

**eceee – Industrial Efficiency – Panel 3
June 2018**

How motivation and digitalisation can drive behaviour change in industry

The EiiF Foundation

Article 2 Purpose of the Foundation

- The Foundation engages itself, exclusively and irrevocably, on a non-profit basis for the **deployment of sustainable insulation systems** in industrial plants and in the industrial environment with the aim of **saving energy, reducing CO2 emissions** and realizing the best possible noise and fire control systems.

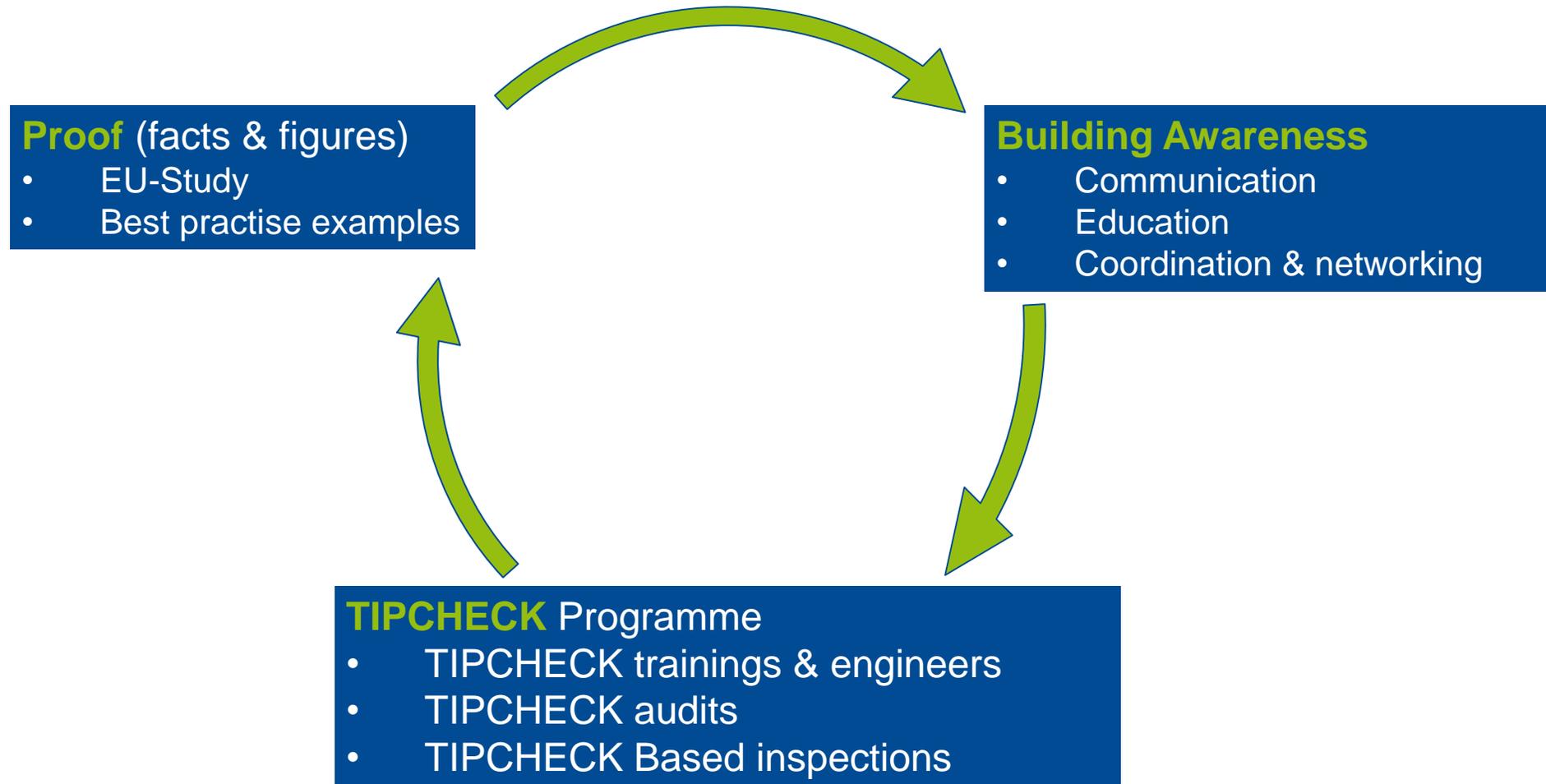


How motivation and digitalisation can drive behaviour change in industry

- **Building Awareness**
- Who knows the consumption of her/his car and the current fuel prices?
- Who knows the consumption of his heating system at home and the current fuel price (gas, oil, etc.)?

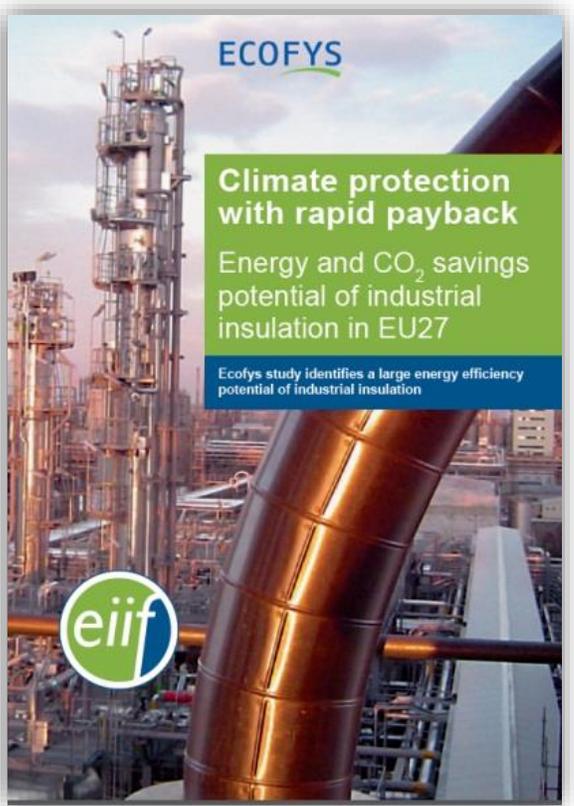


The Strategy building on a spiral development



Proof – Ecofys Study

- Climate protection with rapid payback – Energy and CO2 savings potential of industrial insulation in EU 27



👉 Full report in EN

👉 Summaries in EN, DE, IT, FR, NL, ES, PL



Download on www.eiif.org



Proof – Ecofys Study

The annual saving potential of improving thermal insulation up to cost-effective levels is **620 PJ**



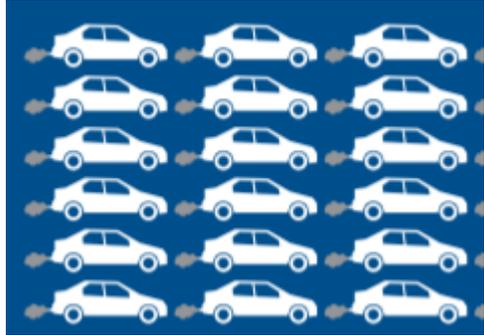
The energy consumption of the Dutch industry (NL)

Or



The energy consumption of **10 millions of households**

Or



The CO₂ emissions of **18 million middle class cars** each running 12'500Km/a



TIPCHECK Explanation

- **Technical Insulation Performance Check:**
- Energy Audits (EN 16247) specialised on insulation system in industrial environments.
- Training programme for insulation engineers: certified TIPCHECK engineer



TIPCHECK



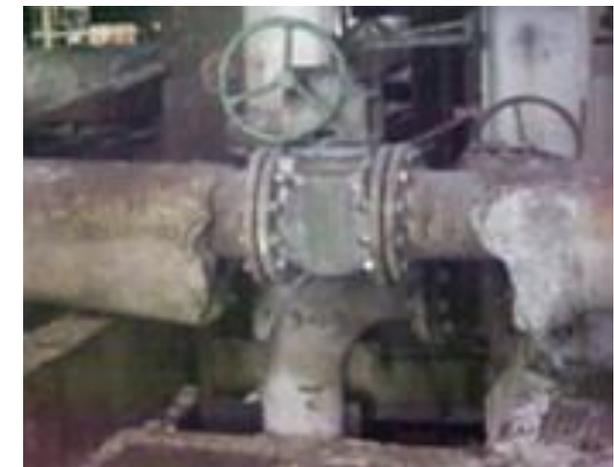
Proof – TIPCHECK Case Studies

Chemical Plant – Process temperature range 75 °C to 150 °C

Identified components: 650 m of piping with missing or damaged insulation, 300 uninsulated pairs of flanges, 160 uninsulated valves, 3 uninsulated tanks.

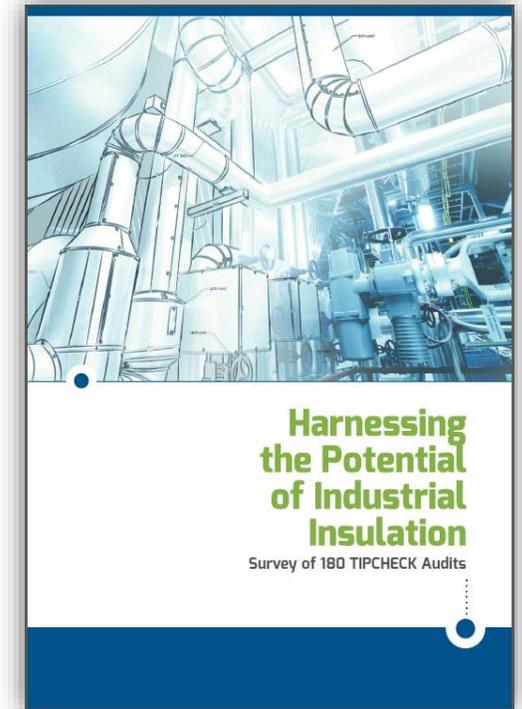
TIPCHECK Outputs:

- **Saving potential: 11.100 MWh/year & 200.000 €/year**
- **CO₂ emission reduction potential: 2.240 t/year**
- **Payback time less than 1 year**



Proof – TIPCHECK Report – Published in 2016

- The annual **energy savings potential** identified by approximately 180 TIPCHECK audits was more than **750.000 MWh/year or ~3PJ/year**. Equivalent to the annual greenhouse gas emissions of almost **110.000 cars**.*
- **75% TIPCHECK recommendations to cut energy losses were implemented.**

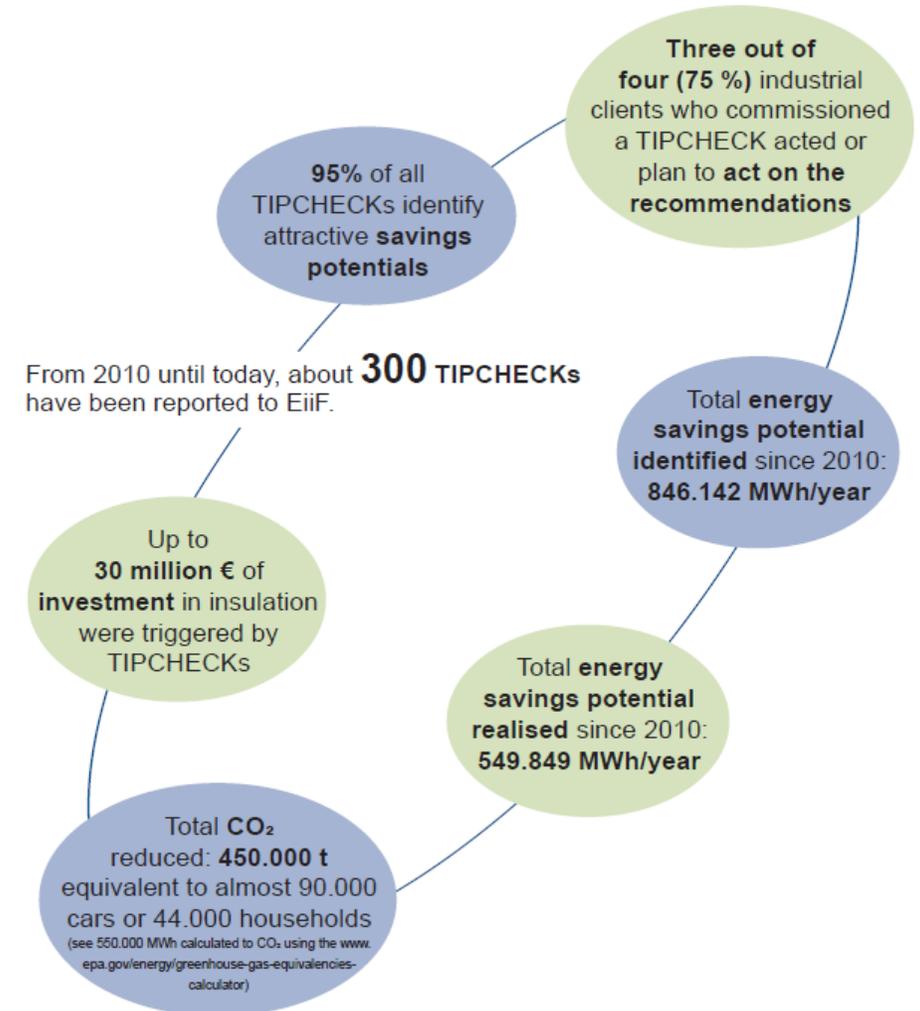


*<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Proof – TIPCHECK Report – Update 2018

Until today about **300 TIPCHECKs** were reported back to EiiF:

- The average payback time for the recommended insulation measures was **2 years** or even less
- **3 out of 4 clients** acted or plan to act
- **95%** of all TIPCHECKs identified energy, CO₂ and cost reduction potentials



We need more TIPCHECKs...

So far, we have tackled only 0,5 % of the 620 PJ/172.222.222 MWh potential:

62'000 TIPCHECKs needed.

➤ **1'000 years!**

FUTURE PERSPECTIVE:

100 TIPCHECKs realise ~ 1 PJ

To realise the **620 PJ** we will need
to carry out:

62'000 TIPCHECKS



Why? Evaluation of TIPCHECK Experience (300 Audits in 300 Plants)



Typical reaction after a first facility walkthrough of a TIPCHECK client:



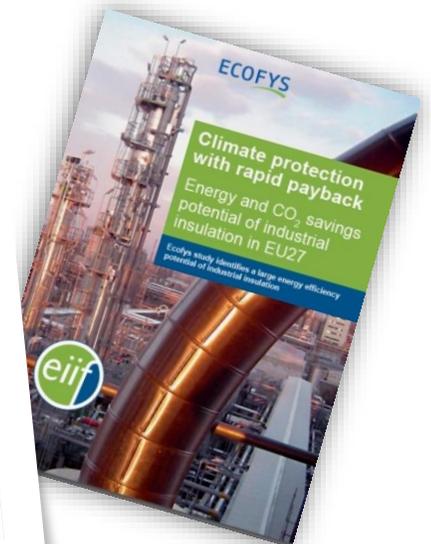
“You don’t know, what you don’t know, until you know”

- TIPCHECK clients are **not necessarily and always aware, how much energy they are wasting**
=> The NOMCA Syndrome
 - **(Not My Core Activity – Marco Paresi from Turboden at the Sustainable Energy Week, Brussels, June 2018)**
- They usually are **not aware how easy and quick** it is to **stop the energy waste** with properly **insulated** systems/installations.

Why? - Lack of Information and Awareness

- The share of equipment **without insulation** or **with damaged insulation** is conservatively estimated to be **10%**, **6%** and **2%** for low-, middle- and high-temperature surfaces respectively.

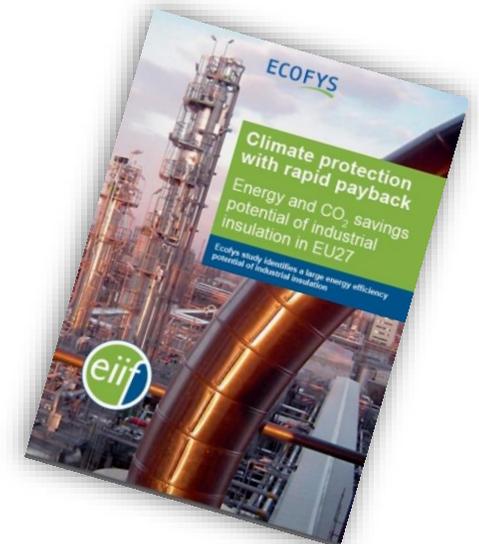
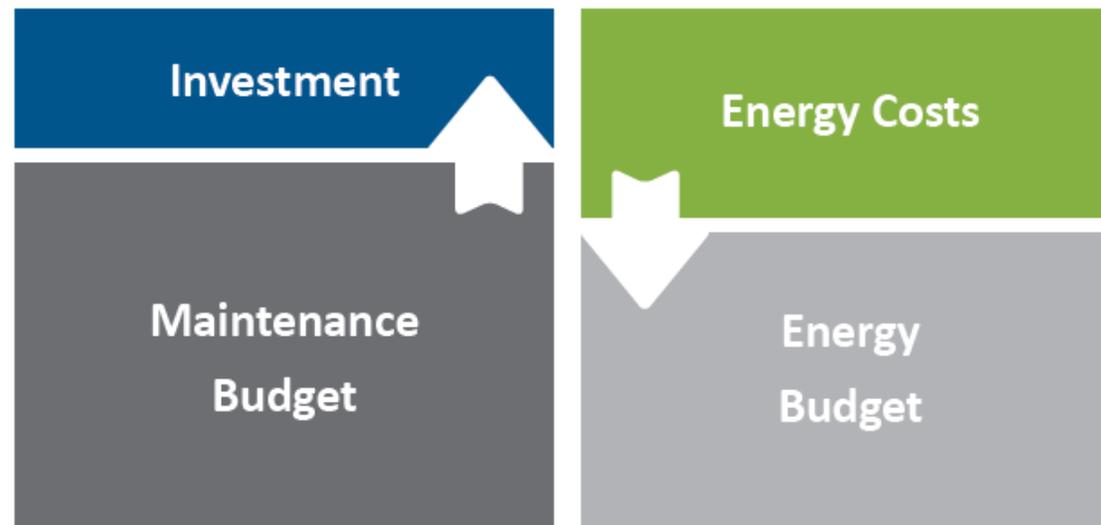
The heat loss rates discussed above refer to insulated surfaces. Not all surfaces are however insulated. The company website of Hertel (2011), a global company, states that in a typical plant 10-19% of insulation is damaged or missing. For U.S. industry, King (2010) estimates that 10-30% of all exposed mechanical insulation becomes damaged or missing within 1 to 3 years of installation. Lettich (2003) presents two typical case studies of U.S. plants, a chemical plant and a refinery, in which about 20% of all insulation is damaged. For the EU, where insulation performance is typically better, NCTI estimates that on average 5-10% of all surfaces is badly insulated (Eiif, 2011). Based on the information above and additional expert judgements, the



Why? – Split Responsibilities

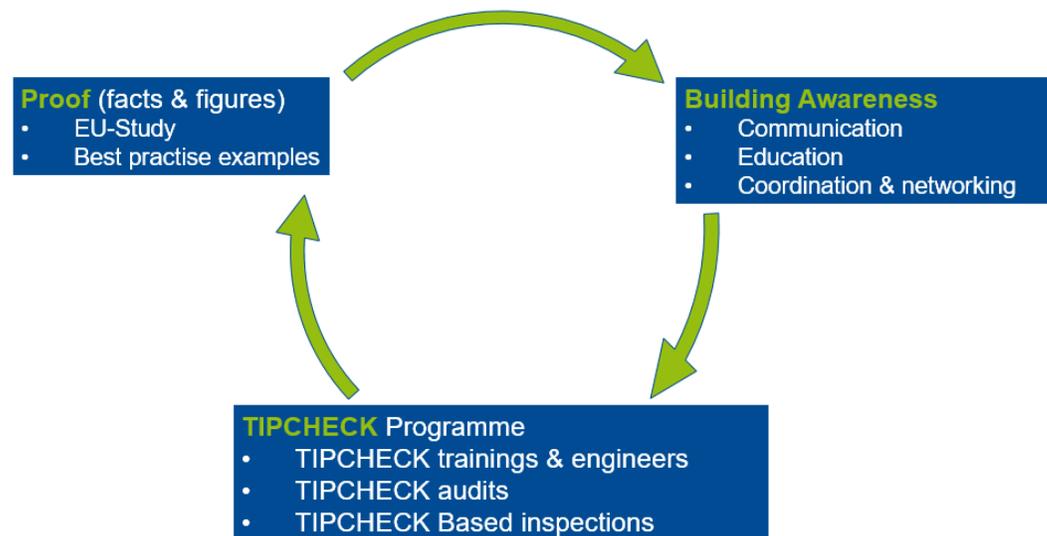
- Insulation energy efficiency investments often become caught in an organizational gridlock between plant management departments.

Split incentives



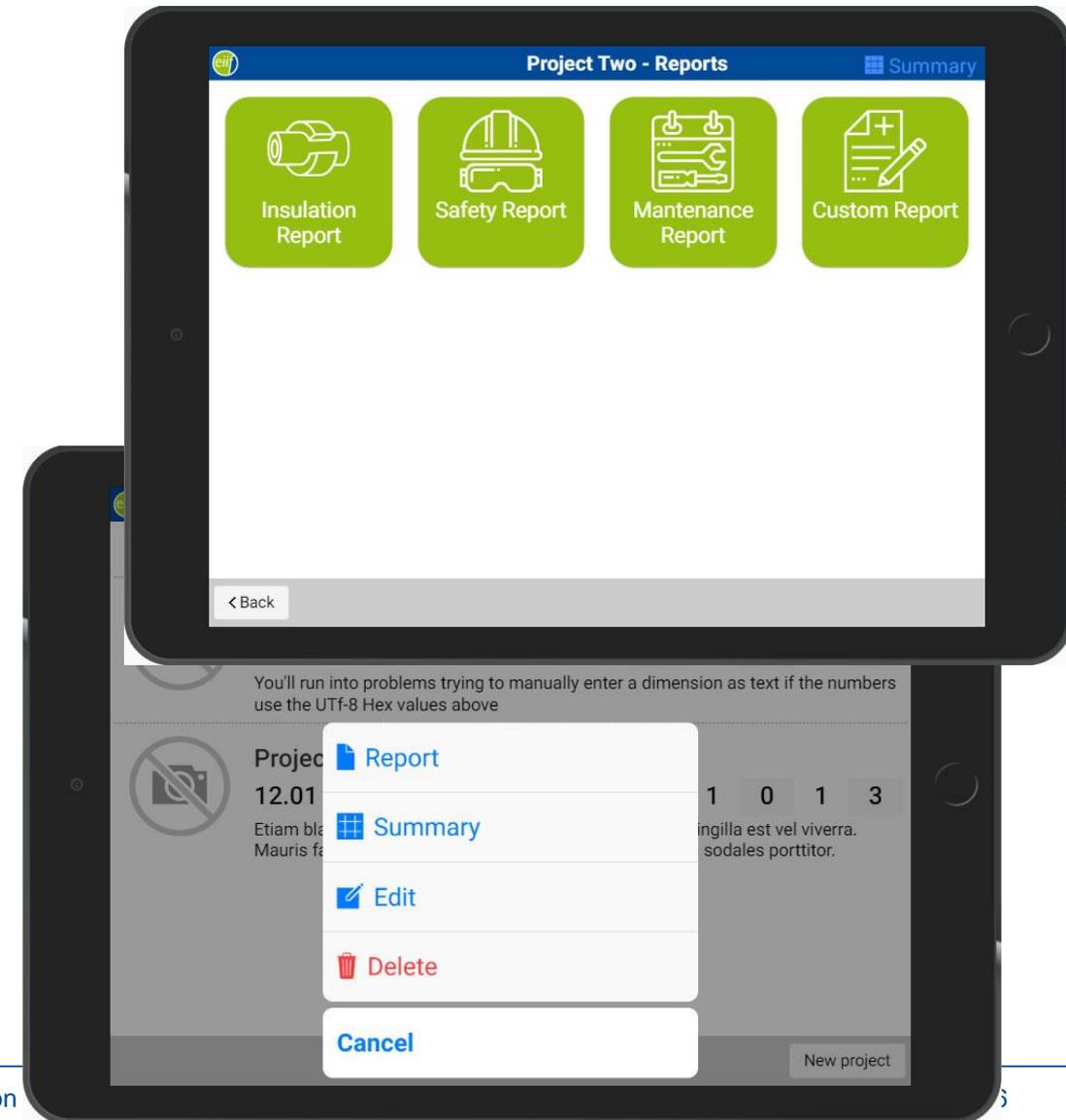
How motivation and digitalisation can drive behaviour change in industry

- **Building Awareness**
- You are aware, if you know the facts and consequences.



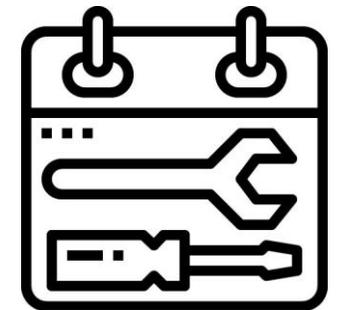
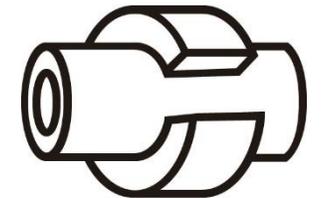
How motivation and digitalisation can drive behaviour change in industry

- **Building Awareness**
- Digital tools and monitoring/illustrating can motivate and help to build awareness and bridge split responsibilities.
- One solution: Enable and motivate Asset Owners and their staff with digital tools to self-inspect and to do the energy audit themselves.

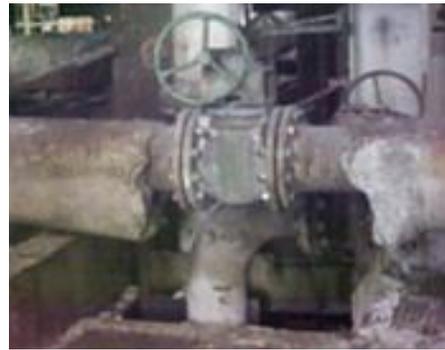


TBi-App – TIPCHECK Based Inspections

- **TBi** (TIPCHECK Based inspection) is a
“do it yourself inspection”
for anyone who wants to organise a tailored reporting about the quality of the existing insulation system of a production line, facility, etc. using the TBi-App
- The **TBi-App** offers a conservative estimation of the amount of energy a system is losing and its potential savings with a better insulation system in place.
- The **TBi-App** is designed in such a way that it motivates the asset owners and their staff to use it, even if they are “not interested nor qualified for insulation”.



TBi – Demo



Un-insulated valve back End

Component / Location Operational time



DN Number 

Surface Material Safety risk

Ambient Temp. Operational risk

Medium or Surf Temp Space issue

Comments

Heat loss	11.471	kWh/a
	574	€/a
Saving potential	9.742 → 10.989	kWh/a
	487 → 549	€/a

SAFETY-Insulation recommended







TBi – Demo

TBi PROJECT: Date Energy price

Component / Location	Dimension	Length	Number	Energy analysis			Insulated	TBi	Others	Safety	Maintenance	Others	Input >>>
				Heat Loss	Potential savings from	to							
1 Burner L6	20 m ²			203.622	157.352	183.912	YES	By increasing performance or thickness		Hot Surface			✎ ✕
				10.181	7.868	9.196							
2 Flange 2345	DN600		1	40.685	37.540	39.686	NO	Recommended		Hot Surface	Leakage		✎ ✕
				2.034	1.877	1.984							
3 Valve 20456	DN300		4	18.893	14.360	18.559	NO	Recommended		Hot Surface			✎ ✕
				945	718	928							
4 Pipe 2119	DN200 10 m			3.421	2.470	3.114	NO	Ok					✎ ✕
				171	124	156							
5 Tank roof 21									Traffic >>>			✎ ✕	
6 Pump 234										Mechanical >>>		✎ ✕	

Reported heat loss 266.621 kWh/a or 13.331 €/a

Estimated minimum potential savings 211.722 kWh/a or 10.586 €/a

TIPCHECK engineer list

List for Insulation job



TBi-App – TIPCHECK Based Inspections

But HOW and WHY will the digital solution motivate and change behaviour?

1. It illustrates opportunities and solves multiple problems:

- ✓ TBi follows the established inspection routines of industrial production facilities and manufacturers
- ✓ It facilitates and speeds up reporting processes and their administration and bridges split responsibilities of different departments like Energy Management, Maintenance, Process & Production, Safety, etc.
- ✓ It reports a problem and how easily it can be solved (insulation = Money & Energy Savings)

2. It supports the investment decision:

- ✓ Insulation (Money & Energy Savings): Based on the TBi-self inspection results it is easy for the asset owner to decide if investing in a professional energy audit service (TIPCHECK) is worthwhile for him or if he wants to directly invest in fixing the identified issues
- ✓ Safety & Maintenance: It helps with the identification and prioritisation of urgencies

TBi-App – TIPCHECK Based Inspections

But HOW and WHY will the digital solution motivate and change behaviour?

3. It is attractive to use:

1. The digital App simplifies the reporting and the administration
2. It is self-explanatory and easy to use
3. It offers multiple benefits and reporting options (Money & Energy Savings, Safety, Maintenance, Custom)
4. Its use can be trained effectively in online training sessions
5. Default & Custom settings will be provided

4. It will change behaviour:

1. Awareness and Education is key: Demonstration, Explanation, Illustration, Monitoring, Co-ordination,

Demonstration of the TBi-App

**18.30 Networking
and welcome reception**
Show your company
or project as an
"exhibitor light" – drinks
and finger food

We invite you to visit us during the Welcome Reception where we will offer you to have a closer look at the TBi-App and how to use it.

Looking forward to welcoming many of you and to fruitful discussions.



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