Task 2.3
Addressing the gap between actual and calculated EP

ALDREN ALliance for Deep RENovation in buildings

Verco

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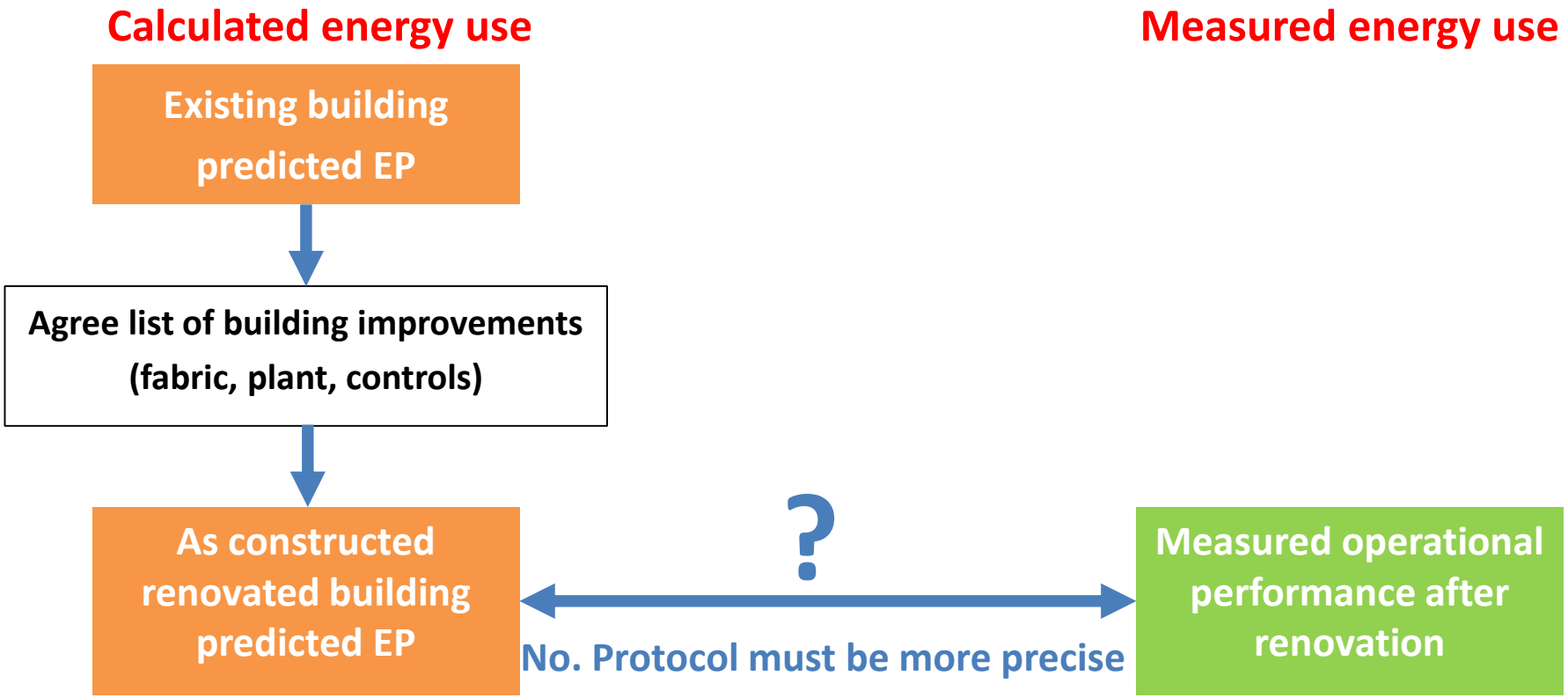
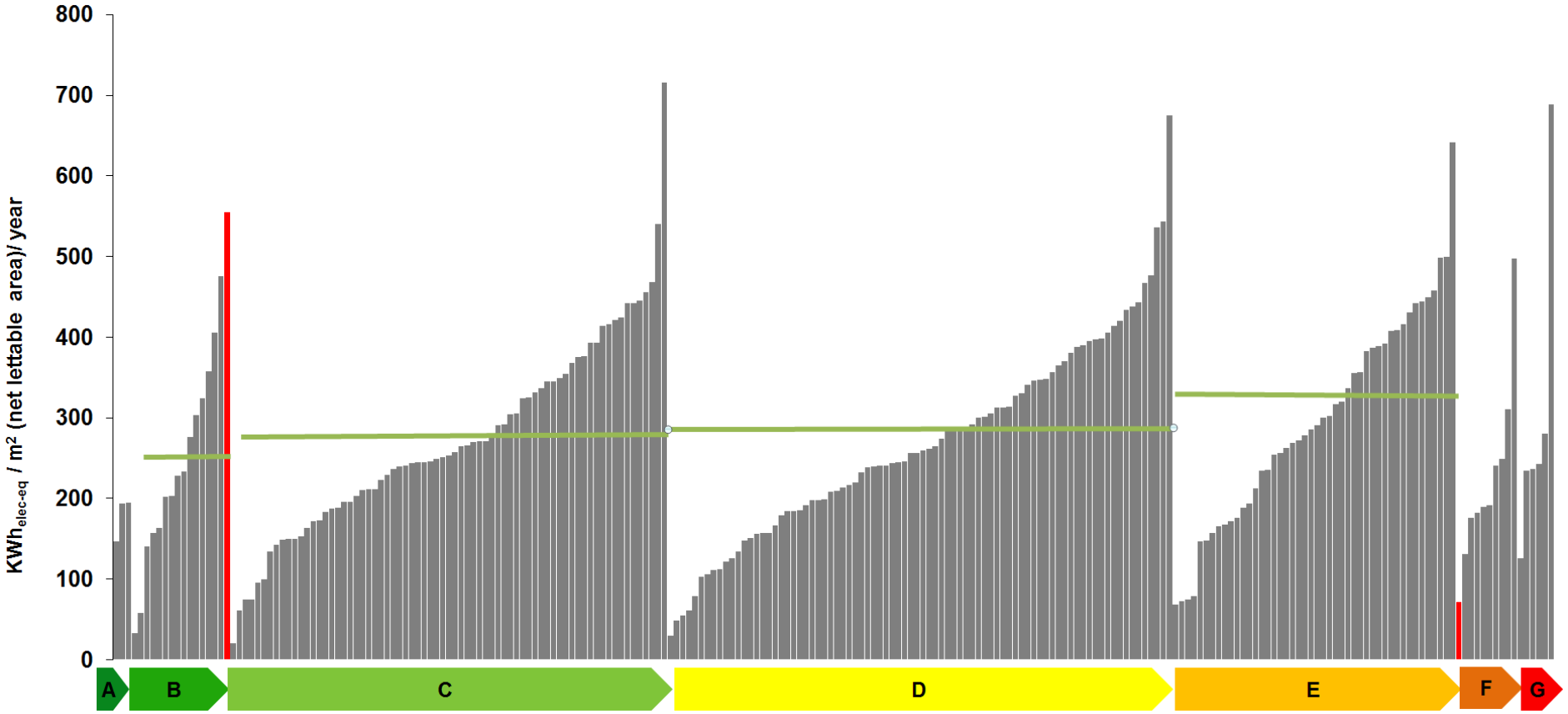
09:30

Developing the EVCS performance verification protocol for deep renovation

Where is the gap between calculated and measured energy performance?



The evidence: without verification, EPCs risk blindsiding the industry



Source: Real Estate Environmental Benchmark Update, BBP, 2016

How do we enable measured values to verify calculated predictions?

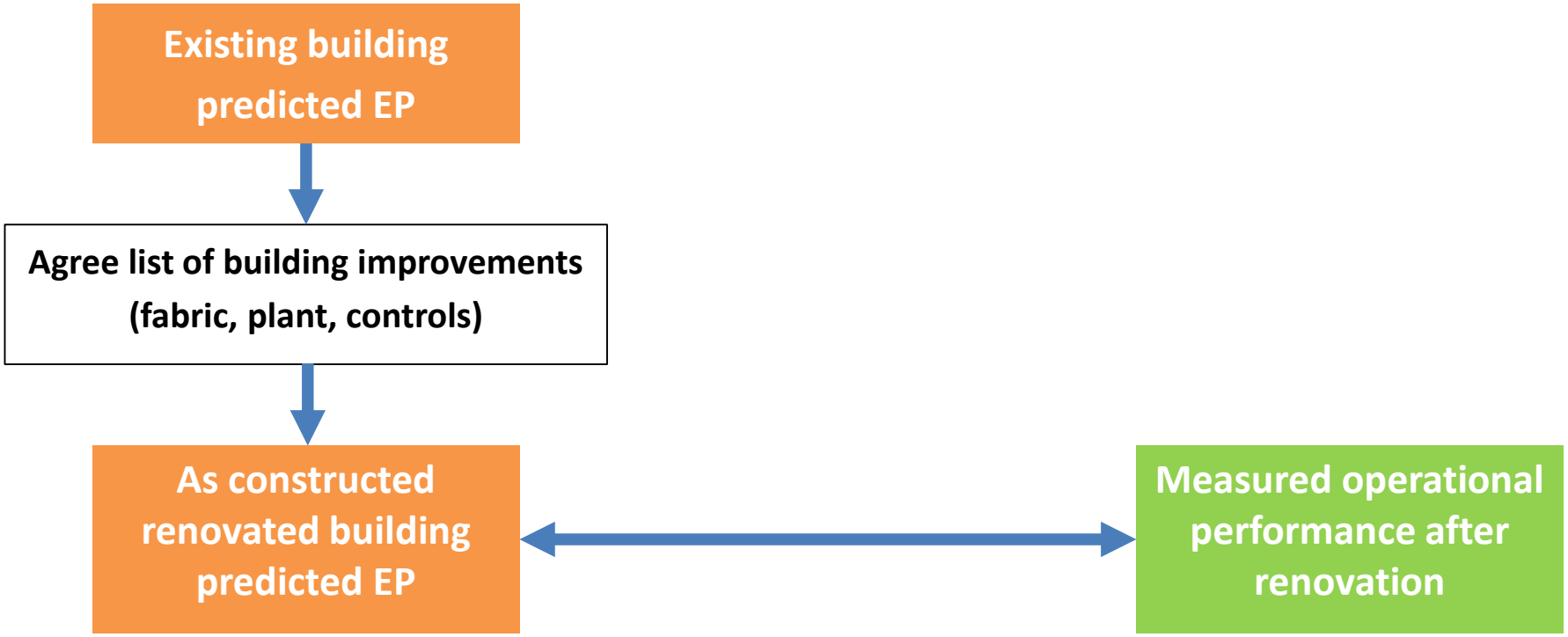
- Use a like for-like comparison
  1. Apply the same boundary conditions
  2. Compare results for same energy uses
- Try harder!
  3. Use a better virtual model (full dynamic simulation)
  4. Ensure the real building operates correctly
     - use the model as a guide for “correct operation”

Ensuring like for like comparison Step 1: Apply the same boundary conditions

Comparing calculated and measured energy performance on like-for-like basis

Calculated energy use – standard conditions

Measured energy use



Ensuring like for like comparison Step 1: Apply the same boundary conditions

Comparing calculated and measured energy performance on like-for-like basis

Calculated energy use – standard conditions

Existing building predicted EP

Agree list of building improvements (fabric, plant, controls)

As constructed renovated building predicted EP

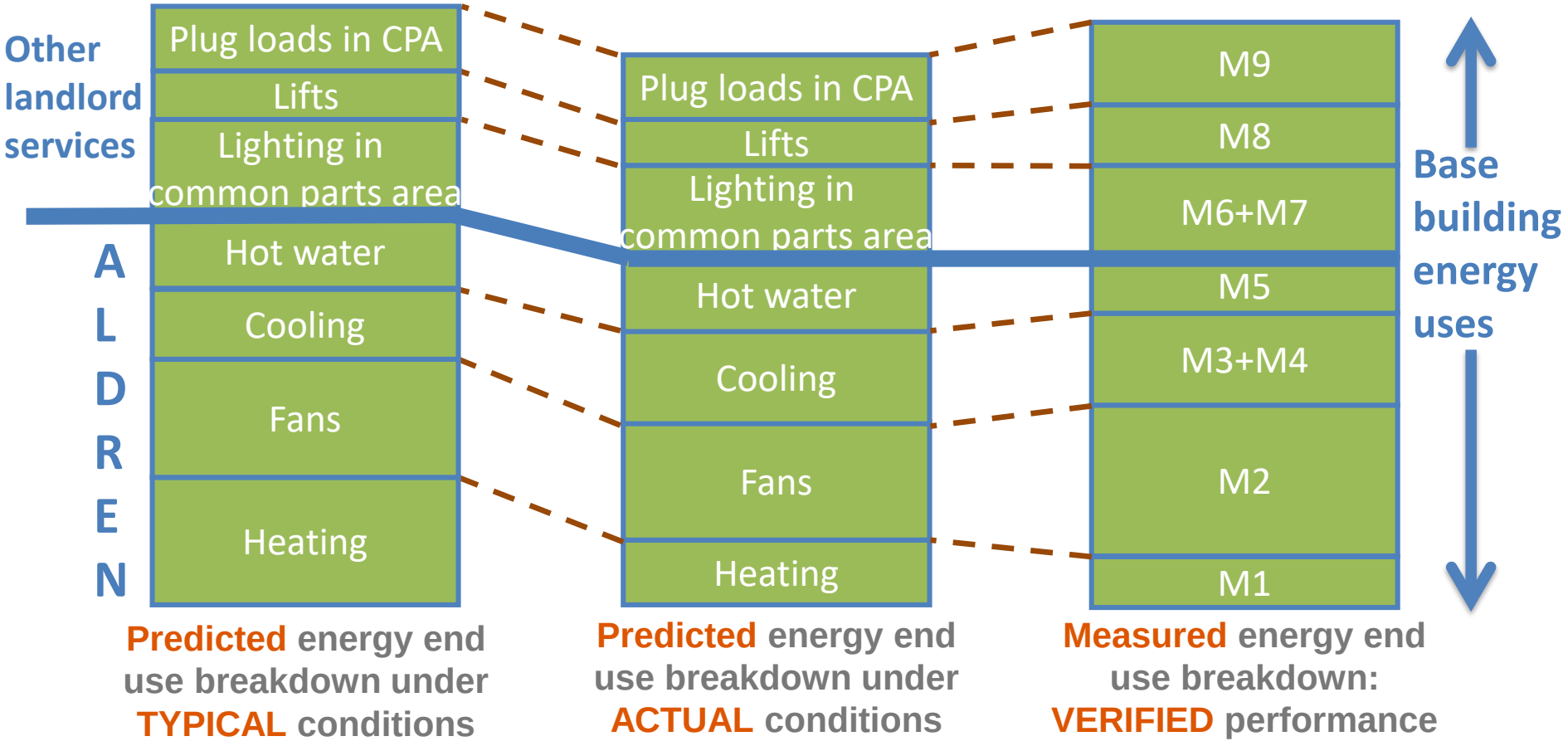
Calculated energy use – Actual conditions

As constructed renovated building predicted EP

Measured energy use

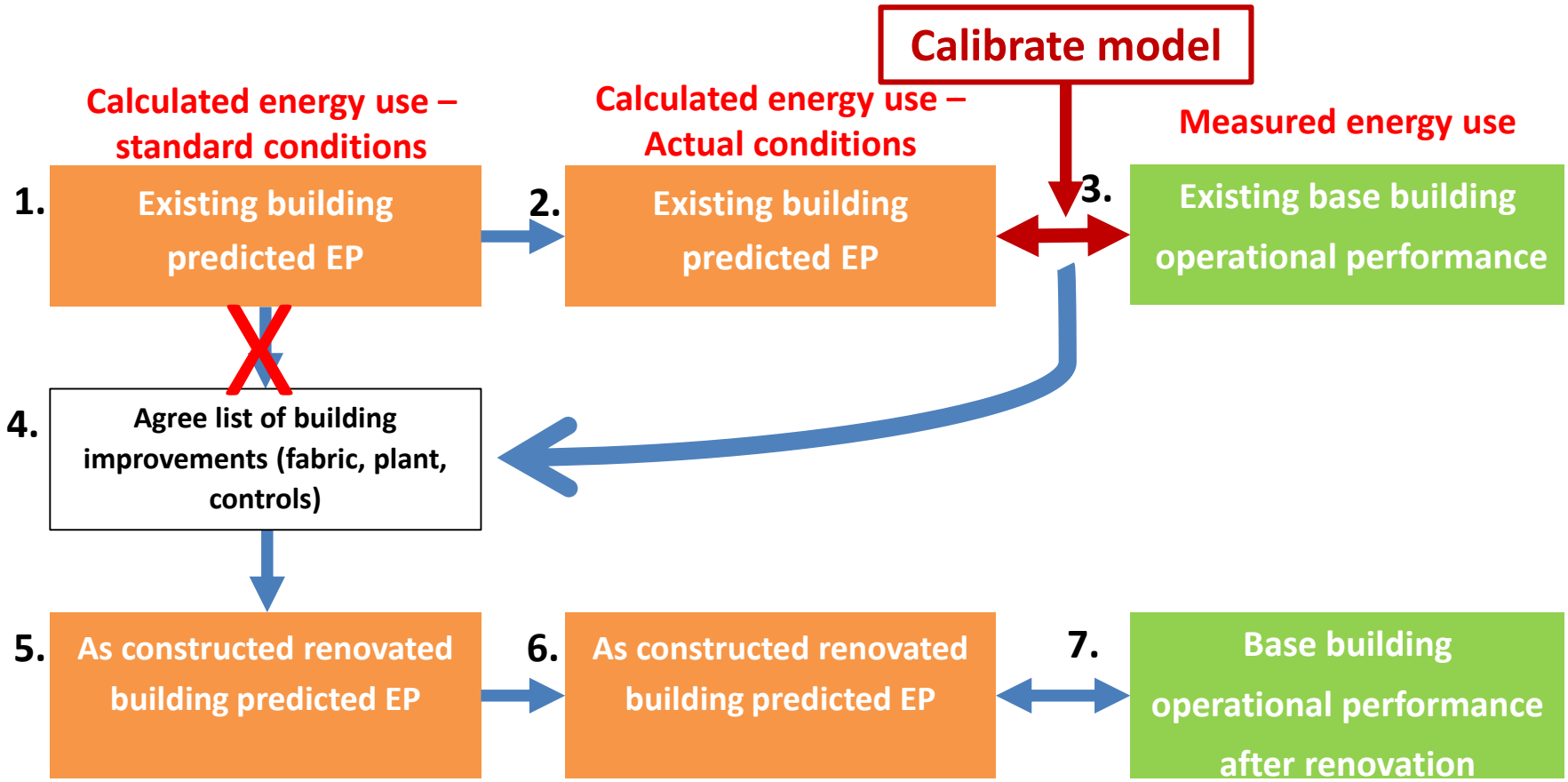
Base building operational performance after renovation

Ensuring like for like comparison Step 2: ALDREN promotes 'design for measurability': compare calculated and measured results for same energy uses

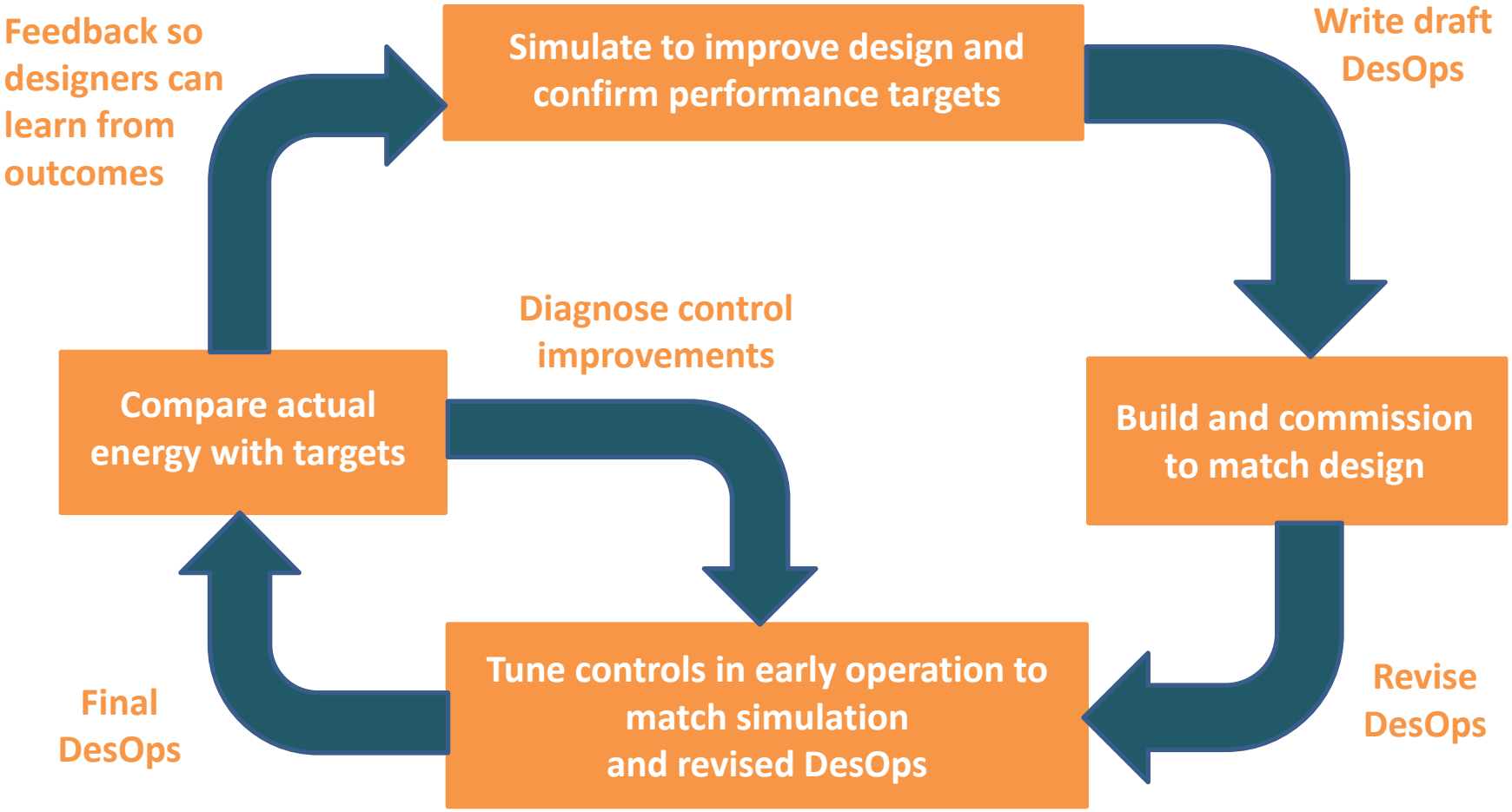


Try harder step 1: use calibrated model to decide improvements

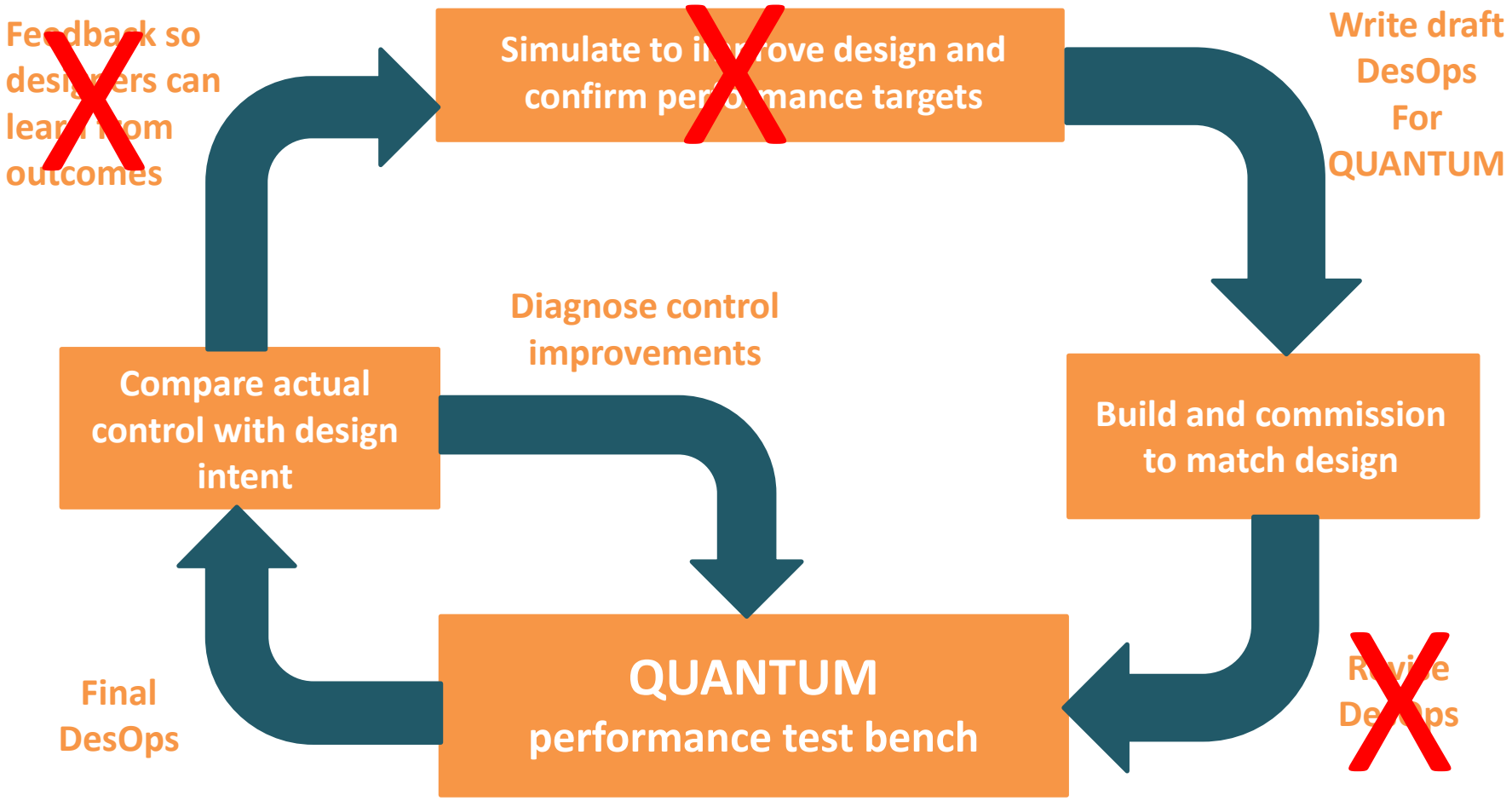
Step by step towards verification of predicted energy



Trying harder Step 2 Option A: Simulation placed at centre of design and operation



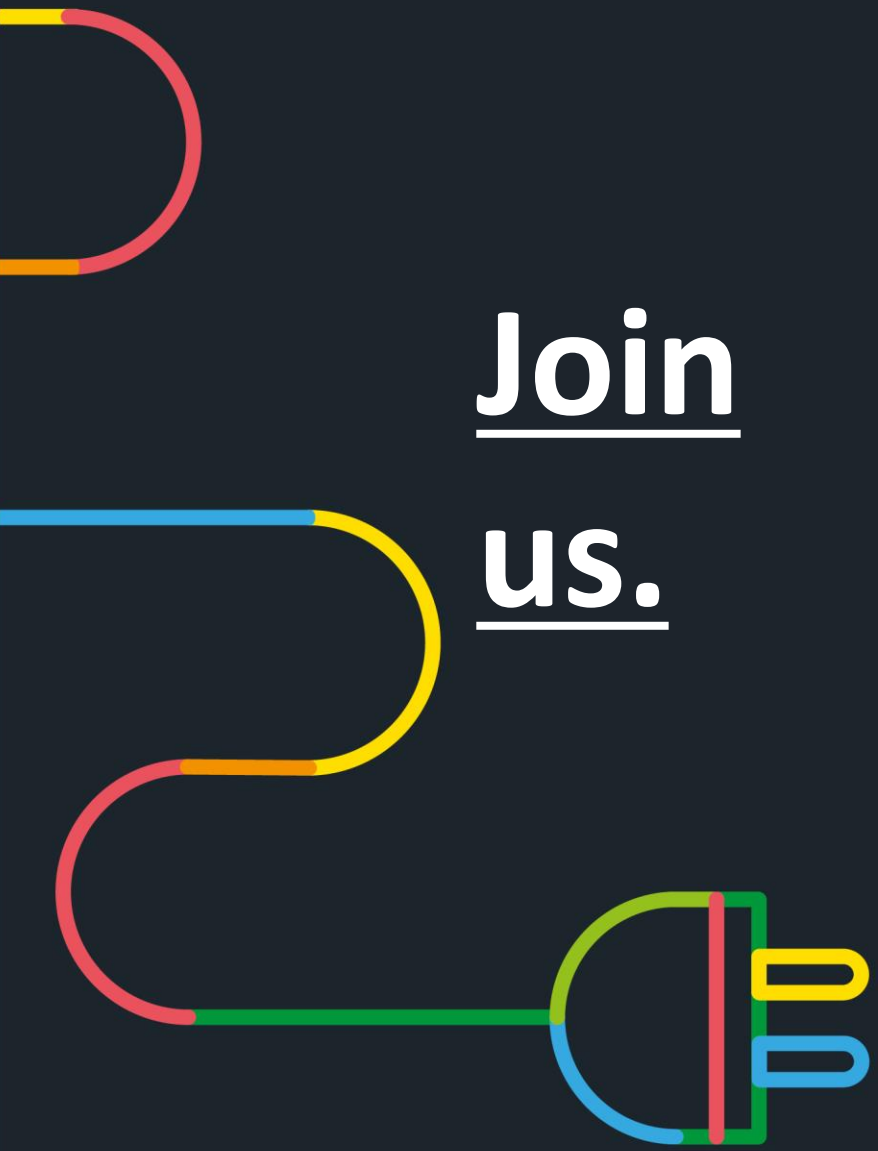
Trying harder Step 2 Option B: QUANTUM (alternative to advanced simulation)



AR + Verification + OR

STEP	TEST	RESULT
1 Asset Rating	Calculate EP under standard conditions of use	EVCS A to G
2 Verification	Compare calculated EP with measured EP	**RED+** x > +25% **AMBER+** 10% < x < 25% **GREEN+** 0 < x <= +10% **GREEN-** 0 > x >= -10% **AMBER-** -10% > x > -25% **RED-** x < -25%
3 Operational Rating	Compare measured EP with tailored benchmark on linear scale with trajectory to zero energy	A to G or 1 to 6 stars Energy scope must be defined: • Offices: base building • Hotels: hosting functions

Design for Performance



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