Save Energy Now LEADER Web Conference
Replication Seminar Series

Replicate Best Practices

Fred Schoeneborn, CEM, CEA
April 26, 2011

Agenda

- Seminar Series **Overview**
- **Replicating** Best Practices

  Fred Schoeneborn - **ORNL** team

  Walt Brockway – **Alcoa**
- **Questions**/Future Seminars

Replication Series

- Presents **5** one-hour Webinars assisting *Save Energy Now* LEADER Companies
- Scheduled monthly - **fourth Tuesday** at 2:00 p.m.
- Focuses on **real-world** examples and solutions
- Offers practical **tools**
- Includes **peer** *Save Energy Now* LEADER participants

Replicating Best Practices

- **Design one – build many**
- **Leverage** Best Practices
- **Link** implementation and replication
- Adhere to company **procedures**

Replicating Roadmap

- Consider it a **process** not an isolated event
- **Identify** a Best Practice candidate
- Build a **vision**
- Present the **business case**
- Develop an **Action Plan**
- **Communicate** the status

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Origin of Best Practices

- Consider **assessments**
- Solicit **self-nominations**
- Hold energy **Summits**
- Review **Technical Sources**
- Inquire about **peer** facilities
- Share other **internal company** site practices

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Concerned Stakeholders

- Credit the **original design team**
- Consider the **Site Engineering team**
- Retrain the **Operating staff**
- Evaluate the impact on the **Finance staff**
- Address **Executive level management**
- Institutionalize with **future design teams**

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Make the Case

- Stress **financial messaging**
- Remember “It’s not the money - It’s the **money**”
- Sell best practice identification using a **matrix**
- Consider corporate **“hot buttons”**

Progressing to a Best Practice…

Progression to a Best Practice-based Energy Management Organization

State	Energy Policy	Organization	Motivation	Information Systems	Tools	Marketing	Investment
0	No **explicit** energy policy endorsed	No **delegation** of energy management	No **awareness** of the need for energy savings	No **accounting** for energy consumption	No **resources** for tracking best practice status	No **promotion** of energy conservation	No **funding** of energy efficiency
1	No **written** set of energy guidelines	**Informal** part-time responsibility	**Some** awareness of the need to save energy	Energy **invoice** checking when submitted	**Some** resources for sharing best practices	Informal **contacts** stimulate energy conservation	Only **low cost** measures implemented
2	No **adopted** formal policy in place	**Delegation** but line management authority unclear	**Sporadic** attempts to provide motivation	Monthly **monitoring** by fuel type	**Intranet** highlights of best practice implementation	Some **ad hoc** staff awareness training	Investment only with **short term payback**
3	**Formal** policy w/o commitment from top management	Clear delegation and **accountability**	**Most major** users motivated to save energy	Monthly monitoring by each **facility**	**Process** for monitoring best practice implementation	Regular and frequent **publicity** campaigns	Same **criteria** used to appraise other investments
4 Best Practice	**Active** commitment from top management	Fully **integrated** into general management	Rewards and **recognition** program in place	Complete system with management **reporting**	Management **reviews** of best practice implementation	**Marketing** inside and outside of the company	**Discrimination** to favor a "green" scheme
Score							

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Rubric	
0-7 Points	Minimal/no best practices
8-14 Points	Few best practices
15-21 Points	Moderate best practices
22-28 Points	Many best practices

“Big Picture” Concepts

- Deliver **sustainable** results
- Avoid **conflicts**
- **Benchmark** with other companies
- Use an **intranet** Website to share energy activities
- Distribute Best Practice documents **frequently**

Champion of Replication

- Walt Brockway, PE, CEM
- Alcoa
- Manager, Global Energy Efficiency
- Focus is on Replication

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ITP Webinar April 26, 2011

Alcoa can’t wait for tomorrow

Alcoa at a glance

- Founded in 1888
- 200+ locations
- 31 countries
- $18.4 billion revenue in 2009
- 59,000 employees
- 10 times safer workplace than US average
- Award-winning sustainability leadership
- 120 years of patents, including the original aluminum process

Number of Employees (2009)	
U.S.	23,000
Other Americas	19,000
Europe	10,000
Pacific	7,000
	59,000

Aluminum – the miracle metal

- Aluminum makes cars and trucks more fuel efficient.
  A pound of aluminum in a vehicle can eliminate 20 pounds of greenhouse gas in its lifetime.
- It makes electronic gadgets “cooler” and more recyclable.
- It makes air and space travel possible.
  All the structural alloys used in modern aircraft were developed by Alcoa.
- It is one of history’s most popular, most recyclable beverage containers.
  More than one trillion cans have been recycled in America since Alcoa pioneered the industry in 1972.
- It makes buildings more beautiful and energy efficient.

We are the aluminum leader

- Alcoa invented the commercial aluminum smelting process in 1888
- Alcoa has the world's largest smelting capacity
- Alcoa is the leader in aluminum technology and innovation

We are #1 or #2 in more than 90% of all our businesses

- Bauxite mining
- Refining
- End and tab can sheet
- Aerospace sheet & plate
- Hard alloy extrusions – advanced
- General engineering plate
- Aerospace fastening systems
- Aerospace airfoils
- IGT airfoils
- Aluminum structural forgings
- Aluminum truck wheels
- Commercial building systems (NA)

Worldwide operations – regional strength

Innovation is our heritage

Year

1886 | 1890 | 1900 | 1920 | 1940-1950 | 1960 | 1980 | 1990 | 2000 | Today

Aluminum Beginnings

Cookware

Airplanes

Electrical Conductor

Model T Castings

Household Foil

Truck bodies & Wheels

Buildings

Marine

Easy Open Cans

Heat Exchangers

Automotive Structures

Audi A8

Ferrari Modena

Space Shuttle

Consumer Electronics

Defense

Airbus A380

Environmentally-Friendly Bus

Oil & Gas

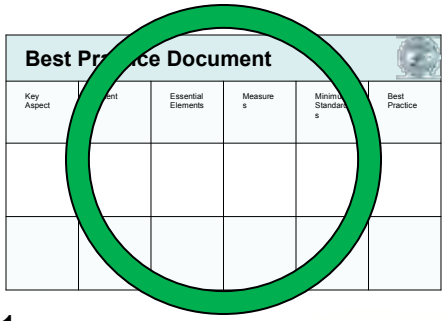
Aluminum Bottles

Best Practice Replication

1.1- What is a Best Practice?

- The first thing we must do to ensure the Best Practices are applicable “across the board” is take a look at the targeted activities one level higher than the SOP level. What we are looking for in this vision are the KEY ASPECTS, INTENT, and ESSENTIAL ELEMENTS of the activities we carry out.

- What it is
  - A guide
  - A group of actions
  - A set of minimum quality standards
  - A list of points to look out for
  - Examples of improvement tools
  - Technical tips
  - Methods



- What it is not
  - An SOP
  - A specific set of work instructions

Stages of Best Practice

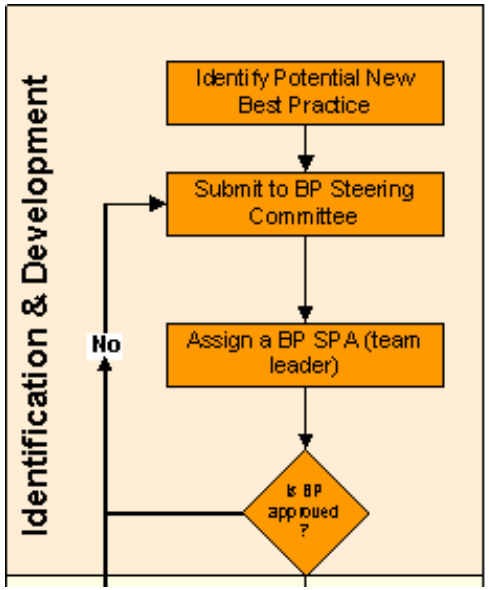
1. Stage A – Identification & development
2. Stage B – Sanctioning
3. Stage C – Deployment
4. Stage D - Governance

Identification & Development

BP identification is done through gap analysis, plant assessment, good practice sharing and plant suggestions.

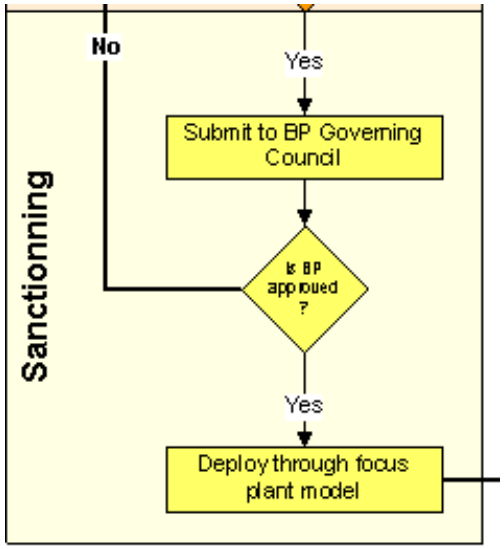
Potential best practice is reviewed and agreed by recognised experts as being the best way to do specific work applicable at all smelter locations

BPs are prepared to be documented, formatted and stored in a formalized way.



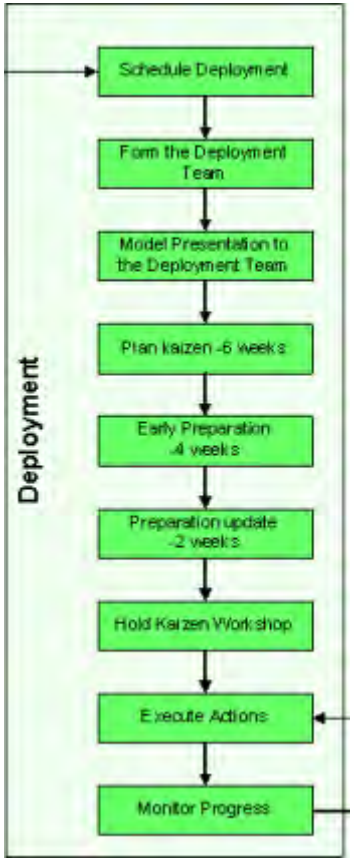
- Best practices originate from plant personnel, technical experts
- They are proposed to a Best Practice steering committee (experts from the field), which analyzes its applicability & business case, to be prepared for submittal
- The BP is assigned to an SPA who will be responsible for developing & deploying it if it is approved by the governing council

Sanctioning



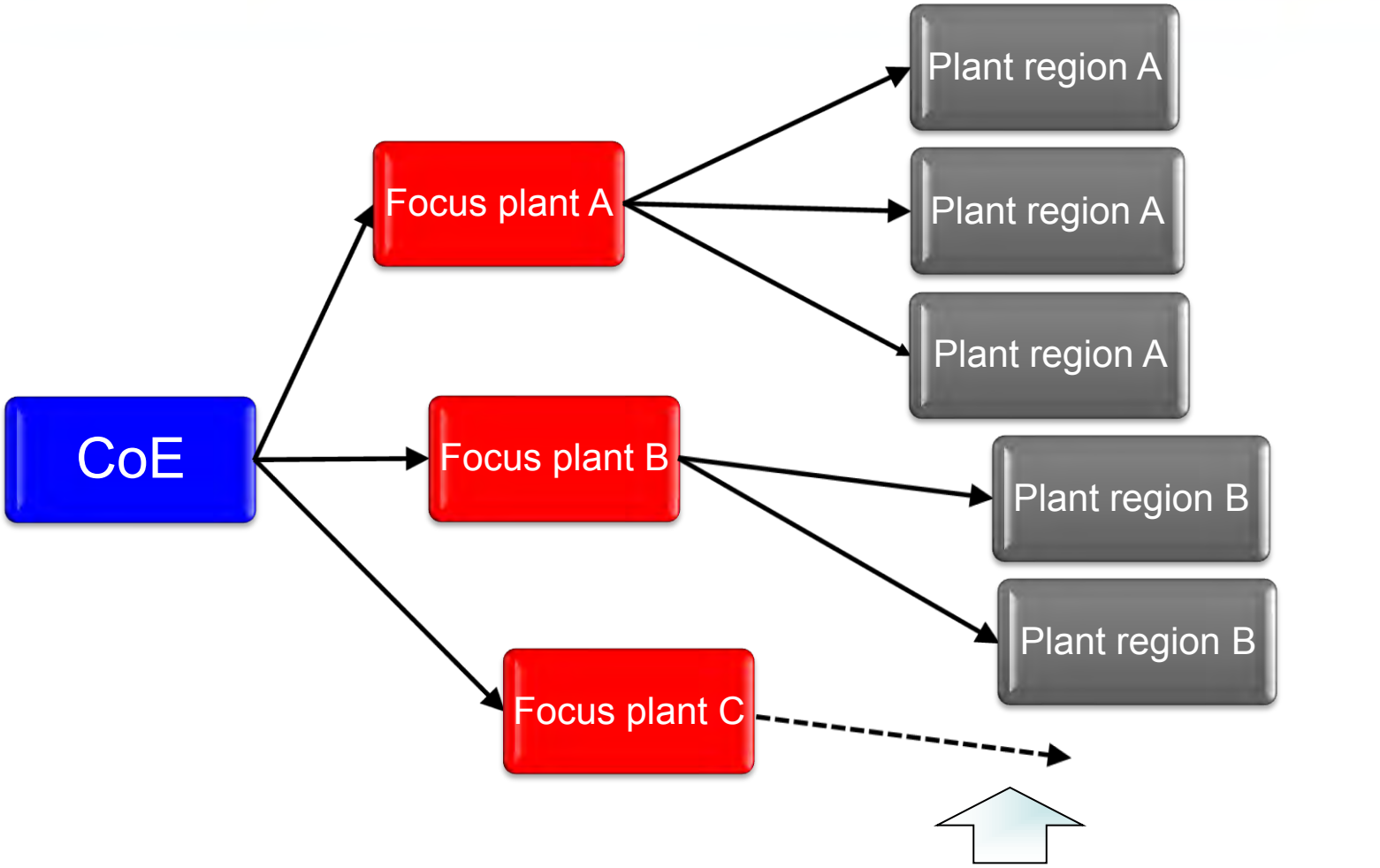
- The proposed Best Practices are submitted to a governing council, which will determine if the Best Practice fits criteria for full scale deployment. If the Best Practice idea does not fit the requirements, it will then be re-sent so the development team to be worked on
- Once they are fully developed and ready to deploy, they are put through the focus plant approach deployment effort, described in this document.

Deployment



- A structured process to establish the Best Practice at locations.
- Actions include:
  - Kaizen Activity
  - develop an A3,
  - Action plan to:
    - close any gaps
    - Make required process and work design changes, and other revisions to ensure work is done according to the sanctioned BP standard
- Deployment through the Focus Plant Approach

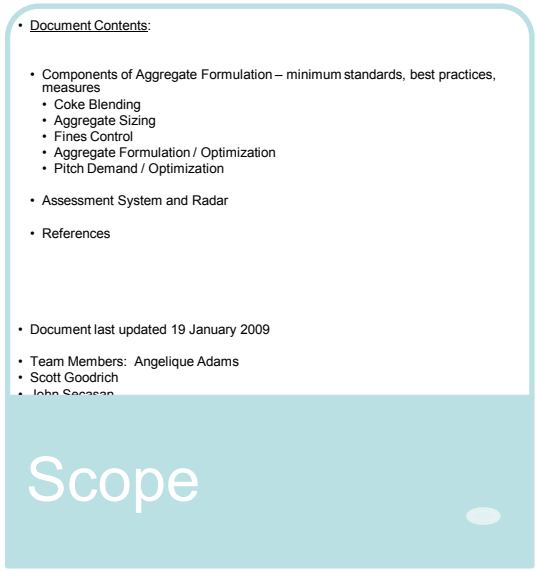
Deployment –
BP Global Process



1.2- Format of a Best Practice

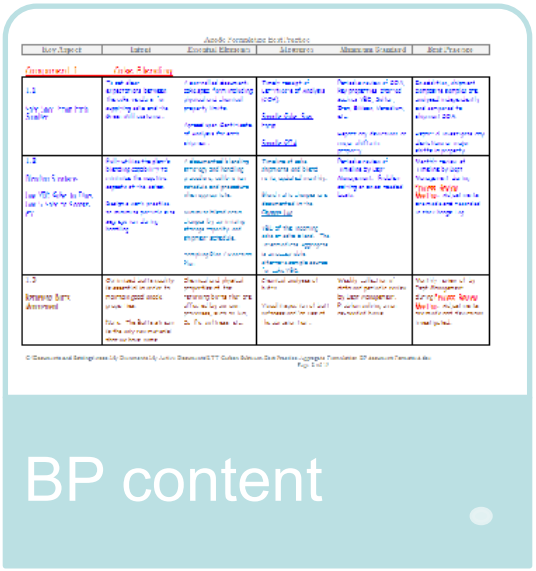
Best Practice documents are divided into 3 main sections.

- The first section briefly describes the scope of the Best Practice
- The second section contains the actual content of the Best Practice
- The Process assessment makes up the last section of the best practice document

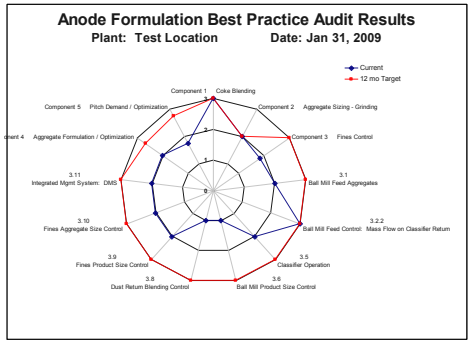


- Document Contents:
  - Components of Aggregate Formulation – minimum standards, best practices, measures
    - Coke Blending
    - Aggregate Sizing
    - Fines Control
    - Aggregate Formulation / Optimization
    - Pitch Demand / Optimization
  - Assessment System and Radar
  - References
- Document last updated 19 January 2009
- Team Members: Angelique Adams
- Scott Goodrich
- John Secasan

Scope



BP content



Process Assessment

Energy Measurement, Management and Verification

Objective

Improve non pot energy intensity by implementing measurement, management and verification capability to our energy consuming equipment and processes. This best practice compliments the current and future "Process BP's" targeting energy reduction, as the energy and process group continue to collaborate.

It is proposed that a best practice for energy measurement (meters), management and verification be developed and deployed at GPP locations.

Value Potential ($)

- Industries have experienced that closer management of energy intensity has resulted in reduced energy consumption. Examples have demonstrated 1% to greater than 5% reductions.
- GPP spends nearly $xxx MM on non pot energy, a 1% improvement is $xxMM; Measurement will help to identify the opportunities.

Deliverables:

- Implement an energy measurement, management and verification best practice for GPP

SPA: GPM and AWA Energy teams and Global energy group resources

Major Milestones & Timeline

Completion Target Date: Develop BP by 4Q10 and deploy to Focus Plants beginning 1Q11.

Major Milestone	By When
1. Develop and finalize Best Practice into the BP format	Dec 30, 2010
2. Initial deployment at targeted Focus Plant	1Q11
3. Deploy to all regions	3Q11

Compressed Air System Operation

Objective

- Generating compressed air is among the highest use of energy for GPP support utilities. All GPP locations have compressed air systems, many have significant cost impact but often times are not seen as a priority. Development of a compressed air management program within GPP could ultimately be used within all BU's. The first step to implement the strategy is to ensure that each location has a leak management program (that includes employee awareness) and is conducting periodic end use surveys. This should be followed up with optimizing compressed air system operation (controls, storage, maintenance).

Value Potential ($)

- A conservative estimate for completely implementing an overall compressed air best practice across GPP is an annual savings of $x to $x MM.

Deliverables:

- Implement air leak management and air usage survey Best Practice throughout GPP.
- Implement compressed air system operations Best Practice throughout GPP.

SPA: GPM and AWA Energy teams and Global energy group resources

Completion Target Date: Develop BP by 4Q10 and deploy to Focus Plants beginning 1Q11.

Major Milestones & Timeline

Major Milestone	By When
1. Develop and finalize Best Practice into the BP format	Dec 30, 2010
2. Initial deployment at targeted Focus Plant	1Q11
3. Deploy to all regions	3Q11

Best Practice Document

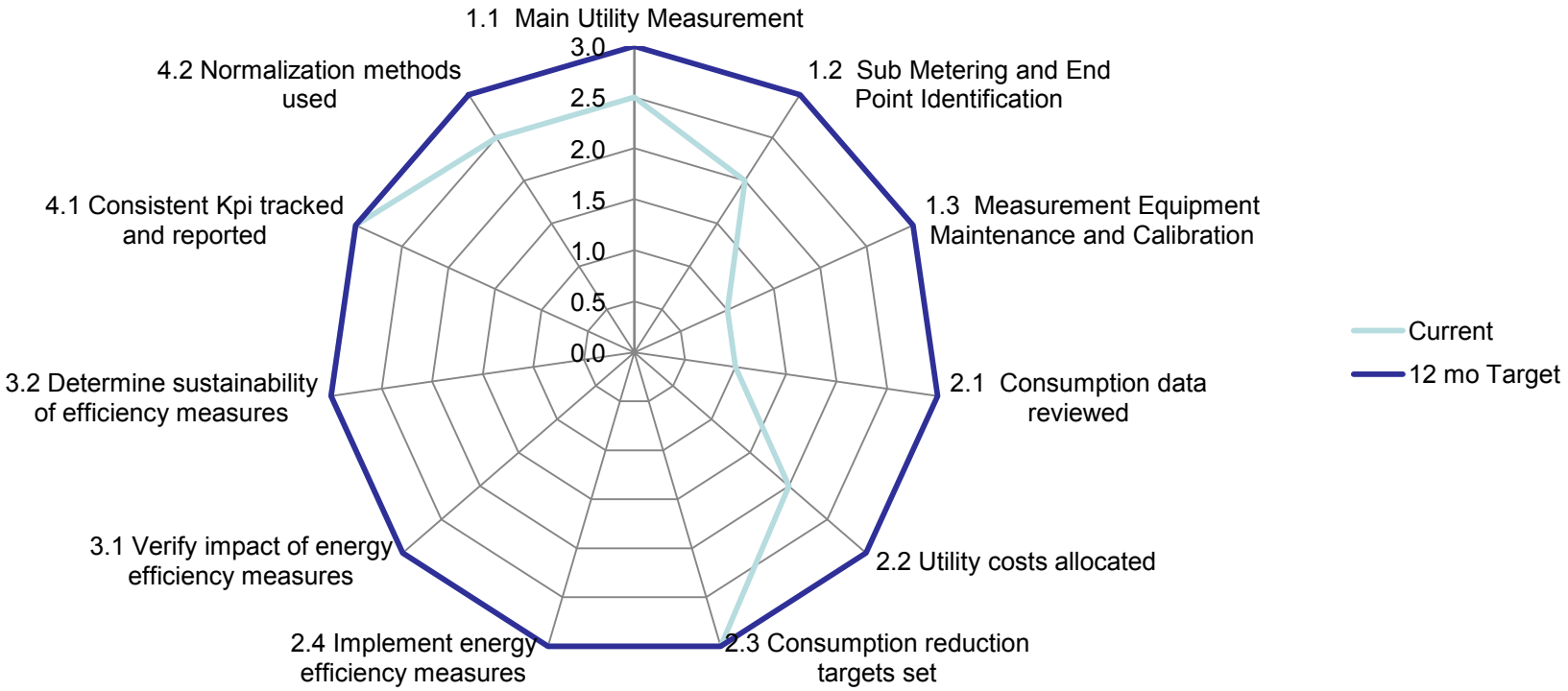
Measurement, Management & Verification Best Practice Audit	
Score	**Description of Situation**
0	Doesn't Exist
1	Exists but potential to add more value - does not meet the intent of the minimum standard
2	Exists, current, adequate & used appropriately - adds value - meets minimum standard
3	Exists & adds significant value - one of best in class - opportunity to transfer out technology

					Average Value
Key Aspect	**Intent**	**Essential Elements**	**Measures**	**Minimum Standard**	**Best Practice**
Component 1 : Measurement - Plant Utility Consumption (Metering)					
1.1 Main Utility Measurement	Ensure accurate billing of energy and to provide a cross reference to sub metering outputs.	- Capture total monthly consumption by main utility type. - Consumption data collected on a realtime basis for main utilities is preferred.	- Measures of consumption exist for all incoming utilities.	Monthly consumption is metered and recorded on all incoming utilities > $100,000 annual energy cost .	- Real Time consumption data is collected on all incoming utilities. - Differential between utility and plant real time consumption values are within 2%.
1.2 Sub Metering and End Point Identification	- Determine thru auditing where potential savings opportunities exist that could be impacted by submetering. - Create focus to install metering at points that will provide direct impact to energy savings.	- Identify and prioritize the top potential candidates for sub-metering. - A prioritized list of submetering opportunities exists and is reviewed on a periodic basis (not less than annually).	- Capture total monthly usage by utility type. - Consumption on a realtime basis for end points measured is preferred.	- At least three end-point measurements are targeted for metering and energy efficiency efforts. - Prioritized list of sub meter opportunities exists and is documented.	Real Time consumption data is collected on identified endpoints where economically justified. - (e.g.. Air Compressors, Gas Furnaces, Distribution Transformers etc.).
1.3 Measurement Equipment Maintenance and Calibration	Measurement (meter) equipment receives proper maintenance, calibration etc.	-Visual inspection of meters - Periodic maintenance - Verification and/or calibration	Visual observation of physical condition of meters, meter readouts and their functionality	- Physical inspection of metering equipment takes place on predetermined frequency, not more than every 12 months. - Verification plan exists to compare submeters against main meters with a predetermined tolerance to determine if calibration is required. - Acceptable tolerances for verification: Electrical-3% Gas,Steam,Air,Water,Fluids-5%	- List of meters to be verified/calibrated exists. - Documented verification/calibration plan exists. - Verification/calibration plan is 100% implemented. - A plan exists to correct abnormal deviations (e.g.: problem solving or reaction plan) - Review metering system every 12 months to insure verification/calibration is being performed (e.g.: pm, audit, etc)

Best Practice Document

Component 2 : Management					
2.1 Consumption data reviewed consistently	Available energy consumption data is integrated into appropriate plant / dept. level daily management system.	- Assemble Plant and Dept. level reports of energy consumption - Review consumption data to insure usage is consistent with expected norms. - Reaction plans must exist for abnormal results.	- Compare energy consumption against accepted values for plant/process use. - Utilize energy Kpi's where they exist	- Review main utility (plant level) consumption data at least monthly. - Compare against expected norm or defined plan. - Reaction plans must exist for abnormal results outside defined tolerance in Key Aspect 1.3	- At least the 3 end points identified in the minimum standard in Key Aspect 1.2 are followed by daily management system (DMS) and problem solving. - Other meters identified in Key Aspect 1.2 are reviewed at least monthly.
2.2 Utility costs are allocated	Allocate utility costs as appropriate to a sector (business unit/department /energy consuming process unit) based on meter data and/or engineering calculations.	- Cost allocation as part of business unit budget. -Available utility consumption costs are allocated across business units/processes with accepted procedures.	- Determine % of utility cost allocation. - Base allocation upon accepted practice and/or metered data as part of overall plant utility costs.	Monthly allocation of utility costs from main meters by agreed upon allocation formula.	- Monthly allocation of utility costs based upon consumption from process level or submeter data. - Plant tracks % of allocation based on actual meter usage and has a plan in place for continuous improvement of cost allocation process.
2.3 Energy reduction targets are set	Reduce consumption of energy to meet corporate, plant and or department level standards.	- Achievable targets are set for reduction of energy consumption at plant and department level as appropriate. - Plan determined for approach to achieve target. - Understand utility billing formulas, in particular charges for peak demand, consumption and infrastructure.	Energy consumption data is normalized and compared against reduction target.	- Energy consumption reduction targets have been established for the plant (e.g.: GJ/ton). - Energy consumption reduction met for 80 % of targets.	- Plant energy consumption reduction targets have been met or exceeded. - Department energy reduction targets have been recommended.
2.4 Implement energy efficiency measures	Implement sustainable changes to process or plant systems and equipment that decrease energy consumption.	- Capital and resources to implement efficiency measures are identified. - Energy Efficiency Incentives from local utility are identified and understood.	- Low cost-no cost efficiency improvements are documented. - Capital projects for efficiency improvements are identified.	- Location has a formal process to collect low cost-no cost energy improvement ideas (e.g.: energy committee). - Documented assessment of low cost-no cost improvement potential has been conducted (e.g.: turn off light in a department during the day). - An implementation plan for low cost-no cost improvements is in place (e.g.. change the circuit by this date).	- Long term capital improvement plan is in place to implement energy efficiency projects. - (e.g.: replace, upgrade or optimize energy consuming equipment and processes). - Where effective utilize Energy Efficiency Incentives from local utility.

Kaizen Results



Follow up Expectations

- Location has identified gaps and set action plans to “fill the gaps”
- Location will re-assess in 90 days
- Certification is given

Certification

Best Practice Certificate

✲ ✲ ✲

Energy Measurement and Management

This document certifies that La Coruna – Europe, has successfully reached scores (not less than 2 and an average of 2.5 min.) and applied all recommendations to be certified as a Best Practice

Date of certification: March 28, 2010

Ghislain Gaudreau,
Best Practices Director

Alberto Prieto Fernandez
Alberto Prieto Fernandez
Regional Reliability and Maintenance Manager

Questions?

Sincere Thank You

On behalf of the entire *Save Energy Now* LEADER Replication Webinar team, we want to extend a special thank you to Dr. Tony Wright for his guidance and leadership over the years. He will be greatly missed.

Next Seminar in the Series

- **May** 24, 2011
- **2:00 p.m.** Eastern
- **Sell Management** on Replication and Build a Network
- **Guest** Speaker from Raytheon
- Please **register**

Feedback

- **Welcome** comments regarding Seminar Series
- Seminars are **your** sessions
- Make seminars **meaningful** for you
- Feedback aids **continuous improvement**
- Send **comments to** Lindsay Bixby at: lbixby@bcs-hq.com