

Non-energy benefits and behaviour change to EE

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Agenda

- Non energy benefits
 - Intro
 - What are non energy benefits (NEB)?
 - How to assess them ?
 - Do NEB make a difference?
- Behaviour change
 - Behaviour change –why do we need this?
 - What can be achieved with behaviour change?
 - How to drive the process

Intro

Ahead of UN summit, leading scientists warn climate change 'hitting harder and sooner' than forecast



Geir Braathen The largest glacier in the Swiss Alps, the Aletschgietscher, is melting rapidly and could disappear altogether by 2100.

Table ES1.3 Economic and technical saving potential of industrial final energy consumption

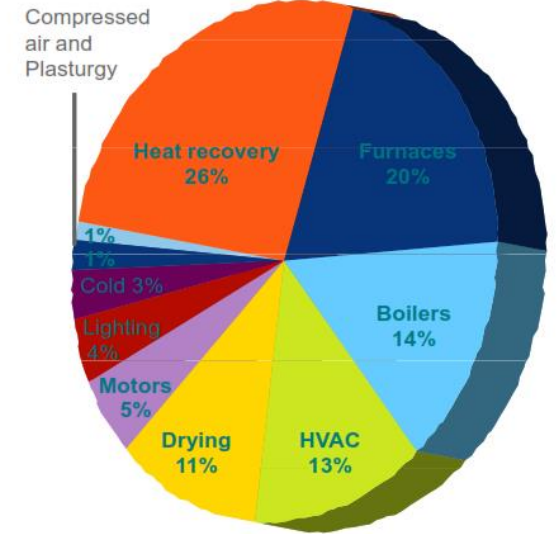
Energy saving potential in Danish industrial sector by energy source and payback-period				
Energy source	Share of energy demand	2 years payback	4 years payback	10 years payback
Electricity	23%	14%	10%	11%
Fuels	77%	14%	10%	11%

Table 1. present the largest p

Energy savings in industry : technical potential

15%–20% energy savings potential with existing technologies and dedicated energy management (80 TWh in France)

- **HEAT = 85%**
- known energy savings
 - Boilers, furnaces, drying,
 - heat recovery, HVAC



Energy savings potentials



Why do we have a slow uptake of energy efficiency ?

- Many reasons, however it could be

ID	Description of measure/project/action	Service	Status	Estimated/Actual (Annual) Savings				Capital Cost (Le)	Total Cost (Le)	Payback (years)
				kWh Elec.	kWh N.GAS	Type of Fuel	Financial (Le)			
1	Office heating by application air-air heat exchanger on the RF dryer exhaust channel line.	Heating	planned	8.000				4.000	4.000	2
2	Application oil cooling heat exchanger on the oil-screw air compressor to obtain hot water which used for building heating.	Heating	planned	500				12.000	12.000	
3	Revision humidity system of The Twisting Hall air Conditioning machine	AC	planned	104.432				35.000	35.000	1,3
5	Periodic control of the steam trap at the factory which had been listed will be made and interfere of the leakage	N. Gas	planned		325.000			20.000	20.000	1

ENERGY COST 2-5 % OF PRODUCTION COST

So where should focus be when we "sell" energy efficiency ?-1

- We could start looking at the non energy benefits ?
- What are non energy benefits ?
 - Any benefit other than energy saving received from an energy efficiency activity.
- NEB is not a new thing, there has been research for more than 25 years, however the concept has been very slow to be recognised

So where should focus be when we "sell" energy efficiency ?-2

- We could look at the non energy benefits

Non-energy benefits from efficiency improvements

Waste	Emissions	Operation and maintenance
Use of waste fuels, heat, gas Reduced product waste	Reduced dust emissions Reduced CO, CO2, NOx, SOx emissions	Reduced need for engineering controls Lowered cooling requirements
Reduced waste water Reduced hazardous waste		Increased facility reliability Reduced wear and tear on equipment/machinery Reductions in labor requirements
Materials reduction		
Production	Working environment	Other
Increased product output/yields	Reduced need for personal protective equipment	Decreased liability
Improved equipment performance Shorter process cycle times Improved product quality/purity Increased reliability in production	Improved lighting Reduced noise levels Improved temperature control Improved air quality	Improved public image Delaying or Reducing capital expenditures Additional space Improved worker morale

How to assess them ?

Use the multiplier value from research (2.5 times!)

NON-ENERGY BENEFITS FROM COMMERCIAL AND INDUSTRIAL ENERGY EFFICIENCY PROGRAMS: ENERGY EFFICIENCY MAY NOT BE THE BEST STORY

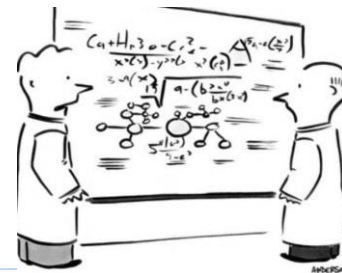
Nick P. Hall, TecMarket Works
Johna A. Roth, TecMarket Works

The results indicate that businesses place significant importance on the non-energy benefits associated with the installed technologies, and that the value of these benefits are equal to about 2.5 times the projected energy savings for the installed measures. In summary, businesses report that the

- Questionnaire

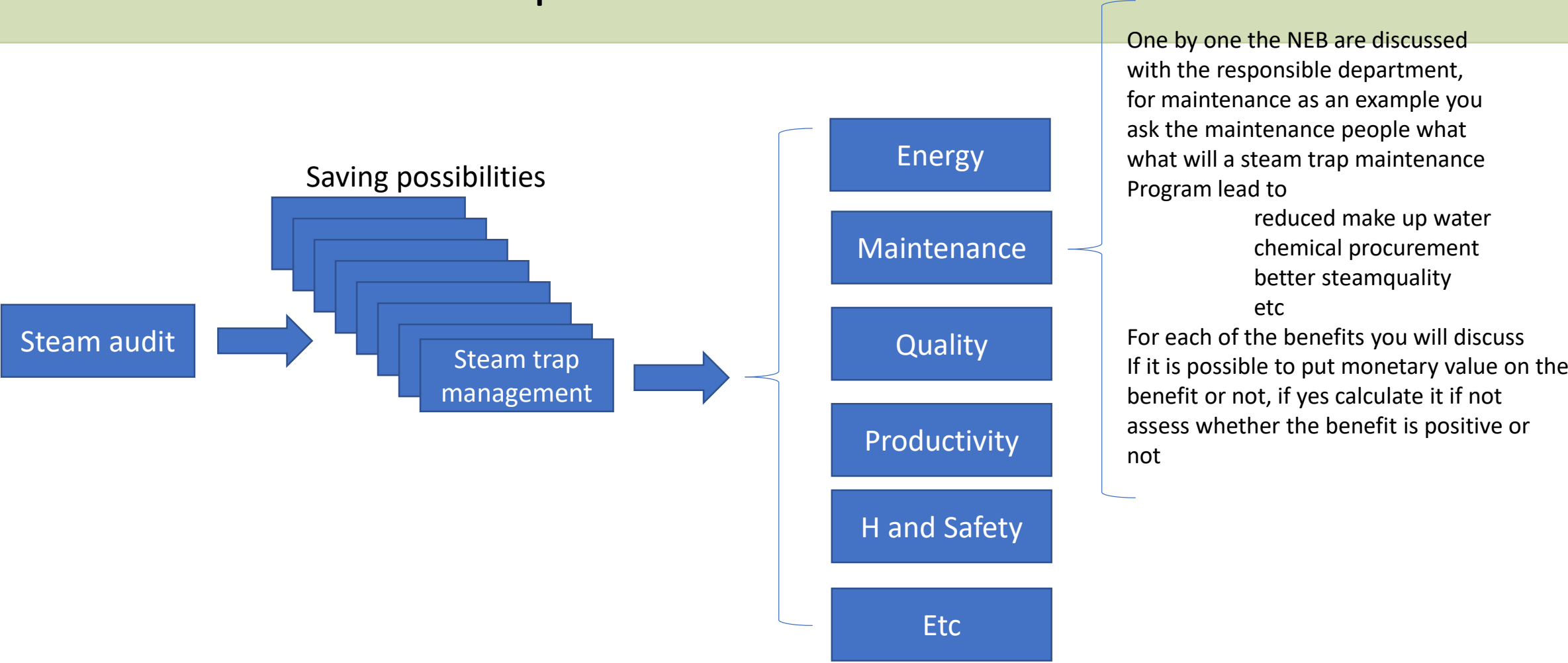


- Exact calculation



The factor could range from 0 to 70

NEB assessment process



Case Study: Production of liquid gasses

Savings due to lower cooling water temperature :

153.000 kWh/year or 12.000 US dollar

However, "what did the company achieve besides saving energy ?"

Reduced:

- Use of chemicals 50.000 US dollar/year
- Corrosion inhibitorer 12.000 US dollar/year
- Reduced corrosion 20.000 US dollar/year
- Reduced labour cost not calculated
- Reduced down time not calculated
- Reduced enviromental influence not calculated
- Better working enviroment not calculated

- **Pay back less than half a year**



Non Energy Benefits of High Efficiency Motor

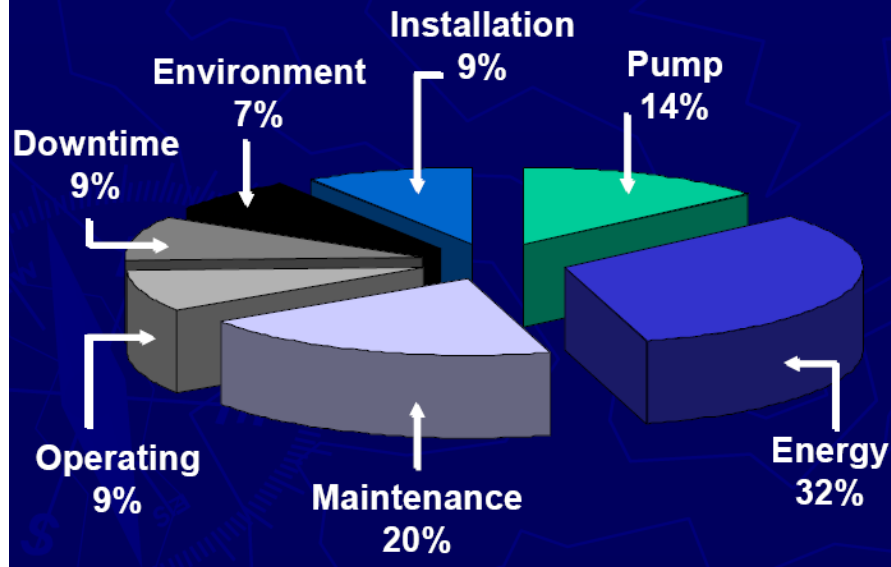
- Low cost of operation due to less consumption of electricity.
- Low noise/ silent operation which makes it suited for indoor use.
- Less heating of motor due to the efficiency factor being high. Which means that you can run these motors for long periods at a time.
- Bearings last longer because the temp is lower
- Low maintenance because of the higher quality materials used. The chances of breakdown are very slim.
- Life of the these machines is generally higher than regular machines.

**GET 10% MORE
ENERGY SAVINGS**
WITH THE
NEW IE5-RATED
MGE MOTORS
COMPARED TO IE3



Case story – pump

Example of Life Cycle Costs for an Industrial Pump.



Industrial electricity use for pumps in DK 10%

Research from Danish project concludes that coating can:

- Protect a new pump from corrosion and erosion and improved energy efficiency
- Renovate and protect existing pumps, bring the pump back to year zero, and improve its energy efficiency compared to new
- Improved energy efficiency 3-29%
- Extended life time 2-3 times

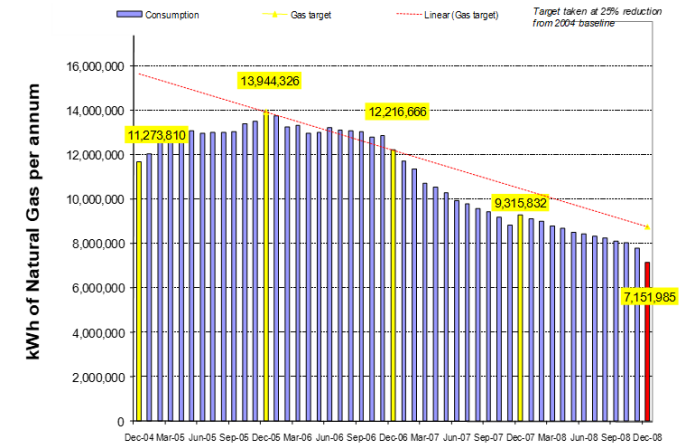
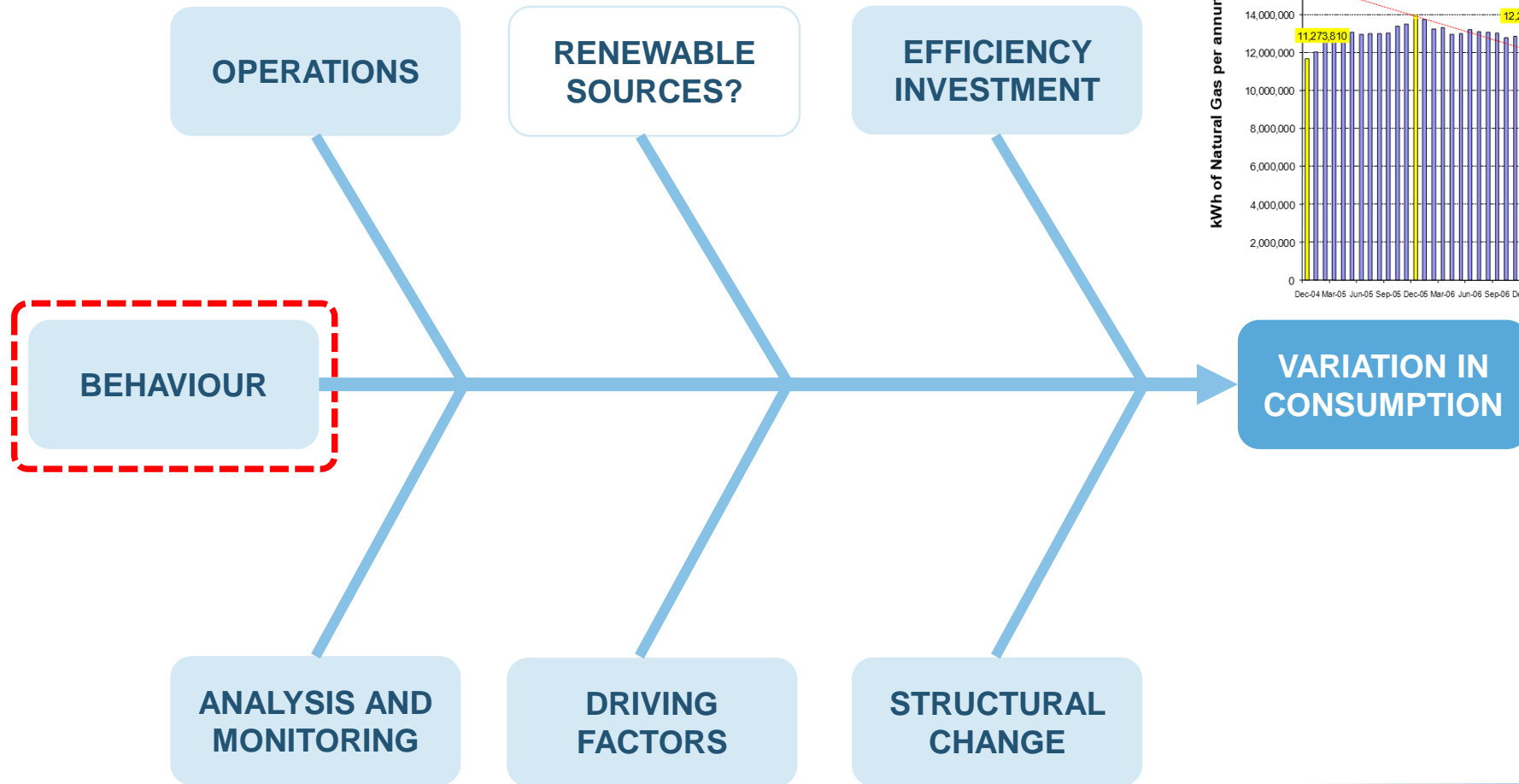
See:

http://www.eeee.org/conference_proceedings/eceee/2007/Panel_7/7.29_5/

So you save energy however the value of the reduced maintenance and downtime is worth much more

Behavior change –why do we need this ?

Causes of variation in consumption



What can be achieved by behavior change ?

- From US SEP program , in some cases 70% of the savings ranging from 6-25 % comes behavior change



- DNV help companies implement energy efficient culture 10% within the first 18 months **DNV in the Netherlands**

- Behavior program in the Danish post 14 % savings



- Experience's from UNIDO EMS program in Turkey in average 4,5% reduction within 9 month's

GEF-UNIDO-UNDP-YEGM Industrial Energy Efficiency Project, TURKEY (2016)

- Reduction of idle electricity in Volvo construction machines, result 25% reduction in electricity consumption



How do you it?

Step 1 – Get top management commitment

- Get the management commitment
- Asses the company culture
- Establish an agreed common understanding of what shall “our energy culture” be
- Pave the road for the implantation

Step 2 – Introduction

- Inform and engage employees
- Address obstacles and difficulties

Step 3 – Implementation

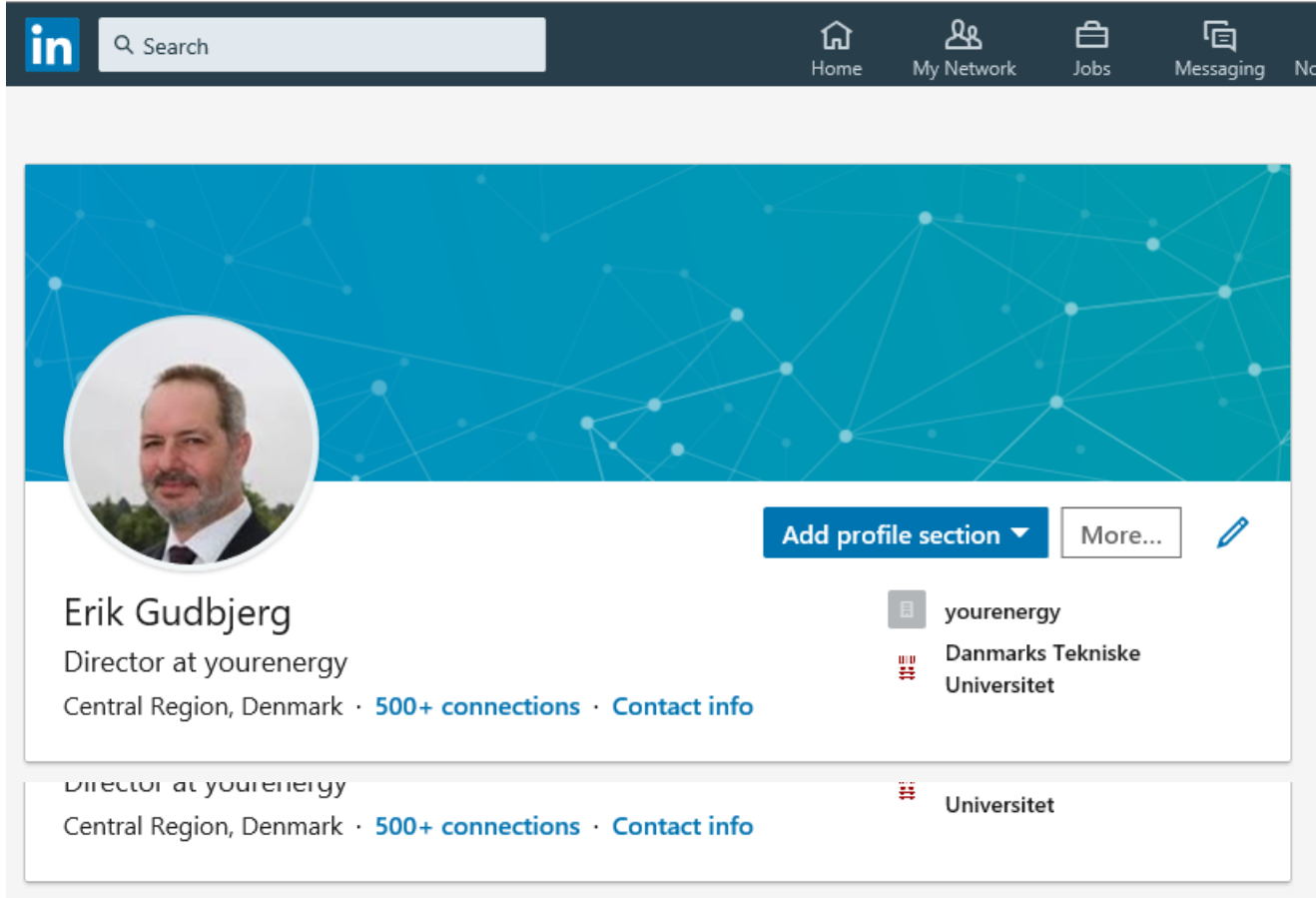
- Integrate into all elements of the business such as procurement, design, maintenance procedures an ENPi's

Step 4 – Evaluation and monitoring

- Evaluate and monitor
- Communicate results
- Celebrate and reward successes
- Extend or modify activities



THX and You can find Erik here 😊



The image shows a screenshot of a LinkedIn profile for Erik Gudbjerg. At the top, there is a dark navigation bar with the LinkedIn logo, a search bar, and icons for Home, My Network, Jobs, and Messaging. Below this is a blue banner with a white network diagram. On the left side of the banner is a circular profile picture of Erik Gudbjerg, a man with a beard and mustache wearing a suit. To the right of the profile picture are buttons for 'Add profile section', 'More...', and an edit icon. Below the banner, the name 'Erik Gudbjerg' is displayed, followed by his title 'Director at yourenergy', location 'Central Region, Denmark', and '500+ connections'. To the right of the name are two organization cards: 'yourenergy' and 'Danmarks Tekniske Universitet'. Below the main profile information, there is a second, partially visible profile section with the same name and title.