Energy Consumption Tracking Policy: Electricity, Natural Gas & Compressed Air

1.0 Program Objective & Scope

The objective of this Energy Consumption Tracking Policy is to establish a standardized, data-driven framework for monitoring, analyzing, and reducing the consumption of electricity, natural gas, and compressed air across all production and facility support assets. This policy directly supports corporate sustainability targets (e.g., carbon footprint reduction, energy cost reduction) and operational reliability goals by identifying waste, optimizing usage, and driving continuous improvement. Scope includes all manufacturing lines, HVAC systems, compressed air networks, lighting, and auxiliary equipment within the facility. This policy applies to the Maintenance Manager, Plant Engineer, Shift Supervisors, Machine Operators, and the Sustainability/Energy Team.

2.0 Key Performance Indicators (KPIs) & Metrics

The following KPIs shall be tracked monthly and reviewed quarterly:

- **Specific Energy Consumption (SEC):** Total energy consumed (kWh for electricity, m³ for natural gas, m³ for compressed air) per unit of production output (e.g., per tonne, per piece).

Formula: SEC = Total Energy Input / Total Production Output.

- **Energy Cost per Unit:** Total energy cost ($) divided by production output. Tracks financial impact.

- **Compressed Air Leak Rate (%):** (Estimated leak flow / Total compressor capacity) x 100. Measured via ultrasonic leak detection or flow meter data.

- **Power Factor (PF):** For electricity, target PF > 0.95 to avoid utility penalties.

- **Peak Demand (kW):** Maximum 15-minute average demand per month. Tracked to reduce demand charges.

- **Natural Gas Intensity (GJ/m² or GJ/unit):** Natural gas consumption per square foot of conditioned space or per unit of production.

- **Carbon Emissions (tCO2e):** Calculated using regional emission factors for electricity and natural gas.

- **Compressed Air System Efficiency (kWh per 100 scfm):** Target < 20 kWh per 100 scfm at full load.

3.0 Roles & Responsibilities

- **Maintenance Manager:** Owns the energy tracking program. Ensures meters and sensors are calibrated and operational. Reviews monthly energy reports and leads root cause analysis for abnormal consumption. Approves energy-related capital projects (e.g., VFD installation, compressor upgrades).

- **Plant Engineer / Energy Champion:** Collects and validates meter data weekly. Calculates KPIs and generates monthly dashboards. Conducts compressed air leak audits quarterly. Identifies energy-saving opportunities and presents business cases.

- **Machine Operators:** Record daily production output and any abnormal energy events (e.g., compressor cycling, unusual motor noise) in the CMMS or shift log. Participate in energy awareness training and suggest improvements.

- **Shift Supervisors:** Ensure operators complete data entry. Escalate any energy anomalies (e.g., spike in demand) to the Maintenance Manager immediately.

- **Plant Leadership (Plant Manager, VP Ops):** Review quarterly energy performance against targets. Approve energy reduction initiatives and allocate budget for metering upgrades or efficiency projects.

4.0 Program Execution & Data Collection

Data collection is executed as follows:

- **Electricity:** Sub-meters on major production lines, HVAC, and compressed air systems record kWh, kW demand, and power factor every 15 minutes. Data is automatically uploaded to the energy management system (EMS) or CMMS via Modbus/SCADA. Manual meter reads are taken weekly for areas without sub-meters.

- **Natural Gas:** Utility meter data is pulled monthly from the utility portal. For process heating, sub-meters or thermal mass flow meters record consumption daily. Data is logged in the EMS.

- **Compressed Air:** Flow meters at compressor discharge and at key distribution points record scfm and pressure. Leak detection audits are performed quarterly using ultrasonic detectors; leaks are tagged and repaired within 2 weeks. Compressor run hours and load/unload cycles are tracked via PLC.

- **Production Output:** Operators enter daily production counts (units, tonnes, etc.) into the ERP or CMMS. This data is linked to energy consumption for SEC calculation.

- **Recording Frequency:** All energy data is recorded at least daily (automated) or weekly (manual). Monthly reports are generated by the 5th business day of the following month.

5.0 Review, Reporting & Continuous Improvement

Monthly energy reports are reviewed by the Maintenance Manager and Plant Engineer. The report includes SEC trends, cost per unit, peak demand analysis, and compressed air leak status. A quarterly Energy Review Meeting is held with Plant Leadership to discuss performance vs. targets, review capital project status, and prioritize improvement actions. Continuous improvement is driven through:

- **Root Cause Analysis (RCA)** for any energy spike >10% above baseline.

- **Kaizen Events** focused on energy waste (e.g., compressed air leak blitz, lighting retrofit, HVAC scheduling optimization).

- **Capital Expenditure (CapEx) Proposals** for high-ROI projects (e.g., VFDs on motors, high-efficiency compressors, solar PV, heat recovery).

- **Benchmarking** against industry standards (e.g., ENERGY STAR, Canadian Industry Program for Energy Conservation - CIPEC).

- **Annual Policy Review** to update targets, incorporate new technology, and align with evolving corporate sustainability goals.