

ENERGY DISPATCH FIELD GUIDE · S05

The energy dispatch field guide

One frequency-response activation, followed from the SCADA sample to the signed dispatch and the replay packet.

SCADA AND EMS

BALANCING

EXACT ARITHMETIC

SIGNED DISPATCH



Not a generic AI brochure. One FCR activation with the signal, tariff lane, deterministic computation, operator, target, and replay kept together.

S05

CONTENTS

The dispatch, from frequency sample to signed packet

This field guide stays with one balancing activation at 17:41:32. The SCADA sample, rule lane, reserve calculation, operator, and final packet remain connected.

PRIMARY READERS

energy dispatch field guide domain, operations and assurance teams

READING DEPTH

Sector specialist

DECISION THIS SUPPORTS

An energy working book for control rooms, balancing teams, grid operators, utilities, OT security, market operations, and assurance.

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A frequency dip becomes a dispatch decision

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An alphabetical finder for concepts, controls, products, and decisions.

HOW TO USE IT

Replace the fictional activation with one operator-owned dispatch. The actual grid code, tariff, reserve contract, and safety boundary come from the responsible operator.

SOURCE DISCIPLINE

Dweve-specific facts are taken directly from the English website text audited 2026-07-20; web-navigation wording is humanised for print. Evaluation guidance is editorial, and scenarios and derived visuals are illustrative. Unsupported synthesis is replaced by canonical copy or omitted.

THE FREQUENCY EVENT

At 17:41:32, the number has a consequence

A frequency dip crosses the declared threshold. The control room needs the same answer as the settlement, audit, and engineering teams later.

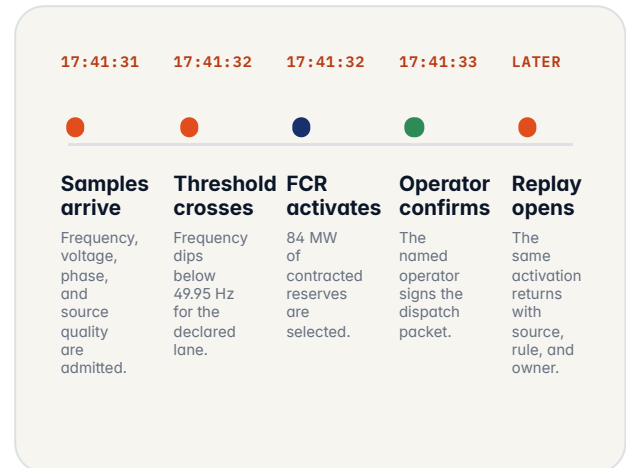
The sample is short, but the accountability chain is long. A 50 ms SCADA trace feeds the balancing lane, the lane version selects the response, deterministic computation produces the activation, contracted reserves move, and the operator confirms the dispatch. The record must make those stages distinct.

The grid does not need a plausible forecast

It needs a declared input, a declared rule, a declared numeric method, a permitted action, an observed target, and a signed packet. Existing forecasting and EMS systems can keep working while the decision layer makes the material state explicit.

DISPATCH TEST

If the same SCADA trace produces a different activation because the machine, release, or tariff version changed, the replay boundary was never defined.

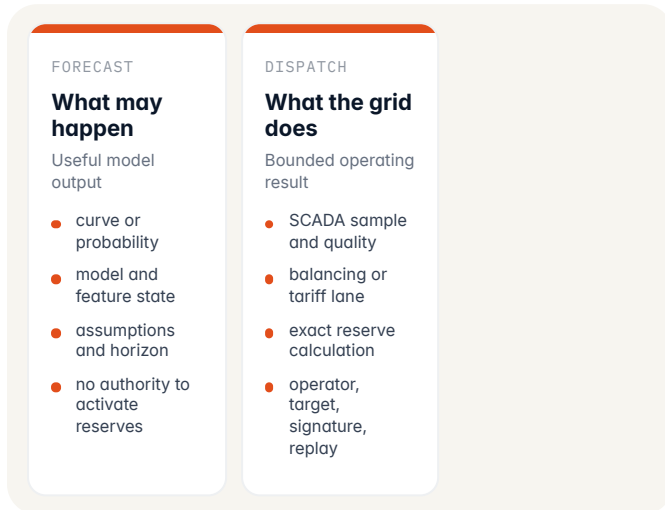


The time series is part of the decision, not merely a chart behind it.

PREDICTION VERSUS OPERATING ACTION

A forecast is not a dispatch

A model may produce a forecast. The balancing action needs a rule lane, exact calculation, authority, and target receipt.



The forecast can remain unchanged while the dispatch becomes accountable.

For the worked activation, the raw model or frequency signal is not the final answer. The dispatch path pins the sample, resolves the FCR rule, computes the contracted reserve response, records any tariff or imbalance lane, and waits for the permitted operator or automatic control authority.

Keep four values separate

- signal: what SCADA measured
- rule: what the balancing lane allowed
- compute: how the reserve amount was derived
- action: who activated it and what the target acknowledged

NO FLOATING EXPLANATION

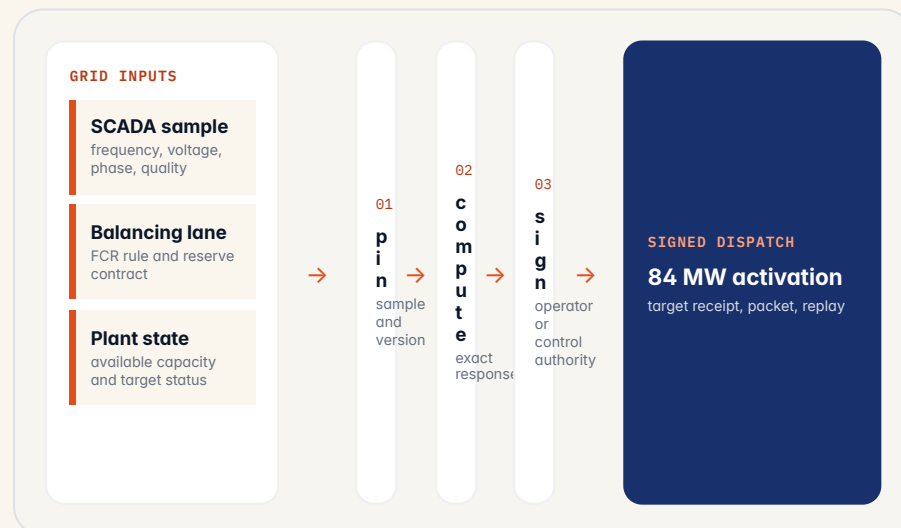
A language model can describe the dispatch. It should not silently determine the numeric activation or the tariff applied to it.

01

FCR ACTIVATION

Keep one balancing action exact from sample to settlement

The event is small enough to replay and consequential enough to expose every hidden assumption in the energy stack.



The activation is an operational and settlement artefact, not a number floating out of a forecast.

SIGNAL, PLANT, AND TARGET STATE

The dispatch has one work identity

A frequency value without its source, plant availability, lane, and target correlation is not enough to explain an activation.

The illustrative event is an FCR activation under ACM rule BAL-2026-H1 paragraph 4.2. A production case needs a stable dispatch identity, source and plant context, reserve contract, rule lane, units, timestamps, target system, operator state, and settlement or audit references.

Bind the operating context

- dispatch identity, market or balancing service, and event time
- SCADA sample, unit, quality flag, source clock, and freshness
- available reserve, plant state, contract, and response limits
- tariff or balancing lane effective at the event
- operator or automatic-control authority and target receipt

dispatch.identity

BOUND

Dispatch

FCR-17:41:32 · contracted reserve activation

scada.frequency

PINNED

Frequency

49.95 Hz threshold crossing with 50 ms samples

lane.version

EFFECTIVE

Rule lane

ACM BAL-2026-H1 paragraph 4.2

reserve.volume

COMPUTED

Response

84 MW contracted reserve activation

operator.state

SIGNED

Owner

Named operator on shift confirmed the dispatch

ENERGY IDENTITY RULE

The dispatch ID must reconcile SCADA, EMS, reserve contract, operator, settlement, and packet storage without creating a second version of the grid event.

EXACT COMPUTATION

Units and precision are operational controls

Balancing actions are damaged by float drift, telemetry skew, and implicit rounding. The numeric profile must be explicit before the reserve moves.



A numerical answer is only replayable when its units and method are part of the record.

Numerus can own the exact arithmetic boundary where the selected workflow requires it. Core can provide a deterministic runtime and dispatch surface. The existing model remains a declared input rather than an invitation to let a language layer improvise the result.

Numeric acceptance

- same input produces the same output across supported machines
- rounding and unit conversions are declared
- high-precision reference checks the published result
- corners, ranges, missing data, and saturation are exercised
- numeric failure becomes hold, refuse, or reconcile

NO INVENTED PRECISION

The packet should state the supported domain and tolerance. A claim of bit-identical output outside that domain is not a proof.

EFFECTIVE VERSION AND SETTLEMENT

Tariff lanes change, dispatch history must not

The lane current today may not be the lane that set the price or reserve obligation during the activation.



One dispatch can be operational, commercial, and regulatory evidence at the same time.

The source owner controls the rule or tariff. Spindle can preserve the admitted lane and lineage. Charter can represent the policy owner and proposal history. Fabric can hold the dispatch record. The operator decides whether the final dispatch is permitted under the live operating context.

Historical lane questions

- Which ACM, BNetza, ENTSO-E, or local lane was effective?
- Which reserve contract and capacity state applied?
- Did the source change between calculation and settlement?
- Can the settlement and control-room records resolve the same activation?

NO TODAY-OVER-YESTERDAY

A replay must resolve the lane in force at 17:41:32, not silently apply the current tariff or balancing rule.

SCADA, EMS, AND DECISION LAYER

The OT network remains the authority

The energy layer wraps existing control systems. It does not create a parallel grid that happens to look familiar.



A decision layer is useful when the grid systems remain authoritative and the boundary is observable.

Integrate through the operator's existing typed interfaces and trust boundaries. Document units, order, retries, idempotency, target receipt, and what happens when SCADA or EMS returns an unknown state. The same trace format across postures is a proposition to prove, not a reason to skip the OT design.

Keep effects explicit

- no duplicate reserve activation after a retry
- no settlement record without a dispatch correlation
- no operator confirmation mistaken for field acknowledgement
- no source or packet export beyond the declared boundary

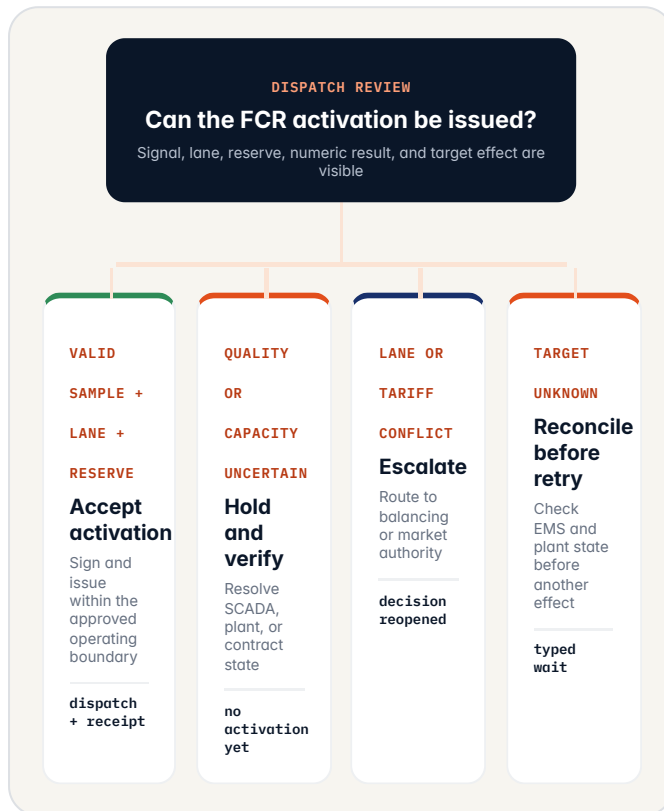
GRID ACCEPTANCE

The dispatch is not closed when the decision layer sends it. It is closed when the authoritative target and packet agree on what occurred.

CONTROL-ROOM AUTHORITY

The operator signs the final dispatch

The named operator is part of the energy decision, not a name appended after automation.



The control room can distinguish a model result, an operator choice, and a field or market effect.

The signature needs context

- which SCADA samples and source quality were visible
- which rule and reserve lane applied
- which numeric profile produced 84 MW
- whether the operator accepted, changed, or stopped the result
- what EMS, plant, and settlement targets acknowledged

Nexus can represent the operator task, challenge, escalation, and receipt. The dispatch authority remains with the role defined by the grid operator and its procedures.

REPLAY AND OVERSIGHT

A signed packet outlives the dispatch window

The supervisor, regulator, settlement team, or engineer should be able to open the same activation later without asking the control room to remember it.

FCR-17:41:32 • SIGNED PACKET			From SCADA sample to replay
01	SCADA SAMPLE SET what frequency and plant state were available	SCADA / EMS	committed
02	BALANCING LANE which rule and reserve contract applied	market / grid authority	effective
03	NUMERIC WITNESS how 84 MW was computed	method owner	verified
04	OPERATOR SIGNATURE who accepted or changed the dispatch	control room	signed
05	TARGET RECEIPT what EMS and reserve target did	grid systems	correlated
06	CERTIFICATE the decision relationship is independently checkable	reviewer	portable

A packet can serve operations, settlement, engineering, and oversight without becoming four different records.

AION can provide a portable decision certificate for the selected dispatch. Ledger can retain events. Selvedge can preserve runtime evidence where a verified execution transcript is required. Each layer has a different purpose; none makes an unsuitable market or grid rule legitimate.

Replay must state its domain

- same input, lane, numeric profile, and supported runtime
- same output within the declared exactness or tolerance
- same operator and target correlation
- same refusal or unknown state when a dependency is unavailable

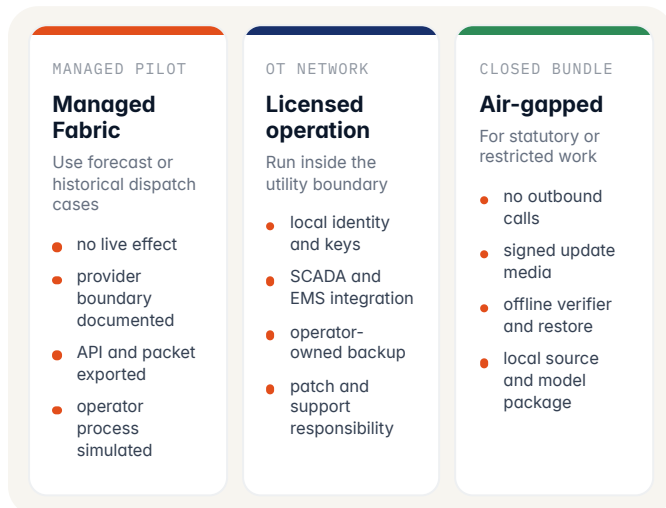
INDEPENDENT REPLAY

The verifier should check the packet on authorised hardware without giving it authority to activate reserves or modify settlement.

MANAGED, OT-NETWORK, OR CLOSED BUNDLE

Deployment is a grid control decision

The energy workflow can be evaluated in different postures, but each posture changes egress, keys, support, update, and recovery evidence.



A utility should prove the actual data and effect paths for the posture in which it will rely on the dispatch.

Start with a replay or shadow dispatch. Expand only after the operator, balancing authority, OT security, market operations, and assurance team can inspect the same packet and agree on its failure states.

Posture evidence

- egress and dependency observation
- key custody, signed package, and update rollback
- source, tariff, model, and numeric artefact availability
- EMS target reconciliation after timeout or retry
- offline replay, restore, and support without external access

NO HOSTING SHORTCUT

A public Mesh or an on-premises label does not establish the exact boundary around a SCADA sample, a key, a model, or a dispatch effect.

THE ACCEPTANCE CORPUS

Run the proof against grid edge cases

Balancing operations are defined by the moments when the inputs, lane, plant, or target do not cooperate.

TEST SLICE	INCLUDE	EXPECTED OBSERVATION
Normal activation	49.95 Hz, FCR lane, 84 MW, operator confirmation	dispatch and packet close together
Telemetry defect	stale, missing, skewed, or conflicting SCADA sample	hold, refuse, or declared degraded path
Lane boundary	tariff or balancing rule changes near event time	historical version remains resolvable
Capacity change	reserve unavailable or plant limit changes	numeric result and authority reopen
Target uncertainty	EMS or reserve target receipt missing	no blind retry; reconciliation state opens
Numeric boundary	rounding, saturation, unit, and high-precision reference	declared result or typed refusal
Recovery	restore, offline replay, settlement export, and oversight	same packet and verdict remain available

A green dispatch is one test case. The proof needs the boundary cases too.

Measure dispatch truth

- sample freshness, quality, and clock alignment
- exact computation and declared tolerance
- operator authority and target receipt
- settlement and packet correlation
- failure state, recovery, and independent replay
- key, egress, access, and incident evidence

Do not report a deterministic claim as a sentence alone. Keep the oracle, test corpus, machine or release metadata, raw outputs, and verdicts that demonstrate the supported domain.

GO, NARROW, HOLD, OR STOP

The production decision belongs to the grid owner

A proof ends with an operating and market decision, not with a forecast screenshot.

The accountable group decides whether the selected activation workflow may proceed, under which balancing lane, plant or reserve population, operator roles, numeric profile, SCADA and EMS integration, deployment posture, settlement link, recovery, and stop conditions. Control room, market operations, engineering, OT security, compliance, procurement, and oversight may each own a condition.

ENERGY PRODUCTION RECORD FCR-17:41:32 proof decision		
WORKFLOW	Frequency-response activation and signed dispatch	BOUNDED
GRID BOUNDARY	Named service, plant, reserve contract, and test cohort	SCOPED
INPUTS	SCADA + quality + lane + capacity + numeric profile	LINKED
AUTHORITY	Operator, control path, target, and settlement receipt	REVIEWED
OPERATION	OT boundary, monitor, restore, incident, support	OWNED
EXIT	Export, verifier, rollback, and stop trigger	DATED
DECISION	Go / narrow / hold / stop	SIGNED
The record should remain useful when the operator changes, the tariff lane is amended, or the supplier is no longer in the room.		

The smallest credible next exercise

Replay one historical activation, then introduce one boundary failure selected by the control room: stale SCADA, lane transition, target timeout, reserve shortage, or numeric edge. Have the operator, engineering, market, OT security, and assurance owners inspect the same packet.

PRIMARY ACCEPTANCE CRITERION

The grid owner can identify the exact sample, lane, calculation, operator action, target state, settlement reference, and replay verdict for every selected dispatch.

That proves one dispatch slice. It does not authorise generalisation across every market, plant, tariff, or automatic control path.

FIND A SUBJECT

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Page references point to the substantive explanation, worked example, control, boundary, or decision record, not merely to a passing label.

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CLOSING RECORD

Make the dispatch replayable before it settles

Choose one balancing or forecast workflow, name the authority that can stop it, and prove that its input, rule, computation, target, and packet agree.

Write the dispatch identity, SCADA sample and quality, plant and reserve context, tariff or balancing lane, model and numeric profile, operator authority, target effect, settlement link, packet, verifier, deployment posture, recovery, retention, export, and stop conditions.

Then choose the result you most dread explaining: a different value after a release, a tariff that changed, a target that timed out, a reserve that was unavailable, or an operator who had to override the model. A dispatch field guide is useful when that case can be replayed before the audit asks for it.

DISPATCH

One bounded energy decision

Do not begin with the whole grid

SOURCE

SCADA, EMS, lane, contract, and plant state

Every input has a status

METHOD

Declared units, precision, oracle, and runtime

Exactness must have a domain

AUTHORITY

Operator, control path, target, and settlement owners

Roles must be distinct

DECISION

Go, narrow, hold, or stop

Signed with replay and recovery conditions

THE DISPATCH STANDARD

A forecast can be plausible. A defensible dispatch shows the sample, lane, calculation, operator, target, settlement, and replay state that existed when the grid acted.