BREAKBULK NEXTWAVE EDUCATION DAY

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SAN JACINTO COLLEGE

BACHELOR OF APPLIED TECHNOLOGY - LOGISTICS & SUPPLY CHAIN MANAGEMENT

WHERE DIGITAL MEETS PHYSICAL

THE INFRASTRUCTURE POWERING DATA CENTERS

Data centers are essential infrastructure for the modern digital economy, especially as AI and cloud technology continue to grow.

METHODOLOGY | Secondary-source review of U.S. Department of Energy, Lawrence Berkeley National Laboratory, World Resources Institute, ERCOT records, and U.S. News.

INTRODUCTION + OBJECTIVE

WHAT THEY DO

DEFINITION

A data center is a specialized facility that stores, processes, and transfers large amounts of digital data.

WHAT'S INSIDE

Servers, storage systems, networking equipment, cooling systems, and backup power.

OBJECTIVE

Examine how rapid data-center growth affects electricity, water, land, and local communities.

(Szczerba, 2026; U.S. Department of Energy, n.d.)

FINDINGS: THE GOOD

VALUE + JOBS

DIGITAL SUPPORT

Data centers provide the physical computing infrastructure that supports cloud services, artificial intelligence, communications, scientific research, and other essential digital services.

WESTERN KENTUCKY PROJECT

$100+ BILLION

Private investment

8,000 construction jobs

600 permanent jobs

Western Kentucky data center and energy infrastructure project

(U.S. Department of Energy, 2026)

438,595 MW

Total power capacity requested by large projects in Texas

Texas could surpass Virginia as the world's largest data center market by 2030.
(Foxhall et al., 2026)

FINDINGS: THE BAD

SUSTAINABILITY

ENERGY DEMAND

4.4% → 11.8%

U.S. electricity consumption by data centers
2023 → 2030 (projected)
Could lead to scarcer power and higher

176 TWh

U.S. data center electricity use in 2023

Industry view: infrastructure has to be ready before demand arrives — a challenge that will only grow with AI.
— C. Peña, personal communication, September 10, 2026

WATER & COOLING

One DOE scenario: cooling tower cycles of concentration rising from 3 to 6 saves:

20% less makeup water

50% less blowdown water

(Smith et al., 2026; U.S. Department of Energy, 2019)

DISCUSSION: THE UGLY

GRID + COMMUNITY

GRID RELIABILITY

Advocates fear rising bills and grid strain will hurt Texans' quality of life.

WATER

3%–9%

of Texas' total water use by 2040—up from less than 1% today

COMMUNITIES

Construction traffic, noise, and land conversion — sites average 224 acres, some over 1,000 — strain local environments and quality of life.

Environmental cost: data centers caused an estimated $25 billion in U.S. environmental and public-health damage in 2025.
(Foxhall et al., 2026; Walker & Goldsmith, 2026; U.S. News, 2026)

CONCLUSION **Data center growth is outpacing available power supply, raising costs and straining the grid, while resource use and construction threaten communities' quality of life and the environment. Balancing that growth will take real leadership from regulators, utilities, and industry.**

REFERENCES

TEAM BIOS

Where Digital Meets Physical: The Infrastructure Powering Data Centers

Venus Turner • Axel Cruz • Heather A. Guajardo
Faculty Advisor: Margaret Kidd
San Jacinto College
Global Capital Projects • Breakbulk Americas 2026

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