



WHITE PAPER 2021

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# Decarbonising Industry with Rapid Payback

How energy-efficient insulation systems will help industry reduce CO<sub>2</sub> costs and contribute towards EU's climate targets



**THE OPPORTUNITY**  
Reducing Europe's CO<sub>2</sub> 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 realising 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.  
So far, 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](http://www.eiif.org/tipcheck)

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*All mentions of CO<sub>2</sub> emissions in this document refer to CO<sub>2</sub> equivalent emissions.*

*Mtoe = Millions of tonnes of oil equivalent*

*EiiF White Paper 2021: 2<sup>nd</sup> edition issued 02/2021*



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## The Opportunity: reducing Europe's CO<sub>2</sub> emissions by 40 Mt every year

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The European Union has set itself two ambitious goals: to reduce greenhouse gas emissions by at least 55% by 2030 and to be climate-neutral by 2050, with net zero CO<sub>2</sub> emissions. Decarbonising EU industry is one of the major challenges to reach this target.

The EiiF Study 2021 analyses that 14 Mtoe of energy can be saved by improving insulation standards in industry, offering the potential to reduce EU's CO<sub>2</sub> emissions by 40 Mt every year.

Considering the current annual level of CO<sub>2</sub> emissions in 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 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.

Energy-efficient insulation systems will help industry **reduce CO<sub>2</sub> costs** and contribute towards EU's climate targets

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THE SAVINGS POTENTIAL FOR EU 27 IS EQUIVALENT TO THE ANNUAL ENERGY CONSUMPTION OF:

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MORE THAN  
**10 MILLION**  
HOUSEHOLDS



MORE THAN  
**20 MILLION**  
CARS



Calculation based on the national average energy consumption provided by the Odyssee-Mure EU project [www.odyssee-mure.eu](http://www.odyssee-mure.eu)





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

The energy efficiency level of insulation in Europe's industrial installations is relatively low.

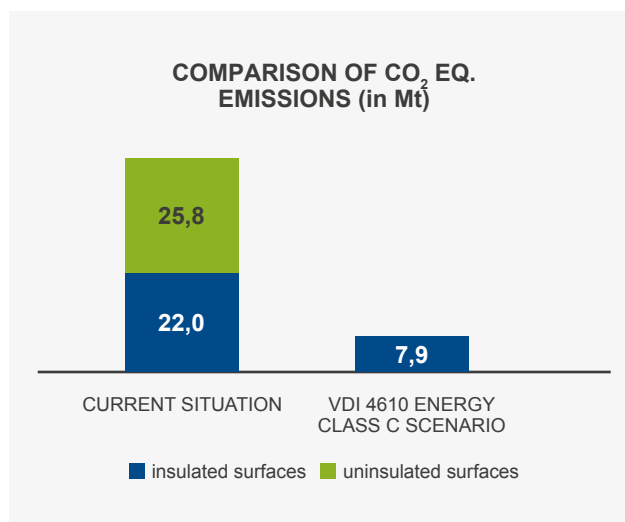
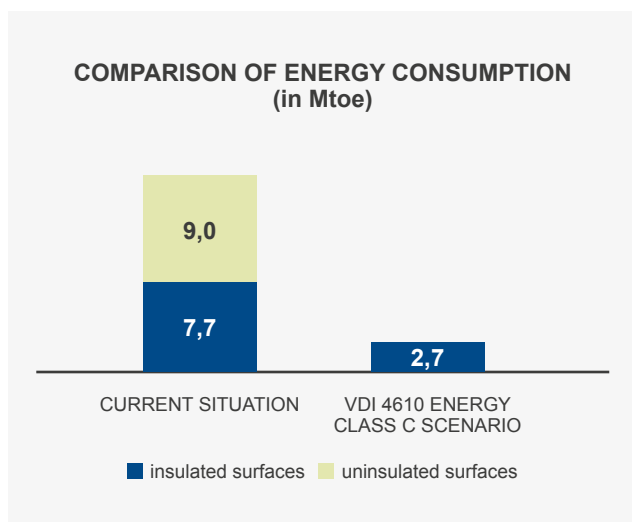
The existing insulation systems and technical requirements most often solely focus on safety to keep surface temperatures below 55 °C. Moreover, many plants in EU 27 are aging and in a dire need for insulation repair.

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.

### INSULATING UNINSULATED EQUIPMENT MAKES A BIG DIFFERENCE

The main part of the 14 Mtoe savings potential originates from uninsulated components. The increasing share of uninsulated or damaged insulation systems in a typical plant varies from 2% to 10%, depending on the temperature.

9 Mtoe of the potential comes from insulating uninsulated and/or damaged systems and introducing maintenance programmes to ensure that the insulation performance is not reduced over time.



5 Mtoe of the potential would come from improving insulation on currently insulated surfaces.

Consistently upgrading industrial insulation systems in Europe according to the VDI 4610 energy classes would quickly deliver multiple benefits not only for our climate but also for the EU and for its industry. Insulating uninsulated and/or damaged systems offers very short payback periods (two years on average and often just a few months).

The insulation technology needed already exists and just has to be better utilised.

Tailored policy actions could significantly accelerate the uptake.

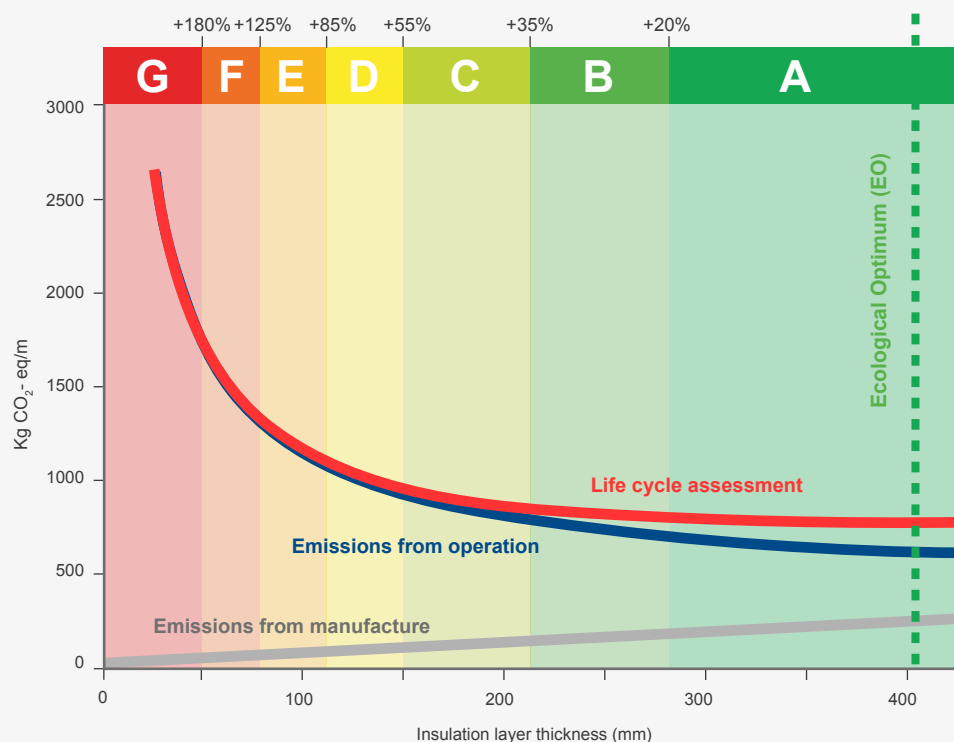
# The Solution: mandatory performance requirements for industrial insulation

EU's CO<sub>2</sub> 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 would save 14 Mtoe of energy, equivalent of the annual energy consumption of more than 10 million European households. This policy action would quickly deliver multiple benefits not only for our climate but also for EU and for 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<sub>2</sub> 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.



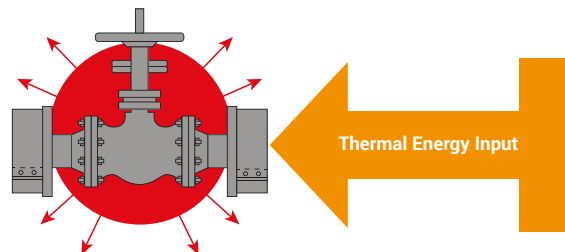
One uninsulated valve:

Size: DN 150/6 inch

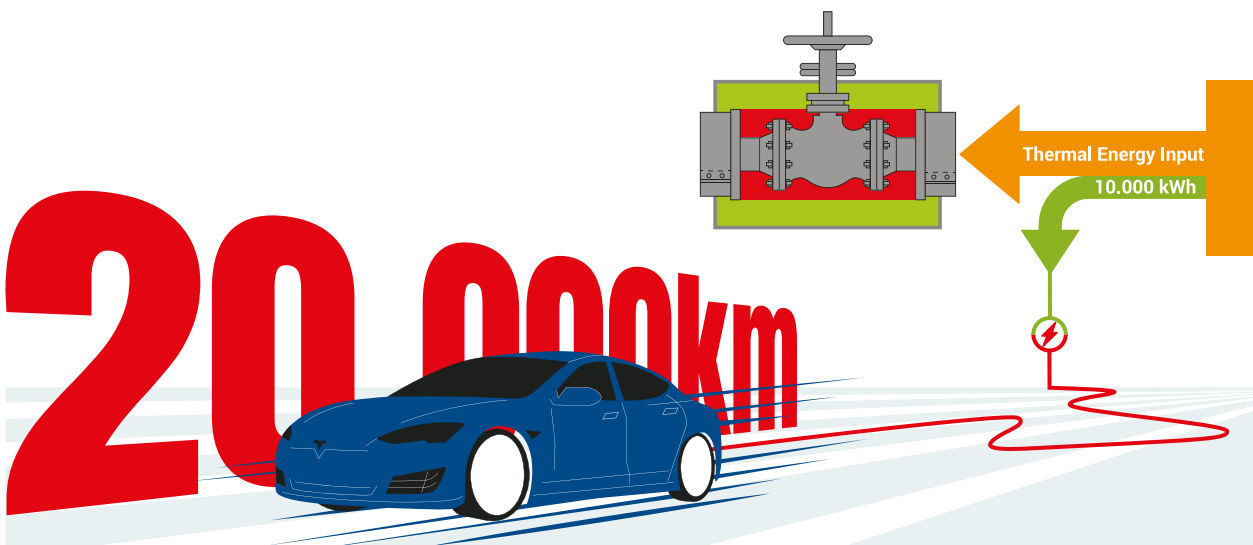
Temperature: 150 °C

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<sub>2</sub> 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<sub>2</sub> 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*

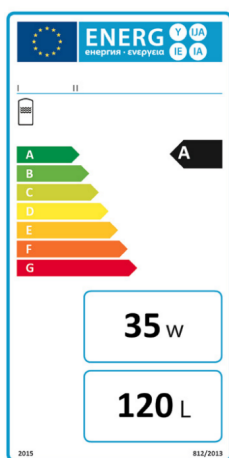
	 CO <sub>2</sub> t	 Energy MWh	 Energy Costs €	 Heat Flow Rate W/m <sup>2</sup>
No insulation	1.900	9.500	240.000	250
Insulation 30 mm VDI Energy Class G	400 <b>-1.500</b>	2.000 <b>-7.500</b>	55.000 <b>-185.000</b>	55



## 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

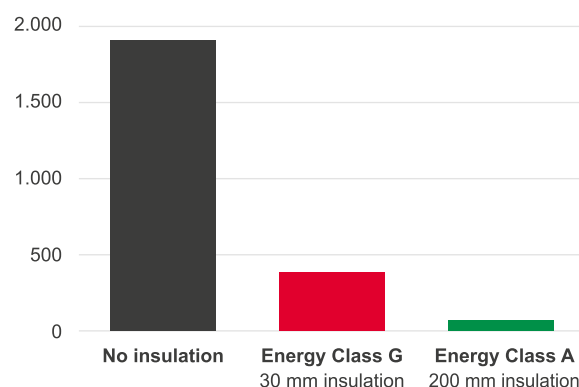
Today the energy efficiency level of a typical hot water storage tank in a building containing water at 60 °C should be Energy Class A (see the Energy Label of a hot water storage tank on the left).

To reach this high energy performance the tank must be insulated with a system keeping the energy losses per square metre at 10 W/m<sup>2</sup> or below. To achieve a comparable efficiency level for industrial systems a VDI Energy Class A insulation solution needs to be applied.

### 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/m<sup>2</sup>. 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<sub>2</sub> emissions by -1.825 t.**

### COMPARING CO<sub>2</sub> EMISSIONS (t)



## The insulation impact

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

	CO <sub>2</sub> t	Energy MWh	Energy Costs €	Heat Flow Rate W/m <sup>2</sup>
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

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# The Benefits: industrial insulation offers added value

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## FOR THE CLIMATE

Cutting annual CO<sub>2</sub> 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

European Industrial Insulation Foundation (EiiF) is an international foundation headquartered in Switzerland.

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

Since its foundation, EiiF has established itself as a resource for industries that need to reduce CO<sub>2</sub> equivalent emissions and save energy. Its programme raises awareness of the multiple benefits of industrial insulation.

EiiF was established in 2009 by 12 Founding Partners. Nowadays, it comprises more than 50 leading industrial insulation companies from global players to small and medium-sized companies.

## ► EiiF Membership

See here which companies have already joined the EiiF network:

[www.eiif.org/members](http://www.eiif.org/members)

## ► EiiF Deed of Foundation

Read here about the purpose and the primary task of the Foundation:

[www.eiif.org/deed-of-foundation](http://www.eiif.org/deed-of-foundation)

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**Learn more about the EiiF Membership and how you can participate in our powerful insulation network: [www.eiif.org](http://www.eiif.org)**

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## European Industrial Insulation Foundation

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[www.eiif.org](http://www.eiif.org)

### ► TIPCHECK

EiiF's energy auditing programme to evaluate the performance of industrial insulation systems:

[www.eiif.org/tipcheck](http://www.eiif.org/tipcheck)

### ► TBI Tools

EiiF's insulation self-inspection and reporting tools to quickly check technical insulation systems:

[www.eiif.org/tbi](http://www.eiif.org/tbi)

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