5. Benefits of motor system optimization

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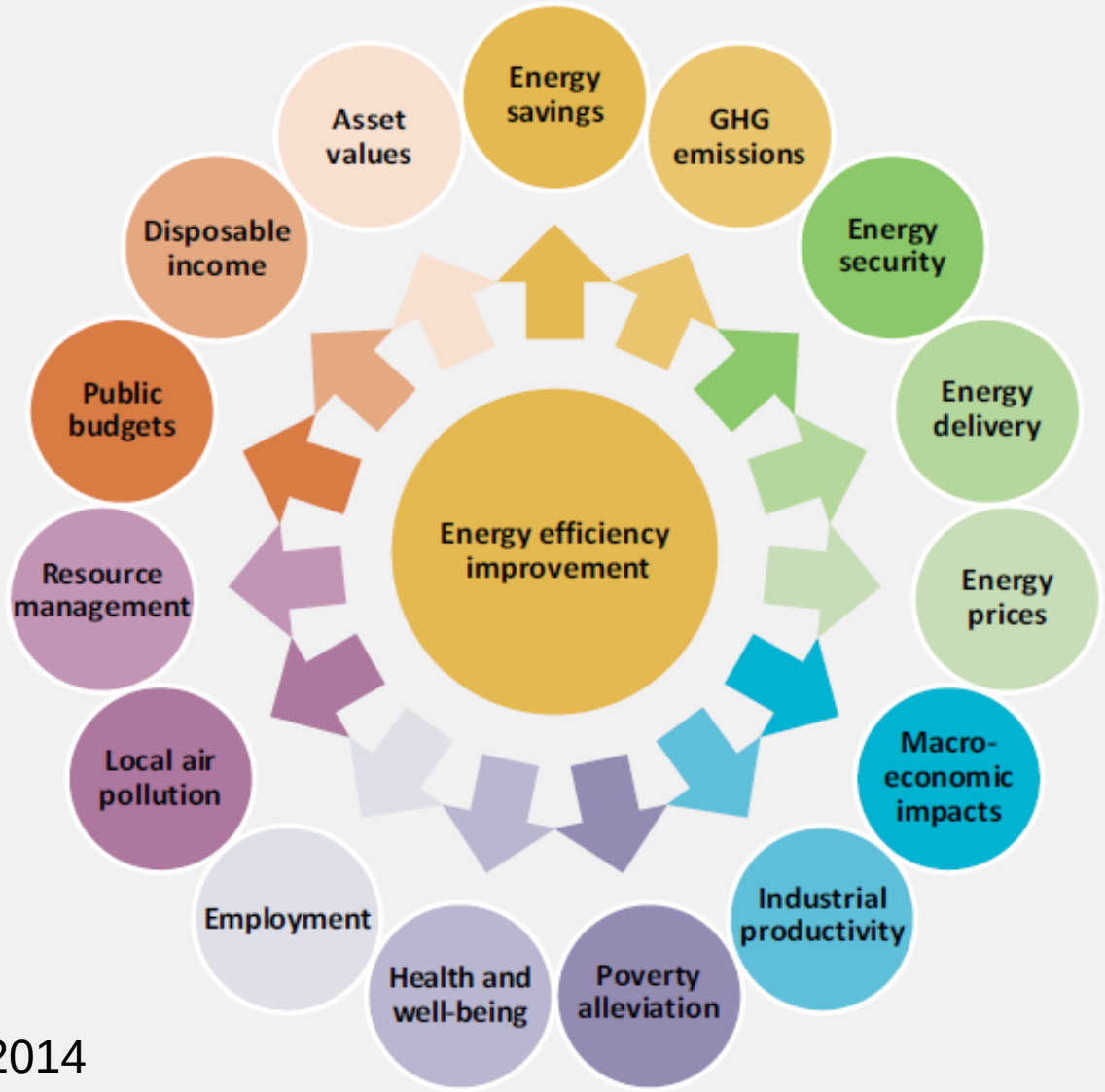


Source-IEA, 2014

Box ES.1

Energy efficiency generates important benefits for emerging economies

Improved energy efficiency provides a variety of benefits of particular importance for emerging economies and developing countries as they seek to exploit their resource base to reduce poverty and support sustainable growth:

- **Access**: Energy efficiency can help countries to expand access, effectively enabling them to supply power to more people through the existing energy infrastructure.
- **Development/growth**: Energy efficiency has a variety of positive impacts that support economic growth, for example by improving industrial productivity and reducing fuel import bills.
- **Affordability/poverty alleviation**: Energy efficiency can increase the affordability of energy services for poorer families by reducing the per-unit cost of lighting, heating, refrigeration and other services.
- **Local pollution**: Energy efficiency (both supply side and end-use) can help to reduce the need for generation – and lower associated emissions – while supporting economic growth.
- **Climate change resilience**: By reducing the need for energy infrastructure, energy efficiency reduces the amount of energy assets exposed to extreme weather events.

Source-IEA, 2014

Benefits of Motor System Optimization

- Energy Savings / Cost reduction;
- Improved operational reliability and control;
- Peak power reduction
- Ability to increase production without requiring additional, and possibly constrained, energy supply;
- Avoidance of capital expenditures through greater utilization of existing equipment assets;
- Recognition as a “green company”
- CO2 emission reduction

Benefits of motor system management

Effective motor system management develops synergies between preventive and predictive maintenance programs, equipment operation and process productivity to establish a repair/replace policy based on a commitment to energy-efficient equipment selection and operation.

Increased Productivity	Improved Reliability	Reduced Costs
Greater control over process requirements	Scheduled downtime instead of breakdown maintenance	More efficient operation
Flexibility in meeting production requirements	Longer production runs between maintenance outages	Reduced maintenance costs
Reduced scrap and rework	Longer equipment life	Lower unit cost

Best Practice Impact

- After system optimization training, a Chinese engineer connects two compressed air lines in a polyester fibre plant, saving 1 million RMB annually (about $US 127,000);

- A United States system optimization expert conducts a plant assessment and directs operations staff to close a valve serving an abandoned steam line, saving nearly $US 1 million annually;

- A United Kingdom facility experiencing difficulty with excess delivery pressure, pump cavitation and water hammer identifies an opportunity to reduce the system head. After trimming the pump impeller for a cost of £377 (about $US 500), the plant realizes energy savings of £12,905 (about $US 18,000)and maintenance savings of £4,350 (about $US 6,000) for a simple project payback of eight days.

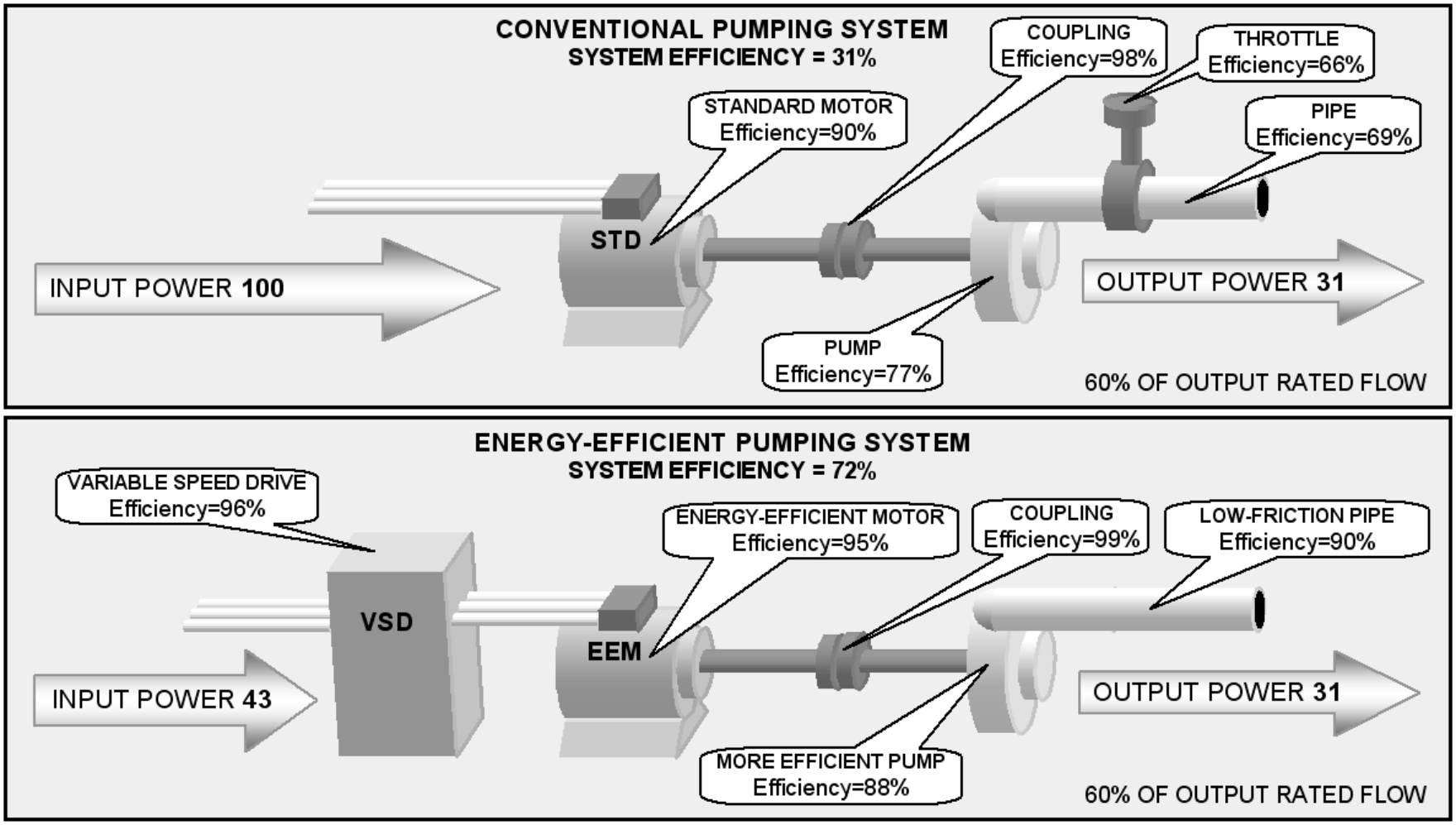
Information, behavioural organisational and market barriers

- Companies have limited knowledge and access to information about new and existing energy saving technologies.
- Companies may perceive technical and operational risks of implementing energy efficiency projects due to unfamiliarity with energy-reducing technologies and practices relative to core business projects.
- Professional and functional boundaries within the organisation limit the collaboration required to identify and support energy efficiency
- Energy prices and taxes are subsidised in some countries in the industrial sector; therefore, companies may not pay the full cost of their energy use and have less incentive to reduce consumption.

Financial Barriers

- Investments in energy efficiency projects do not meet financial criteria within companies (especially in countries where interest rates are high)
- Companies lack access to capital
- Investments impose too high a risk due to lack of familiarity with energy-savings projects relative to core business projects and difficulty in predicting future energy prices.
- Businesses like to use capital and resources to grow and expand their business. When they want to reduce costs, they want to do so without spending too much capital. Companies will often only fund projects with an 18-month to two-year payback or less, unless it has a productivity or growth outcome as well.

Case Study: Pumping system



Case Study: Optimising the compressed air supply of a car manufacturer

System description

- One water- cooled screw compressor, 22.2 m^3/min free air delivery (FAD)
- Four water-cooled piston compressors, 15 m^3/min each (FAD)

- Maximum operating pressure was 8.7 bar
- Demand for compressed air varying from 15 to 65 m^3/min

Case Study: Optimising the compressed air supply of a car manufacturer

Action taken

The new system was fitted in two stages, comprising only air-cooled screw compressors:

- Base load – 4 compressors with a FAD of 16.4 m³/min each
- Peak loads – 3 compressors with a FAD of 5.62 m³/min each,
- All seven compressors were coordinated depending on their relative workload by means of a compressed air management system.
- maximum operating pressure lowered from 8.7 to 7.5 bar, possible by fixing leaks

Case Study: Optimising the compressed air supply of a car manufacturer

Results:

- savings amounted to 483 000 kWh
- And additional €55 000 savings per year by reducing the need for cooling-water
- Waste heat can be used for space or low temperature process heating