

GBI Pro-Series

14 April 2020

Type Of Roof Insulation

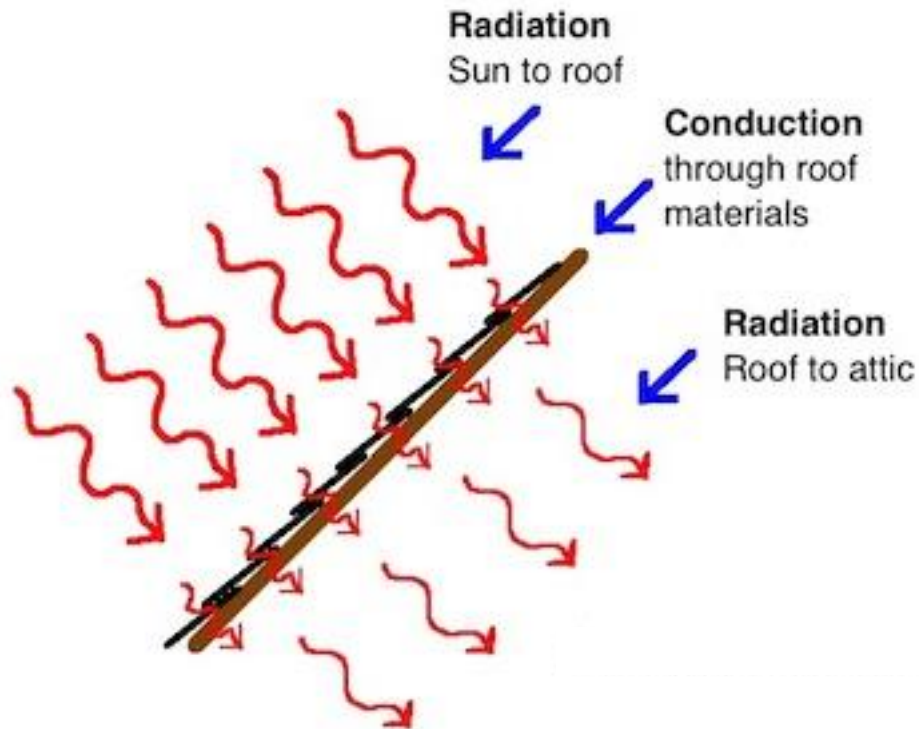
Ar Michael Ching

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Type Of Roof Insulation

Primary Role of Roof Insulation

Reduce Solar Heat Gain Through The Roof



Type Of Roof Insulation

R-Value

R-value of a material is a measure of its **resistance of conductive to heat flow** through a given thickness of that material

The **higher** the R-value, the more effective the insulating properties

Type Of Roof Insulation

Type Of Roof Insulations

In general, there are 4 types:-

- 1) Foam Board / Rigid Foam
- 2) Bulk
- 3) Reflective / Radiant Barrier
- 4) Spray



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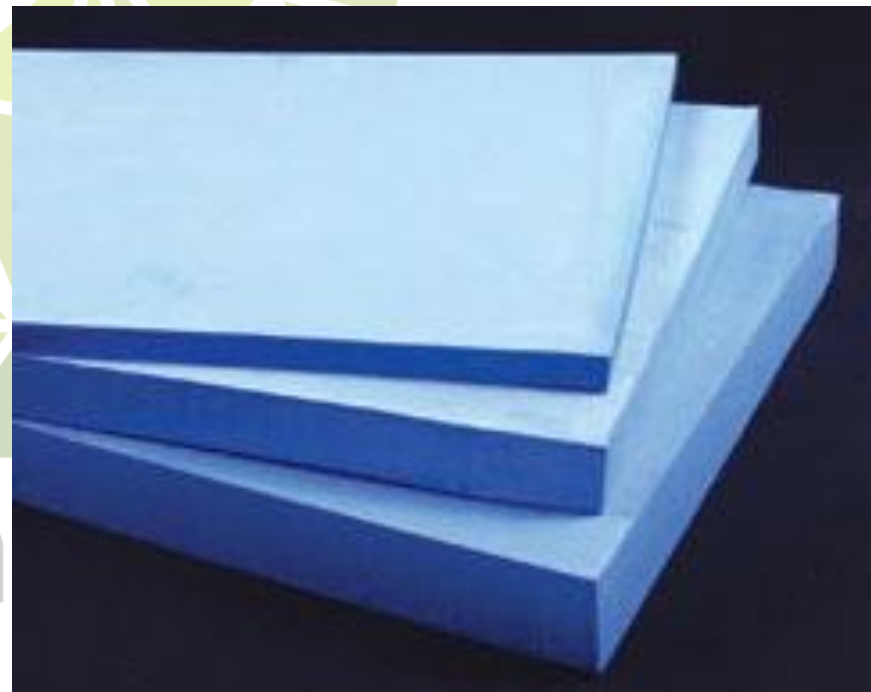
Type Of Roof Insulation

1) Foam Board / Rigid Foam

Commonly used insulation for concrete roof construction.

Thicker insulation (with same density) will have a higher R-value.

The most common types of materials used in making rigid foam insulation include polystyrene, polyisocyanurate and polyurethane.



Type Of Roof Insulation

1) Foam Board / Rigid Foam

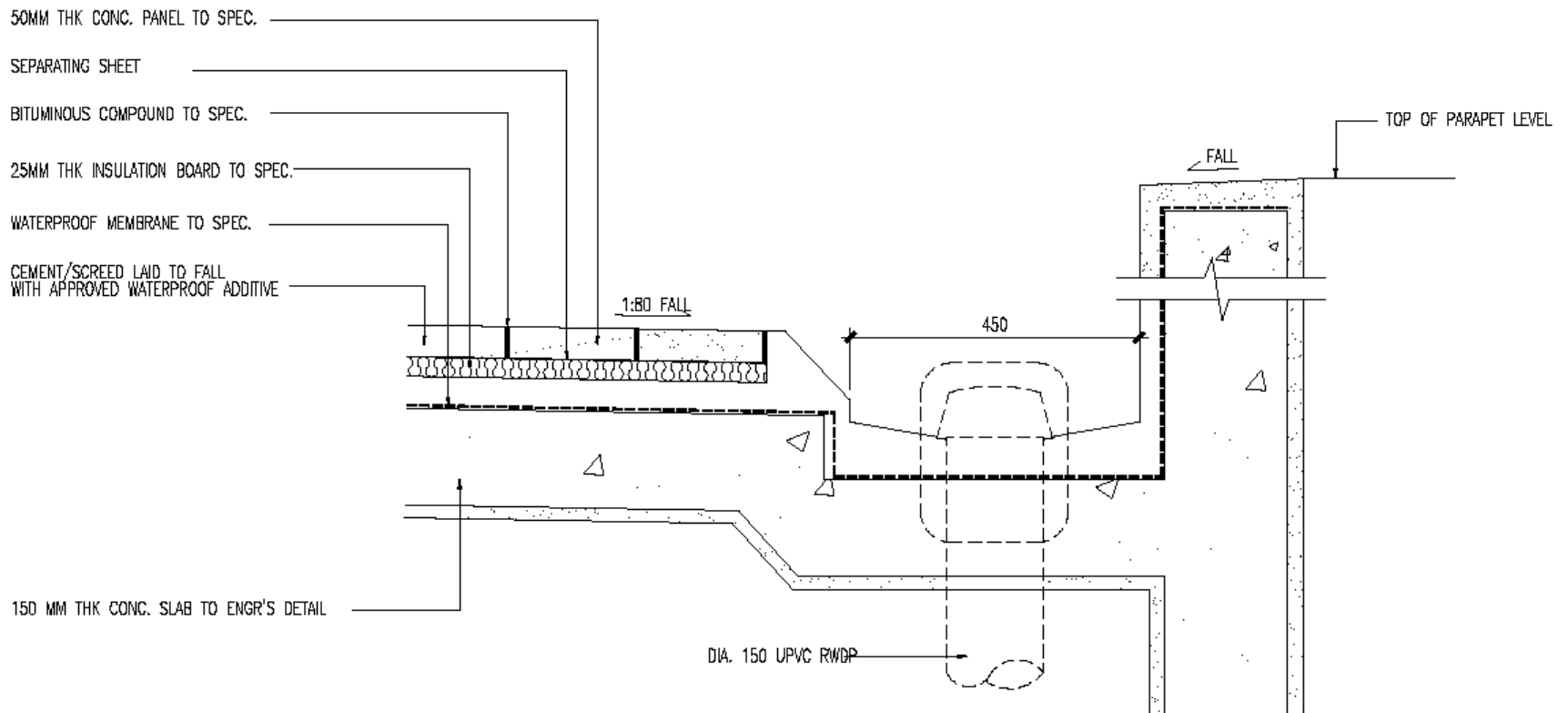
The insulation is usually placed between the reinforced concrete roof and the protective cement screed.



Type Of Roof Insulation

1) Foam Board / Rigid Foam

Caution: Potential construction defect if the detailing is incorrect.



Type Of Roof Insulation

2) Bulk

Bulk insulation is the most common type of insulation for lightweight roof construction.

Thicker insulation (with same density) will have a higher R-value.

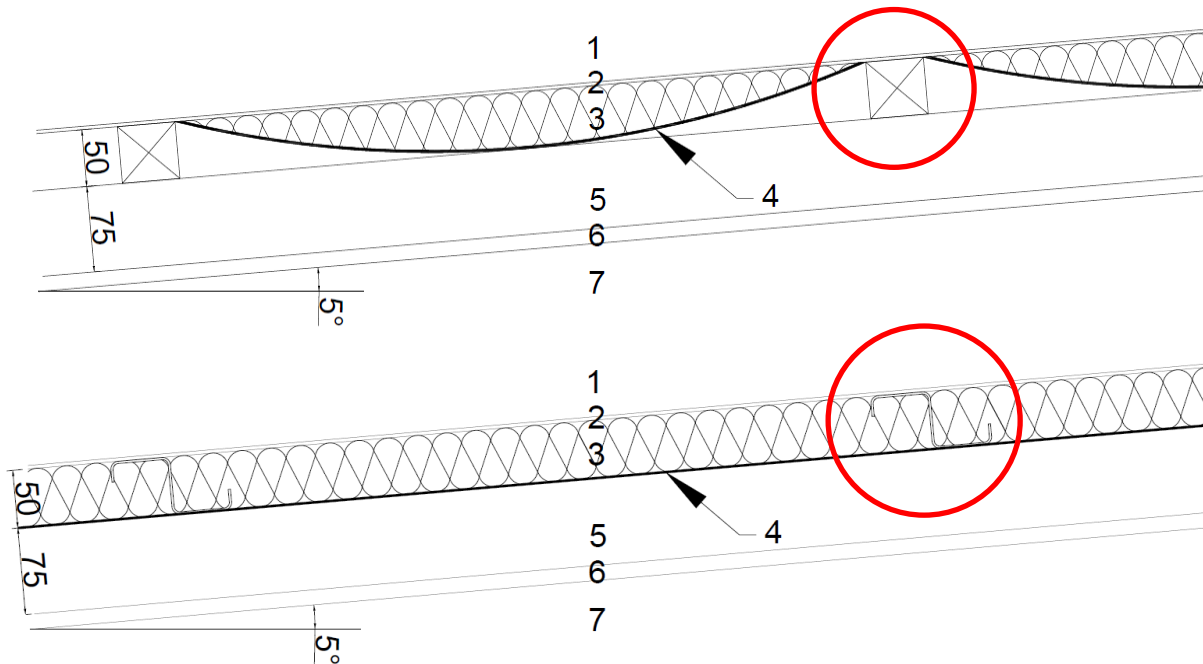
It consists of flexible fibres, most commonly fibreglass or wool.



Type Of Roof Insulation

2) Bulk

Caution: It is important **to maintain dry and not to compress** bulk insulation, as this will reduce the air pockets and the material will lose its insulating properties.



Compressed

**Not
Compressed**

Type Of Roof Insulation

3) Reflective / Radiant Barrier

Unlike other insulation systems, which resist conductive heat flow, this type of insulation work by **reflecting** heat within an enclosed air space

Typically consist of a thin layer of aluminium bonded to another material that adds strength and durability.



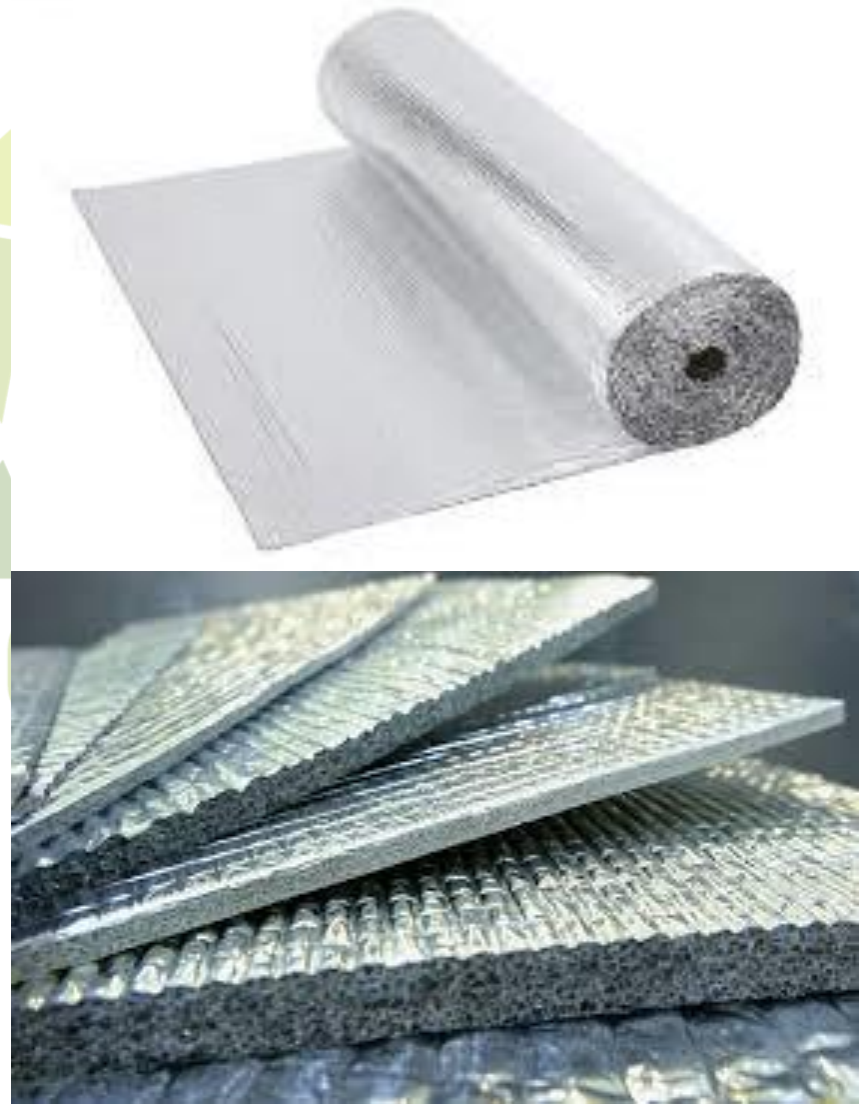
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3) Reflective / Radiant Barrier

MS 2095:2014 section 3.5 and section 3.6 stated:

Reflective Insulation: Reflective surface within an enclosed air space

Radiant Barrier: Reflective surface laminated onto woven, foam, etc which has a resisted conductive element



Type Of Roof Insulation

3) Reflective / Radiant Barrier

Not all shiny foil materials qualify as reflection insulation or radiant barriers.

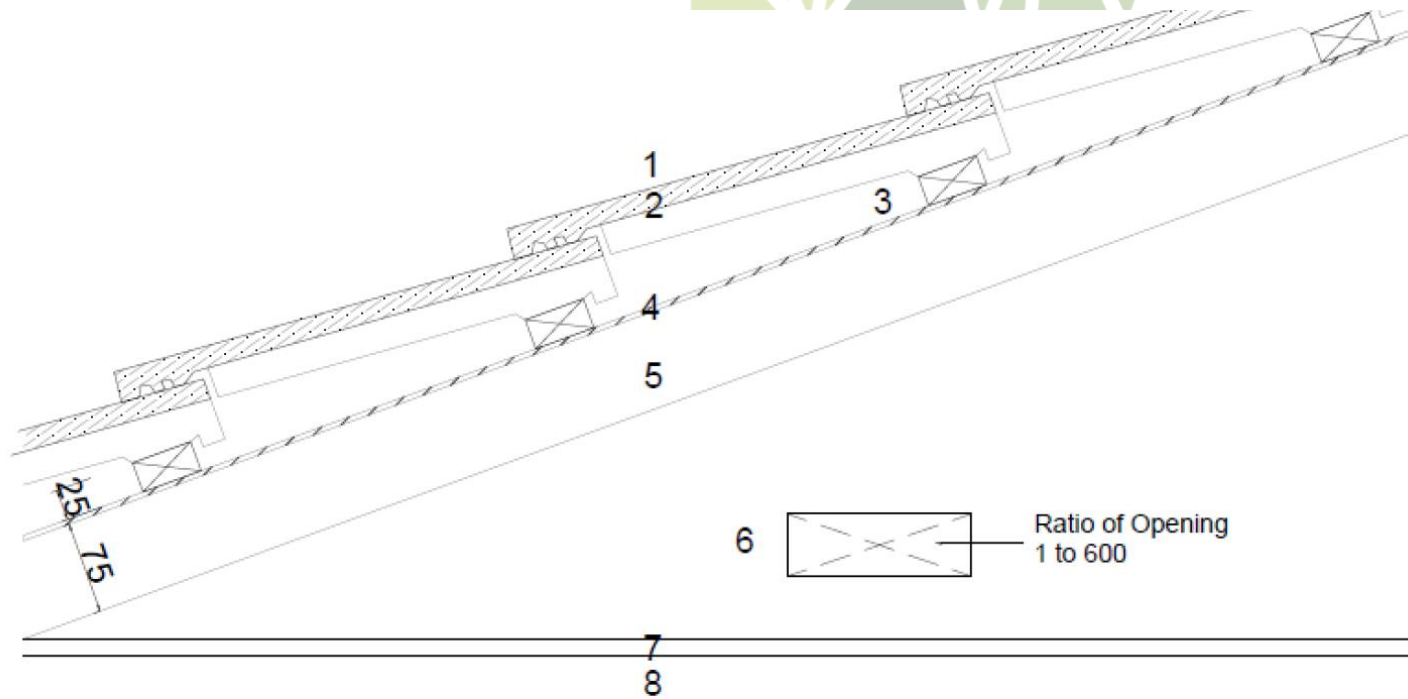
In order to qualify as one,

- a) it must **reflect up to 95%** of heat radiation and
- b) have an **emittance rating < 0.05**. Emittance is a ratio of energy or heat that is intercepted by the insulation and radiated outwards.

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3) Reflective / Radiant Barrier

Reflective Insulation and Radiant barriers are **not insulators** and therefore have **low R-value**. However, when they are used within **enclosed air spaces** as part of an insulating system, it reduces the heat emitted through the roof and enable the insulation to perform at or near its intended R-value.



Type Of Roof Insulation

3) Reflective / Radiant Barrier

Caution: If incorrectly installed, they may offer little benefit.

In order to perform properly, reflective insulation and radiant barriers must be installed **facing an enclosed air space of appropriate dimensions** to work as part of an insulating system. Roof attics are not considered as appropriate air spaces because of the **convection** air movement within them.

When placed **directly against another material**, these barriers can transfer heat by conduction, instead of blocking or reflecting it.

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4) Spray

The spray foam insulation is spray applied onto the underside of the roof system to seal the roof and stop the heat from entering through conduction and convection.

Thicker insulation (with same density) will have a higher R-value.



Type Of Roof Insulation

4) Spray

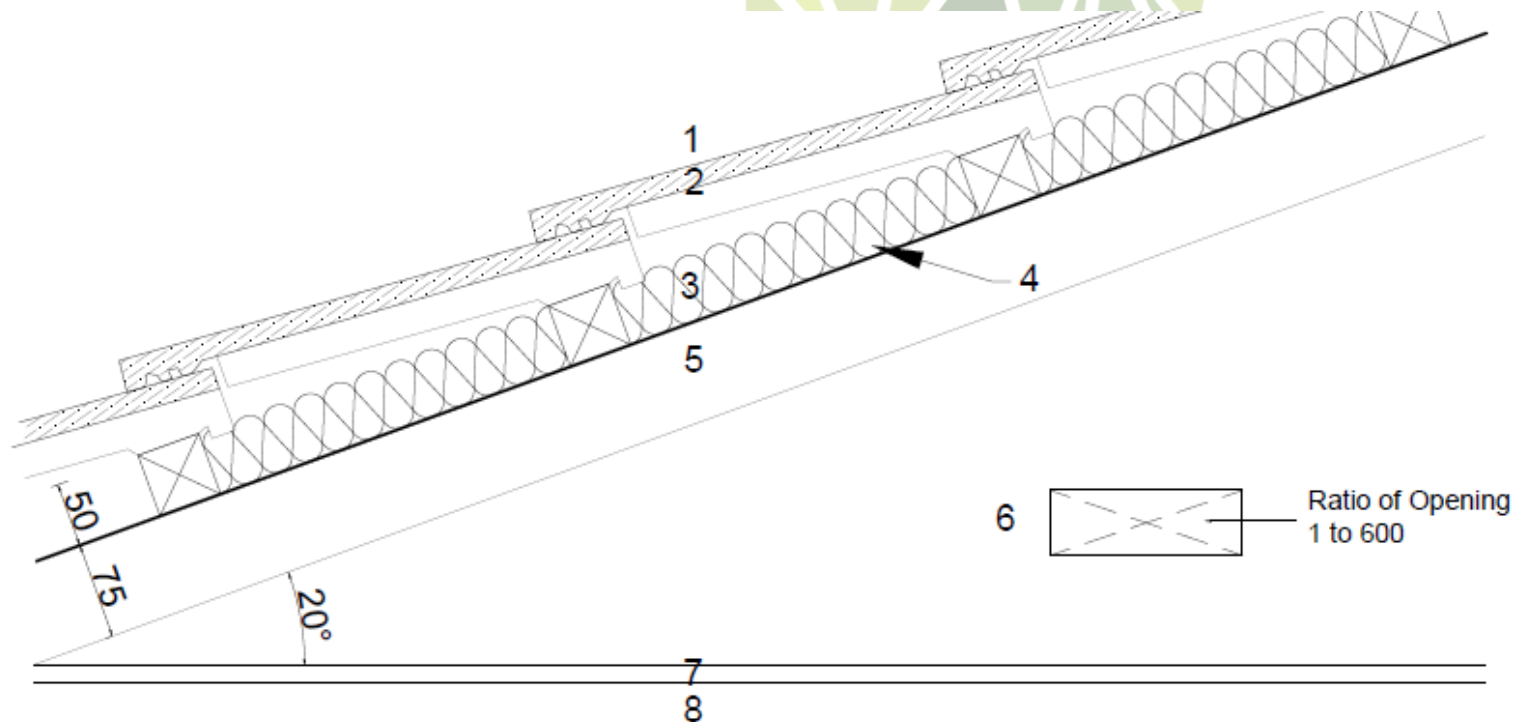
Spray foam insulation can be applied to both solid and lightweight roofs. The benefit of spray foam insulation is its ability to conform to **irregular roof shapes**. Some installations can yield a higher R-value than other insulations for the same thickness, and can fill even the smallest of cavities, thus creating an effective air barrier.

Caution: Difficult to maintain the consistent thickness hence affect the R-value property.

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Combination

Architects has combined two insulation materials to create an insulation sandwich that maximizes the potential, given the different products' efficiency, cost, application techniques, and environmental impact.



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Thank You

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