### DNV·GL

# **Energy Culture**

DNV GL Energy – Sustainable Energy Use Europe

SAFER, SMARTER, GREENER

# **DNV GL - a world leader**



# DNV GL Energy: One company serving the needs of the energy market place



# Sustainable Energy Use

- Support industry to reduce their energy costs and remain competitive
- Design, implement and evaluate policy
- Develop, operate and measure the effectiveness of Utility obligation schemes
- Capacity building and market assessments for the new energy economy (smart cities, demand side management, Measurement & Verification, etc.)
- Research & innovation

3 DNV GL © 2013

# **Energy Culture Can Unlock Energy Savings Potential**



*"Two-thirds of the economic potential to improve energy efficiency remains untapped in the period to 2035"* 

IEA, WEO 2012

#### **European Environment Agency**



Up to 20% of the energy we currently consume can be saved through changing behavior"

Energy efficiency has been on the agenda for years but **significant saving potential remains**.



One of the factors that contributed, in part, to the downward trend of our energy consumption was the engagement of the workforce.

Roughly 50% of the savings were achieved by engaging the workforce to improve existing assets.



# Energy Efficiency is facing many barriers, most of them nontechnical and non-financial

- Low awareness
- Lack of knowledge
- Resource constraints (time, money)
- Fragmented energy saving potential
- Preference for supply side solutions
- Lack of management commitment
- Inadequate energy data
- Resistance to change
- Perceived risk of production/operation disruption
- Measurement & verification uncertainty
- Split/contradicting incentives
- Insufficient focus on non-technical solutions



Why is it that contextual factors such as corporate culture and investment strategies, presents strong inertial forces within organizations that inhibit implementations that appear rational?



# What is Energy Culture?

Energy Culture is the shared mindset that creates and sustains an environment that leads to continual improvement of the organization's energy performance. It comprises people, systems, structure, skills and strategy



# **Behavioral change theory**



## **Theories of change**



### Models of behavior

- Threat
- Fear
- Response efficacy
- Self-efficacy
- Barriers
- Benefits
- Subjective norms
- Attitudes
- Intentions
- Cues to action
- Habits
- Reactance

Energy Culture is quantified in **eight** characteristic **dimensions** with **five** maturity **levels** for each



This approach builds on models of behavior, theories of change, experience of DNV GL's "Safety Culture" and energy efficiency expertise in industry

#### 10 DNV GL © 2013

# Improving Energy Culture – A motor of an ISO50001 system

# The change process is driven by optimization projects

- Diagnostic Assess the current status of the energy culture of an organization. Important to calculate baseline from where you start.
- Solution Development Based on the findings in the diagnostic stage a solution program is developed.
- Implementation The solution program is implemented at a pace that is suitable for the organization.
- Sustaining A quantitative and qualitative evaluation at regular intervals to close the circle of continuous improvement.



# **Diagnostic – How to measure Energy Culture?**



# A first step to evaluate the savings potential linked to behavioral change



#### Gas consumption vs. Electricity production - average daily values

# What causes energy use variability?

- Derived from two main sources
  - In and output parameters
    - Outside temperature
    - Raw material
    - Type of product produced
  - Process parameters
    - Automation
    - Influenced by operators

# **Diagnostic – How to measure Energy Culture?**



# **Diagnostic – Maturity levels**

N°	Maturity Level	Examples		
1	Inert	<ul> <li>No or limited information on energy performance is available</li> <li>There is no energy related training provided</li> </ul>		
2	Reactive	<ul> <li>Energy is measured via on-site utility meters but recorded manually at irregular/long intervals</li> <li>Regular poster campaigns are organized to generate awareness</li> </ul>	Visibility 5 Progress 4 Accountability 2	
3	Involved	<ul> <li>There are energy targets per department</li> <li>Plant wide monthly energy performance compared to target is shown on screens and/or boards</li> </ul>	Learning Collaboration	
4	Proactive	<ul> <li>Energy use for main energy users is measured and stored in real time</li> <li>A self assessment process is carried out by the energy champions on regular basis</li> </ul>	Motivation Targeting Commitment	
5	Continually improving	<ul> <li>A comprehensive metering structure is in place in real time comprising both main energy users and main energy drivers</li> <li>Energy performance is discussed on a daily basis at all level of the organization</li> </ul>		

# Case study: Implementation - Action plan

Scenario	0-6 months	6-12 months	12-18 months	18-24 months
Ambitious	<ul> <li>Create a vision to change energy culture</li> <li>Update the vision and highlight realistic 2015 &amp; 2020 intermediate targets</li> <li>Identify quick-wins</li> <li>Validate the metering plan to ensure adequate meters will be available for quick wins and energy KPI</li> <li>Include EE in every site wide communication - Quarterly forums – Operator training. Communicate about the vision, targets and key activities.</li> <li>Identify energy champions in main areas</li> </ul>	<ul> <li>Develop an optimal KPI structure from the bottom-up with roles and responsibilities</li> <li>Create quick-wins</li> <li>Implement energy meter data acquisition into PI</li> <li>Develop baselines for main energy users</li> <li>Communicate the vision for culture change</li> <li>Develop newsletter &amp; a panel at entrance with info on energy</li> <li>Facilitate workshop/discussion about energy during operator training.</li> <li>Set up a formal energy efficiency improvement team composed of champion and train them</li> <li>Celebrate yearly progress</li> </ul>	<ul> <li>Develop dashboards at different levels of the organization (management, engineering, operations)</li> <li>Set targets for KPI structure</li> <li>Work on a monthly reporting incl. production, safety, quality and energy (progress vs. targets)</li> <li>Re-launch a poster campaign with figures related to energy savings</li> <li>Develop and/or update operational procedures including energy efficiency and energy baselines</li> </ul>	<ul> <li>Develop an incentive program including ideas collection, analysis, selection and implementation</li> <li>Identify best practices in targeted department</li> </ul>

## **Case study: Chemical Plant – Dow Corning**

- Dow Corning
- Site located in Belgium
- Manufacturing of sealants, compounds, emulsions
- Research and development of new materials for industries such as personal care, textiles and construction
- Offices, laboratories, production facilities
- Staff: 700 FTE's





# Case study: Diagnostic results



Dimension	Level	
Visibility	Inert	
, i cia integ		
Accountability	Inert-Reactive	
Collaboration	Inert	
Targeting	Inert- Reactive	
Commitment	involved	
Motivation	Reactive-involved	
Learning	Inert-Reactive	
Progress	Inert-Reactive	

N°	Maturity Level
1	Inert
2	Reactive
3	Involved
4	Proactive
5	Continually improving

# Case study: Setting targets for Energy Culture

Define various scenarios to improve the selected dimensions on which the organization wants to focus



#### Next steps – next 3 months

- Develop intermediate steps to reach their 2050 decarbonization targets and communicate those steps to the organization
- Install sensors and store the data in the data historian plus publish dashboards on their intranet
- Identify and capture quick wins
- Develop an internal network of "Energy Champions"
- Continuously inform all collaborators on progress

# Changes are already happening

- Board of directors are starting to ask about information on energy consumption
- New leadership has embraced the Energy Culture concept
- Engineering department has made it mandatory to study the energy consequences on all new projects
- The safety department would like to coordinate communication on Energy Culture and Safety Culture
- Employees volunteer to help improve energy efficiency
- An operator has identify a problem of insulation in one of the building that is now being fixed
- The maintenance team has initiated an insulation campaign
- A group of operators have rerouted tracing cables to improve energy efficiency
- Maintenance has synchronized two compressors

1% energy savings captured after 1 month

# **DNV GL Energy**

#### Energy Efficiency Center

ulrika.wising@dnvgl.com sophie.chirez@dnvgl.com

+32(0) 3 206 65 47

www.dnvgl.com

SAFER, SMARTER, GREENER

23 DNV GL © 2013