Tires Tires Tires

New Mexico High School
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Executive Summary

In our project we will use Excel to show how much tires will build up in the next hundred years. We want to project how long it will take for all the tires in landfills, dumps and peoples' back yards to stack up to the moon.

Abstract

There are 280 million tires being stockpiled each year in the U.S. alone. Approximately 48% are being recycled each year. The problem is that 52% are still not being recycled, and they are accumulating in junkyards, landfills, and roadsides. These tires pose a fire hazard and provide a breeding ground for disease carrying rodents and insects.

The purpose of our project is to prove that these tires could be used to create an alternative fuel or be recycled into other uses. We plan to research the environmental impact of recycling rubber tires. We will contact major tire manufactures as well as the Scrap Tire Management Council in Washington D.C.
we hope to prove that recycling is more economically efficient then just discarding them into our landfills.

Introduction

Tires are one of the most used things in the world and every person has seen or used tires in their life. The title of our project is “Tires, tires, tires.” Our first question was what is the economical feasibility of recycling tires? The problem that we are working is to find out when it will be most needed and probable to start to recycle tires in the world. In our research we found that there are many more places in the United States that are recycling then we knew about. But these places are not well publicized and not many people know about them.

Background

There are many types and stockpiles of tires in the United States. The most used are cars and trucks. The Racing Industry and the Trucking companies contribute greatly to the problem of an over abundance of tires wasting away in our landfills and roadways. We took pictures of the area in the town we live in. There are piles of tires in several places. This problem is literally in our 'own backyard'. This is not just a local issue. Our research has shown that tires are a problem all over the United States, and the world.

Problem definition

In our project we are trying to figure out how economically feasible it is to recycle tires. If we don't start recycling in years to come we will be over run by tires. The more they stack up the more hazardous they become. They can catch on fire; they become a habitat for animals, rodents, and insects, which carry disease.

Pollution is an obvious problem with discarded tires. If these tires were to catch on fire they would burn for days and would release gases and smoke with a high content of a toxic substance called pyrolisis. These toxic substances would be harmful to people, pets and livestock.

Disease is another concern. These stockpiled tires become habitats for rodents, insects, and diseases. The mosquito is the number one insect that carries disease. It is notorious for carrying the West Nile and Encephalitis viruses. When these tires become filled with rain water or run off water they become lucrative breeding grounds for mosquitoes. There are also many other pests such as scorpions, black widows, centipedes, and vinageroones. Disease carrying rodents, such as rats, mice, skunks and

others collect in these tires, and reproduce. These mammals are known to carry rabies. Snakes and other pests find tire stockpiles attractive because of the abundance of food supply for them. This aspect of our project is worthy of further consideration as we could build a predator-prey model and explore this more extensively.

Tires are being dumped right into people's back yards. They litter the roadways, fill the landfills and generally are an eye sore to our landscape.

Things tires can be used for.

Tires can be recycled and used for many things. For example: In asphalt, or rubberized asphalt, on the roads, retreading tires, artificial reefs, breakwaters, construction, crumb rubber, sealants, Rail-Road crossings, Sporting surfaces, stampings, soil additives, sheet goods, molded products, tire boilers, pulp/plants, utility boilers, cement kilns, fluidized bed boilers.

The products that can be made are: reefs, breakwater, retaining walls, crumb rubber, asphalt, roof/road sealant, railroad crossings, running tracks, playgrounds, dock bumpers, pipe rollers, tire chips, floor mats, mud guards, truck bed liners, pots, buckets, retreaded tires, fuel, energy, oil/combustible gas, and carbon black.

The energy potential of tires to others fuels are: coke 13.7 Btu/lb., wood 4.375 Btu/lb., lignite coal 7.3 Btu/lb., subbituminous coal 10.5 Btu/lb., bituminous coal 12.75 Btu/lb., and rubber derivative is 16 Btu/lb.

There are a multitude of products that can be made from used and recycled tires. We were surprised to find out through our research that tire recycling is even being done.

We believe that it is not being done enough. Tire recycling at this time is not a money making business. One source tells us that it costs $1,000 to shred a ton of tires, and the resulting shreds can be sold for $10 a ton. This is the biggest reason we found for tire recycling to not be popular.

What people are doing?

Nucor Corp. is melting tires in its electric-arc furnace for about 18 months and estimates it has saved about a $1 million dollars in coal and scrap-steel costs. It is working with the state to begin helping clean up some tire stockpiles, which can be breeding grounds for mosquitoes and are vulnerable to uncontrolled fires. They estimates 500,000 tires used since March 2002 have replaced roughly 4,000 tons of coal. Each 20-pound passenger tire also typically contains a few pounds of steel, which is melted to make new steel products. That means the Auburn plant has been able to get roughly 500 tons of scrap steel out of the tires it has used. The good thing is that they don't require the steel or rims to be removed or the rubber to be shredded before going into the scrap bucket. Company wide, Nucor each year uses about 13 million tons of scrap metal from junked cars, appliances and construction debris, but scrap costs have been rising as China's own steel plants and its growing infrastructure put demand. Finally, the melting tires put off heat energy, which helps the plant use a bit less electricity.

According to the office of Energy Efficiency and Renewable Energy, www.eere.energy.gov, Consumer information, about 8 million scrap tires are cut, stamped, or punched into hundreds of different products every year. An additional 20 million whole or chopped scrap tires become fill and cover material in construction and landscaping, arterial reefs and breakwaters for beach erosion control, playground

surfacing material and equipment, highway and racetrack crash and sound barriers, boat dock, shock absorbers, and even more materials for building houses.

Farmers and ranchers use about 2.5 million whole scrap tires for holding down covers on haystacks, controlling erosion, protecting structures from livestock damage, and many other uses.

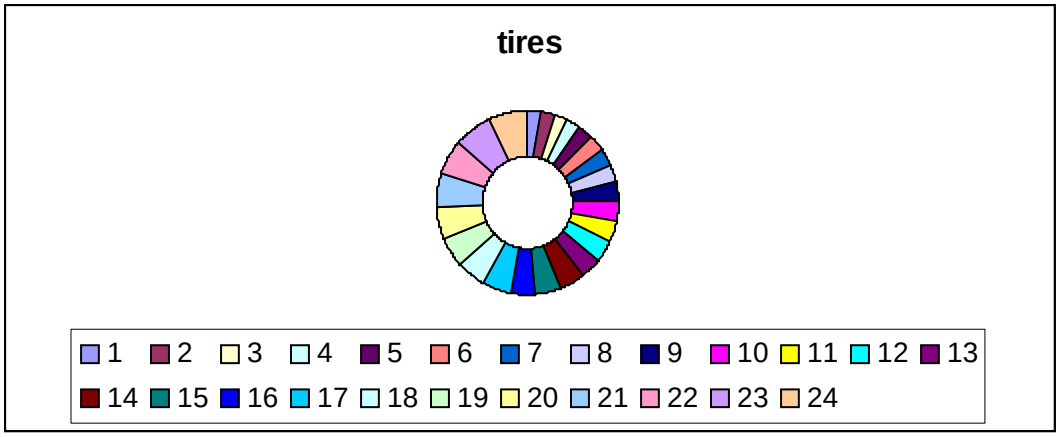
Each 20 pound car tire is the equivalent to approximately 25 pounds of coal. Each tire recycled could save approximately 12 gallons of oil.

Math

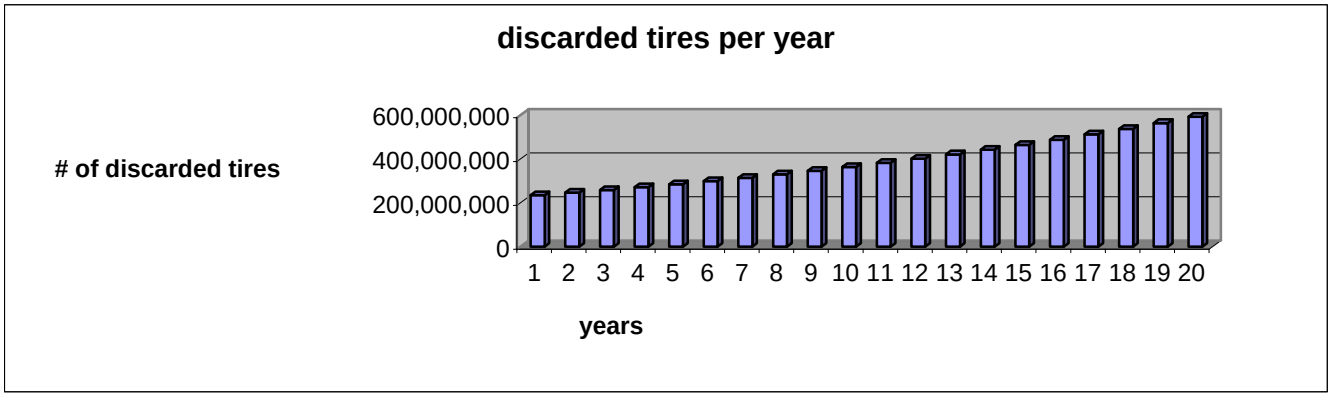
Years	# Of discarded		Increase of 5%	# After 5% increase	# Of discarded tires that year after increase
	1	223,333,333	0.05	11,166,667	234,500,000
	2	234,500,000	0.05	11,725,000	246,225,000
	3	246,225,000	0.05	12,311,250	258,536,250
	4	258,536,250	0.05	12,926,813	271,463,063
	5	271,463,063	0.05	13,573,153	285,036,216
	6	285,036,216	0.05	14,251,811	299,288,027
	7	299,288,027	0.05	14,964,401	314,252,428
	8	314,252,428	0.05	15,712,621	329,965,050
	9	329,965,050	0.05	16,498,252	346,463,302
	10	346,463,302	0.05	17,323,165	363,786,467
	11	363,786,467	0.05	18,189,323	381,975,790
	12	381,975,790	0.05	19,098,790	401,074,580
	13	401,074,580	0.05	20,053,729	421,128,309
	14	421,128,309	0.05	21,056,415	442,184,724
	15	442,184,724	0.05	22,109,236	464,293,961
	16	464,293,961	0.05	23,214,698	487,508,659
	17	487,508,659	0.05	24,375,433	511,884,092
	18	511,884,092	0.05	25,594,205	537,478,296
	19	537,478,296	0.05	26,873,915	564,352,211
	20	564,352,211	0.05	28,217,611	592,569,822
	21	592,569,822	0.05	29,628,491	622,198,313
	22	622,198,313	0.05	31,109,916	653,308,228
	23	653,308,228	0.05	32,665,411	685,973,640
	24	685,973,640	0.05	34,298,682	720,272,322
	25	720,272,322	0.05	36,013,616	756,285,938
	26	756,285,938	0.05	37,814,297	794,100,235
	27	794,100,235	0.05	39,705,012	833,805,246
	28	833,805,246	0.05	41,690,262	875,495,509
	29	875,495,509	0.05	43,774,775	919,270,284
	30	919,270,284	0.05	45,963,514	965,233,798
	31	965,233,798	0.05	48,261,690	1,013,495,488
	32	1,013,495,488	0.05	50,674,774	1,064,170,263
	33	1,064,170,263	0.05	53,208,513	1,117,378,776
	34	1,117,378,776	0.05	55,868,939	1,173,247,715
	35	1,173,247,715	0.05	58,662,386	1,231,910,100
	36	1,231,910,100	0.05	61,595,505	1,293,505,605
	37	1,293,505,605	0.05	64,675,280	1,358,180,886
	38	1,358,180,886	0.05	67,909,044	1,426,089,930
	39	1,426,089,930	0.05	71,304,496	1,497,394,426
	40	1,497,394,426	0.05	74,869,721	1,572,264,148
	41	1,572,264,148	0.05	78,613,207	1,650,877,355
	42	1,650,877,355	0.05	82,543,868	1,733,421,223
	43	1,733,421,223	0.05	86,671,061	1,820,092,284
	44	1,820,092,284	0.05	91,004,614	1,911,096,898
	45	1,911,096,898	0.05	95,554,845	2,006,651,743
	46	2,006,651,743	0.05	100,332,587	2,106,984,330

47	2,106,984,330	0.05	105,349,217	2,212,333,547
48	2,212,333,547	0.05	110,616,677	2,322,950,224
49	2,322,950,224	0.05	116,147,511	2,439,097,735
50	2,439,097,735	0.05	121,954,887	2,561,052,622
51	2,561,052,622	0.05	128,052,631	2,689,105,253
52	2,689,105,253	0.05	134,455,263	2,823,560,516
53	2,823,560,516	0.05	141,178,026	2,964,738,542
54	2,964,738,542	0.05	148,236,927	3,112,975,469
55	3,112,975,469	0.05	155,648,773	3,268,624,242
56	3,268,624,242	0.05	163,431,212	3,432,055,454
57	3,432,055,454	0.05	171,602,773	3,603,658,227
58	3,603,658,227	0.05	180,182,911	3,783,841,138
59	3,783,841,138	0.05	189,192,057	3,973,033,195
60	3,973,033,195	0.05	198,651,660	4,171,684,855
61	4,171,684,855	0.05	208,584,243	4,380,269,098
62	4,380,269,098	0.05	219,013,455	4,599,282,553
63	4,599,282,553	0.05	229,964,128	4,829,246,680
64	4,829,246,680	0.05	241,462,334	5,070,709,014
65	5,070,709,014	0.05	253,535,451	5,324,244,465
66	5,324,244,465	0.05	266,212,223	5,590,456,688
67	5,590,456,688	0.05	279,522,834	5,869,979,523
68	5,869,979,523	0.05	293,498,976	6,163,478,499
69	6,163,478,499	0.05	308,173,925	6,471,652,424
70	6,471,652,424	0.05	323,582,621	6,795,235,045
71	6,795,235,045	0.05	339,761,752	7,134,996,797
72	7,134,996,797	0.05	356,749,840	7,491,746,637
73	7,491,746,637	0.05	374,587,332	7,866,333,969
74	7,866,333,969	0.05	393,316,698	8,259,650,668
75	8,259,650,668	0.05	412,982,533	8,672,633,201
76	8,672,633,201	0.05	433,631,660	9,106,264,861
77	9,106,264,861	0.05	455,313,243	9,561,578,104
78	9,561,578,104	0.05	478,078,905	10,039,657,009
79	10,039,657,009	0.05	501,982,850	10,541,639,860
80	10,541,639,860	0.05	527,081,993	11,068,721,853
81	11,068,721,853	0.05	553,436,093	11,622,157,945
82	11,622,157,945	0.05	581,107,897	12,203,265,843
83	12,203,265,843	0.05	610,163,292	12,813,429,135
84	12,813,429,135	0.05	640,671,457	13,454,100,592
85	13,454,100,592	0.05	672,705,030	14,126,805,621
86	14,126,805,621	0.05	706,340,281	14,833,145,902
87	14,833,145,902	0.05	741,657,295	15,574,803,197
88	15,574,803,197	0.05	778,740,160	16,353,543,357
89	16,353,543,357	0.05	817,677,168	17,171,220,525
90	17,171,220,525	0.05	858,561,026	18,029,781,551
91	18,029,781,551	0.05	901,489,078	18,931,270,629
92	18,931,270,629	0.05	946,563,531	19,877,834,160
93	19,877,834,160	0.05	993,891,708	20,871,725,868
94	20,871,725,868	0.05	1,043,586,293	21,915,312,162
95	21,915,312,162	0.05	1,095,765,608	23,011,077,770
96	23,011,077,770	0.05	1,150,553,888	24,161,631,658

97	24,161,631,658	0.05	1,208,081,583	25,369,713,241
98	25,369,713,241	0.05	1,268,485,662	26,638,198,903
99	26,638,198,903	0.05	1,331,909,945	27,970,108,849
100	27,970,108,849	0.05	1,398,505,442	29,368,614,291



Each year is compared to the previous showing the number of tires discarded



We got these figures from taking the 52 percent of tires that are not being discarded at this point in time then adding five percent each year to allow for growth as more people buy cars and use up more tires. We then projected how many tires would be used up each year a hundred years from now. We then graphed the information to only twenty years from now so you could see the approximate increase in tire waste each year.

Our findings indicate that in as little as twenty years we will have a major environmental problem unless further actions are taken to boost the recycling efforts.

Conclusion

In conclusion, we started out trying to prove that recycling tires would be economically feasible. When we started our research we were unaware that there were any recycling efforts being done. There were many directions our project could have taken. We found that our project could have easily shown a predator prey model as to the different animals and pests that are attracted by stockpiles of tires. We also discovered that we could compare the land that is being used to stockpile the discarded tires will significantly increase. This increase in land use will eventually disrupt the farming industry, as land will not be available for farming or building homes. We also calculated that in approximately 19 ½ years, there will be enough tires abandoned and unused in the Unites States alone to stack from the Earth to the moon.

Our biggest discovery was that recycling of tires is not economically feasible. While this is what we had intended to prove. We found out that if it were, it would be done in greater extent already. The cost of building recycling plants is extremely expensive and any resulting profit does not exist because the cost to recycle is one hundred times more than the value of any consequential product.

With the amount of energy and fuel that is saved by recycling tires, we are still concerned that not enough effort is being made in this area. We believe that our country should be at the forefront of any/all efforts to save natural resources. Doing so would save millions of dollars each year, because the United States has very few resources, they are not renewable, and we have to import them. This makes us dependent on foreign countries for our fuel supply.

We are glad to report that we were able to prove that in as little as 20 years, the recycling of tires will have to be a global effort. More and more people are becoming aware of the need to recycle, and to recycle tires. We are all concerned with the environment and saving our fuel resources. It is interesting to note that at the current rate of tires being discarded in the United States alone, we will have enough tires to stack from the Earth to the Moon in 19.5 years.

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