DeepTech China Watch

China DeepTech 2030

From KPIs to System Design — Interpreting the Next Phase

Executive Summary

China's current Five-Year Plan (2026-2030) does not primarily describe a set of technology priorities.

It reflects the maturation of a system designed to move technologies from research into large-scale deployment.

This system is characterized by:

- increasing technological self-reliance
- systematic deployment across industries
- integration of supply chains and infrastructure
- and a focus on resilience under external constraints

These elements are not independent.

They reinforce each other to create an environment in which technologies can be:

- validated
- integrated
- scaled

faster and more consistently than in comparable systems.

The result is not only the emergence of capable companies, but the formation of execution environments.

The system is not designed to win at invention. It is designed to win at industrialization.

For European actors, the implication is structural:

Competitiveness is increasingly determined not by firm-level capabilities alone, but by the effectiveness of the surrounding system in enabling technologies to move into execution.

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1. The Question Behind the Plan

Much of the discussion around the Five-Year Plan focuses on sector priorities, funding volumes, or headline technologies.

These are observable.

But they remain upstream. They describe activity, not outcomes.

A more relevant question is how the system moves technologies from development into execution.

This transition — from prototype to deployment — is where outcomes are determined.

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2. China's KPI System as an Operational Mechanism

The Five-Year Plan does not function as a high-level strategy document alone.

It defines and translates strategic direction into measurable, coordinated targets across the system.

At the highest level, these targets relate to:

- technological self-reliance
- deployment across the economy
- supply chain localization
- system resilience

These priorities are not tracked as isolated indicators.

They are operationalized through coordinated KPIs across ministries, provincial governments, industrial clusters, and companies.

At the national level, sector priorities are defined through output, capacity, and adoption targets.

At the provincial level, these targets are translated into concrete objectives such as pilot projects, infrastructure development, and industrial output.

At the company level, particularly for strategically relevant firms, targets are reflected in production, deployment milestones, and integration into supply chains.

Funding allocation, evaluation, and incentives are linked to these targets.

The result is a system that does not only observe technological development — it actively directs it.

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Key Insight

The KPI system functions less as a measurement layer and more as a control system. It controls not just performance — but the flow of technologies through the system:

→ aligning capital
→ coordinating infrastructure
→ shaping demand

with the objective of accelerating deployment.

Execution Layer — Technology Progression (TRL 6 to 9)

Pilot → Deployment → Integration → Scaling → Throughput → Outcomes

Layer	What Is Measured	Typical Metrics	Purpose
Pilot & Early Validation	Transition into real-world testing	pilot projects (per year / per region) certified demo zones average time-to-pilot (months from prototype)	Early validation in operational environments
Deployment & Adoption	Entry into production	% technology adoption (by industry) total procurement volume (€ / ¥) % of smart factory / automated facility penetration	Conversion of pilots into real use
Integration & Industrial Embedding	Industrial embedding	industrial partnerships (per company / per cluster) % of localized supply chain components supply chain integration ratio (%)	Connection to industrial base
Infrastructure & Scaling Capacity	Capacity to scale	installed compute capacity (FLOPs / data center capacity) manufacturing capacity (units / year) capacity utilization rate (%)	Removal of scaling bottlenecks

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Layer	What Is Measured	Typical Metrics	Purpose
Speed & System Throughput	Time across stages	pilot → deployment time (months) regulatory approval timelines (days / months) iteration cycle time (prototype → upgrade)	Acceleration of industrialization cycles
Quality	Execution quality	revenue from deployed technologies (€ / ¥) pilot → deployment success rate (%) companies reaching scale stage (IPO / exit pipeline)	Filtering for viable companies
Capital	Allocation alignment	follow-on funding ratio (%) funding-to-deployment conversion rate (%) capital intensity per deployed unit (€ per MW, per chip, etc.)	Funding of execution rather than activity
Density	Ecosystem completeness	suppliers per value chain layer cluster specialization index (%) firm density (firms per km^2 / region)	Elimination of missing industrial layers
Demand	Market creation	government procurement volume (€ / ¥) % demand driven by public programs large-scale deployment contracts	Generation of early demand
Feedback (system-level learning loop)	Iteration and learning cycles	performance improvement per iteration (%) deployment data volume (TB / PB) failure rate reduction (% over time)	Acceleration of learning loops

Units: TB (Terabyte, 10^{12} bytes) · PB (Petabyte, 10^{15} bytes) · EFLOPS (10^{18} operations per second, Floating-point operations per second (a measure of computing power))

These layers form a **pipeline that systematically converts technology into scale.**

Implication — Role of KPIs

The primary function of KPIs within the system is not limited to performance measurement.

They act as coordination mechanisms, aligning capital allocation, infrastructure development, and industrial demand with the objective of accelerating deployment.

What is measured is not whether a technology works, but whether it is deployed, scaled, and integrated.

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3. What the System Measures — and What It Produces

These KPIs do not operate in isolation. They define how technologies move through the system — and what the system ultimately produces.

These KPIs define not only what is measured — but what is prioritized, funded, and scaled.

Across sectors, a consistent pattern emerges: technologies are not evaluated based on their characteristics alone, but on how effectively they are translated into deployment, integration, and scale.

The KPI system makes this process measurable — and therefore controllable.

Semiconductors

In semiconductors, self-sufficiency targets, capacity expansion, and supply chain localization define the direction of development.

These targets drive capital allocation into mature-node production, equipment and material localization, and coordinated industrial expansion.

The outcome is not frontier leadership, but increasing control over the industrial semiconductor stack — particularly in segments critical for large-scale manufacturing.

Artificial Intelligence

In artificial intelligence, the system prioritizes compute capacity, industrial deployment, and integration into real-world environments.

Investment flows into infrastructure, enterprise adoption, and cross-sector application rather than model development alone.

The outcome is not isolated AI champions, but system-wide embedding of AI capabilities across industries.

Biotechnology

In biotechnology, clinical trial activity, regulatory timelines, and the share of innovative drugs define system performance.

Regulatory acceleration and expanded trial capacity reduce the time from discovery to validation.

The outcome is a system optimized for faster clinical cycles and more consistent translation into marketable therapies.

Energy and Climate Technologies

In energy and climate technologies, installed capacity, EV penetration, and battery production define progress.

Infrastructure expansion, manufacturing scale, and demand creation are developed in parallel.

The outcome is scale-driven competitiveness, where cost advantages and industrial capacity reinforce each other.

Advanced Manufacturing

In advanced manufacturing, automation density, smart factory penetration, and equipment localization define system development.

The focus is on integrating robotics, digital systems, and real-time data into production environments.

The outcome is a highly automated and deeply integrated industrial base.

Cross-Sector Implication

Across all sectors, the pattern is consistent:

technologies are not evaluated based on innovation alone,
but on their ability to move through the system — into deployment, across industries, and into integrated production environments.

The KPI system does not simply track this process.

It structures it — and accelerates it.

This pattern is not sector-specific. It reflects the underlying logic of the system — and how it produces outcomes.

4. The Logic of Industrialization

The system is not designed to maximize invention.

It is designed to maximize industrialization.

Technologies are not evaluated based on novelty alone, but on their ability to move into operational use, scale across industries, and integrate into existing systems.

What matters is whether they move through the system — consistently and at scale.

Four characteristics define the system:

- reduction of critical dependencies
- deployment at scale
- integration across supply chains
- resilience under constraint

This raises a central question: how is this logic implemented in practice?

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5. Policy as Operating System

The answer lies in how policy structures the system.

The Five-Year Plan does not only set direction. It defines the operating system within which technologies are deployed. Policy does not just set direction. It defines the operating conditions under which technologies are deployed.

The state defines direction, while markets operate within that framework.

Infrastructure and demand are developed in parallel to technological progress.

Healthcare systems, smart cities, and industrial programs are not only outcomes of innovation.

They function as mechanisms through which technologies are deployed and validated. This results in a different sequencing of technological development.

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Comparative Technology Deployment Pathways

Step	Typical Western Model	China Model
1	Research	Research
2	Prototype	Prototype
3	Company formation	Pilot environments
4	Funding rounds	Deployment pathways
5	Market validation	Integration into real-world systems
6	Scaling	Scaling embedded in system

Interpretation

Deployment is not only the outcome of the system.

It is embedded earlier in the process.

This shifts where risk sits: early-stage uncertainty is reduced through exposure to real environments, while scaling risk is distributed across infrastructure, partners, and demand.

This structure does not operate in isolation.
It is reinforced by economic and demographic pressures — making acceleration a necessity rather than a policy choice.

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6. Why the System Accelerates

This system is not accidental. It is reinforced by structural constraints that make acceleration necessary.

Demographic changes, including a shrinking workforce and rising dependency ratios, create sustained pressure to increase productivity.

Automation, digitalization, and industrial upgrading are therefore not optional.

They are necessary conditions for economic stability.

Deep technologies are not only opportunities. They are required responses to these constraints.

7. From Products to Platforms

Technologies are increasingly developed as platforms rather than single-use solutions.

Artificial intelligence, robotics, and sensing technologies are applied across multiple industries.

This enables reuse and accelerates deployment.

Implication — Competitive Dynamics

As a result, competition is no longer bounded by sector definitions. It is shaped by the movement of capabilities across industries, increasing both the number of competitors and the difficulty of identifying them early.

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8. System Reinforcement Mechanisms

The system operates through reinforcing feedback loops.

pilot → deployment → capital → scaling → integration → more deployment

Technologies move from pilot to deployment, attract capital, scale into production, and integrate into supply chains.

Each stage increases the likelihood of further scaling.

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9. Constraints and Limitations

The system is not without limitations.

Coordination can lead to inefficiencies, and capital allocation may not always reflect long-term viability. In some sectors, overcapacity is a potential outcome.

The same mechanisms that enable acceleration can also create structural imbalances.

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10. Beyond the Domestic System

Self-reliance does not imply isolation.

It provides a foundation for external expansion.

Technologies developed and deployed domestically can be extended into international markets, particularly where cost, scale, and system integration are decisive.

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11. Implications for European Scale-Ups

For European scale-ups, the implication is not simply stronger competition, but a different competitive structure.

Competitors increasingly emerge from systems that accelerate deployment and scaling, rather than from isolated firms operating within defined sectors.

The number of competitors increases, their visibility decreases, and their ability to scale improves.

In this context, competitiveness is shaped less by access to capital and more by access to execution environments, integration pathways, and the speed at which technologies can move from validation into deployment.

Implication — Role of Intelligence

As technologies move across systems rather than remaining within firms, visibility becomes a constraint.

Understanding competition requires tracking where technologies are deployed, how quickly they scale, and how capabilities evolve across sectors.

Intelligence becomes an operational requirement.

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12. A Different Measure of Success

Success is no longer defined primarily by invention.

It is defined by the ability to:

- deploy technologies
- scale them across industries
- integrate them into systems
- sustain them under external pressure

Closing Thought

The Five-Year Plan does not introduce a fundamentally new direction.

It makes more explicit a system that has been developing over time.

This system is designed to enable the consistent movement of technologies from development into deployment and from deployment into scale.

The competitive question is no longer who can build a technology. It is who can move it through the system — faster, more consistently, and at scale.

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Appendix A — China DeepTech KPI System (Sector Overview)

These KPIs do not measure activity. They measure the system's ability to convert technology into scale.

Cross-Sector Meta-KPIs

KPI	Indicator	Direction (2025–2030)	Interpretation
Self-reliance ratio	% of critical technologies domestically controlled	~30–40% → 60–80% (sector-dependent)	Reduction of external dependencies
Deployment scale	% of industries adopting key technologies	<20% → 40–70%	Transition from pilot to system-wide deployment
Supply chain localization	% domestic sourcing across value chains	~40–60% → 70–90%	Increasing control over full industrial stack
System resilience	redundancy, substitution capacity	qualitative → measurable targets	Ability to operate under external constraints

Definitions
Self-reliance ratio: share of critical technologies produced domestically.
Supply chain localization: percentage of value chain components sourced within the domestic ecosystem.

Artificial Intelligence

KPI	Indicator	Direction (2025–2030)
Compute capacity	national AI compute (EFLOPS)	~1–2 → 5–10+
Foundation models	# large-scale domestic models	100+ models (increasing consolidation)
Industrial adoption	% of enterprises using AI	~15–25% → 40–60%
Smart city deployment	% of cities using AI systems	~50% → 80–90%

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Outcome: System-level integration of AI across industries

Definitions

EFLOPS (ExaFLOPS): unit of computing power equal to 10^{18} floating-point operations per second.
Smart city deployment: use of AI systems in urban infrastructure such as traffic, energy, and public services.

Semiconductors

KPI	Indicator	Direction (2025–2030)
Self-sufficiency	domestic chip supply share	~30% → 50–70%
Mature node capacity	28nm / 14nm production	>2–3x expansion
Supply chain localization	equipment, materials, EDA	~30–50% → 60–80%
State capital deployment	national semiconductor funds	€40–60B+ equivalent

Outcome: Resilient industrial semiconductor ecosystem

Definitions

Self-sufficiency: share of domestic chip demand met by domestic production.
Mature nodes: semiconductor manufacturing processes (e.g. 28nm, 14nm) widely used in industrial applications.
EDA (Electronic Design Automation): software tools required for designing semiconductor chips.

Biotechnology

KPI	Indicator	Direction (2025–2030)
Innovative drug share	% domestic innovative drugs	~10–15% → 25–40%
Clinical trials	global share	~25–30% → 30–40%
Patent activity	biotech patents	sustained double-digit growth
Regulatory timelines	approval time	−20–40%

Outcome: Accelerated clinical validation cycles

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Definitions

Innovative drugs: newly developed therapies (as opposed to generics).
Regulatory timelines: time required for clinical approval and market authorization.

Energy and Climate Technologies

KPI	Indicator	Direction (2025–2030)
Renewable capacity	installed capacity (GW)	~1,500 → 2,500+
EV penetration	% of new vehicle sales	~35–40% → 50–70%
Battery production	global market share	~60–70% maintained
Grid infrastructure	ultra-high voltage (UHV) expansion	nationwide scale-up

Outcome: Scale-driven cost and production advantages

Definitions

UHV (Ultra-High Voltage): high-capacity electricity transmission enabling long-distance power distribution.
EV penetration: share of electric vehicles in total new car sales.

Advanced Manufacturing / Robotics

KPI	Indicator	Direction (2025–2030)
Robot density	robots per 10,000 workers	~400 → 700–1,000
Smart factories	% automated / digitized facilities	~20–30% → 50–70%
Equipment localization	domestic high-end machinery	~30–40% → 60–80%
Productivity growth	contribution to TFP	increasing

Outcome: Highly automated industrial base

Definitions

Robot density: number of industrial robots per 10,000 workers.
TFP (Total Factor Productivity): measure of efficiency gains beyond labor and capital inputs.
Smart factories: digitally integrated manufacturing facilities using automation and real-time data.

Aerospace and Space

KPI	Indicator	Direction (2025–2030)
Satellite constellations	number of active satellites	1,000+ → several thousand
Launch frequency	annual launches	~60–70 → 100+
Aircraft penetration	domestic aircraft share	~10–15% → 20–30%

Outcome: Independent infrastructure capabilities

Definitions

Satellite constellations: networks of satellites providing communication, navigation, and data services.
Aircraft penetration: share of domestically produced aircraft in national fleets.

Digital Infrastructure

KPI	Indicator	Direction (2025–2030)
5G / 6G coverage	population coverage	>90% nationwide
Data center capacity	compute and storage capacity	multi-fold expansion
Cloud adoption	enterprise usage	~30–40% → 60–80%
Data market size	economic value of data	sustained double-digit growth

Outcome: Foundational digital ecosystem

Definitions

Cloud adoption: use of cloud computing services by enterprises.
Data market size: value created through data as a production factor.

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Final Interpretation

Across sectors, China's KPI system consistently measures:

- the ability to build technologies domestically
- the speed at which they are deployed
- the scale at which they are integrated
- and the resilience of the system under constraint

These indicators collectively define the trajectory of the system.

Appendix B — Sources and Analytical Basis

This analysis synthesizes policy signals, industry data, and structured observation of real-world activity across China's deep-tech ecosystem.

The objective is not to rely on individual sources, but to combine multiple layers of information into a coherent view of system-level dynamics.

1. Policy and Strategic Documents

These sources define direction and system priorities.

- China's Five-Year Plans (14th and emerging 15th cycle)
- Government Work Reports (Two Sessions)
- Ministry-level strategies (MIIT, NDRC)
- "Made in China 2025" and subsequent policy evolution
- National AI Development Plan

2. Industry and Economic Analysis

These sources inform sector dynamics, KPI direction, and industrial trends.

- McKinsey & Company — China technology and industry reports
- Mercator Institute for China Studies (MERICS) — industrial policy and innovation analysis
- Germany Trade & Invest (GTAI) — sector and regional insights
- KPMG — technology and investment trends
- Asia Society — China innovation system analysis
- Capgemini — *Physical AI (2026)* — convergence of AI, robotics, and real-world systems

3. Market and Signal Data Sources

These sources provide visibility into real-time activity and execution signals.

- 36Kr
- CyZone
- TechNode
- Caixin
- TianYanCha

Used to track:

- funding activity
- pilot and deployment signals
- industrial partnerships
- company scaling dynamics

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4. Venture Capital and Industry Perspectives

These sources provide insight into capital allocation and investment behavior.

- China-focused venture capital firms
- operator and corporate perspectives
- cross-border startup ecosystem analysis

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5. Structural and Ecosystem Mapping

These sources provide visibility into value chains, clusters, and industrial structure.

- DoingX Robotics Map (RoboMap — China robotics ecosystem mapping platform)
- cluster-level analysis of industrial regions and specialization

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6. Internal Signal Analysis Framework

This report also draws on structured signal analysis across sectors, including:

- classification of activity vs. execution signals
- mapping of technologies to industrialization stages (research → pilot → deployment → scale)
- tracking of deployment velocity and ecosystem density

This layer enables the transition from descriptive analysis to system-level interpretation.

Methodological Note

The objective is not to provide an exhaustive dataset, but to identify consistent patterns across sources and translate them into system-level insights.

The analysis focuses on:

- direction of change
- interaction between system components
- implications for deployment and competitiveness

The value lies not in individual data points, but in how they are structured to reveal system behavior.

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