Texmart is a locally owned “big-box” retail store chain in Texas with 75 stores, primarily located in the Dallas-Fort worth area. In order to compete with national big-box store chains, Texmart is planning to undertake several “sustainability” projects at its stores. The national chains have been heavily publicizing their sustainability efforts, including the reduction of green house (CHG) emissions, which has had a positive effect on their sales. They have also demonstrated that sustainability projects can have a positive effect on their sales. They have also demonstrated that sustainability projects can have a positive impact on cost (especially energy) saving. The projects Texmart is considering include installing solar panels at some or all of its stores; installing small wind turbines; replacing some or all of its 165 trucks with more fuel-efficient hybrid trucks; reducing wastes, including recycling; and reducing plastic bags in their stores. The cost for these projects, the resulting reduction in GHG emissions, the energy savings, and the annual costs saving are shown in the following table.

|  |
| --- |
|  Sustainable projects |
|  | Solar power | Wind power | Shipping/vehicles | Waste/recycling | Plastic bags |
| Media/public relations socre | 3 | 2 | 1 | 1 | 2 |
| Cost | 2,600,000 | 950,000 | 38,000 | 365,000 | 175,000 |
| CHG reductions(metric tons per year) | 17,500 | 8,600 | 25 | 1,700 | 900 |
| Cost savings($) | 220,000 | 125,000 | 26,000 | 75,000 | 45,000 |
| Energy savings(kwh) | 400,000 | 150,000 | 34,000 | 1,200 | 55,000 |
| units | 75 | 75 | 165 | 75 | 75 |

The media public/relations score in this table designates the importance of a particular project relative to the other projects in generating public awareness and publicity. For example, a score of 3 indicates that the solar power projects will have the greatest public impact. However, Texmart believes that if it undertakes a project, it will require a threshold number of projects to make an impact-specifically. A solar power installation at 1 store or more, wind power projects at least 3 stores, at least 10 new trucks, at least 2 waste/recycling store projects, and at least 6 stores with plastic bag reduction projects. Texmart has budgeted $30 million for sustainable projects, and it wants to achieve GHG emission reductions of at least 250,000 metric tons per year; it wants to achieve annual cost savings of al least $4 million; and it wants to achieve annual energy savings of at least 5 million kilowatt hours (kwh), while maximizing the public relations impact of its sustainability program. Develop and solve a linear programming model to help Texmart determine how many projects of each type it should undertake