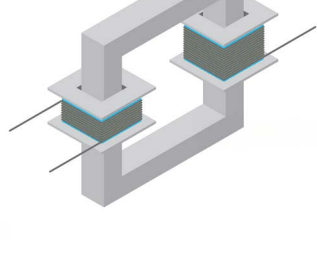


STEP-UP & STEP-DOWN POWER TRANSMISSION

EFFICIENTLY MOVING POWER FROM GENERATION TO CONSUMPTION



STEP-UP & STEP-DOWN TRANSFORMERS

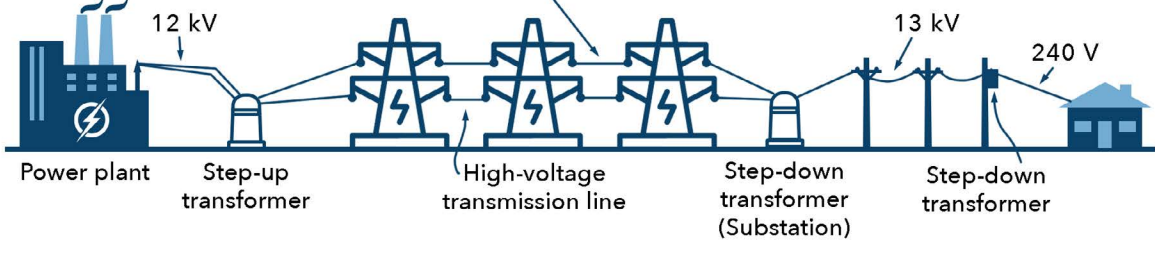
THE BACKBONE OF THE POWER GRID

Transformers manage voltage levels to move electricity from source to destination:

STEP-UP TRANSFORMERS	STEP-DOWN TRANSFORMERS
Increase voltage for long-distance transmission	Reduce voltage for safe use in homes, buildings, and industry

They enable the reliable flow of electricity, but face growing pressure from the evolving demands of modern power systems.

Step-up and Step-Down Power Transmission



70%
OF GRID
IS 25 YEARS OLD

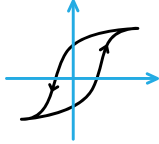
TRADITIONAL SYSTEMS FACE INCREASING STRAIN

NEW & INTENSIFYING CHALLENGES IMPEDING EFFICIENT POWER SYSTEMS

Today's power grid systems face increasing strain from:



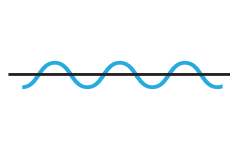
High operating temperatures that exceed older material tolerances



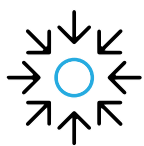
Energy losses in the core (hysteresis) and copper windings (I²R losses)



Voltage regulation issues due to more input load fluctuations



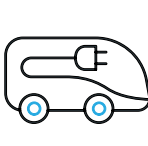
Harmonic distortion from modern, non-linear loads



Inrush currents up to 16x greater when transformers are reverse-fed



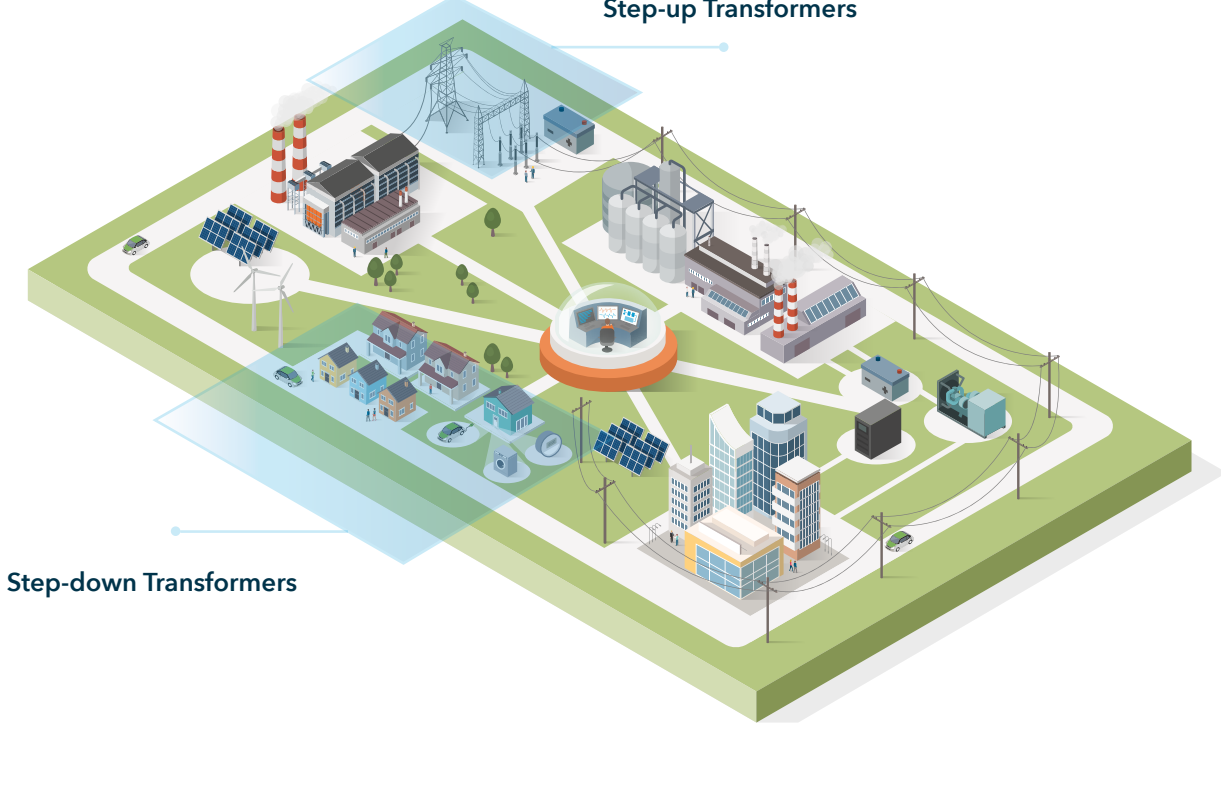
Integration of renewable, decentralized energy sources with variable energy output like solar and wind



Electrification from EVs, AI, and digitalization

These challenges impact the efficiency, reliability, and lifespan of key power transmission infrastructure. They underscore the continuous need for innovation and improvement in transformer technology.

Over 70% of the grid is more than 25 years old and will need replacing in the coming decades.



79%
SURGE
IN POWER DEMAND

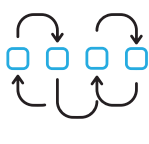
MORE EFFICIENT & RELIABLE TRANSFORMERS

STEP-UP & STEP-DOWN SYSTEMS NEED INNOVATION & IMPROVEMENT

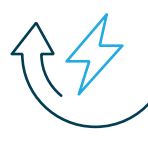
To address the 79% surge in power demand - driven by AI, EVs, expanding populations, and economic growth - transformer systems must integrate next-generation technology to:



Operate at **higher temperatures**



Support faster switching and high-frequency operation



Improve **power factor** and voltage stability



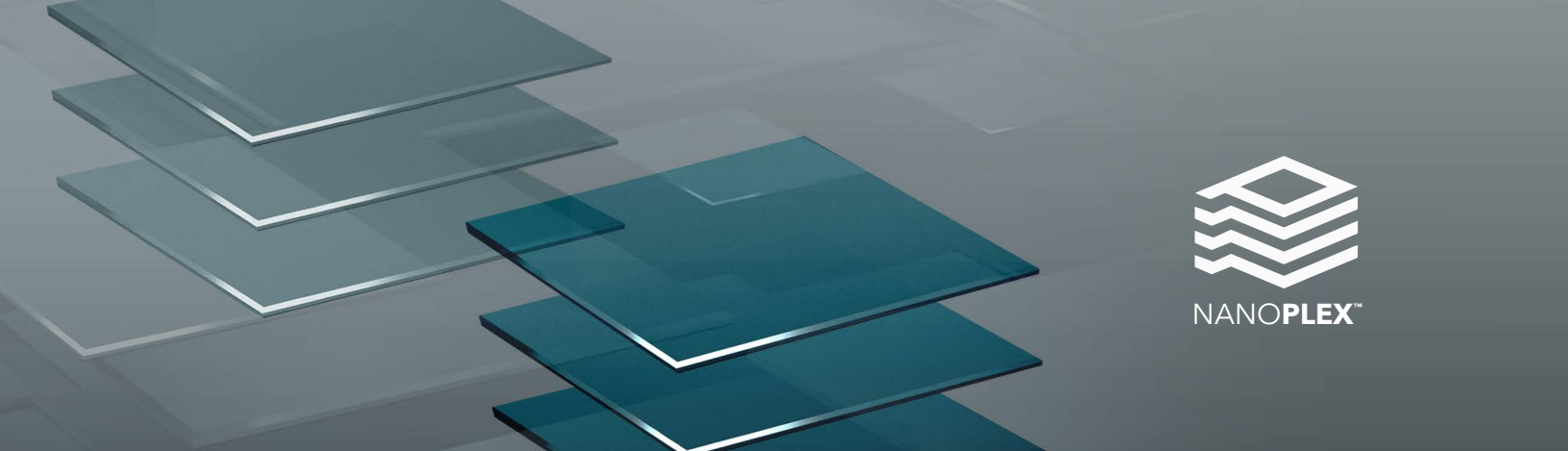
Handle harmonics and inrush currents



Integrate seamlessly with renewable energy sources

At the heart of these systems, **capacitors are indispensable**. They play a vital role in enhancing transformers to be more efficient, reliable, and resilient.

By integrating advanced, next-generation films into capacitors, capacitor manufacturers can address the urgent market demand for modern transformer systems.



UP TO
50%
SMALLER
AND LIGHTER

NEXT-GENERATION CAPACITOR FILM TECHNOLOGY

PEAK NANOPLEX FILMS SIGNIFICANTLY ENHANCE CAPACITOR PERFORMANCE FOR MODERN STEP-UP & STEP-DOWN POWER TRANSMISSION

Peak NanoPlex films enable breakthroughs in capacitor technology, providing enhanced thermal stability, superior energy density, and greater durability compared to traditional BOPP capacitors.

ADVANTAGES OF NANOPLEX FILM VS. BOPP	
Higher Energy Storage	Nanolayered technology enables up to 4x more energy storage
Reduced Footprint	Capacitors up to 50% smaller and lighter, enhancing efficiency and reducing impedance
Longer Lifespan	High durability enables capacitor lifespan up to 5x longer
Higher Duty Cycles	3-5x higher duty cycles , ideal for high-performance applications
Superior Temperature Tolerance	Withstands temperatures up to 135 °C, exceeding BOPP by 30°C+
Bill of Materials (BOM) Savings	Significant cost advantages, enabling capacitor manufacturers to cut BOM costs in half
US-made, 20+ global patents	Manufacturers exposed to supply chain vulnerabilities with ~80% of BOPP film production concentrated in China

ADVANTAGES OF NANOPLEX INTEGRATED TRANSFORMERS		
 Power Efficiency Minimized energy loss in transmission	 Power Quality Cleaner output through harmonic filtering	 Energy Support Short-term storage & reactive power control
 Surge Protection Shielded from voltage spikes & inrush currents	 System Longevity Less maintenance, longer operational life	 Future-Ready Optimized for renewables & smart grids

By integrating NanoPlex film enabled capacitors, grid operators can improve overall power transmission reliability and efficiency, especially in dynamic load environments or grids with fluctuating input from renewables.

Peak NanoPlex film empowers step-up and step-down transformers to meet the demands of tomorrow's energy systems.