Broome County Plan for Sustainable Economic Development

ASSESSMENT THREE

INFRASTRUCTURE ASSESSMENT

APRIL 2002

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April 2002

AngelouEconomics (AE) is pleased to present the Steering Committee of the Broome County Plan for Sustainable Economic Development (the BC Plan) with this **Infrastructure Assessment.** This document is one of several analytical documents that will drive the SWOT analysis and target industry selection, leading to specific recommendations for marketing and implementation strategies for Broome County.

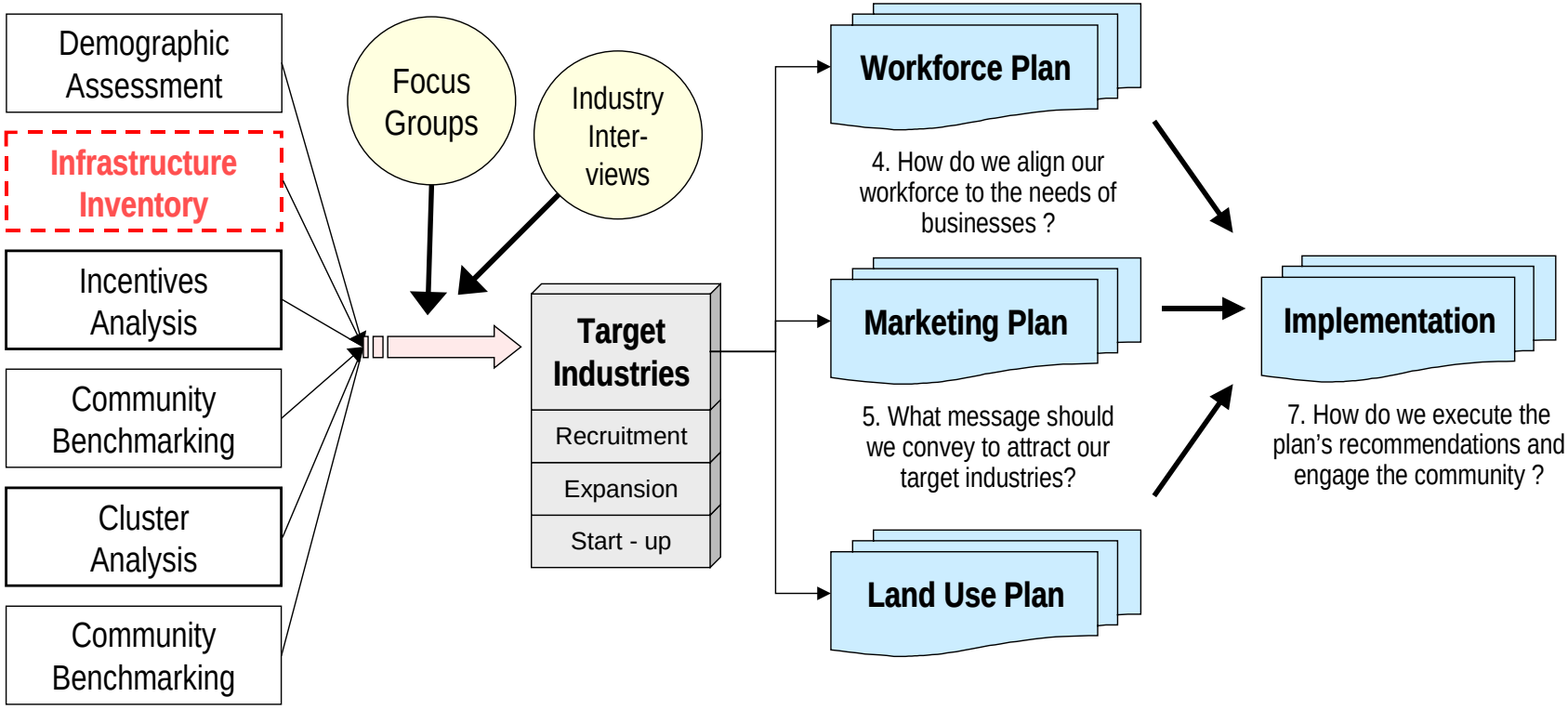
This report provides an inventory of Broome County's infrastructure and utilities and assesses the degree to which it supports future economic development. Our intent is identify opportunities presented by existing resources and begin the process of prioritizing infrastructure investments to improve the county's readiness. Our assessment is based on our experience with communities across the U.S. and our knowledge of the site selection needs of industry.

This report includes substantial information provided by the Broome County Industrial Development Agency (www.bcida.com) and Broome County Planning Department.

All BC Plan reports, as well as much of the additional research underlying them, will be made available online at www.theBCplan.com. Thank you for your interest in the BC Plan.

Angelos Angelou, Principal
AngelouEconomics

The Broome County Planning Process



Report Purpose

This report addresses a critical step in the site selection process: the availability of infrastructure that satisfy the corporate prospect's current and long-term requirements. Often, the lack of sites and infrastructure may remove a community from a site selector's review list. Many communities believe that a good supply of greenfields equates to a good supply of sites. However, companies are increasingly focused on the supply of developed, "shovel-ready" sites in communities around the U.S., and this has raised the bar for corporate recruitment. Companies and site selectors are now approaching communities as they would a supplier, requesting specific information on their "product" (pre-developed sites or available buildings) prior to a thorough examination of the community. A corporate prospect that finds few or no sites that fit its unique needs will often discontinue its local search.

This infrastructure assessment is one of several reports that will address the specific site requirements of target industries. AE performed its analysis by collecting utility data at the county-level on capacities, pricing, and availability. AE examined the "readiness" of each of these areas, i.e. is regional capacity available, can the region's infrastructure handle future growth, etc. To supplement this analysis, AE selected several industries as a representative sample of utility users (high water / low electricity, etc.). This list is intended to be one of several exercises in the process for selecting target industries. Final targets will be determined at the conclusion of the **Cluster Industry** study and will allow for the full participation of stakeholders. Additional information will be incorporated in the **Land Use** and **Marketing** reports with specific mention of sites and possible infrastructure improvements.

Sample Facilities

To measure Broome County's readiness for recruitment, AE selected a representative sample of facilities that have a wide range of infrastructure requirements:

- Electronics manufacturing (Electricity)
- Food processing (Water and wastewater)
- Data center / back office (Electricity and telecommunications)
- Software (Telecom and air access)

For each, we outline the general location criteria for these industries and give specific infrastructure requirements for utilities, access, and land. Target industries have yet to be identified by the BC Plan team. These four industries may or may not be selected as targets, and for this report are used to reflect a wide range of infrastructure capacities that will impact target selection.

Infrastructure Examined in this Report

This report examines five major infrastructure areas and their ability to support high impact employers:

- Power
- Water and Wastewater
- Natural gas
- Telecommunications
- Transportation

For each infrastructure area, we provide an evaluation of several metrics, such as capacities, availability, reliability, and pricing, and provide a general rating (High-Med-Low) comparing Broome County to national standards.

Future Land Use Planning

This report does not offer prescriptions or suggested land use changes – those matters will be left to the expertise of Allee King Rosen & Fleming and will be addressed in the "Land Use" report of Phase Three.

Preliminary Findings:
Infrastructure Readiness for Broome County

Overall, Broome County is well-served by its electric and gas suppliers, but lacks adequate wastewater treatment capacity to handle future growth opportunities. Economic development prospects for the region are limited by the current state of its infrastructure and the lack of developable sites. The information gathered in this report will assist in making future strategic infrastructure investments.

Water and wastewater is generally available to most parts of the county, but several undeveloped areas are not connected to regional infrastructure. Electricity is expensive relative to the U.S., but Broome County enjoys an abundance of transmission capacity, and NYSEG has the ability to negotiate rate contracts with large customers.

There are limited land parcels in Broome County that are “shovel-ready”, as the two industrial parks in Kirkwood and Conklin have reached or are reaching build-out. Few large, contiguous parcels are available, and much of the remaining commercial land is scattered throughout the county.

Transportation infrastructure is good, as roadways and highways provide easy access to most business districts. Air access into and out of the county is an issue.

Broome County Assessment: Electricity

Overview

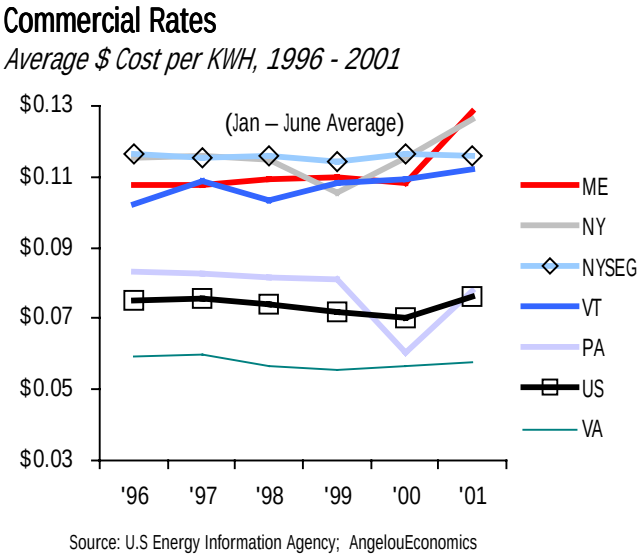
According to NYSEG, Broome County has a transmission and distribution capacity of approximately 400 megawatts (MW) and now serves over 120,000 customers with a peak demand of 300 MW. The system is 75 percent loaded during peak hours, and the remaining capacity would be dependent on the location of load pockets. The New York market is undergoing deregulation and has several service providers selling electricity to Broome County businesses. Prices now reflect a 13 percent rate reduction, and NYSEG does negotiate pricing for new large users. In addition, the New York Power Authority can provide low-cost electricity to businesses across the State for projects that demonstrate significant economic development potential for expansion, retention, or revitalization purposes.

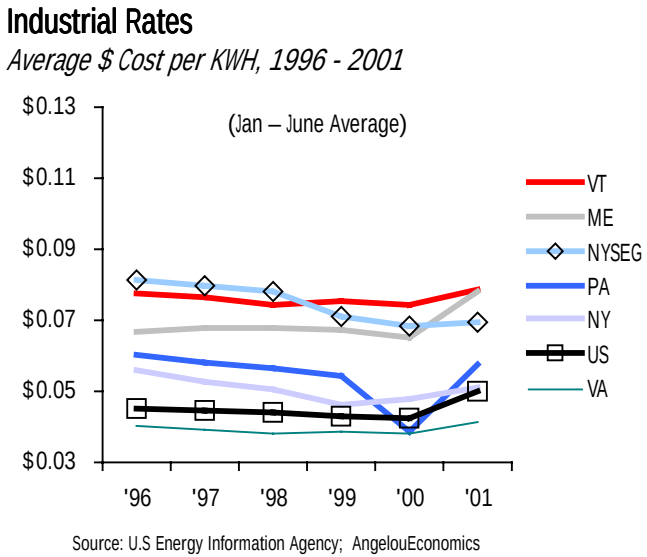
Inventory

Electric Power	
	Broome County
Overall Capacity	400 MW
Peak Demand	300 MW
Deregulated?	Yes
Providers currently servicing industry	8: NYSEG, AES, TXU
Reliability	Good
Average pricing, Jan – June, 2001	Industrial: $0.064 / kwh Commercial: $0.10 / kwh
KWH Rate for heavy industrial user	$0.058 / kwh

National Rate Comparison

Relative to U.S. levels and prices for most southern states, Broome County offers electricity at a high cost. A recent comparison of typical utility bills for large industrial users ranked New York as the third most expensive state in the U.S., behind Hawaii and California (Edison Electric Institute, Summer 2001) and NYSEG lower in the top 30 bracket with its industrial high load factor rates approaching the U.S. average price. Recent rate reductions have moved the state lower in the top-20 bracket. Some of this cost is additionally reduced by industrial incentives offered by NYSEG.





Average cost per kwh, Jan – June 2001	Commercial	Industrial
NYSEG:	10 cents/kwh	6.4 cents/kwh
U.S. average:	7.6 cents/kwh	5.0 cents/kwh

These prices reflect an "effective" rate: the total revenues received by utilities for total electricity generated. Electricity pricing can be a highly complex calculation, and these "effective" rates should be considered a good proxy for rate comparisons.

Broome County Assessment: Electricity

Overall, electric service in Broome County is good and can be expanded to meet the need of new employers. Pricing, however, is relatively high. Reliability is good, as few brownouts are reported in the area due to a high level of available transmission capacity relative to demand. The deregulation of the electric industry in New York has resulted in slowly falling prices, and several providers are selling to consumers in Broome County. Most industrial sites in Broome County offer redundant services (from different substations).

Readiness Matrix: Electricity

Electricity		
	Rating	**Detail**
Availability	High	Good for most of county, need to examine for pockets of "high load"
Regional Capacity	Very High	Transmission capacity is underutilized
Redundancy	Moderate	Available sporadically
Reliability	High	Few brownouts
Competitive pricing	Low	Pricing is high, some economic development incentives, negotiated industrial rates

Broome County Assessment: Water and Wastewater

Overview

Broome County is currently served by several water and wastewater facilities, run by local municipalities and serving the region through service agreements. Currently Broome County is undergoing a comprehensive study of wastewater management that examines alternative wastewater management options, including county involvement, in order to ensure adequate capacity for future growth and development.

Broome County enjoys a high quality, reliable supply of water from ground and surface sources. Currently, the county consumes about 28 million gallons per day from municipal water systems, with total capacity estimated at about 65 million gallons per day. Water is available at most sites in the county, and additional capacity is available. Wastewater treatment averages 30 to 35 million gallons per day, much of which includes leakages into the system. Wastewater treatment is unavailable to many sites and little to no additional capacity currently exists. The Binghamton-Johnson treatment plan has no additional capacity but is undergoing a major upgrade to be completed by year-end 2004. The Endicott plant is also undergoing an upgrade but cannot offer its additional capacity to many of the county's undeveloped areas without significant pipeline investment.

Wastewater Treatment Capacity – Largest Facilities

	Binghamton-Johnson plant	Endicott plant
Capacity	20 to 25 million gallons per day (mgd)	8 million gallons per day
Additional capacity available	None	1-2 millions gallons
Planned upgrade	$40 million bonded to replace aging infrastructure	Minor upgrades underway
Future capacity	60 mgd (primary), 35 mgd (secondary) Note: Johnson City does not plan to release any additional capacity for use outside the city	10 million gallons per day
Completion date	year-end 2004	2002
Pricing	$1.12 - $1.30 per 100 cubic feet	$1.28 - $2.26 per 100 cubic feet

Broome County Assessment: Water and Wastewater

Broome County enjoys a large supply of water, but suffers from aging wastewater treatment. Most sites in the county are ready for water and wastewater service, or require minor investment to connect to the systems. Because no wastewater treatment is or will be available from the Binghamton-Johnson plant, significant investments need to be made to link some areas to the Endicott plant.

Readiness Matrix: Water and Wastewater

Water and Wastewater		
	Rating	**Detail**
Water		
Regional Capacity	Very High	Large supplies available
Availability at Sites	High	Some require hookups
Wastewater		
Regional Capacity	Very Low	Existing plants overutilized and requiring maintenance
Availability to Sites	Moderate	Some sites need hookups, but most are ready serve

Broome County Assessment: Natural Gas

Overall, New York state operates in a deregulated environment whereby more than 85 percent of all natural gas consumed is imported from outside the state. Increased demand by non-industrial commercial users accounts for 90 percent of all new demand since 1996.

Natural Gas service is available throughout Broome County. All developed sites have access to natural gas, although some undeveloped areas still lack hook ups. According to NYSEG, the specific needs of potential customers will need to be further examined to identify areas of service and equipment improvements.

Readiness Matrix: Natural Gas

Natural Gas		
	Rating	**Detail**
Regional Availability	Very High	No problems
Access within region	High	All developed sites have access, some undeveloped areas do not
Deregulated?	Yes	
Pricing	Moderate	$6 / $11 industrial (summer / winter); $7 / $11 commercial (EIA '00)

Broome County Assessment: Transportation

Location

Broome County is located in New York state's Southern Tier region, centrally located to major cities in New York and Pennsylvania:

New York City	180 miles
Albany	140 miles
Scranton	60 miles
Philadelphia	180 miles

Broome County Regional Context

Source: BCIDA

Roadway Access

At the convergence of Interstates 81 and 88 and New York Route 17 (The Southern Tier Expressway), Broome County is well served by major highways connecting the area to neighboring regions. As Route 17 is upgraded to I-86, the county will benefit from the availability of alternate, limited-access routes to the lower Hudson Valley and New York City.

Within the county, roadway capacity is also excellent. With population declines over the past 25 years, Broome County does not suffer from traffic congestion like much of the northeastern U.S. Existing industrial properties in Binghamton, Union Township, Conklin, and Kirkwood are easily accessible from the three major highways. Urban brownfield sites scattered throughout the Triple Cities are less uniformly accessible, but are rarely far removed from Route 17 and/or the Brandywine Expressway.

The only widely observed traffic challenge exists along the Vestal Parkway from the Route 201 Bridge west through Vestal. Since it is unlikely that the Vestal Parkway will be the site of any significant industrial development, this congestion poses little challenge to economic development initiatives.

Rail Access

Binghamton and Broome County are well-served by cargo rail capacity. Rail lines to the lower Hudson Valley, Syracuse, Utica, and Albany, and a meandering line through the Southern Tier all meet in the Triple Cities. A rail and freight study completed in 1997 indicated that freight service in Broome County provides a point of entry for raw materials such as paper, agriculture products, resins, feeds, and coal. Industrial parks in the region are presently served by rail. The county is currently served by Norfolk Southern, which recently acquired Conrail. The county is also served by Canadian rail-line that offers service from Montreal to Harrisburg. While the county is currently well-served, lack of additional investment by Norfolk Southern (in part due to high railroad property taxes) may threaten the level of rail service offered in the county in the future.

New York State Railway Map

Source: NY State Department of Transportation

Binghamton Regional Airport - Direct Flights

Air Access

The Binghamton Regional Airport is located at Edwin A. Link Field on Mount Ettrick in the Town of Maine, less than twenty minutes from major industrial parks and downtown. As most residents will attest, air service to Broome County is both limited and costly. Direct flights from Edwin A. Link Field (BGM) are limited to Philadelphia and Washington, DC to the east, and Pittsburgh and Detroit to the west. Several airports are located in nearby communities, including Wilkes-Barre/Scranton (AVP), which provides additional service to Pittsburgh and Cincinnati. At both facilities, service is inconsistent – too few flights guarantee long delays when glitches occur. In addition to BGM and AVP, limited commercial air service is available in Elmira-Corning (Detroit, Philadelphia, Pittsburgh) and Ithaca (LaGuardia, Philadelphia, Pittsburgh, Boston). A longer commute provides air service through Albany, with 25+ direct flights.

The regional air transportation issue is complicated by stagnating passenger traffic in the Southern Tier. BGM experienced a decline of 14% in enplanements from 1994 to 1999, while total regional traffic declined by 5% over the same period. Over the years, much has been made of the prospect of a regional airport for the Southern Tier of New York, serving the Binghamton, Elmira-Corning, and Ithaca communities. To this point little progress has been made, and AngelouEconomics sees little immediate prospect for a resolution. As a practical matter, enplanement records indicate the emergence of Elmira-Corning's Twin Tiers Airport as a growing regional airport, enjoying a 10% rise in enplanements despite the county's declining population. This trend is by no means irreversible, as BGM still handles more traffic than either regional alternatives.

Regional Air Service Alternatives

City/Airport		Distance
Ithaca	ITH	62 miles, 1:30 hours
Elmira-Corning	ELM	66 miles, 1:20 hours
Scranton/Wilkes-Barre	AVP	70 miles, 1:15 hours
Albany	ALB	140 miles, 2:30 hours

Regional Emplanements (1994-1999)

Airfield	1994	1999	Change
Binghamton Regional	158,085	136,305	-14%
Tompkins County	110,428	101,945	-8%
Elmira-Corning	97,947	108,124	10%
Regional Total	*366,460*	*346,374*	*-5%*

Source: NY State Department of Transportation

Summary Assessment

Readiness Matrix: Transportation

Transportation and Access		
	Rating	**Detail**
Roadway	Very High	Good highway access to major metros
Rail	High	Good rail connectivity to industrial parks
Air service	Low	Infrequent and few direct flights
Air cargo	Moderate	Poor proximity to existing industrial parks

Broome County Assessment: Telecommunications

Broome County businesses are currently served by several telecommunications providers:

Inventory

Telecommunications	
Provider	**Services**
Verizon (previously NYNEX)	Telephone service, datalines
Time Warner Telecom	Land-based services, T1's, phone, datalines
Time Warner Cable	Cable TV, Roadrunner Internet service
ChoiceOne (purchased CTSI's infrastructure)	Fiber lines

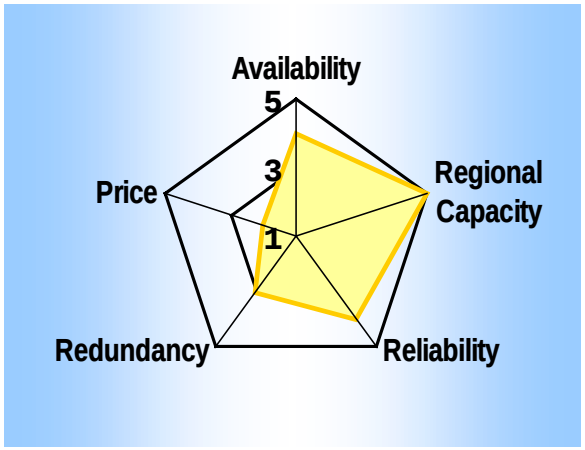
Time Warner's Roadrunner service is the most common high-speed access to Internet, as Verizon (NYNEX) has not made the upgrades to its infrastructure to provide high-speed DSL service throughout the county. According to County staff, reliability of the Internet service in Broome County is high. Few alternatives has kept pricing somewhat high.

Readiness Matrix: Telecommunications

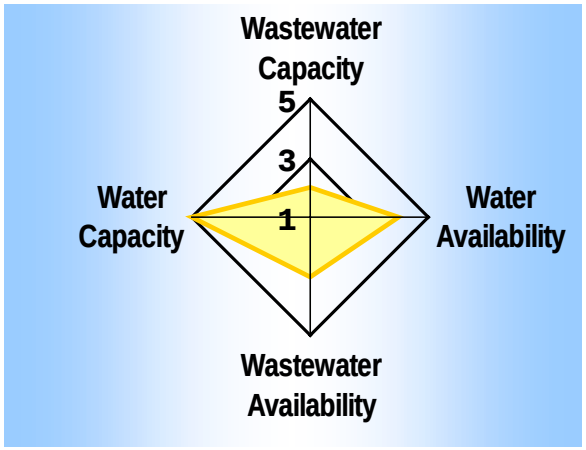
Telecommunications		
	Rating	**Detail**
Access	Moderate	Standard options available, few high-speed alternatives, unclear for specific sites
Reliability	High	Existing infrastructure is reliable
Price	Low	High cost for T1 rentals

Broome County Assessment: Summary

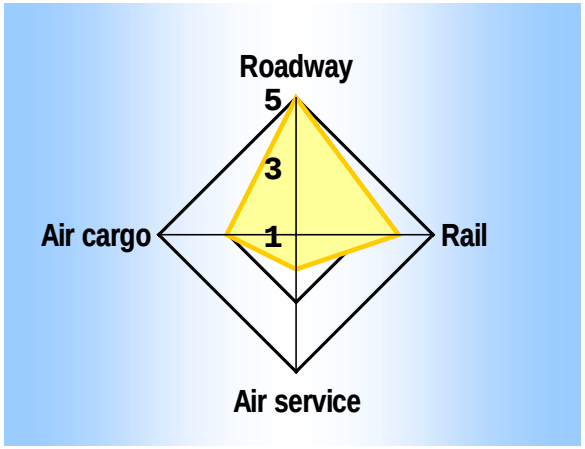
Electricity



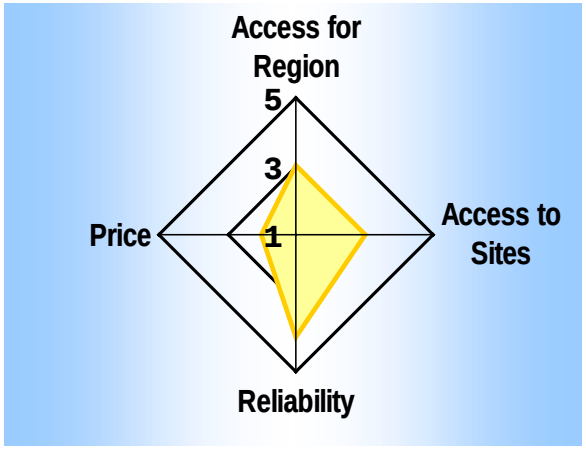
Water and Wastewater



Transportation



Telecommunications



Readiness Rating
5 = High
3 = Moderate
1 = Low

Note: "Readiness" ratings are made in comparison to national standards.

Industry Requirements

Overview

As part of the **Infrastructure Assessment** of Broome County, AngelouEconomics selected several industries to serve as a baseline to measure the county's infrastructure "readiness."

Four industries were selected for their range of infrastructure requirements:

- Electronics manufacturing (Electricity)
- Food processing (Water and wastewater)
- Data center / back office (Electricity and telecommunications)
- Software (Telecom and air access)

Preliminary Findings

- Electronics manufacturers are adequately served for all infrastructure areas
- Future food processors may not find adequate wastewater treatment capacity
- Data centers or back office operations most likely can obtain their high electricity requirements, though additional research on specific site infrastructure is required
- Software companies can be served by electricity and telecommunications, but may reconsider Broome County due to a lack of direct air access to major markets

Requirements:
Electronics Manufacturing

Overview

Location decisions by electronics manufacturers (including contract manufacturers) are highly driven by transportation access, electric infrastructure, and cost of doing business.

Electronics manufacturers are high consumers of electricity, and the manufacturing process requires a highly reliable, low-cost supply. Large manufacturers make significant investments in onsite gasoline-powered backup generators, and dual-feed connections to separate electric grids offer additional assurances. Most manufacturers do not have large water requirements, except for silicon-related manufacturers such as semiconductor chip fabs, which can use up to 3 million gallons per day.

Transportation access is critical to the industry, as many companies are tightly connected to a long supply chain. Short production schedules and highly integrated supplier relationships are often cited as the primary success factors for the industry. Just-in-time manufacturing processes require quick and stable distribution routes, and most companies rely on reliable and efficient intermodal transit, primarily between trucking and air cargo facilities.

Currently, the industry is undergoing consolidation in an effort to boost efficiencies so as to improve and stabilize historically low margins. Due to the high value of the supplier inputs for final goods assembly, industry-wide operating margins are kept to 3 to 5 percent, and many companies fail to reach profitability. Due to the high capital investment required for the manufacturing process, companies gravitate toward low cost environments and aggressively pursue incentives.

Electronics Manufacturing: Requirements of a Typical Facility

	Requirement	Details
Manufactures	Electronics and components	Network cards, cell phones, consumer electronics
Size	120,000 sf	Medium-sized facility with 15-20 lines of production running 24 hours per day
Acres	10-15 acres developable; 20 acres buffer	Surface parking
Employees	400 to 500	24 hours / 2 shifts
Water	80,000 to 100,000 gallons per day	Light user, primarily to serve employee needs
Wastewater	72,000 to 90,000 gallons per day	No on-site treatment required
Electricity	1.0 to 1.5 million kilowatt-hours per month	Backup and redundancy required
Natural Gas	Low	Not required for manufacturing process

Requirements:
Food Processing

Food processing plants are highly sensitive to distribution costs, water requirements, the availability of raw materials, and labor costs.

Most manufacturers require large amounts of water and wastewater processing, both in the manufacturing process and for cleaning the facility several times per day. Food and safety regulations have specific guidelines on factory floor layout and cleaning procedures. As a result, some on-site treatment of water refuse is usually required.

Electricity requirements do not exceed those of a typical manufacturer, except for frozen food producers, who are large consumers of electricity for refrigeration.

Access to raw materials is frequently cited as a primary location factor, as the cost of transporting bulky commodities to the plant can be prohibitive. Operating margins are typically low for the industry, and most producers are sensitive to the cost of low-skilled labor in the local market.

The food processing industry is currently experiencing corporate and plant consolidation to boost efficiency and leverage existing distribution channels. These distribution channels are trending toward a "Direct Store Delivery" model whereby distribution centers are bypassed for direct delivery of product from the plant to the retailer. This model increases the need to locate plants near the product's consumer market, and excellent highway access is required to the site and the final destinations.

Food Processing: Requirements of a Typical Facility

	Requirement	Details
Manufactures	Packaged foods	Non-refrigerated, ready-to-eat food (snacks, cereals, grain-based products)
Size	120,000 sf	Facility requires special construction – sloped floors for draining, floor coatings, unique building footprint for several long lines; requires USDA certification when shipping to U.S.
Acres	10-15 acres developable; 20 acres buffer	surface parking
Employees	600	24 hours / 2 shifts
Water	150,000 gal / day -->max 50,000 gals per hour 120,000 gals / day TOTAL: 270,000 gals / day	full facility cleaning 3x/day for 1 hr; highly dependent on the product; standard use of 200 gal/emp
Wastewater	240,000 gal / day	Should have on-site treatment
Electricity	1,000 - 1,500 KW; 700,000 - 1,100,000 KWH/mo	Some need dual-substation, backup generators
Natural Gas	Yes	for heating facility and water

Requirements:
Data Center / Back Office

Data centers and data-related back office functions are highly sensitive to the cost and reliability of power, the availability of a technical workforce, telecom connectivity, and security issues.

Electricity requirements are significant, as these facilities operate a high density of telecom and computer equipment, 24 hours a day. A typical facility could have a demand of 10 to 15 MW per hour. Data centers required 100% up time and have very high standards for electric reliability and redundancy. All make significant investments in uninterruptible power supplies (UPS), and many utilize internal electric generating capacity of up to 15 MW. Redundancy is also important to data operations, as backup generators typically can support the facility's operations for only several days. Data centers typically require a supply of electricity that is dual-feed from separate substations. Telecommunications infrastructure must support high-speed, redundant connections on fiber to the Internet backbone, and many top-tier companies require that 2 separate telecom service providers for redundancy.

Security issues for data operations include the need for an adequate buffer zone, distance from disaster-prone regions, and a remote, inconspicuous building.

Data Center / Back Office: Requirements of a Typical Facility

	Requirement	Details
Service	**Data storage and service**	Server co-location facility; corporate data center
Size	150,000 sf	15% office, 75% server floorspace, 10% utilities/loading dock
Employees	150-200	20 on staff after-hours
Water	30-40,000 gallons per day	For employees
Wastewater	35,000 gallons per day	
Electricity	15 MW, high load factor	Redundancy: dual substations, possibly on separate grids Reliability: 100% uptime; backup generators and uninterruptible power supply
Telecom	Very high bandwidth	Redundant fiber connection to the backbone
Shell Improvements	$70 million	$450 / sf on mechanical, electrical, and flooring

Requirements:
Software / Internet

Software companies are highly sensitive to issues of technical labor availability, air access to major markets, some telecommunications, and real estate costs.

The availability of specialized technical labor has driven many software companies to cluster in major knowledge-based metros, where workers can be recruited away from neighbors and keep current on the latest technologies through social and business networks. Because of the fast-changing nature of software technologies, many firms locate in university towns or areas with a large base of young workers. The cost of labor can account for 70 to 80 percent of a software company's monthly overhead, and attracting and retaining the highest quality workers is a top concern. High quality of life, low cost of living, dynamic social environment, and low personal taxes greatly improve to the software company's ability to hire these workers.

Transportation access is also important to most software companies, as many business models rely on placing workers in the field or constantly interacting with clients in other major metros. Having the ability to quickly travel to clients on short notice requires that a community have several direct flights to neighboring major metros. This need for good air service is not unique to the software industry, but does contrast with the manufacturing industries examined in this report, which rely on shipping goods, not people.

Telecommunications requirements of software firms are high, but quickly becoming the norm for most office buildings. High speed Internet access and buildings pre-wired for networking are now common in most class A buildings. T1 and T3 data lines are standard for software companies, but newer technologies such as ADSL and fiber networks are improving their reliability.

Data Center / Back Office: Requirements of a Typical Facility

	Requirement	Details
Service	**Software / Internet**	Business software products with Internet functionality
Size	35,000 sf	Class A or B office
Employees	100	Business hours
Water	15-20,000 gallons per day	For employees
Wastewater	15,000 gallons per day	
Electricity		Reliability: uninterruptible power supply
Telecom	Very high bandwidth	Need for high reliability

Industry Infrastructure Requirements: Summary Table

In addition to the four industries examined in the previous sections (Electronics, Food Processing, Software, and Datacenters), AngelouEconomics presents below a top-line review of typical requirements of other high-impact industries. For each infrastructure area, AE describes the industry's needs as High, Medium, or Low with a short description. Clearly, the specific needs of firms within each industry will vary based on their size, end-market, R&D levels, production schedule, and labor skills. The data presented here is intended to support current discussions on Broome County's best target industries. Specific improvements to existing sites in preparation for these industries may require some additional investigation.

Industries Examined in Detail (in previous sections of this report):

	Land / Location	Elec-tricity	Water / WW	Telecom	Air Access	Road ways	Description
Electronics Mftg	Med	Med	Low	Low	High	Med	High volume and value of component inputs require good air service or roadways; some buffer required; electric backups
Food Processing	Med	Med	High	Low	Low	High	Safety regulations require frequent facility cleaning with water, often onsite pretreatment; some buffer due to odor
Software / IT	Low	Low	Low	High	High	Low	Interconnected industry that requires high speed Internet and good air service to customer markets
Datacenters	Med	High	Low	Very High	High	Low	Remote location best; high consumer of electricity with backups; located on fiber backbone

Additional High-Impact Industries

	Land / Location	Elec-tricity	Water / WW	Telecom	Air Access	Road ways	Description
Computer Mftg	Med	High	Low	Med	High	High	Just-in-time mftg requires good air and roadway access to major customer and supplier markets
Semiconductor Mftg	High	High	High	Med	High	High	Large buffer required; high consumer of all utilities; ability to ship product quickly to market
Industrial Machinery	Med	High	Low	Low	Med	High	Buffer required for some; most distribution done through trucking
Biotechnology Mftg	Med	Med	Low	Low	Med	Low	Some buffer required to bio-medical materials production; R&D nature requires specialized workforce
Telecom Equip Mftg	Med	Med	Low	Med	High	Low	Good cargo for quick in/out delivery; backup generators usually required
Health Services	Med	Med	Low	Med	High	Low	Regionally serving institutions require good air service
Warehouse and Distribution	Med	Low	Low	Low	Low	High	Need large land tracts removed from residential and commercial areas; good roadways in/out of region; proximity to large end-user market
Call Centers	Low	Low	Low	High	Low	Low	Highly flexible in facility configuration; primary needs are high load telecom and low-wage labor
Back office / shared services	Low	Low	Low	Med	Low	Low	Remote, low cost environment with good telecom to connect to regional offices & HQ
Financial Services	Low	Low	Low	Med	Med	Low	Similar to back office operations; often requires specialized workforce and some air service to major markets
Communications Services	Low	Med	Low	Med / High	Med	Low	Telecom service providers offering nationwide service require strong telecom / air service links to major markets