CASE STUDY

Avoided Emissions from AP/ArmaFlex

Armacell's AP/ArmaFlex insulation helps reduce use-phase greenhouse gas emissions in commercial buildings by limiting heat gain in cooling pipework. AP/ArmaFlex is estimated to enable approximately 505 ktCO_2e of avoided emissions over its lifetime, compared with a mineral wool insulation reference scenario in commercial cooling applications. The estimate uses a forward-looking approach based on 2025 product net sales and modelled lifetime use.

ASSESSMENT DETAILS

// **Functional unit:** m^3 of insulation sold.
// **Impact - Emissions Avoided:** 3.32tCO_2e avoided per m^3 of AP/ArmaFlex.
// **Time Period:** 50-year assumed product lifetime.
// **Scope:** Commercial cooling applications across Armacell's global sales network.
// **System Boundaries:** The assessment includes use-phase emissions associated with heat gain through commercial cooling pipework. Upstream embodied emissions associated with the production of AP/ArmaFlex and mineral wool are excluded from the avoided emissions calculation.

LOW-CARBON SCENARIO

// The low-carbon scenario reflects the use of AP/ArmaFlex in commercial cooling pipework.
// AP/ArmaFlex is a flexible, closed-cell elastomeric insulation designed for HVAC, refrigeration, cooling and process systems. It reduces heat gain in chilled-water pipework compared with the mineral wool reference scenario, reducing the cooling energy required to maintain operating conditions.
// The avoided emissions are calculated as the difference in emissions between the low-carbon scenario with the application of AP/ArmaFlex and the mineral wool reference scenario.

REFERENCE SCENARIO

// The reference scenario is mineral wool insulation used in commercial cooling pipework.
// Mineral wool is one of the dominant insulation materials globally and represents a major share of the building insulation market.
// A no-insulation counterfactual has not been selected as it has been deemed less representative and could materially overstate the avoided emissions claim by 20 to 30 times more.

METHODOLOGY

ASSUMPTIONS & LIMITATIONS

// The avoided emissions result is a modelled estimate and is subject to uncertainty.
// The cooling system's operating hours and the number of cooling days are key sources of uncertainty. Changes to either assumption can directly affect the estimated avoided emissions result.
// The methodology applies country-level cooling day assumptions and does not account for regional climate-zone variation within large countries.
// A uniform operating-hours assumption has been applied across commercial building types, although actual operating profiles may vary by building type.
// Avoided emissions vary by installation location and local grid emission intensity.
// Future decarbonisation projections for the electricity grid have not been incorporated into the current modelling approach.

INPUTS
// Pipe diameter
// Insulation thickness
// Thermal conductivity (AP/ArmaFlex and mineral wool)
// Ambient and operating temperature

1 ESTIMATE HEAT GAIN THROUGH THE INSULATED PIPEWORK

Estimate heat gain through insulated pipework for AP/ArmaFlex and mineral wool using radial conduction.

2 COMPARE HEAT TRANSFER BETWEEN AP/ARMAFLEX AND MINERAL WOOL

The difference between the two is the reduction in heat gain.

INPUTS
// Cooling days per year
// Assumed chiller operating hours
// Pipework length (based on product sales volume)

3 CONVERT HEAT-GAIN REDUCTION INTO COOLING ENERGY SAVINGS

Apply cooling days, operating hours and sales-derived pipework length to estimate annual energy savings.

INPUTS
// Electricity grid emission factor
// Seasonal Energy Efficiency Ration (SEER)
// Product lifetime

4 CONVERT ENERGY SAVINGS INTO AVOIDED EMISSIONS

Energy savings multiplied by the electricity grid emission factor adjusted for cooling efficiency.

AVOIDED EMISSIONS

Annual avoided emissions are estimated and then aggregated over the assumed product lifetime.