



Energy Management Systems

What is ISO 50001 and why does it matter?

Michael DeWit

- Canadian Mirror Committees
- TC 207 Environmental Management
- TC 242 Energy Management
- TC 268 Sustainable Development in Communities
- PC 251 Asset Management, Management Systems



ISO 50001 - What is it, in a nutshell?

ISO 50001:2011 – *Energy Management Systems – Requirements with guidance for use* is a **voluntary** international framework for the effective and sustainable management of energy in any business large or small. Implementation of this standard will assist organizations in **reducing energy use** through the utilization of international best practices, measurement and reporting disciplines, continuous improvement and promoting energy efficiency throughout the supply chain. Reduction in energy leads to **reduced GHGs** and **reduced operational costs**.

It is estimated that the standard could influence up to 60% of the world's energy use.



Purpose of EnMS

What is the Purpose of EnMS?

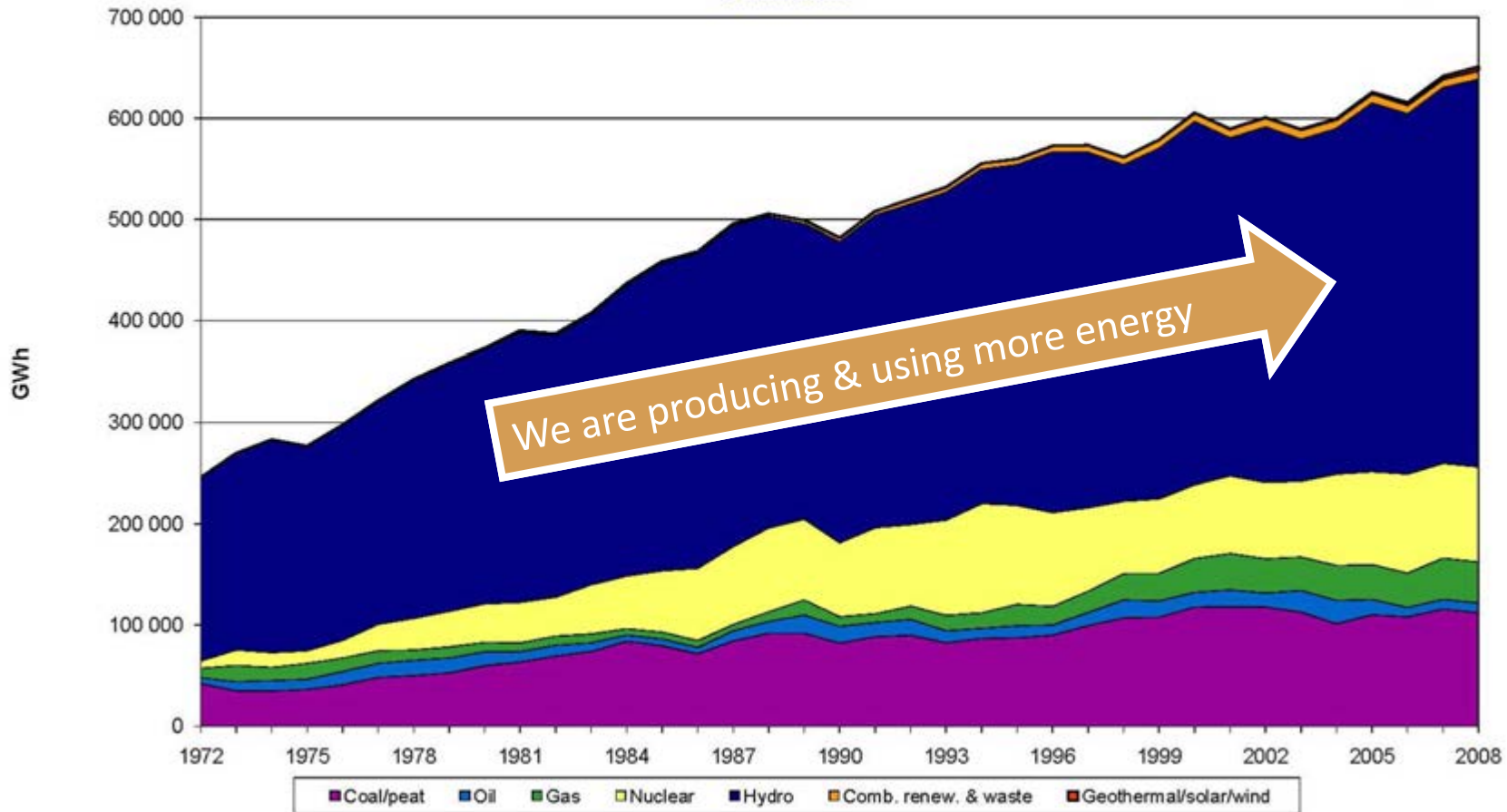
- 'to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy use and consumption'

[ISO 50001]

Drivers Behind the Standard



Electricity generation by fuel
Canada



© OECD/IEC 2010

Industrial:

Canada is a leader in Natural Gas, forest products, pulp & paper, potash, copper, nickel, aluminum, coal, zinc, diamonds, gold, iron, steel and uranium. Second largest in oil production.

Energy use grew 23% over 18 years.

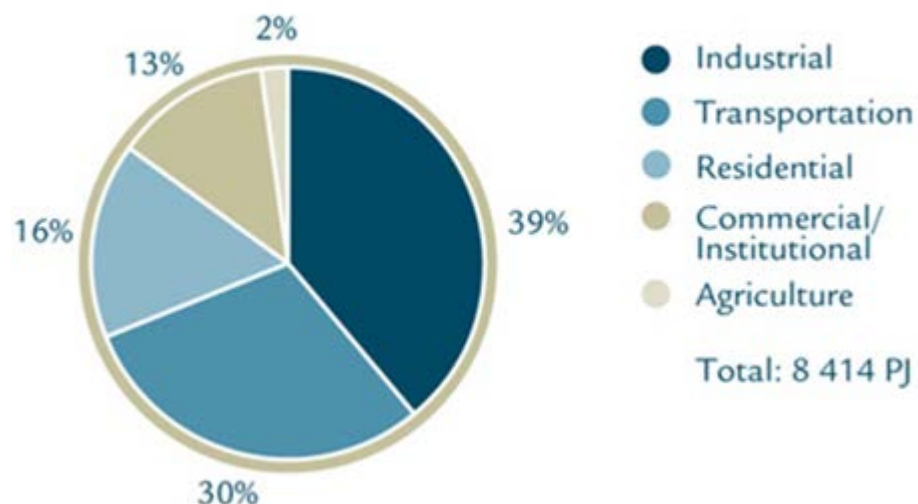
Commercial (Buildings):

Over 440k commercial and institutional building in Canada @ 670+million sq. m.

Energy use increased 34% in 15 years.

Target Sectors

Secondary Energy Use by Sector, 2006

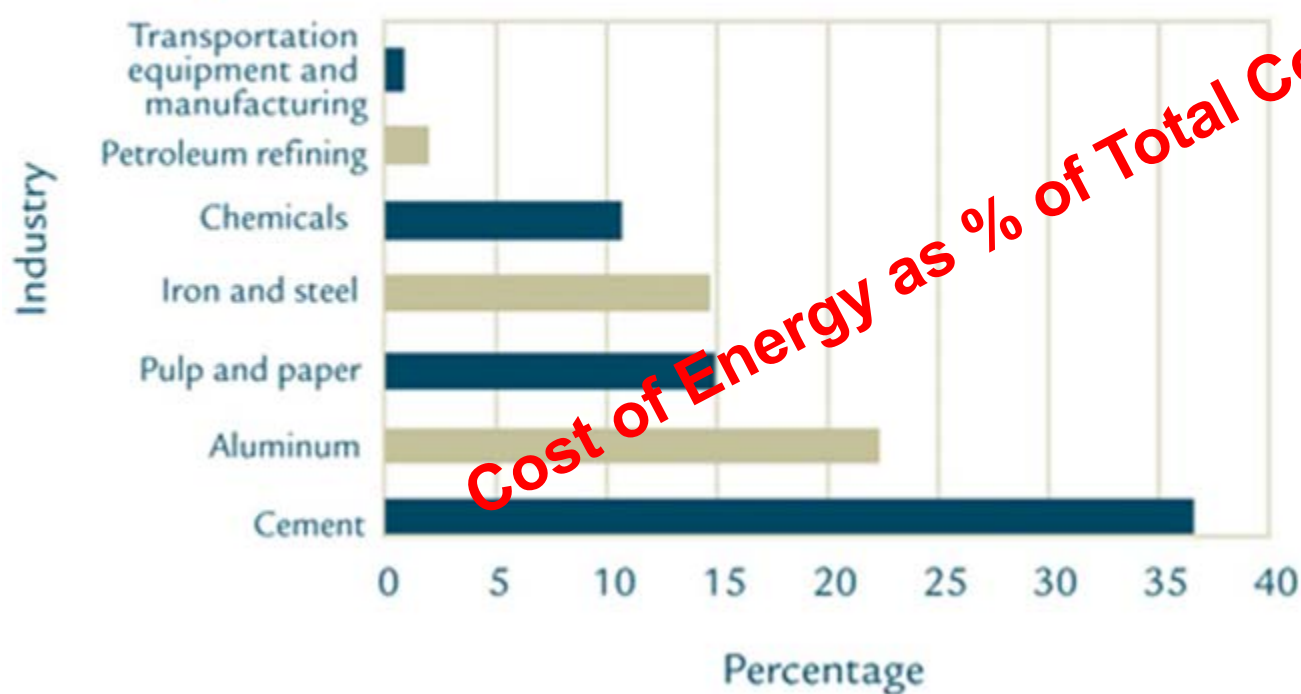


Source:
oee.rncan.gc.ca/corporate/statistics/neud/dpa/handbook_tables.cfm

Increasing Cost of Energy & Impact to Bottom Line



Cost of Energy to Manufacturing Industries as a Percentage of Total Production Cost, 2006



Key Concerns:

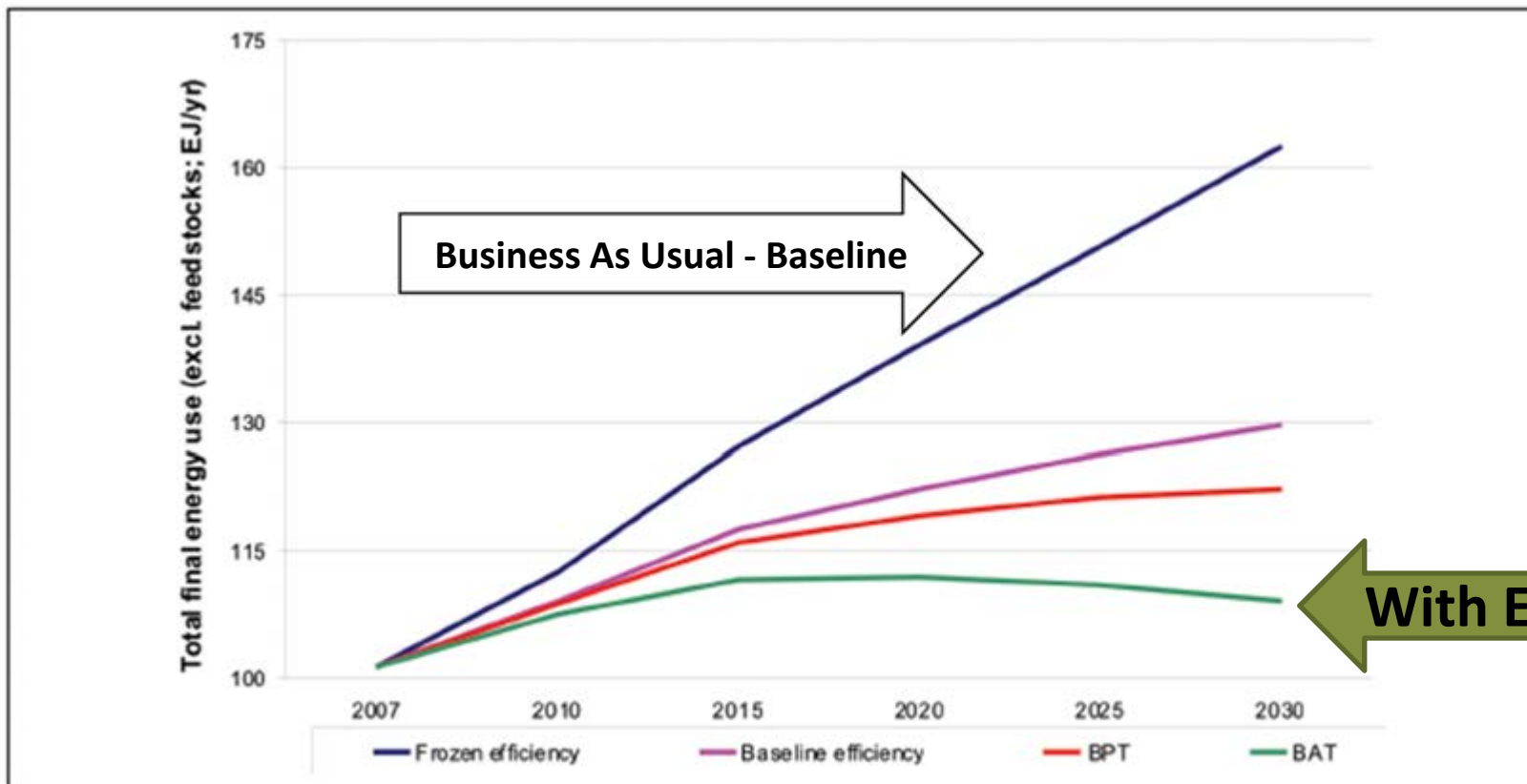
- Energy cost reduction
- Regulatory changes
- Supply chain pressures

Source:

oee.rncan.gc.ca/corporate/statistics/neud/dpa/handbook_res_ca.cfm

Energy Use Worldwide

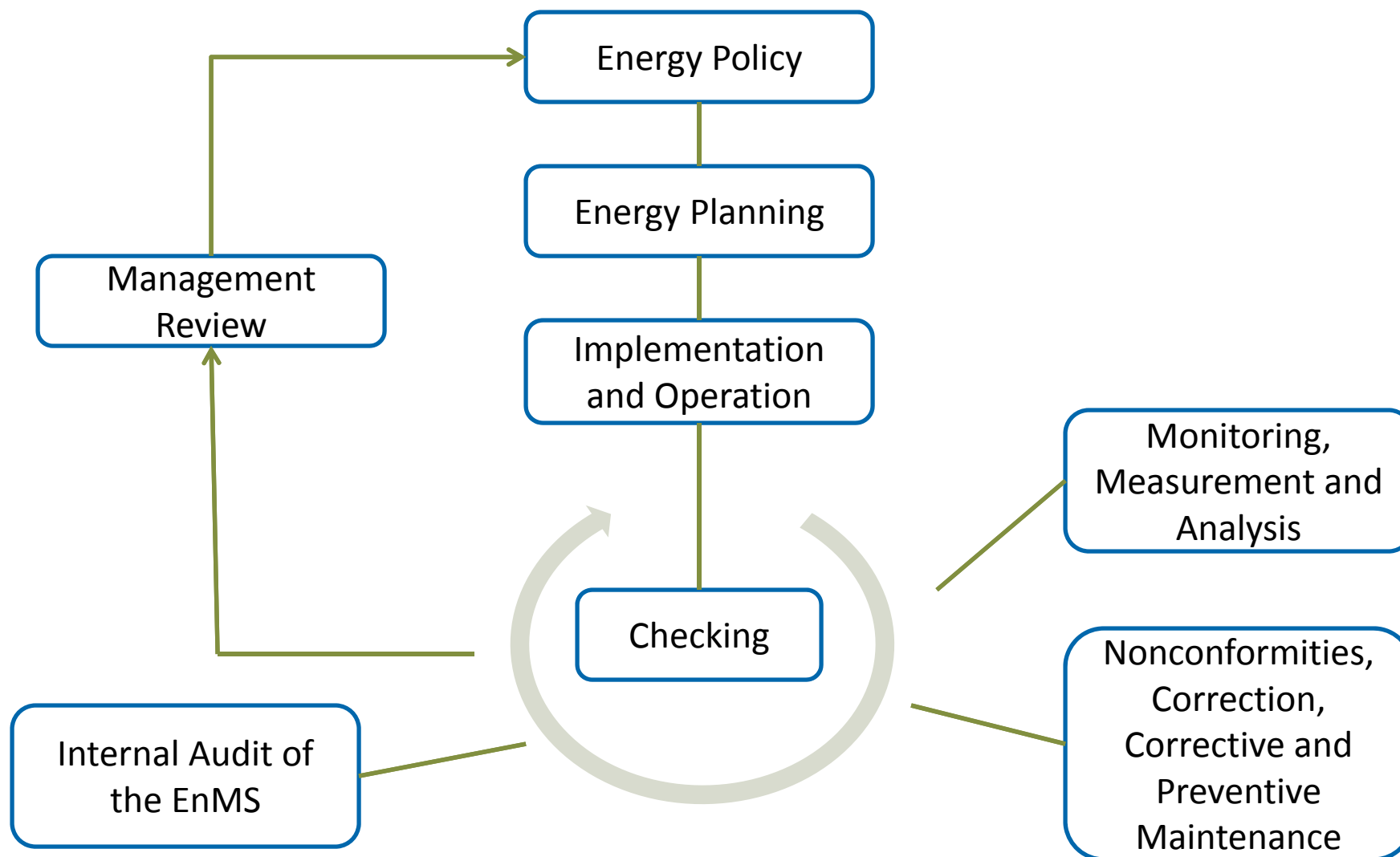
Total final industrial energy use worldwide, 2007 - 2030



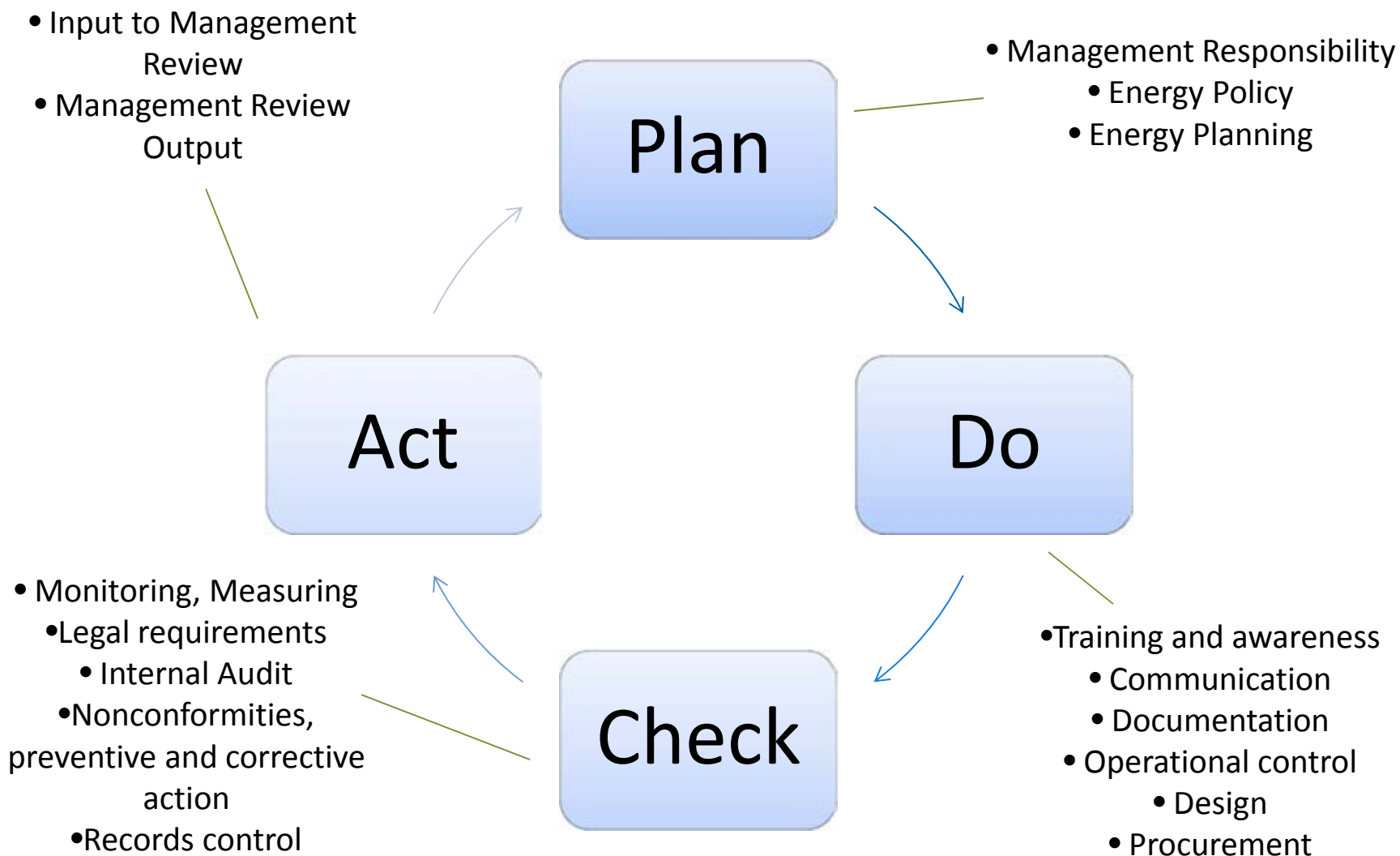
Note: Values exclude feedstock use

Source: UNIDO Report

ISO 50001 EnMS Model



PDCA – a familiar framework

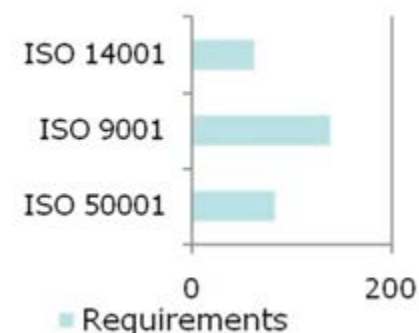


ISO 50001- Where does it fit in the family?

- ISO 50001 is compatible with both ISO 14001 and ISO 9001 with the following differences:
 - ISO 50001 calls for **energy performance improvement and not only system improvement**
 - ISO 50001 **does not follow ISO 9000/9001** process/ and structure format
 - ISO 50001 includes requirements related to **procurement of Energy & Energy Services**

Note: *ISO 50001 has 83 "shalls" (number of Requirements)*
ISO 14001 has 63 "shalls" and
ISO 9001 has 138 "shalls"...

ISO 50001 is only 22 pages long!





ISO 50001 – What is it not?

- Not prescriptive
- Does not reflect specific regulatory requirements
- Recognises technical dimensions only in terms of related business processes
 - E.g. requires energy efficiency to be considered in purchasing process but does not specify energy efficient equipment specifications
- Not an energy management plan
- Does not provide process for technical assessment of plant systems and procedures
 - requires an energy review (audit) but does not dictate how to do it

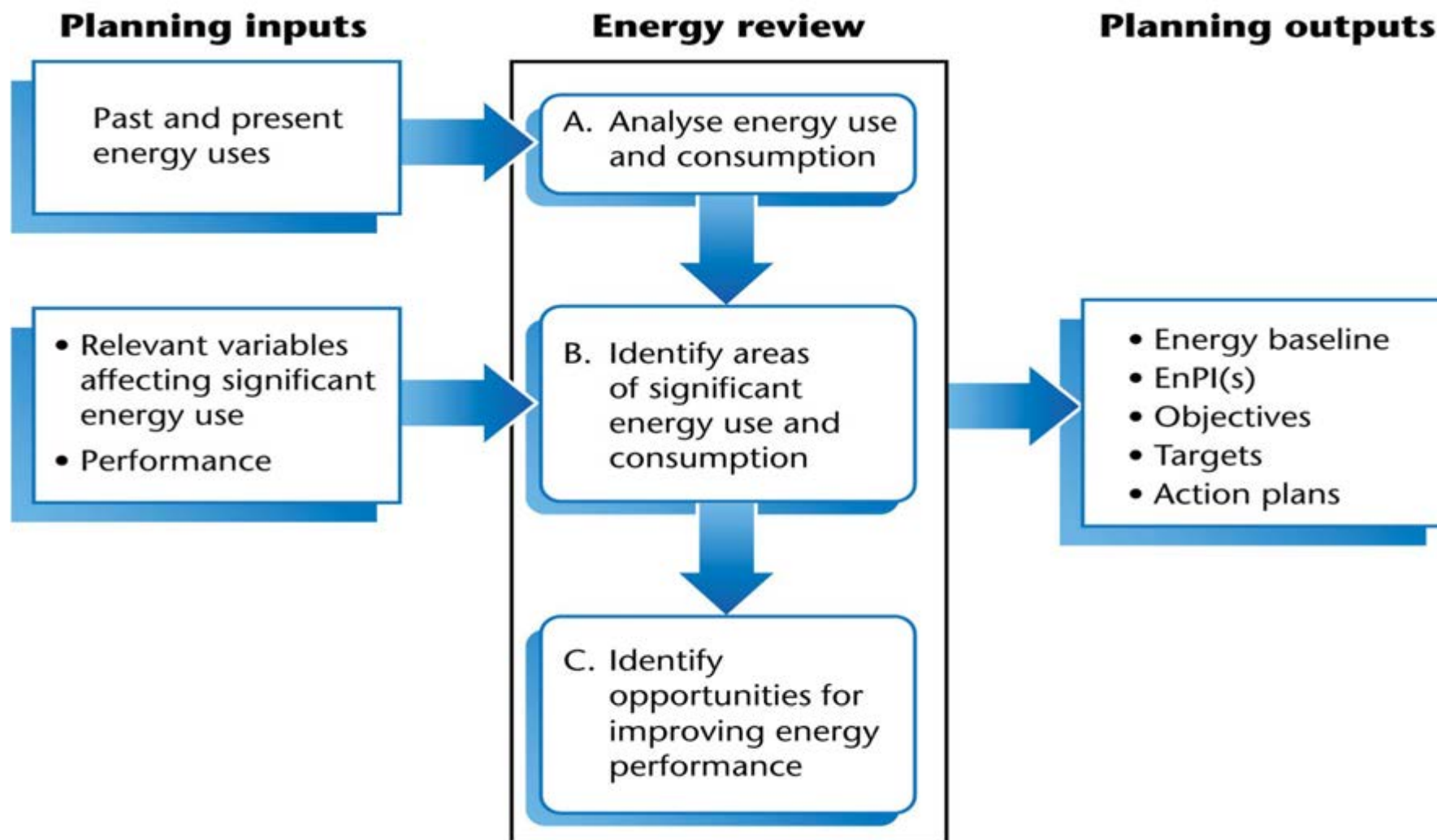


Key Elements

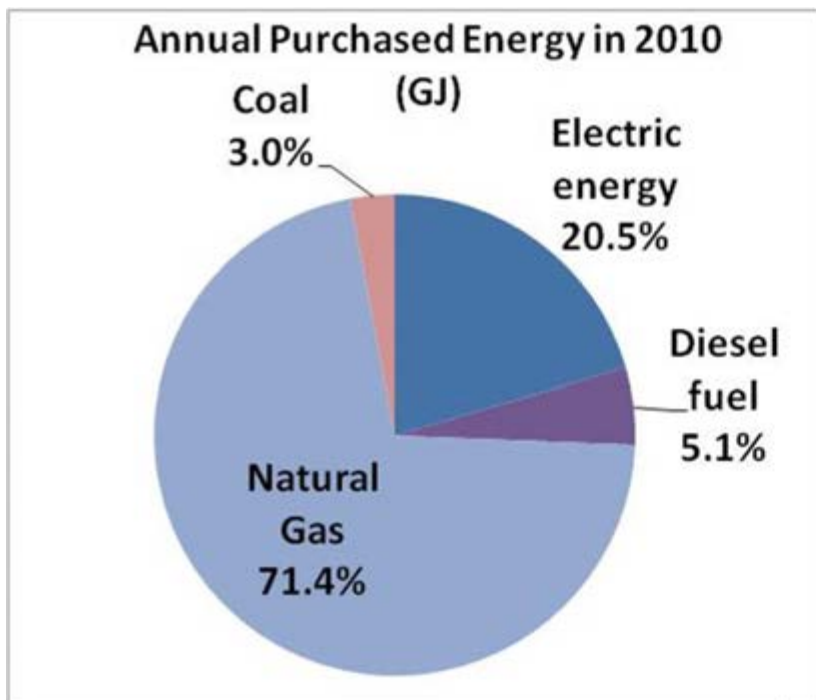
Requires an **organization** to:

- Conduct an **energy review**
- Establish an **energy baseline**
- Establish energy **objectives and targets**
- Establish an **action plan**
- **Implement** the action plan
- **Check and improve performance**
- **Monitor**, document and report all the above

What is different - Plan

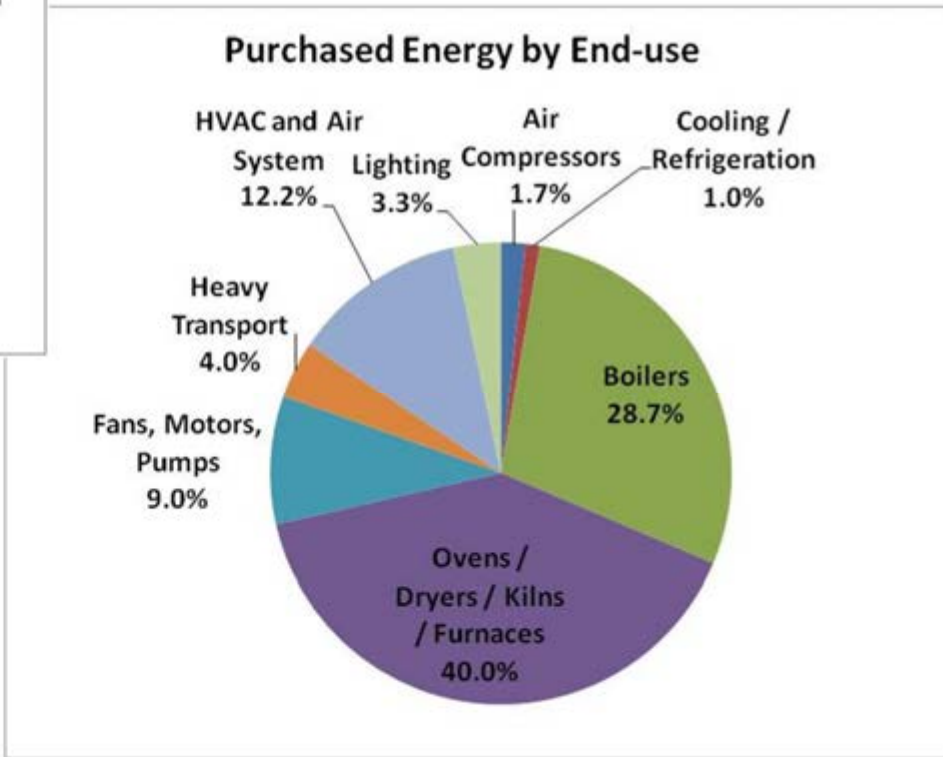


Energy Inventory



ENERGY IN

ENERGY USED



ENERGY INTENSITY

Energy use per main unit of output, 2010 (MJ/Unit)

6.8



What is Different – Do / Check

- The Energy Manager /competence
- Specific operational controls (Design, Procurement)
- Monitoring /measurement
- **The Big Difference / Driver –improve performance**

Energy performance

energy performance

- **measurable results related to energy efficiency, energy use, and energy consumption**

energy

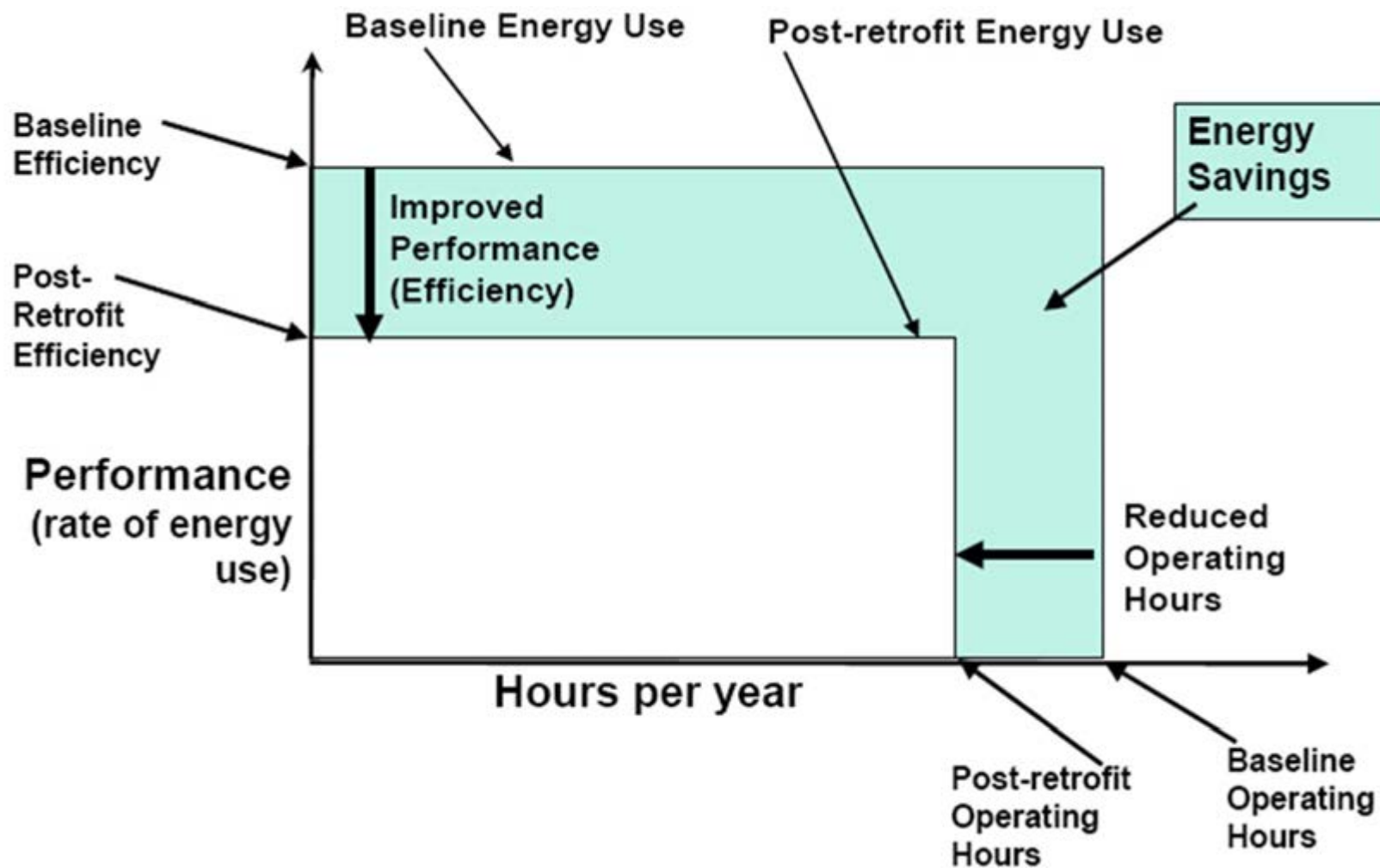
- capacity of a system to produce external activity or perform work

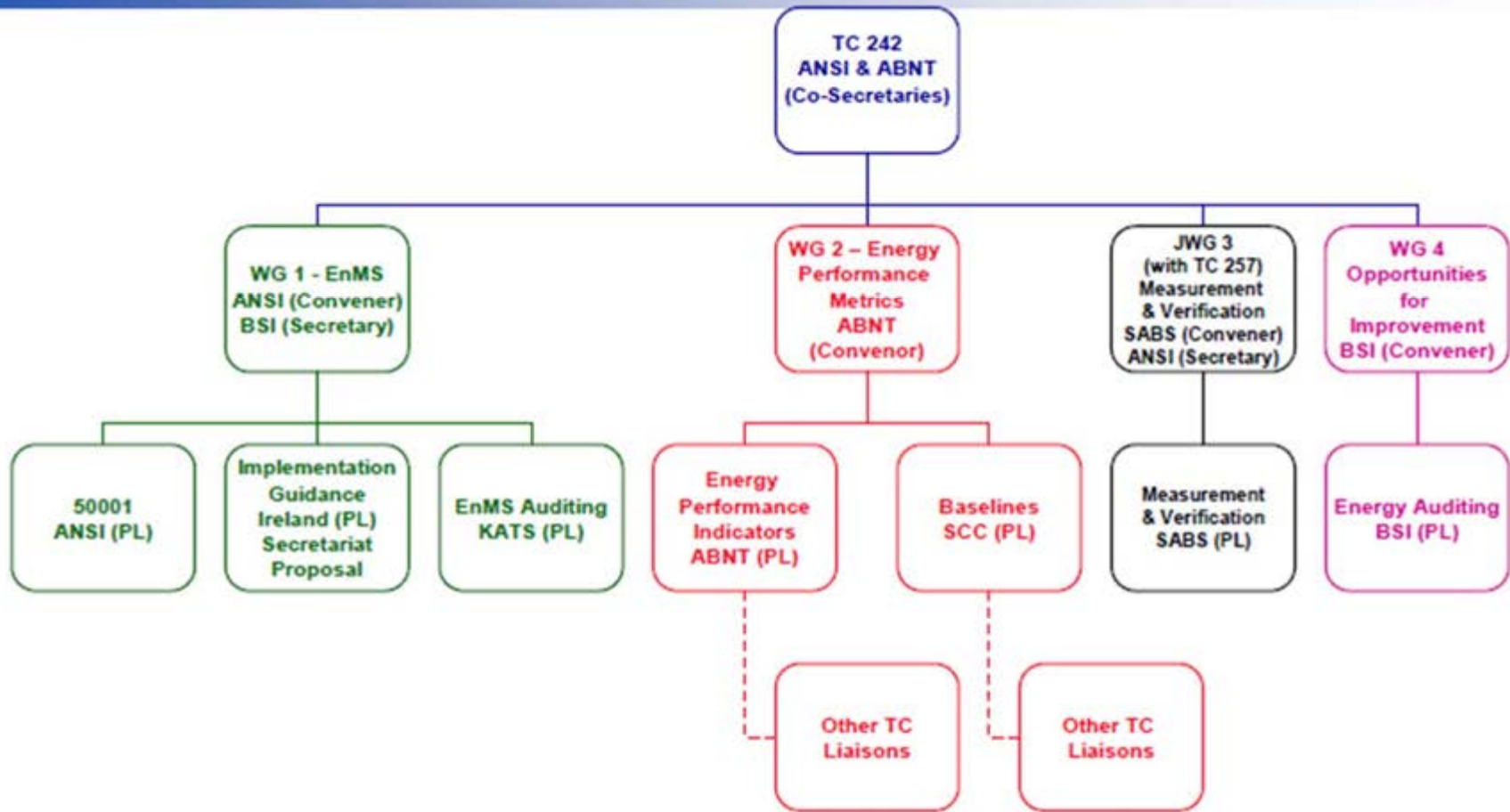
Note 1: Energy may take several forms such as thermal (heat), mechanical (work), chemical, electrical etc.

Note 2: The term “energy” is commonly used for electricity, fuel, steam, heat, compressed air and other like media.

Note 3: Units for energy include joule (J) and watt-hour (Wh).

Energy Savings Depend on Performance and Usage





TC 242 Structure

Standards Under Development

- ISO 50002 - Energy Audit
- ISO 50003 - Conformity assessment — Requirements for bodies providing certification audits of energy management systems audits and auditor competency
- ISO 50004 - Guidance for the implementation, Maintenance & Improvement of an EnMS
- ISO 50006 - Measuring Energy Performance using Energy Baselines and Energy Performance Indicators — General Principles and Guidance
- ISO 50015 - Measurement and Verification of Organizational Energy Performance — General Principles and Guidelines
- Modular implementation of the energy management system ISO 50001 including the use of energy performance evaluation techniques
- Additional energy efficiency standards

ISO/CD 50003

Requirements - certification audits, auditor competency

- Builds on / in addition to ISO/ IEC 17021:2011 - Conformity assessment — Requirements for bodies providing audit and certification of management systems
- In part follows approach in ISO/ IEC 17021-2 - For EMS and QMS audits
- In part covers EnMS “equivalent content” in IAF MD5 and MD 1 (audit duration and multi site audits)
- References ISO 19011 as guidance
- Characteristics of energy management system auditing
- Auditing process requirements
- Competence requirements

ISO 50003 (draft under review / revision)

■ **General competence**

- The certification body shall define and document the competence criteria for auditor(s) and other personnel involved in EnMS audit and certification activities, consideration shall be given to the following:
 - education (science or engineering) or recent training in related topics such as EnMS, facilities, system, processes, equipment, green house gas (GHG), measurement and verification (M&V), etc.;
 - knowledge of legal and other requirements related to energy;
 - recent and relevant auditing experience;
 - relevant professional credentials;
 - demonstrated relevant skills.

ISO 50003 (draft under review / revision)

Table 1 — Table of required EnMS general knowledge

Certification Functions Knowledge	Conducting the application review to determine audit team competence required, to select the audit team members, and to determine the audit time	Reviewing audit reports and making certification decisions	Auditing
Knowledge of ISO 50001	X	X	X
Knowledge of energy specific terminology	X	X	X
Knowledge of basic energy principles	X	X	X
Knowledge of energy-related legal and other requirements	X	X	X
Knowledge of energy performance Indicators and energy baseline		X	X
Knowledge of energy performance evaluation		X	X
Knowledge of common energy systems for example: steam systems, refrigeration systems, motor systems, process heat etc.		X	X

ISO 50003 (draft under review / revision)

Table 2 — Table of EnMS technical skills

Certification Functions	Conducting the application review to determine audit team competence required, to select the audit team members, and to determine the audit time	Reviewing audit reports and making certification decisions	Auditing
Skills related to measurement and verification		X	X
Skills related to measurement and monitoring techniques for energy data		X	X

ISO 50003 (draft under review / revision)

Technical competence

- The **energy system profile** of the auditor shall also be evaluated as a part of competency.
- An **energy system profile** provides criteria on the types of energy systems or processes within a sector the certification body would expect the auditor to be able to audit.
 - Industry – light to medium
 - Industry – heavy
 - Commercial buildings
 - Buildings – complex
 - Transport
 - Agriculture
 - Mining
 - Military and government
 - Energy supply/ generation
 - Laboratories, cleanrooms and data centres

Standards Council of Canada

CAN-P-1517 – Annex I

- CAN-P-1517
 - Management Systems Accreditation Program (MSAP) Handbook - Conditions and Procedures for the Accreditation of Bodies Certifying Management Systems
- ANNEX I - requirements for bodies providing audit and certification of energy management systems
 - 4.1.2 Sectorial scopes for accreditation
 - Commercial Buildings
 - Light & Medium Industry
 - Heavy Industrial
 - Transportation
 - Building Complex energy Use
 - Energy providers



Acknowledging Content Sources

- Standards Council of Canada
- ISO
- NRCAN
- Canadian Standards Association
- TC 242 Canadian Mirror Committee working materials
- TC 242 working materials
- United Nations Industrial Development Organization