

MARKET OPPORTUNITY

Singapore



**GREEN
ENERGY**
TECHNOLOGIES



Expected private
sector investment
€2-2.6 billion

Contributes
€2.2 billion to
Singapore's GDP

A 'Living Lab' for
innovative solutions

OVERVIEW

- Singapore is willing to spend up to €445 million on clean technology R&D in order to reduce energy intensity by 35% from its 2005 level by 2030.
- Energy products such as solar and waste constitute only 3.4% of the resources consumed (2013).
- €90 million earmarked for research into clean energy technologies under the banner of the Energy Innovation Programme Office (EIPO).
- Singapore is Asia's first Photovoltaic market; no subsidies have been required to sustain this market.

Business Opportunities for EU companies

1. Offering technologies on:
PV materials, cells and modules (Very high-efficiency c-Si cells, high efficiency multi-crystalline solar cells), PV grid integration (components and software for smart grids) and PV system for the tropics (rural and industrial off-grid PV applications, including PV hybrid systems)
2. Partnerships with Singaporean companies to respond to **SolarNova**, a government-led solar lead demand programme, spearheaded by the Singapore Economic Development Board (EDB). SolarNova will support Singapore's plan to have 350 MWp of solar power in Singapore by 2020. More tenders under the programme will be called over the next 4 to 5 years.
3. Research co-operation with local companies. Potential use of several existing funds for innovation, including those targeting novel very-high-efficiency solar cells, low material consuming and low cost energy conversion paths
4. Having technology-led solutions in the production of biomass fuel from horticultural waste and wood waste
5. Partnerships with Singaporean companies to seek the support of Singaporean government agencies to export technical solutions and business models to countries in the region where there is abundant biomass waste

Sector Characteristics

- Strong focus on solar energy given its strategic location in the tropical sun belt and semiconductor capabilities.
- Emphasis on wind energy, biomass, tidal energy, smart grids, green buildings, energy efficiency and carbon services.
- Solar PV is a natural choice for Singapore, thanks to its close proximity to the equators. Singapore has high solar irradiation levels with minimal seasonal variation.
- Sustainable Energy Association of Singapore (SEAS) estimates about 230 renewable energy companies in Singapore, most of them in Solar.
- Singapore has enough space to accommodate 6GWp of solar PV (17% of current energy demand).
- The potential market size of biomass energy is estimated to be €42 million.
- The total biomass waste will grow at a 4.5% until 2018.
- Biomass and biogas are already financially viable and with an annual growth of 4.5%.

MARKET OPPORTUNITY

Singapore



GREEN
ENERGY
TECHNOLOGIES

OVERVIEW

- Singapore could meet 7% of its energy demand with Renewable Energies unlocking private sector investment of €2-2.6 billion in the next 12 years.
- The levelized cost of electricity (LCOE) in Singapore is already below retail tariffs, making renewable energy competitive with conventional energy sources.
- Singapore has consistently ranked highly in the World Bank's Ease of Doing Business Report, where it is currently ranked No. 1 (2016).

Key Players

	Renewable Energy Corporation has established one of the largest integrated solar manufacturing complexes in Singapore.
	Trina Solar is a leading manufacturer of solar photovoltaic (PV) products worldwide.
	Phoenix Solar has become the market leader in PV systems integration in Singapore and in the region.
	Gamesa is a leading wind turbine manufacturer with Singapore as its base for its first R&D centre in Asia
	Yingli Solar, one of the largest vertically integrated photovoltaic manufacturers.
	SembCorp industries opened a €22 million woodchip-fuelled biomass steam production plant in Singapore.
	China Guangdong Nuclear Power Holdings constructed a unique integrated biomass-solar power generation plant.
	ecoWise runs one of the country's most recognisable biomass projects, the Biomass Cogeneration System at the Gardens by the Bay.

Key Sub-sectors and Technologies

1.	PV materials, cells and modules
2.	Floating and ground mounted PV
3.	Energy-efficient organic PV
4.	PV grid integration
5.	PV system for the tropics
6.	Biomass from horticultural & wood waste
7.	Combined heat and power (CHP) & Tri-generation