ARCH 633 ENVIRONMENTAL SYSTEM I

ASSIGNMENT 09
BUILDING ENCLOSURE

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3 TYPICAL INSULATION MATERIAL

	Fiberglass	Mineral Wool	Polyurethane Foam
			
R-Value	R-2.9 ~ R-3.7/inch	R-3.1-R-3.8/inch	R-3.6-R-6.3/inch
Approximate price	$346.00-$477.60/10^3 sq ft	$580.3-$801.2/10^3 sq ft	$881.7-$1217.2/10^3 sq ft

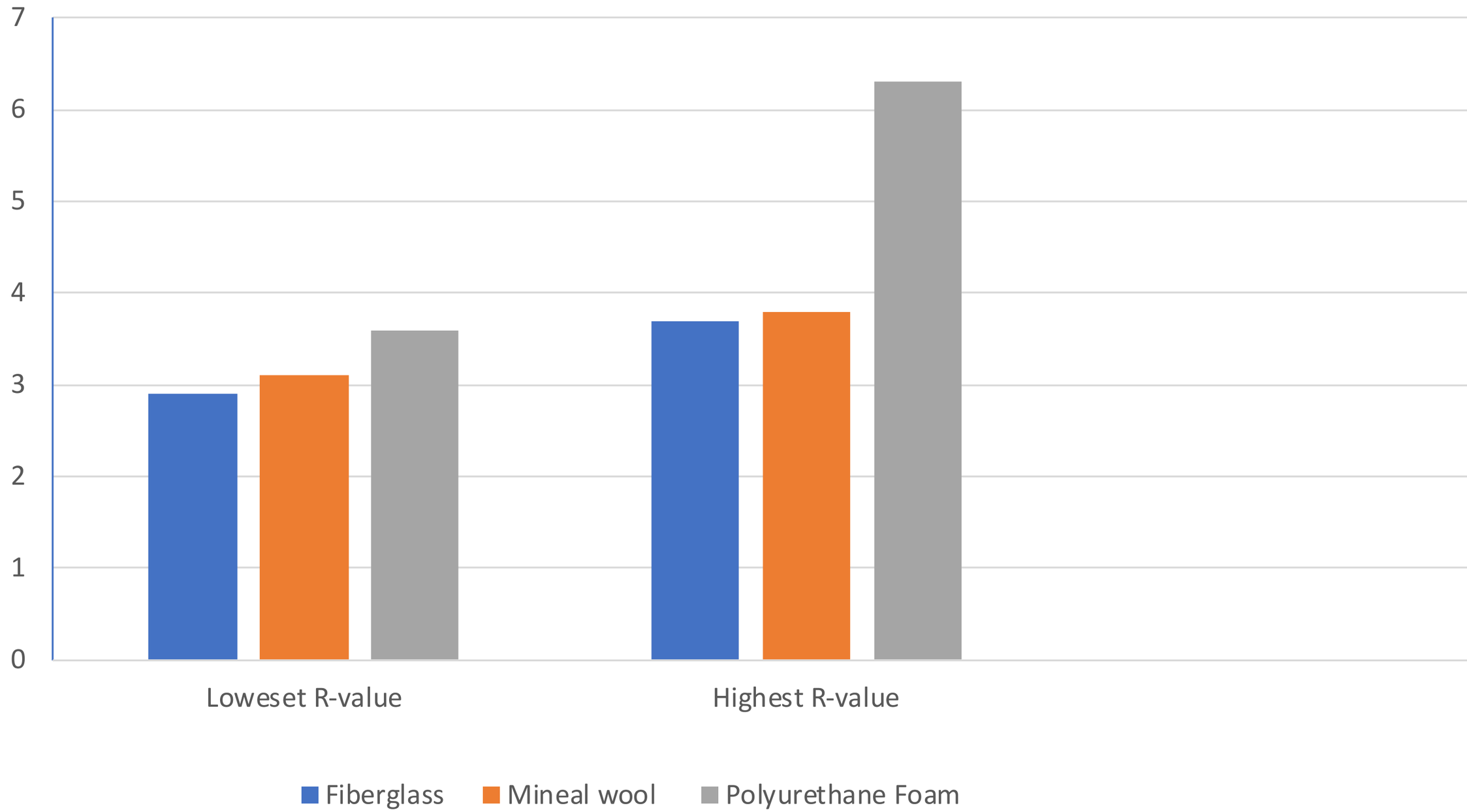
Price provided by "Homewyse"
Post code: 19104

https://www.thermaxxjackets.com/wp-content/uploads/2011/06/fiberglass-insulation.jpg

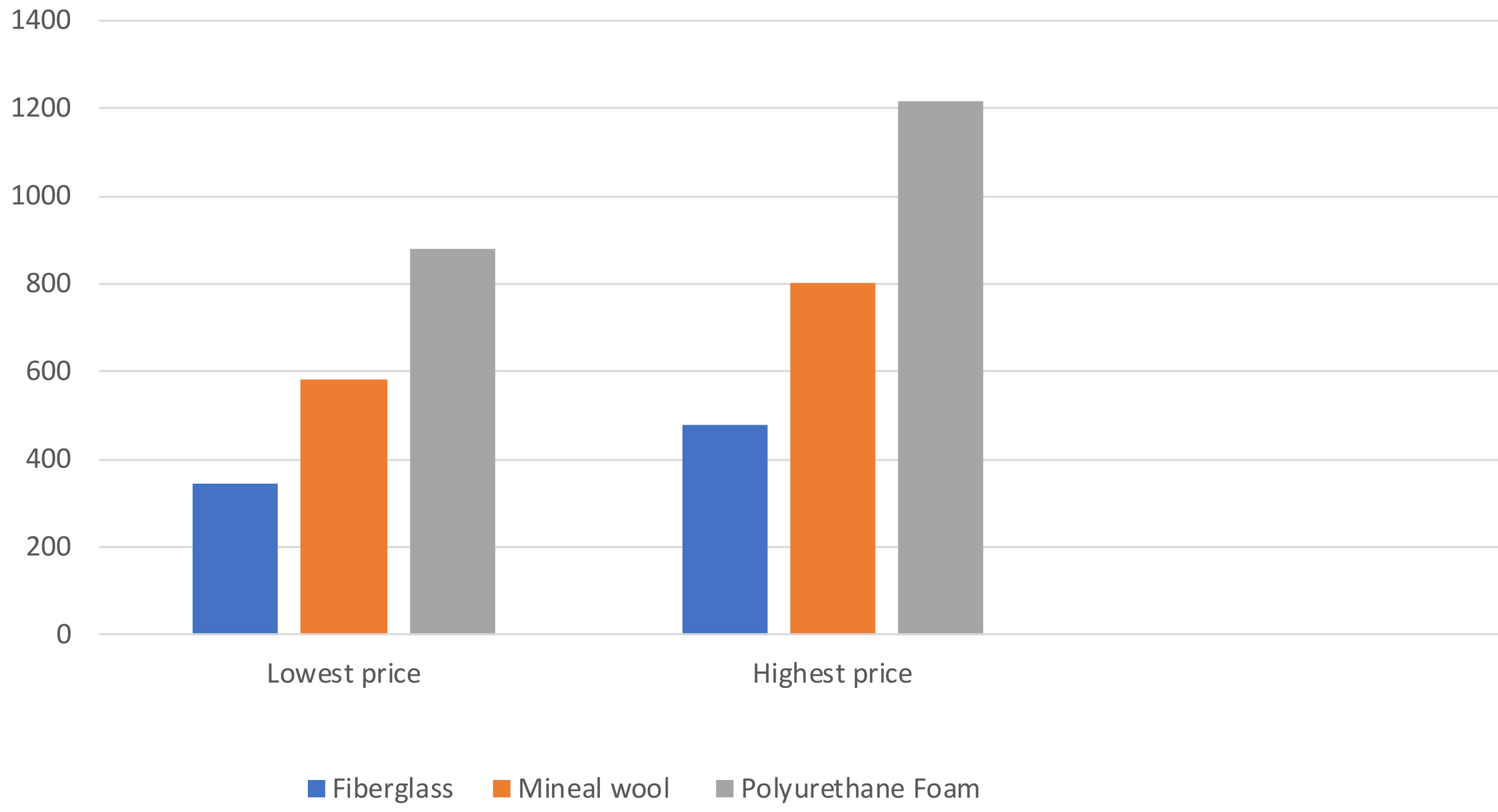
https://upload.wikimedia.org/wikipedia/commons/thumb/5/55/Rockwool_4lbs_per_ft3_fibrex5.jpg/1200px-Rockwool_4lbs_per_ft3_fibrex5.jpg

http://www.uratex.com.ph/industrial-institutional/wp-content/uploads/2015/08/spray-polyurethane-foam-uratex.jpg

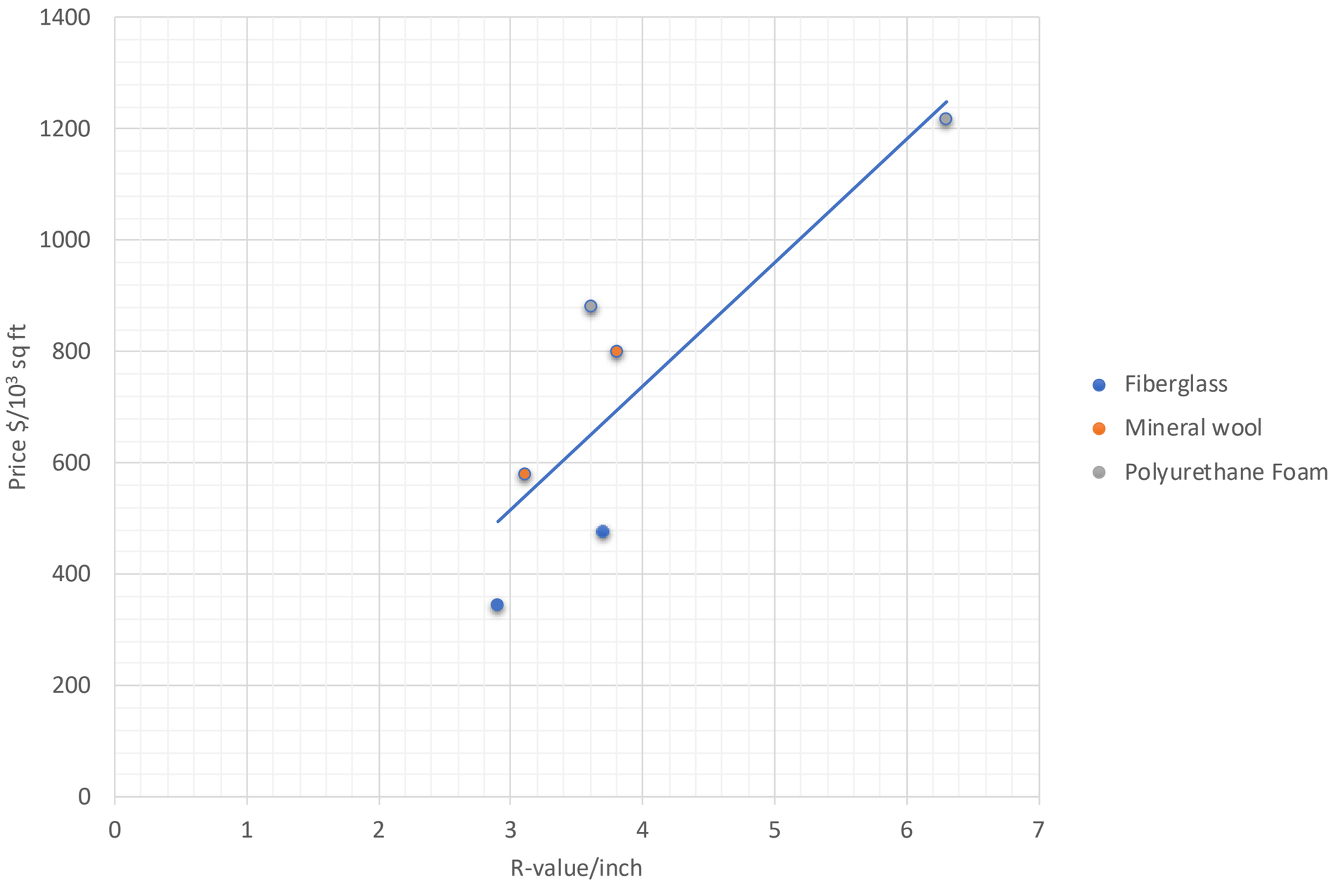
Insulation R-value/Inch



Insulation prices $/10³ sq ft



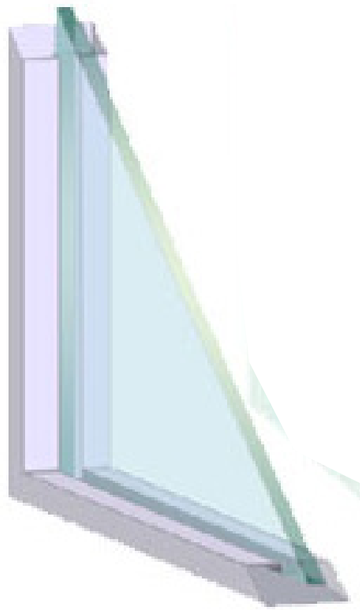
R-value & Price relation



CONCLUSION

After compare and comparison, the relation among those three typical insulation material is that the higher R-value, the higher price. The R-value stands for the material's insulation ability. Each material have their own advantage, and clients should choose the insulation material based on their particular needs.

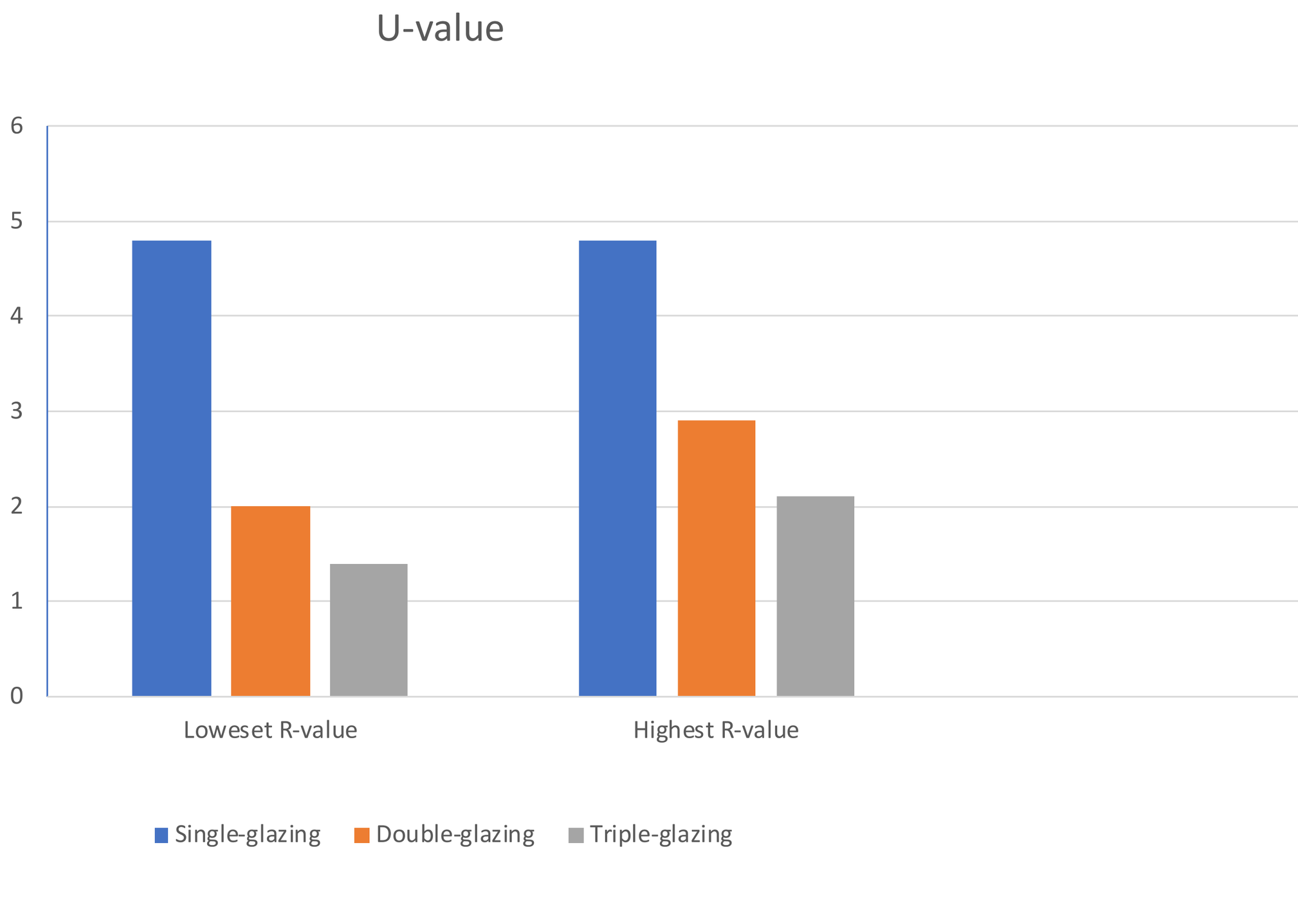
3 TYPICAL WINDOW ASSEMBLIES

	Fiberglass	Mineral Wool	Polyurethane Foam
			
U-Value	U-4.8	U-2.0~U-2.9	U-1.4~U-2.1

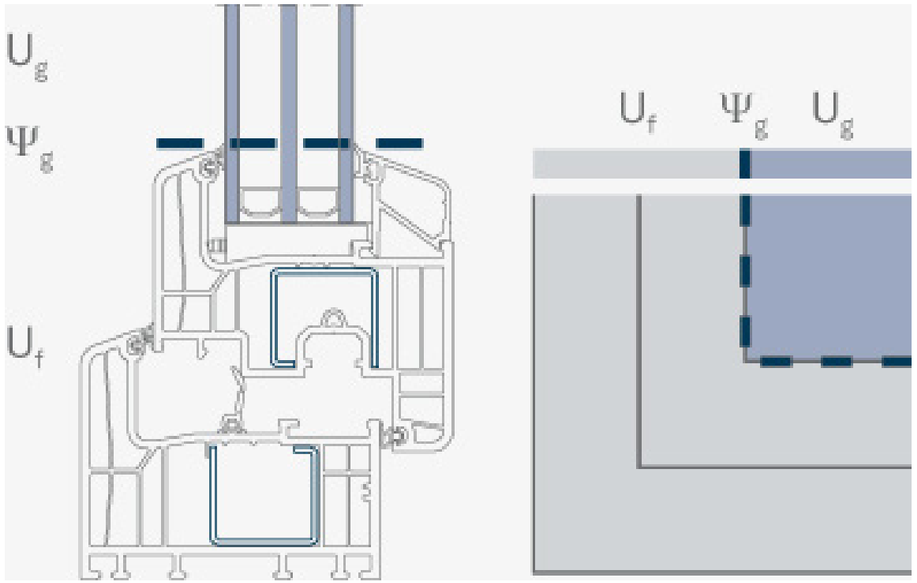
Data froM
https://www.pilkington.com/~/media/Pilkington/Site%20Content/UK/Reference/TableofDefaultU-Values.ashx

http://renewal-by-andersen-new-jersey.com/wp-content/uploads/2015/07/new-jersey-new-york-replacement-window-sing-double-triple-pane.jpg

The more gazing windows have, the better thermal re-sistance they have



U-VALUE ASSEMBLY METHOD



Usually, there are three U-Values need to be calculated in windows assembly.

U_w (U value of window)
U_g (U value of glazing)
U_f (U value of frame)

The overall u-value is with additive relation with each window elements.
The formula is

$$U_W = (A_g x\ U_g + A_f x\ U_f + l_g x\ \Psi_g)/(A_g + A_f)$$

U_w (U value of window)
U_g (U value of glazing)
U_f (U value of frame)
Ψ_g (linear heat transfer coefficient of the insulated glazing edge seal)
A_g (glass area)
A_f (frame area)
l_g (length of inside edge of frame profile)

http://www.inoutic.de/en/tips-on-window-purchase/saving-energy/u-value-for-windows/