

Ozren Ocic

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Energy Efficient, Cost Effective, Environmentally Benign



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Preface

The increasing competition among the oil refineries of the world, which results in fewer and larger installations, calls for a clear understanding of the economics and the technological fundamentals and characteristics.

According to its basic function in the national energy system, the oil-processing industry actively participates in attaining the objectives of energy and economy policy at all levels of a society. In many national economies today, oil derivatives participate in more than one third of the final energy consumption, the same as crude oil in available primary energy. This proves that oil and its derivatives are still among the main pillars of national industry, and the oil-processing industry one of the main branches in energetics, despite all the efforts to limit the application of liquid fuels for thermal purposes, considering the need to limit the import of crude oil.

In addition to being one of the main energy generators, and a significant bearer of energy in final use, oil-processing industry is at the same time a great energy consumer. The importance of the oil-processing industry as one of the main pillars of national energetics, obligates it to process oil in a conscientious, economical way. The mere fact that oil refineries mostly use their own (energy-generating) products does not free them from the obligation to consume these energy carriers rationally. Rational consumption of oil derivatives should start at the very source, in the process of derivative production, and it should be manifested in a reduction of internal energy consumption in the refineries. The quantity of energy saved by the very producer of energy will ensure the reduction in the consumption of primary energy in the amount that corresponds to the quantity of the produced secondary energy.

From the aspect of a rational behaviour towards the limited energy resources, the oil-processing industry should be treated as a process industry that uses considerable quantities of energy for the production. The mere fact that these products are oil derivatives, i.e. energy carriers, does not affect the criteria for rational behaviour. In that sense, oil processing industry is treated in the same way as the other process industries from non-energy branch.

The book gives a detailed practical approach to improve the energy efficiency in petroleum processing and deals with the role of management and refinery operators in achieving the best technological parameters, the most rational utilization of energy, as well as the greatest possible economic success.

I would like to express my gratitude to Prof. Dr. Siegfried Gehrecke and Dr. Bozana Perisic, both long-time colleagues, who greatly contributed with their professional knowledge to the quality of this book. I would also like to thank Dr. Hubert Pelc of Wiley-VCH and all other staff involved, who made this book available to oil industry experts from all over the world, as well as to those having similar aspirations.

Pancevo, September 2004

Ozren Ocic

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Introduction

In the early 1970s, it was clear that the world economy was facing recession and that the four-fold increase in crude-oil prices by OPEC, a monetary crisis, and inflation were the main reasons for such a trend. The four-fold increase in crude-oil prices in 1974, which was intensified in 1979, is why 1974 and 1979 are called the years of “the first” and “the second crude-oil shock”, respectively. Increases in crude-oil prices had an effect on all importing countries, more precisely on their economic development. This effect depended on the quantity of oil that was being imported and on the possibility of substituting liquid fuel with solid fuel or some alternative forms of energy. The fact remains that oil-importing dependence in developed countries varied, ranging from some 20% in the USA, for example, up to 100% in Japan, and this was how the increase in crude-oil prices that affected developed countries was interpreted differently, starting from “crude-oil illusions” to “sombre prospects”, depending on who was giving the interpretation.

However, in underdeveloped countries, the effects of the rise in crude-oil prices were unambiguous, especially in the countries that lacked both oil and money, and were forced to solve their energy problems by way of import.

When commenting on economic trends and making forecasts, it became customary after each increase in crude-oil and oil-product prices, to predict to what percentage this increase would affect monthly, and therefore annual, inflation. Considering that crude oil has priority in the energy–fuel structure and that oil-product prices in the course of the 1970s and 1980s increased up to twenty times in comparison with the base year – 1972, it became clear that energy was the main cause of inflation.

The fact that economic policy subjects in all those years, had not taken measures to decrease the share of imported energy in the domestic energy consumption, supports the assumption that they attributed much greater importance to demand inflation than to cost inflation.

The compound word “stagflation”, representing the combination of two words “stagnation + inflation”, was related to demand inflation that, being accompanied by the stagnation in economic development, presented the most difficult form of economic crisis and in accordance with that the suggested measures were directed towards decreasing the demand inflation, i.e. decreasing citizen spending capacity. The arguments against this interpretation are economic theory, on the one hand, and in practical terms on the other. Namely, economic theory does not accept the

possibility of a simultaneous appearance of demand inflation and economic-growth stagnation.

“After World War II, economies were often stagnating, meaning that there was no surplus in global demand, but the prices continued to increase. Economists call these situations – stagflation (stagnation + inflation). In situations like these, interpretation of inflation is complicated. It can no longer be explained by overdemand, but by cost inflation, or by both together” [1].

In the sphere of cost inflation, the following are stated: spiral of wages and prices, uneconomic consumption, import costs and sector inflation, and in the sphere of structural inflation: import substitution, inequality regarding the sector economic position and foreign trade exchange.

Bearing in mind the crude-oil price trends in the world market, the dependence of some countries on crude-oil imports and the importance of energetics as a branch with tremendous external effects, it could be concluded that cost inflation is caused by imports and that its mechanism is simple. By incorporating the ever more expensive imported feedstock into product prices, without meaningful attempts to compensate, at least partially, this cost by internal economy measures, selling prices started to increase. Considering that energetics directly or indirectly contributes to the prices of all other goods, inflation started to develop. On the other hand, it was proven in practice that economic-policy measures directed towards decreasing the demand inflation by decreasing citizen spending capacity have not resulted in an inflation rate decrease, which leads to the conclusion that it is some other type of inflation, not demand inflation.

If this “diagnosis” were accepted, i.e. if it were accepted that it was mostly cost, psychological and structural inflation rather than demand inflation, it would mean that adequate “therapy” would have to be accepted as well, that is suitable economic-policy measures affecting inflation in the mentioned order.

It has been shown in practice that product prices incorporate all the faults and drawbacks of the internal economy without any significant attempts to find ways to stop the increase and even cut the prices, by way of a better utilisation of production capacities, greater productivity, better organisation, etc. Each increase in prices was explained by the increase in costs, the tendency to eliminate business losses or by the fear from operating with loss. In the conditions of free price forming, this last argument can mostly explain the so-called psychological inflation typical of the last couple of years. All the activities by business subjects were directed towards forecasting and determining business costs without analysing the cause or finding the possibility to reduce them by adequate internal economy measures.

This is supported by the fact that in one of the basic economy branches that causes inflation in all other branches – the oil industry – there are no cost prices either for semi-products or for products, but only cost calculations per type of costs. Justification for such a practice can be found in the fact that the feedstock, i.e. crude oil (mostly imported) has the greatest share in the cost-price structure, and this is something that the oil industry has no effect on. However, when this problem is more thoroughly analysed, it can be seen that other costs are not irrelevant either, that great savings are possible, but also that the crude-oil share in the cost-price structure shows a ten-

dency to decrease. For years, efforts were made to prove that it was impossible to determine cost prices because it was coupled products that were in question and that it was not possible to distribute the costs per cost bearer.

It is becoming even clearer that a methodology must be established to determine the cost prices and refinery products, so that by way of actual planning calculations, i.e. by way of calculations per unique prices (which would eliminate the inflation influence), refinery business operations could be monitored, by comparing the calculations between the refineries across the world. In order to make this possible, it is necessary to select a common methodology that would be improved through practice.

From the aspect of rational power utilization, it must be pointed out that, when evaluating the total rationality of power utilization in industry, the adopted objectives of energy and economic policy must present a starting point, as well as the question whether and to what extent the existing way of utilizing the power contributes to attaining these objectives.

In addition to giving priority to domestic instead of imported energy carriers, one of the objectives of national energy and economy policy is economic, conscientious, and rational behaviour towards the limited energy resources. This objective is attained by way of numerous technical, organizational and other measures for rational energy consumption. The effects of energy-consumption rationalization are mostly measured by:

- indicators of specific energy consumption per product unit, or
- indicators of specific energy costs per product unit.

Both indicators have their function and complement each other, which indicates that economical behaviour has its technical and economic effects, which may, but do not have to, coincide.

According to its basic function in the national energy system, the oil-processing industry actively contributes to attaining the objectives of energy and economy policy at all levels of a society. In many national economies today, oil derivatives participate in more than one third of the final energy consumption, the same as crude oil in available primary energy. This proves that oil and its derivatives are still among the main pillars of national industry, and the oil-processing industry is one of the main branches in energetics, despite all the efforts to limit the application of liquid fuels for thermal purposes, considering the need to limit the import of crude oil.

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Analysis of the oil-processing industry as a processing industry that uses considerable quantities of energy for the production starts, as in all the other industries, energy consumers, with an analysis of the energy system.

This book deals with the possibility of a rational production and consumption of energy, thus with a more economical running of business in the oil-processing industry.