

IN-SET

BOLETÍN DE VIGILANCIA TECNOLÓGICA

ELECTRIC POWER SYSTEMS

Resumen de la actualidad tecnológica en transición energética, que recoge tendencias en energías renovables, almacenamiento y materiales, combustibles sostenibles, procesos térmicos y de combustión, infraestructura eléctrica e inteligencia artificial, así como su aplicación en los distintos sectores de consumo.

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PREFACIO



Marco Mancilla
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Mover energía renovable hasta donde y cuando se necesita es un mismo problema planteado en tres escalas. A escala continental se resuelve con transporte en corriente continua; a escala local, con coordinación entre recursos distribuidos; y en el medio, con una señal de precio que haga coincidir ambas. Esta edición de In-SET recorre los tres ámbitos del eje de sistemas eléctricos de potencia: mercados eléctricos con alta penetración renovable, microrredes y sistemas de energía distribuida, y HVDC y sistemas avanzados de transmisión.

El mercado de microrredes crece de 15.630 millones de dólares en 2026 a 57.580 millones en 2034, con una tasa anual compuesta de 17,7% según Fortune Business Insights, y los sistemas de transmisión HVDC pasan de 14.620 millones en 2026 a 22.470 millones en 2031, a 8,9% según la consultora de mercado Mordor Intelligence. Las plataformas de comercialización entre pares siguen siendo marginales, con 73,8 millones en 2025 de acuerdo con Market.us, aunque la Unión Europea ya contabiliza más de 8.000 comunidades energéticas.

En investigación el énfasis está puesto en la operación bajo estrés, como en el trabajo de la Universidad Federal de Santa Catarina y de INESC P&D Brasil publicado en Electric Power Systems Research, que propone un esquema de protección de respaldo basado en sincrofasores para evitar la inestabilidad transitoria en sistemas con enlaces HVDC embebidos, un problema que el sistema brasileño ya enfrenta en sus corredores de ± 800 kV. La propiedad industrial recogida en esta edición se ocupa del mismo tipo de contingencia, con desarrollos patentados que detectan fallas de vaina a tierra en cables HVDC mediante reflectometría en el dominio del tiempo sin interrumpir la operación, y que energizan transformadores y ejecutan arranque en negro con recursos basados en inversores, sin corriente de irrupción.

Terna, operadora de la red de transmisión eléctrica italiana, y STEG, la empresa tunecina de electricidad y gas, adjudicaron a Hitachi Energy un contrato de unos 770 millones de euros por las estaciones convertoras del proyecto Elmed, la primera interconexión eléctrica entre Italia y Túnez. Por otra parte, el operador belga Elia Group, a través de su plataforma WindGrid, y el fondo de pensiones canadiense CPP Investments adquirieron Tarchon, enlace submarino de 1,4 GW entre Alemania y el Reino Unido, en una señal de que el capital institucional de largo plazo empieza a entrar directamente en infraestructura de transmisión.

En relación con la normativa, España aprobó un real decreto que habilita 17.900 millones de euros adicionales de inversión en redes hasta 2030, tras declarar insuficientes los límites vigentes de 0,065% del PIB en transporte y 0,13% en distribución, y ACER, la agencia europea de reguladores de la energía, incorporó la frontera entre Irlanda y Francia al cálculo de capacidad de la región Core tras la puesta en servicio del Celtic Interconnector. Para Chile las tres escalas conviven, dada la distancia entre los recursos renovables del norte y los centros de consumo, el crecimiento de la generación distribuida y un diseño de mercado que debe



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ÍNDICE

Electricity markets with high renewable penetration

HVDC and advanced transmission systems

Microgrids and distributed energy systems

NOTICIAS

- 03 National Grid launches new local voltage flexibility service
- 03 New York's Alfred University, Clean-Tech Startup Partner on AI-Powered Microgrid Controller
- 04 Power at the Edge: How a Smart Hybrid Microgrid is Poised to Change the Power Profile of a UK University
- 04 Elia Group and CPP acquire Tarchon interconnector project
- 04 Hitachi Energy Wins ELMED Converter Station Contract

PUBLICACIONES CIENTÍFICAS

- 05 A convex interactive energy management framework for residential smart microgrids with sha...5
- 05 Expansion planning of hybrid HVAC/HVDC transmission systems under wind power integration a...5
- 06 Synchrophasor-based backup protection scheme to prevent transient instability in bulk powe...6
- 06 A comparative analysis of local flexibility markets in Europe: Market design, performance, and regulatory alignment
- 07 Provision of black start and system services by sector-coupled hybrid power plants: A real...7

PATENTES

- 08 Islanded power system for large data centers
- 08 Microgrid power management system and method for providing ancillary service
- 09 Method of transient-free transformer energization and black start using inverter based resources
- 09 System and methods to estimate sheath to ground faults using online contactless time domai...9
- 09 Multi terminal HVDC control methods and systems

PROYECTOS

- 10 GLocalFlex — A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balanci...10
- 10 I-CARE - Integrated Low-carbon and Resilient Hierarchical Microgrids Framework for Energy-flexible Buildings
- 11 Spittal to Peterhead Subsea Cable Link

MERCADO

- 12 Microgrid Market Size, Share & Industry Analysis and Regional Forecast, 2026-2034
- 12 Peer-to-Peer Energy Trading Platforms Market
- 13 HVDC Transmission Systems Market Analysis Report 2026-2031

EVENTOS

- 14 IEEE PES ISGT EUROPE 2026

ÍNDICE

Electricity markets with high renewable penetration

HVDC and advanced transmission systems

Microgrids and distributed energy systems

- 14 ● Enlit Europe 2026 - Viena
- 15 ● ACDC Global 2027 - 25th IET International Conference on AC and DC Power Transmission

REPORTES

- 16 ● Clean flexibility roadmap: July 2026 update
- 16 ● DOE Study Endorses North Plains Connector HVDC Project
- 17 ● CEEPR Working Paper - Designing Second-Best Price Zones in Electricity Markets

NORMATIVAS

- 18 ● Tarifas aplicables a recursos energéticos distribuidos
- 18 ● Real Decreto por el que se regulan los planes de inversión de las redes de transporte y di...18
- 19 ● ACER updates Core region's electricity rules to support long-term flow-based capacity calculation

NOTICIAS

Edición n°3 | septiembre de 2026 | set.usm.cl

National Grid launches new local voltage flexibility service

Etiqueta: Local flexibility markets | Publicada el 14/09/2026

National Grid Distribution System Operator is launching a new flexibility service designed to help manage voltage constraints on local electricity networks. The Local Voltage Management service will be included for the first time in National Grid DSO's annual long-term flexibility procurement round, which opens on 21 September. The tender will cover more than 800 zones and seek more than 2.8TWh of flexibility, representing a potential market opportunity worth up to £4.6 million.

[ver más...](#)



New York's Alfred University, Clean-Tech Startup Partner on AI-Powered Microgrid Controller

Etiqueta: Microgrid control | Publicada el 13/08/2026

Alfred University's Inamori School of Engineering and clean-tech startup Raniel Systems are developing a new artificial-intelligence-assisted battery storage and microgrid controller. The controller could be used for grid-scale battery storage, commercial and industrial microgrids. Work on the next-generation System-on-Chip Energy Management System / Battery Management System controller began in June and is expected to conclude in November.

[ver más...](#)



Power at the Edge: How a Smart Hybrid Microgrid is Poised to Change the Power Profile of a UK University

Etiqueta: Decentralized electricity system | Publicada el 10/08/2026

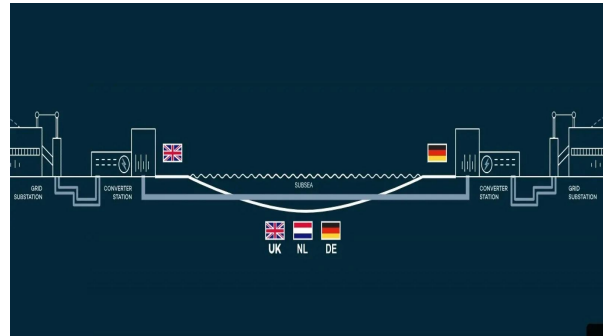
An innovative hybrid microgrid project at the London Design and Engineering University Technical College (LDE UTC) has been granted full planning permission from the London Borough of Newham, a critical milestone for the project. The project could serve as a model for deploying hybrid renewable microgrids within urban environments.

[ver más...](#)

Elia Group and CPP acquire Tarchon interconnector project

Etiqueta: HVDC transmission systems | Publicada el 31/07/2026

Elia Group, through its development platform WindGrid, and Canada Pension Plan Investment Board have acquired Tarchon, a subsea interconnector project between Germany and the UK, from Copenhagen Infrastructure V. The link will provide 1.4 GW of high-voltage direct current capacity between the two countries and allow up to 1.8 GW to move in either direction. CPP Investments is committing C\$1 billion for a majority stake, while Elia Group's participation through WindGrid is a 25% look-through minority holding.

[ver más...](#)

Hitachi Energy Wins ELMED Converter Station Contract

Etiqueta: HVDC transmission systems | Publicada el 24/06/2026

Terna, the operator of Italy's national electricity transmission grid, and STEG, the Tunisian electricity and gas operator, have awarded Hitachi Energy a contract worth approximately €770 million (\$875 million) for the construction of the converter stations for the Elmed project, the first electricity interconnection between Italy and Tunisia.

[ver más...](#)

PUBLICACIONES CIENTÍFICAS

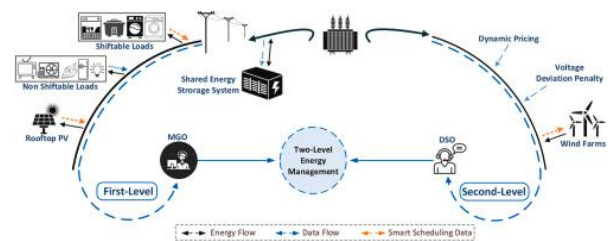
Edición n°3 | septiembre de 2026 | set.usm.cl

A convex interactive energy management framework for residential smart microgrids with shared energy storage within active distribution networks

Etiqueta: Microgrid control | Publicada el 04/08/2026

This paper presents a novel convex two-level interactive energy management framework between smart residential microgrids and the distribution network, incorporating SESS with a customer-investment approach. At the first level, shiftable appliances are optimally scheduled by an integrated home energy management system (iHEMS) based on microgrid operator (MGO) signals, while SESS capacity and subscriber investment costs are determined considering battery degradation costs.

[ver más...](#)

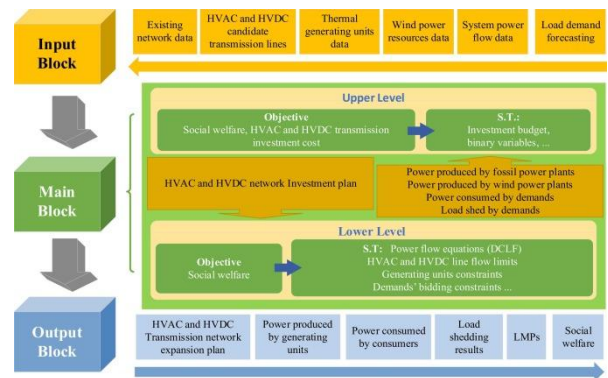


Expansion planning of hybrid HVAC/HVDC transmission systems under wind power integration and generation flexibility constraints

Etiqueta: HVDC transmission systems | Publicada el 30/07/2026

This paper proposes a novel bi-level optimization framework for TNEP that integrates short-term wind power and load demand fluctuations in electricity markets. The proposed methodology employs a 24-hour operational horizon to capture renewable generation variability and demand patterns while evaluating 2 critical flexibility factors: (1) thermal unit ramp rate impacts and (2) high-voltage direct current (HVDC) line integration.

[ver más...](#)



Synchrophasor-based backup protection scheme to prevent transient instability in bulk power systems with embedded HVDC links

Etiqueta: Transmission line reliability | Publicada el

This paper presents a response-based backup System Integrity Protection Scheme (SIPS) designed to enhance grid resilience in power systems with embedded high-voltage direct current (HVDC) transmission systems. This response-based SIPS is envisioned to function as backup to the existing primary event-based SIPS, which relies on unsynchronized measurements.

[ver más...](#)

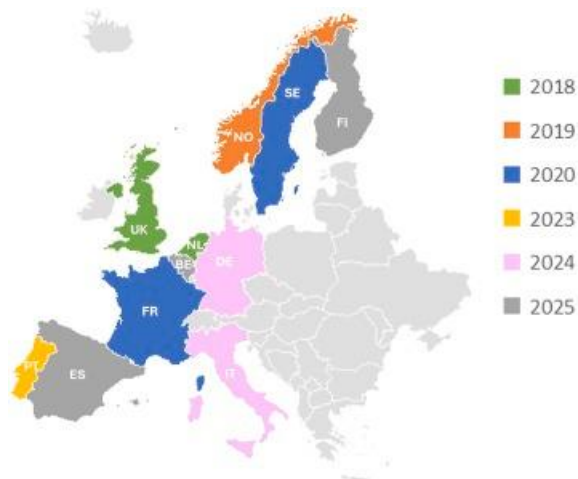


A comparative analysis of local flexibility markets in Europe: Market design, performance, and regulatory alignment

Etiqueta: Local flexibility markets | Publicada el 04/07/2026

This study addresses this gap by presenting a comparative analysis of existing LFM in Europe, structured around three key dimensions. First, an overview of LFM is presented in terms of their design, implemented functionalities, flexibility products, and market architectures. Second, a quantitative performance assessment is conducted, covering traded flexibility volumes, pricing dynamics, and the level of market competition.

[ver más...](#)

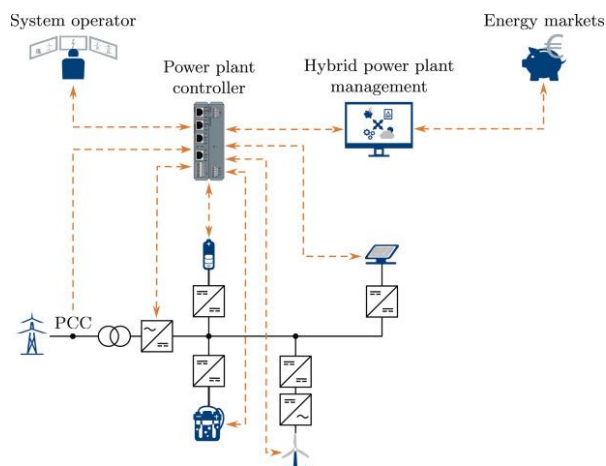


Provision of black start and system services by sector-coupled hybrid power plants: A real-time validated power plant controller framework

Etiqueta: Black-start capability | Publicada el 26/06/2026

This article addresses the growing demand for advanced system service provision by inverter based resources in future power systems. The co-location and joint grid connection of multiple generation technologies within hybrid power plants offer significant potential to deliver such services, while requiring sophisticated coordination of individual assets.

[ver más...](#)



PATENTES

Edición n°3 | septiembre de 2026 | set.usm.cl

Islanded power system for large data centers

Etiqueta: Islanded microgrid operation | Publicada el 10/09/2026

A method for designing and operating a power supply system for one or more AI data centers operating in an islanded power system environment is disclosed. The method includes receiving input data describing projected electrical load characteristics of the one or more AI data centers, identifying system requirements and constraints, defining a plurality of candidate equipment configurations and operating conditions for the power supply system configured to operate independently of an external electrical grid.

[ver más...](#)

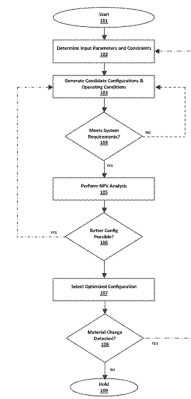


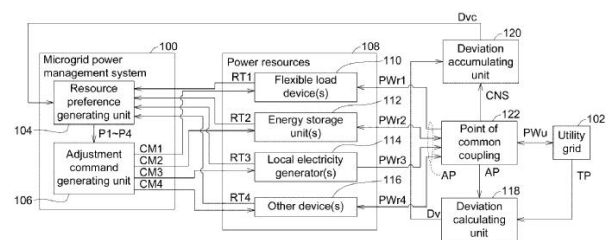
FIGURE 1

Microgrid power management system and method for providing ancillary service

Etiqueta: Ancillary services market design | Publicada el 10/09/2026

A microgrid power management system configured to control a plurality of power resources to provide ancillary services to an electrical power system is provided. A resource preference generating unit generates priority parameters for the power resources according to time-varying cost-effectiveness values of the power resources and an accumulated deviation value. The accumulated deviation value is a sum of deviations between a target power setpoint and an actual power value over a time period.

[ver más...](#)

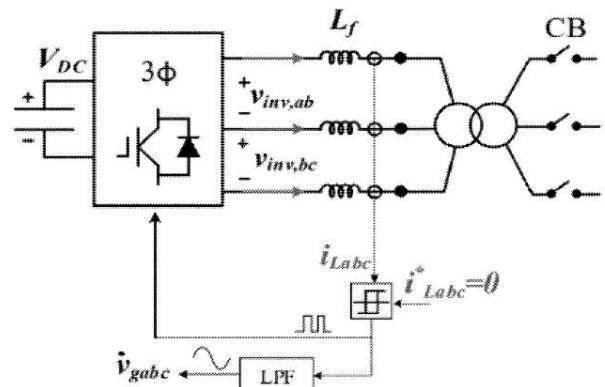


Method of transient-free transformer energization and black start using inverter based resources

Etiqueta: Black-start capability | Publicada el 03/09/2026

Systems and methods for energizing transformers with inverter-based resources (IBRs) are provided. IBRs can pick up local critical loads after blackout and ultimately support the bulk power system recovery. The transformer energization process can be achieved by controlling IBRs without any inrush current, and the duration of the process can be instant or essentially instant.

[ver más...](#)



(a) Direct current control schematic

System and methods to estimate sheath to ground faults using online contactless time domain reflectometry in an HVDC cable system

Etiqueta: DC insulation | Publicada el 30/07/2026

The present invention relates to a real-time monitoring system for detecting sheath-to-ground (SG) faults in high-voltage direct current (HVDC) cable systems. It employs a non-intrusive inductive coupler for Time-Domain Reflectometry (TDR), enabling continuous monitoring without disrupting operations. Combining TDR with Decision Tree Regression (DTR), the system processes fault reflections using historical data for precise fault localization.

[ver más...](#)

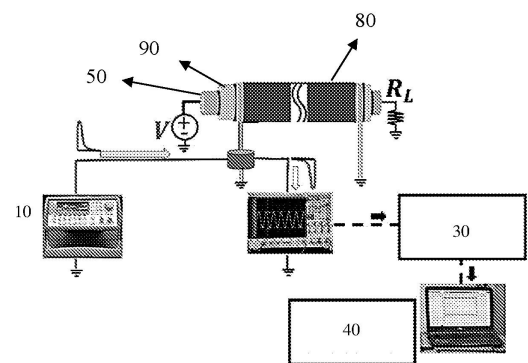


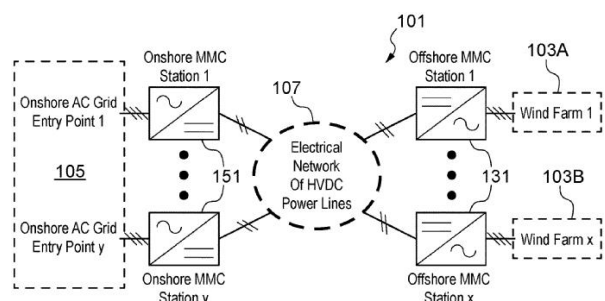
Fig. 1

Multi terminal HVDC control methods and systems

Etiqueta: HVDC transmission systems | Publicada el 23/07/2026

A method for controlling or operating High Voltage Direct Current (HVDC) converters within a multi-terminal HVDC system, multi-terminal HVDC systems implementing such controls, controllers and computer software for same. The outputs of the HVDC converters are controlled by providing each HVDC converter with a respective or converter specific DC voltage reference.

[ver más...](#)



PROYECTOS

Edición n°3 | septiembre de 2026 | set.usm.cl

GLocalFlex – A Global as well as Local Flexibility Marketplace to Demonstrate Grid Balancing Mechanisms through Cross-sectoral Interconnected and Integrated Energy Ecosystems

Etiqueta: Flexibility markets | Publicada el 10/08/2026

The main objective of GLocalFlex is to mobilise demand-response solutions & services in replicated manner for prompt horizontal scaling of flexible local energy systems (LES) by means of easy access and low barrier energy flexibility markets to increase the participation of the consumers across all energy-sectors.

[ver más...](#)

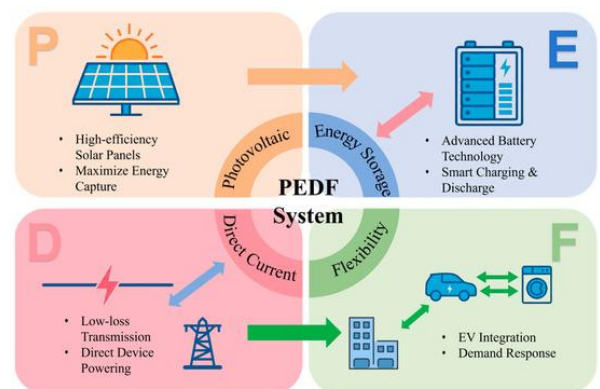


I-CARE - Integrated Low-carbon and Resilient Hierarchical Microgrids Framework for Energy-flexible Buildings

Etiqueta: Microgrid control | Publicada el 10/08/2026

Starting from integrated building flexibility modelling, the project aims at co-optimised and coordinated operation and planning of building microgrids and external microgrids, drawing on building microgrid modelling, energy hub methods, big data technologies and model predictive control. Project keywords include low carbon resilience, commercial building microgrid flexibility, hierarchical microgrids and distributed and decentralised optimisation.

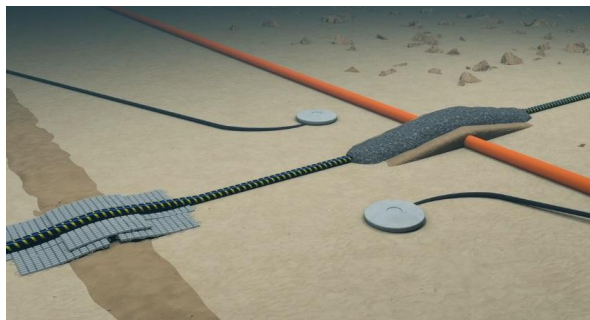
[ver más...](#)



Spittal to Peterhead Subsea Cable Link

Etiqueta: HVDC transmission systems | Publicada el 21/07/2026

The Spittal to Peterhead High Voltage Direct Current (HVDC) subsea cable link is a 166km, 2GW subsea link between Sinclair's Bay in Caithness and Rattray Head near Peterhead and will play a major role in Scotland and the UK's journey towards a secure, clean energy future. The subsea cable will connect into the recently consented Netherton hub near Peterhead in Aberdeenshire, and the proposed Banniskirk Hub in Caithness.

[ver más...](#)

MERCADO

Edición n°3 | septiembre de 2026 | set.usm.cl

Microgrid Market Size, Share & Industry Analysis and Regional Forecast, 2026-2034

Etiqueta: Decentralized electricity system | Publicada el 30/08/2026

The global microgrid market size was valued at USD 13.58 billion in 2025 and is projected to grow from USD 15.63 billion in 2026 to USD 57.58 billion by 2034, exhibiting a CAGR of 17.70% during the forecast period. Asia Pacific dominated the global market, accounting for 31.35% market share in 2025.

[ver más...](#)

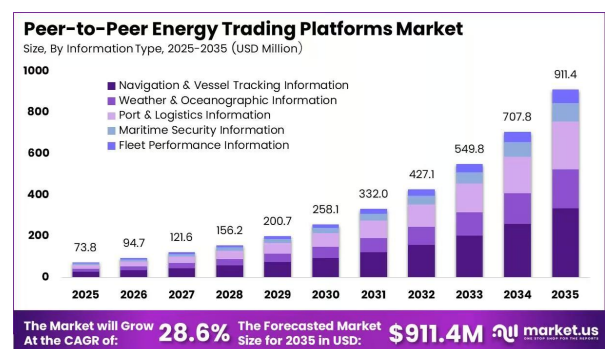


Peer-to-Peer Energy Trading Platforms Market

Etiqueta: Peer-to-peer electricity trading | Publicada el 18/08/2026

The global peer-to-peer energy trading platforms market was valued at USD 73.8 million in 2025 and is projected to reach about USD 911.4 million by 2035, a 28.6% CAGR over 2026-2035. The European Union reported more than 8,000 energy communities by 2025, with a sample of 107 communities representing 12,022 MW of installed renewable capacity, more than EUR 34.3 million in investments, and around 3.5 million tonnes of CO₂-equivalent emissions avoided.

[ver más...](#)

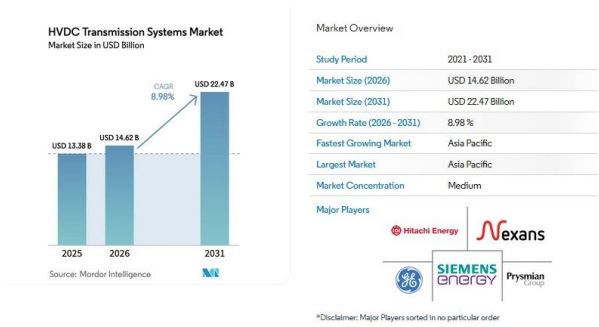


HVDC Transmission Systems Market Analysis Report 2026-2031

Etiqueta: HVDC transmission systems | Publicada el 24/07/2026

The HVDC Transmission Systems Market size is expected to grow from USD 13.38 billion in 2025 to USD 14.62 billion in 2026 and is forecast to reach USD 22.47 billion by 2031 at 8.98% CAGR over 2026-2031. Strong capital spending on offshore wind export cables, ultra-high-voltage corridors in Asia, and grid-hardening programs in North America and Europe are steering this advance.

ver más...



EVENTOS

Edición n°3 | septiembre de 2026 | set.usm.cl

IEEE PES ISGT EUROPE 2026

Etiqueta: Distributed energy resource (DER) | Publicada el 30/08/2026

IEEE PES ISGT Europe 2026 runs from 19 to 22 October 2026 at the Budapest Congress Centre, under the theme From Flexibility to Autonomy – Smart Grids for a Sustainable and Stable Future. Organized by the IEEE Power & Energy Society (PES) and the Budapest University of Technology and Economics (BME), it will bring together researchers, industry leaders, policymakers, and students from across the globe to shape the future of power systems.

[ver más...](#)



Enlit Europe 2026 - Viena

Etiqueta: Flexibility markets | Publicada el 21/07/2026

Enlit Europe 2026 takes place 10-12 November 2026 at Messe Wien in Vienna, Austria, with more than 750 exhibitors and over 600 speakers. Its Consumers & Flexible Demand Hub devotes a full day of sessions to flexibility on 10 November, covering the estimate that commercial and industrial consumers could capture up to EUR 8 billion of Europe's emerging flexibility value pool by 2030, a comparison of how the UK, Spain and the Nordic region are building flexibility into their energy systems, programmes that reward commercial, industrial and residential consumers for providing flexibility services, and the effect of grid tariffs on electric vehicle adoption.

[ver más...](#)



ACDC Global 2027 - 25th IET International Conference on AC and DC Power Transmission

Etiqueta: HVDC transmission systems | Publicada el 01/07/2026

25th IET International Conference on AC and DC Power Transmission. 1 - 3 March 2027 | SEC, Glasgow.

As the energy transition progresses, it is essential that you keep your technical knowledge up to date and learn about the latest innovations to maintain grid efficiency. Taking part as an author brings your latest work in front of key names in power transmission, and is the ideal way to raise your profile in the sector.

[ver más...](#)



REPORTES

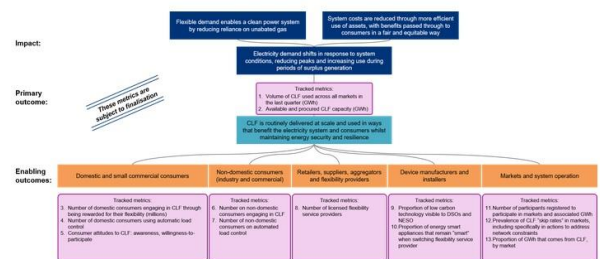
Edición n°3 | septiembre de 2026 | set.usm.cl

Clean flexibility roadmap: July 2026 update

Etiqueta: Prosumer coordination | Publicada el 30/07/2026

This July 2026 update reports progress against the Clean Flexibility Roadmap published in July 2025. By mid-June 2026 Ofgem and Elexon had migrated more than 11.3 million smart meters to half-hourly settlement, the basis on which households and small businesses can be rewarded for shifting demand. Distribution network operators must submit their RIIO-ED3 business plans, including build and flex strategies, in December 2026, and Ofgem will report on its review of DSO use of flexibility under ED2 by autumn 2026.

[ver más...](#)

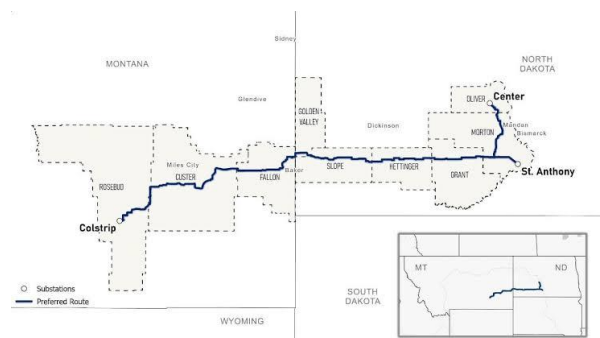


DOE Study Endorses North Plains Connector HVDC Project

Etiqueta: HVDC transmission systems | Publicada el 21/07/2026

The study states that interregional transmission has the highest potential value to relieve transmission congestion and provide resource adequacy benefits. It notes that North Plains Connector can provide value by enabling cross-interconnection power transactions with generation resources that experience different weather patterns, allowing regions to share resources more efficiently and respond more effectively to changing system conditions.

[ver más...](#)



CEEPR Working Paper - Designing Second-Best Price Zones in Electricity Markets

Etiqueta: Locational marginal pricing | Publicada el 22/06/2026

More than two-thirds of electricity in North America is traded in deregulated wholesale markets. These markets use a system called locational marginal pricing (LMP), where generators are paid prices that reflect local supply and demand conditions at each point in the grid. These prices can vary enormously across locations, driven mainly by transmission congestion.

[ver más...](#)



NORMATIVAS

Edición n°3 | septiembre de 2026 | set.usm.cl

Tarifas aplicables a recursos energéticos distribuidos

Etiqueta: Tariffs for prosumers | Publicada el 29/07/2026

El Grupo ICE publica el pliego de tarifas aplicables a los recursos energéticos distribuidos, actualizado al 29 de julio de 2026. Incorpora los cargos de interconexión a las redes de distribución fijados por la resolución RE-0031-IE-2026 de la ARESEP, publicada en el Alcance N°93 de La Gaceta N°137 del 23 de julio de 2026.



Real Decreto por el que se regulan los planes de inversión de las redes de transporte y distribución de energía eléctrica

Etiqueta: Decentralized electricity system | Publicada el 28/07/2026

El Consejo de Ministros aprobó el Real Decreto que regula los planes de inversión de las redes de transporte y distribución de energía eléctrica, que permitirá una inversión adicional de 17.900 millones de euros hasta 2030 y establece los procedimientos para la elaboración, tramitación y justificación de los planes de inversión de las empresas distribuidoras. Los límites vigentes de inversión anual con cargo al sistema eléctrico, del 0,065 % del PIB en la red de transporte y del 0,13 % en la de distribución, se habían mostrado insuficientes.



ACER updates Core region's electricity rules to support long-term flow-based capacity calculation

Etiqueta: HVDC transmission systems | Publicada el
17/07/2026

Following the commissioning of the Celtic Interconnector between Ireland and France, ACER has integrated the Ireland and Northern Ireland single electricity market to France bidding zone border into the capacity calculation rules of the Core region. The agency adopted two decisions amending the day-ahead and long-term capacity calculation methodologies for the Core capacity calculation region, the largest in the EU, covering 13 Member States.

