

Investment visibility in the European transmission system: Opportunities and challenges

10 September 2026 | What the 2026-2035 investment pipeline tells us about equipment, technology and delivery capacity?



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Transmission investment needs, and benefits for the European Economy

> €800 Bn

Investment needs in the
next 20 years

2 for 1

Every €1 invested in
interconnections saves €2

€49 Bn/Year

Increase in energy bill by
2040, if we stopped
investing in grids



Europe is managing three investment waves at once

System expansion

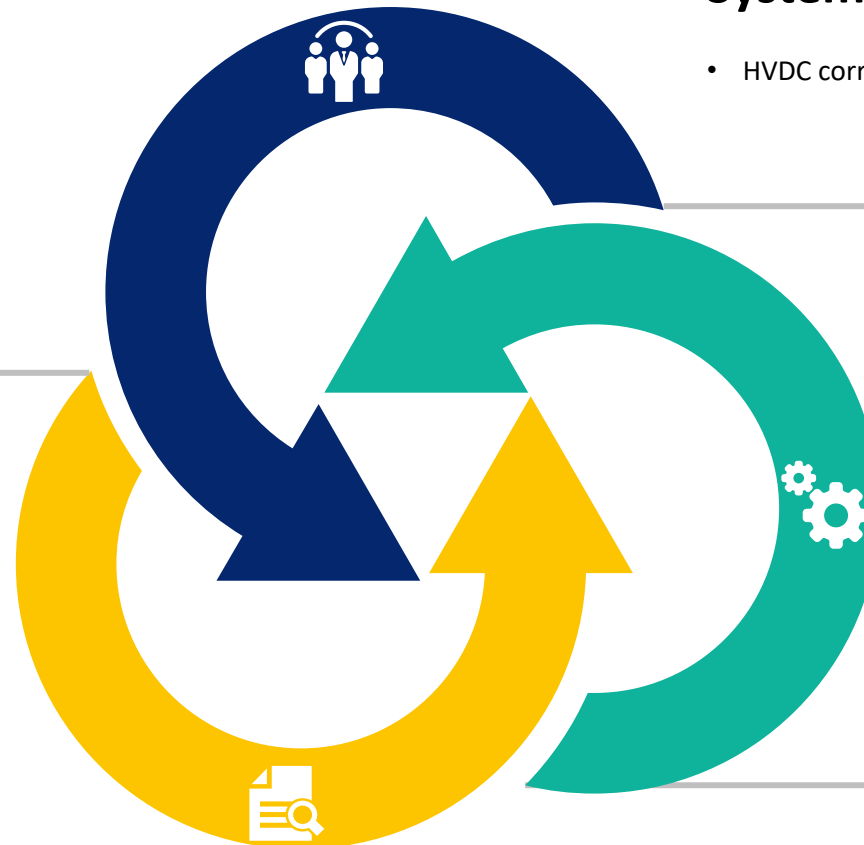
- HVDC corridors, offshore connections and grid reinforcement

Technology transition

- SF₆-free switchgear, dynamic reactive compensation and digital grid optimisation

Asset renewal

- equipment installed in the 1980s and 1990s reaching end of life

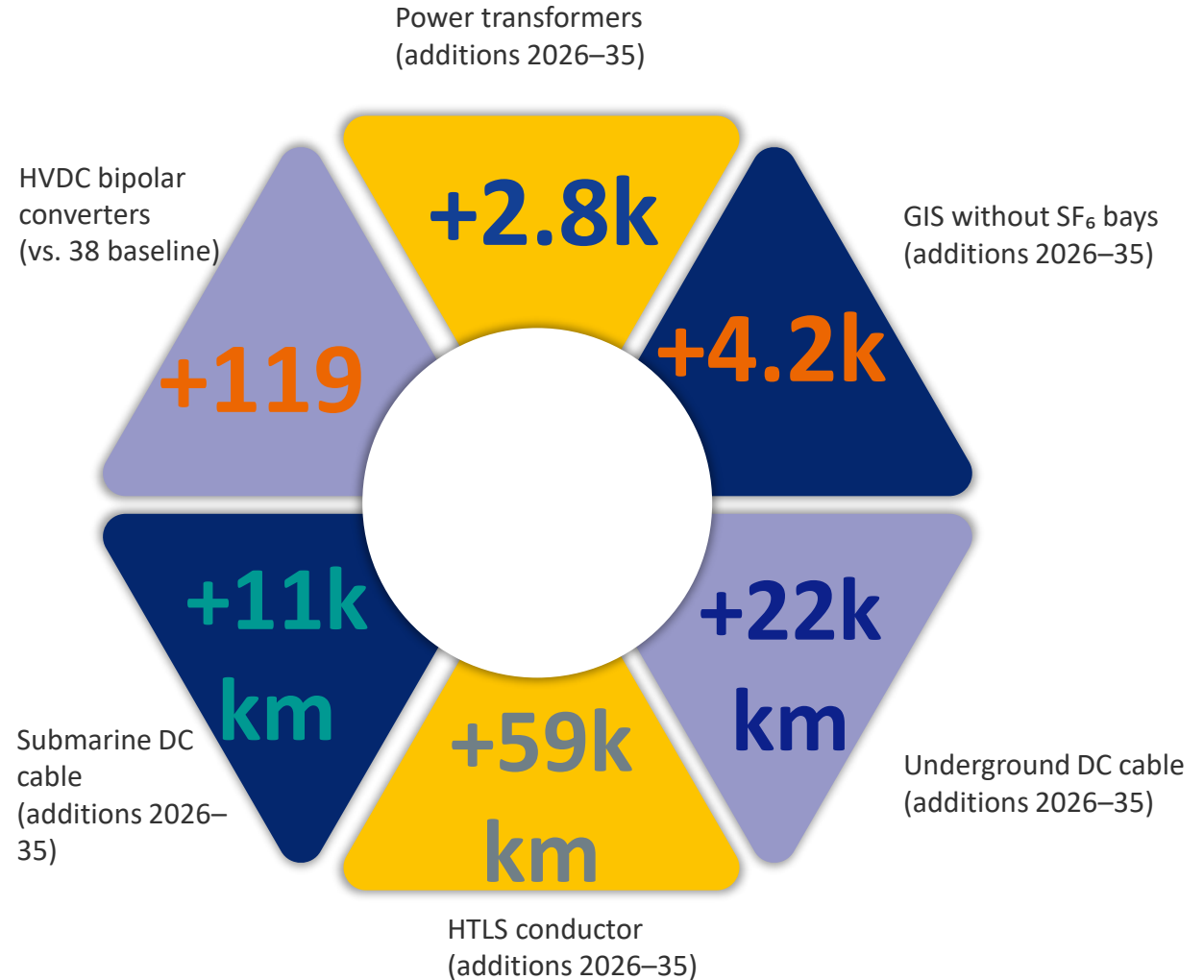


Different drivers, but the same factories, engineering resources, installation crews and procurement windows

What the Investment Pipeline Means for Financing

Investment decisions for long-lead assets must be taken years before demand is confirmed. Financing frameworks need to reflect this reality to avoid delays in delivery.

The volumes involved in certain categories exceed what individual TSOs can finance in isolation. EU-level instruments will need to be mobilised alongside national frameworks.



The survey creates an asset-level view of future demand

27

TSOs surveyed

7

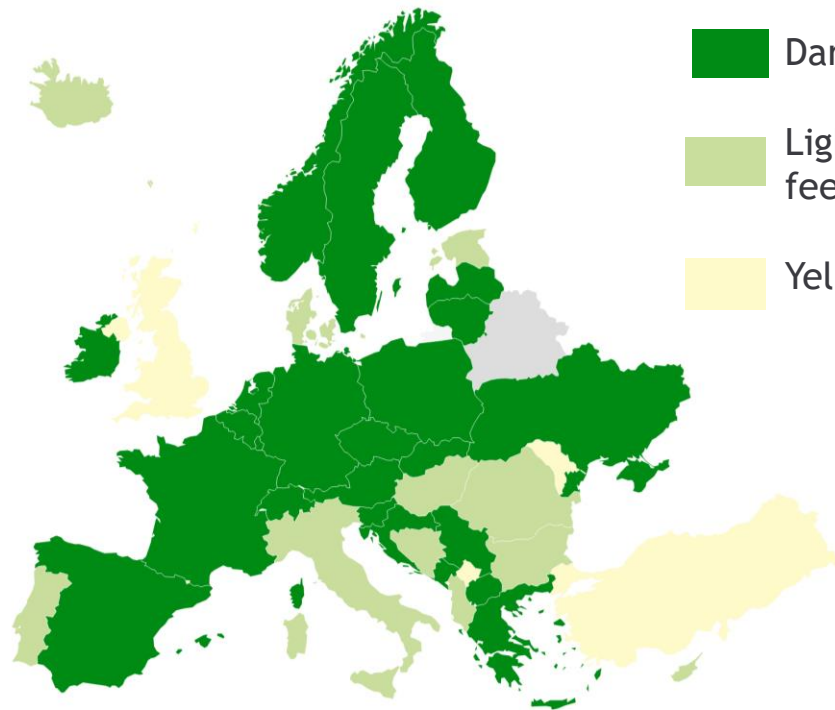
Asset categories

2026-2035

Planning horizon

≈90%

ENTSO-E population coverage



- Dark Green: TSO provided feedback
- Light Green: TSO did not provide feedback
- Yellow: TSO not in scope

Planned annual additions were collected by asset type and voltage band, alongside the 2025 installed baseline.

The pipeline shows a major change in both scale and composition

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Asset Category	Asset Type	2025 Baseline	→ 2030	→ 2035	Additions
Transformers	Power transformer (mineral oil)	5,649	1,393	2,820	50%
Transformers	Phase shifting transformer	103	54	111	108%
Transformers	Shunt reactor (oil immersed)	735	706	1,017	138%
Switching	CB with SF6	26,767	7,588	10,819	40%
Switching	GIS without SF6	266	1,728	4,238	1,593%
OHL	ACSR circuit km	234,704	45,352	73,533	31%
OHL	HTLS conductor km	17,561	26,394	59,364	338%
Underground	AC conductor km	33,150	16,949	30,665	93%
Underground	DC conductor km	847	8,222	22,303	2,633%
Submarine	DC conductor km	1,965	5,664	11,687	595%
HVDC	Bipolar converters	38	60	119	313%

NOTE *: The above table shows the number of TSOs' planned assets that were mapped in the 2026 Investment Pipeline Survey. Please note that the data only covers 27 out of the 40 members surveyed, so the overall numbers are very likely to be higher. ENTSO-E The Transmission Grid Investment and Supply Chain Assessment Report 2026, to be published in early November 2026, will provide an in-depth analysis.

Visibility exposes technology transitions hidden by aggregate investment figures

- +10,819 SF₆ circuit breakers still planned by 2035
- +7,558 SF₆-free air-insulated circuit breakers
- +4,238 SF₆-free GIS bays
- SF₆ and SF₆-free product lines must coexist through at least 2030–2031

Technology maturity varies by voltage and application

Long-term spare-parts and obsolescence strategies are required for newly installed SF₆ assets



Different manufacturing and testing infrastructure

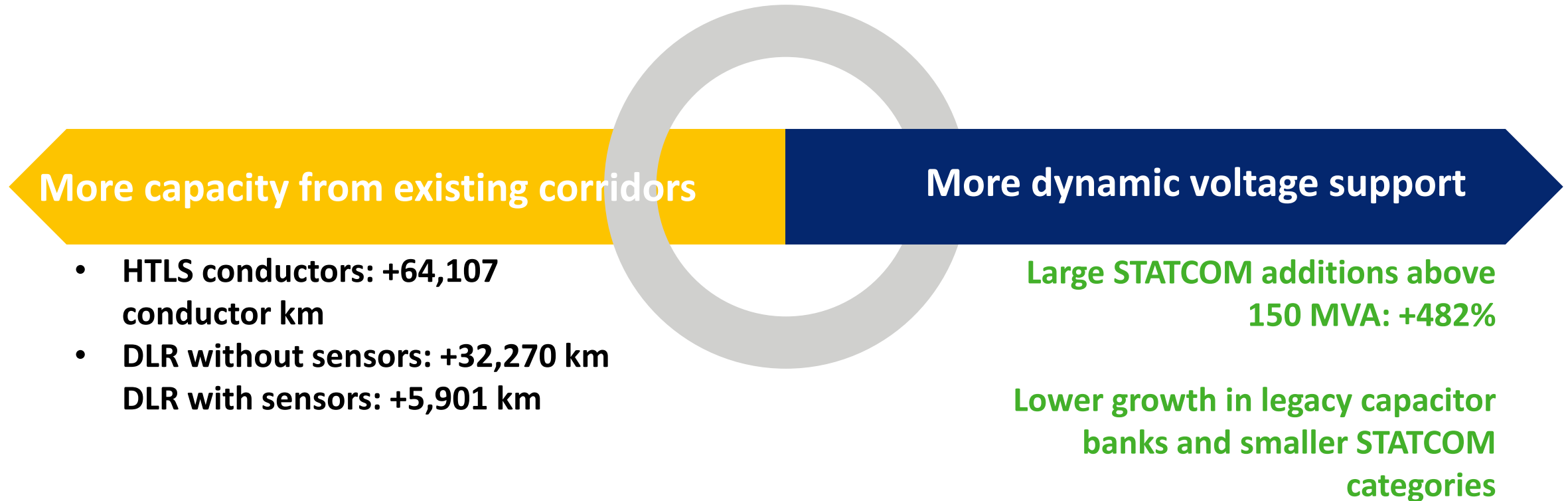


Some niche/high short-circuit-current applications remain unresolved



The pipeline also shows a shift towards optimisation and active system support

Investment visibility must track capability and technology-not only kilometres, units or expenditure.



Workforce capacity is part of the technical delivery chain

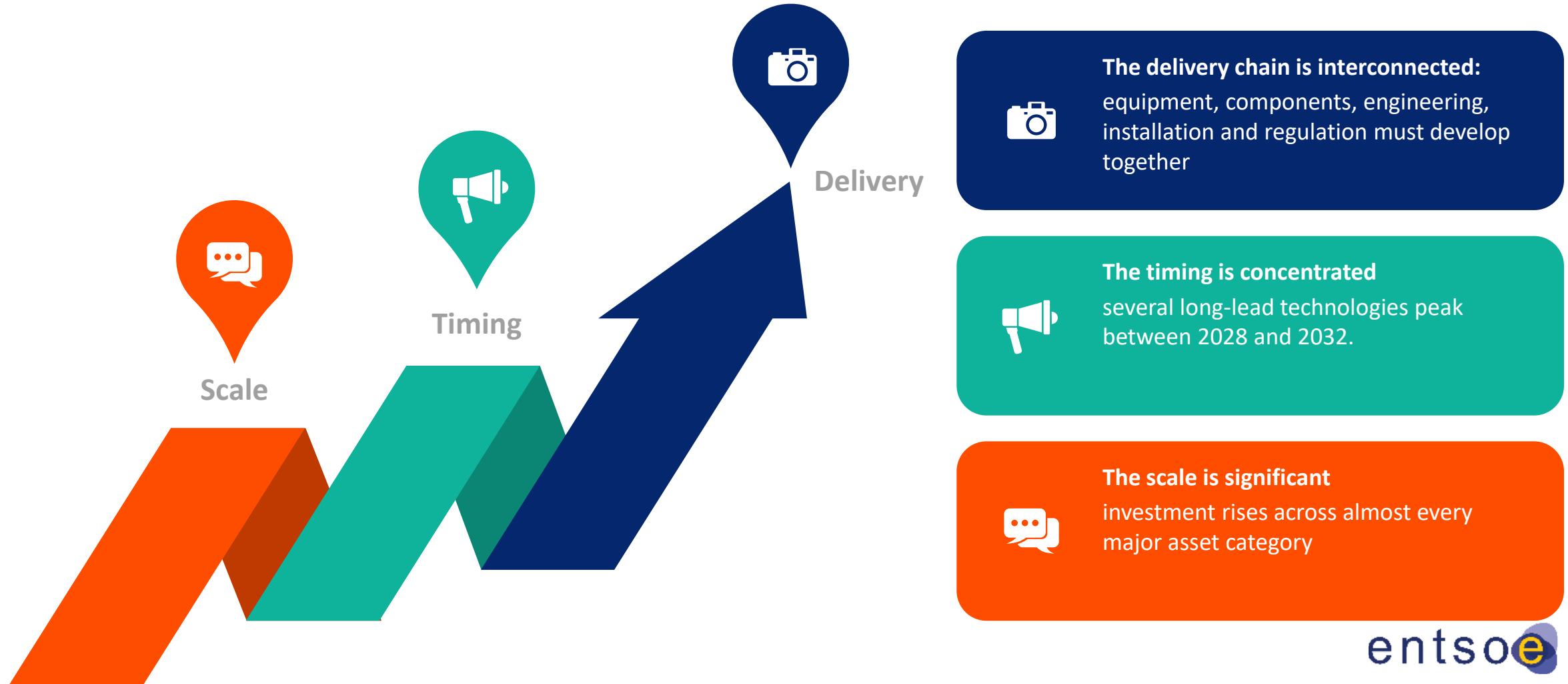
Equipment availability does not equal deliverability without design, installation, testing and operational competence.

- 9 of 12 TSOs identify skilled workforce availability as a key challenge
- 10 of 12 depend heavily on subcontractors for project implementation
- White-collar engineering and IT profiles are the most affected
- Reported shortages include protection and control engineers, HVDC specialists, project managers, cable jointers and commissioning engineers
- Six TSOs already report project delays



Visibility creates value only when it changes decisions early enough

The objective is not perfect forecasting. It is sufficient shared visibility to act before individual constraints become system-wide bottlenecks.



Thank you very much for your attention!

Our values define who we are, what we stand for and how we behave.
We all play a part in bringing them to life.



EXCELLENCE

We deliver to the highest standards.
We provide an environment in which people can develop to their full potential.



TRUST

We trust each other, we are transparent and we empower people.
We respect diversity.



INTEGRITY

We act in the interest of
ENTSO-E



TEAM

We care about people. We work transversal and we support each other.
We celebrate success.



FUTURE THINKING

We are a learning organisation.
We explore new paths and solutions.

We are ENTSO-E