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CONSTRUCTION ENGINEERING & INFRASTRUCTURE

Data Centres – Contracts, Design and Insurance

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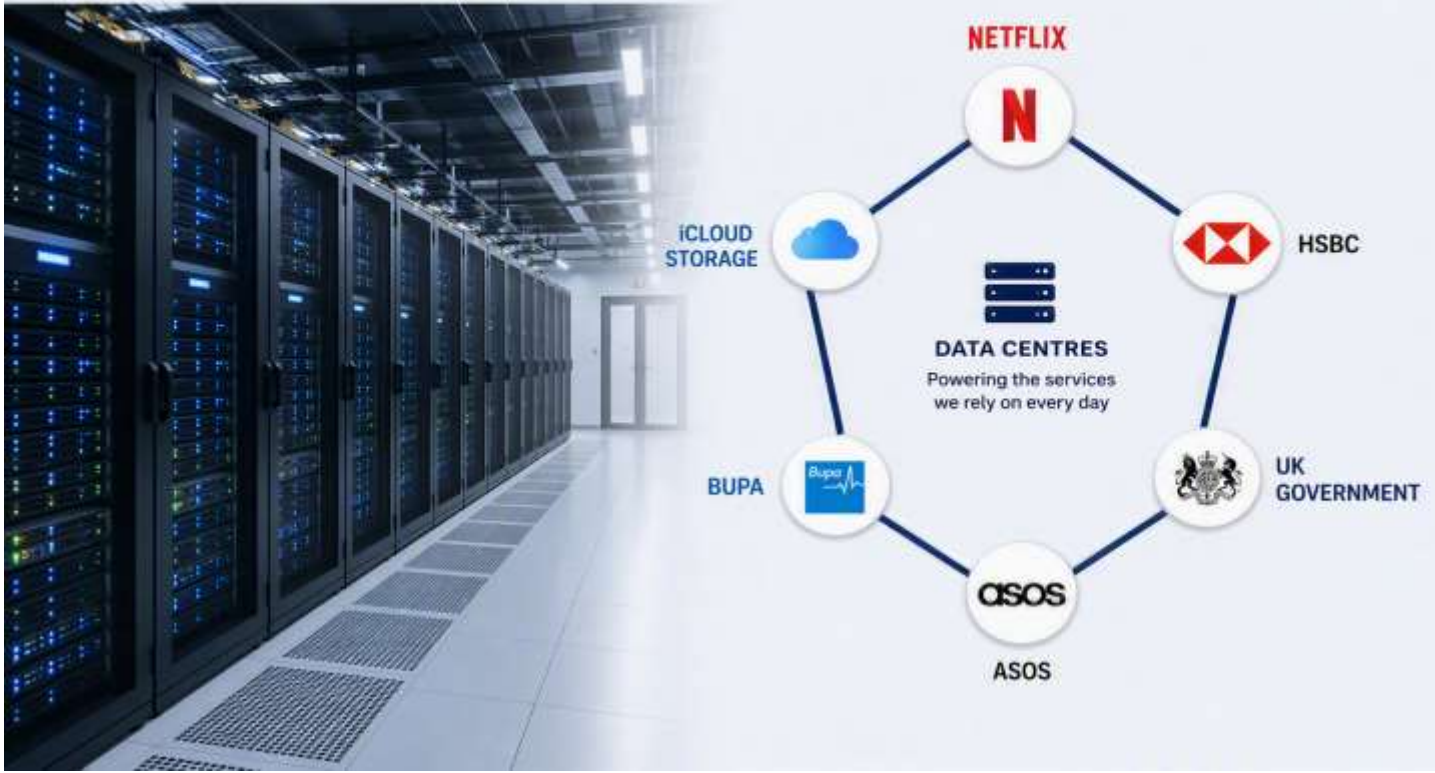
Agenda

- Why data centres matter
- How they work
- Project ecosystem
- Contracts & risk transfer
- Failure modes
- Claims scenarios
- Insurance challenges
- Conclusions

What actually is a data centre?



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Project PIF

Project Facts

- £500m construction value
- 100MW facility
- Multiple data halls
- 99.999% availability target
- Thousands of customers dependent on continuous
- operation

Throughout this presentation we will follow Project PIF and ask:

- How is it designed?
- Who designs it?
- What contracts are used?
- What can go wrong?
- Who gets sued?
- Which insurance responds?

From concept design to a major professional indemnity claim.

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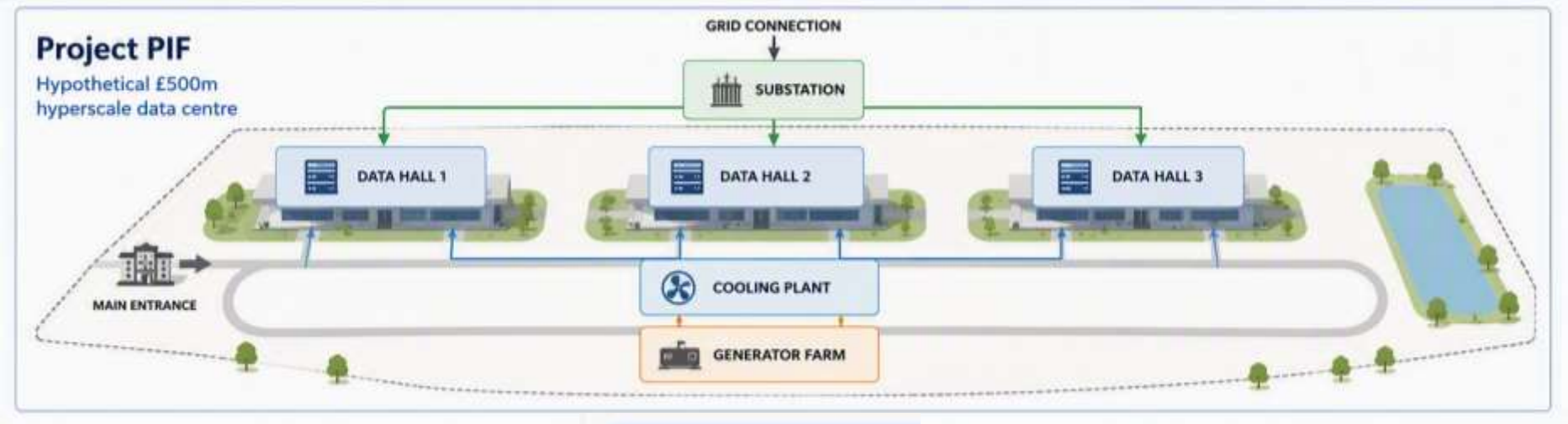

PROJECT FACTS

- £500m construction value
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- 99.999% availability target
- Thousands of organisations dependent on continuous operation

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Why Data Centres Matter

The world runs on data centres - the internet does not float in a cloud but sits securely in data centres.

- AI and cloud computing are driving unprecedented demand
- Billions are being invested in data centre infrastructure across the globe
- Data centres have evolved from specialist buildings to critical national infrastructure
- A single failure can affect thousands of customers simultaneously
- Professional liability exposure is increasing in both scale and complexity

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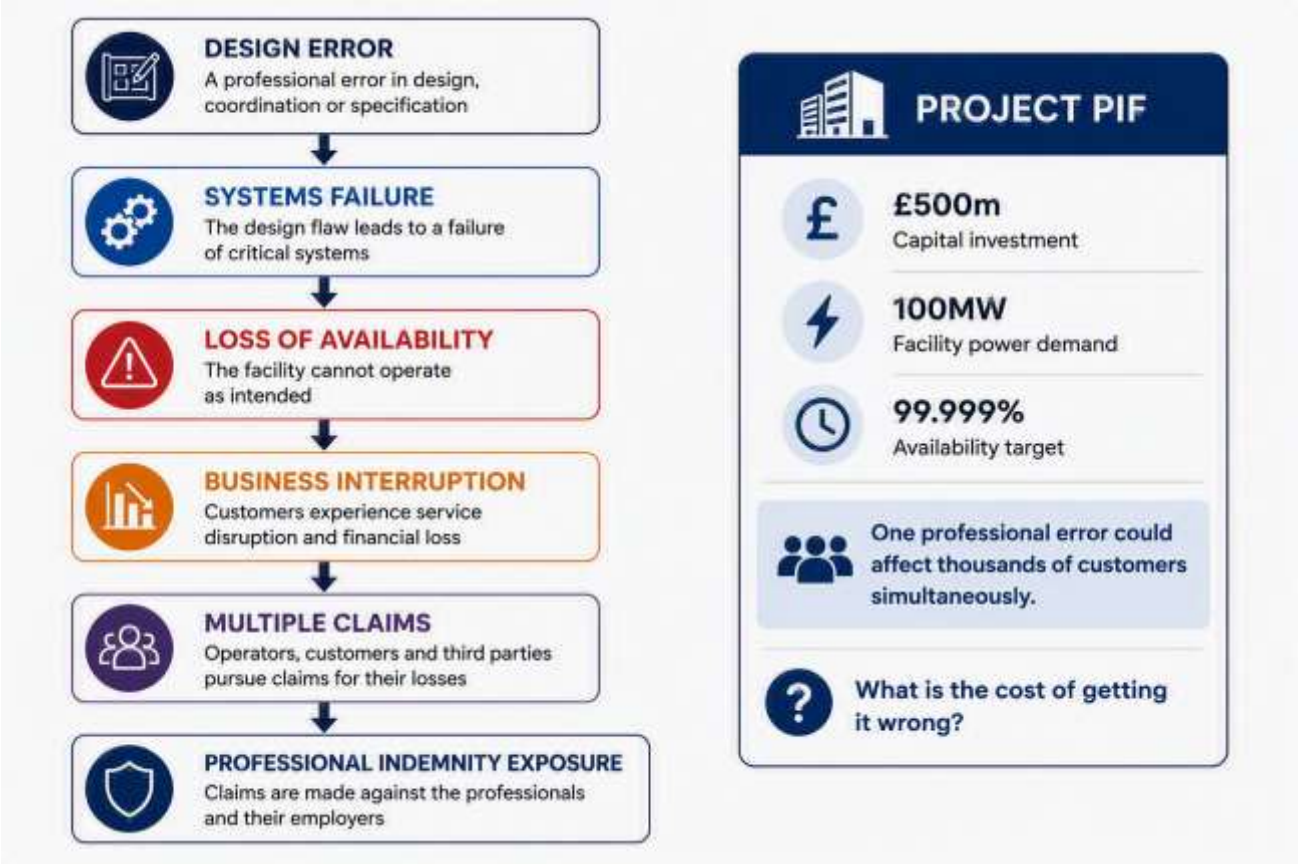
Why Insurers Should Care



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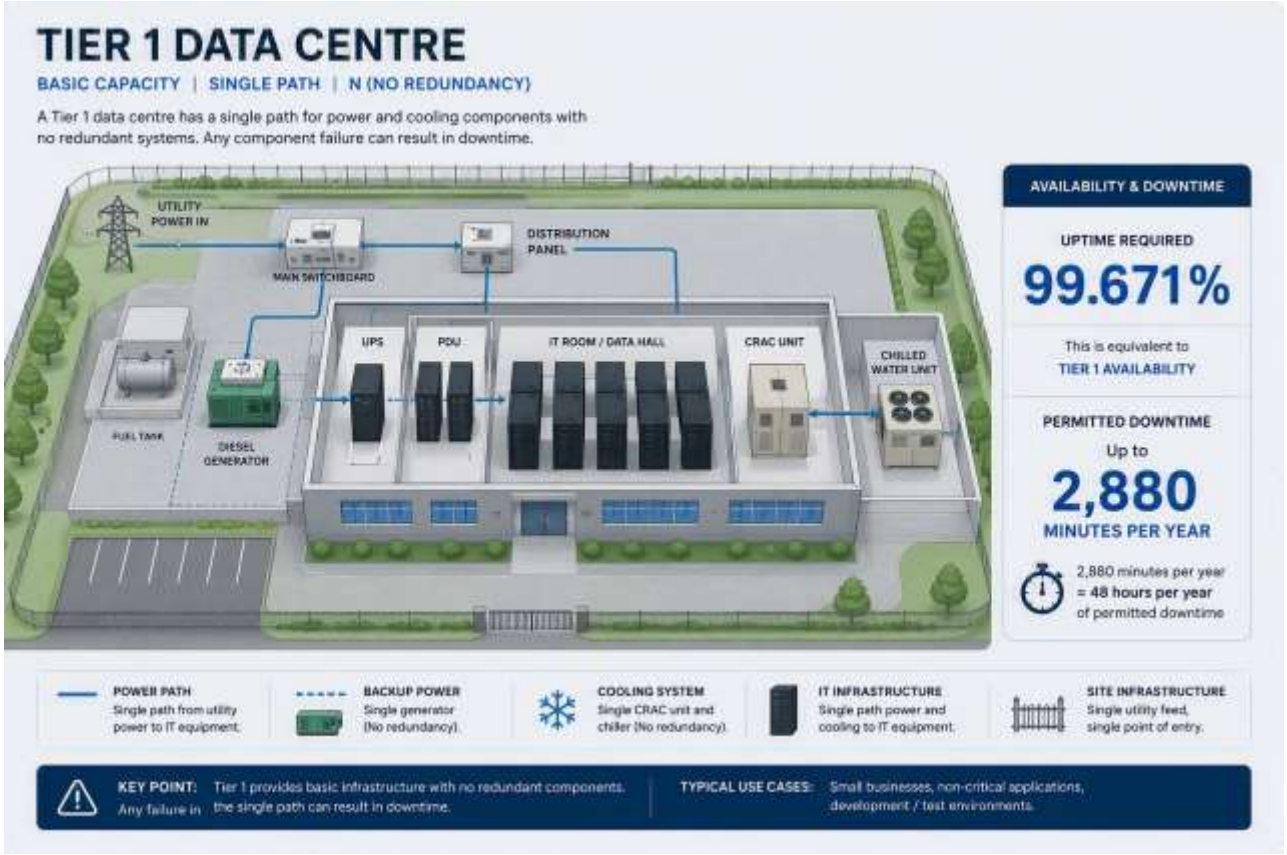
How Data Centres Actually Work

A data centre has one job: keep the servers running.

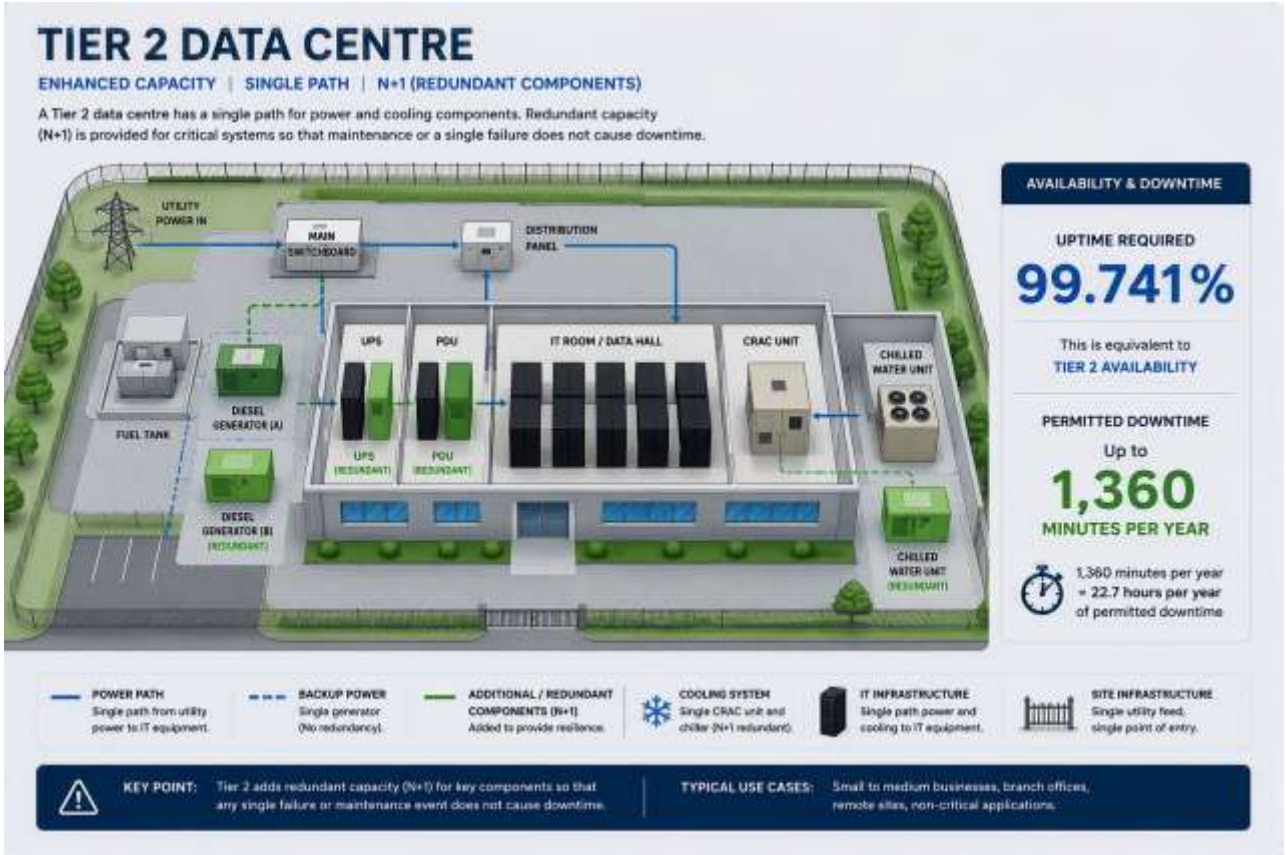
Six critical systems support continuous operation:

- ⚡ Power
- ❄ Cooling
- 🏗 Structure
- 🌐 Connectivity
- 🔥 Fire Protection
- 🔒 Security

Tier I


TIER 1 DATA CENTRE
BASIC CAPACITY | SINGLE PATH | N (NO REDUNDANCY)
A Tier 1 data centre has a single path for power and cooling components with no redundant systems. Any component failure can result in downtime.
UTILITY POWER IN
MAIN SWITCHBOARD
DISTRIBUTION PANEL
UPS
PDU
IT ROOM / DATA HALL
CRAC UNIT
CHILLED WATER UNIT
FUEL TANK
DIESEL GENERATOR
AVAILABILITY & DOWNTIME
UPTIME REQUIRED
99.671%
This is equivalent to
TIER 1 AVAILABILITY
PERMITTED DOWNTIME
Up to
2,880
MINUTES PER YEAR
2,880 minutes per year = 48 hours per year of permitted downtime
POWER PATH
Single path from utility power to IT equipment.
BACKUP POWER
Single generator (No redundancy).
COOLING SYSTEM
Single CRAC unit and chiller (No redundancy).
IT INFRASTRUCTURE
Single path power and cooling to IT equipment.
SITE INFRASTRUCTURE
Single utility feed, single point of entry.
KEY POINT: Tier 1 provides basic infrastructure with no redundant components. Any failure in the single path can result in downtime.
TYPICAL USE CASES: Small businesses, non-critical applications, development / test environments.

Tier II


TIER 2 DATA CENTRE
ENHANCED CAPACITY | SINGLE PATH | N+1 (REDUNDANT COMPONENTS)
A Tier 2 data centre has a single path for power and cooling components. Redundant capacity (N+1) is provided for critical systems so that maintenance or a single failure does not cause downtime.
UTILITY POWER IN
MAIN SWITCHBOARD
DISTRIBUTION PANEL
UPS
PDU
IT ROOM / DATA HALL
CRAC UNIT
CHILLED WATER UNIT
FUEL TANK
DIESEL GENERATOR (A)
DIESEL GENERATOR (B) (REDUNDANT)
UPS (REDUNDANT)
PDU (REDUNDANT)
CHILLED WATER UNIT (REDUNDANT)
AVAILABILITY & DOWNTIME
UPTIME REQUIRED
99.741%
This is equivalent to
TIER 2 AVAILABILITY
PERMITTED DOWNTIME
Up to
1,360
MINUTES PER YEAR
1,360 minutes per year = 22.7 hours per year of permitted downtime
POWER PATH
Single path from utility power to IT equipment.
BACKUP POWER
Single generator (No redundancy).
ADDITIONAL / REDUNDANT COMPONENTS (N+1)
Added to provide resilience.
COOLING SYSTEM
Single CRAC unit and chiller (N+1 redundant).
IT INFRASTRUCTURE
Single path power and cooling to IT equipment.
SITE INFRASTRUCTURE
Single utility feed, single point of entry.
KEY POINT:
Tier 2 adds redundant capacity (N+1) for key components so that any single failure or maintenance event does not cause downtime.
TYPICAL USE CASES:
Small to medium businesses, branch offices, remote sites, non-critical applications.

Tier III


TIER 3 DATA CENTRE
CONCURRENTLY MAINTAINABLE | DUAL PATH | N+1
A Tier 3 data centre provides multiple independent distribution paths serving IT equipment.
Any capacity component can be removed from service for maintenance without impacting operations.
UTILITY POWER IN (A)
UTILITY POWER IN (B)
MAIN SWITCHBOARD (A)
MAIN SWITCHBOARD (B)
DISTRIBUTION PANEL (A)
DISTRIBUTION PANEL (B)
UPS (A) (N+1)
PDU (A) (N+1)
IT ROOM / DATA HALL
CRAC UNIT (N+1)
CHILLED WATER UNIT (N+1)
FUEL TANK
DIESEL GENERATOR (A) (N+1)
DIESEL GENERATOR (B) (N+1)
UPS (B) (N+1)
PDU (B) (N+1)
CHILLED WATER UNIT (N+1)
AVAILABILITY & DOWNTIME
UPTIME REQUIRED
99.982%
This is equivalent to
TIER 3 AVAILABILITY
PERMITTED DOWNTIME
Up to
95
MINUTES PER YEAR
95 minutes per year = 1.6 hours per year of permitted downtime
POWER PATH (A)
Primary path from utility power to IT equipment.
POWER PATH (B)
Independent path from utility power to IT equipment.
ADDITIONAL / REDUNDANT COMPONENTS (N+1)
Added to provide resilience.
COOLING SYSTEM
Redundant cooling distribution path (N+1).
IT INFRASTRUCTURE
Single path power and cooling to IT equipment.
SITE INFRASTRUCTURE
Single utility feed, single point of entry.
KEY POINT:
Tier 3 introduces dual distribution paths so maintenance can be performed on infrastructure without disrupting IT operations.
TYPICAL USE CASES:
Large enterprises, financial services, healthcare, colocation facilities, critical applications.

Tier IV


TIER 4 DATA CENTRE
FAULT TOLERANT | DUAL PATH | 2N (NO SINGLE POINT OF FAILURE)
A Tier 4 data centre provides completely independent and redundant infrastructure (2N) across all systems.
Any component can fail without impacting operations. Maintenance can be performed without any interruption.
UTILITY POWER IN (A)
UTILITY POWER IN (B)
MAIN SWITCHBOARD (A)
MAIN SWITCHBOARD (B)
DISTRIBUTION PANEL (A)
DISTRIBUTION PANEL (B)
UPS (A) (2N)
PDU (A) (2N)
IT ROOM / DATA HALL
CRAC UNITS (A) (2N)
CHILLED WATER UNITS (A) (2N)
FUEL TANKS (2N)
DIESEL GENERATORS (A) (2N)
CRAC UNITS (B) (2N)
CHILLED WATER UNITS (B) (2N)
DIESEL GENERATORS (B) (2N)
UPS (B) (2N)
PDU (B) (2N)
CHILLED WATER STORAGE / BUFFER (2N)
AVAILABILITY & DOWNTIME
UPTIME REQUIRED
99.995%
This is equivalent to
TIER 4 AVAILABILITY
PERMITTED DOWNTIME
Up to
26
MINUTES PER YEAR
26 minutes per year = 0.43 hours per year of permitted downtime
POWER PATH (A)
Independent path from utility power to IT equipment.
POWER PATH (B)
Independent path from utility power to IT equipment.
ADDITIONAL / REDUNDANT COMPONENTS (2N)
Fully redundant (2N) capacity with no single point of failure.
COOLING SYSTEM
Independent cooling distribution paths (2N).
IT INFRASTRUCTURE
Dual path power and cooling to IT equipment.
SITE INFRASTRUCTURE
Single utility feeds, single point of entry.
KEY POINT:
Tier 4 has no single points of failure with fully independent distribution and 2N capacity across all systems. Operations continue even with any component failure.
TYPICAL USE CASES:
Mission-critical enterprises, financial trading platforms, data centres for Tier 1 cloud providers, national infrastructure, defence, and ransomware resilient environments.

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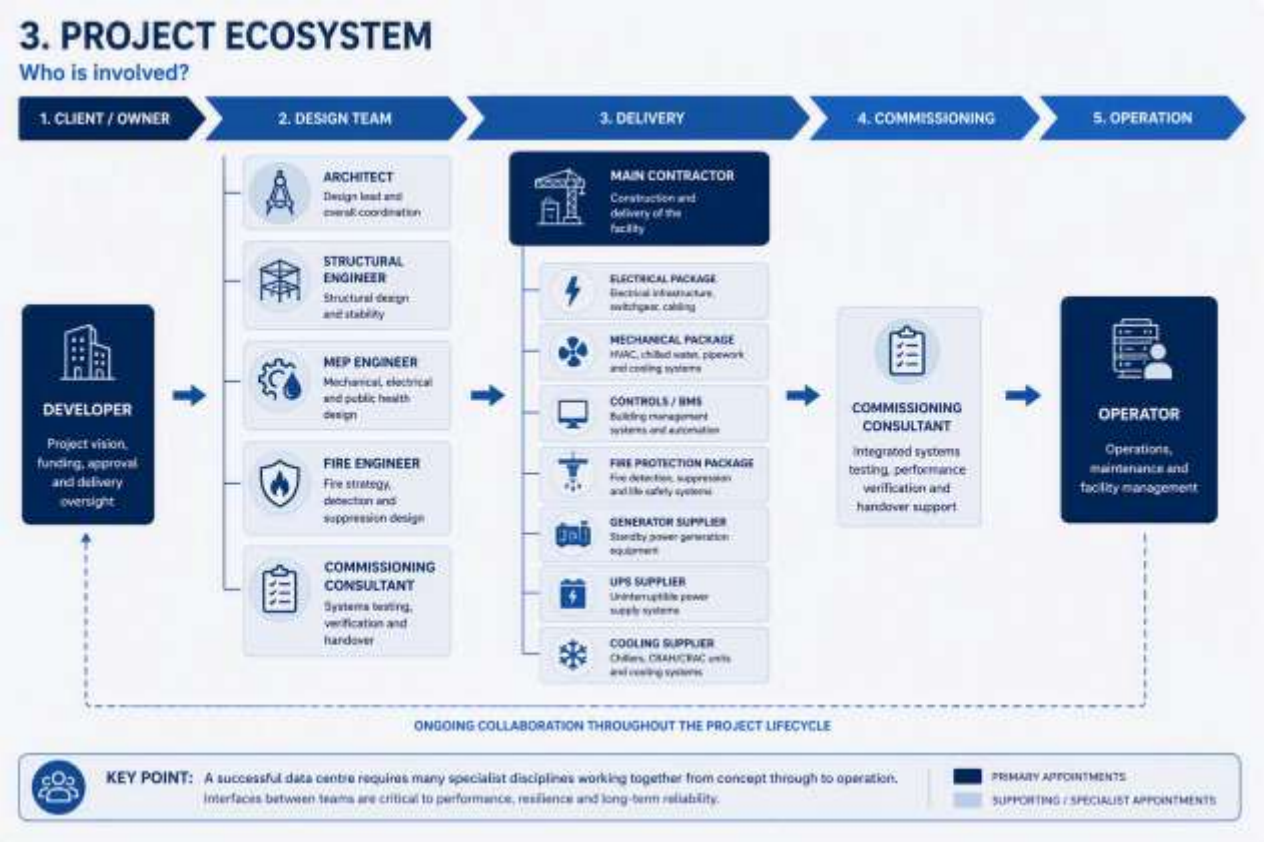
Project Ecosystem



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Responsibility Map

Data centre projects involve:

- Multiple contracts
- Multiple consultants
- Numerous interfaces
- Shared responsibilities

Most major claims arise at the interfaces between disciplines.

Project PIF

Power, cooling, fire protection and controls must operate as a single integrated system. The risk is not the individual components. The risk is the integration.

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Risk Allocation & Liability

Key issues:

- Skill and Care or Fitness for Purpose?
- Who carries Design Responsibility?
- Has Responsibility Been Novated?
- Is there a Duty to Warn?
- Are There Liability Caps?

Contracts are often central to claims outcomes.

Project PIF
A 30-minute outage may be caused by an engineering failure.
The size of the claim may be determined by the contract.

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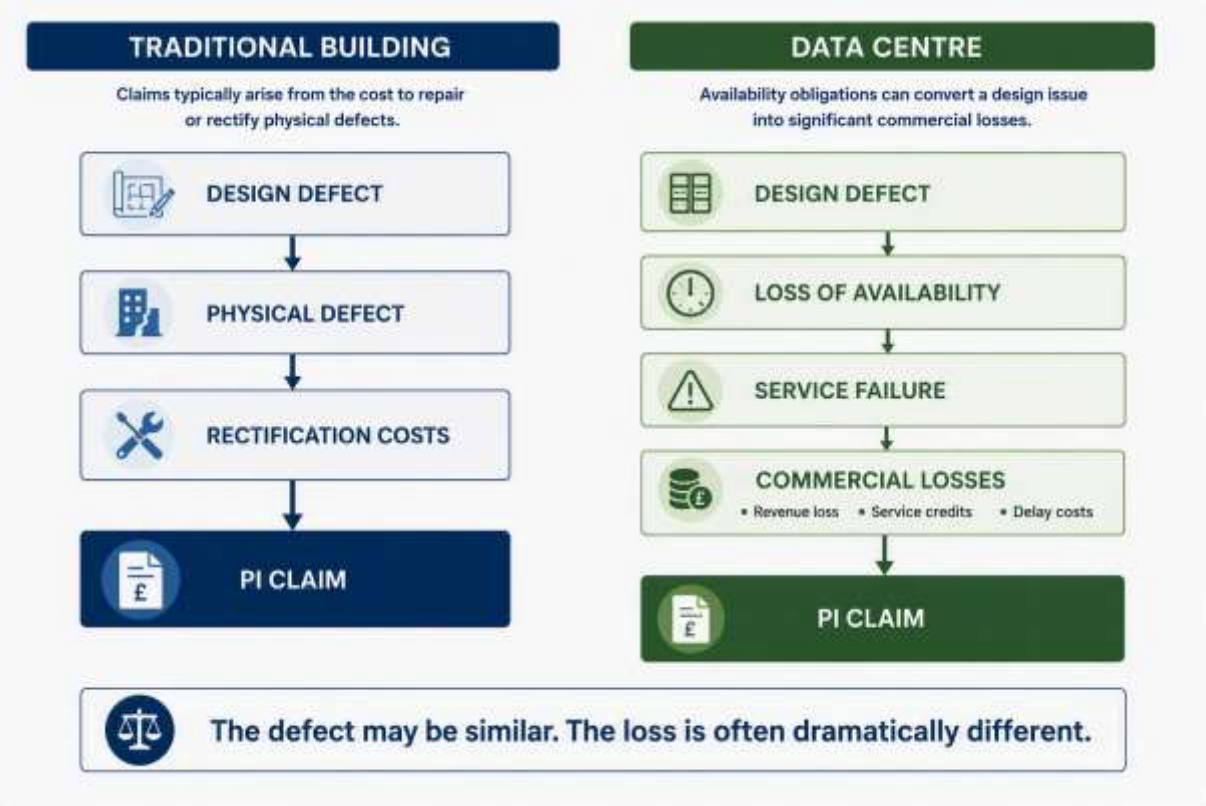
Data Centre Specific Issues



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What Goes Wrong?

Five common sources of failure:

- Electrical failures
- Cooling failures
- Fire protection failures
- Structural failures
- Commissioning failures

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Commissioning Risks

Many significant losses occur before normal operation.

Examples:

- Incorrect sequencing
- Testing failures
- Incomplete commissioning
- Incorrect assumptions
- Change management failures

Commissioning is often where large claims begin.

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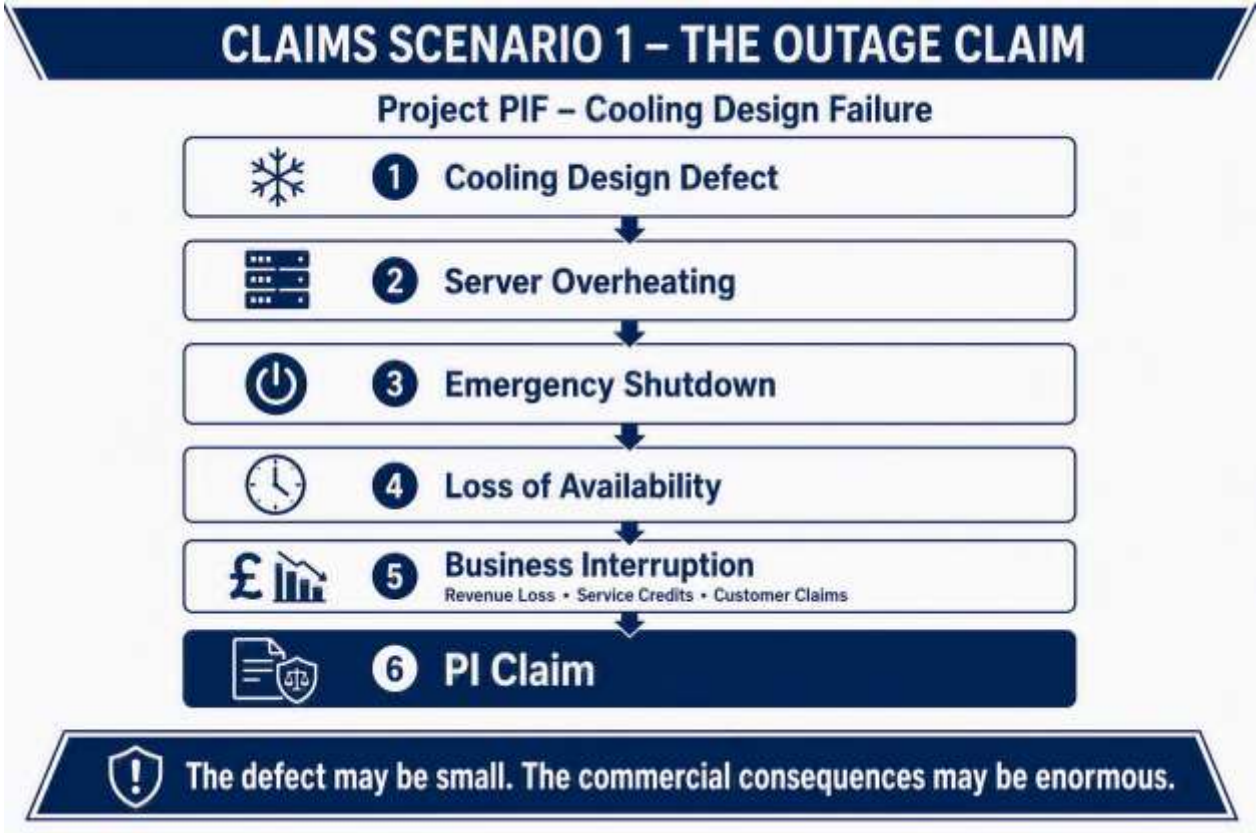
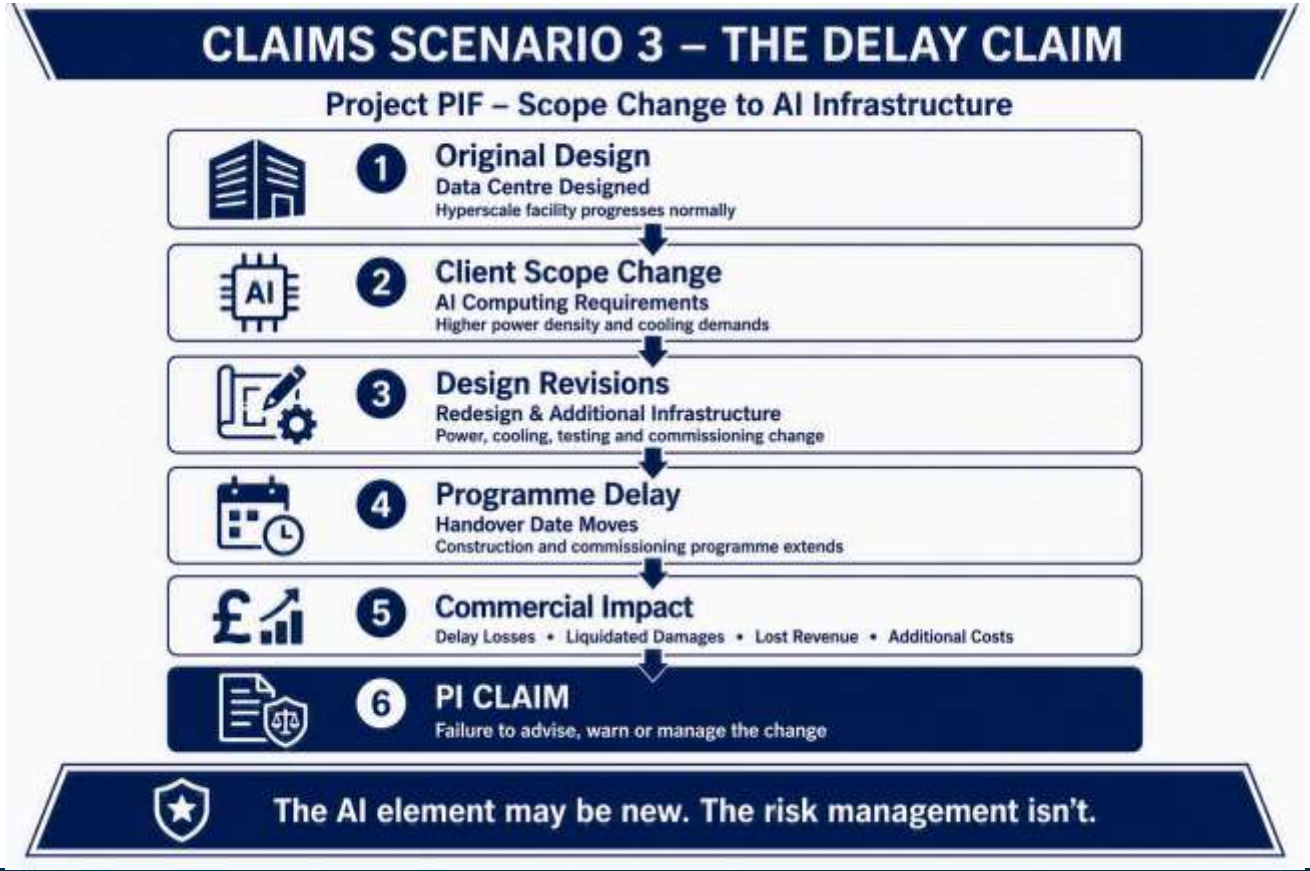
Claims Scenario 1 – The Outage Claim

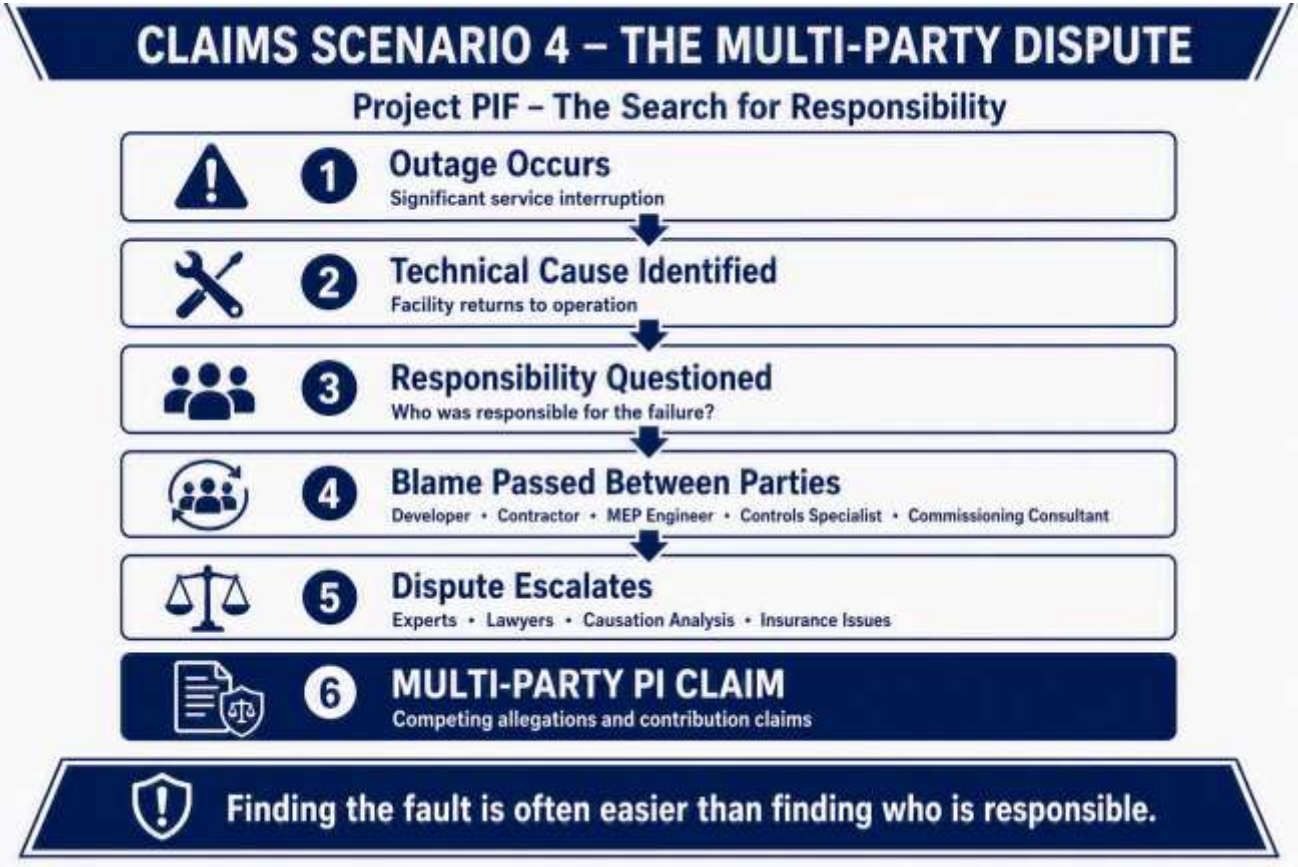


Claims Scenario 2 – The Performance Claim

Claims Scenario 3 – The Delay Claim



Claims Scenario 4 – The Multi-Party Dispute



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Heads of Loss – Case Study

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Insurance Challenges

Key concerns:

- Aggregation risk
- Concentration of users
- Systemic exposure
- Broker challenge
- AI infrastructure

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Emerging Risks – The Next Constraint: Water

Data centres face many ‘red tape’ issues which affect their construction. These include:

- Power consumption, subsequent grid demands
- Water consumption and cooling requirements
- Noise and light pollution, and subsequent impact on wildlife
- Biodiversity and habitat loss
- Emissions from backup generators

Historically, the primary concern has been power consumption.

Increasingly it may be water.

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Why Water Matters

Water Is Required Throughout The Lifecycle

- Construction
- Cooling Systems
- Operational Use
- Electricity Generation

Cooling Technologies

- Air Cooling
- Direct-to-Chip Liquid Cooling
- Immersion Cooling
- Hybrid Cooling Solutions

As power densities increase, cooling strategies become more important and design assumptions relating to water availability become increasingly significant.

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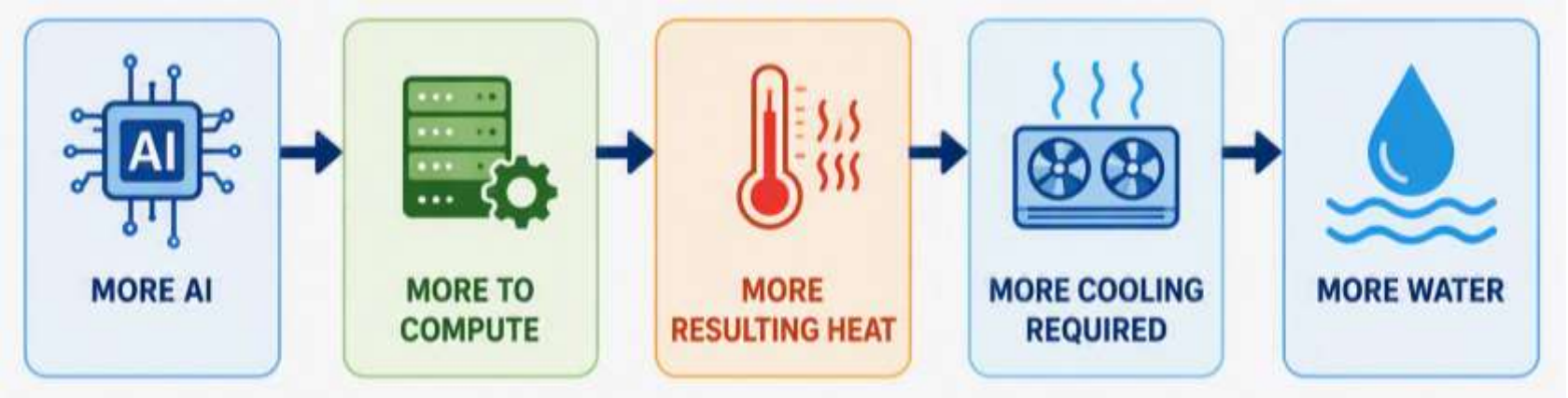
Why AI Changes the Equation



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From Engineering Constraint to Public Policy Issue

Data centres are no longer only facing engineering scrutiny – they are facing environmental and social scrutiny

- Several examples of data centres in the United States being resisted by residents
    - Washington Township, Macomb County, Michigan
- Similar instances in the United Kingdom
    - Brick Lane, East London

Water is no longer simply a design issue. It is becoming a planning, political and regulatory issue.

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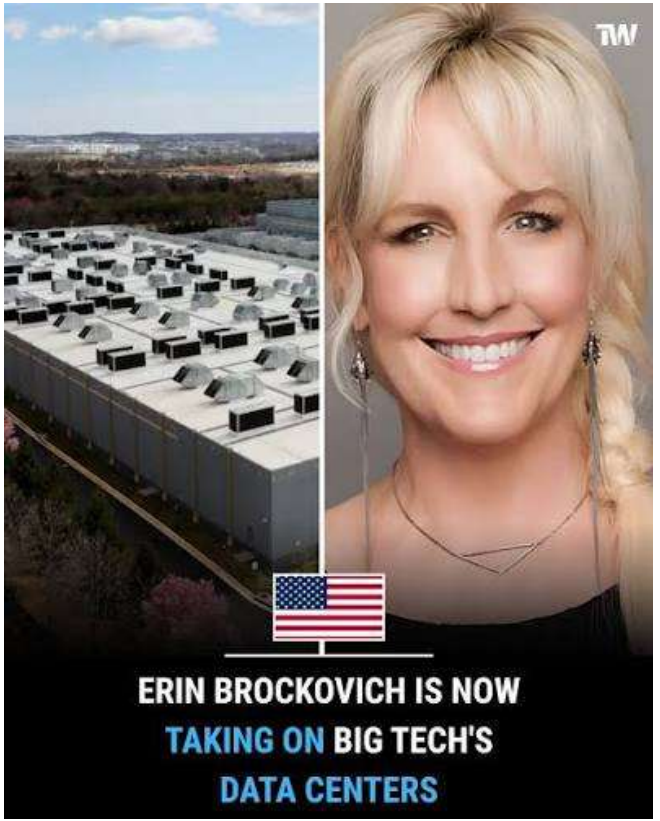
Erin Brockovich and Community Opposition



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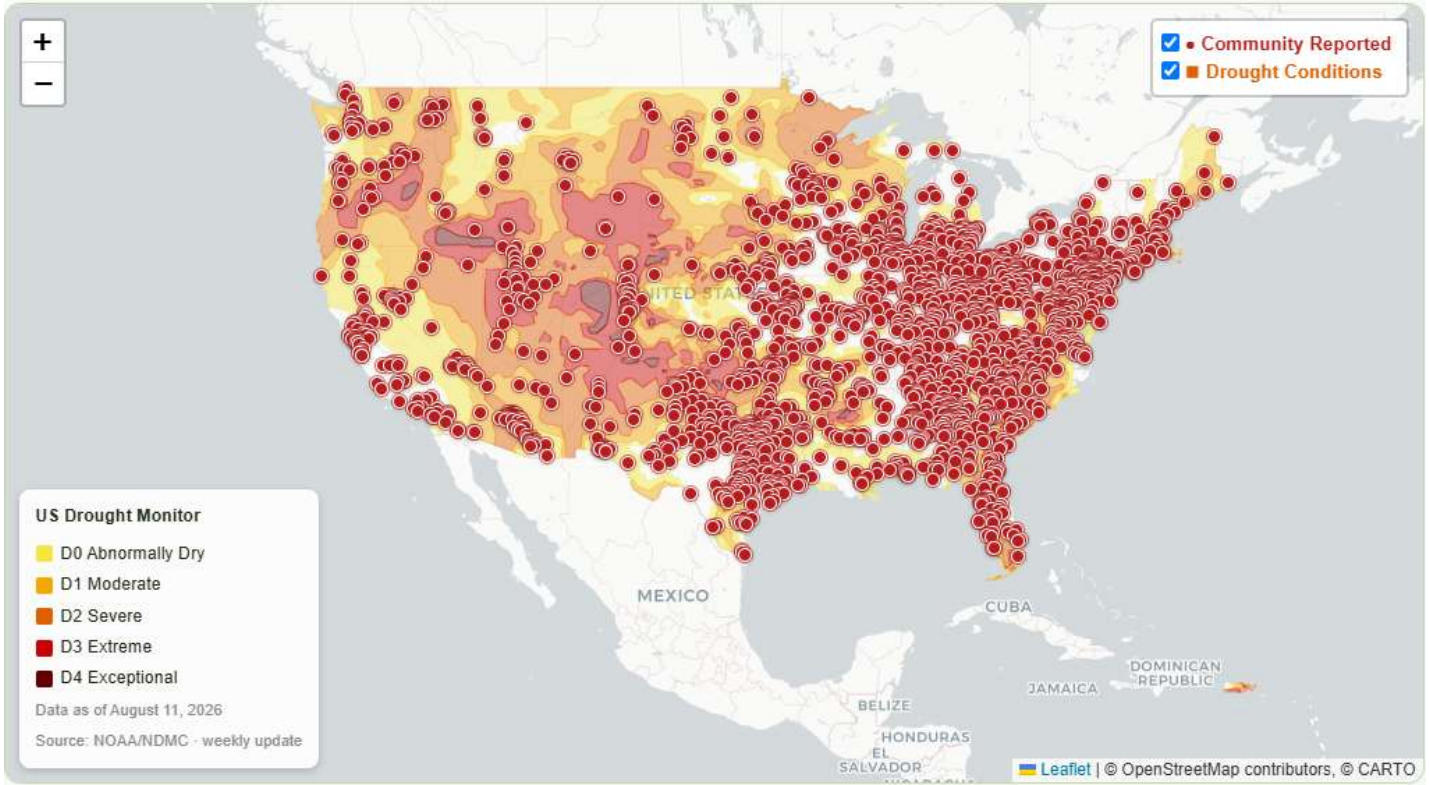
Erin Brockovich and Community Opposition



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5 Key Messages

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Q&A

Get in touch

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