

Availability of technologies, services and processes, needs and gaps in Brazil

SUB-SECTOR	TECHNOLOGIES OR SERVICES	MAIN TECHNOLOGIES OR SERVICES AVAILABLE IN BRAZIL	NEEDS AND GAPS IN THE BRAZILIAN SECTOR
Design and engineering	Architecture	Large number architecture firms with an understanding of the Brazilian reality. Good levels of technical design.	Some architecture firms may not have the capability to apply BIM or to lead large, complex multidisciplinary projects with modern design standards.
	Engineering design	Generally smaller firms with a good grasp of basic VRF and chilled water systems. Provide services at low cost through template approach.	Few large, multidisciplinary companies capable of providing integrated engineering design services or innovative designs.
	Low-carbon consultancy	Many companies providing consultancy and building simulation services for sustainability certification.	Few companies capable of participating in a complex, integrated design process.
Construction materials	Insulation materials	Major multinational providers are present in Brazil. Standard materials such as PU foam are widely available, and usually sufficient for the Brazilian market.	Insulation in hot climates is generally less important than in heated buildings. No major needs are identified, apart from higher quality of installation work.
	Reflective materials	Major multinational providers are present in Brazil. Often white paint provides adequate performance.	Low-cost, durable paints or surface coverings with good long-term reflectivity performance in dirty or humid tropical climates.
	High-performance glass	Major multinational providers are present in Brazil and aggressively market high-performance glazing products through energy efficiency concerns.	No major gaps are identified.
Water heating	Solar thermal systems	A wide range of locally manufactured technologies, many supplying standardised, low-end systems to the MCMV programme or higher end products to private houses.	Mid-range systems for commercial application. Full system provision for residential flats. There are few designers or products for larger systems.
	Gas heating	Instantaneous gas heaters widely used in new buildings in areas with piped gas.	Intelligent controls or centralised systems, if they can be installed with initial costs comparable to individual instantaneous gas heaters.
	Heat pumps	Unknown in domestic water heating, although used in some swimming pool heating.	Air source heat pumps for domestic water heating systems, to replace direct electric heating.
Measurement and monitoring	Smart meters	Energy distributors have carried out pilot smart metering projects in several areas, but the roll-out programme is largely stalled.	Offer technology or innovative designs to Brazilian technology companies who can develop pilots and R&D projects with electricity distributors.
	Home energy monitors	Largely unknown in the Brazilian market.	Provide low-cost home energy monitors for domestic installation and small commercial buildings such as bakeries (<i>padarias</i>).
	Remote energy management	Some software systems available. Most hardware is off-the-shelf products from large multinationals.	Advanced software for energy management, low-cost hardware for temporary or permanent measurement of energy consumption and energy quality.

Demand management	Building management systems (BMS)	High-end or large new buildings often have complex BMS systems. Many are provided by the air conditioning system providers, usually large multinationals.	Training for BMS system operators. Simple, low-cost systems that can be retrofitted to existing buildings and identify energy saving opportunities. Home automation systems for high-end residential developments are likely to be a significant opportunity.
	"Internet of things" devices	Largely unknown in the Brazilian market.	May be some opportunity for appliances with time-of-day operation to avoid peak energy cost times, especially as the White Flag energy tariffs become more common.
	Software solutions	Largely unknown in the Brazilian market.	Software to link significant loads to the energy distributors' needs to provide instantaneous energy demand reduction (megawatts) at times of peak demand.
Controls and electrical systems	Power factor correction	Both fixed and variable systems commonly used.	No major gaps are identified.
	Harmonic filters	Increasingly common.	There may be a pace for low-cost systems with measurable benefits, which can be supplied through performance contracts.
	Voltage optimisation	Several companies are marketing these solutions on the Brazilian market.	Low-cost systems with proven track-records measurable benefits, which can be supplied through performance contracts.
Lighting systems	High-efficiency lighting	LED lighting is widely used and effectively marketed by large multinationals and low-cost Chinese producers.	There may be some space in niche markets, but generally this market is considered to be saturated.
	Controls	Lighting control systems are available and simple systems such as occupancy sensors are widely used.	Full design and supply of more advanced lighting control systems, such as daylighting and dimmers.
	Natural lighting solutions	Several natural lighting systems available on the market.	There may be an opportunity for marketing and supplying innovative systems for high-end developments.
HVAC systems	High-efficiency cooling	The market for high efficiency systems is dominated by large multinationals. Low-cost producers compete with less efficient systems. Most international companies assemble the systems in Manaus (AM) to take advantage of tax breaks. VRF systems are becoming more common in large commercial buildings, while split or inverter systems are used in residences. Chillers are used in large developments, although the 2014 water crisis has caused a sharp move away from cooling towers towards air-cooled chillers.	Innovative systems or those with niche applications. Any systems which can work at high efficiency while reducing water consumption from existing or new air conditioning systems.
	Heat exchangers	Some heat recovery or enthalpy wheels applied in green buildings to meet required certification levels.	Systems for reducing heat and humidity (enthalpy) gains from outside air by exchanging heat with exhaust air, if they provide financial pay-back.

	Ventilation systems	Simple ventilation systems, usually from multinational suppliers.	Dedicated Outdoor Air Systems or other innovative, low-energy ventilation systems or silent fans.
Appliances and equipment	Servers and datacentres	Large datacentres are designed to international best practice, but medium-sized and small datacentres are often poorly designed and inefficient.	Design services. Specific systems and products that make datacentres more robust and efficient. Effective and efficient UPS systems. Control and operation.
	Office equipment	Standard products.	No major gaps are identified.
	High-efficiency appliances	Multinationals and lower-cost national manufacturers are all able to meet A-rating levels in INMETRO's PBE.	High-efficiency, European-designed systems for high-end residential developments.
Education	Training for building managers, energy auditors and specific systems operators	SENAI runs a postgraduate energy manager programme. Procel has provided training for some energy auditors. International qualifications such as the European Energy Manager (EUREM) and ASHRAE Building Energy Assessment Professional or Building Energy Modelling Professional are run in Brazil occasionally.	Effective training courses focussed on the design and operation of high-efficiency equipment, especially mechanical systems and building services, aimed at all levels of professionals.