WHITE PAPER **2020**
10 min read

Decarbonising Industry with Rapid Payback

How mandatory requirements for industrial insulation will deliver 10% to reach the EU's 2030 energy efficiency target

THE OPPORTUNITY
Reducing Europe's CO_2 emissions by 40 Mt every year

THE SITUATION
The tendency to insulate less is leading to increased emissions

THE SOLUTION
Introducing mandatory performance requirements for industrial insulation

WE POWER SUSTAINABILITY

You don’t know what you don’t know, until you know.

Typical reaction of a client recognizing how much money and energy she or he is wasting when reading the results of a TIPCHECK thermal energy audit report.

TIPCHECK stands for **T**echnical **I**nsulation **P**erformance **C**heck. Until today EiiF-certified TIPCHECK engineers have carried out about 2.500 thermal energy audits.
3 out of 4 clients invest or plan to invest after receiving their TIPCHECK Report.

Read more about the TIPCHECK Programme:
www.eiif.org/tipcheck

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All mentions of CO_2 emissions in this document refer to CO_2 equivalent emissions.
Mtoe = Millions of tonnes of oil equivalent

EiiF White Paper 2020: 1st edition issued 10/2020

The Opportunity: reducing Europe's CO_2 emissions by 40 Mt every year

The European Union has set itself an ambitious goal: to be climate-neutral by 2050, with net zero CO_2 emissions. Decarbonising EU industry is one of the major challenges to reach this target.

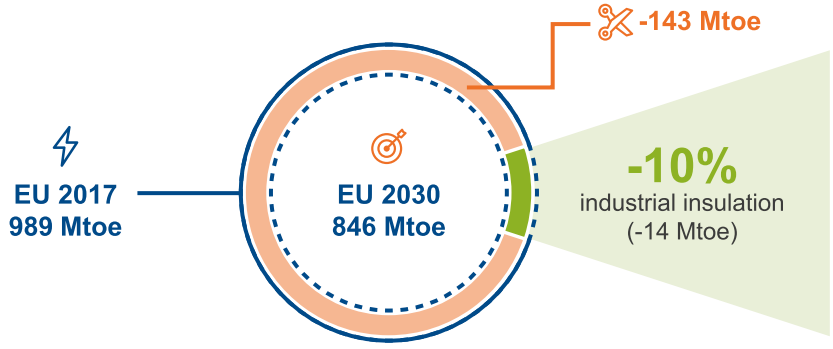
The EiiF Study 2020 analyses that 14 Mtoe of energy can be saved by improving insulation standards in industry, offering the potential to reduce the EU's CO_2 emissions by 40 Mt every year.

Considering the current annual level of CO_2 emissions in the EU 27 (EEA 2017: 3.853 Mt), it is clear that this goal can only be achieved with the support and participation of all key sectors including the EU's industry and energy supply, accounting for 49% (EEA 2017) of the EU's emissions.

The good news is that there are effective short-term industrial insulation solutions which are cost-effective to the asset owners and ready to deliver.

Performance requirements for industrial insulation will deliver **14 Mtoe**, representing **10%** of the energy savings needed to reach the EU's 2030 energy efficiency target

ENERGY EFFICIENCY TARGET FOR 2030 AND THE POTENTIAL OF INDUSTRIAL INSULATION



Power Generation (fossil fuel)	-3.100
Chemical & petrochemical	-2.100
Refineries	-1.600
Paper&pulp	-1.300
Food & tobacco	-1.300
Non-metallic minerals	-1.200
Iron and steel	-900
Machinery	-700
Non-specified (industry)	-1.900

Total energy consumption EU 27

Energy savings to reach 2030 target

Insulation energy saving potential by industry sector (ktoe)

The Situation: the tendency to insulate less is leading to increased emissions

Several factors contribute to the tendency in industry to insulate less rather than implement more energy efficient insulation systems: the pressure to reduce investment and maintenance costs, an increasing lack of insulation know-how and split responsibilities for energy and maintenance budgets.

THE PERFORMANCE LEVEL OF INSULATION IN EUROPE

The energy efficiency level of insulation in Europe's industrial installations is relatively low. The existing insulation systems and technical requirements most often solely focus on safety to keep surface temperatures below 55 °C. Moreover, many plants in the EU 27 are aging and in a dire need for insulation repair.

		Wall at 200 °C according to VDI 4610/1 *Energy efficiency of industrial installations – Thermal insulation*						
		Class G	**Class F**	**Class E**	**Class D**	**Class C**	**Class B**	**Class A**
INSULATION THICKNESS		<135 mm	135 mm	174 mm	222 mm	281 mm	345 mm	422 mm
HEAT FLOW RATE		>83 W/m²	83 W/m²	64 W/m²	50 W/m²	40 W/m²	32 W/m²	26 W/m²
EUROPE	*Surface temperature 55 °C*							
SWEDEN	*SSG (Standard Solutions Group)*							
GERMANY	*Industry average*							
FRANCE	*DTU 45.2-2018*							
NETHERLANDS	*Energy invest. allowance 2019*							
SPAIN	*PNE 92330-2017*							

General good practices are not sufficient to reach the ambitious EU targets. Moreover, these performance levels are often not maintained, leading to higher losses and emissions.

THE SHARE OF INDUSTRIAL EQUIPMENT WITHOUT OR WITH DAMAGED INSULATION

The biggest part of the growing but with energy efficient insulation easily avoidable CO_2 emissions in industry comes from equipment without insulation or covered with damaged insulation. Depending on the temperature, the increasing share of uninsulated or damaged insulation systems today varies from 10% to 2%.

LOW-TEMPERATURE < 100 °C	MIDDLE-TEMPERATURE 100 °C - 300 °C	HIGH-TEMPERATURE > 300 °C
10%	**6%**	**2%**

Insulating uninsulated equipment and repairing damaged insulation offers a large CO_2 and energy saving potential with short payback periods (two years on average and often just a few months).

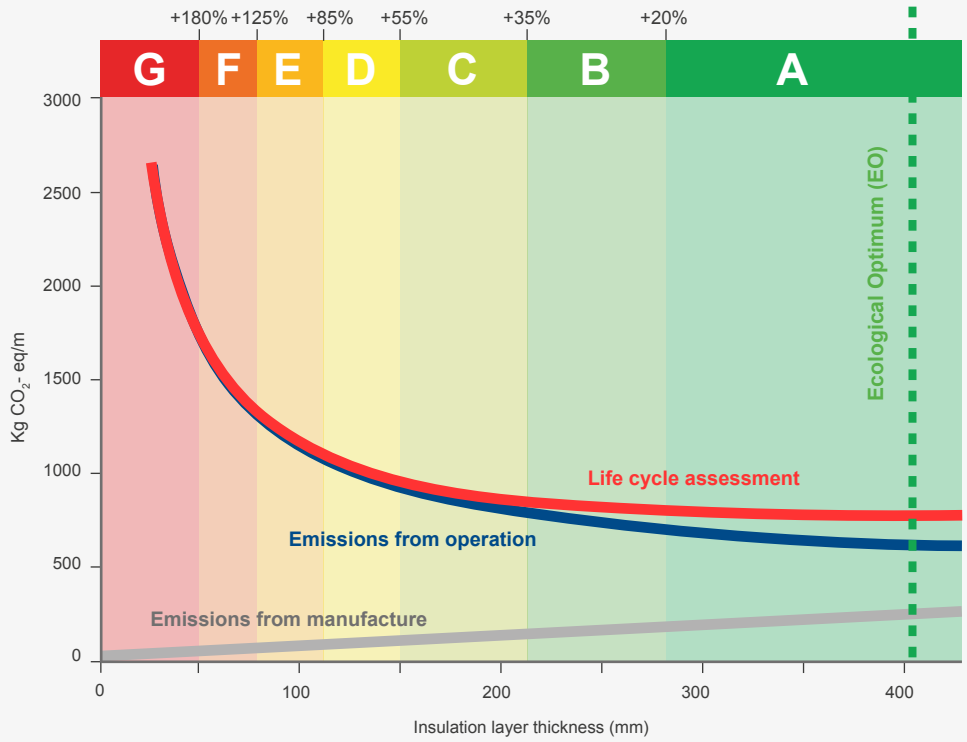
The Solution: mandatory performance requirements for industrial insulation

The EU's CO_2 emissions could be reduced by 40 Mt every year if VDI 4610 Energy Class C was introduced as a mandatory performance requirement for industrial insulation. Furthermore, this will save 14 Mtoe of energy, representing 10% of the gap to reach the EU's 2030 energy efficiency target.

This policy action would quickly deliver multiple benefits not only to our climate but also to the EU and to its industry.
The insulation technology for introducing mandatory performance requirements already exists and just needs to be utilised.

A simple, fast and cost effective strategy: defining mandatory performance requirements for industrial insulation based on the existing **VDI 4610 Energy Classes**

THE VDI 4610 ENERGY CLASSES



EiiF recommends using the existing VDI 4610 guidelines. The guidelines define the Energy Classes for industrial insulation systems by calculating the life cycle CO_2 emissions of an insulation system in relation to the ecological optimum.

CASE STUDY #1

THE TESLA EXAMPLE

Insulating ONE valve drives an electric car 20.000 km

Industrial processes are energy intensive
To keep process temperatures in industry at high levels (up to 600 °C and more), an intensive energy input to the system is needed. High temperatures lead to high heat losses on uninsulated equipment adding to an intensive energy consumption of the system.

Typically uninsulated equipment
The TIPCHECK thermal energy audit experience shows that valves and flanges in industrial plants are typically uninsulated. The energy loss can be detected and illustrated with infrared thermography.

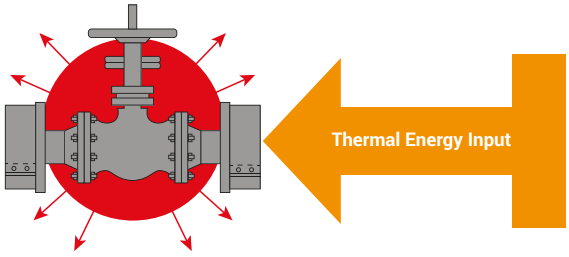
One uninsulated valve:

Size: DN 150/6 inch

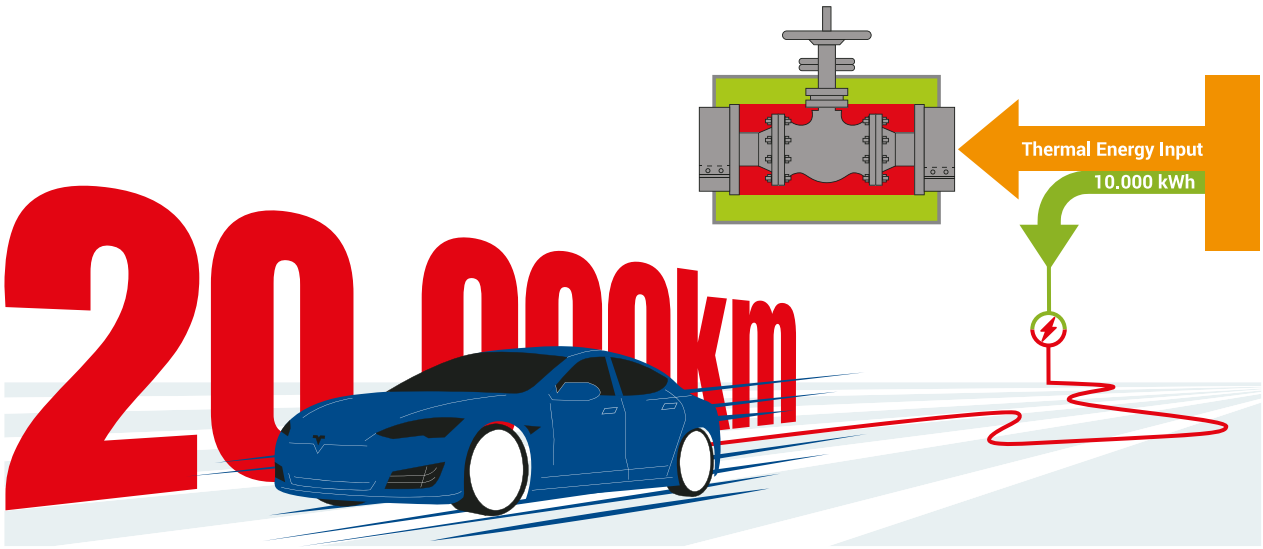
Temperature: 150 °C

Operational time: all year (8.760 hours)

Annual energy loss: 10.600 kWh



By insulating the valve 10.000 kWh can be saved
Transforming the saved 10.000 kWh thermal energy with a 40% thermodynamic efficiency into 4.000 kWh electric energy and using this to charge the battery of a TESLA Model S, one could drive more than 20.000 km.



CASE STUDY #2

THE STORAGE TANK EXAMPLE

The roof of an aged storage tank containing oil at 60 °C was heavily corroded and had to be replaced.
The owner of the refinery was planning to build the new roof without insulation, believing that the old insulation was part of his corrosion problem.

Without insulation the large roof, the size of a soccer field, would have produced every year:

CO_2 emissions: 1.900 t

Energy costs: 240.000 €

Energy loss: 9.500 MWh

By showing this analysis and explaining that a good insulation system will help to avoid corrosion, the insulation contractor managed to convince the asset owner to change his plans. They agreed on a basic 30 mm insulation solution equivalent to the VDI Energy Class G, applied with a long lasting and effective corrosion protection system.

The investment offered a payback time of less than 2,5 years and cost approximately 400.000 €.

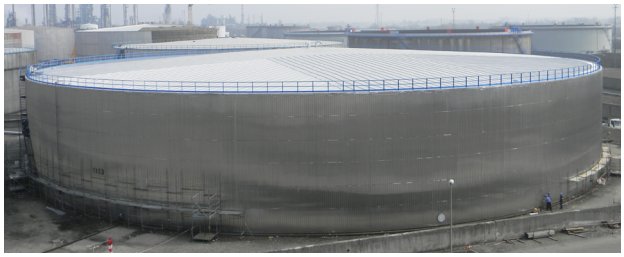
The installed 30 mm insulation system equivalent to the VDI Energy Class G saves every year:

CO_2 emissions: -1.500 t

Energy costs: -185.000 €

Energy: -7.500 MWh

BEFORE. An aged oil storage tank in a refinery had a heavily corroded roof and urgently needed repair.



AFTER. The tank roof newly insulated with a 30 mm insulation solution and long lasting corrosion protection.

The insulation impact

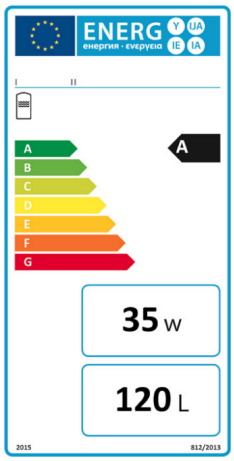
Savings of the insulation solution compared to the emissions/consumption of the uninsulated tank roof

	CO_2 t		Energy MWh		Energy Costs €		Heat Flow Rate W/m²
No insulation	1.900		9.500		240.000		250
Insulation 30 mm *VDI Energy Class G*	400	**-1.500**	2.000	**-7.500**	55.000	**-185.000**	55

The Need: mandatory requirements similar to buildings

The two case studies demonstrate the power of insulation and also highlight that industry is not using all the potential. This underlines the need for mandatory energy performance requirements.

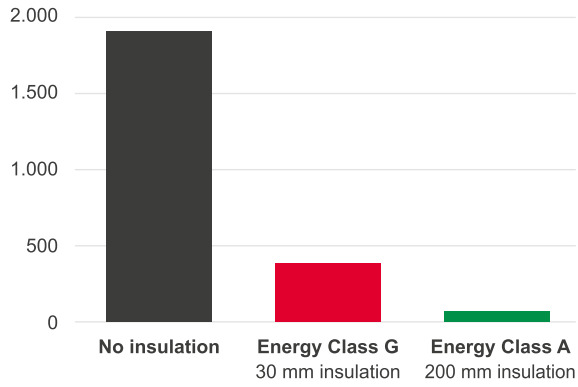
The following comparison shows that these requirements should be aligned with the already existing building insulation standards (*see the comparison chart on the right*). Like this the full industrial insulation potential could immediately be tapped and effectively contribute towards decarbonisation and net zero in 2050.



© EU Commission

Today the energy efficiency level of a typical hot water storage tank in a building containing water at 60 °C should be Energy Class A (*see the Energy Label of a hot water storage tank on the left*). To reach this high energy performance the tank must be insulated with a system keeping the energy losses per square metre at 10 W/m² or below. To achieve a comparable efficiency level for industrial systems a VDI Energy Class A insulation solution needs to be applied.

COMPARING CO_2 EMISSIONS (t)



Case Study #2 - VDI Energy Class A

The storage tank from Case Study #2 stores oil at 60 °C. Like the hot water storage tank in a building it can be insulated with a system limiting the energy losses per square metre to the same level of 10 W/m². The only thing needed in this particular case is to simply increase the insulation thickness to 200 mm. **This system would be equivalent to the VDI Energy Class A and reduce the annual CO_2 emissions by -1.825 t.**

The insulation impact

Savings of insulation solutions compared to the emissions/consumption of the uninsulated tank roof

	CO_2 t	Energy MWh	Energy Costs €	Heat Flow Rate W/m²
No insulation	1.900	9.500	240.000	250
Insulation 30 mm *VDI Energy Class G*	400 **-1.500**	2.000 **-7.500**	55.000 **-185.000**	55
Insulation 200 mm *VDI Energy Class A*	75 **-1.825**	400 **-9.100**	9.500 **-230.500**	10

The Benefits: industrial insulation offers added value

FOR THE CLIMATE

Cutting annual CO_2 emissions by 40 Mt

Reducing energy consumption in industry by 14 Mtoe

FOR EUROPE

Contributing towards net zero in 2050 (*Green Deal*)

Creating and saving jobs in Europe (*Green Recovery*)

FOR INDUSTRY

Increasing competitiveness (reducing production costs)

Offering smart investment opportunities with rapid payback

Creating safer, better working conditions

WE POWER SUSTAINABILITY

The European Industrial Insulation Foundation (EiiF) is a Foundation headquartered in Switzerland.

As a neutral and non-profit institution, it promotes insulation as a top-of-mind method of enhancing sustainability and profitability.

Since its foundation, the EiiF has established itself as a resource for industries that need to reduce CO_2 emissions and save energy. Its programme raises awareness of the growing, much needed multiple benefits of insulation.

The EiiF was established in 2009 by 12 Founding Partners. Nowadays, it comprises more than 60 leading industrial insulation companies from global player size to small and medium-sized companies.

EiiF Membership
Find all EiiF Members here

EiiF Deed of Foundation
Read here

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