The Megatrends Series.

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Disruptive technologies

Investing in the next technological wave

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Imagine it is 2030

You start your day in a home that quietly adapts to your routine. Soft lighting brightens as you wake, the temperature adjusts to your preference, and the kitchen comes alive on its own. Your coffee brews just as your toast pops up, appliances coordinating their **energy use** with the grid to minimise cost and demand. Your **AI assistant** greets you with a tailored briefing of overnight news, key market moves, reminders, and a few personalised suggestions for the day ahead.

While you take a shower, your electric car is already warming up, syncing with real-time traffic flows and planning the most efficient route to work. When you step inside and pull away, it glides through the morning traffic in smooth choreography with other **autonomous vehicles**. You read the newspaper,

Explore Close up

review your schedule, or simply enjoy a quiet moment while the car handles the driving with calm precision. Behind you, your home shifts into energy-saving mode, adjusting its systems to real-time electricity prices.

At work, **humanoid robots** move purposefully through the facility, taking over logistics, inventory handling, and physically repetitive tasks. They work alongside human teams rather than replacing them, lifting heavy loads, navigating hazardous areas, or performing monotonous steps so that people can focus on oversight, problem-solving, coordination, and creativity. **AI systems** assist with analysis and scenario testing, drafting reports, or preparing simulations that once took days. **Digital twins** keep production lines running at peak efficiency, predictive maintenance avoids downtime and **smart energy** systems balance demand across the building.

As the day progresses, a **web of digital infrastructure** supports everything around you. Your **wearable devices** track health indicators and gently suggest when to stretch, hydrate, or take a short walk outside. Around lunchtime, a humanoid delivery robot arrives with your meal, navigating corridors and doors effortlessly. Outside, **autonomous delivery vehicles** restock supplies, while the building adjusts lighting, ventilation, and energy flows based on occupancy and weather forecasts. Public transport routes shift dynamically to passenger demand, making urban movement smoother and more predictable.

By late afternoon, the journey home is quicker thanks to coordinated autonomous mobility systems. As your phone signals you're on your way, your home prepares for your arrival adjusting lighting, temperature, and air quality before you even enter. **Household robots** have taken care of cleaning or small errands, and your AI assistant summarises your day and flags tomorrow's priorities. Entertainment systems adapt content to your preferences, while **health devices** review your biometrics and offer gentle suggestions for sleep or recovery.

None of this feels extraordinary anymore. It will not be everyone's daily reality by 2030 – adoption will be uneven and shaped by cost, regulation and infrastructure. Still, the direction of travel is clear; disruptive technologies have matured, converged, and quietly transformed every layer of the economy, from how we live and work to how we move, learn, and care for ourselves.

This future is closer than we think. The technologies that will define 2030 are already emerging today. Understanding them and the opportunities they create is essential for long-term investors.

1 - Source: PWC PwC's Global Artificial Intelligence Study | PwCm accessed february 2026
2 - Source: : World Health Organization Boosting digital health can help prevent millions of deaths from noncommunicable diseases, accessed february 2026
3 - Source: International Energy Agency Reaching net zero emissions demands faster innovation, but we've already come a long way – Analysis - IEA, accessed february 2026

From vision to reality

The drivers of this 2030 reality are already underway. Breakthroughs in artificial intelligence, robotics and quantum computing are **transforming industries at unprecedented speed.** Automation, big data, and the Internet of Things are rewriting business models, accelerating productivity shifts, and changing consumer behaviour. As **innovation intensifies**, companies must navigate ethical, regulatory and cybersecurity challenges while positioning themselves for the next technological wave.

Within Candriam's Thematic 2.0 framework, **disruptive technologies are a core megatrend** because they demonstrate double materiality: they generate measurable economic value while simultaneously driving profound societal and environmental change.

The scale of this transformation is already visible. Economically, **AI alone could add an estimated $15.7 trillion to global GDP by 2030**[1]. That is more than the current output of Germany and India combined. Socially, AI-enabled healthcare **save more than two million lives** over the next decade through earlier diagnosis and more effective interventions.[2] Environmentally, **innovation is essential**: roughly 35% of the emissions reductions required by 2050 will depend on technologies that are yet to reach commercial markets.[3]

In this white paper, we assess the **key sub-trends driving technological disruption**, such as Generative AI, electrification, quantum computing and next-gen automation, and translate them into concrete investment opportunities.

Mapping the disruption landscape from GenAI to Quantum Computing

Today's technological transformation is being driven by several critical innovation domains, spanning generative AI, electrification, quantum computing and next-gen automation. These sub-trends touch virtually every sector of the global economy, emerging into long-term opportunities. Below we explore each of these innovation domains in more detail and highlight the opportunities that come with it.

Generative AI

As the most visible front of technological disruption, generative AI (GenAI) is rapidly transforming work, automation, and digital services. GenAI creates text, code, images, audio and video, and increasingly acts as an agent that executes tasks across software. GenAI is not just another IT upgrade, but a capability that raises the ceiling on what knowledge workers and autonomous systems can do, especially when paired with automation and high-quality data.

Enterprise use has shifted from pilots to broad adoption: 65% of organizations reported regular GenAI use in McKinsey's 2024 global survey, nearly double from 10 months prior. Estimates vary, but the direction is clear. **McKinsey sizes $2.6–$4.4 trillion of annual value across more than sixty use-cases** concentrated in customer operations, marketing, software, and R&D, while Goldman Sachs projects **GenAI could lift global GDP by around 7%** over a decade as adoption diffuses through firms. Both emphasize that value realization depends on process redesign, data access, and risk controls. Value should accrue at multiple layers: compute (chips, memory, interconnects), AI data centres (power, cooling, fibre), tooling, and domain-specific applications.

In healthcare alone, earlier detection, triage, and decision support could help prevent premature deaths drastically. In education and public services, GenAI can close access gaps and personalize support, provided deployments meet emerging standards around ethics, safety, and cybersecurity.

Case study: personalized cancer vaccines in weeks

BioNTech has pioneered the use of **artificial intelligence to develop personalised cancer vaccines**, designed specifically for each individual patient. Unlike traditional treatments that are the same for everyone, this approach recognises that every tumour has a unique genetic "fingerprint". AI plays a crucial role in analysing this data and translating it into a tailored therapy.

Using advanced algorithms, BioNTech analyses genetic information from a patient's tumour and compares it with healthy tissue to identify the most relevant cancer-specific features to target. AI helps prioritise which of these features are most likely to trigger an effective immune response. This automated analysis dramatically shortens what would otherwise be a lengthy research process, enabling a **personalised mRNA vaccine** to be designed and manufactured **within a matter of weeks.**

Early clinical studies in cancers such as melanoma show that these AI-guided vaccines can strengthen the body's natural defences against cancer, especially when used alongside existing immunotherapies. BioNTech emphasises that AI does not replace clinical trials or medical judgment, but acts as **a powerful accelerator**, improving precision, reducing development time, and opening the door to truly individualised cancer care. This case illustrates how AI can move healthcare beyond diagnosis and into the creation of personalised treatments at unprecedented speed.

Electrification

Electrification has become a central pillar of the shift to cleaner and more resilient energy systems. Advances in power electronics, **smart-grid software, AI-driven optimisation** and next-generation batteries are accelerating the move away from fossil fuels in mobility, buildings and industry. Global investment reflects this structural change: **clean-energy spending now exceeds USD 2 trillion annually**[4], and record growth in electric vehicles and heat pumps is redrawing demand across the energy value chain.

At the same time, **electrification is making energy use smarter and more efficient**. AI-enhanced systems optimise routing, scheduling, leak detection and resource sorting, while building-automation technologies lower emissions by adjusting heating, cooling and lighting in real time. Even if renewable capacity is expanding, Electricity demand continues to rise (from EV to datacentres) significantly. Other than electricity generation, the electricity grid itself is becoming a bottleneck. Upgrading transformers, interconnections, flexibility tools and digital coordination platforms is becoming essential to maintain resilience. Ultimately, electrification is a **multi-decade infrastructure and technology cycle**, supported by regulation, economics and innovation. It opens opportunities in critical hardware, digital enablers and fast-growing end-markets such as clean mobility, smart buildings and grid modernisation.

4 - Source: Bloomberg Global Investment in the Energy Transition Exceeded $2 Trillion for the First Time in 2024, According to BloombergNEF Report | BloombergNEF, accessed february 2026

Quantum computing

The next core-trend is **quantum computing**, early in its journey, but full of long-term optionality and future breakthrough potential. Quantum computing approaches information in a completely different way from classical machines. Instead of processing one possibility at a time, quantum processors can evaluate many possible solutions simultaneously and link information across qubits in ways that classical computers cannot. This allows them to tackle specialised problems in areas such as chemistry, optimisation, and cryptography far more efficiently. A recent milestone illustrates the potential: **Google's "Willow" prototype** completed a benchmark calculation in a few minutes, a task that would take today's most powerful supercomputers a septillion time longer than the age of the universe to solve.

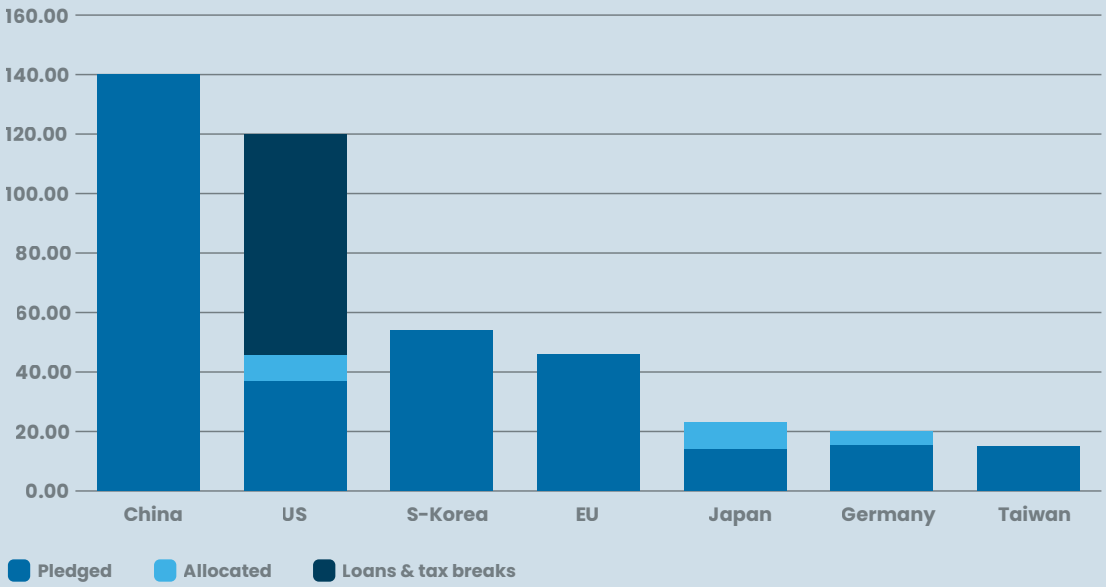
Although the technology is still in its early stages, its commercial landscape is beginning to take shape. Near-term revenue will skew to software toolchains, quantum-inspired algorithms, and post-quantum cryptography (PQC) services, with hardware exposure taken as milestone-based optionality. Boston Consulting Group's 2024 update projects $450–$850 billion in annual end-user value by 2040, supporting $90–$170 billion in provider revenue. **McKinsey sees $1–$2 trillion in value by 2035**, with early impact in chemicals, life sciences, finance, mobility.

The most immediate societal implication is security: networks must migrate to quantum-resistant cryptography well before large-scale code-breaking is practical. At the same time, quantum-accelerated modelling could support drug discovery, materials science (e.g. battery chemistries), and logistics, areas with direct environmental and health benefits.

U.S.-China's battle for technology leadership

Technological innovation is no longer concentrated in the U.S. A global race, most visibly between the U.S. and China, is redrawing leadership in disruptive technologies, particularly AI. In 2024, China filed **12,945 AI patents**, compared with **8,690 in the U.S.**, underscoring the shift toward a geographically distributed innovation landscape.

Figure 1 : Superpowers in global chip war (Global chip investments in $ bn)



Source: Bloomberg, Graphic News

This momentum extends beyond AI into strategic technologies supported by government policy. The **U.S. CHIPS and Science Act** commits **$52 billion** to domestic semiconductor production, while the **European Chips Act** mobilises **€43 billion** in public and private investment. Cybersecurity is another priority area, driven by rising attacks on critical infrastructure.

For investors, this competition reinforces the need for **geographic and thematic diversification.** While some technologies, such as quantum computing, offer long-term optionality, near-term opportunities are concentrated in scalable, revenue-generating areas such as semiconductors, automation, and cybersecurity, where policy support & commercial demand already converge. As a result, the opportunity set is extremely large.

Next-Gen automation

In the meantime, **automation is evolving beyond traditional robotics** toward fully software-defined, AI-driven industrial systems that transform how physical processes operate. Next-Gen automation is the fusion of industrial robotics, computer vision, autonomous mobile robots (AMRs), digital twins, and software-defined automation. As a result, factories and warehouses are becoming reprogrammable systems in which software orchestrates physical workflows.

The installed base and annual installations of robots continue to set records. The International Federation of Robotics counted around 4.7 million industrial robots operating worldwide in 2024 with over 500.000 new installations and around 80% of deployments in Asia.

However, the bigger shift is architectural: open, software-defined stacks and digital twins shorten changeovers, improve yield, and extend useful life of existing industrial facilities. As these technologies scale, **industry 4.0 and 5.0 are expected to offer roughly $3.7 trillion in value-creation potential**[5] as we march toward AI-driven factories by 2050.

In the meantime, **humanoid robots are emerging as one of the most transformative frontiers** in automation. Supported by advances in edge computing, AI perception, actuation, sensing, and battery technology, humanoids bring together the full stack of modern robotics—hardware, software, engineering, and autonomy into systems capable of operating in environments designed for humans.

Morgan Stanley projects **global humanoid robot revenues could surpass $4 trillion** annually **by 2050,** with the global installed base rising toward one million units. As AI boosts robots' flexibility, humanoids could take on increasingly complex tasks and change how labour is organised across logistics, manufacturing, and service industries.

5 - Source: : McKinsey Industry 4.0: Capturing value at scale in discrete manufacturing, accessed february 2026

Translating disruption into investment opportunities

The sub-trends outlined in the previous chapter do not exist in isolation. Together, they form a **technological ecosystem that cuts across sectors and industries.** Their interaction creates strong compound effects. For instance, AI accelerates drug discovery, automation reshapes industrial workflows and quantum research prepares the next frontier of computation and security.

That convergence, not the individual technologies alone, turns technological disruption into investable opportunities. Disruptive technologies simultaneously act as a clear enabler of structural growth, a source of resilience and a catalyst of societal transformation.

Robotics and autonomous systems

Robotics sits at the intersection of today's most advanced technologies. Modern robots, and especially humanoids, combine mechanics, sensing and artificial intelligence into systems capable of operating in complex, human-designed environments. As capabilities converge, robots are evolving from rigid machines into flexible, software-defined platforms.

Investment opportunities emerge across the robotics ecosystem, notably in:

- **Advanced sensing and vision systems** that allow robots to perceive their surroundings with increasing precision.
- **Mechatronics** and **actuation technologies** enabling safe, human-like motion.
- **AI models and control software** that support autonomous decision-making.
- **Edge computing**, connectivity and energy-management systems that enable real-time operation at scale.

As these building blocks mature, robotics expands beyond factory automation into logistics, inspection and service activities, reinforcing the shift toward autonomous physical work.

Connectivity, cloud and digital platforms

Connectivity is the invisible infrastructure underpinning automation, robotics and AI. As data volumes grow and real-time coordination becomes essential, investment opportunities concentrate along the data journey.

We see opportunities in:

- Next-generation networks such as **5G, 6G, fibre** and **satellite** enabling low-latency communication.
- **Industrial IoT ecosystems** connecting machines, sensors, vehicles and infrastructure.
- **Cloud and edge computing** environments that distribute intelligence closer to where data is generated.

Together, these technologies form the digital fabric that enables smart industry, intelligent mobility and modern energy systems.

Electrification and GreenTech

The shift toward clean and electrified energy systems is both a climate imperative and a technology-driven transformation. Electrification spans mobility, buildings and industrial processes, supported by digital control and optimisation.

Key opportunity areas include:

- **Power electronics** and advanced **inverters** managing energy flows in EVs, charging systems and buildings.
- **Smart-grid technologies** integrating sensors, communications and optimisation algorithms.
- AI-enabled **energy-management** and **building-automation** systems improving efficiency and reducing emissions.

Electrification is a multi-decade investment cycle, reinforced by regulation, economics and technological innovation.

Artificial intelligence and data infrastructure

Artificial intelligence is becoming the computational foundation of the digital economy, with opportunities evolving as adoption deepens. Early value creation is concentrated in the infrastructure needed to train and deploy increasingly complex models, before shifting toward software, applications and ultimately the adopters themselves.

Key investment opportunities include:

- **High-performance computing** and specialised AI chips optimised for reasoning, vision and language tasks.
- **Agentic models** that extend the range of tasks AI systems can execute autonomously.
- **AI-native applications** transforming workflows across various economic and public sectors.

As deployment scales, the economic upside increasingly accrues to organisations that successfully redesign processes and expand margins through AI-driven productivity gains.

Smart industry

Smart industry reflects the transition from fixed production lines to adaptive, data-driven manufacturing systems. Digital intelligence is increasingly embedded into physical operations, reshaping how factories and supply chains function.

Investment opportunities focus on:

- **Digital twins** and simulation tools that allow virtual design, testing and optimisation.
- **Connected industrial equipment** providing real-time visibility into operations.
- **Predictive-maintenance solutions** that reduce downtime and extend asset life.
- **Supply-chain intelligence platforms** improving transparency, coordination and resilience.

This transformation supports higher efficiency, greater flexibility and stronger competitiveness across industrial sectors.

Cybersecurity

As digital systems expand and autonomy increases, cybersecurity becomes foundational to economic continuity. The attack surface widens across cloud platforms, AI workflows, connected factories and critical infrastructure.

Structural opportunities arise in:

- **Identity and access management** ensuring trusted interactions between users and devices.
- **Advanced threat-detection** and behavioural analytics.
- **Secure cloud architectures** and operational-technology security protecting physical assets.

Cybersecurity is therefore not a peripheral theme, but a long-term enabler of every other digital transformation.

Key messages

Technological disruption is a structural megatrend redefining how economies grow and industries operate, and where long-term value will be created. For investors, it offers a roadmap to target companies positioned at the core of this shift.

- **AI becomes the foundational growth engine**. Artificial intelligence accelerates decision-making, automation, and innovation across all sectors.
- **Automation enters a new era with robots and software-defined industry.** Advanced robotics and digital twins transform manufacturing, logistics, and industrial efficiency.
- **Electrification triggers a multi-decade cycle**. Investment in grids, power electronics, EVs, and smart buildings drives sustained structural growth.
- **Quantum computing and other breakthrough technologies are redefining security and critical infrastructure.** Advances in computation and real-time systems are transforming modelling, cybersecurity, and global transaction flows.

Convergence across technologies creates the investable ecosystem. The interplay of AI, robotics, energy systems, cloud, and cybersecurity forms a powerful platform for long-term value creation.

Candriam is well positioned to help investors capture the benefits of these technological disruptions, on the back of decades of experience in technology investing and a deep understanding of each technology's real-world value and market potential.