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VISION OF THE REFINERIES' DEVELOPMENT UP TO 2050

WIZJA ROZWOJU RAFINERII DO 2050 R.

***Summary**: The history of petroleum industry, including refining sector and the perspectives for its development until 2050 has been presented. The prognoses for consumption of petroleum as primary energy carrier and of transport fuel as well as dominating role of petrol products in the world economy have been illustrated. The attention was paid to the legal regulations, including those ones limiting emission and having an effect on the discussed industrial sector and the participation of a new generation of fuels in the total balance of fuels and consumption of new raw materials in their production. The report 'Fuels Europe' which is simultaneously a vision of the way of evolution of refinery branch and liquid fuels up to 2050 has been described.*

***Keywords**: petroleum industry, refinery, crude oil, transport fuel, law, biofuels, liquid fuels*

***Streszczenie**: Przedstawiono historię przemysłu naftowego, w tym rafineryjnego, oraz prognozę jego rozwoju do 2050 r. Zobrazowano prognozy dla zużycia ropy naftowej, jako nośnika energii pierwotnej oraz paliwa transportowego a także dominującą rolę produktów naftowych w światowej gospodarce. Zwrócono uwagę na regulacje prawne, w tym ograniczające emisję i mające wpływ na ten sektor przemysłu oraz udział nowej generacji biopaliw w ogólnym bilansie paliw i użycie nowych surowców do ich produkcji. Opisano raport Fuels Europe, który jest jednocześnie wizją ścieżki ewolucji branży rafineryjnej i paliw płynnych do 2050 r.*

***Słowa kluczowe**: przemysł naftowy, rafineria, ropa naftowa, paliwo transportowe, prawo, biopaliwa, paliwa płynne*

Introduction

Not all people understand the meaning of refinery industry and think that petroleum serves only for production of fuels, especially of those ones employed in transport 1-16). Our all surrounding, i.e. inter alia, plastics, composites, glass, medicines, furniture, construction and isolation materials and cloth materials, is directly or indirectly (also, more and more frequently, natural gas) produced from petroleum. In connection with this fact, replacement of the discussed raw material in the future will be difficult. According to different literature sources [6, 7, 11,14, 17-31], in 1837, the first commercial petrol plant, distilling petrol to paraffin was established. In 1847, the Scottish chemist, James Young noticed a natural leakage of petrol in coal mine Riddings Colliery in Alfreton, from which light, "thin" oil was distilled; it was suitable for greasing the machines. It should be stressed here that petrol owes its success to our countrymen and namely, Ignacy Łukasiewicz who was the first who carried out the process of its distillation and obtained paraffin oil. This last product was used, *inter alia*, in lighting. The first kerosene lamp was lighted up in March 1853 in pharmacy of Mikolasch in Lvov and later, in the Lvov hospital where on 31 August 1983, the first surgical operation was carried out at its light [6, 7, 11, 14, 17-31].

The first refinery, manufacturing petroleum products on the industrial scale was found in Cleveland, in the Unites States of America. It was launched in 1861. One of the first modern refineries, being simultaneously the largest one in the world, was constructed in the nineties of the 20th century and was situated near Michigan Lake in Whiting. Rockefeller's Standard Oil was its owner and the raw material originated from the oil fields of Lima. In 1891, refineries of Standard Oil produced 175 products from petroleum.

The increase of interest in petrol products required building of new refineries. The most of them was constructed in the Western Europe what resulted from the strongly sulphated oil from the Near East. In 1964, there were ca. 700 refineries. In the successive years, less refining plants were constructed but the already functioning ones were modernised and their processing capacities were increased. The greatest refineries belong to private giants such as ExxonMobil, Royal Dutch-Shell, British Petroleum, Conoco Philips, Total, Chevron Texaco, and the state enterprises such as Sinopec, Petro China, Petrobas, Pemex, NIOC and Lukoil, operating in the leading producer countries [6, 7, 11, 12, 17-31].

It is estimated that at the beginning of the 21st century, ca. 750 refineries with different processing capacities worked all over the world, from million tonnes/year to as much as 44 million tonnes/year, including *inter alia*, Baytown (Texas), Falcon (Venezuela), Omsk

Tab. 1. Goals of the world agreement on climate

No.	Goals
1	Long-term goal: maintaining the increase in the global temperature to well below 2°C, i.e. above the pre-industrial level
2	Striving to limit the global temperature increase to 1.5°C; this would significantly reduce the risks and impacts of climate change
3	The necessity to obtain globally as soon as possible the returnable point of maximum emission level, assuming that this will take longer for developing countries
4	Undertaking the rapid reduction in emissions in accordance with the best available scientific information

(Russia) and Ulsan (the South Korea). Due to the time period in which they were commissioned, their age as well as technological level is differentiated. Many of the discussed objects implement the so-called "shallow oil processing". They utilize the technological scheme, in which there is a basic system of installations, allowing production of fuels, i.e. DRW installation (in Polish: pipeline – column distillation) + reforming of gasoline + hydro-refining of distillates + bloc of sulphur plus recovery and, optionally, isomerisation *of n*-alkanes C_5 – C_6, contained in a light gasoline from DRW installation and, also, alkylation of isobutene with propylene or n-butylenes [6, 7, 32-34].

Nowadays, oil refineries are complex industrial objects, consisting of many production units, implementing many technological mutually linked processes, owing to which highly valuable petroleum products are produced.

At refineries, there are usually situated polymers-producing plants including polyethylene, polypropylene and polystyrene. By-products of refineries include also organic dissolvents such as petroleum ether, toluene and acetone.

Adaptation to climate changes – legal regulations

In December 2015, during the conference of the United Nations in matter of climate changes (United Nations Framework Convention on Climate Change), COP21 (21st Conference of the Parties), 195 countries adopted the first-in-the-history universal, legally bounding agreement in the field of climate. The problems, to which the agreement related, are presented in Tab. 1. In the agreement, the global action plan was defined; the mentioned plan is expected to save the world from the threat of far-advanced climate change owing to limitation of global warming to value being found considerably below 2°C.

The refineries affect undoubtedly the natural environment. The influence on the particular components of the environment may be different and is dependent on many factors. The participation of emission from refinery in contamination emissions coming from industrial activity and from power sector is presented in Tab.2. It should be stressed that the absolute values of emission of contaminations from oil refineries in the years 2007-2009 were decreased from few to several percent and in the case of SOx and

Tab. 2. Participation of contaminants 'emissions from oil refinery to the air in UE-27 (2007–2009)[35]

The main air contaminants	Total emission coming from industry thousand tons	Emission from energy generation thousand tons	Emission from refinery 2007, thousand tons	Participa-tion of refinery emissions in the industry %	Participation of refinery emissions in energy generation, %	Emission from refinery,2009, thousand tons
Greenhouse gases (GHG) (equivalent of CO_2)	4 638 000	2 201 000	158 880	3,4	7,2	146 745
Carbon oxide (II) (CO)	27921	4 634	58	0,2	1,3	55
Dust(PM_{10})	1 952	312	8	0,4	2,6	7
Dust ($PM_{2,5}$)	1 266	224	11	0,9	4,9	-
Nitrogen oxides (NOx)	10 939	3 991	193	1,8	4,8	162
Sulphur oxides (SOx)	7 442	6 024	574	7,7	9,5	426
Non-metallic volatile organic compounds (NMVOC)	8 951	265	180	2,0	67,9	138

non-methane volatile organic compounds (NMVOC) were the highest ones and were equal to 29.6% and 26.4%, respectively.

The European Union wants to be a leader in problems of environmental protection and therefore, it undertakes discussion concerning the climate changes more and more frequently. It will be difficult to reconcile the development and reduction of GHG (greenhouse gases) emission, and especially, of CO_2, what is illustrated in Fig.1. Hence, in the strategies, we meet variants of the so-called sustainable development, considering the environmental problems.

At this moment, in the opinion of the authors of the present article, we have to make a critical remark to the suggestion of decreasing CO_2 emission in the industry, including refinery sector as we know that the discussed emissions constitute below 5% of global industrial emissions. We should also remember that each extracted tonne of any fossil fuel (coal, crude oil or gas) in its final LC (life cycle) will be transformed into CO_2, sulphur oxides, nitrogen oxides and dust and the quantity of the discussed substances is dependent on the content of carbon, sulphur, solid particles, nitrogen in a given raw material and on the way of processing. We should also bear in mind that there is a theoretical, thermo-dynamical limit of improving the energy effectiveness behind which the further improvement results in negative consequences in other areas or components of environment.

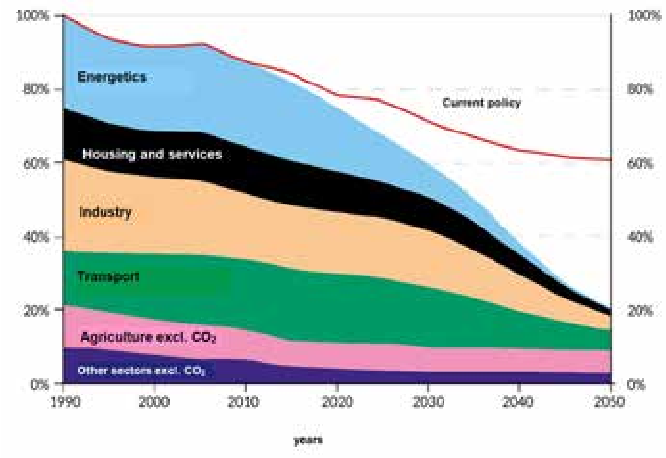
It is a degradation of natural environment that may be a significant reason for deterioration of the life quality. It becomes a barrier to placing capital in such territories and forces a change in economic processes, orienting them to the economy acting in favour of sustainable development. A model of such management assumes the appropriate and aware relations between the economic development and care of the environment and the quality of life. The political conception of sustainable development is an effect of the work of the World Commission on Environment and Development. The mentioned Commission has contributed to convening the Earth Summit in Rio de Janeiro in 1992 during which there were adopted the documents, defining the fundamental principles in social-economic policy, ordering consideration of environmental protection.

The sustainable development of economy and environment protection

Until now, the key long-term goal of the European Union has included the emission of greenhouse gases (GHG) up to 2050 by 80-95% (in relation to 1990). At present, the EU prefers the scenario of 1.5°C and 100% of GHG reduction until 2050.

On 28 November 2018, the European Commission presented its strategic, long-term vision of prosperous, modern, competitive and climate-neutral economy up to 2050. The strategy shows how Europe may outline the way to climatic neutrality when investing in real technological solutions, strengthening of citizens' position and adapting the action in key area, such as industrial policy, finances or research, with the simultaneous assurance of social fairness, serving the just transformation. After the invitation of the European Parliament and of the European Council, vision of the Commission concerning the future climatic neutrality includes almost all area of

Fig. 1. Reduction in CO_2 emission to obtain a low-emission economy up to 2050 (in relation to the emission level of 1990)[36]

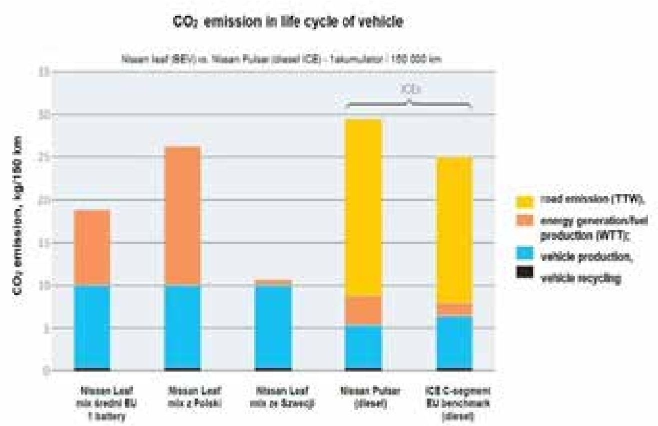


the EU policy and in consistent with the target of Paris Agreement to maintain increase of temperature all over the world considerably below 2°C and continue the efforts aimed at maintaining the temperature to 1.5°C.

Emission of GHG from transport, as it is followed from Tab.3, is increasing. In effect, the electro-mobility seems, for some people, to be the only one way for obtaining the reduction of GHG. Such thinking is a considerable challenge for the European refinery and car industry. The electric vehicles, however, not always and not everywhere decrease really the emission of GHG in transport. In Fig. 2, the emissions of CO_2 in life cycle of vehicles have been illustrated, with the attention paid to the effect of national "energetic mix" employed during the drive of two comparable vehicles of a segment of C class. The present development of technology does not allow transforming each transport mean into electrical one (e.g. aircraft).

In the EU, the emission from the produced transport fuels is responsible for 23.8% of the total emission of greenhouse gases in the Community, including the emission of CO_2 amounting to 27.9%.

Fig. 2. CO_2 emission in life cycle of vehicle[34]



Tab. 3. Emissions of greenhouse gases (GHG), EU-28, in 1990 and 2015[38])

Source of emission	1990, Gg	2015, Gg	Participation in 1990, %	Participation in 2015, %
Combustion of fuels and emissions from evaporation of fuels (excluding transport)	3 554 744	2 454 082	62,2	55,1
Transport (inlcuidng international aircraft)	851 082	1 048 070	14,9	23,6
Industrial processes and utilization of commodities	516 886	373 937	9,0	8,4
Agriculture	548 270	436 784	9,6	9,8
Waste management	240 948	139,313	4,2	3,1
Sum (without LULUCF (Land Use, Land Use Change and Forestry), including aircraft	5 711 969	4 450 151	100	100

Of course, the European Union undertakes many actions, oriented to the limitation of transport emissions, including first of all car transport (e.g. the rule to limit the emission of CO_2 by engines of newly produced vehicles to 120 g per vehicle kilometre up to 2015 and to 95 g in 2020; the recommendation of 10-% participation of energy from renewable sources in the energy consumed by transport in 2020).

Demand on energy and fuels

The world leaders try to construct a new approach to global energetic system but due to such differentiations as abundance of natural resources, geographical location, level of technological advancement, the reaching of universal agreement is not easy. From among few scenarios, including, inter alia, the most probable (available), most reliable (the lowest number of risks) and the sustainable one, the recent scenario seems to enable the possibility of inhibiting the climatic changes. According to elaborated document[39)], the world consumption of primary energy increased by 2.2% in 2017, as compared to 1.2% in 2016 and above the mean for 10 years being equal to 1.7%. As it is followed from different scenarios, the discussed demand will be increasing during the coming years (Fig. 3).

Petroleum is a dominating fuel all over the world and constitutes one third of the total consumed energy. A high increase of demand on oil has affected the increase of its volume and processing which increased in 2017 by 1.6 Mb/d, i.e. more than twice than the mean for 10 years; it caused the increase of utilization of processing capacities of refineries [39, 40)]. According to the developed materials40, the total consumption of energy produced from oil in the European Union was found on the level of 37% in 2017 what together with the energy from gas on the level of 24% remained the main source of energy in the European Union and gave 61% of its consumption. According to the report [38, 41, 42)], ca. 65 % of petroleum, being processed in the refineries in the European Union, is constituted by liquid transport fuels, the next 10% is a component of petrochemical raw materials and 25% are utilized in manufacture of other products.

The combustion of fuels is a source of energy in transport. The fuels are produced from oil. According to the elaboration [43)], the EU transport is based in 97% on oil-derived fuels. When looking look via the prism of the aims of the world policy in respect of sustainable development, we may say – as it results from numerous literature elaborations [11, 39, 40, 42, 44-47)] – that petroleum shall remain the main energetic-industrial raw material for production of liquid fuels, destined for driving of transport means but also for manufacture of other products indispensable for satisfying various needs, including the economic ones of the developing world. The refineries will play important and meaningful role in manufacture of modern fuels (hydrogen fuels in cracking process) and also, together with the modern infrastructure, they will constitute the stores of future-driving energy. The report [48)] points to transport consequences of the anticipated social-economic changes, connected with the demand on transport services what, in turn, is translated into the increase of demand on the fuels of this type.

Fig. 3. World consumption of primary energy, as calculated into equivalent of tons of oil[39)]

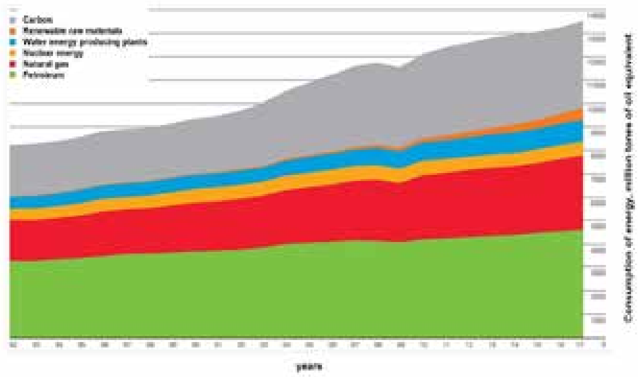
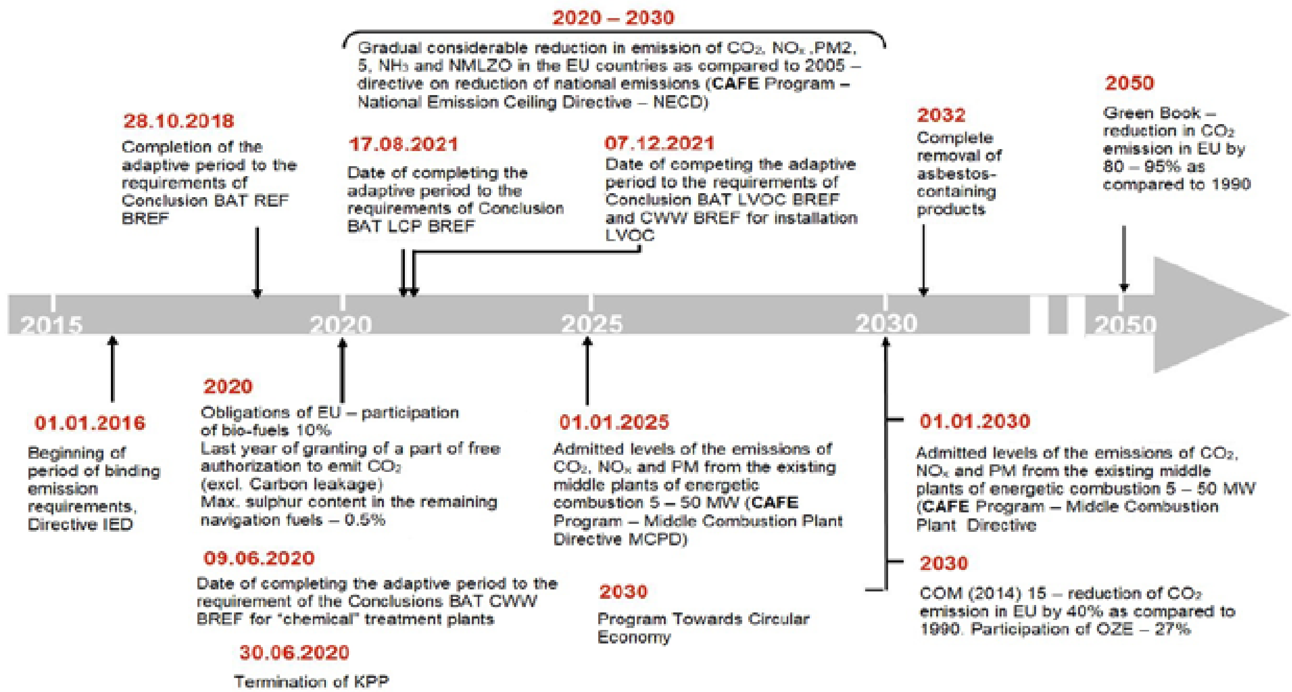


Fig. 4. Environmental legal regulations concerning refinery industry

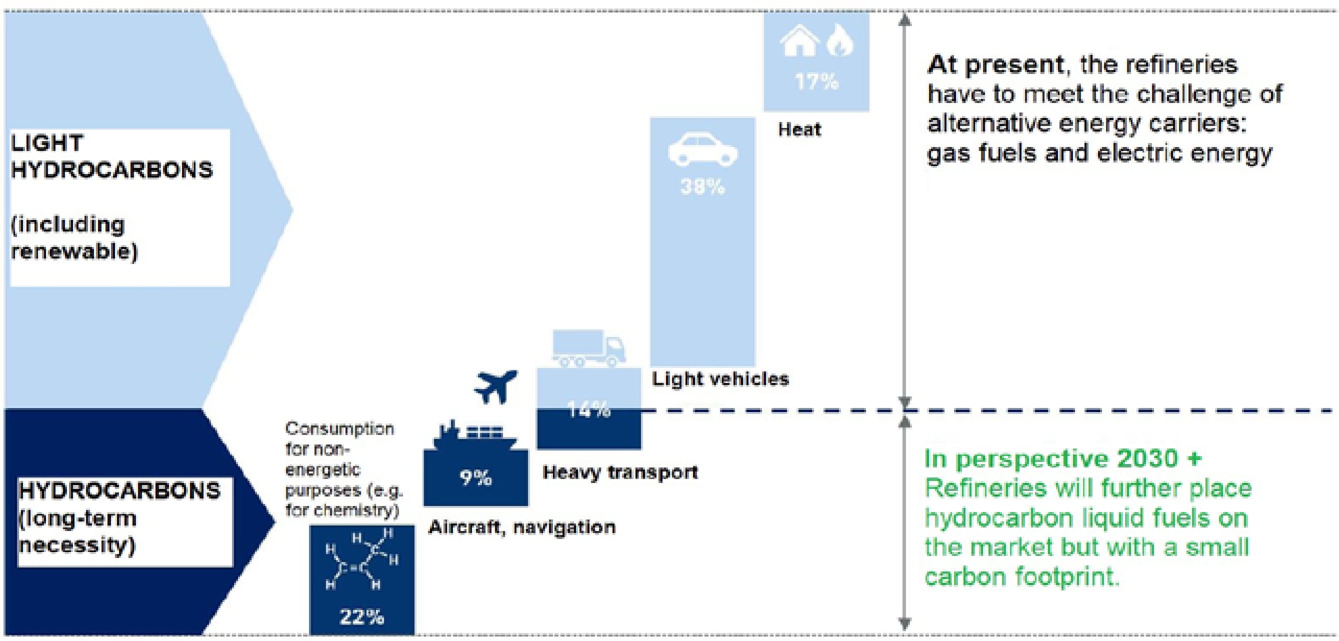


Refinery of the future

In long-time perspective, liquid hydrocarbons as well as the resulting fuels and products will be indispensable. According to the elaboration [35], only crude oil refining plants deliver 42% of the EU demand on energy and 95% of fuels, used by transport. In the European Union, Switzerland and Norway there are found more than 100 refineries which process about 700 million tonnes of crude oil annually in total. Also, 4 natural gas-processing plants are situated on the land. The particular plants are relatively uniformly distributed at the territory of Europe and majority of them are situated near sea coast. It is estimated[35] that the refinery sector in Europe employs directly 55 thousand persons and ca. 35 thousand people indirectly.

The changing legal regulations, especially in respect of environment protection will have a great meaning and influence on refinery industry, bearing the additional cost by it in respect of adaptation and introduction of preceding and developmental measures. Fig. 4 shows certain environmental regulations having a significant effect on the discussed sector. Fig. 5 contains the prognoses of the European Union in respect of petroleum utilization and the limited long-term role of light hydrocarbons, resulting from the policy of sustainable transport.

Fig. 5. Project of the EU concerning utilization of petroleum[42, 49]



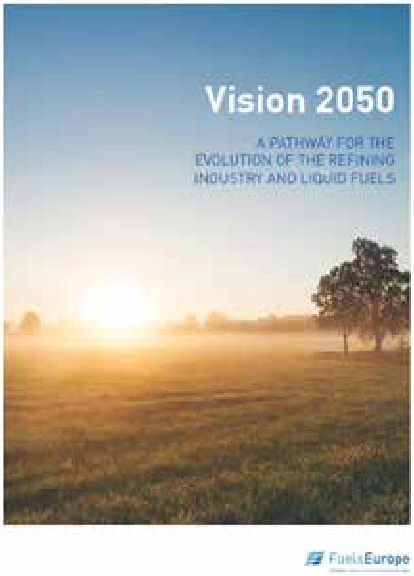
Tab. 4. Pathway of development of refinery industry and of liquid fuels up to 2050[42)]

No.	The main conclusions coming from EPRA report
1	Change of climate requires urgent and decided measures in all sectors
2	Hydrocarbon liquid fuels will remain an important part of the future mobility system even if the participation of alternative energy sources is increased; demand on refinery products will be increasing due to a global economic development and demography; there are limitations for application of electric drive in sea transport, aviation and heavy vehicles: for these types of transport, the key requirement is storage of maximum energy quantities in possibly smaller volume and mass – oil derivate fuels have a meaningful advantage in regard to e.g. batteries
3	Combustion engines will still play the important role for different transport sectors in the coming decades
4	Development and introduction of low-emission hydrocarbon liquid fuels offers a meaningful possibility to satisfy effectively the demand on oil-derivate fuels, and simultaneously, contribute to the solution of the threats, caused by climate change
5	Liquid fuels with a low level of hydrocarbons may decrease CO_2 emission in all segment of transport in a very short time, with the utilization of the existing float of vehicles and the existing infrastructure for production, distribution and storage of fuels (gas fuels, synthetic fuels, fuels with the participation of biodegradable components); the existing network of distribution of fuels for navigation, aircraft and road transport may easily become adapted to the future decrease of the emissions
6	A meaningful potential of decrease in CO_2 emission may come from the betterment of infrastructure and, operational improvements, resulting from construction of vehicles and age of fleet: quicker renovation of fleet, optimization of aerodynamics (especially in the case of heavy transport vehicles and semi-trailers), better energetic effectiveness of tyres, systems of braking energy recovery
7	Decarbonisation of transport may be and should be self-financing; a high competitiveness of the European refinery industry and the related branches (chemical and petrochemical) should be maintained
8	Technological neutrality in the work on decarbonisation of transport should be continued; in each location, different technical-economic methods may be applied

Tab. 5. Comparison of scenarios of development of passenger cars

EU Scenario	EPRA Scenario
Scenario of mass electromobility – refineries supply 10% of fuels	Scenario of low-carbon liquid fuels – refineries supply 70% of fuels
EU scenario is characterized by expensive infrastructure and a high risk	EPRA scenario is characterized by decisively lower costs
Investment on chargers and infra-structure of network up to 630-830 billion EURO up to 2050	Investment on chargers and infra-structure of network up to 326-390 billion EURO
There is a need of 15 Giga of batteries-producing plants (550 TWh)	There is required only 5 or 6 Giga of batteries-manufacturing plants
6-fold increase in the world lithium obtaining - only for coverage of the Europe's needs	The possibility to deliver fuel for the whole already existing fleet of light and heavy vehicles

Fig. 6. Report Vision 2050[42)]



The answer to the social expectations and the international climate policy is contained in plan (Fig. 6), developed by the European Petroleum Refiners Association (EPRA, allowing the maintenance of the work of refining industry, even with the full introduction of the Paris Agreement provisions and preservation of self-financing of refineries (preservation of competitiveness). The pathway for development of refinery industry and liquid fuels until 2050 is given in Tab. 4[42)].

From document Vision 2050 it is followed that the reduction of CO2 in transport will be based upon (i) improvement of effectiveness of fuels' production and their use in vehicles, (ii) change of raw materials, (iii) change of energy sources and (iv) utilization of technologies CCS/CCU (technologies of capture and storage of CO2/utilization of caught CO_2).

During the transformation period, new legal solutions are required, including application of LCA (life cycle analysis) and protection from the unfair non-Europe competition in respect of emission.

In EPRA publication[42)], two scenarios of development of passenger cars development were presented (Tab. 5) (Fig. 7),

Fig. 7. Scenarios of development of passenger cars[50)]

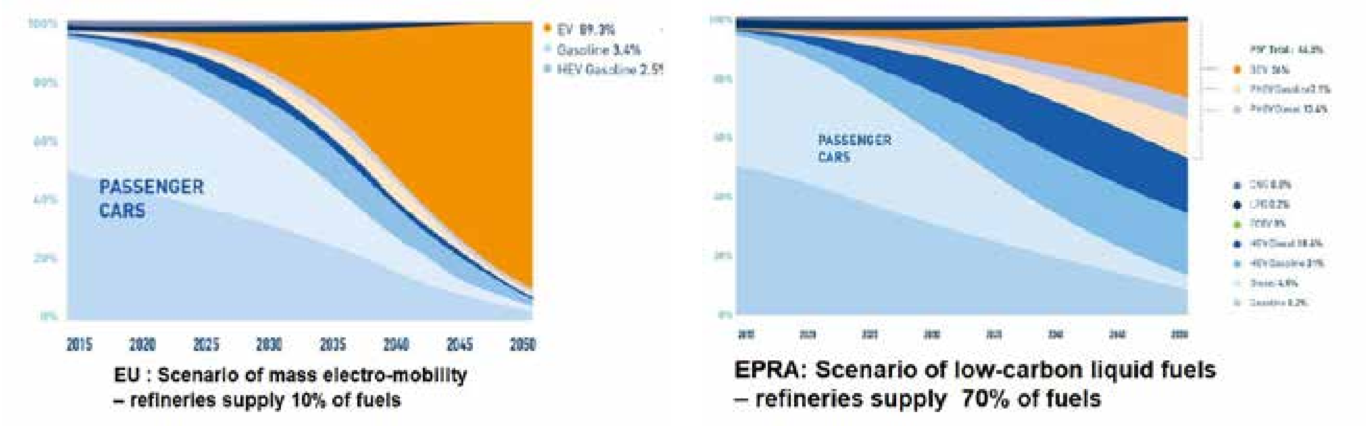
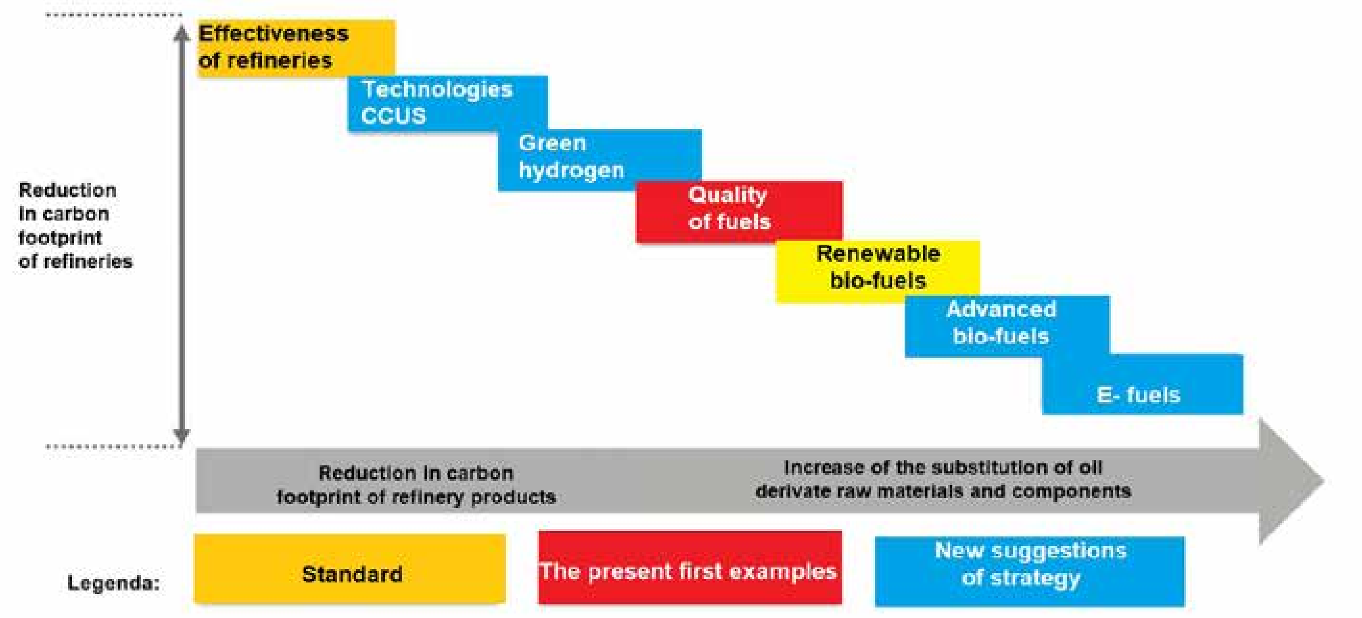


Fig. 8. Solutions towards reduction of carbon footprint in refineries[42)]



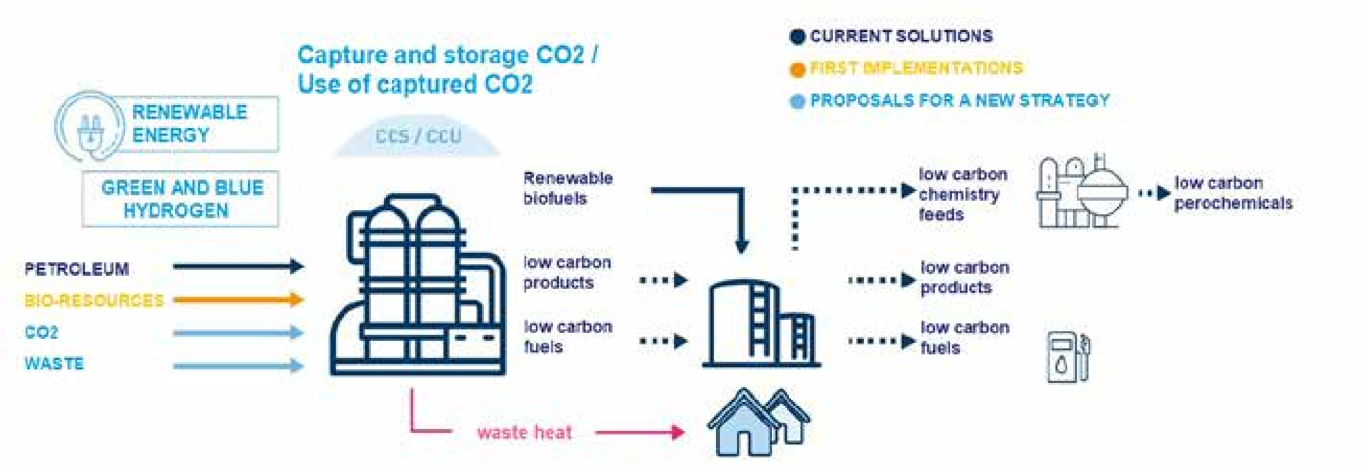
allowing obtaining ca. 90-% reduction of emission of CO_2 up to 2050 (ca. 3% annually). The solutions proposed by EPRA are based upon the better utilization of energy, OZE (Renewable Energy Resources) and change of the employed raw materials (Fig. 8). Many technologies may be utilized together in order to obtain a meaningful reduction of CO_2 emission intensity from liquid fuels. Vision 2050 indicates a refinery as a centre of industrial cluster, utilizing a wide range of raw materials.

Refineries will be transformed into energy hubs in industrial clusters. Fig. 9 shows the possible ways of future production of low-emission fuels with consideration of various types of waste in refinery processes and co-processing, the traditional one i.e. from crude oil to fuel and two future possibilities from organic waste and mineral waste to manufacturing processes of low-emission fuels e.g. industrial food waste, wood biomass, biomass different than wood (subscreen fraction, grasses, tree branches), plastics, used greases, used tyres, recovered solid fuels and solid municipal waste.

It is recognized that emissions connected with functioning of oil refinery may be reduced by many methods but most of them will be focused – in the future – on alternative raw materials for manufacture of petroleum products. The advanced bio-fuels are already developed on a high scale but more possibilities result from processing or co-processing the new types of waste materials. The refinery sector may contribute the expert knowledge to the development of alternative to the possibility of storage and combustion of plastic waste and the residues.

In the opinion of the authors, there is no fuel with a low content of hydrocarbons and with economic meaning at the present moment as compared to the traditional fuels. The national long-term targeted indicators, assuming the participation of bio-fuels in the total pot on the level of 10% consider the necessity of producing the bio-fuels of the next generations. They have to be especially advanced due to the growth of the population and the necessity of food assurance as the bio-fuels of the 1st generation are connected with the indirect land use change (ILUC).

Fig. 9. Transformation of refining plants[42, 50]



Further development of refinery technologies (in respect of new catalysts, more effective processes of fractions' separation and hydrocarbons' transformations, development of installations of reforming and isomerisation) will require the adaptation of the stream of the generated waste to the raw material which might be utilized in the refinery, guaranteeing simultaneously the quality of final product. It results from Fig. 10 that many refineries are integrated and are found in the radius of 100 km from the towns with the number of inhabitants higher than 50 thousand persons. It is anticipated that the mentioned configuration may be a future for ensuring the input to oil manufacturing plants. In Fig. 11, the conception of producing aviation fuel from the stream of municipal waste of urban infrastructure, situated near refinery, was presented.

The conception of the plant assumes that the waste is collected and then subjected to recycling. The appropriate waste is selected as suitable for aircraft fuel JET and is converted into synthetic aviation fuel of this type. The synthetic aircraft fuel JET is then blended as to be suitable for use in airplanes. Finally, the fuel is delivered to fuel terminal of the airport where the tanks of the airplanes are filled up.

Fig. 10. Situation of oil-refining plants and big urban areas in Europe[42]

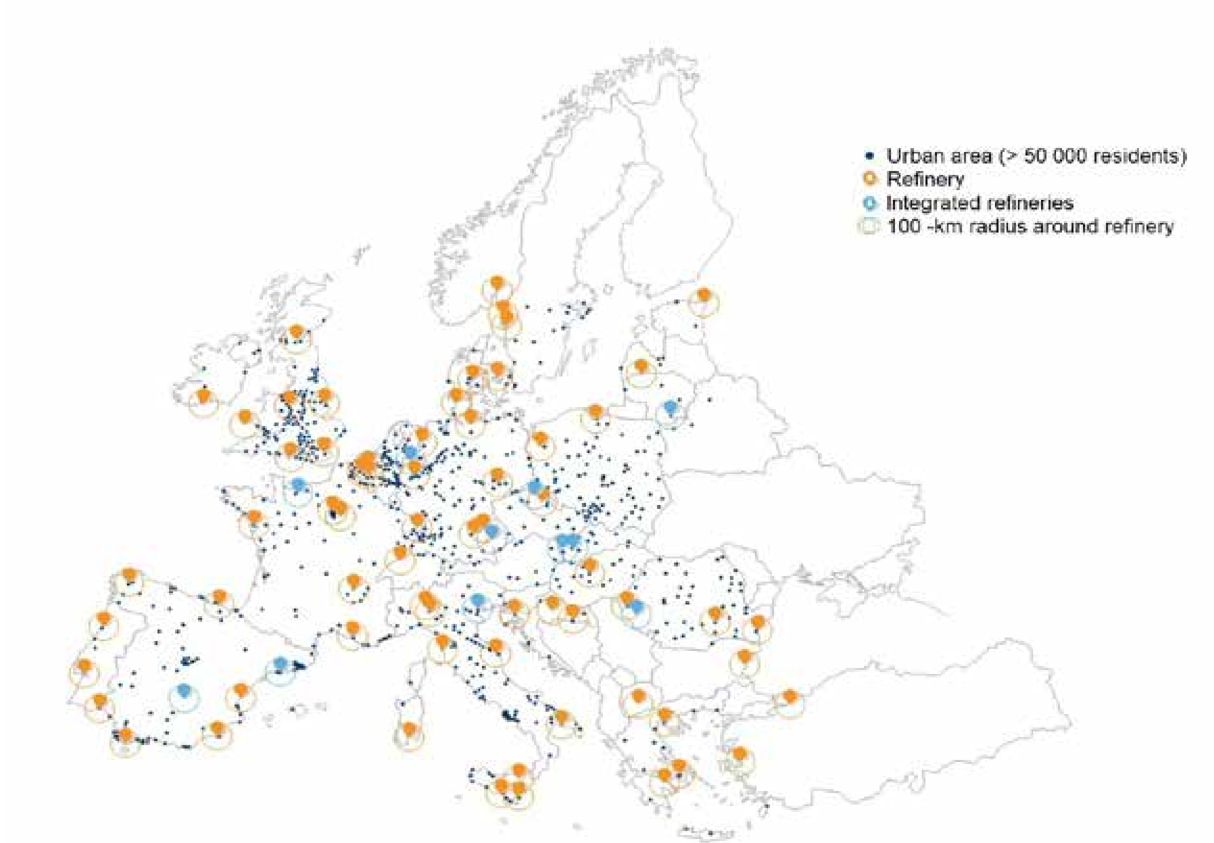


Fig. 11. Conception of utilization of municipal waste in aircraft fuels JET[42]

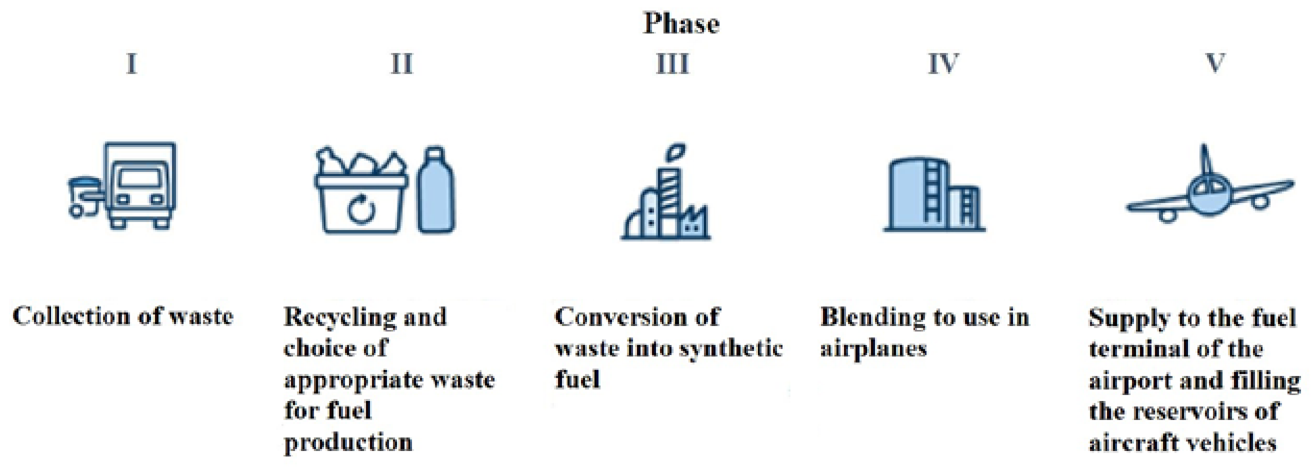
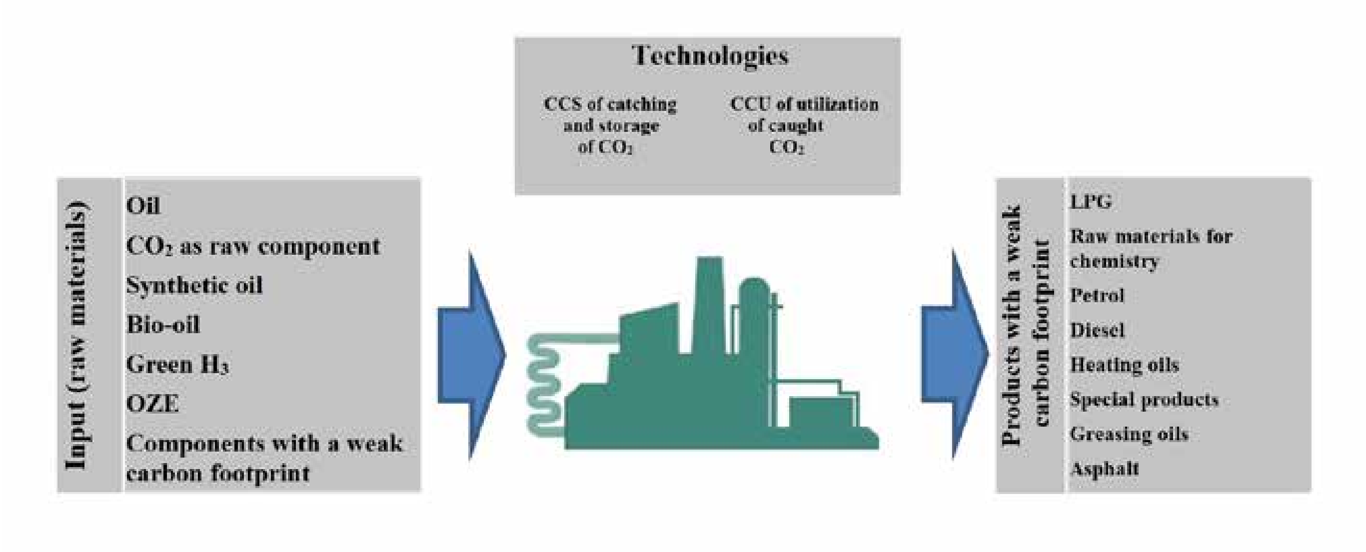


Fig. 12. Vision of refinery in 2050



Summing up

The products of crude oil processing will be responsible for 90% of the demand of the European sector of transport in 2030 and 89% in 2050. The forecast for the world demand on petroleum products is also optimistic for refineries. The refineries will be, therefore, necessary not only as the source of input to petrochemical production but also as storage places for energy. Fig. 12 contains a vision of refinery in 2050.

Polish Petroleum Concern ORLEN intends to utilize the existing refineries in Płock and Litvinov for implementation of the process of co-hydrogenation in the industrial scale. It consists in introduction of vegetal oils or used fats to refinery installations in parallel with petroleum fractions. Owing to it, the obtained drive oil contains the hydrogenated vegetable oil (HVO). The mentioned components will supplement esters being applied until now in the drive oil; they will be further used in a wide range up to the limit, provided by the standards of the fuel quality. The transition of hydrogenation process into the industrial scale was determined by the successful run of the technological test, implemented in September 2018 within the frames of CP-Bop Project, co-financed from the means of the sector programme Innochem.

When utilizing the experience with the co-hydrogenation of vegetal oils in the industrial scale and considering the way of implementing Directive RED II (Directive (UE) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources) on the ground of Polish regulations, ORLEN will undertake – in the perspective of 2020 – the decision on constructing the independent manufacturing installation of HVO. Additionally, there is analyzed the project concerning erection of installation for ethanol production from raw cellulose materials and also, other technologies allowing obtaining the advanced bio-components are found under the consideration.

The program for development of bio-fuels in PKN ORLEN will require preparation of refinery to receipt of a new component and organization of logistics of raw material supplies.

The Concern builds also systematically the knowledge on the market of renewable fuels and expects the increase of its role up to 2030. The interest of the Concern in bio-fuels refers especially to the utilization of waste raw materials for production of renewable fuels fits into a wider trend of closing a circulation of raw materials in the economy.

The planned research-developmental work includes the implementation of the pre-implementing tasks in respect of fuels with the increased participation of bio-component and also, the research activities, preparing PKN ORLEN to further technological and product changes.

Conclusions

The energetic scenarios are a big challenge for the oil refining industry. It is affected both by the variations of the raw materials' prices, pressure of the society to decrease the effect on the environment as well as refinery margins. The decrease of the consumer market is one of the main threats to refinery due to the prohibition of producing the fossil fuel-driven vehicles, mainly on the European market.

Due to the fact that during the recent years the petrochemical industry has been developing in a considerably quicker rate as compared to the market of transport fuels, the integration of refining and petrochemical processes is necessary for constructing the synergies capable of lowering the operating costs and increasing the value of derivate products, manufactured in the refineries.

The change in raw materials for refineries must be and will be accompanied by the change in technologies. It means the passage from conventional refining of heavy raw materials, using (usually) technology of coking (high temperature carbonization) to more innovative processes which will be concentrated on maximum utilization of raw materials.

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