5.10 ENERGY CONSERVATION AND ENVIRONMENTAL IMPACT

The lubrication program management plan shall have an optimum energy conservation and environmental impact element. Effective and optimum management of the elements of the lubrication program seeks to reduce maintenance costs and increase machine reliability, while also having a marked influence on energy consumption and the environment.

For instance, optimum lubricant selection can reduce wear, extend machine service life, and reduce friction. Both reduced wear and friction have a positive impact on energy conservation and the environment. Further, many factors involved with lubricant application have an equally favorable impact on energy conservation and the environment.

5.10.1 ENERGY CONSERVATION

A critical aspect of lubrication management is the reduction of fluid friction and the friction generated at the lubricated surface. Reduced fluid friction reduces the portion of the machine energy that is allocated (or needed) for the lubricant to perform at optimum design speeds and loads. Reducing fluid friction occurs when the most appropriate lubricant is selected for an application. Reducing fluid friction must be balanced against mechanical interfacial friction and wear **[1]**.

The organization shall consider the following energy management factors pertaining to its lubrication management plans:

a. Lubricant selection to include an evaluation of the physical and chemical properties that minimize mechanical friction, fluid friction, and reduce energy consumption **[1]**.
b. Lubricant selection (initial fill) in terms of manufactured product quality that minimizes friction and energy consumption **[1]**.
c. Contamination control of lubricants, systems, and subsystems to minimize the presence of foreign or internally generated particles that can be expected to increase friction.
d. Sizing and design of lubricant pumping systems and piping to minimize turbulent flow and fluid friction.
e. Fluid volume (grease and oil) to minimize churning, turbulence, and fluid friction.
f. A monitoring program that regularly measures and trends lubricant health.
g. A process that measures and verifies claims of energy reduction and then compares these claims to targeted savings (e.g., current consumption, power index, temperature, fuel consumption in engines, etc.)

NOTE 1: Energy conservation decisions should consider all potential consequences, including maintenance costs, machine reliability, and safety.

GENERAL NOTE: The organization should consider aligning its lubrication energy management practices with ISO 50001, as amended, and its subparts.

5.10.2 ENVIRONMENTAL IMPACT

Reduced demand for nonrenewable fossil fuels means cleaner air, reduced greenhouse gas emissions, and a healthier environment. When fuels are not consumed, there is no waste stream (smoke stack, tailpipe, etc.) nor the risk of pollutants from emissions such as nitrogen oxides (the principal component of smog), sulfates or CO2. Unburned hydrocarbons are reduced as well. Hence, when there is better economy in the consumption of both petroleum fuels and mineral-based lubricants, there is reduced dependence and consumption of nonrenewable fuels. A significant and overarching benefit is a reduced carbon footprint related to plant or fleet operation.

Lubricants and lubrication methods that reduce energy consumption will normally reduce heat and wear debris generation (with some exceptions). When heat and wear debris is reduced, less stress is imposed on additives, and the base oil contained in formulated lubricants. The result will be longer thermal and oxidative stability, lower oil consumption, and lower ancillary costs associated with oil changes. Furthermore, a well-designed and implemented lubricant analysis program can optimize lubricant change intervals and significantly reduce consumption. When lubricant consumption is reduced, there is reduced disposal of environment polluting waste oil and certain suspended contaminants – some of which may be hazardous and toxic. These benefits also lead to a significant and overarching reduction of carbon footprint.

The selection, handling, and storage of lubricants shall meet regulatory and site requirements. These might include:

a. Lubricants that are less toxic and more biodegradable.
b. Lubricants that are food safe.
c. Lubricants that can be recycled.
d. Lubricants with a longer service life.
e. Indoor climate-controlled storage.
f. Requirements to mitigate and retain spills.
g. Reporting spill or usage to appropriate regulatory bodies.