



TIPCHECK Training Programme

Lessons learnt from Energy Audits in EU Industry
Insulation offers significant energy saving potentials
with rapid payback

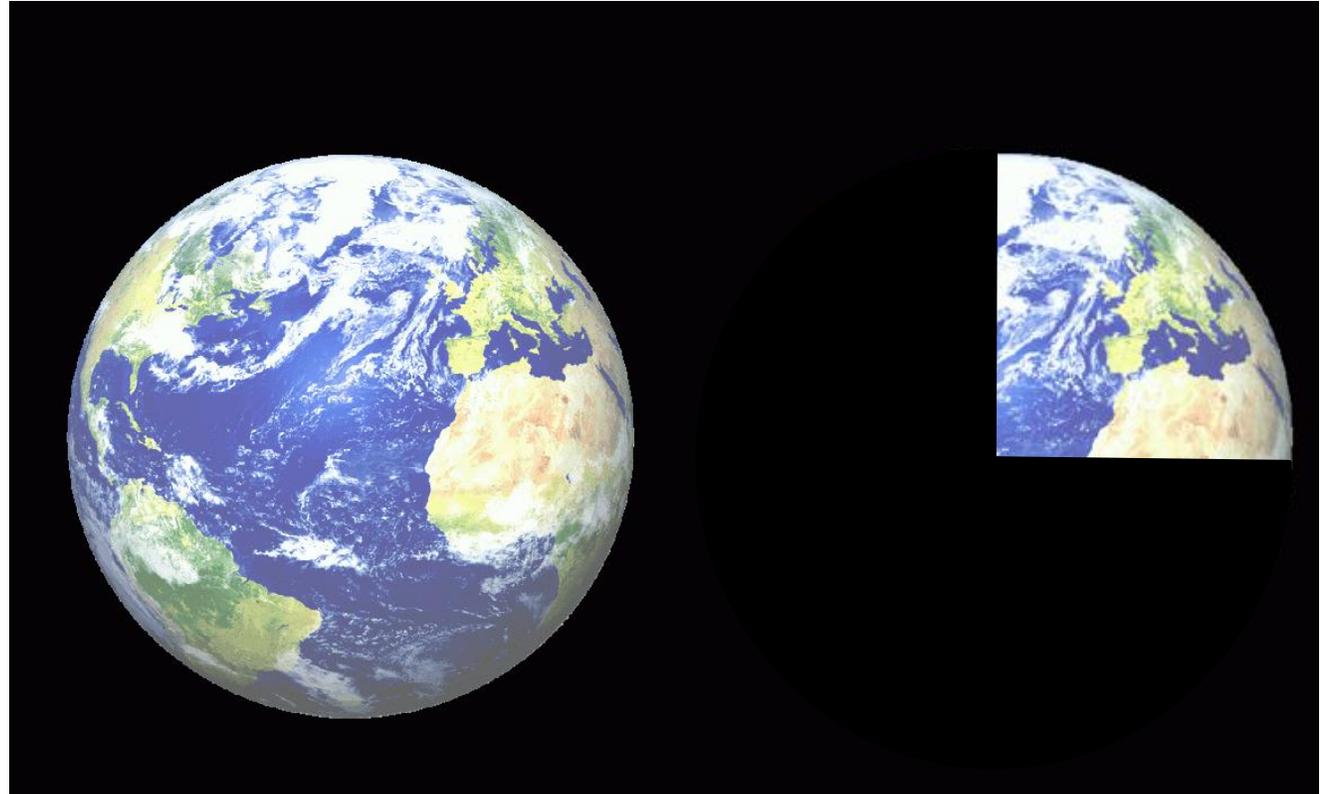


The technical INSULATION “WORLD” has a job to do!

2010 We were consuming roughly

1.25 earth's

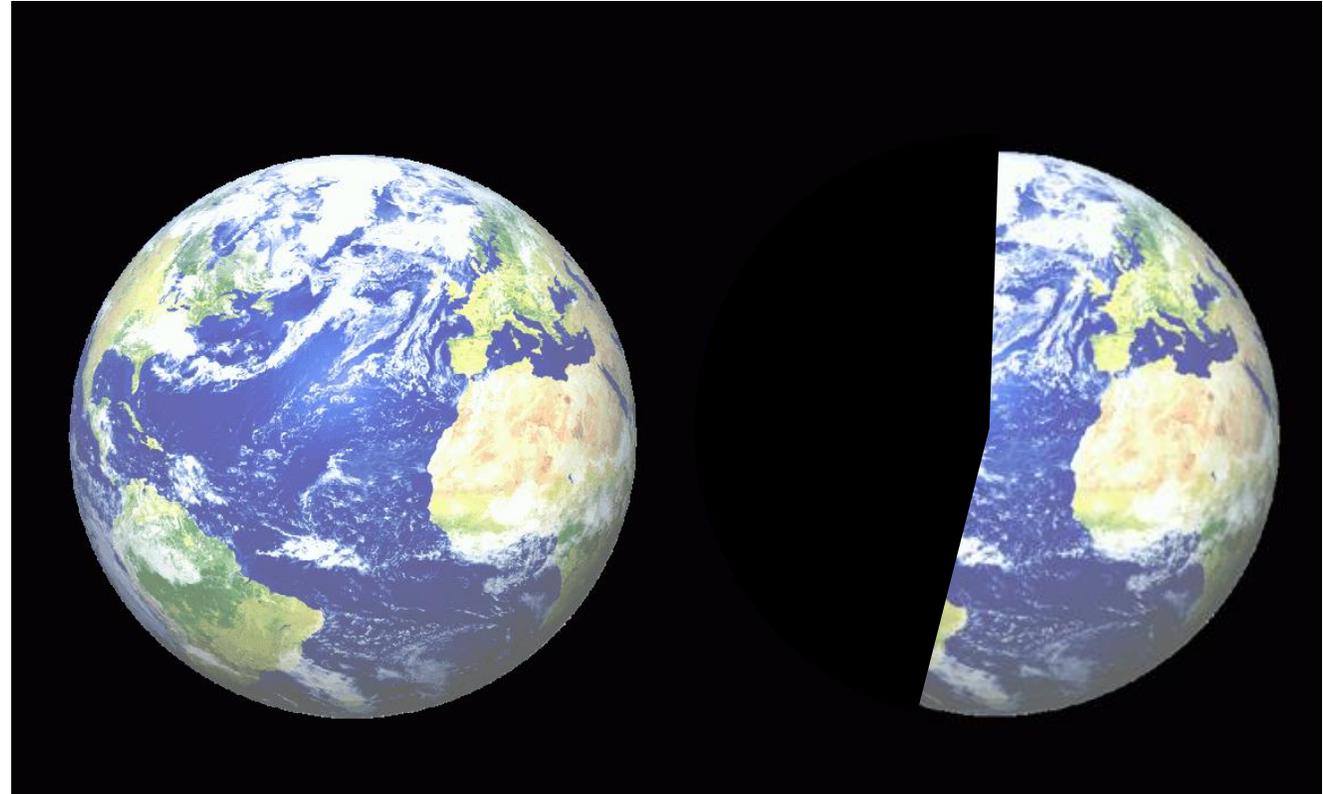
worth of resources.



The technical INSULATION “WORLD” has a job to do!

Today humanity already
uses the equivalent

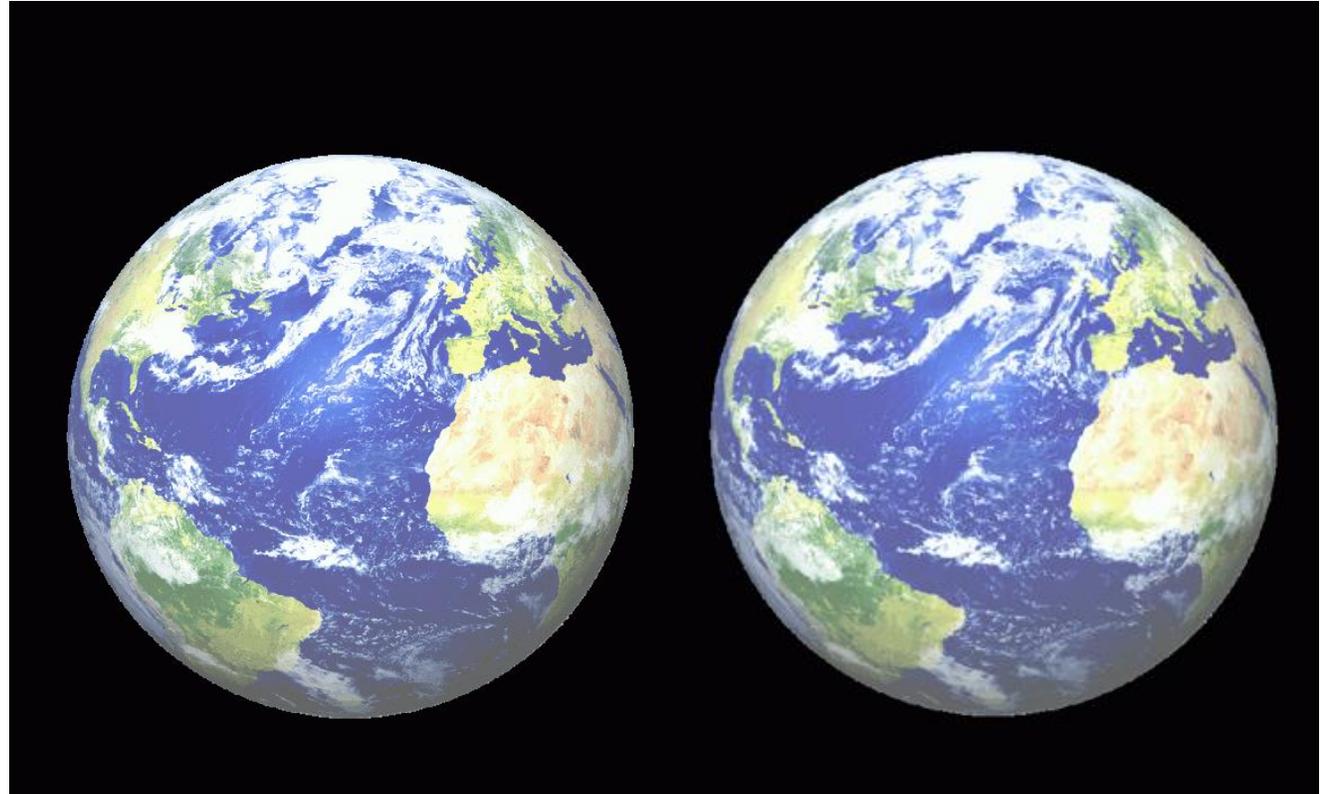
of 1.6 planets.



Source: http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/

The technical INSULATION “WORLD” has a job to do!

- Moderate UN scenarios suggest that if current population and consumption trends continue, by the **2030s**, we will need the **equivalent of two Earths**.
- If China consumes at the rate that the US population does (2010), we need **two new earths just for Chinese consumers**.



Source: http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/

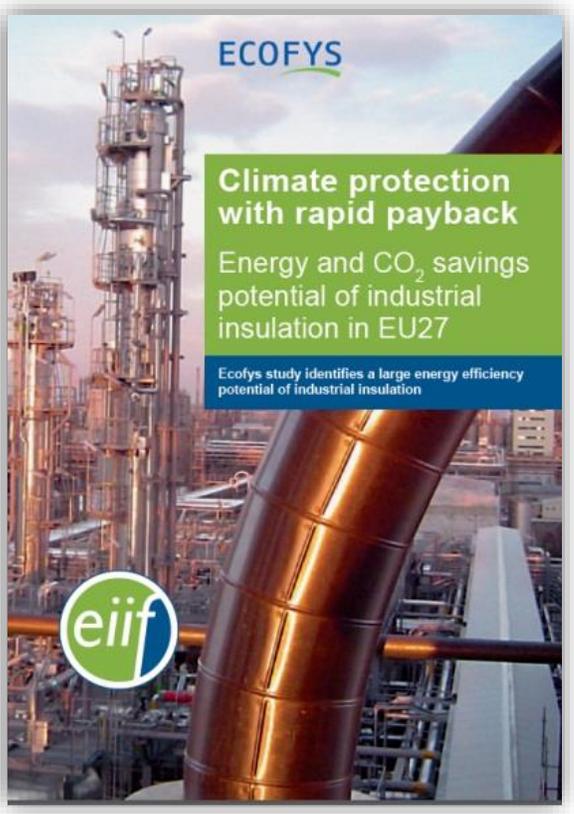
The EiiF Foundation

- EiiF was established in 2009 by **8 Founding Partners** as a non-profit Foundation.
- Today it comprises **more than 60 leading** industrial insulation companies from global player size to small and medium-sized companies.
- As a neutral and non-profit institution, it promotes insulation as a top-of-mind method of enhancing sustainability and profitability.



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, FR, DE, ES, IT, NL, **PL**



Download on www.eiif.org



Proof – Ecofys Study

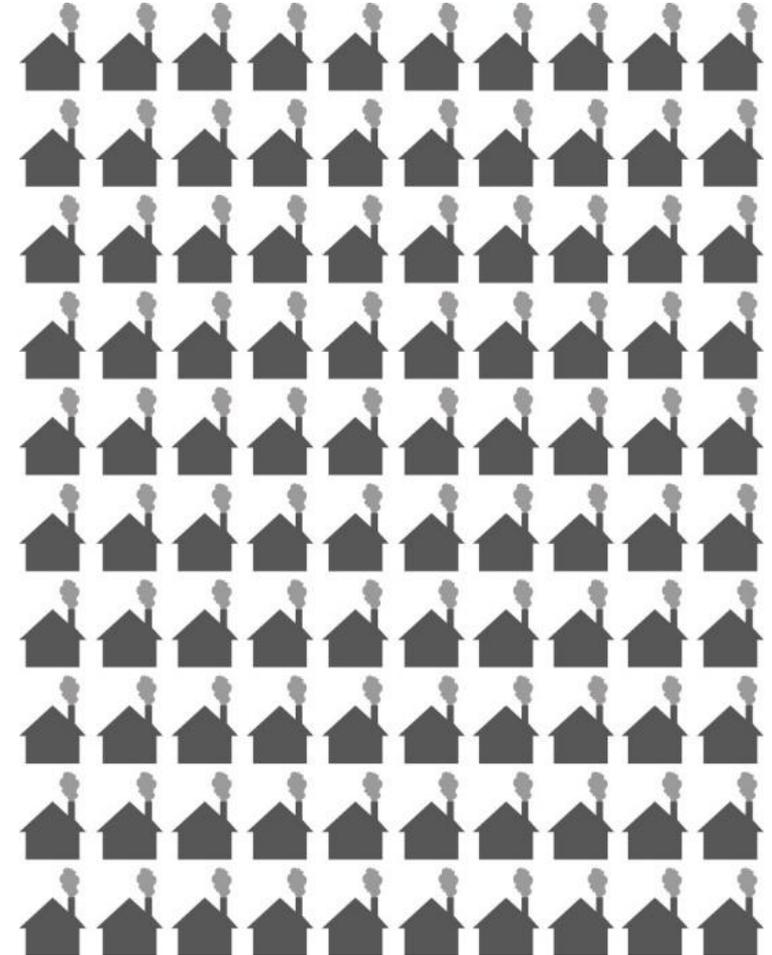
The annual cost-effective savings potential
is

620 PJ

=

Equivalent to the Energy consumption of

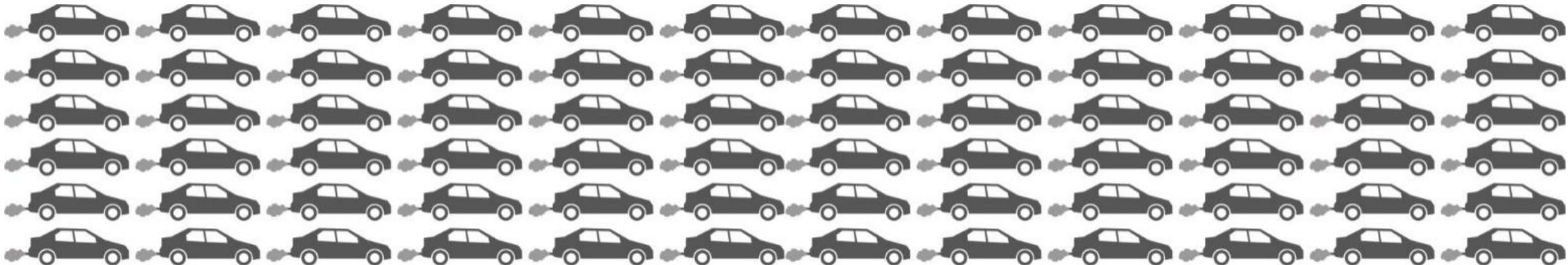
10 million households



Proof – Ecofys Study

The annual CO₂ reductions potential is 49 Mt = equivalent to the emissions of

- **18 million middle class cars**
- running 12 500 kilometres per year



Proof – Ecofys Study – National Factsheets

The National Factsheets demonstrate the potentials by country

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

The image displays a collection of national factsheets from the Ecofys study, each detailing energy and CO2 savings potential for industrial insulation in different countries. The factsheets are presented in a staggered, overlapping manner. On the right side, there is a vertical banner titled 'Climate protection with rapid payback' which highlights the energy and CO2 savings potential of industrial insulation in Spain. Below the factsheets, there are two summary cards: 'The annual savings potential is more than...' and 'The annual CO2 reductions potential is equivalent to...'. The bottom left corner features the eiiif logo.

Proof – Ecofys Study – National Factsheets

The National Factsheets demonstrate the potentials by country:

	Annual cost-effective savings potential		...in industry		...in fossil fuel-fired power generation		Households	Cars	Initial investment	Energy savings potential	Annual savings
FR	51 PJ	3.8 Mt CO2	45 PJ	3.4 Mt CO2	6 PJ	0.4 Mt CO2	750.000	1.9 million	€ 100 million	75%	€ 420 millions
DE	106 PJ	8.7 Mt CO2	80 PJ	6.3 Mt CO2	26 PJ	2.4 Mt CO2	1.500.000	4.3 million	€ 180 million	75%	€ 750 million
IT	65 PJ	4.5 Mt CO2	48 PJ	3.3 Mt CO2	17 PJ	1.2 Mt CO2	1.500.000	2.2 million	€ 90 million	75%	€ 500 million
PL	40 PJ	3.4 Mt CO2	27 PJ	2.2 Mt CO2	13 PJ	1.2 Mt CO2	600.000	1.7 million	€ 35 million	75%	€ 200 million
ES	49 PJ	3.4 Mt CO2	40 PJ	2.8 Mt CO2	9 PJ	0.6 Mt CO2	1.200.000	1.7 million	€ 75 million	70%	€ 400 million
SE	16 PJ	1.4 Mt CO2	15 PJ	1.3 Mt CO2	1 PJ	0.1 Mt CO2	200.000	0.7 million	€ 35 million	70%	€ 150 million
UK	65 PJ	4.7 Mt CO2	46 PJ	3.2 Mt CO2	19 PJ	1.5 Mt CO2	900.000	2.3 million	€ 100 million	75%	450 million

Proof – Ecofys Study – National Factsheets

The National Factsheet for Poland demonstrates the potential:

Annual cost effective savings potential: **40 PJ** and **3,4 Mt CO₂**

Annual equivalent to households: **600.000**



Annual equivalent in cars: **1,7 million**

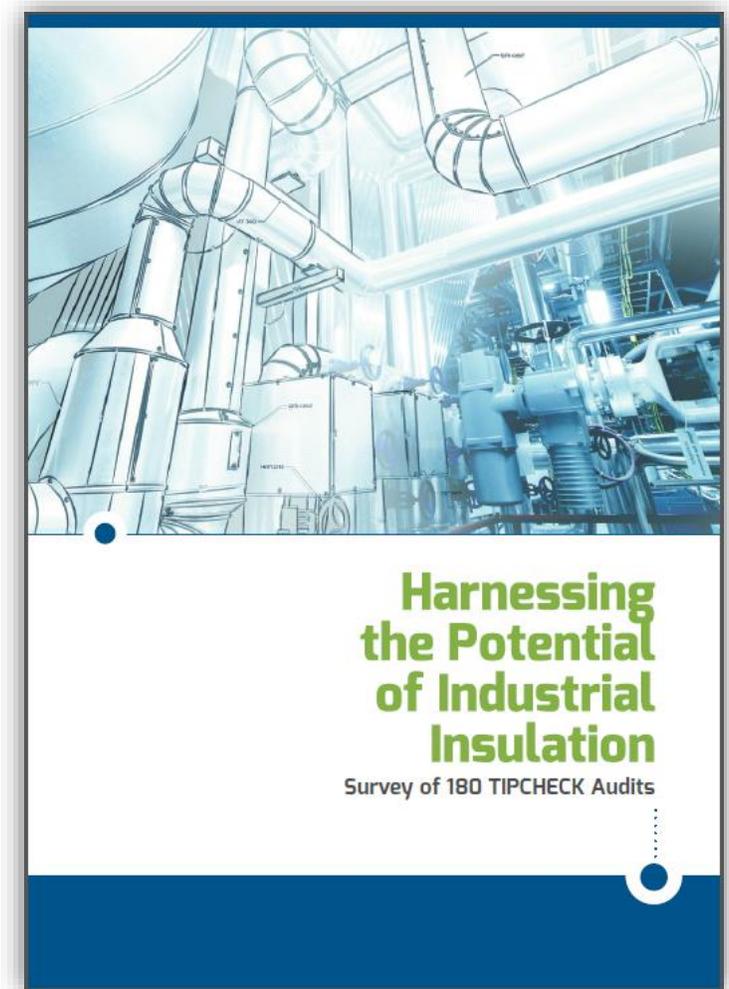


Proof – TIPCHECK Report

Survey of **180 energy audits**
@
180 industrial plants

Publication: May 2016

Second Edition: November 2016



Proof – TIPCHECK Report

Available in Polish

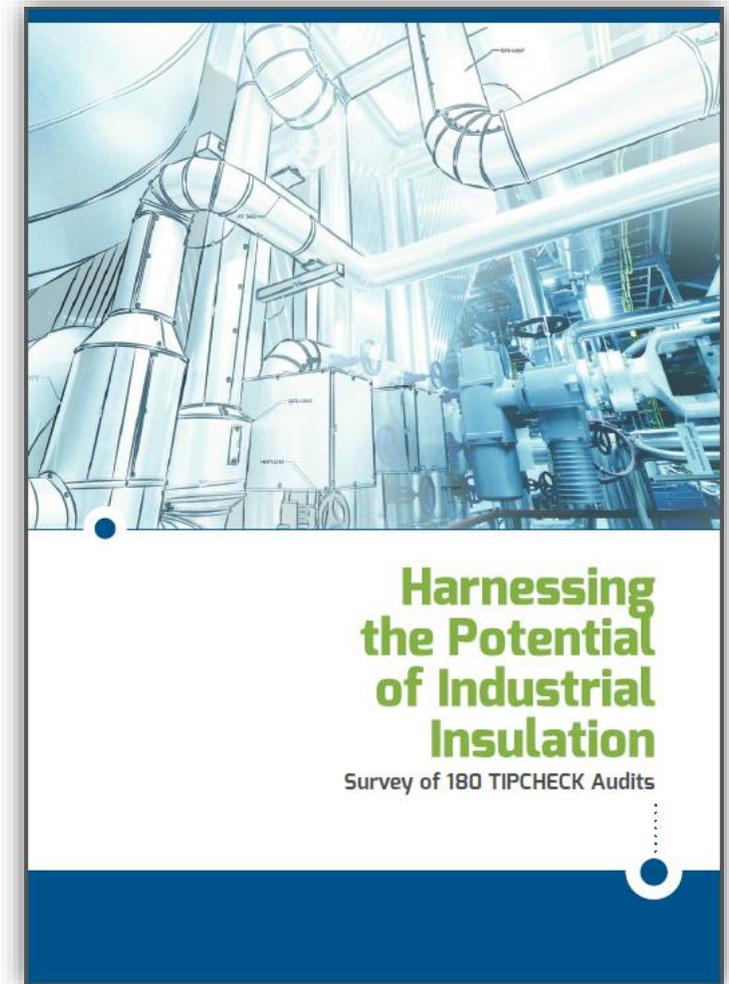
@

www.eiif.org



Proof – TIPCHECK Report = TIPCHECK Experience

- The annual **energy savings potential** identified by approximately 180 TIPCHECK audits was more than **750.000 MWh/year** (2,7 PJ/year)
- Resulting in an estimated **CO2 emission reduction** potential of more than **500.000 t CO₂**
- Equivalent to the annual greenhouse gas emissions of almost **110.000 cars.**



Proof – TIPCHECK Report = TIPCHECK Experience

Resulting in a TIPCHECK-identified cost **saving potential** for industry of at least:



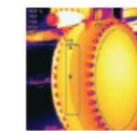
Proof – TIPCHECK Report = TIPCHECK Experience

After a TIPCHECK audit:

- **3 out of 4**
- **75% industrial clients** have either already **invested or plan to invest** in the near future (for example, at the next turnaround) in insulation to remediate existing insulation deficiencies.

Case Study 1 Coking-oven By-products Plant

SUMMARY



At a coking-oven by-products plant in Ghent, Belgium, the plant manager noticed that process efficiency was being compromised by an unidentified heat loss, leading to higher-than-necessary energy bills. A TIPCHECK audit revealed the heat loss to be caused primarily by the heat exchanger and pipe network. Implementation of insulation recommendations from the TIPCHECK report reduced ongoing energy losses, and the associated investment paid back in less than eight months.

PROJECT INFORMATION

Client Details

Company: ArcelorMittal

Facility Purpose and Location: Coking-oven by-products plant, Ghent, Belgium

Project Contact (Role): Johan van de Vijver (Plant Manager)

Quote: "This survey had shown us that there was an issue and that it could be solved relatively easily. We really hadn't considered that the valves and flanges could be an area of key heat loss, but the TIPCHECK images and calculations showed the impact of leaving this area uninsulated."

CASE DETAILS

Key Facts and Challenges

- The coking-oven by-products plant uses steam to clean coking-oven gases for use elsewhere onsite—an energy-intensive process that operates at temperatures as high as 180 °C.
- Unidentified heat losses were causing process inefficiencies, leading to rising energy bills.

Key Findings

- The TIPCHECK audit included 37 thermographic images of 79 different pieces of equipment—leading to the conclusion that the largest heat losses were from the heat exchanger and associated pipe work.
- Insulation of the valves and flanges in the areas of largest heat loss had the potential to reduce plant energy costs by more than € 28.000 per year.

Payback

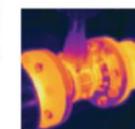
The payback period of this project was eight months.

Results

The client implemented the recommendations of the TIPCHECK-certified engineering team and monitored year-to-year energy use to determine the effect of the insulation investment. Actual energy cost reduction slightly exceeded the reduction predicted by the team. As a result, the client has requested the team to conduct similar TIPCHECK audits on other areas of the coking-oven plant.

Case Study 2 Sugar Beet Processing Plant

SUMMARY



At a sugar beet processing plant in Vierverlaten, Netherlands, the team leader of the mechanical engineering department sought ways to reduce energy losses in line with its Total Productive Maintenance (TPM) programme, one goal of which is to reduce energy use. A TIPCHECK audit identified critical heat-loss spots in the process and outlined three different remediation scenarios with payback periods of two, four, and six years, respectively. Based on the report, the client was able to prioritise planned remediation efforts to coincide with scheduled plant downtime.

Proof – TIPCHECK Report = TIPCHECK Experience

- Based on the implementation rate (55% have implemented 100%, 13% have implemented parts, and 14% are considering implementation),
- The **TIPCHECK** programme has already resulted in **EU-wide annual energy savings of more than 500.000 MWh/year (1,8 PJ/year)**.
- **And CO2 reductions of more than 370.000 t CO₂**
- The Equivalent to the annual greenhouse gas emissions of almost **80.000 cars**.



Proof – TIPCHECK Report = TIPCHECK Experience

Implemented insulation improvements resulting from **the first 119 realised** TIPCHECK audits (68% of all TIPCHECK audits) represent



Proof – TIPCHECK Case Studies

Refinery – Oil Storage tank roof 60 °C

Key facts:

- Very old and damaged insulation was present on the roof
- Huge CUI problems - sheets of the roof heavily corroded
- Need to demolish the old roof and to replace it
- ***The owner considered to rebuild the roof without any insulation***



Proof – TIPCHECK Case Studies

Refinery – Oil Storage tank roof 60 °C

- Without insulation the energy loss would have been **~9,500 MWh / € 430.0000** per year.
- An insulation of only 30 mm thickness on the roof, applied with a technical solution which avoids future C.U.I. problems, **reduces the energy loss by 80% with a payback time less than 2 years.**



Proof – TIPCHECK Case Studies

Refinery – Oil Storage tank roof 60 °C

-> The owner decided to insulate the new roof:

- Without insulation the energy loss would have been **~9,500 MWh / € 430.0000** per year.
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Proof – TIPCHECK Case Studies

Refinery – Oil Storage tank roof 60 °C

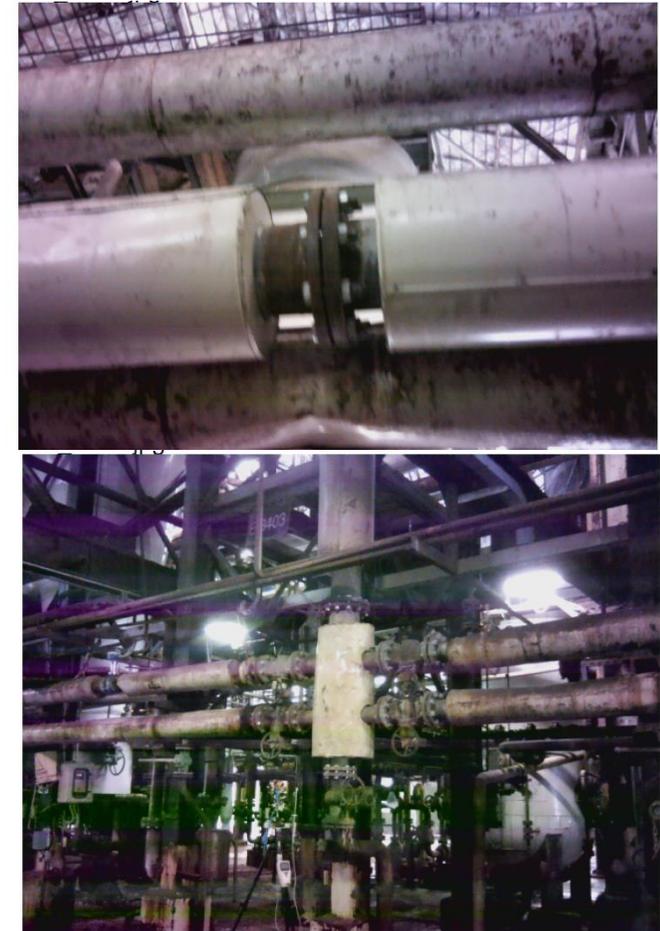
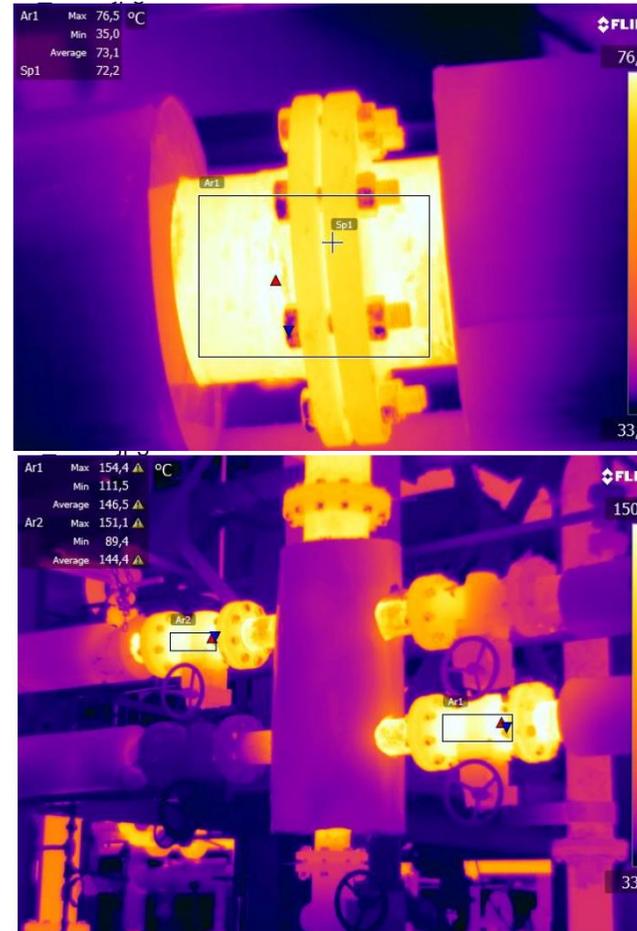
-> The owner decided to insulate the new roof:



Proof – TIPCHECK Case Studies

Chemical Plant

- Uninsulated pairs of flanges and valves
- Old and damaged insulation partly in place.
- TIPCHECK the savings potential of uninsulated parts and of old and damaged insulation



Proof – TIPCHECK Case Studies

Chemical Plant – TIPCHECK Result:

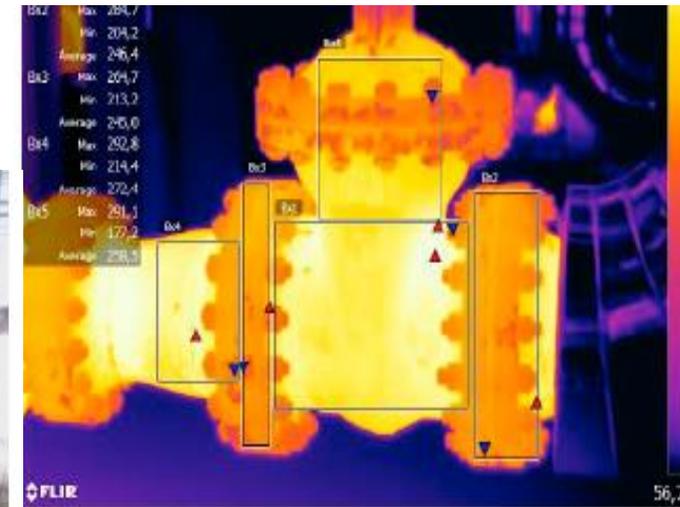
- **650 m** of piping with missing or damaged insulation
- **300** uninsulated **pairs of flanges**
- **160** uninsulated **valves**
- **3** uninsulated **tanks**
- Process temperature range:
from **75 °C** (170 °F) to **150 °C** (300 °F)
- **Saving potential: 11.100 MWh/year & 200.000 €/year**
- CO₂ emission reduction potential: **2.240 t/year**
- **Payback time less than 1 year**



Proof – TIPCHECK Case Studies

Refinery – Focus on a high temperature valve

- 12' uninsulated valves
- Process temperature: 260 °C/500 °F
- **Saving potential: 114 MWh/year**
- **CO2 emission reduction potential: 51 t/year**
- **Payback time less than 1 year**



Why?

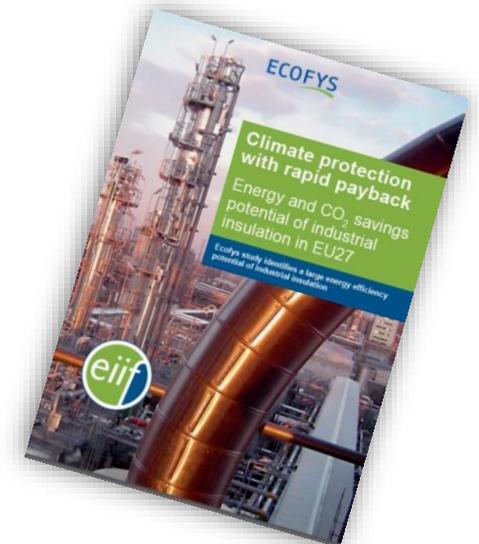
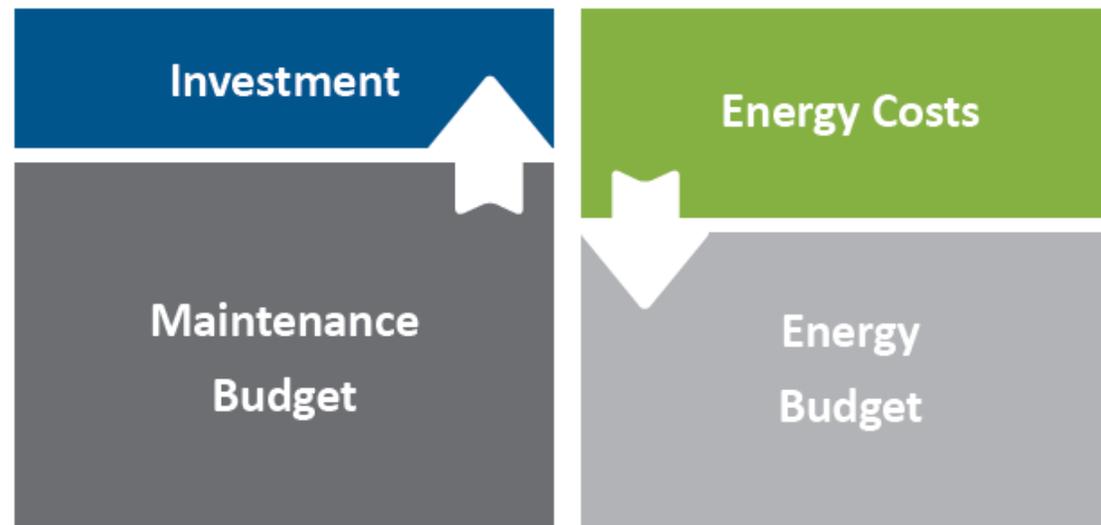
- Generally speaking...
 - Lack of information and awareness
 - Split responsibilities and budgets
 - Insulation is not the core business: Companies are using outdated Standards
- Technically speaking...
 - Level of insulation is based on minimum investment decisions like
 - ✓ Safety (maximum surface temperatures)
 - ✓ Minimum process needs
 - ✓ Outdated insulation standards (accepting high & costly heat loss rates)
 - ✓ Maintenance



Why? – Split Responsibilities

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

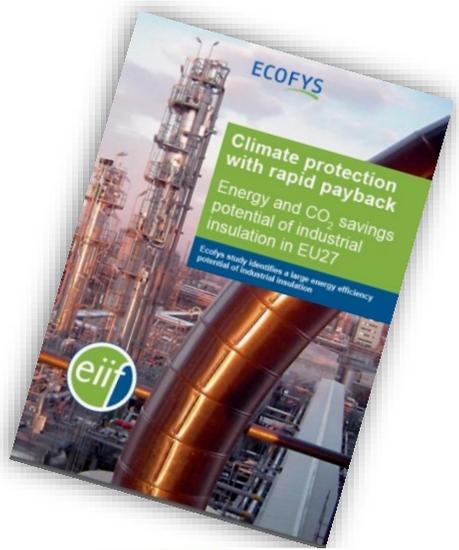
Split incentives



Why? – Outdated Standards

- Insulation standards: A simple comparison of industry and building insulation standards illustrates why industry is LOSING not only ENERGY but also MONEY whilst producing tons of unnecessary CO₂:

	Power Plant	Current building code	Passive House
Temperature	250°C – 640°C	18°C – 22°C	18°C – 22°C
Heat loss (AGI Q101)	150 W/m ²	< 10 W/m ²	< 3 W/m ²
Insulation thickness	100mm	100mm	350–500mm



Lessons learnt

- 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.**
- They usually are **not aware how easy and quick** it is to **stop the energy waste** with properly **insulated** systems/installations.
- Energy is **not the core business** of most industrial players but a necessary means to manufacture their products – whatever it is...

First Advocacy Successes in Germany and France – What about Poland?

- Driven by the initiative of EiiF the following subsidy programmes have been established:

In Germany



The image shows a document from the Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA) regarding the 'Energie wende' program. The document is titled 'Einzelmaßnahmen' and is a 'Merkblatt für Anträge nach 3.1.1 der Richtlinie für Investitionszuschüsse zum Einsatz hocheffizienter Querschnittstechnologien vom 29. April 2016'. It also mentions 'Förderung von Querschnittstechnologien'. Below the document is a photograph of two industrial workers in green uniforms and yellow hard hats looking at a tablet in a factory setting.

Quelle: © Fotolia.com/branex

In France



The image shows a French 'CERTIFICATS D'ECONOMIES D'ENERGIE' (CEE) document. The title is 'CERTIFICATS D'ECONOMIES D'ENERGIE' and it is dated 10 décembre 2016. The document is from the 'JOURNAL OFFICIEL DE LA REPUBLIQUE FRANÇAISE' and is 'Tome 8 sur 228'. It is an 'ANNEXE 7' titled 'Certificats d'économies d'énergie' and 'Opération n° ISB-E-131'. The main heading is 'Isolation thermique des parois planes ou cylindriques sur des installations industrielles (France métropolitaine)'. The document includes '3. Conditions pour la délivrance de certificats' and 'La mise en place est réalisée par un professionnel'. It lists the simplified thermal resistance R' values for different conditions and temperatures.

3. Conditions pour la délivrance de certificats
La mise en place est réalisée par un professionnel.

Les performances de l'isolation thermique des installations sont déterminées à partir de la résistance thermique simplifiée R' définie comme le quotient de l'épaisseur d'isolant installée par sa conductivité thermique à respectivement -40, 80, 200 et 450°C selon la plage de température du fluide de l'installation calorifugée.

Pour les tuyauteries ou les équipements cylindriques de diamètre inférieur à 508 mm (ou 20"), la résistance thermique simplifiée R' est supérieure ou égale à :

- 3,3 m² K/W pour une température de fluide T telle que -60°C < T ≤ 0°C ;
- 1,6 m² K/W pour une température de fluide T telle que 40°C < T ≤ 100°C ;
- 2,0 m² K/W pour une température de fluide T telle que 100°C < T ≤ 300°C ;
- 2,3 m² K/W pour une température de fluide T telle que 300°C < T ≤ 600°C.

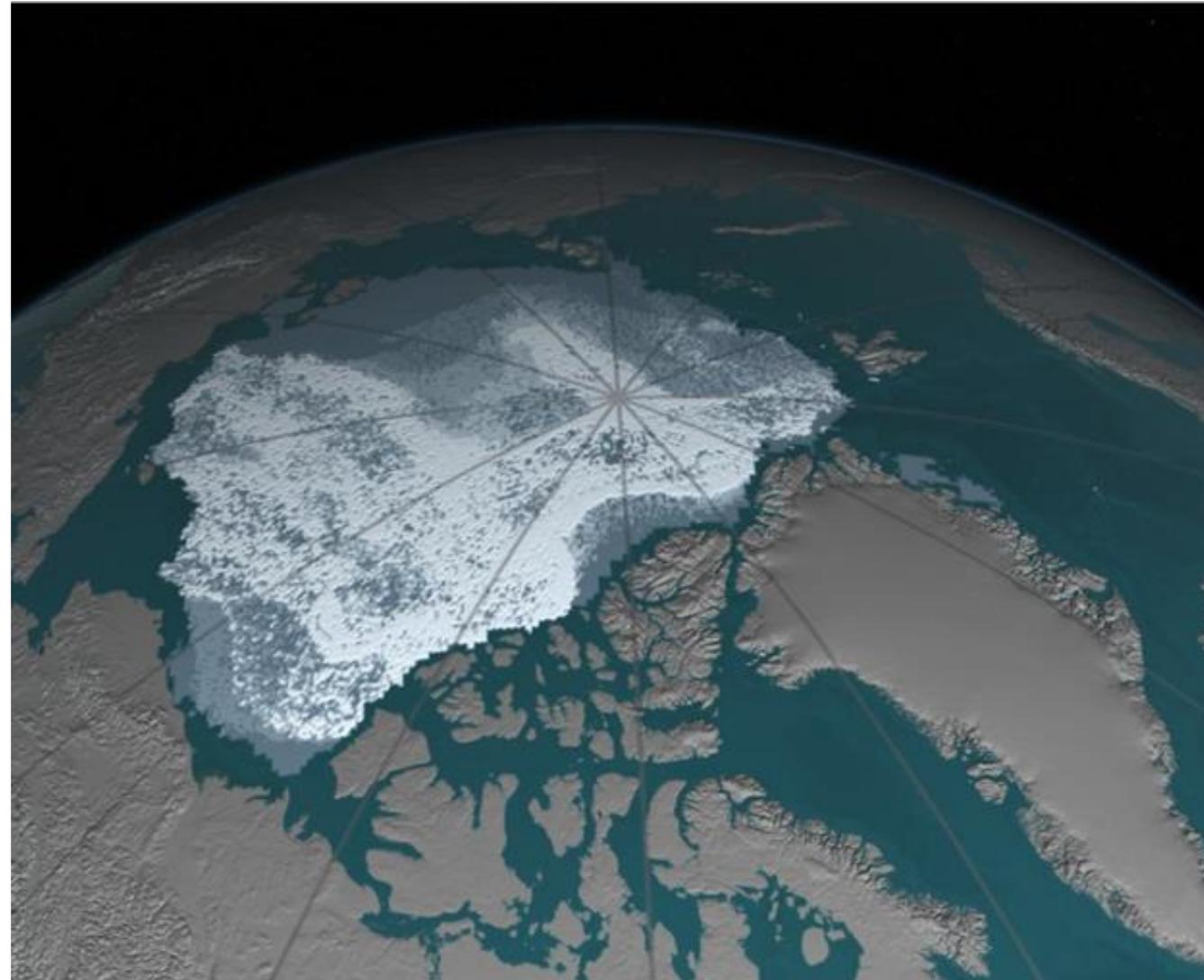
Pour les surfaces planes ou les tuyauteries et équipements cylindriques de diamètre supérieur ou égal à 508 mm (ou 20"), la résistance thermique simplifiée R' est supérieure ou égale à :

- 4,3 m² K/W pour une température de fluide T telle que -60°C < T ≤ 0°C ;
- 2,1 m² K/W pour une température de fluide T telle que 40°C < T ≤ 100°C ;
- 2,4 m² K/W pour une température de fluide T telle que 100°C < T ≤ 300°C ;
- 2,6 m² K/W pour une température de fluide T telle que 300°C < T ≤ 600°C.

La preuve de réalisation de l'opération mentionnée est la mise en place d'une isolation sur une installation industrielle avec le marquage et référence du matériau isolant ainsi que, selon le cas, la quantité posée en mètres carrés (pour les

Climate Change: Marine Ice is Shrinking Dramatically in the Arctic...

- 1984

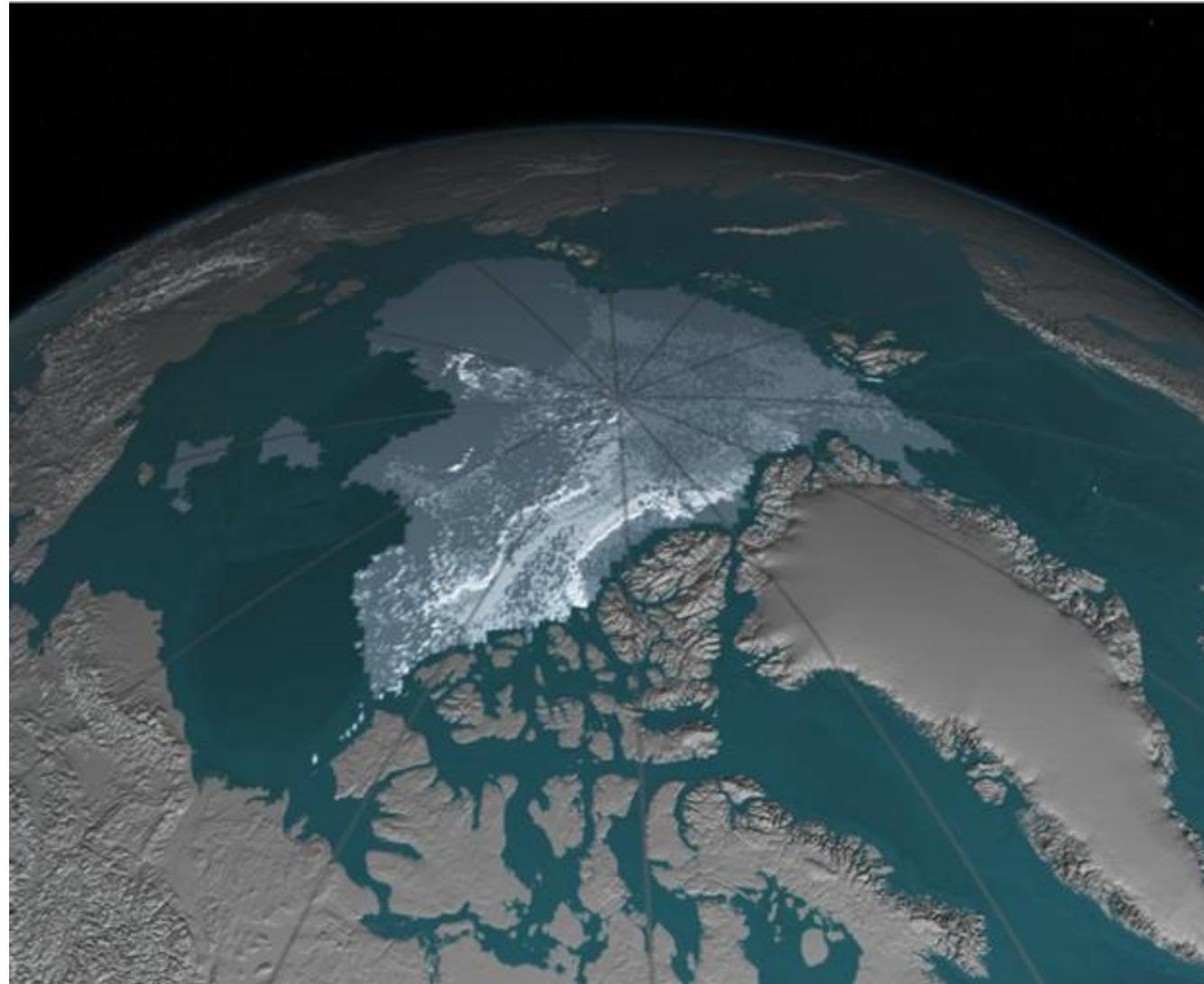


Source:
<http://www.spiegel.de/wissenschaft/natur/klima-globales-meereis-schrumpft-dramatisch-a-1122089.html>



Climate Change: Marine Ice is Shrinking Dramatically in the Arctic...

- 2016



Source:
<http://www.spiegel.de/wissenschaft/natur/klima-globales-meereis-schrumpft-dramatisch-a-1122089.html>

Ice Shrinking in the Arctic...

- The Guardian, 24 August 2017:

theguardian

Russian tanker sails through Arctic without icebreaker for first time

Climate change has thawed Arctic enough for \$300m gas tanker to travel at record speed through northern sea route



i The Christophe de Margerie carried a cargo of liquefied natural gas from Hammerfest in Norway to Boryeong in South Korea in 22 days.

Contact

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Switzerland

Andreas Gürtler
Foundation Director

Materiał pochodzi z
Konferencji Naukowo-
Technicznej Heat Not Lost
organizowanej przez [https://
hnl.pl/](https://hnl.pl/)

