

LEAD INDUSTRIES ASSOCIATION, INC.

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LEAD ANTIKNOCK CONSUMPTION IN THE FREE WORLD*

I am honored to be invited to talk to you this morning on the subject of lead antiknocks and I hope that I shall be able to give you an idea how we see the future for this industry. I should like to review for you the domestic picture and also in a more general manner, the foreign situation.

First let me review the historical background. Table 1 shows the total lead antiknock demand on U.S. producers in terms of metallic lead, which I believe is your preferred nomenclature.

TABLE 1

Metallic Lead in Millions of Pounds

1953	313	1958	300
4	306	9	312
5	329	1960	316
6	349	1	314
7	334	2	334

You will note that after reaching a low point in 1958, caused principally by the installation of high octane producing refinery equipment, and a slow-down in octane number growth, the trend has been modestly upward until 1962. In the year 1962 the total pounds of lead antiknocks increased 6.3% from 1961. This was due largely to an increase of 3% in the gasoline demand on U.S. refiners and to an increase of about 4% in lead antiknock dosage in motor gasoline. This represents the first annual gain in dosage since 1956. Although octane numbers failed to show much upward trend in 1962, the healthy gain in gasoline volume plus the relatively lower proportion of high octane gasoline components blended into gasoline, are believed to be responsible for the gain in dosage.

Table 2 shows our thinking on the demands on domestic producers for lead antiknocks for the next ten years.

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Look Ahead with Lead

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TABLE 2

Forecast of Metallic Lead in Millions of Pounds

1963	339	1968	352
1964	347	1969	359
1965	347	1970	367
1966	346	1971	376
1967	347	1972	384

The immediate future is not very encouraging since it is not until 1968 that the trend is definitely up again. I should like to dwell for a few minutes on the factors behind this forecast since these figures are important to us in preparing for the future and to you also, because of the effect on lead purchases by the antiknock industry.

Gasoline demand is perhaps the most important item in this forecast and over the ten year period we are estimating that growth will be at the average rate of 2.3% per year. Motor gasoline, the most significant segment, is in at 2.3%, but the continued decrease in demand for aviation gasoline reduces the overall to 2.3%. In developing these figures we have made the following assumptions.

1. No major war.
2. A continuing upward growth in the general economy.
3. No wide spread application of such developments as gas turbines, fuel cells or any other technological accomplishments which would alter significantly the current fuel pattern.
4. Small cars will continue to exert a restraining influence on gasoline consumption because of their greater economy. Somewhere in range of 30-35% of each year's car sales are expected to be in the form of small or compact cars. This figure is reduced from the thinking of two years ago which was closer to 40%.
5. Diesel vehicles will continue to grow in number at a faster rate than gasoline vehicles, but overall, the total effect is small.
6. Jet aircraft will increase in number which will cause the aviation gasoline trend to continue downward.

Another important variable influencing antiknock volume is dosage. After reaching a peak of 2.28 cc/gallon in 1956, dosage started a downward trend which terminated in 1961 with an average of 1.88 cc/gallon. We are assuming the gain to 1.96 cc in 1962 is significant and, because we believe that octane numbers will rise about 0.3 to 0.4 numbers per year through the next five or six years, we are forecasting that average lead dosage will increase to at least 2.10 cc/gallon during the forecast period.

Two other factors which will restrict the continued growth of the lead antiknock business during the next five years are the increasing use of lead alkyls other than tetraethyl lead, and a reduction in exports. As you know, in the Spring of 1960 tetramethyl lead was introduced commercially, and later the mixed lead alkyls, both in the reacted form and physical mixtures, were also offered as alternatives to TEL. The reasons for these antiknock modifications have been fully discussed at meetings and in the literature, so I shall not cover this phase of the

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subject. Of interest in the present discussion is their effect on the total volume of lead used. Because of the higher use efficiency per unit of metallic lead the total lead used is reduced as the volume of TEL and mixed alkyls is increased. The net effect has been and will continue to be a reduction in total lead used over the amount which might have been used as TEL, until the use ratio of the various compounds becomes stabilized. Illustrative of this effect is a reduction of 1.3% in the total metallic lead used in 1962 due to the use of approximately 10% in forms other than TEL. Built into our forecast is the recognition that the use of mixed alkyls will continue to grow over the next few years, but the extent of this growth is quite speculative since the balance of the various alkyls is quite sensitive to the relative pricing of these products.

The second restricting factor on the demand on domestic producers is the reduction in exports due to the construction of lead antiknock plants abroad and the aggressive pricing tactics of foreign competitors. I shall comment on these foreign plants later.

Before leaving the domestic scene, I should mention air pollution from automobile exhaust which is one of the new problems facing the industry. Increasing attention at both the Federal and State levels is being given to exhaust as a source of air pollution. Particulate lead compounds are under scrutiny for two reasons. The possible effect on catalysts in mufflers presently under development to reduce unburned hydrocarbons; and the allegation that air borne lead may be detrimental to public health. Although it is believed unlikely that limiting air standards will be enacted by states such as California, the possibility remains that such actions could have an adverse effect on the lead market. More information is needed in this field, and it is for this reason that cooperative research work on the nature of particulate matter in the atmosphere and in exhaust gas is currently underway. This work is being supported by your Association in the work at the Kettering Laboratory in Cincinnati and in California. We, in the antiknock industry, are very appreciative of this support you are giving us, not only for the funds you are contributing, but also for increasing the breadth and stature of the endeavour.

While the domestic petroleum and lead antiknock outlook is for modest growth over the next ten years, the foreign market shows more vigor. The rate of growth varies from area to area but in all countries for which we have statistics, the rate of growth has been above ours. Table 3 details our gasoline forecast for the next five and ten years for various areas of the free world.

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Gasoline Consumption

	Average Rate of Change		
	1957-1962	1962-1967	1967-1972
Canada	+ 4.3%	+ 4.0%	+ 3.6%
Mexico	+ 5.5	+ 5.8	+ 5.9
Central America & Caribbean	+ 4.9	+ 5.2	+ 5.0
South America	+ 6.7	+ 6.5	+ 6.5
Western Europe	+ 10.1	+ 8.0	+ 6.5
United Kingdom	+ 5.9	+ 4.6	+ 3.7
Middle East	+ 8.4	+ 7.2	+ 7.0
Africa	+ 2.2	+ 5.0	+ 5.0
South Asia, Far East			
Oceania, Australia	+ 8.7	+ 7.6	+ 6.9
Total	+ 7.3	+ 6.6	+ 5.9
U. S.	+ 2.6	+ 2.3	+ 2.4
Grand Total	+ 4.0	+ 3.8	+ 3.8

Gasoline volume increases will be at a reduced rate over the next ten years but it is still an optimistic picture. Antiknock dosage which averaged 1.55 cc/gallon in 1962 in the free world, exclusive of U.S., Mexico and Canada, is expected to increase to about 1.7 cc or about 10% by 1972.

Using gasoline growth and dosage change we can calculate the demand for lead antiknocks, which after all is the item of greatest interest to you and ourselves. While we have already covered the demand on U.S. producers, we are including the demand of the U.S. per se in the free world figures so that they may be compared directly. This information is shown in Table 4.

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TABLE 4

	Lead Alkyl Demand Motor and Aviation Millions of Pounds of Pb				Annual Average Rate of Change %		
	1957	1962	1967	1972	1957-'62	1962-'67	1967-'72
North America							
U. S.	317	297	330	370	- 1.3	+ 2.1	+ 2.3
Canada	18	21	25	30	+ 3.3	+ 3.4	+ 3.8
Mexico	4	8	12	15	+ 14.2	+ 8.4	+ 5.9
Total	339	326	367	415	- 0.8	+ 2.4	+ 2.5
Cent. Amer. & Carib.	2	3	3	4	+ 8.4	0	+ 5.9
South America	10	18	26	37	+ 12.5	+ 7.6	+ 7.3
Western Europe	23	38	59	82	+ 10.6	+ 9.2	+ 6.8
U. K.	10	13	17	21	+ 5.4	+ 5.5	+ 4.3
Middle East	3	4	6	9	+ 5.9	+ 8.4	+ 8.4
Africa	6	7	8	10	+ 3.1	+ 2.7	+ 4.6
South Asia, Far East & Oceania							
Australia	4	6	8	11	+ 8.4	+ 5.9	+ 6.6
Japan	5	9	16	26	+ 12.5	+ 12.2	+ 10.2
Other	5	8	10	12	+ 9.9	+ 4.6	+ 3.7
Total	14	23	34	49	+ 10.4	+ 8.1	+ 7.6
Total	407	432	520	627	+ 1.2	+ 3.8	+ 3.8
Total (Excl. U.S.)	90	135	190	257	+ 8.4	+ 7.1	+ 6.2
Total (Excl. N.A.)	68	106	153	212	+ 9.3	+ 7.6	+ 6.7

Table 4 gives metallic lead figures which we computed on the basis of TEL. Undoubtedly TEL, and more particularly the mixed alkyls, will increase even more rapidly abroad than in the U.S. because of the highly aromatic nature of their gasolines. A recent export price reduction in TEL and mixed alkyls will add impetus to this shift, but it is still too early to evaluate the full significance of this change.

The increase in foreign demand as well as the trend abroad to build up national industries has led to increased manufacturing facilities and plans for new plants. In Europe, plant additions have been built in England, France and Italy. A new plant in Italy brings the number of manufacturers in that country to four for a total capacity of 35 million pounds of metallic lead. This added to the other European production capacity totals about 125 million pounds. A new plant is currently

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under construction in Mexico which should be completed next year. Plans are under way to build a plant in Japan and there is talk of a plant in Brasil. Since a large portion of this volume is currently supplied from the U.S., this volume will be lost to us and is reflected in the levelling off in the U.S. demand curve.

In summary, I should like to point out that the projections which I have just outlined for you indicate that while the lead antiknock business does not appear to have a spectacular future growth, it is in a good sound position both in this country and abroad and we can look forward to continued conservative expansion.