THERMAL INSULATION MANUFACTURERS & SUPPLIERS ASSOCIATION

WHY INSULATE?

The financial and environmental arguments

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Association House, 99 West Street, Farnham, Surrey GU9 7EN
tel: 01252 739 154 fax: 01252 739140 www.timsa.org.uk

INSULATION IMPROVES ENVIRONMENT - AND SAVES MONEY!

There are two major reasons why thermal insulation provides such a good investment for the future: financial and environmental.

THE FINANCIAL ARGUMENT

You may play the Lottery, wager on the football pools or put your money into tax free savings accounts and pension schemes, but can anyone match the rate of return that is obtainable from investing in insulation for process plant, or for heating and ventilation applications?

TIMSA believe it would be extremely difficult to match such a return. It can easily be shown that, in many situations, a substantial amount of the cost of insulation can be repaid within only three months. Amazingly therefore, it is quite possible that there would be little cash outflow by the beneficiary of the insulation. In addition, from the time the insulation had paid for itself, it continues saving costs, adding to profits at the same rate, year after year, for the lifetime of the insulation.

With such a valuable commodity obtainable at virtually no capital outlay and providing such a worthwhile investment, it is surprising that not more companies are considering increased insulation, especially in the current trading conditions. We are living in tough times and installation of the correct insulation is one of the finest investments that those responsible for commercial, industrial and public buildings can make.

A200% return on a one-off investment!

For every £1,000 invested, £2,000 could be added to your net profit each year for years to come.

Here's how.

Energy is expensive - wasted energy is loss straight off your organisation's bottom line! Thermal insulation is much more valuable than most people recognise.

Read off from the following chart the 'critical number' for your factory:

Equipment temperature in °C	'Critical' number
100	3000
110	2750
120	2500
130	2250
140	2000
150	1750
160	1500
170	1250

Let us take an example:

Assume an uninsulated pipe, 42mm outside diameter (1¼" bore steel) at a temperature of 170ºC. From the chart above the 'critical' figure is 1250. (For flat or large radius surfaces use a diameter of 320mm. For every uninsulated valve count 3m equivalent of pipe and for every flange count 1m.)

Divide 1250 by the outside diameter of the pipe (i.e. 42) and you get 29.76, say 30.
Insulate this length of 30m efficiently and you will add approx. £1,000 to your profits every year!

You can picture the situation better when you realise that £1,000 of energy represents about 11kW running to waste. To put it another way, eleven bars of an electric fire left on for a whole year! And all this from 30m of 42mm bare pipe at 170ºC.

Payback

Because of the enormous savings potential and the moderate cost of insulation, the guideline is that, in many circumstances, the savings in wasted energy will pay for the installation of the insulation within about 20 weeks. (1kW running for one year using industrial fuel prices and average efficiencies of heat production costs about £90.)

Cash flow

If you are currently required to pay your fuel supplier shortly after delivery, then by the time you need to pay for the installation of the insulation, you will probably have saved the cost of the installation – i.e. you have no cash outflow and the insulation is effectively free!

Although this assumes that the equipment is running constantly, you can easily get an idea of your own potential savings by taking the following factors into account:

The savings are proportional to:

1. The hours in the year that your equipment is running. The figures above assume constant running, i.e. 8760 hours per year.
2. The difference in temperature between the equipment and ambient normally assumed to be 20ºC.

Get someone to go round your factory. Get them to look for uninsulated hot pipework, valves, flanges and equipment. Most factories have lots more than you think!

Get them to find out the following information:

1. At what temperature is the equipment running?
2. For how many hours a year does it run?
3. How many metres of the different sizes of pipe are there and, particularly, how many valves and flanges?

Then apply the simplified technique used above, taking into account your own circumstances, and get an idea of the scale of profit increase available to you.

It must be said that this is only a very approximate guide to the increased profits that are available in thousands of factories in the UK. The arguments against using a brief layman's guide like this prevent many from being aware of what can be achieved from investment in energy saving. This guide is therefore only a starting point. Decision makers who have the opportunity should call on companies with expertise in the field of energy saving potential for a written report.

Contact a TIMSA member today to help you assess your potential profit increase.

THE ENVIRONMENTAL ARGUMENT

Various ways in which man's activity impacts on the environment have come into sharp focus in recent years. They attract attention because it is the global, rather than the local, environment which is under threat. Scientists have been able to quantify these causes and their possible consequences.

One activity that has major implications for the global environment is the construction and occupation of buildings. The reaction of some raw materials and chemicals during the manufacture of building materials can have significant environmental consequences and the

heating of buildings accounts for over half the nation's fuel consumption. The combustion of fossil fuels is having a particularly damaging impact on the global environment.

Combustion of fossil fuels is a major cause of the 'Greenhouse effect' - the term given to global warming caused by the build up, in the atmosphere, of gases which inhibit the re-radiation of heat from the earth. The principal greenhouse gas is carbon dioxide, which is generated largely from the combustion of fossil fuels. If current trends continue, global temperatures are set to rise perceptibly in the next few decades, with significant climatological and ecological consequences. Acid rain is caused by gases such as sulphur dioxide and nitrogen oxides being absorbed and returned to earth. These gases are produced principally by the combustion of fossil fuels, particularly in power stations. The combustion of fuel has a damaging effect on plant life, especially forests, animal life in lakes, etc.

High standards of insulation leads directly to the reduction of greenhouse gases. The overall achievement of better U-values, through the increased use of insulation products, would result in less fossil fuels having to be burned to keep buildings warm.

Under the weather conditions prevailing in the UK, it has been calculated that, during the life time of a typical building insulated to minimum standards, a square metre of 50mm thick insulation will reduce carbon dioxide emissions by at least one tonne. Higher standards of insulation will achieve far greater savings in CO_2. Clearly the manufacture of insulation materials initially requires the combustion of fuels, however, a square metre of insulation can reduce the amount of carbon dioxide by over a thousand times more than that generated during manufacture.

Since use of more insulation products will result in less fossil fuel being burnt, either by heating systems of individual buildings or at the power station, it follows that increases in insulation would significantly reduce the emission of damaging environmental gases. More and better insulation on pipes, ductwork and on boilers and furnaces would be a major beneficial contributor to man's environment.

Additionally, it has been calculated that many hundreds of thousands of tonnes of CO_2 emissions could be saved in the UK per annum if pipeline insulation thicknesses were increased from 'Personnel Protection' levels to 'Economic' levels. As suggested by the term 'Economic', attractive financial savings accompany this positive environmental impact.

AVERAGE SITE	
ANNUAL UTILISATION OF PLANT (HOURS)	4800
NET ENERGY COST (£/GJ)	4
AMBIENT 'STILL AIR' TEMP. (°C)	20
INSULATION TYPE	TYPICAL 140kg/m^3 MINERAL WOOL
SURFACE FINISH	GALVANISED STEEL

Economic thickness may be defined as the thickness of insulation that gives a minimum total cost over a chosen evaluation period, taking into consideration the cost of fuel, the efficiency of the system and the cost of the insulation including installation.

The chart of Economic Insulation Thickness, shows the **additional** financial savings that can be made if insulation thicknesses are increased relative to those currently used to provide personnel protection.

The data is based on guidance given in BS5422: 1990. The **additional** financial savings are shown per linear metre of pipe and per square metre of flat area, per year. Clearly, when multiplied by the total area of a typical site, the savings become significant.

The 'design' insulation thickness is that required to ensure that the outer surface does not exceed 55°C (personnel protection), rounded-up to the nearest 10mm. The 'economic' thickness is that advised by Table 24 of BS5422:1990 for greatest financial economy.

CHART OF ECONOMIC INSULATION THICKNESS

Operating Temperature (°C)	Pipe Diameter (mm)	Design Insulation Thickness (mm)	Heat Loss for Design Thickness (W/m pipe) (W/m^2 flat)	Economic Insulation Thickness (mm)	Heat Loss for Economic Thickness (W/m pipe) (W/m^2 flat)	Saving in Heat Loss	£ saved per year (per m pipe) (per m^2 flat)
100	60	20	32	50	19	13	0.90
100	169	25	65	70	31	34	2.35
100	324	30	101	80	46	55	3.80
200	60	20	86	80	38	48	3.32
200	169	25	171	100	64	107	7.40
200	324	30	266	110	96	170	11.75
300	60	20	159	100	62	97	6.70
300	169	25	318	120	103	215	14.86
300	324	30	492	140	147	345	23.85
400	60	40	165	110	95	70	4.84
400	169	40	357	150	143	214	14.79
400	324	40	623	170	203	420	29.03
500	60	50	214	130	128	86	5.94
500	169	60	390	170	195	195	13.48
500	324	60	662	200	268	394	27.23
600	60	60	270	150	168	102	7.05
600	169	80	446	200	248	198	13.69
600	324	80	738	230	341	397	27.44
700	60	80	311	170	214	97	6.70
700	169	100	517	220	317	200	13.82
700	324	110	779	260	425	354	24.47
100	flat	30	90	90	33	57	3.94
200	flat	30	237	130	61	176	12.17
300	flat	30	439	160	91	348	24.05
400	flat	50	441	190	122	319	22.05
500	flat	70	474	230	148	326	22.53
600	flat	100	472	250	191	281	19.42

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