Liquid air energy storage (LAES) is a cost-competitive, long-term, and large-scale solution without geographical restrictions. It makes fluctuating renewable sources capable of bearing base loads. MAN Energy Solutions provides turbomachinery including air compressors and air expanders which are the key components of LAES systems.

**Benefits at a glance**
- High system efficiency enabled by MAN turbomachinery
- MAN compressors and air expanders available for medium to very large system sizes for long-term storage
- Long life cycle and no degradation
Technology

Off-peak or excess electrical energy is used to compress air via a MAN Energy Solutions compressor. The compressed air is then cooled down to be liquified. The liquid air is stored in insulated tanks. When power is required, liquid air is drawn from the tank, put under pressure by a cryogenic pump, evaporated and heated. This produces a high pressure gas, which is passed through a MAN air expander to drive an electricity generator.

MAN equipment for LAES

MAN ES has the most suitable key turbomachinery equipment for bulk energy storage solutions like LAES.

MAN compressors

MAN Energy Solutions is a leading manufacturer of air compressors with many years of experience in air separation. Our compressor portfolio includes radial, integrally geared and combined axial/radial type main air compressors for large units. MAN compressors cover suction flow rates up to 1.5 million m$^3$/h and max. discharge pressures up to 250 bar (3625 psi). With MAN compressors, over 45,000 tons of liquefied air can be produced per day.

MAN expanders

MAN Energy Solutions offers an efficient and reliable power recovery unit including air expander. Our expanders and steam turbines are suitable for power generation and mechanical applications up to 180 MW. The robust design of the expanders enables high inlet temperatures up to 760 °C (1400 °F) or high inlet pressure up to 140 bar (2031 psi). MAN tailors axial and radial gear expander solutions with single- and multistage designs to strike the perfect balance between costs and efficiency.

MAN Cryo

MAN Cryo has decades of extensive experience in cryogenic design and solutions. We design, engineer and provide a complete storage and vaporization system including cryogenic pumps for liquid air.

MAN Energy Solutions
86224 Augsburg, Germany
P +49 821 322-0
F +49 821 322-3382
info@man-es.com
www.man-es.com

MAN Energy Solutions
46145 Oberhausen, Germany
P +49 208 692-01
F +49 208 669-021
turbomachinery@man-es.com
www.man-es.com

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