

# ISO 50001 /Superior Energy Performance Project

Andrew Hejnar, CEM, CEA, CRM, Energy Manager, 3M Canada Company



Brockville Tape Plant



# 3M Canada Facts

- First 3M subsidiary (1956) of US parent company (MMM)
- Employs 1,700 people
- Nine manufacturing facilities in Ontario and Manitoba
- Main products:
  - *Abrasives, Tapes, Healthcare, Scotchkote and Scotch-Brite*
- \$1.2 B annual sales
- First 3M subsidiary to have a full time Energy Manager (2009)



# Manufacturing Operations Brockville Tape, ON



- Established 1992
- 10 Acre Site
- 140,000 sq. ft.
- 170 Mfg Employees

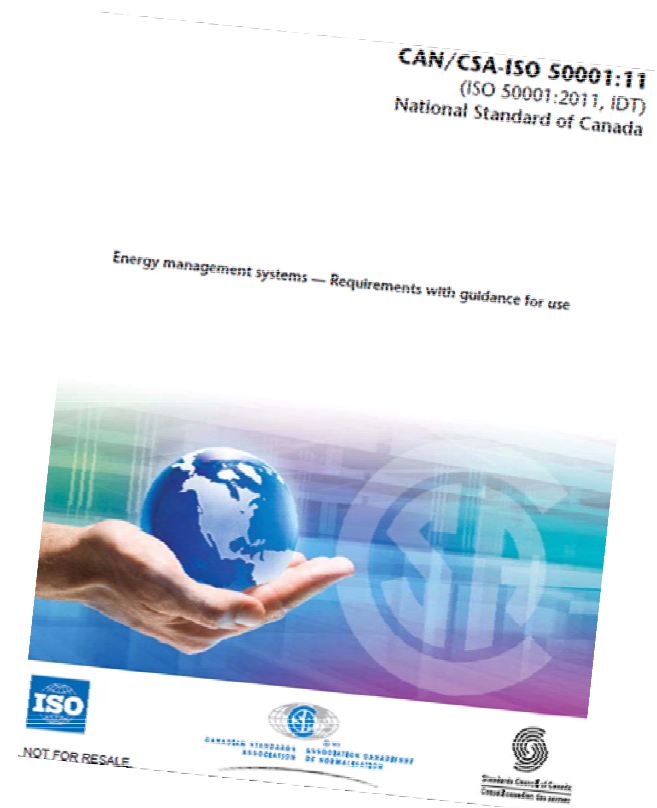
- High volume masking tape manufacturing operation.
- 200 SKUs ranging from low cost bundling and holding tapes to high temperature fine line automotive masking tapes.
- Current ISO Registrations:

ISO 14001    ISO 9001-2000



# ISO50001

- Voluntary international standard framework to manage energy
- Based on “Plan – Do – Check –Act” continuous improvement cycle
- Leads to improved energy performance and reduced costs
- Integrates energy efficiency into management processes
- Released by ISO June 15, 2011 and quickly adopted as Canadian national standard **CAN/CSA-ISO 50001:11**
- Many core elements in common with ISO9001 (quality) and ISO14001 (environmental) ISO standards



# SEP – Superior Energy Performance

- US DOE and industry partnership program for energy performance
- Fully incorporates ISO 50001 but adds more requirements per ANSI/MSE-50021 standard
- Prescribes specific silver-gold-platinum energy reduction achievement levels
- Assesses performance using a rigorous, statistically sound International Measurement & Verification Protocol
- Global SEP implementations supported by 25 international energy ministers, including Canada, at July 2010 Clean Energy Ministerial



# Motivations

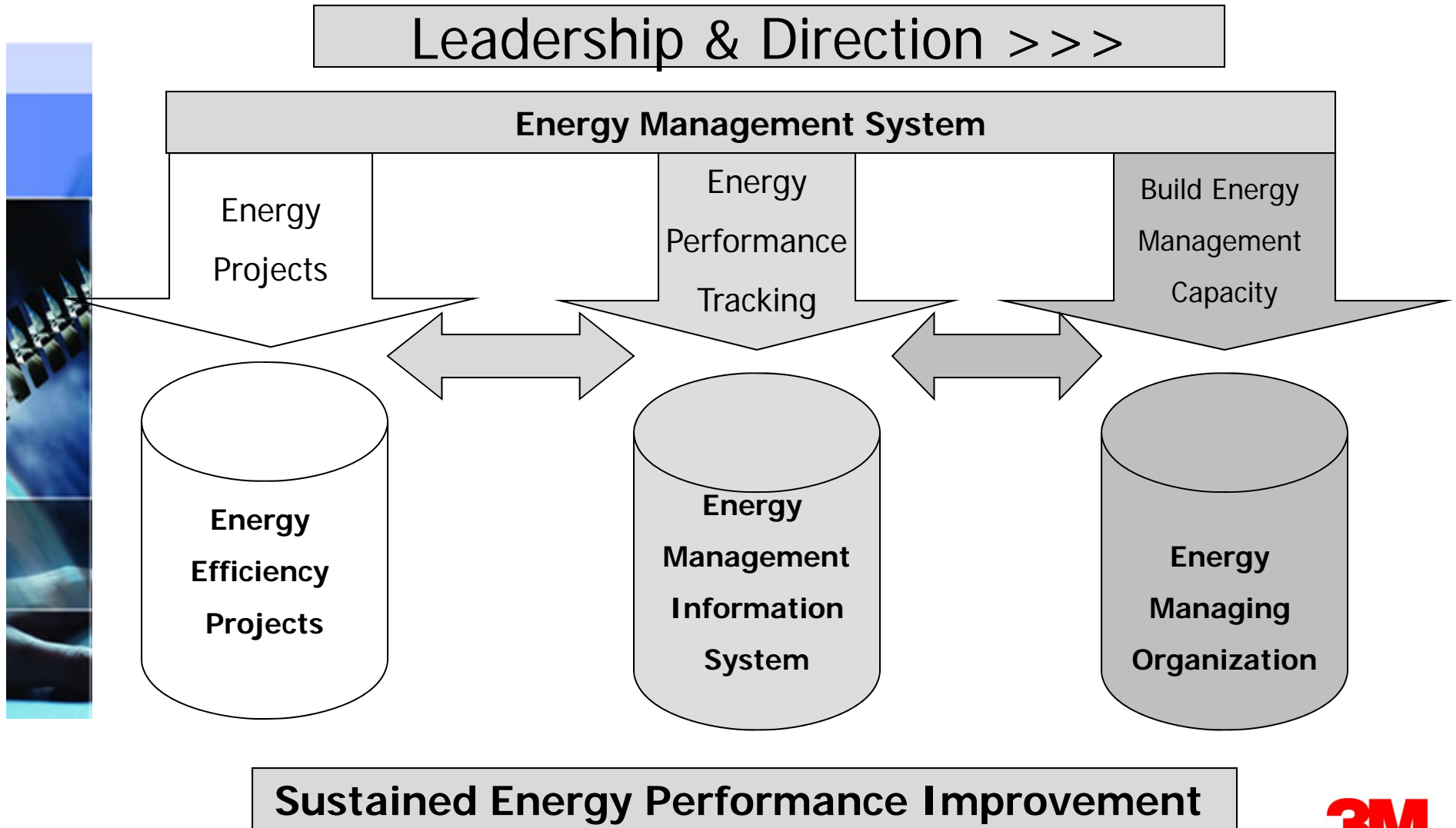
- To build on the substantial energy performance gains achieved through earlier energy projects
- To improve our ability to sustain energy performance gains over the long term
- To respond to increasing energy cost pressures
- To reinforce our reputation with customers as an environmentally responsible supplier
- To provide US-Canada requested support for the GSEP initiative of the Clean Energy Ministerial [www.cleanenergyministerial.org](http://www.cleanenergyministerial.org)
- To ensure 3M's competitive position in the marketplace
- ISO 50001 is a standard that drives results directly to the bottom line by systematically driving down energy costs to improve competitiveness.

# Process

- Build on existing 3M Energy Management legacy
  - *Long standing commitment to improving environmental and energy performance worldwide*
- Integrate a systematic Energy Management System into plant operations & culture
- Leverage existing management system components, 3M business & operations systems where possible

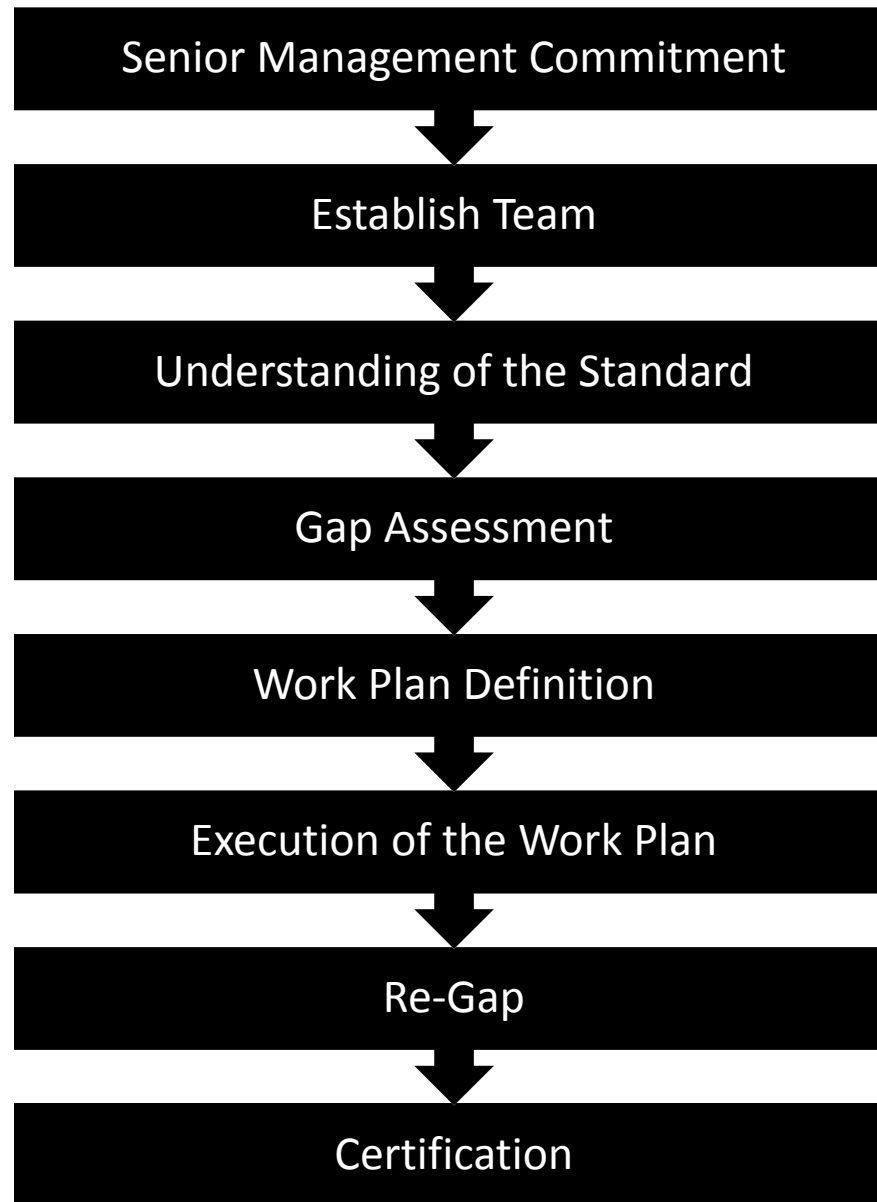


# EnMS Development





# Brockville Tape ISO50001 Program Phases



# The Team

## 3M Canada Team

- Earl Taylor - Plant Engineering Leader (EnMS Mgmt Representative)
- Tyler Blakely - Master Technologist (EnMS Coordinator)
- Andrew Hejnar - Energy Manager 3M Canada
- Alan Polk - 3M Canada Corporate Lead Auditor

## Consultant: Energy Performance Services (EPS/Canada) Inc.

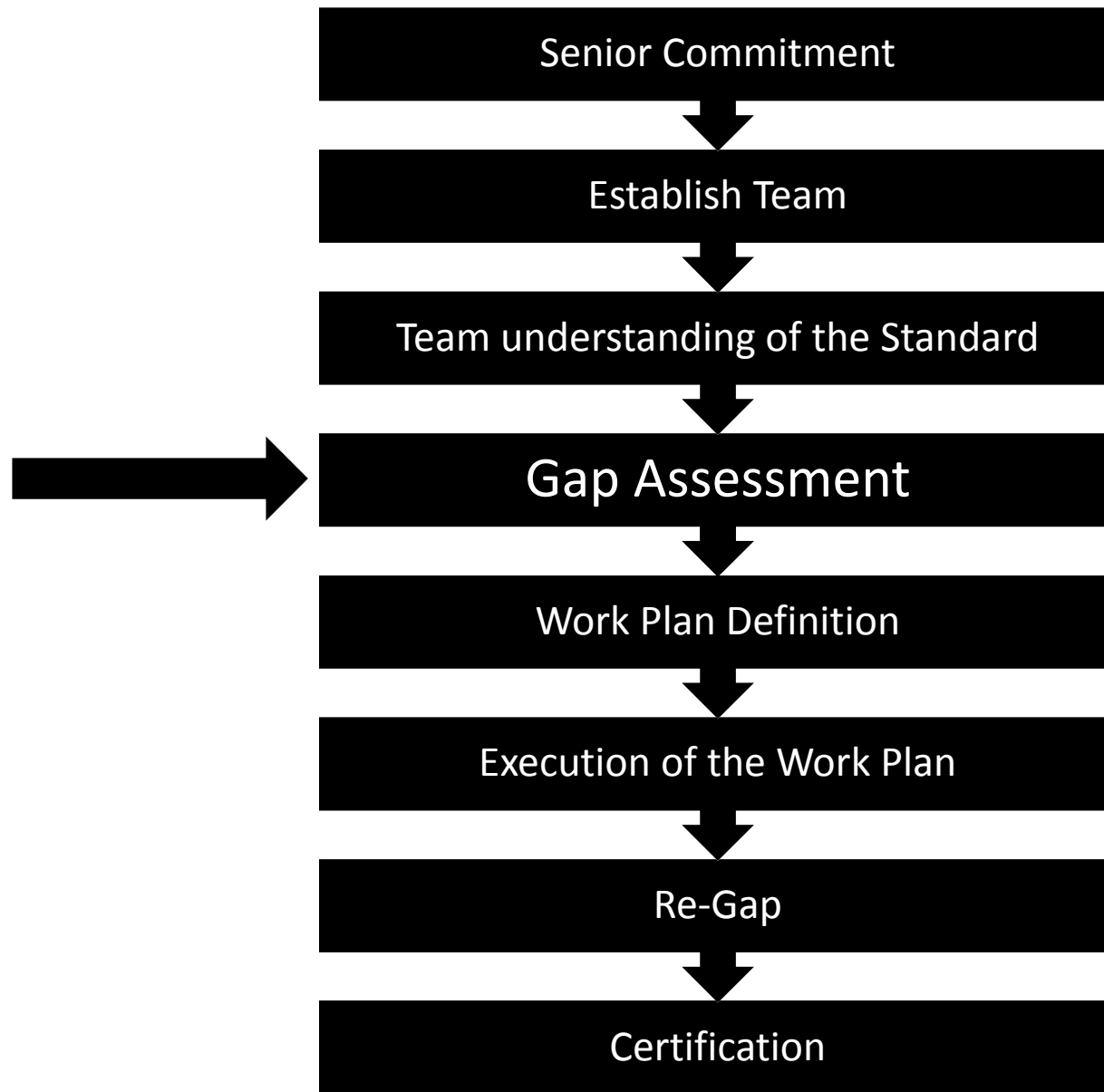
- Peter Bassett – President
- Lauri Gregg - Senior Consultant – Member of CSA for ISO 50001
- Steve Dixon - Training Expert

## Support from:

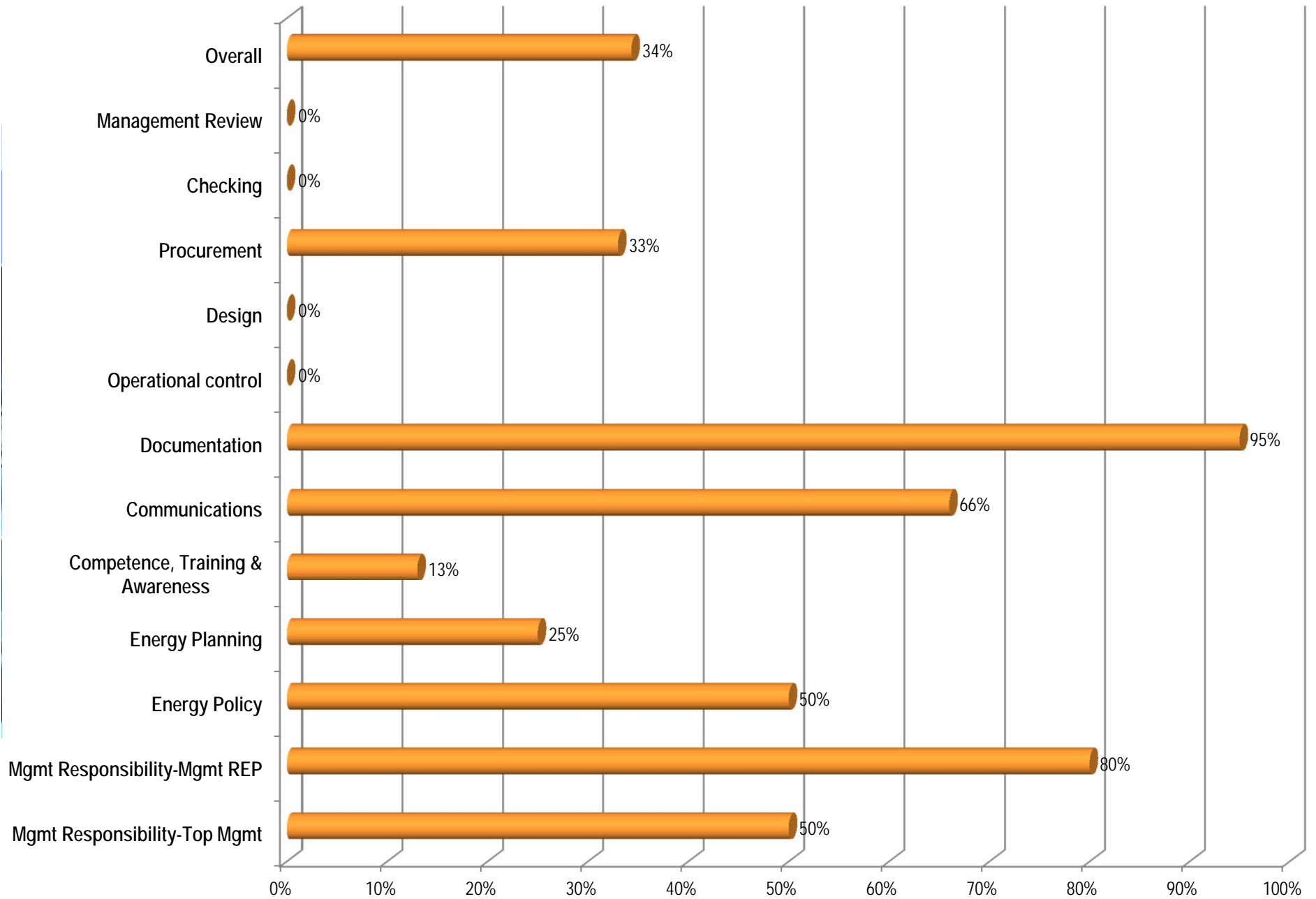
- Federal Government of Canada - Natural Resources Canada
- Enbridge Gas Distribution
- Hydro One Networks



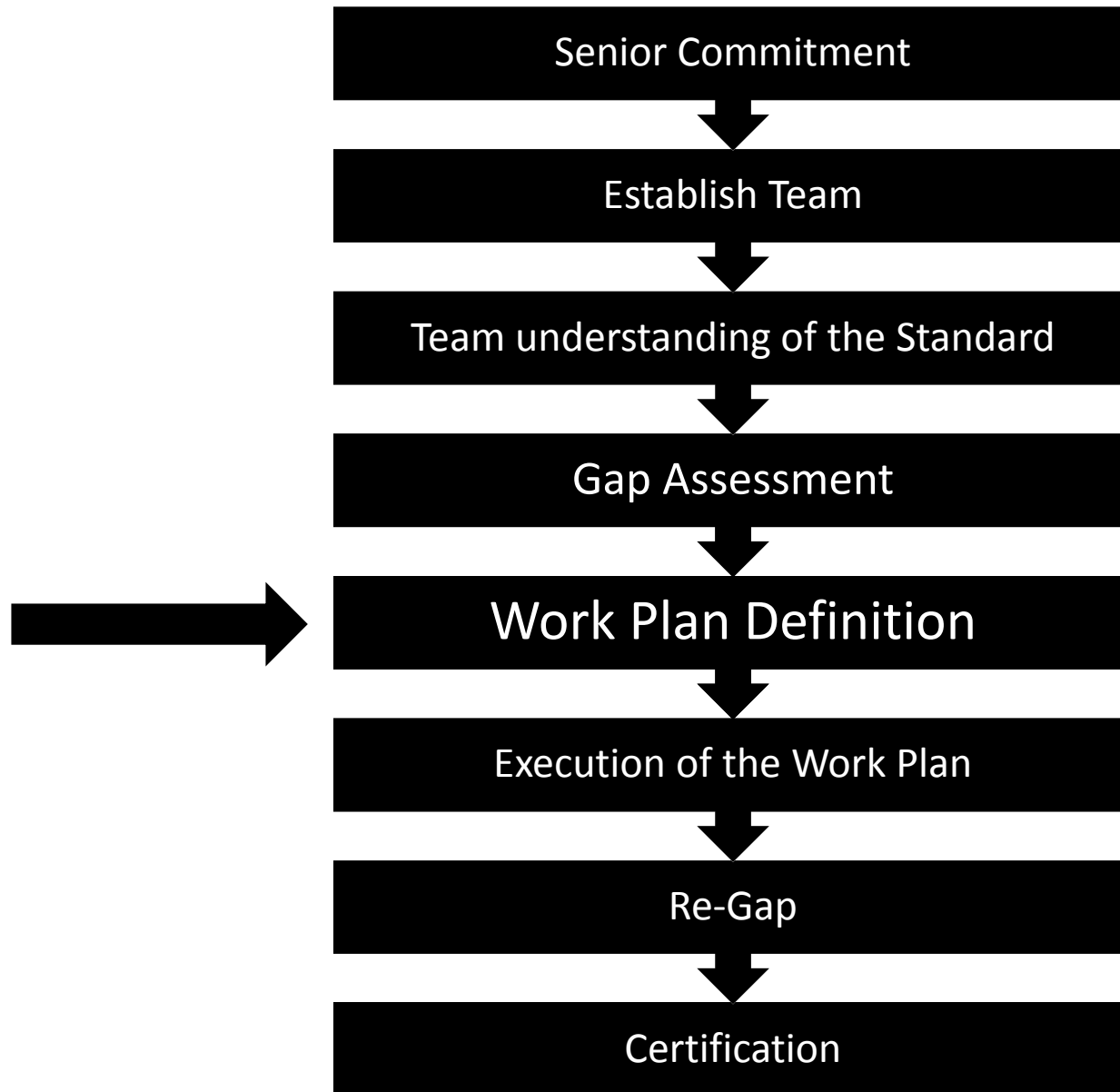
# Brockville Tape ISO50001 Program Phases



# Initial Gap Analysis



# Brockville Tape ISO50001 Program Phases



# The Work Plan

Clause by clause list of requirements

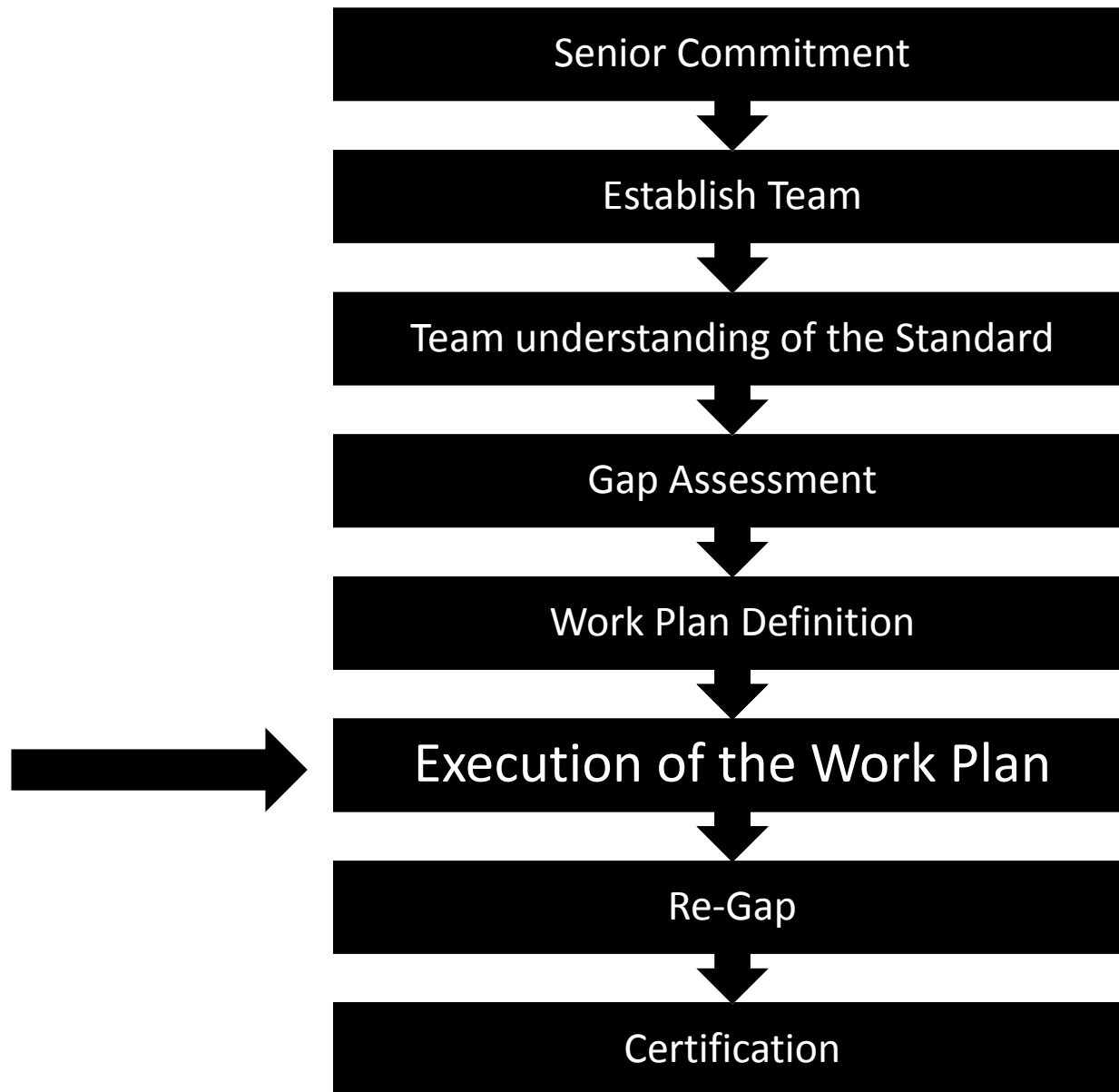
Gap closure action items, dates, responsibility

EPS		ISO Standard Reference	ISO 50001 Standard clause	Actions	Action Type	Completion Date	Responsibility	Status	Completion %
					No action required				54%
Energy Policy	Energy Policy	4.3.g	Define energy policy	Complete	Amend existing EnMS	Jul	Rich	Complete	100%
Energy Policy	Energy Policy	4.3.g	is documented and <u>communicated</u> at all levels within the organization;	Complete	Communication	Oct		Active	100%
Energy Policy	Energy Policy	4.3.g	is <u>documented</u> and communicated at all levels within the organization;	Complete	Integrate energy into existing business system	Jul	ET	Complete	100%
					No action required				100%
Energy Planning	General	4.4.1	The organization shall conduct and document an energy planning process. Energy planning shall be consistent with the energy policy and shall lead to activities that continually improve energy performance.	enms 100 Energy Planning procedure documents the Energy Planning process	Design new procedure	Jul	ET	Complete	100%
Energy Planning	Legal & other requirements	4.4.2	The organization shall identify, implement, and have access to the applicable legal requirements and with other requirements to which the organization subscribes related to its energy use, consumption and efficiency.	Will be addressed through the Energy Planning Process	Integrate energy into existing business system		EPS	Complete	100%

Periodic assessment & tracking



# Brockville Tape ISO50001 Program Phases



# Key Work Plan Activities

- Make Basic Decisions
  - *Scope of EnMS*
  - *External communication*
  - *Resource allocation*
    - *Management Representative*
    - *Energy Coordinator*
    - *Energy Team*
- Adapt existing Energy Management practices
  - *Energy Policy*
  - *Energy Objectives, Targets & Action Plans*
  - *Project Planning & Management Systems*
  - *Results Reporting Systems*





# Key Work Plan Activities

- Leverage Existing Business Systems
  - *Communication Policy*
  - *Legal*
  - *Training*
  - *Internal Audit*
  - *Employee Suggestion*
  - *Documentation & Control of documents*
  - *Non-conformities control*



# Key Work Plan Activities

- Write EnMS Manual

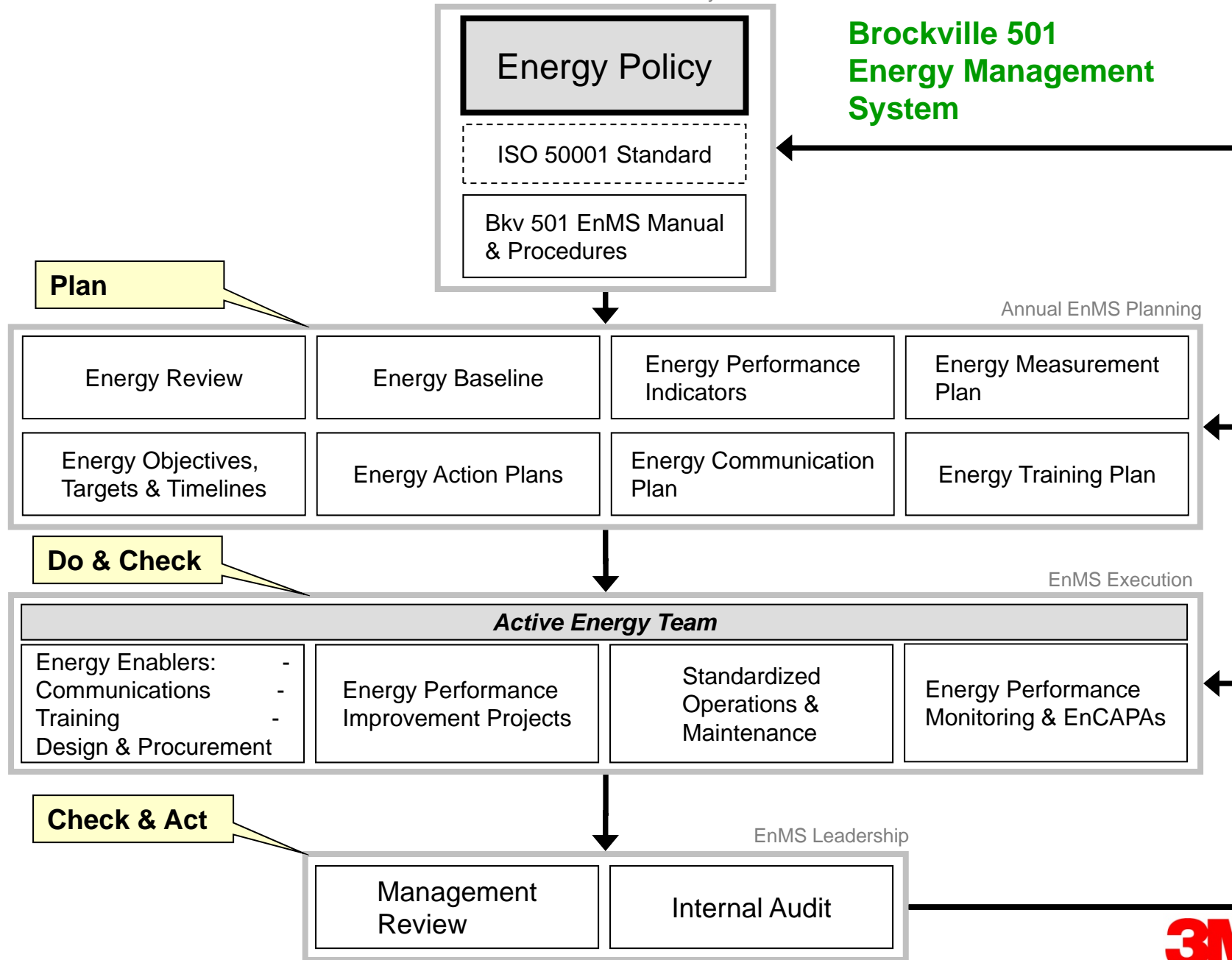
- *Documents the EnMS*
- *Addresses all elements of the Standard*
  - *Reporting to Top Mgmt on EnMS performance*
  - *Operational Control*
  - *Action Plan effectiveness*
  - *Management Review of EnMS performance*
  - *Training process*
- *EnMS Manual is a great **vehicle** for formalization of Top Management Commitment*





EnMS System

# Brockville 501 Energy Management System



# Key Work Plan Activities

- Write required top level procedures
  - *Energy Planning Process*
  - *Energy Review Procedure*
  - *Internal Audit Procedure*
  - *Energy Performance Indicators (EnPIs) Selection Process*
  - *EnMS Recordkeeping Requirements*



# Key Work Plan Activities

- Detailed design outputs
  - *Life Cycle Cost Analysis*
  - *Procurement specifications*
  - *Role & Responsibilities matrix*
  - *Scorecard for EnMS effectiveness*
  - *Baseline modeling*
  - *EnPI's selection*
  - *Energy measurement plan*



# Roles & Responsibilities Matrix



**EnMS Deliverables**

**EnMS Roles**

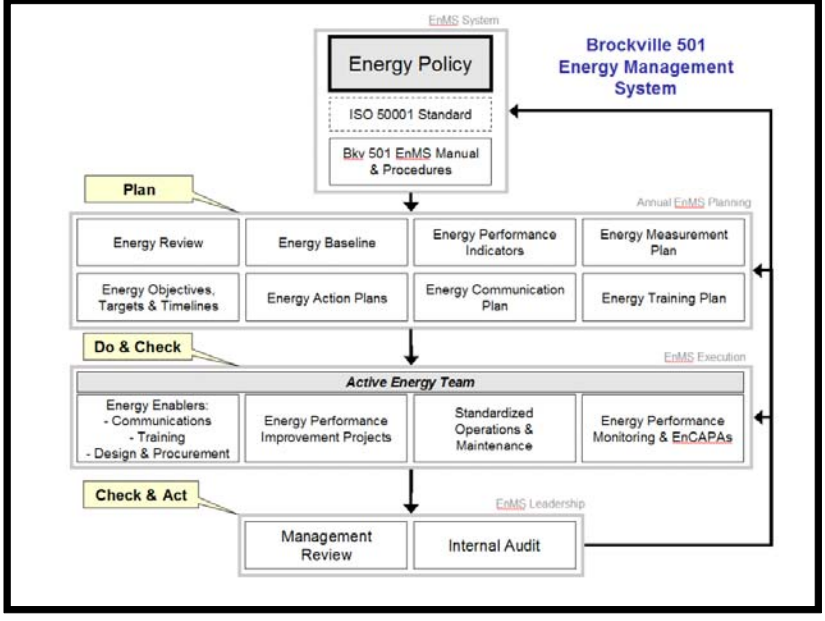
**R&R Level:**  
**A - Accountable**  
**R - Responsible**  
**S - Support**  
**C - Consulted**  
**I - Informed**

BKV 501 EnMS Role	Energy Policy	ISO50001 Standard	EnMS Manual	Energy Reviews	Energy Baseline	Energy Measurement Plan	Energy Objectives, Targets & Timelines	Energy Action Plans	Energy Communication Plan	Training	Design & Procurement	Energy Projects	Standardized O&M	Energy Performance Monitoring	EnMS Audits	EnMS Score
Plant Mgr	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
EnMS Mgmt Rep	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
EnMS Coord	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Plant Engg Ldr	S		C	S	C	C	S	S	S	C	S	S	R	R	R	S
Operations Ldr	S		C	S	C	C	I	S	S	C	S	S	R	R	R	S
Technical Ldr	S		C	S	C	C	I	S	S	C	S	S	R	R	R	S
Corp. Energy Mgr	S	S	C	C	C	S	C	R	S	C	C	S	S	S	C	C
Area Coaches/Mtc Spvr	S		I	S	I	I		I	S	C	S	S	I	S	R	R
EHS Ldr	S		I	C	I	C		C	C	C	S	S	C	S	R	C
EnMS Energy Team	S		I	C	I	I		I	S	C	C	S	S	S	R	S
Lean Six Sigma BB	S		I	S	I	I		S	S	C	C	S	S	C	R	S
Techs	S		I	S	I	I		S	I	S	I	C	S	S	S	S
Supply Chain Ldr	S		I	I	I	I		I	C	C	C	S	S	C	C	R
Engineers	S		I	S	I	I		I	S	I	C	S	S	S	S	I
Shift Supervisors	S		I	C	I	I		I	C	I	C	S	S	S	S	R
Operators	S		I	C	I	I		I	C	I	C	S	S	S	S	S
Trainers	S		I					I	I	S	S			S	S	C
Business Dvlpmt Ldr	S		I	I	I	I		I	C	I	S	S				S
EMIS Support	S															
Corp. Lead Auditor	S	S	I													R
IT Support	S		I													
Product Developers	S			C												
EHS Staff	S		I													
Plant Buyer	S		I													
Corp. Engg Mgr	S															
Corp. Execs & Depts	S															
Others	S															

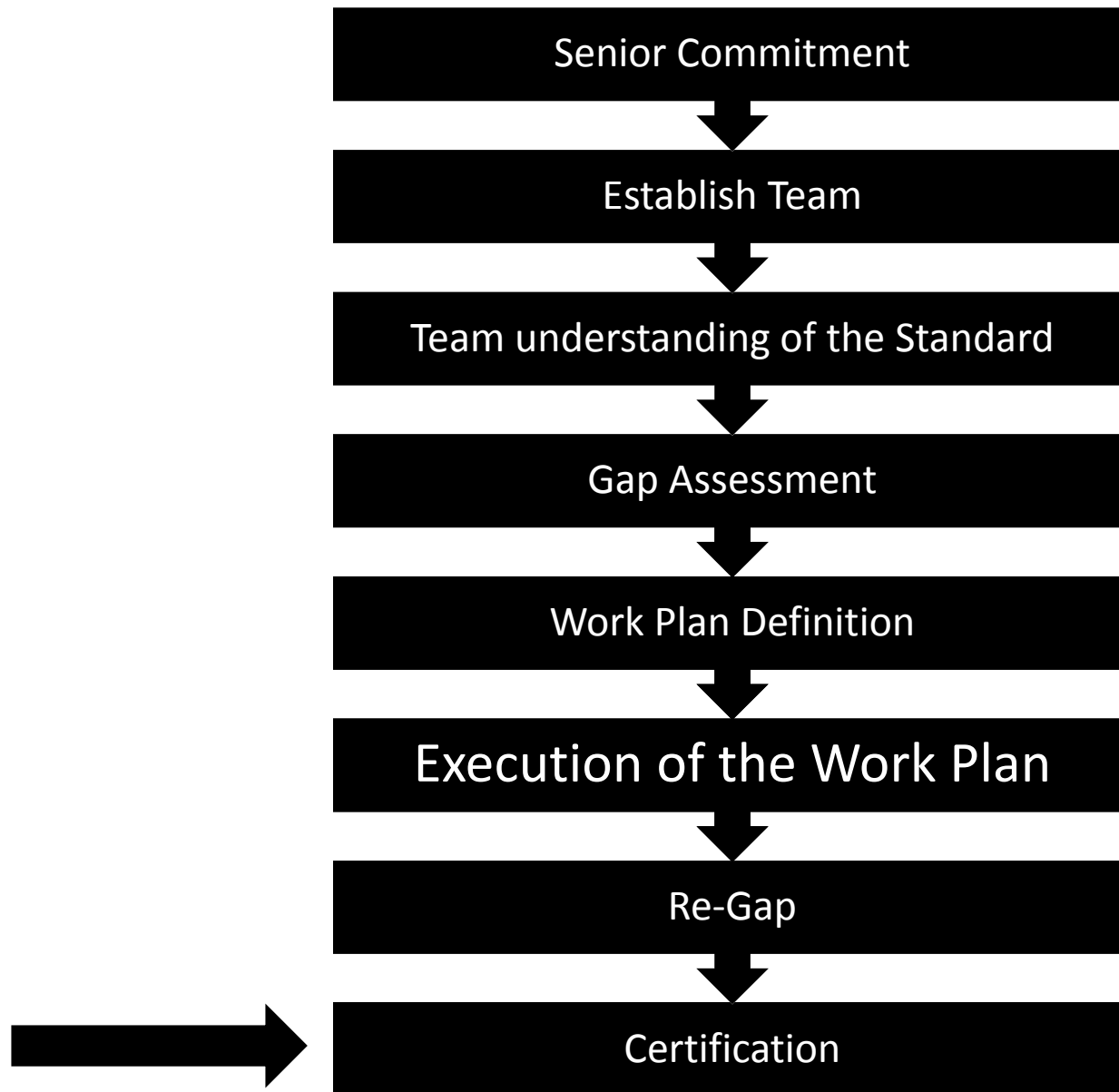
Responsibility	Description
<b>A</b>	Accountable
<b>R</b>	Responsible
<b>S</b>	Support
<b>C</b>	Consulted
<b>I</b>	Informed

**Documents & Supports:**

- Performance Expectations
- Communications
- Training
- Resource Planning



# Brockville Tape ISO50001 Program Phases



# Certification

## ■ Preparation

- *Complete first iteration of the EnMS Planning work*
  - *Perform Energy Review, Select EnPIs, Establish Action Plans, etc.*
- *Activate EnMS Execution work*
  - *Training, Monitoring, Include Energy in Standardized O&M, Energy Corrective and Preventive Action (EnCAPA), etc.*
- *Conduct Management Review & Internal Audit*
  - *Engage management team, close audit findings, etc.*
- *Work the system and generate the records that demonstrate implementation*





# Certification

- External Certification
  - *Pre-assessment*
    - *Review of EnMS documentation to determine readiness*
  - *Phase I Audit*
    - *Detailed investigation of all system elements*
  - *Phase II Audit*
    - *On-site audit to examine evidence of implementation*
  - *Certification Results*



## Certification Results

- First ISO 50001 / SEP EnMS in Canada certified by an ANAB accredited Certifying Body
- Achieved 'Platinum' level for SEP
  - Externally verified, statistically validated energy performance improvement exceeding 15% over three years (2007 to 2010)
  - Second ISO 50001 / SEP platinum level in the world



# ISO50001 Certification

**CERTIFICATE**

Certificate Number: 561263.01

The Energy Management System of:

**3M Canada Company**  
Brockville Tape Plant  
60 California Ave, P.O. Box 755  
Brockville Ontario K6V 5W1 Canada

Including its implementation, meets the requirements of the standard:

**ISO 50001:2011**

Scope:  
The Energy Management System scope applies to the facility and processes for manufacturing pressure sensitive adhesive tapes at the Brockville 501 Tape Plant, Brockville, Ontario, Canada.

This Certificate is valid until: June 14, 2015  
This Certificate is valid as of: June 14, 2012  
Certified for the first time: June 14, 2012


*H. Pierre Saie*

H. Pierre Saie  
President  
DEKRA Certification, Inc

The method of operation for energy certification is defined in the DEKRA EnMS Certification Services to ISO 50001 Requirements. Integral publication of this certificate is allowed.

DEKRA Certification, Inc.  
4377 County Line Road  
Chalfont, PA, 18914  
PH: (215)997-4519  
Fax: (215)997-3809  
OHT 908 0810210

Accredited By:  
ANAB



**CERTIFICATE**

Certificate Number: 561263.02

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Including its implementation, meets the requirements of the standard:

**Superior Energy Performance<sup>cm</sup>  
Platinum Certified Partner  
Energy Performance Pathway  
ISO 50001:2011**

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Accredited By:  
ANSI  
ANAB  
United States  
Department of  
Energy



# Results

- Engagement of top management
  - *Plant leadership team actively involved*
- Increased awareness of energy performance
  - *Communication, training, dashboards to make energy visible, daily review, etc.*
- Increased idea generation
  - *Employee suggestion system*
  - *Energy review output tripled ideas in hopper*
- Improved O&M practices
  - *Start-up and shutdown, leak reduction, PMs, service contracts, etc.*

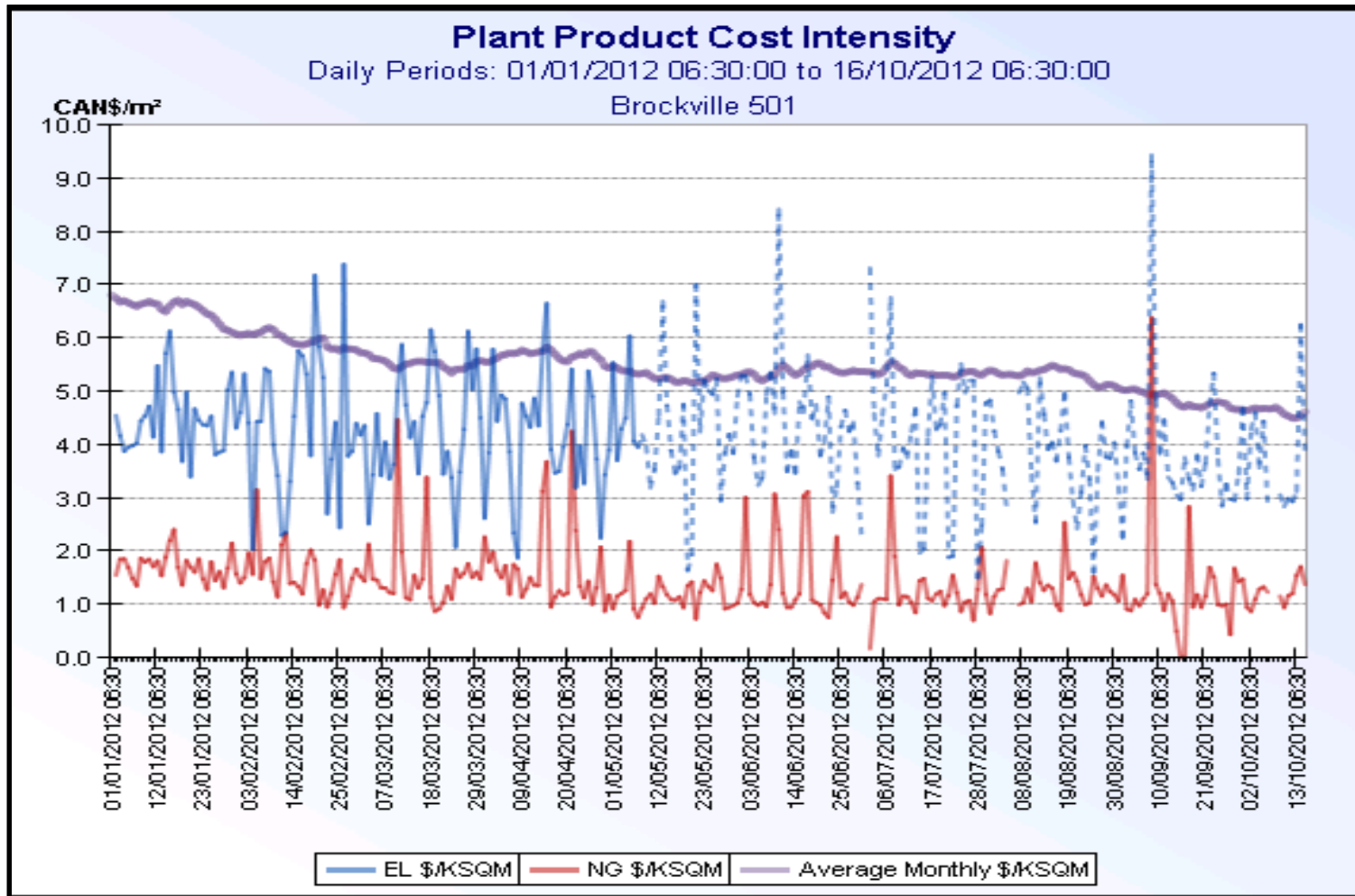


# Results

- Renewed project activity
  - *LED lighting, compressor efficiency, CW load matching, HVAC, etc.*
  - *Many projects moved from hopper to implementation stage*
- Improved procurement and engineering practices
  - *Awareness training and expectations for engineering*
  - *Engineers actively incorporating energy performance in specifications and design plans*
  - *Vendors routinely advised of energy performance criteria*
- **Improved Energy Performance**

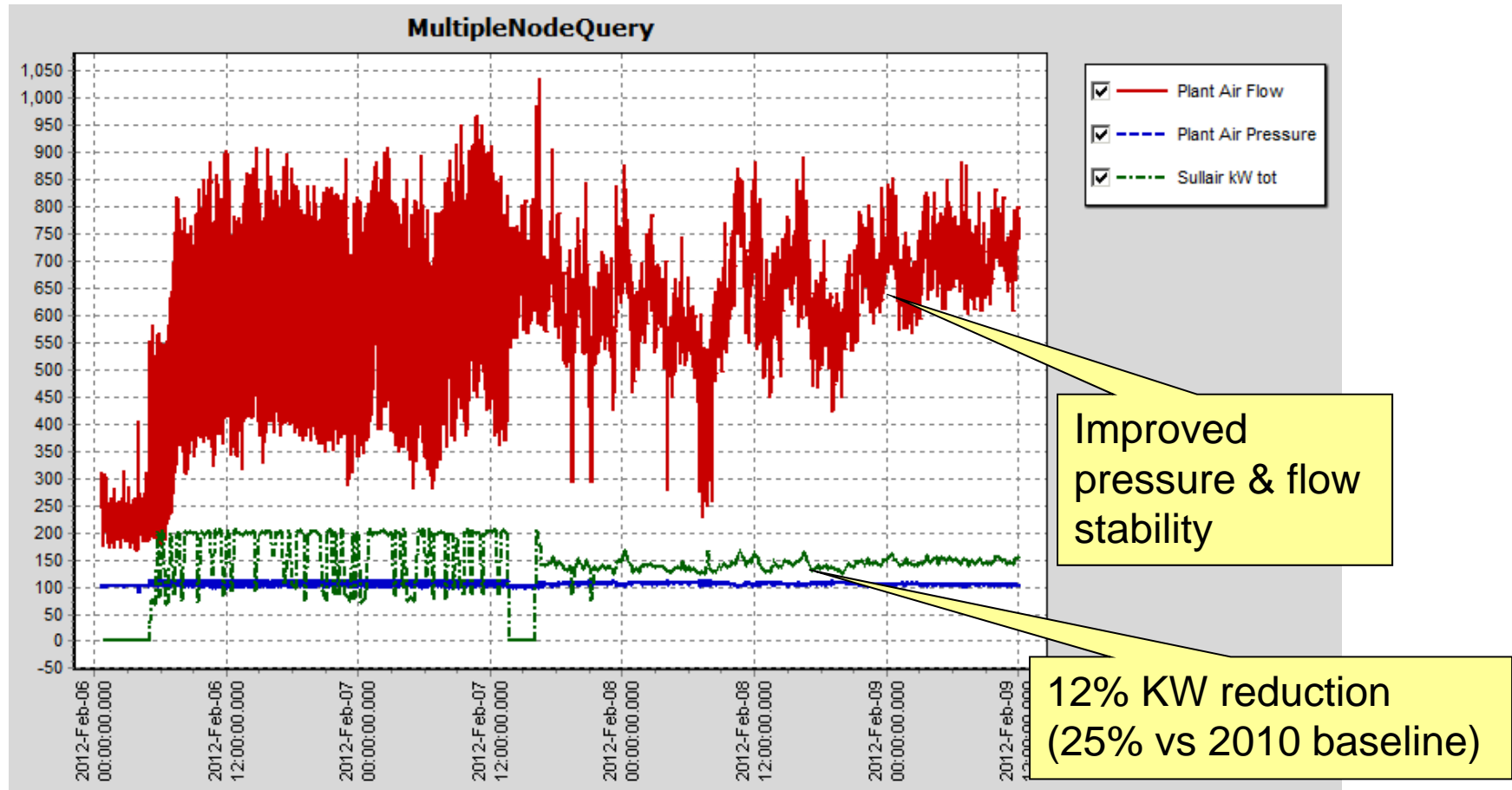


# 30% Lower Energy Intensity YTD 2012



# Energy Performance Project

## Example - Air Compressor 'Spiral Valve' Optimization



# Challenges

- Engaging executive management support
  - *Demonstrate alignment of EnMS with organizational goals*
  - *Needed to show business case to gain significant commitment of resources*
- Draft standards
  - *Standards still developing as we worked*
  - *Needed to seek clarifications & interpretations*
  - *Decisions on application, scope and rigor for our operation*
  - *No prior implementations for reference*
- Resource constraints
  - *Initial team didn't include plant leadership rep & coordinator*
  - *Active plant operational demands and competing priorities*
  - *Experience with other standards, energy management and statistical techniques for modeling need to come together – not that easy to do*
  - *Auditors – internal and external – are new to the standards as well*
- Losing energy performance focus while implementing EnMS
  - *Resources that were driving progress were partly consumed with EnMS*





# Lessons Learned & Advice to Others

- **Build a robust system that will keep working long term**
  - *Management commitment – make it important*
    - *Allocate resources – people, time, money*
    - *Set EnMS-related job expectations – all levels*
- **Use Project Management techniques**
  - *Set deliverables, milestones, action plans, due dates, assigned responsibilities, follow-up, etc. to drive implementation progress*
- **Build on what you have**
  - *Use and integrate with existing systems – docs, training, etc.*



# Lessons Learned & Advice to Others

- Objectives, Targets & Energy Review are critical
  - *Know what you want from the system*
  - *Get to energy review quickly – energy map, SEUs, team engagement, etc. are very powerful*
- Energy Mgmt Information System (EMIS) is a major asset
  - *Prior investments in submetering and electronic data collection and reporting provided excellent data to support the EnMS*
  - *We use ION power meters and ION Enterprise platform for energy data collection and analysis*
- ISO 50001 does not require much documentation
  - *Notably less than other standards*



# Key Success Factors

- Top management commitment
- Selection of team members
- Expert consultant support
- Government and LDC support
- Rigorous project tracking
- Existing Quality and Environmental management systems
- Prior investments in metering, data collection and reporting
- Legacy of corporate leadership in sustainability
- Availability of approved standards



# Questions

