

Understanding Mitrex's Solar Cladding EPD & Energy Production

The Mitrex Solar Facade EPD quantifies the impacts of our building integrated photovoltaic (BIPV) cladding, with a focus on carbon emissions. For 1 m² of cladding, the total lifecycle carbon emissions are 40.79 kg CO₂e/m². This EPD, aligned with ISO 14025 and EN 15804:2012+A2:2019, uses 2023 data from Mitrex's Toronto facility, leveraging Ontario's low-carbon grid (0.038 kg CO₂e/kWh, 50.8% nuclear, 24.5% hydro). The functional unit is 1 m², with a 60-year service life, ensuring robust lifecycle analysis for sustainable building solutions.

Mitrex Solar Facade EPD total lifecycle emissions are approximately 70% less than a competitor's BIPV cladding product.¹ During the 60-years service life of the product, the BIPV cladding can produce clean energy. The energy production can be calculated using the equations on page 6 of the EPD, taking into account the site-specific and annual average solar radiation, BIPV specific electrical power, and potential losses and degradation.

The total lifecycle carbon emissions of the cladding can be offset by the energy production. The energy produced by the cladding would displace grid supplied electricity, and the local electricity emissions would be prevented for every kWh produced by the cladding.

Alternative cladding solutions such as metal cladding may appear better in terms of total lifecycle carbon emissions. However, the BIPV cladding can offset those emissions while the metal cladding cannot. Also, the reference service of a competitor's metal cladding is 30 years², which means the competitor's cladding will need to be replaced, contributing to higher total lifecycle carbon emissions using the same timespan of 60 years.

Carbon Offset via Solar Energy

To offset 40.79 kg CO₂e in New York:

New York Electricity Emissions Factor: 0.211 kg CO₂e/kWh

Electricity needed to offset lifecycle carbon emissions: $40.79 \div 0.211 \approx 193.32$ kWh

Annual electricity produced by 1m² cladding in New York: 79.20 kWh/year

Time to offset: $193.32 \div 79.20 \approx 2.44$ years

Average Energy Use in New York:

- Residential: ~7,000-7,500 kWh/year per household
- Commercial: ~20-30 kWh/sqft/year depending on building type and efficiency level

¹ <https://www.epddanmark.dk/uk/epd-database/solarlab-dk/solarlab-bipv-facade-cladding-w-color-coated-and-satinated-glass/>

² <https://www.kingspan.com/ca/en/campaigns/certifications/epd/>

Comparative Energy Use in Other Cities

Emission factors and energy use vary by grid mix and climate:

Miami, FL:

- Miami Electricity Emissions Factor: 0.357 kg CO₂e/kWh
- Electricity needed to offset lifecycle carbon emissions: $40.79 \div 0.357 \approx 114.26$ kWh
- Annual electricity produced by 1m² cladding in Miami: 82.06 kWh/year
- Time to offset: $114.26 \div 82.06 \approx 1.39$ years

Houston, TX:

- Houston Electricity Emissions Factor: 0.348 kg CO₂e/kWh
- Electricity needed to offset lifecycle carbon emissions: $40.79 \div 0.348 \approx 117.21$ kWh
- Annual electricity produced by 1m² cladding in Houston: 78.96 kWh/year
- Time to offset: $117.21 \div 78.96 \approx 1.48$ years

Los Angeles, CA:

- Los Angeles Electricity Emissions Factor: 0.179 kg CO₂e/kWh
- Electricity needed to offset lifecycle carbon emissions: $40.79 \div 0.179 \approx 227.88$ kWh
- Annual electricity produced by 1m² cladding in Los Angeles: 89.16 kWh/year
- Time to offset: $227.88 \div 89.16 \approx 2.56$ years

Toronto, ON:

- Toronto Electricity Emissions Factor: 0.038 kg CO₂e/kWh
- Electricity needed to offset lifecycle carbon emissions: $40.79 \div 0.038 \approx 1073.42$ kWh
- Annual electricity produced by 1m² cladding in Toronto: 72.03 kWh/year
- Time to offset: $1073.42 \div 72.03 \approx 14.90$ years

Edmonton, AB:

- Edmonton Electricity Emissions Factor: 0.49 kg CO₂e/kWh
- Electricity needed to offset lifecycle carbon emissions: $40.79 \div 0.49 \approx 83.24$ kWh
- Annual electricity produced by 1m² cladding in Edmonton: 87.34 kWh/year
- Time to offset: $83.24 \div 87.34 \approx 0.95$ years

Why Mitrex BIPV?

Mitrex Solar Facades transform buildings into energy generators, offsetting embodied carbon faster in high-emission grids (e.g., Miami, Houston) while maintaining aesthetic versatility. Our EPD empowers consultants to design sustainable, net-positive buildings with confidence.

Example Energy Production Calculations

$E1 = \text{Srad} * A * y * \text{PR} * (1 - \text{deg})$

City	Panel Output (W/m2)	Srad (kWh/kWp/year)	A (m2)	y (kWp)	PR	deg	E1 (kWh/year)	Embodied Carbon to Offset (kg CO2e)	Electricity Emissions Factor (kg CO2e/kWh)	Years to Offset Emissions
New York	135.5	825	0.9028	0.1355	0.79	0.007	79.20	40.79	0.211	2.44
Miami	135.5	901	0.9028	0.1355	0.75	0.007	82.06	40.79	0.357	1.39
Houston	135.5	855	0.9028	0.1355	0.76	0.007	78.96	40.79	0.348	1.48
Los Angeles	135.5	979	0.9028	0.1355	0.75	0.007	89.16	40.79	0.179	2.56
Toronto	135.5	751	0.9028	0.1355	0.79	0.007	72.03	40.79	0.038	14.90
Edmonton	135.5	888	0.9028	0.1355	0.81	0.007	87.34	40.79	0.49	0.95

Canadian Emission Factors: [Emission factors and reference values : Canada's greenhouse gas offset credit system](#)

US Emission Factors: [Emissions & Generation Resource Integrated Database \(eGRID\)](#)

Srad and PR values taken from PVsyst for the local conditions.