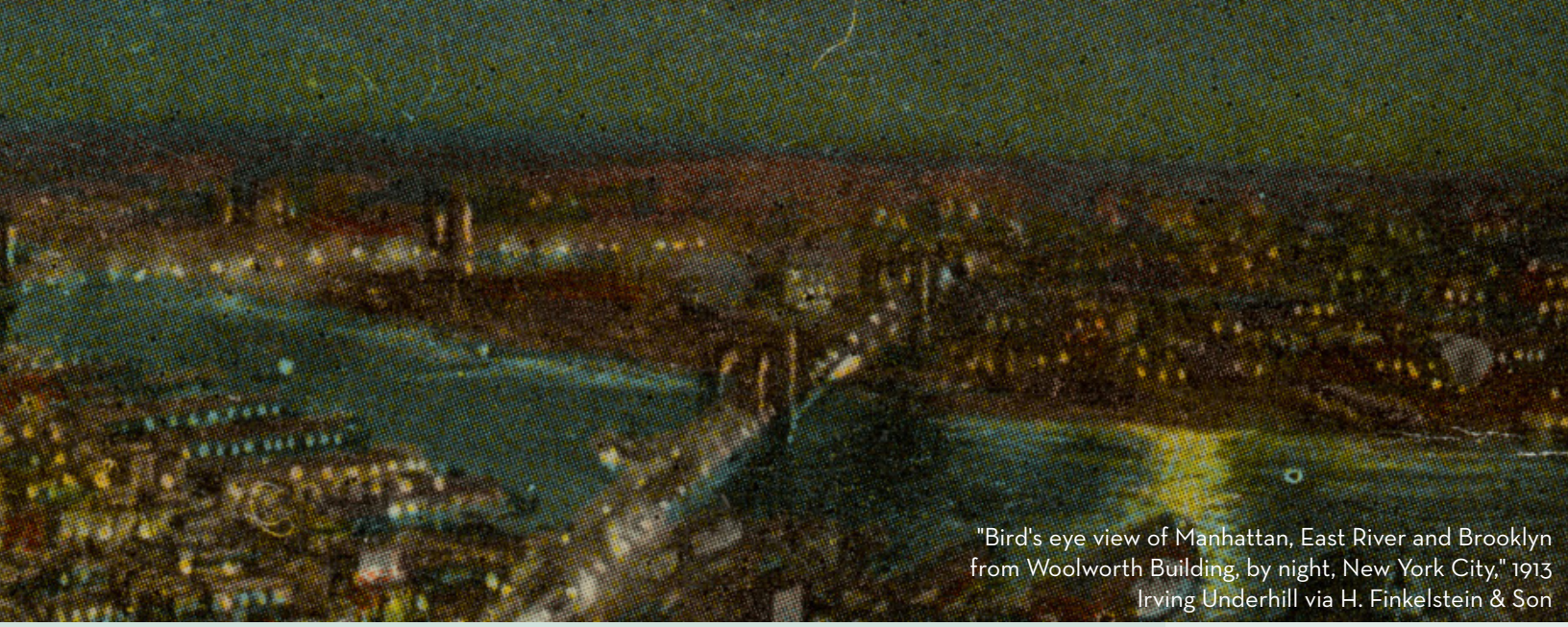
The dawn of the energy age

How did modern world progress from steam-powered railways and industrial machinery to the energy that arrives through electrical wires and gas station pumps? This Core Concept explores how energy went from being a resource exploited by wealthy industrialists to a daily necessity for everyday Americans. In the United States, from the turn of the twentieth century through the post-World War II period, the story of this transformation is also that of the transforming landscape: automobile ownership and electrification fed the sprawl of suburbanization. Just as colonialism and industrialization transformed the region surrounding Jones Beach, in this period, the development of New York and Long Island was a model for how cities, suburbs, and rural communities across the nation would adapt to the expanding network of energy consumption.

First, a discussion activity structured around primary historical sources leads students through the story of electrification and the transition from industrial to individual energy use. Concepts such as "economies of scale" help draw connections between early electrical systems and modern-day energy utilities. Students analyze technical diagrams, promotional illustrations and advertisements, maps, photographs, correspondence, and data sets to explore how decentralized, private systems of energy production and consumption came to be organized into public infrastructure, and how government-sponsored suburbanization efforts shaped private choices to migrate within the region.

Next, students explore the role of rhetoric and advertising in stimulating individual desires for change. After examining documentation from the 1964 World's Fair, they collaborate on a fictionalized advertising campaign that channels midcentury ideals about energy as a gateway to freedom and the future.

Lastly, students draw a connection from this history to the contemporary push to expand renewable energy, exploring the tension between public infrastructure and private rights. Ultimately, students analyze the ethics of this conflict and write a letter to their State Legislator in support of their position.



"Bird's eye view of Manhattan, East River and Brooklyn from Woolworth Building, by night, New York City," 1913
Irving Underhill via H. Finkelstein & Son

Flipping the switch to electrification

How might the technologies developed during the coal era have become the foundation of electrification?

What challenges would the designers of the first electrical systems have faced? What problems would they have needed to solve?

How do you expect the public would have reacted to electricity at first?

PRIMER

Give students a few minutes to respond, either alone or in small groups. Then move into the next activity by inviting students to share their answers.

LEARN MORE

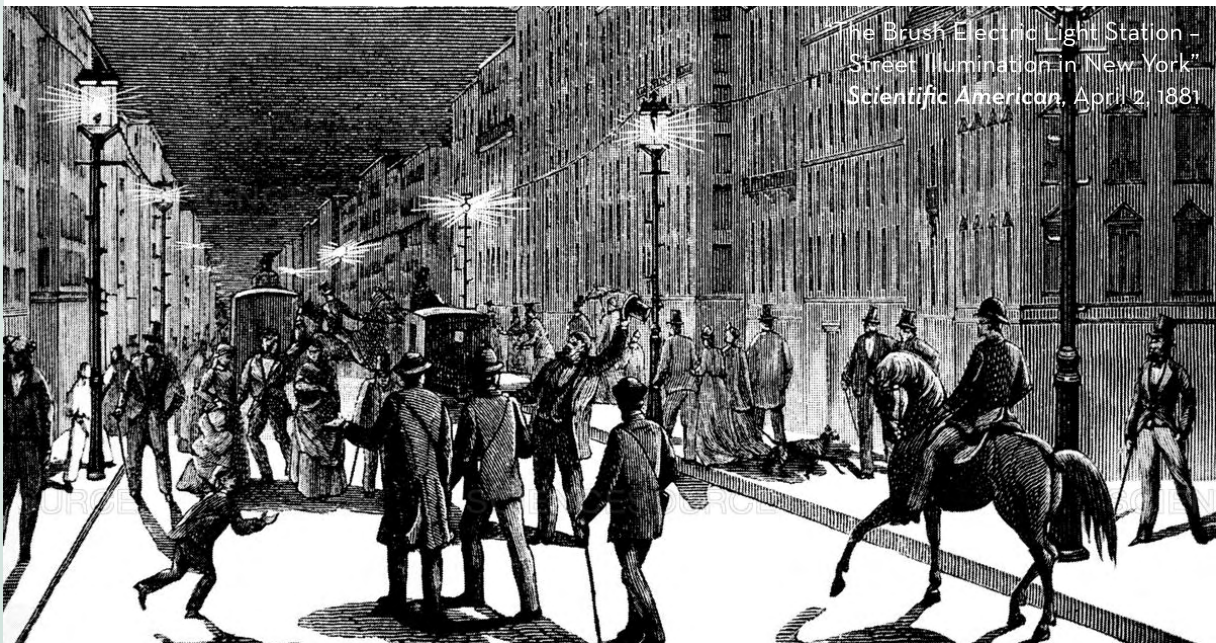
See 1.2 for discussion of the transformation of kinetic energy into electrical energy through electromagnetic induction.

Energy and expansion

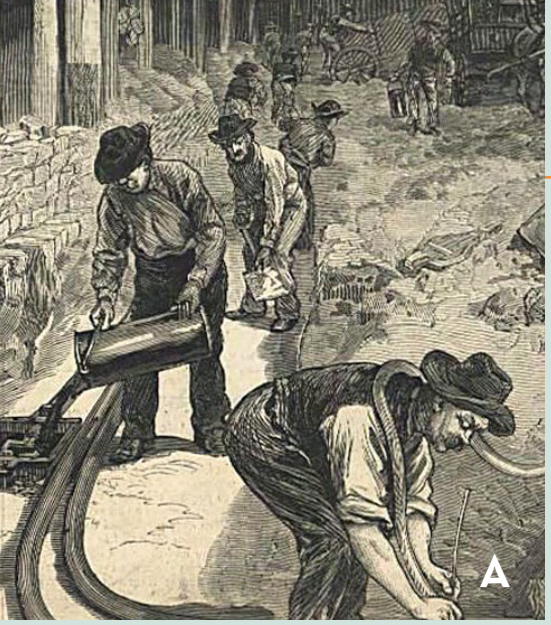
How did early electricity build on the discoveries of the Industrial Revolution?

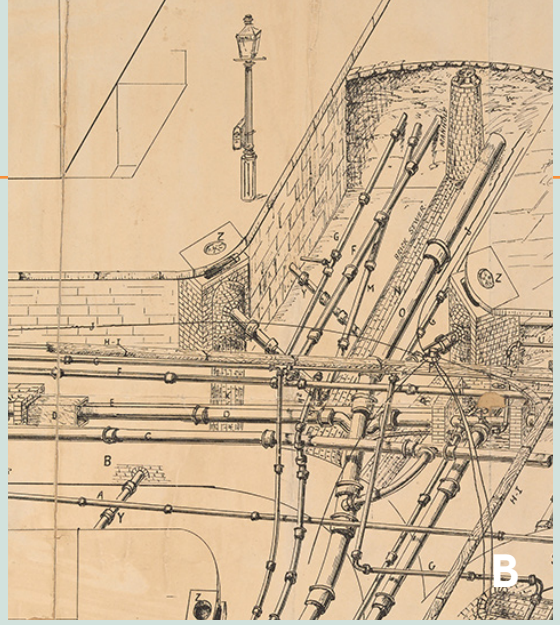
It was no coincidence that the coal mining boom helped push electrical generators forward. Beginning in the 1830s, the first dynamos that produced electricity through electromagnetic induction were manually operated, turned by a laborer using a crank; later, steam engines of the sort used to power industrial machines, boats, and trains turned dynamos using belts and gears. Eventually, engineers perfected the steam turbine, which allowed the steam produced by a boiler to turn the dynamo more directly. Coal remained an indispensable element in electricity generation for many decades — even today, electricity production in many parts of the world relies on coal. (New York State's last coal-fired power plants closed in 2020.) The current produced by dynamos traveled through conductor wires, supplying power first to individual devices and later to electrical networks. The first electrical lamps produced light by creating a small gap in the conducting circuit, which the electrical current would jump across, producing a very bright, hot light. The resulting "arc lights" were impractical for indoor use, but effectively illuminated city streets at night. By 1881, Broadway between 14th and 34th Streets was illuminated by electric lighting — arc lights — for the very first time.

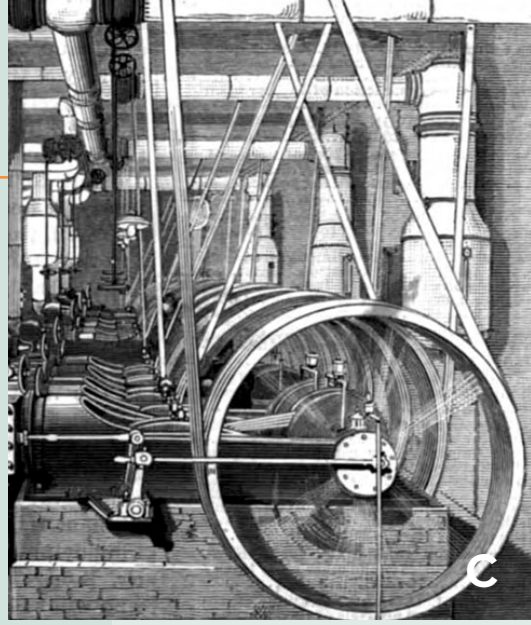
In 1879, Thomas Edison produced an incandescent light bulb that was more suitable for indoor use. Rather than a gap in the conductor, Edison's lamps employed circuits that included a section with intentionally poor insulation. As energy was "lost" from the circuit along this section, the conductor glowed with a soft light and produced a small amount of heat. Within a year, Edison had created a lighting network using generators and his incandescent bulbs in Menlo Park, New Jersey. Visiting New York City aldermen were so impressed that in 1881 they granted Edison New York's first electrical franchise, contracting him to power 8,400 lamps across 51 blocks in Lower Manhattan.



"The Brush Electric Light Station – Street Illumination in New York," *Scientific American*, April 2, 1881







Document analysis

What would have been the challenges of building the first Grid in Lower Manhattan?

Why would the power lines have been laid underground? What other forms of infrastructure do you notice underground?

How did the Pearl Street power station work? Can you identify the energy source, the dynamo, and the mechanism that makes it turn? What kind of labor was involved in operating this power station?

Edison was allowed to dig up the streets of Lower Manhattan in order to install electrical distribution lines alongside already existing gas lines and water pipes. The city's first central power station, occupying two warehouses at 255-257 Pearl Street, in the Financial District, began generating on September 4, 1882, powering a Grid of one square mile. The station's generators used coal-fired steam engines to turn the dynamos and produce direct current electricity. The excess steam was distributed to other buildings on the same block for heating, making the Pearl Street Station the world's first co-generation plant.

Sources

A | "The Electric Light in Houses — Laying the tubes for wires in the streets of New York," by W. P. Snyder for *Harper's Weekly*, June 24, 1882

B | Underground infrastructure at Broadway and Fulton Street, *Engineering News*, Vol. 72 (1890)

C | Cross-section of Brooklyn Pearl Street station, *Scientific American*, June 13, 1891

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 58-61

LEARN MORE

See 3.2 for discussion of the manufactured gas system in New York, including maps and diagrams of the infrastructure of gas supply below the Broadway and Fulton Street intersection.

See 4.1 for discussion of Direct Current and Alternating Current Electricity.

What were the challenges of the kind of electrical system Edison created?

Lighting, and in particular street lighting, was already being provided thanks to manufactured gas, which was distributed by underground pipes throughout developed parts of Manhattan. The extensive existing infrastructure of manufactured gas meant new electricity companies had to convince potential customers to switch, a task made more difficult by the fact that wiring neighborhoods and homes for electricity was invasive and expensive. What's more, those seeking to make electricity an appealing, economical option faced a conundrum: electricity required an economy of scale. Because the amount of power produced by generators could not be moderated based on demand, electricity generation became less expensive to produce, per unit of power, the more people used it. But so long as it was relatively expensive, fewer users would adopt the new system, and costs would remain high. Furthermore, Edison's steam-powered dynamos generated Direct Current electricity, which could only travel limited distances. This meant the number of paying customers supplied by each generator was geographically constrained, which in turn kept costs up.

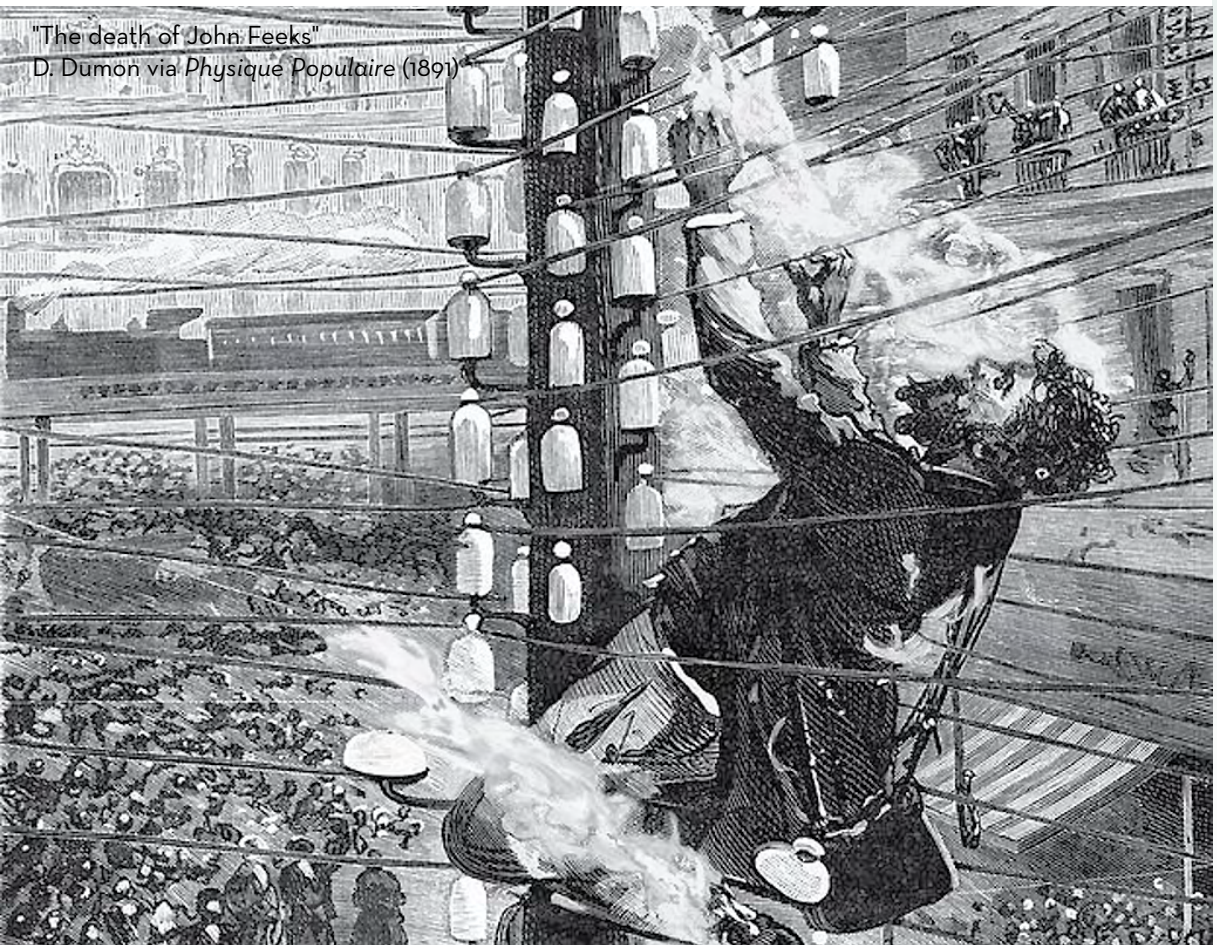
How did electrification take hold?

Ultimately, electricity won out over gas because it provided more consistent light and could be used to power appliances that promised to transform industrial manufacturing, medicine, and domestic life. Meanwhile, electricity companies were working even harder to market the new devices to potential customers. By 1889, the city's largest gas company, Consolidated Gas, had accepted the sea-change and merged with the Edison company in order to fund the electrical system's expansion.

Alternating Current electricity could solve the problem of scale. High voltage AC power can cover longer distances than DC, traveling from power plants to regional substations where transformers lowered the voltage to the level lights and motors could use. But despite its advantages, AC power did not immediately dominate the emerging electrical system. Large amounts of capital (both money and material resources) had been invested in Edison's DC dynamos, and by the mid-1880s, the investments were starting to pay themselves off. During a bitter "Battle of the Currents," Edison and his supporters sowed disinformation among the public, claiming AC power was more dangerous than DC — indeed, Edison's efforts to propagandize against AC power led to the invention of the electric chair. After a number of high-profile accidents, like the death by electrocution of Western Union lineman John Feeks, in front of large crowds in Lower Manhattan, AC power lines were buried underground. Yet, it became inescapably clear that the DC system's reliance on distributed power stations could not scale up, especially in a city. (One proposal for lighting New York had 36 separate power stations supplying the territory south of Central Park.) AC power emerged victorious heading into the 20th century.

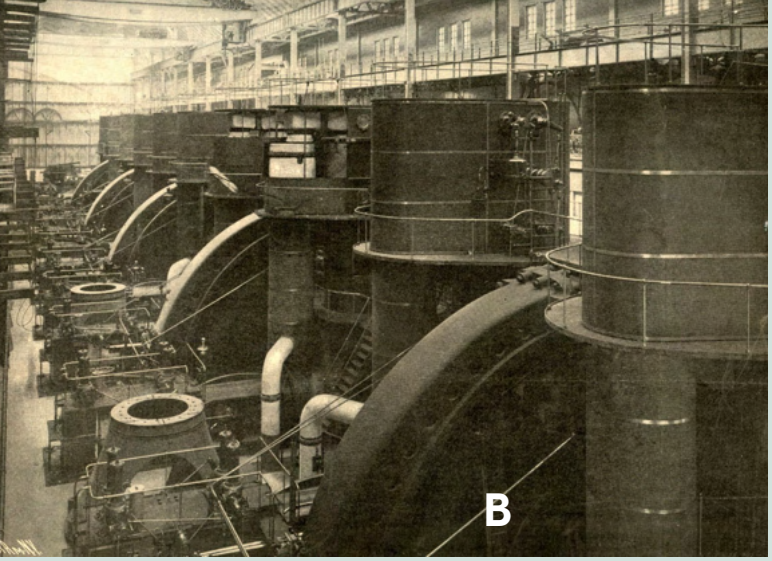
But efficiency alone couldn't solve the electrical system's economic problems. Even with AC power, producing electricity was too costly for small networks like the one extending out from Pearl Street. At the turn of the century, electricity cost around $5 per kilowatt-hour in today's dollars; today, the average cost is around $1.10. Economists in the early 20th century argued that, because electrical systems required huge investments of capital and huge customer bases in order to be profitable, prioritizing "competition" between multiple companies wasted money and materials, led to inefficient distribution networks, and raised costs for both producer and consumers. Thus, the electricity business, like the railroad industry and other "utilities," came to be seen as a site of "natural monopoly." In 1901, twenty years after its founding, Edison Electric Illuminating Co. of New York merged with seven smaller companies to create a single power network serving the entire city south of 135th Street. High-voltage electricity was generated at a single AC station, Waterside, and conveyed to sixteen substations that transformed it into DC power for delivery to customers' homes and businesses.

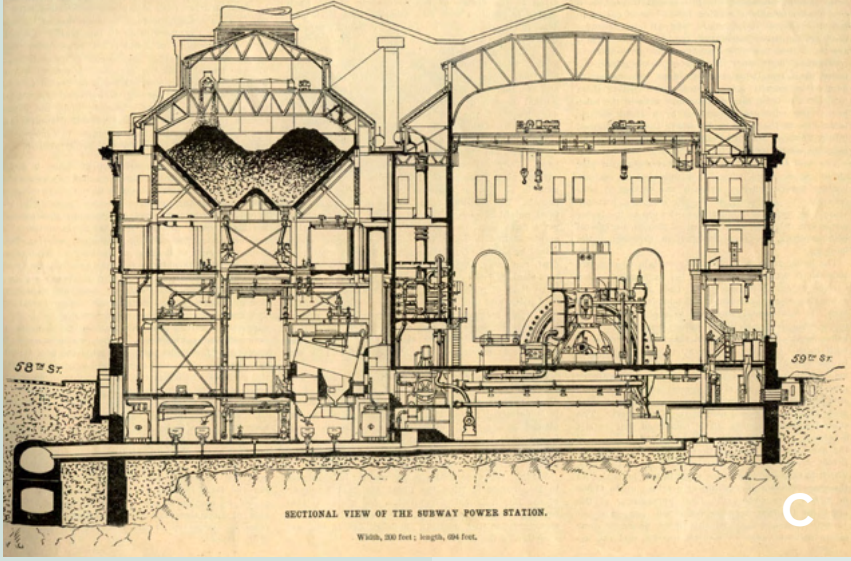
The trend towards consolidation fundamentally shaped energy networks from that point on. In 1917, the first high-voltage, long-distance transmission lines allowed power stations to be built at the mouths of coal mines, eliminating the costs of transporting fuel to the point of production. Elsewhere, including upstate New York, power stations located on rivers and waterfalls generated AC power that could power nearby residential communities. These laid the groundwork for government in subsequent decades to extend electricity access to remote areas of the United States under a system of large, consolidated utilities.



"The death of John Feeks"
D. Dumon via *Physique Populaire* (1891)

Private electrical stations and smaller companies across the country also consolidated to achieve the necessary economies of scale. From 1901 to 1918, the real price of electricity declined steadily, and the number of private stations diminished at a rate of several dozen each year. From 1917 to 1930, the number of residential electric customers increased from six million to twenty million. Meanwhile, the number of central station companies producing electricity fell by 63 percent from about 4,300 to roughly 1,600. Nationwide, the output from electrical utilities skyrocketed, from 5.9 million kWh in 1907 to 75.4 million kWh in 1927, and the real price of electricity declined 55 percent.





Document analysis

What do you notice about the location of the transit lines? What about the substations?

What does the diagram of the station tell you about how power for the subway was generated?

Trolleys had existed in New York since the 1830s, when they were drawn through the streets by horses; by the 1890s, trolleys also ran on steam, steel cables, or electric traction. Just like the railroads and the electrical system, rapid transit in the city was initially supplied by many different companies without central organization or planning. Over time, the networks consolidated and many non-electrical lines were bought up and converted to electricity. By 1900, a single holding company had acquired all the steam, railway, and street-level rapid transit lines in Brooklyn. In 1902, another company acquired all the elevated railway lines in Manhattan and began work on the city's first underground (and electrified) subway.

Like the Electrical Grid, the newly consolidated and electrified rapid transit systems relied on economies of scale. Strong central generators continuously churned out high-voltage AC power, which was delivered to substations throughout the city. There it was transformed to lower-voltage power and transmitted to the trains via the "third rail." The power stations were located along the riverfront, so that barges could deliver coal directly to their massive boilers.

Sources

A | "Map of New York City, Brooklyn, Jersey City, and Vicinity" with index of streetcar lines, by Rand, McNally & Co. (1891)

B | "The Great Subway Power Station, with Five of the Eleven Engines and Generators In Place. Ultimate Capacity, 132,000 Horse Power," from *Scientific American*, October 29, 1904

C | "Sectional view of the subway power station," from *Scientific American*, October 29, 1904

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 62-64

How did the new electrical systems allow the city to grow?

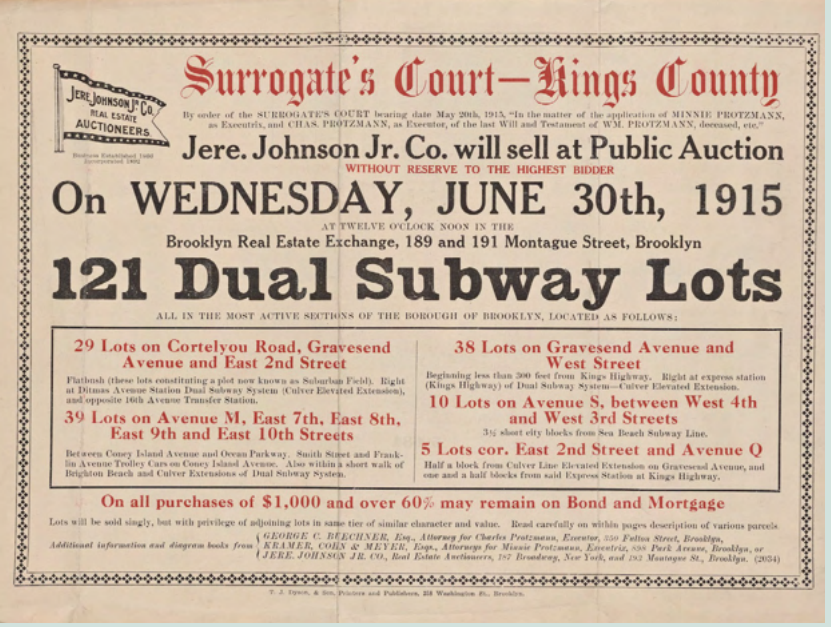
Besides bringing light inside people's homes, electrification also changed where people lived. Electricity brought new kinds of rapid transit, and thus new possibilities for commuter lifestyles: people could live further away from where they worked and travel to and from the workplace every day.

By the first decade of the 20th century, the city was straining at the seams. Between 1880 and 1900 the population of Manhattan more than doubled from 1,206,299 to 3,437,202 residents. After Brooklyn, Queens, Staten Island, and the Bronx were amalgamated into "Greater New York City" in 1898, this growing population began to spread out. In the first two decades of the century, though the population of the amalgamated city grew, the population living below 50th Street in Manhattan decreased steadily, declining from 1.27 million to 1.06 million people between 1910 and 1920 alone.

The outer boroughs had to be woven into the fabric of the city as a whole. Greater connectivity was a hallmark of industrialization: The Brooklyn Bridge, the first suspension bridge to take advantage of new steel manufacturing, opened in 1883. Before that, ferries had been sufficient to connect then-rural Long Island to bustling, urban Manhattan. Now, a new city Department of Bridges set about building connections between the center of industry and expanding outer-borough housing.

In 1903, the Williamsburg Bridge opened to road, railway, and pedestrian traffic; 1909 saw the opening, after 30 years of planning, of the Manhattan and Blackwell's Island (Queensboro) Bridge. By 1910, a new tunnel beneath the East River connected the Long Island Rail Road to Penn Station, funded by the LIRR. Then, in 1913, the city embarked on an expansion of the existing transit system into previously undeveloped parts of the Bronx, Brooklyn, and Queens.

"Showing Construction of New Bridge over East River, New York, NY, USA" (1905)
The Keystone View Company



Surrogate's Court—Kings County

Jere. Johnson Jr. Co. will sell at Public Auction

WITHOUT RESERVE TO THE HIGHEST BIDDER

On WEDNESDAY, JUNE 30th, 1915

Brooklyn Real Estate Exchange, 189 and 191 Montague Street, Brooklyn

121 Dual Subway Lots

ALL IN THE MOST ACTIVE SECTIONS OF THE BOROUGH OF BROOKLYN, LOCATED AS FOLLOWS:

29 Lots on Cortelyou Road, Gravesend Avenue and East 2nd Street

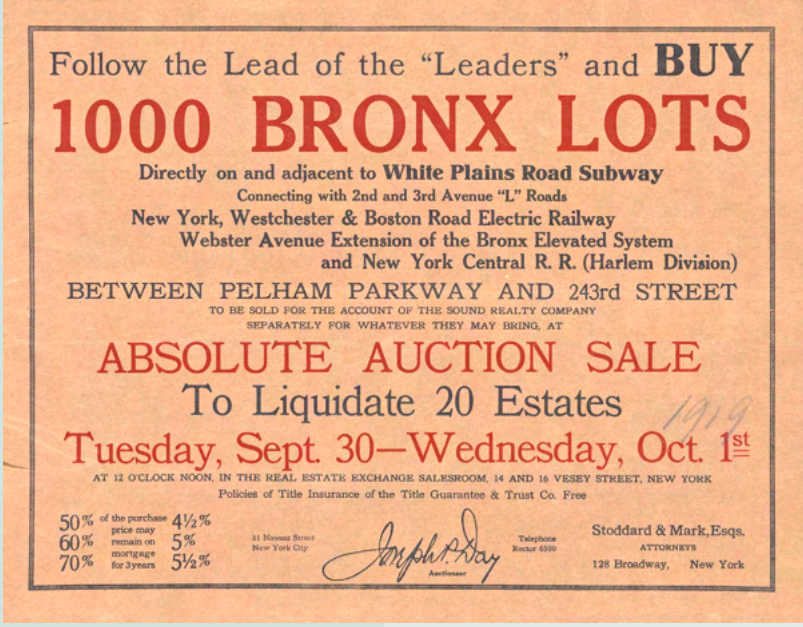
38 Lots on Gravesend Avenue and West Street

39 Lots on Avenue M, East 7th, East 8th, East 9th and East 10th Streets

10 Lots on Avenue S, between West 4th and West 3rd Streets

5 Lots cor. East 2nd Street and Avenue Q

On all purchases of $1,000 and over 60% may remain on Bond and Mortgage



Follow the Lead of the "Leaders" and BUY

1000 BRONX LOTS

Directly on and adjacent to White Plains Road Subway

Connecting with 2nd and 3rd Avenue "L" Roads

New York, Westchester & Boston Road Electric Railway

Webster Avenue Extension of the Bronx Elevated System

and New York Central R. R. (Harlem Division)

BETWEEN PELHAM PARKWAY AND 243rd STREET

ABSOLUTE AUCTION SALE

To Liquidate 20 Estates

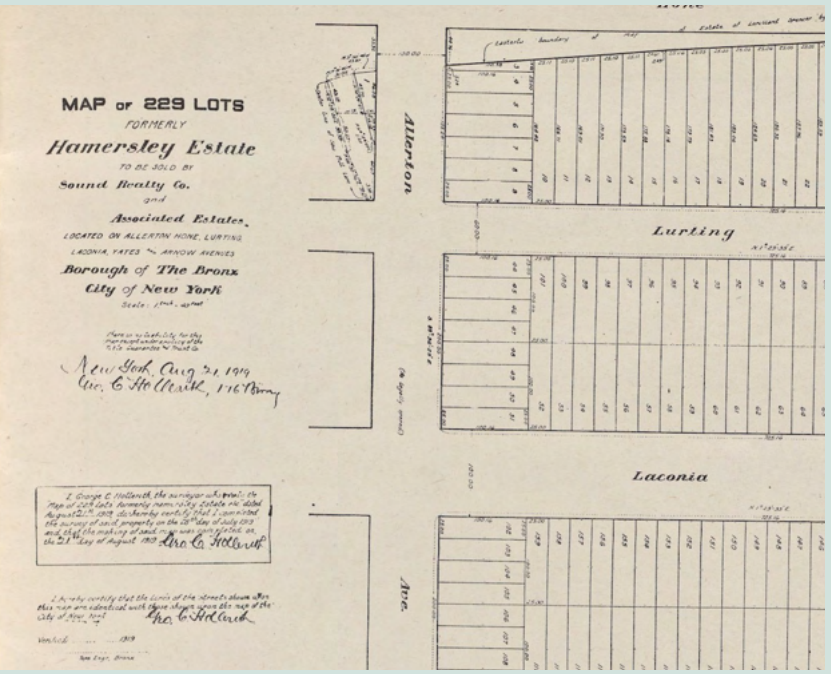
Tuesday, Sept. 30—Wednesday, Oct. 1st

AT 12 O'CLOCK NOON, IN THE REAL ESTATE EXCHANGE SALESROOM, 14 AND 16 VESEY STREET, NEW YORK

Policies of Title Insurance of the Title Guarantee & Trust Co. Free

50% 60% 70% of the purchase price may remain on mortgage for 3 years 4½% 5% 5½%

Stoddard & Mark, Esqs. ATTORNEYS 128 Broadway, New York



MAP OF 229 LOTS

FORMERLY

Hamersley Estate

TO BE SOLD BY

Sound Realty Co.

and

Associated Estates,

LOCATED ON ALLERTON, LURTING, LACONIA, YATES & ARNOW AVENUES

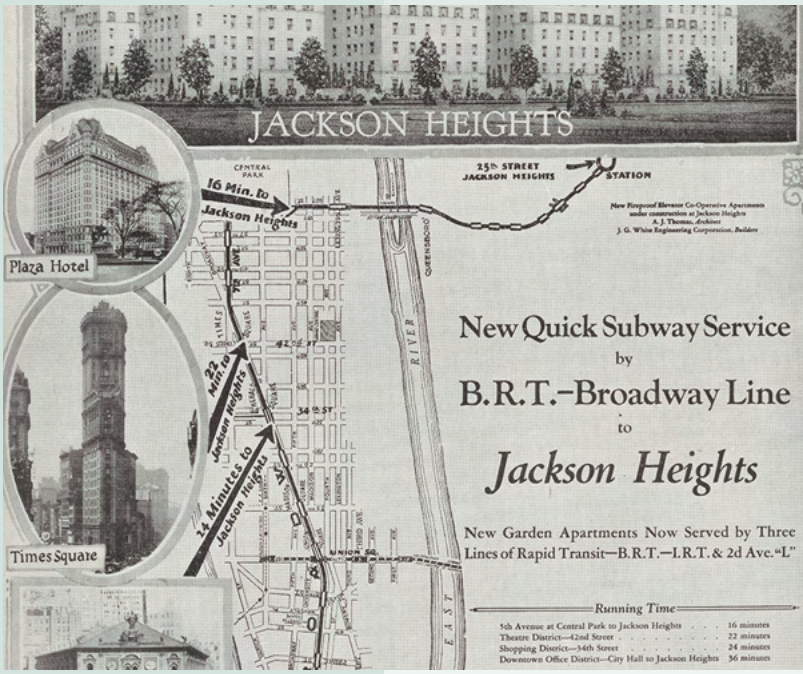
Borough of The Bronx

City of New York

Allerton

Lurting

Laconia



JACKSON HEIGHTS

Plaza Hotel

Times Square

16 Min. to Jackson Heights

22 Minutes to Jackson Heights

34 Minutes to Jackson Heights

New Quick Subway Service

by

B.R.T.–Broadway Line

to

Jackson Heights

New Garden Apartments Now Served by Three Lines of Rapid Transit—B.R.T.—I.R.T. & 2d Ave. "L"

Running Time

5th Avenue at Central Park to Jackson Heights . . . 16 minutes

Theatre District—42nd Street . . . 22 minutes

Shopping District—34th Street . . . 24 minutes

Downtown Office District—City Hall to Jackson Heights . . . 36 minutes

Document analysis

How did these documents appeal to their intended audience?

What do you notice about the language of the advertisements?

What do you notice about the geography of the subway lots?

Real estate developers jumped on the opportunity to build and market housing along the future lines. The consolidated subway system and the expansion of settlements served the needs of a rapidly growing population.

Source

Advertisements for "subway lots" arising from estate liquidations in Brooklyn, the Bronx, and Queens, via New York Public Library

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 65-68

What would be the significance of this growth for the future of humans, energy, and nature?

These projects permanently changed the distribution of people around the economic center of Manhattan. As people increasingly made their homes in the outer boroughs, those places changed from rural settlements to dense neighborhoods. And as people got used to the idea of taking transit between home and work, the stage was set for further expansion: a process called suburbanization.

But the expansion, and the massive projects that enabled and responded to it, signified an even larger paradigm shift simultaneously underway. Electrical grids, rapid transit, bridges, tunnels: all of these projects had once been undertaken by private companies, often by several different companies in competition with one another. Over the course of the first decades of the 20th century, these industries, which all required "economies of scale" in order to be profitable, consolidated into “natural monopolies” of single-company dominance. Subsequently, corruption and economic crises caused these companies to be brought under public (government) control. As the infrastructure that allowed power and people to circulate through space came to be seen as a public good, the American public was less willing to leave those systems' governance to the whims of private companies.

Several other major shifts were simultaneously underway that would forever change humans’ relationships to one another, to the environment, and to energy.

How did petroleum transform Long Island and New York?

Though coal continued to be fundamentally important for industrial production and electricity generation, petroleum would come to occupy a central role in the lives of individual energy consumers. By 1955, coal comprised only 29 percent of primary fuel consumption in the US, down from its peak at almost 77 percent in 1910. Meanwhile, oil and gas increased from 9 percent to 65 percent over the same interval. Several factors encouraged this shift, including the new availability of oil and the expansion of the Electrical Grid using petroleum-fueled power plants. But another factor transformed bothpatterns of energy consumption in American society and Americans’ daily lives: the automobile. Diesel-powered vehicles were on the road by the first years of the 20th century, but the importance petroleum was locked in not by the invention of the car itself, but by a different kind of innovation — this time in the method of production, rather than the product alone.

From 1913 on, Henry Ford’s factories produced cars at record-high speeds and record-low prices using an “assembly line production” strategy. Ford kept his employees loyal with relatively high wages and benefits like paid time off, which was unusual for the time. It was said that, with four months' pay, a worker in one of Ford's factories could buy one of the Model T cars he helped produce. This style of manufacturing, called “Fordism,” was soon adopted by many other industries, creating a new class of workers with enough disposable income to purchase the commodities they produced, and leisure time making them more interested in consumption.

Year	Motor vehicle						
	Registrations			Vehicle miles of travel (VMT)		Highway fatalities	
		Passenger cars					
	Motor vehicles, total (1,000)	Number (1,000)	Rate per 1,000 persons	Motor vehicles, total (mil.)	Average travel per vehicle (miles)	Number [1]	Rate per 100 million VMT
1900	8	8	0.1	100	12,500	36	36.00
1905	79	77	0.9	970	12,310	252	25.98
1910	469	458	5.0	3,580	7,641	1,599	44.66
1915	2,491	2,332	23.2	19,530	7,840	6,779	34.71
1920	9,239	8,132	76.4	47,600	5,152	12,155	25.54
1925	20,069	17,481	150.9	122,346	6,096	20,771	16.98
1930	26,750	23,035	187.2	206,320	7,713	31,204	15.12
1935	26,546	22,568	177.4	228,568	8,610	34,494	15.09
1940	32,453	27,466	208.1	302,188	9,311	32,914	10.89
1945	31,035	25,797	194.7	250,173	8,061	26,785	10.71
1950	49,162	40,339	265.6	458,246	9,321	33,186	7.24
1955	62,689	52,145	315.9	605,646	9,661	36,688	6.06
1960	73,858	61,671	342.7	718,762	9,732	36,399	5.06
1965	90,358	75,258	388.9	887,812	9,826	47,089	5.30
1970	108,418	89,244	437.5	1,109,724	10,236	53,816	4.85
1975	132,949	106,706	495.2	1,327,664	9,986	45,500	3.43
1980	155,796	121,601	535.2	1,527,295	9,803	51,091	3.35
1985	171,689	127,885	537.5	1,774,826	10,337	43,825	2.47
1990	188,798	133,700	536.0	2,144,362	11,358	44,599	2.08
1991	188,136	128,300	508.9	2,172,050	11,545	41,508	1.91
1992	190,362	126,581	496.4	2,247,151	11,805	39,250	1.75
1993	194,063	127,327	494.0	2,296,378	11,833	40,150	1.75

Data analysis

How did the total number of automobiles, and automobile ownership rate, relate to one another?

When did major changes to these trends occur? What could be the cause?

Source

Table from "20th-Century Statistics," in US Census Bureau, *Statistical Abstract of the United States 1999*

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Page 69

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 70-71

Document analysis

What do you notice about the distribution of the proposed parks and parkways on Long Island? Where do they go, and where don't they go?

Why do you think the barrier islands, including then-Jones Island, were appealing sites for the new parks system?

Source

"Maps Showing System of State Parkways and Parks on the Western Section of the South Shore of Long Island," by Long Island State Parks Commission (1929)

The increase in leisure time and automobile ownership, coupled with the growing urban population, drove residents to escape the city and explore the countryside — including Jones Beach State Park, one of the first and most prominent parks established to reconnect the urban middle class to the environment.

For Robert Moses, an ambitious planner just starting out in his career, this moment of expansion was a singular opportunity to make a mark. In 1924, the newly-minted Chairman of the State Parks Commission and President of the Long Island State Parks Commission began planning a system of "Parks and Parkways" that would connect city residents to the beaches and parklands across Long Island. The parks would serve the new car-owning leisure class, while the parkways were inspired by the preexisting roads that wealthy families had built to connect their rural retreats to the center of urban industry. These included the Long Island Motor Parkway, a private road developed by a scion of the wealthy Vanderbilt family, which opened in 1908 as the first parkway designed for individual automobiles. Moses envisioned the parkways as an extension of the parks themselves: green spaces that transported urban dwellers to a beautiful natural landscape.

Jones Beach, the "crown jewel" in the Parks and Parkways plan, opened in 1929, welcoming 25,000 cars filled with eager beach-goers on the first day. Sections of the Southern and Wantagh State Parkways connecting to Jones Beach opened in 1929. Other sections, along with the Long Beach Causeway (Loop Parkway), and the Northern State, Meadowbrook, Bay and Bethpage Parkways were complete or underway by the early 1930s, along with connections to parkways in Brooklyn and Queens. In total, 16 parkways were eventually built under the plan, sited on a combination of private and public lands, including the disused Brooklyn Waterworks system.

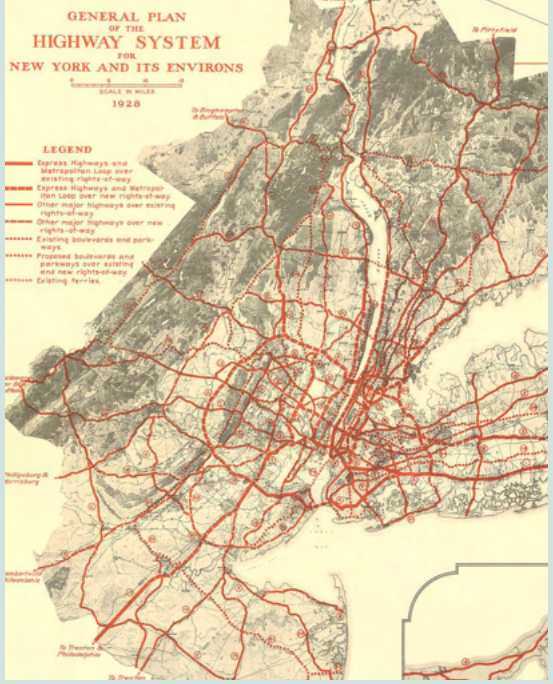
Besides bringing New Yorkers to the new parks on Long Island, the parkways conveyed New Yorkers to new homes, as well. This was the beginning of a new era of suburbanization, but also simply a continuation of the expansionist trend that had begun with families leaving Manhattan for Brooklyn and Queens in the preceding decades.

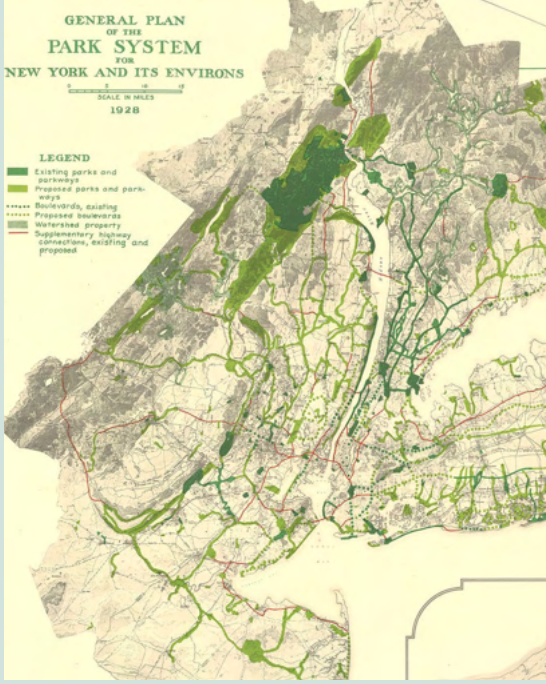
What opportunities, challenges, and cultural shifts followed expansion?

The Long Island Parks and Parkways system as a whole, and Jones Beach especially, reflected a new approach to "nature," one that constructed landscapes intentionally for the enjoyment and edification of the public. Moses's plan for Jones Beach transformed a thin slip of marsh and shifting dunes into a palatial beach with state-of-the-art bathhouses. The park was a triumph of engineering. Forty million cubic yards of sand were dredged from the bay to widen the beach and raise the elevation 12-17 feet, preventing flooding. Later, an army of workers hand-planted a million grasses in order to prevent the sand from blowing away in the wind.

Robert Moses is known as New York's Master Builder, the mastermind behind many large-scale public works of this period. In fact, Moses was part of a larger shift towards regional planning and bold public works that sought to accommodate urban growth. At the same time, in response to the public's increasing mobility thanks to automobiles and public works projects, a burgeoning environmental conservation movement sought to protect and maintain "natural" landscapes beyond city limits, allowing opportunities for recreation and resource extraction.

Workers planting beach grasses on Jones Beach, 1931
Courtesy of New York State Archive





BREAK OUT

For a selection from the *Graphic Regional Plan*, see:

Unit 3 Appendix
Pages 72-75

Archive investigation

How do these documents reflect a new logic of regional planning?

The same year that Jones Beach opened, the Regional Plan Committee released *The 1929 Regional Plan of New York and its Environs*, its first Plan for the greater New York metropolitan area, which included analysis and prescriptions for land use, transportation networks, and infrastructure throughout the five boroughs as well as Long Island, parts of eastern New Jersey, and Westchester County.

Source

Regional Plan Association | *The 1929 Regional Plan of New York and its Environs*

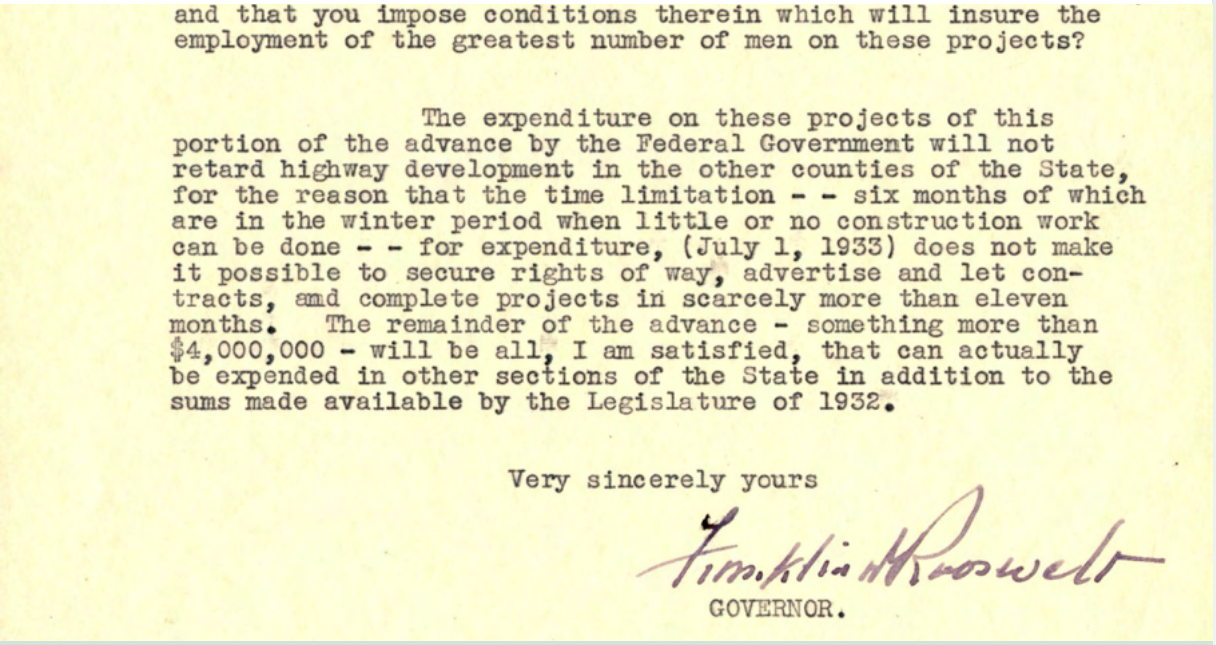
rpa.org/work/reports/regional-plan-of-new-york-and-its-environs

Efforts to reshape the regional geography would soon have popular support towards another purpose: stimulating the economy. In the 1930s, large-scale public works projects were seen as a means to activate unemployed people and mobilize stagnant capital, at both a state and national level. Franklin Delano Roosevelt, Governor of New York from 1929 to 1933 and President of the United States from 1933 to 1945, sought to relieve the economic crisis of the Great Depression with policies modeled on projects he and his predecessor as governor of New York, Al Smith, had previously undertaken. Collectively, these policies were known as the New Deal.

In the wake of the Depression, New York State used federal funds to build parkways, including the Grand Central Parkway, and other major transportation infrastructure including the Triborough Bridge, the Lincoln Tunnel, the Queens Midtown Tunnel, and LaGuardia Airport.

On Long Island, New Deal funds were used to improve and expand roads, housing, schools, sewer systems, sidewalks, beaches, parks, and public buildings. Jones Beach was expanded too, with roads, parking lots, and new buildings.

Nationally, the New Deal public works programs funneled a total of $9 billion towards the construction of public works including thousands of schools, hospitals, libraries, and other public buildings; water and sewer systems; electric power systems; flood control and reclamation projects; and more than 11,000 road projects. Meanwhile, the Civilian Conservation Corps employed up to 300,000 people in the expansion of the national parks system, building fire roads, creating trails, and planting 3 billion trees. According to Roosevelt, these projects had two goals: "to relieve unemployment (and) to develop great regions of our country in the future for the benefit of future Americans."



and that you impose conditions therein which will insure the employment of the greatest number of men on these projects?

The expenditure on these projects of this portion of the advance by the Federal Government will not retard highway development in the other counties of the State, for the reason that the time limitation - - six months of which are in the winter period when little or no construction work can be done - - for expenditure, (July 1, 1933) does not make it possible to secure rights of way, advertise and let contracts, and complete projects in scarcely more than eleven months. The remainder of the advance - something more than $4,000,000 - will be all, I am satisfied, that can actually be expended in other sections of the State in addition to the sums made available by the Legislature of 1932.

Very sincerely yours

Franklin D. Roosevelt

GOVERNOR.

Document analysis

What criteria does Governor Roosevelt set out?

How does this letter reflect the thinking that would guide the development of the New Deal?

Why would the construction and maintenance of parks (like Jones Beach), highways, and bridges have made sense according to this logic?

Source

Letter from New York Governor Franklin D. Roosevelt to New York's Superintendent of Public Works, Franklin S. Greene, describing an allocation of funds for the improvement of Northern, Grand Central, and Eastern Parkways, July 28, 1932

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 76-78

This period marked two major developments in the history of energy, the environment, and human society. First, an incredible amount of energy went into the public works projects that reshaped the American landscape — human labor power, as well as energy sources put towards transporting humans and materials to project sites. Second, the development of "great regions of [the] country," in Roosevelt's words, meant new lifestyles and patterns of settlement could — and even had to — emerge. Where new roads were built, cars would drive. Where new electrical and sewer systems extended, homes would be built. When new national parks beckoned, families would travel to appreciate the wonders of the national landscape. If the US was already on its way to building a cultural identity around suburban sprawl and automobile transportation, the New Deal's public works set that identity in stone.

Again, Long Island would be the pattern on which the rest of the country was modeled. Levittown, New York was completed in 1947 on a tract of former farmland as a reflection of the new trends privileging nuclear families, suburban settlement, automobile ownership, and a consumer economy. Then, after World War II, the development was replicated elsewhere in the country through a combination of military-style mass production techniques and federal financing.

In the wake of this disruption — the end of the war — federal policy focused on economic development by building not mass public infrastructure, but rather mass private housing. The GI Bill gave aid to (white) returning veterans, helping them buy houses in newly minted suburbs like Levittown. The establishment of federal housing loan programs for veterans almost doubled the number of private homes under construction from 1946 to 1950.

In parallel, highways and electrical systems were being expanded. The Federal-Aid Highway Act of 1944 had authorized the construction of a 40,000-mile "National System of Interstate Highways" through and between the nation's cities. The Federal-Aid Highway Act of 1956 provided the funding for construction. On Long Island, the Parkways were straining under the weight of larger numbers of commuters; the Act allowed roads and bridges to be widened and speed limits increased.

By the 1960s, the place of energy in the rhetoric of American idealism had fundamentally changed. Rather than a basic necessity of survival, a tool of private industry, or an infrastructure guiding collective expansion, energy was something almost spiritual that granted individuals and families greater autonomy, mobility, and "freedom."

But in reality, for many Americans, the expansion of the highway network and the spread of suburbs meant less freedom and opportunity, not more. New urban highway connectors cut through or circumscribed thriving Black and Latino neighborhoods, segregating and fragmenting the communities that lived there. Meanwhile, racist zoning and lending policies often limited access to the suburbs to white middle-class families, contributing to the "white flight" that impoverished cities in the decades to come.

Food and tobacco	Clothing [2]	Personal care	Housing	Household operation	Medical care	Personal business	Transportation	Recreation
21.2	11.2	1.1	11.7	10.7	3.1	3.9	7.7	4.4
12.8	5.4	0.7	8.1	6.4	2.1	2.5	4.0	2.2
17.6	7.0	0.8	7.9	7.7	2.4	2.8	5.4	2.6
22.0	8.9	1.0	9.7	10.4	3.2	3.2	7.2	3.8
43.5	19.6	2.0	12.8	15.5	5.2	4.2	6.8	6.2
58.1	23.7	2.4	21.7	29.1	9.4	6.6	25.4	11.2
73.6	28.4	3.7	34.4	37.3	14.2	10.1	34.9	14.6
89.2	32.7	5.6	48.2	46.7	22.1	14.6	42.9	18.5
108.8	41.4	8.1	65.4	62.1	34.1	20.9	59.1	26.8
154.6	57.6	11.8	94.0	84.8	60.0	32.0	81.1	43.1
238.2	85.6	16.7	147.0	135.4	107.9	53.0	130.2	70.5
376.2	132.3	26.6	255.2	232.6	206.4	101.2	238.4	116.3
497.3	188.3	39.1	407.1	342.0	366.7	182.6	372.8	185.9
672.5	262.7	57.3	586.3	436.2	615.6	290.1	463.3	281.6
780.4	321.8	71.8	750.4	559.4	875.0	388.8	574.1	404.2
832.3	353.3	79.4	829.8	620.7	957.3	459.1	636.4	462.9
27.4	14.5	1.4	15.1	13.8	4.0	5.0	9.9	5.7
30.2	12.3	1.2	11.3	15.1	4.9	3.4	13.2	5.8
23.9	8.9	1.8	14.5	13.1	9.3	4.9	12.5	6.7
17.5	6.8	1.5	15.3	11.4	16.0	7.6	12.1	7.3
15.2	6.4	1.4	15.1	11.3	17.4	8.4	11.6	8.4

Data analysis

Where in these numbers can you locate the growth of a consumer middle class?

Where can you locate an improving standard of living?

What do you think were the benefits and problems caused by this expanded consumerism?

Source

Table from "20th-Century Statistics," in US Census Bureau, *Statistical Abstract of the United States 1999*

BREAK OUT

For full activity materials, see:

Unit 3 Appendix
Pages 79-103

Selling a vision of the future

In 1964, New York City hosted the World's Fair at Flushing Meadows-Corona Park for the second time (the first time being 1939). The theme of the fair was "Peace Through Understanding," and it was dedicated to "Man's Achievement on a Shrinking Globe in an Expanding Universe," an internationalist, futurist framework an internationalist, futurist framework typical of the post-war period. But in addition to these lofty ideals, the Fair gave a platform to dozens of companies — including General Motors, General Electric, Chrysler, IBM, Dupont Chemical, and Ford — who used exhibits and attractions to advertise their state-of-the-art products. To a critical eye, the way that these companies presented their' products communicates a great deal about the culture and expectations of visitors at the time.

One of the products advertised at the Fair was the General Motors Firebird IV passenger car, which like the rest of the Firebird line employed an internal gas turbine engine. This engine was meant to produce a streamlined car with a much simpler, lighter-weight engine, but noise and fuel efficiency issues prevented it from ever being mass produced. Only nine Firebirds exist intact today.

Instructions

For full activity materials, see:

Unit 3 Appendix
Pages 104-107

In small groups, examine the photos and video clips and consider the following questions.

What vision(s) of the future can be seen in these spaces and images?

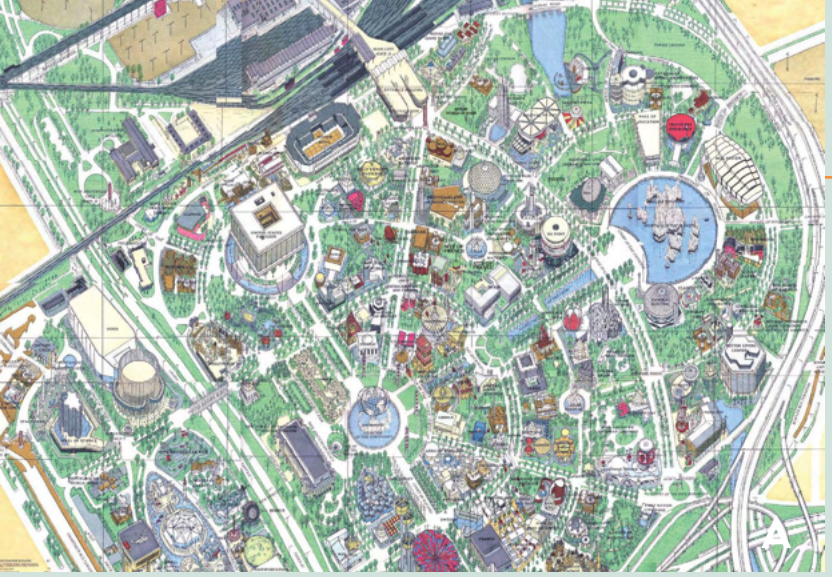
What role does energy play in this future?

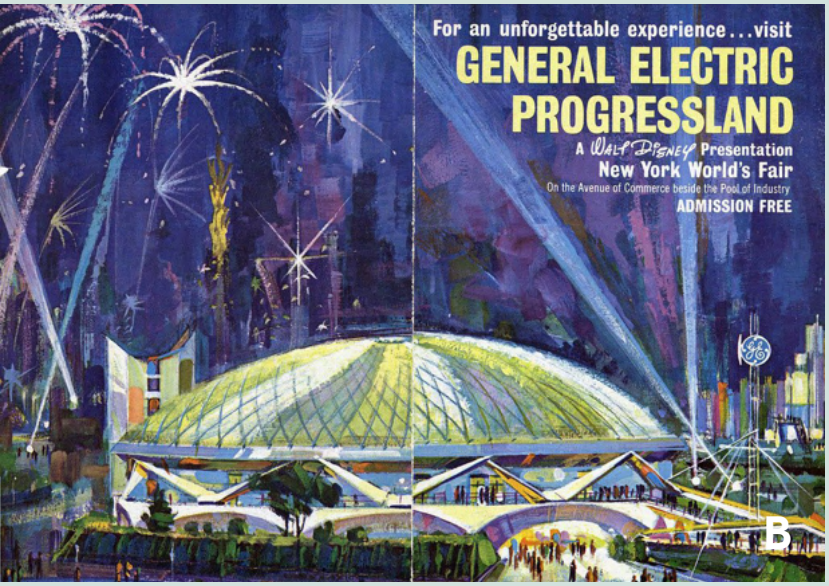
What ideals or aspirations do these visions speak to?

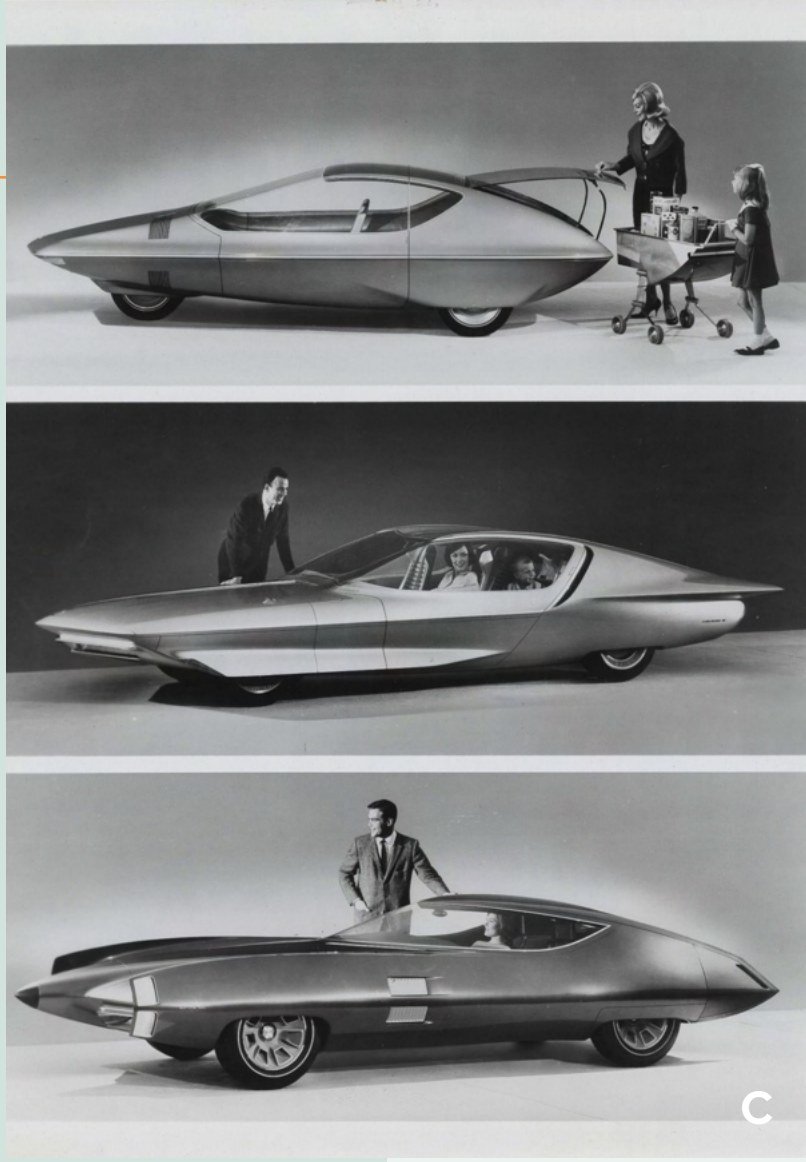
Then, work together to design and write an advertisement for a 1964 Firebird IV.

Don't try to create an entire, finished campaign, but come up with a general proposal, or pitch that speaks to your core ideals. What kind of advertisements will these be — posters? Radio messages? Television ads? Where would they appear? Brainstorm key taglines, phrases, images, and narrative elements.

Pitch your campaign to the rest of the class.







Sources

General Motors | Firebird IV turbine automobile promotional video

youtu.be/xKOdux6Gjno

World's Fair overview (44:25 - 47:25)

youtu.be/j0weXcJlE1g

A | Map of exhibits at New York World's Fair (1964), via David Rumsey Map Collection

B | "Progressland," promotional image by General Electric (1964)

C | Firebird IV promotional photographs by Chrysler (1964), courtesy of Museum of the City of New York and the Queens Museum

Renewable energy infrastructure, rights, and ethics

In the 1920s, Robert Moses lobbied for a change to New York State law that allowed his department to appropriate private land for the parks and parkways he intended to build. However, some of the land that the roads were designed to pass through belonged to wealthy families with large country estates who fought the change in the courts and delayed construction for many years. Ultimately, Moses prevailed and the parkways were built. The plan also included public lands that had previously been part of the Brooklyn Waterworks system.

In the 21st century, as the problems posed by anthropogenic climate change intensify, transitioning the energy system to renewable energy sources becomes ever more urgent. The transition requires the expansion of renewable energy infrastructure, including wind and solar power plants. But there has not always been agreement on the right way to go about this expansion. As in Moses' time, some have argued that government has a right to take bold steps towards building necessary infrastructure; others assert that the rights of individuals and communities who may be impacted by big projects should come first.

Long Island provides a notable example. Off-shore wind farms, spread over hundreds of thousands of acres south and east of the island, could produce enough carbon-neutral electricity to power millions of homes. But communities who work and live near proposed project sites, especially fishermen, have resisted what they see as a threat to their livelihoods. Other critics have argued that the projects, developed by private companies with government help, will ultimately enrich corporations rather than the public.

Instructions

For full activity materials, see:

Unit 3 Appendix
Page 108

Use the internet to research the pros, cons, and stake-holders of off-shore wind projects like the one south of Jones Beach, known as the Empire Wind project.

Then, imagine you are a state legislator supporting or opposing a similar off-shore wind project in the future. Write a short speech to the public making the case for your position. Consider:

What does the government owe impacted communities?

How should the public and the government reconcile collective need for renewable energy and the rights of individuals in the context of climate change?

What is the value of central planning and expertise, versus democratic process and planning through consensus?

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