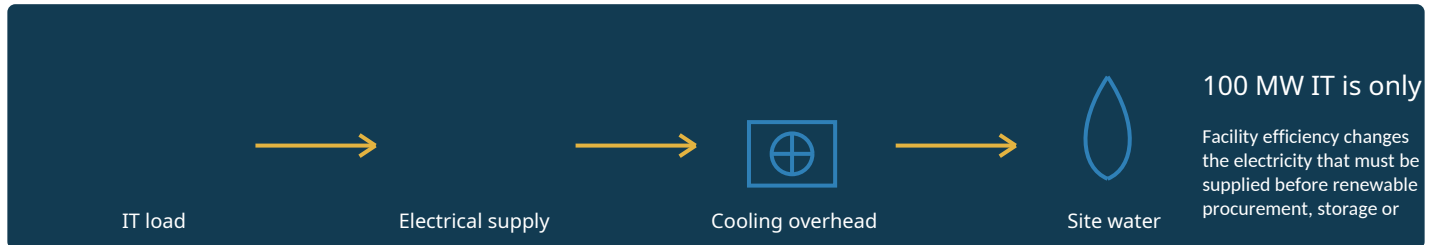


## 1.0 FACILITY ELECTRICITY

# The real cost of India's data-centre boom

Power, water and infrastructure decisions for a representative 100 MW IT facility.



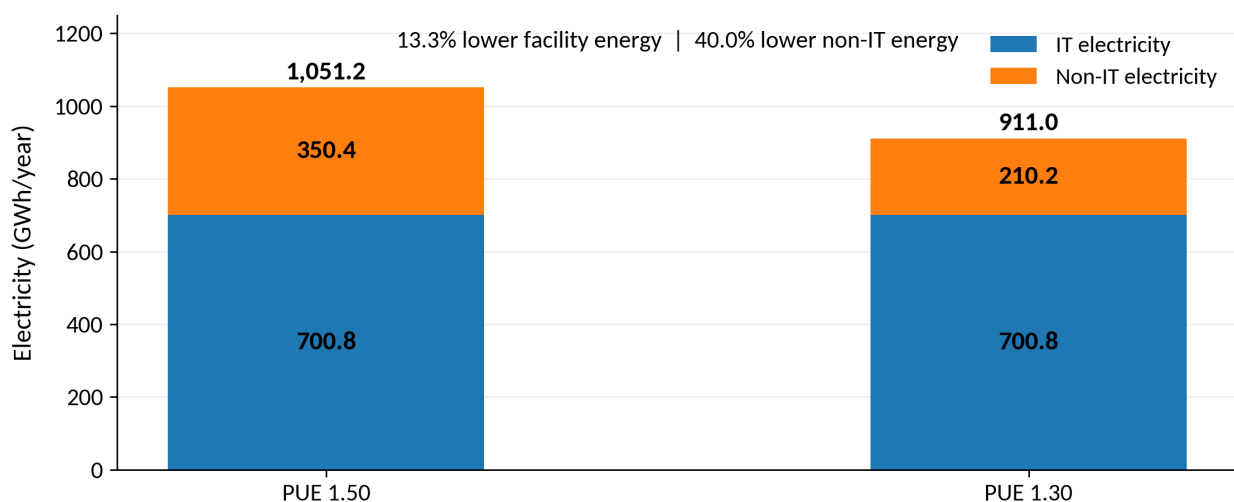
A 100 MW IT facility does not draw 100 MW continuously, nor does all electricity entering the site reach the IT equipment. In our reference case, an 80% average IT electrical load factor produces 80 MW of average IT demand. At PUE 1.30, total facility demand reaches 104 MW, or 911.04 GWh a year.

Our analysis separates four decisions: facility overhead, cooling and water, renewable energy shifted through storage, and the financial consequences of connection timing and external infrastructure. These decisions interact, but their benefits and costs should not be counted interchangeably.

|                                        |                                      |                              |                                      |
|----------------------------------------|--------------------------------------|------------------------------|--------------------------------------|
| <b>100 MW</b><br>Installed IT capacity | <b>80%</b><br>Average IT load factor | <b>1.30</b><br>Reference PUE | <b>15 years</b><br>Financial horizon |
|----------------------------------------|--------------------------------------|------------------------------|--------------------------------------|

FIGURE 01 Same IT electricity, less facility overhead

## Same IT load, less facility overhead



140.16 GWh/year saved, or ₹98.11 crore/year at the retained ₹7/kWh assumption. Constant-PUE illustration; not the heatwave-weighted cooling comparison.

Firstgreen analysis • Source: 02\_Inputs; 13\_Graph\_Data

140.16 GWh/year saved is worth ₹98.11 crore/year at the retained ₹7/kWh assumption. This is 13.3% less facility electricity, or 40.0% less non-IT electricity, before additional investment needed to achieve the lower PUE.

## 2.0 COOLING AND RESOURCE USE

# Cooling is a joint power-and-water decision

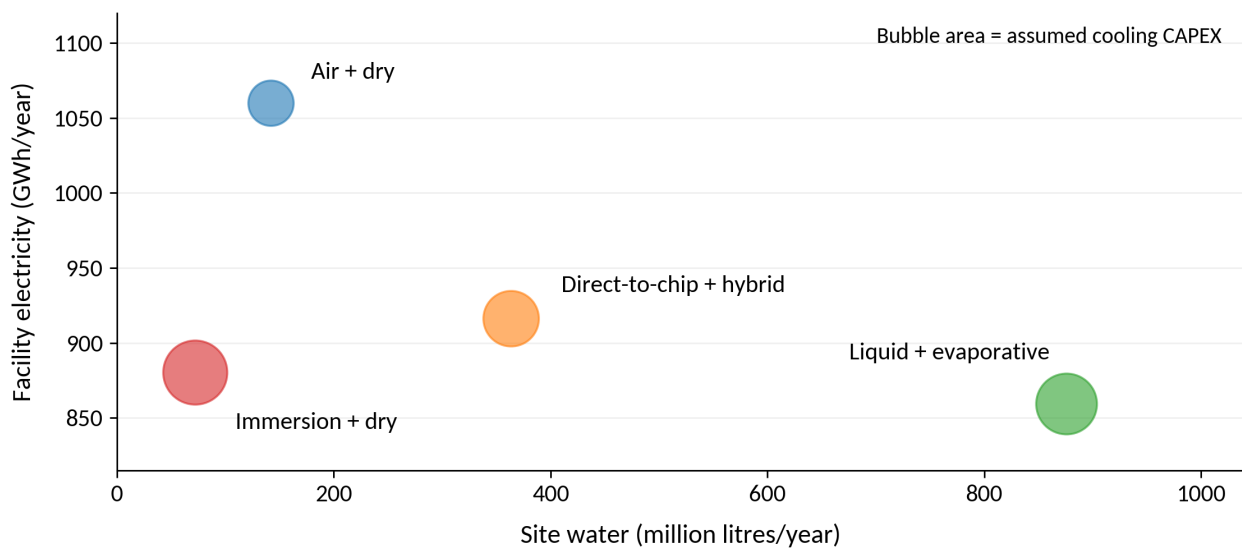
A lower electricity bill does not, by itself, establish the right heat-rejection design.

The four cooling cases produce different combinations of electricity use and site-water demand. Under the retained assumptions, liquid cooling with evaporative heat rejection has the lowest annual electricity requirement, but the highest site-water requirement.

These are assumed configurations, not a technology ranking. Equipment compatibility, maintenance needs and local water security are not established. Water usage effectiveness is expressed in litres per IT kWh; offsite water used to generate electricity is outside this boundary.

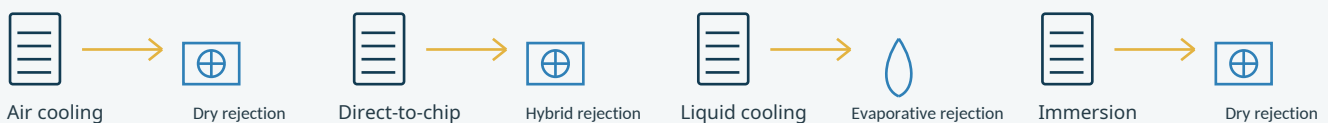
### Cooling electricity and site water move differently

FIG1



Retained cooling assumptions include 45 hot days/year. Bubble CAPEX: ₹100–200 crore.  
Site water only; no technology guarantee, offsite-water estimate or environmental ranking.  
Firstgreen analysis • Source: 03\_Cooling

### CONFIGURATIONS REPRESENTED IN THE ANALYSIS



Annual values include 45 assumed hot days. At constant WUE of 0.5 L/IT-kWh, site water is 0.96 ML/day; that is a separate calculation from the heatwave-weighted cooling cases.

### 3.0 RENEWABLE SUPPLY AND STORAGE

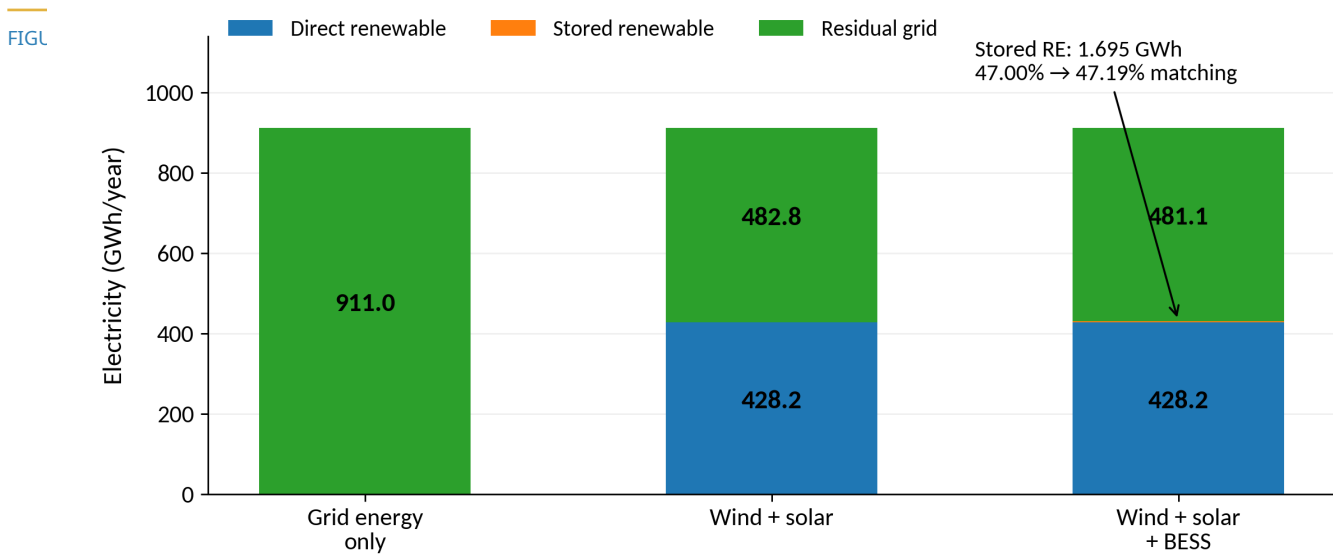
## A battery can shift only the energy available

In this portfolio, limited renewable surplus constrains the contribution from storage.

Wind and solar generate 430.08 GWh/year against facility demand of 911.04 GWh. Most renewable generation is used when it is produced. Only 1.883 GWh/year is surplus to coincident load and available for charging; after storage losses, 1.695 GWh/year returns to the facility.

This finding is specific to the retained synthetic profiles, not a conclusion about all storage projects. A larger battery cannot, by itself, replace a shortage of chargeable renewable energy. The dispatch reconciles opening and closing state of charge.

### Corrected electricity supplied to the facility



Every case serves 911.04 GWh/year. Renewable attribution is not the carbon mix of grid power. Annual-only procurement is excluded: its hourly matching and delivered-cost scope are unassessed.  
Firstgreen analysis • Source: 05\_RepDay\_Dispatch; 06\_Power\_Economics

#### FOLLOW THE ENERGY AVAILABLE TO THE BATTERY

1.883 GWh  
surplus renewable



1.695 GWh  
returned to facility

~0.188 GWh  
storage losses

#### ENERGY ECONOMICS

₹0.85 crore/year

Selected energy saving before fixed ownership costs.

#### ANNUAL PROCUREMENT

Not assessed

Hourly matching and delivered-price scope unassessed.

#### BACKUP POWER

50 MW vs 93.6 MW

Battery cannot supply assumed critical load alone.

#### 4.0 CONNECTION TIMING AND VALUE

## Delay is a cash-flow problem

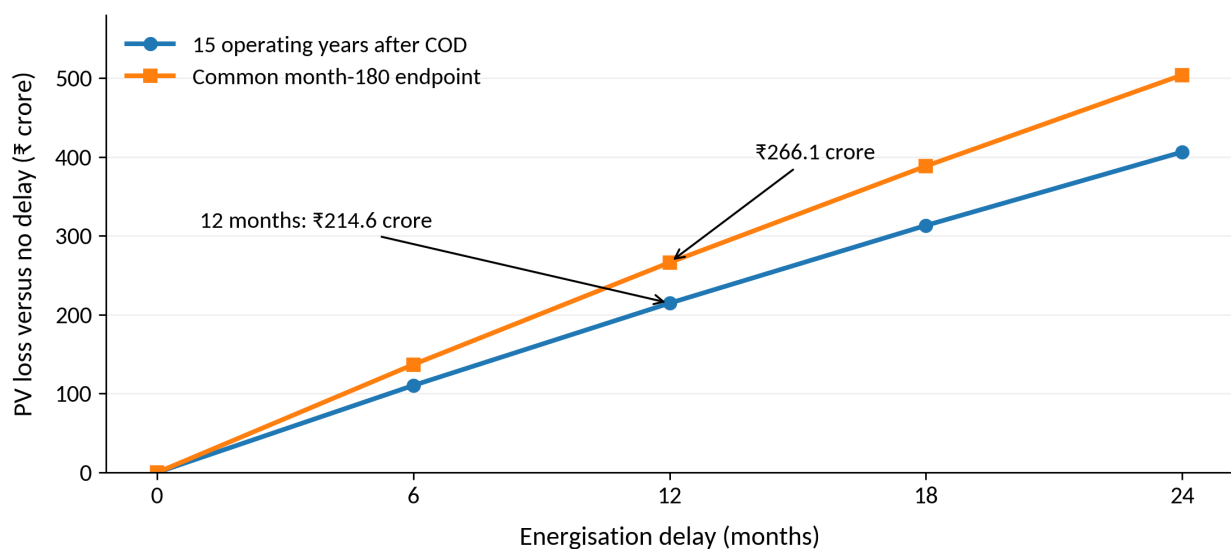
The loss depends on what moves in time - and whether the operating life is preserved.

The delay case assumes ₹2,500 crore of infrastructure investment has already been made. After energisation, live IT capacity ramps through 60 MW, 85 MW and 100 MW. Net operating contribution is assumed at ₹3 crore per live IT MW-year; all cases use monthly cash flows and a 12% discount rate.

A 12-month delay reduces present value by ₹214.6 crore when all 15 operating years move with energisation. With a common month-180 endpoint, the loss is ₹266.1 crore because some operating time is lost rather than merely deferred. These are alternative scenario results.

### The financial effect of delay depends on the endpoint

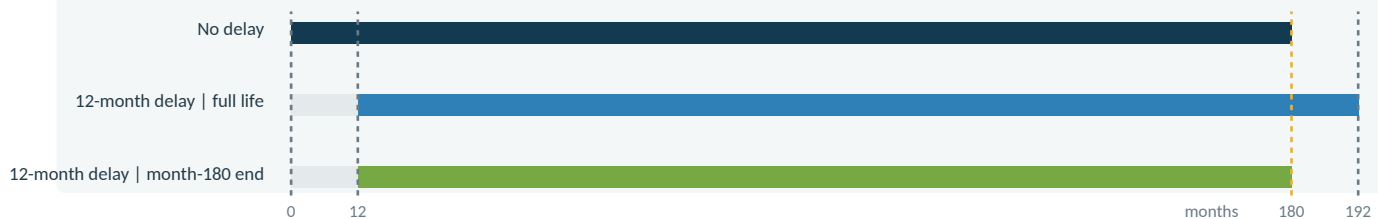
FIGL



Same month-0 capital and 12% discount rate. Net contribution ramps with 60 / 85 / 100 MW live capacity. No duplicate WACC carrying charge. This is a scenario DCF, not a full data-centre project valuation.

Firstgreen analysis • Source: 08\_Delay\_DCF

#### A DELAY CAN SHIFT OPERATING YEARS - OR REMOVE THEM



A positive value indicates deterioration relative to no delay. The analysis is a bounded scenario DCF, not a complete project valuation; no separate carrying penalty is added to the discounted cash flows.

## 5.0 INFRASTRUCTURE AND COST ALLOCATION

# The infrastructure bill needs an owner

Changing the payer does not make the underlying asset requirement disappear.

The illustrative infrastructure pool totals ₹3,100 crore. Allocation changes the payer, not the assets assumed. It establishes no legal recovery right from other consumers. This pool is separate from the ₹2,500 crore facility case used for delay valuation; overlaps must be checked before combining the two.

### WHAT IS BEING FUNDED?

Total ₹3,100 crore



₹800 Cr  
Substation



₹1,200 Cr  
Grid reinforcement



₹600 Cr  
Reliability interface



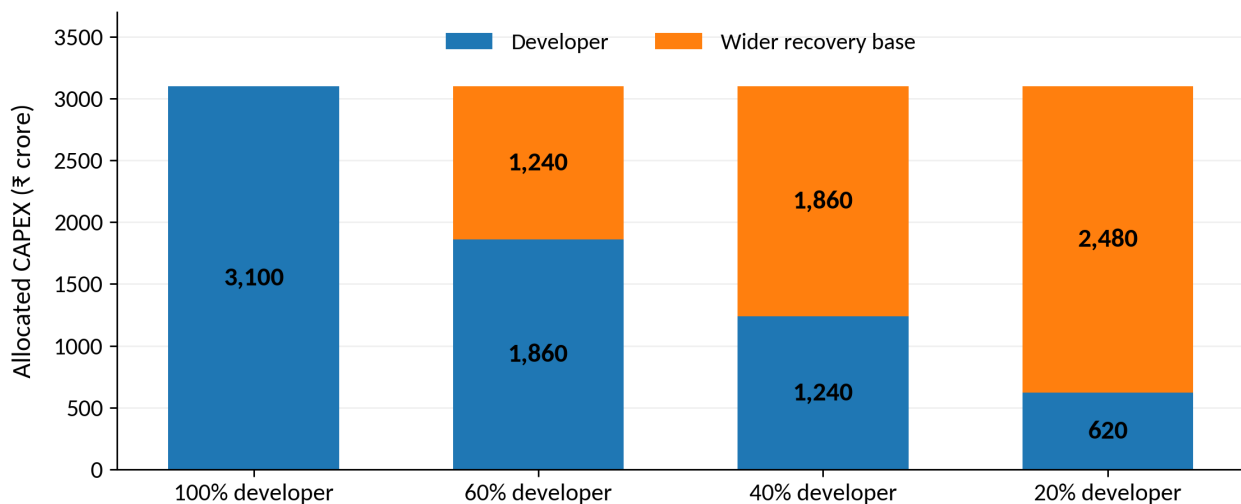
₹300 Cr  
Water infrastructure



₹200 Cr  
Road + fibre

### Changing the payer does not remove the asset cost

FIG1



Every bar totals ₹3,100 crore. The electrical-only capital-recovery proxy is separate from water/common costs. No legal recovery right or notified tariff is established.

Firstgreen analysis • Source: 10\_Infrastructure

| Recovery boundary      | CAPEX ₹ crore | Annual capital-recovery proxy ₹ crore/year |
|------------------------|---------------|--------------------------------------------|
| All five asset groups  | 3,100         | 406.0                                      |
| Electrical assets only | 2,600         | 339.1                                      |
| Water and common works | 500           | 66.9                                       |

At 40% wider recovery and 50,000 GWh/year of billed electricity, the electrical-only equivalent is approximately ₹0.0271/kWh. Water and common works require a separate recovery decision.