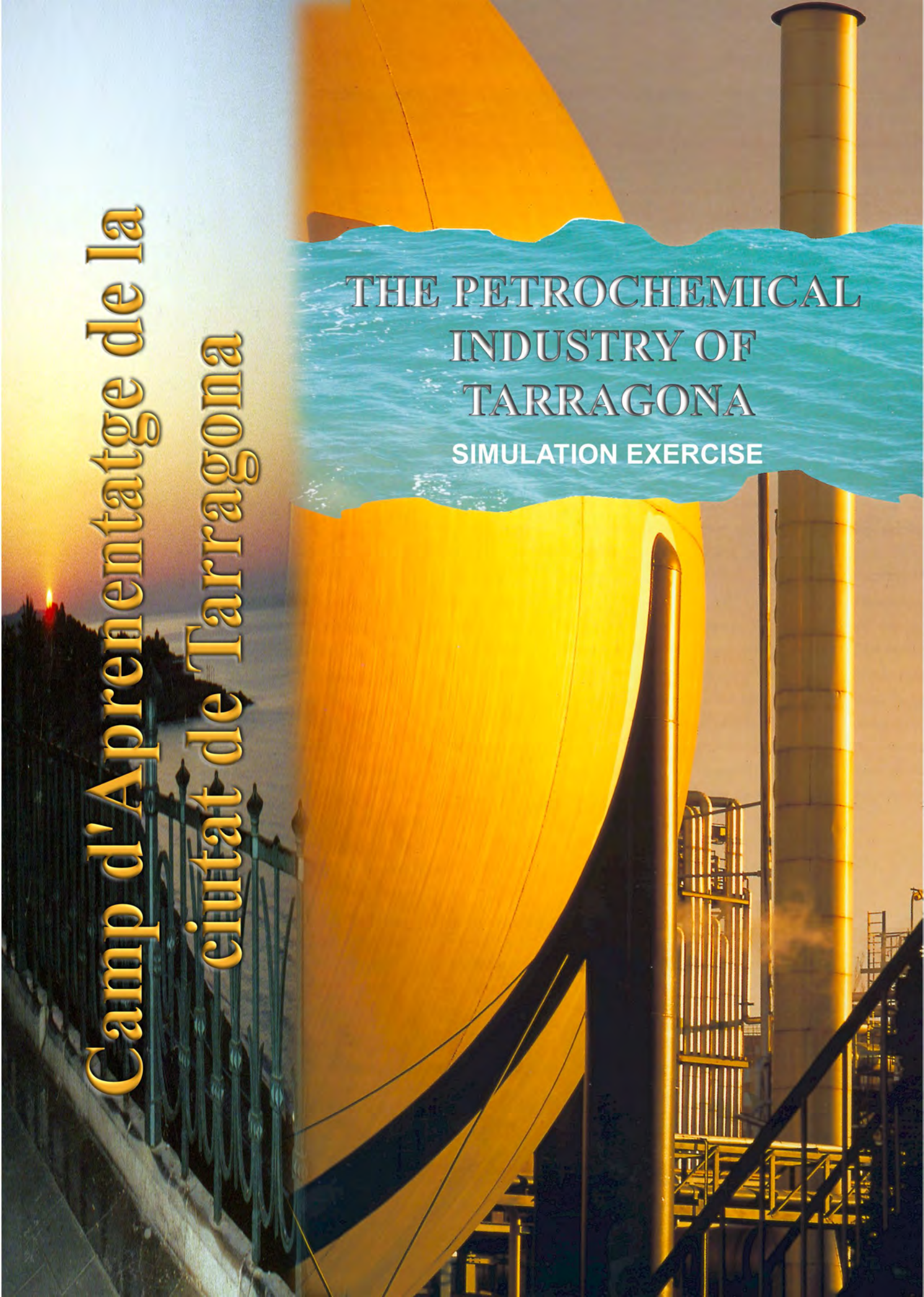


*Camp d'Aprenentatge de la
ciutat de Tarragona*

THE PETROCHEMICAL
INDUSTRY OF
TARRAGONA
SIMULATION EXERCISE





Generalitat de Catalunya
**Departament
d'Ensenyament**

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CdA
CIUTAT DE TARRAGONA



Camp d'Aprenentatge de la ciutat de Tarragona
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THE PETROCHEMICAL INDUSTRY OF TARRAGONA

SIMULATION EXERCISE

STUDENT'S BOOKLET

Name of the student

School Level



THE PETROCHEMICAL INDUSTRY OF TARRAGONA

From the Educational Centre, the following didactic exercise on a simulation has been proposed. Students, gathered in groups of 4 or 5 people, will have to locate a big oil refinery that has been put into tender by the government of Marinada. The oil refinery will be placed in a hypothetical area and students will have to take into account the conditioning factors of each location —such factors will have been previously set.

Our main objective is to foster the students' capacity of observation and analysis, as well as their ability to draw inferences that take them to appreciate the impact on the location of their choice. In addition to this, we also aim at arousing the students' critical faculties so as to achieve a balance in the chosen area. Accordingly, they will have to bear in mind the economical, demographic, environmental, technological and social factors.

As time goes on, the social and economic evolution shall provide for the emergence of a modern society based on the new technologies. As a matter of fact, these new technologies are increasingly becoming more respectful with regard to the environment and more considerate with the use of the renewable energy sources, based on sustainability. Actually, the renewable energies are definitely emerging values giving way to a new and better vision of the world we live in, together with its needs.

To have a better idea of our immediate environment, this simulation exercise has been set in the 1970s. Thus, students will have the chance to consider the thinking and interests of the society in that time, when the establishment of an oil refinery was raised and four different locations were suggested.

With the given information, students will have to weigh up which is the place that better suits the project. Then, they will have to give some justification for their choice in front of their classmates. Finally, after having shared all the conclusions, together with the detailed analysis of the pros and cons, a winner group will be taken by ballot.





OJGM

Official Journal of the Government of Marinada

YEAR XXV

Thursday, 8th January 1968

OJGM number 1147

Summary

LEGAL REQUIREMENTS

MINISTRY OF INDUSTRY AND ENERGY

14/1968 ANNOUNCEMENT of January, 14th by means of which a tender of projects to locate an oil refinery in the territory of Marinada is launched. 27501

MINISTRY OF GOVERNANCE AND CIVIL SERVICE

205/1968 DECREE of January, 18th regarding the partial reorganization of the Ministry of Governance and Civil Service 27502

MINISTRY OF TERRITORIAL POLITICS AND PUBLIC WORKS

206/1968 DECREE of January, 18th by means of which the 98/1965 Decree of March, 9th on the promotion and improvement of ski resorts and snow tourism is repealed 27508

**MINISTRY OF
INDUSTRY AND ENERGY****ANNOUNCEMENT**

14/1968 ANNOUNCEMENT of January, 14th by means which a tender of projects to locate an oil refinery in the territory of Marinada is launched.

The Government of Marinada has decided to launch a public tender of projects and proposals for the establishment of an oil refinery near one of the following towns: Masmolins, Cap de Mar, Sorrafina or Bonaona. The popular and business groups can present their projects and appeals within the period laid down. The projects have to be properly developed by following these criteria:

Article 1. Evaluation of the different locations.

Article 2. Justification of the chosen location, taking into account the following issues:

- 2.1. Advantages of the location.
- 2.2. Incidences in the area.
- 2.3. Foreseen inconveniences and possible solutions
- 2.4 Environmental impact.

Bonaona, January 14th 1968.

Roger Masip

Secretary-General



**CONDITIONS UNDER WHICH AN OIL
REFINERY SHALL BE LOCATED**

CONDITIONS UNDER WHICH AN OIL REFINERY SHALL BE LOCATED

THE LAND

- 1 Relief** A significant parcel of flat land is needed, since other industries could set up around in the near future.
- 2 Use and price** Most of the land plots are devoted to agriculture. To a lesser extent, they are devoted to small businesses or natural spaces. The most productive areas are also the most expensive ones.

THE RAW MATERIALS

- 1 Oil** The oil is shipped to the oil refinery, since the local production —of marine oil wells— does not even cover the 5% of the expenses of Marinada.

- 2 Water** For the distillation and processing of the oil, a large amount of liquid is required, approximately 25,000 m³ per day.

The available water:

Subterranean	In the surface
--------------	----------------

The amount of water to spend:

Population	Agriculture	Industry
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THE ENERGY

- 1 Electricity** Despite the great power-generating capacity of the refinery, its functioning requires a proper distribution network. Thus, a power supply that is higher than the current one will be needed.



THE PRODUCTION

Due to profitability purposes, oil refineries are usually located near consumption centres.

- 1 Final products** Those used by consumers, such as transport fuels (petrol, diesel, etc.), or those used by power stations or heating, such as fuel oil.
- 2 Intermediate products** The products that have just been mentioned can be used to produce a large variety of plastics and fibers. Economically speaking, it is highly advantageous to locate these by-product industries near the oil refinery (geographic concentration), since transport costs are saved.

THE TRANSPORT

The current transport network will need to be modernized and enlarged for it to be updated.

- 1 Transport by sea** All the oil arrives in large boats (of up to 300,000 tonnes). Therefore, to facilitate the entrance and release of products, a great deepwater port is needed.
- 2 Oil pipelines** Large pipelines will also be needed in order to transport the oil from the port to the facilities and to supply the intermediate products.
- 3 Land transport** All the elaborated products are distributed to the consumption centres by railway and by road.
- 4 Airfreight** This is a fast mean of transport both for the executives of the surrounding industries who need to travel and for the exchanges with other industries.



THE DEMOGRAPHY

1 Manpower

- a) Approximately 5,000 workers will be needed, for about 2 or 3 years, to build up the oil refinery.
- b) About 1,000 specialized workers, of a wide range of professions, will be needed for its production. Apart from that, other workers from the service sector will also be hired.

The relationship between the investment and the amount of jobs that are created is rather low. However, these will be steady, well-paid jobs with an ongoing qualification and training.

2 Immigration

Depending on the demand, and hence in different flows, a lot of workers and technicians come from other areas looking for a job. Accordingly, it is due to this fact that population increases.

3 Housing

The newcomers need flats to live in. Consequently, new working-class neighborhoods and business areas will be settled near the industries.

GENERAL FORESEEN CONSEQUENCES

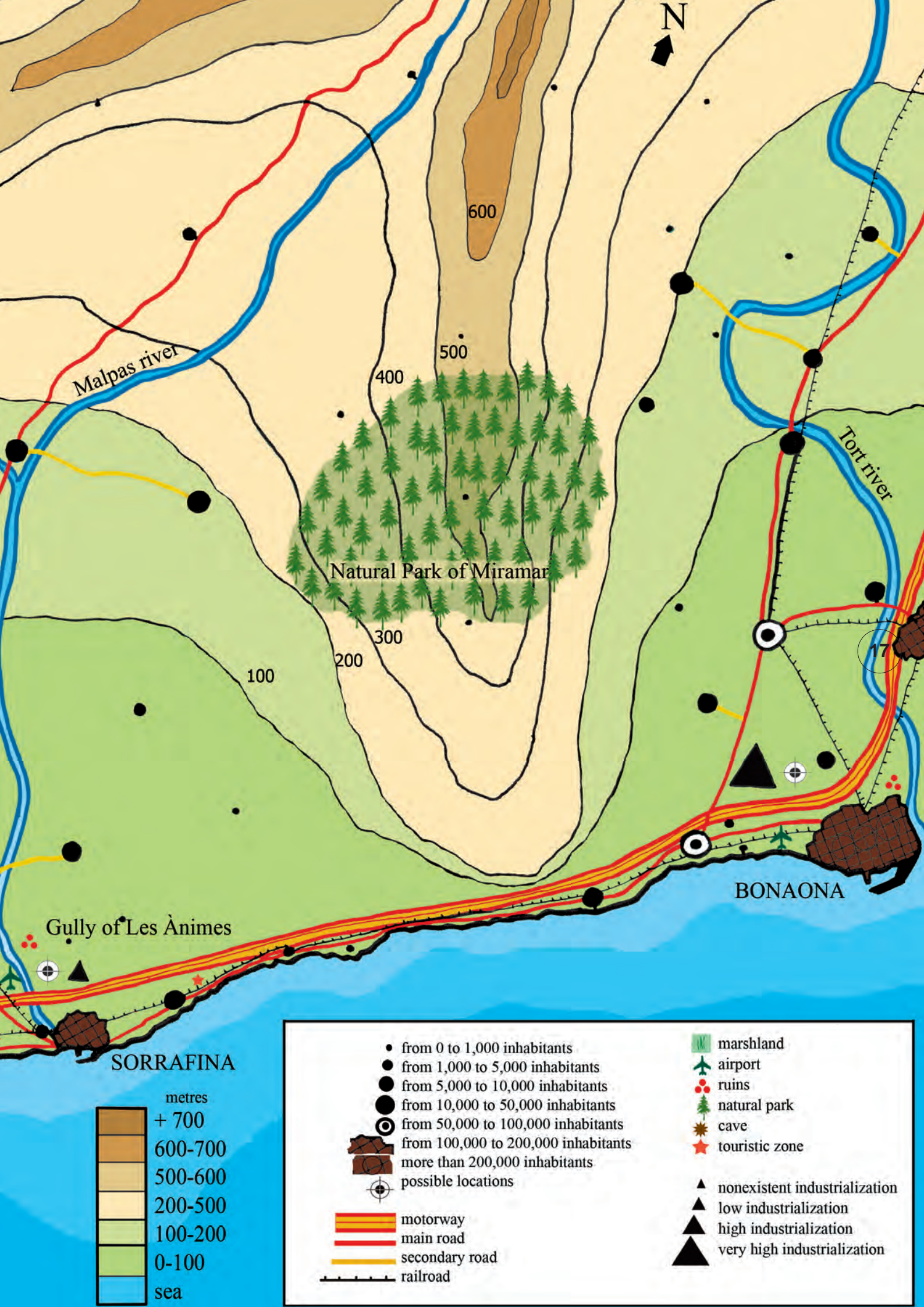
- Partial or total transformation of the territory: Switching from a farming area to an industrial one.
- Increase in the price of both the building land and the housing.
- Environmental impact: Increase in the air pollution and its risks.
- Coexistence with the tourism sector.
- Increase in services.
- Urban growth.
- ...

LOCATION MAP



MAP OF MARINADA



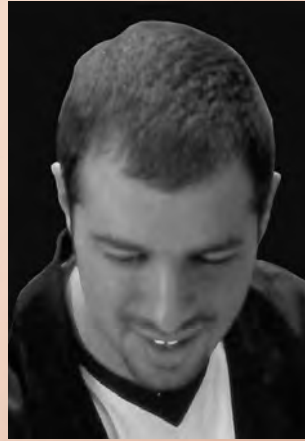






**Josep Bovè,
51-year-old
The Mayor**

"We are very glad to welcome the refinery in our area. This would entail richness and progress for our city; it would be great for all of us."



**Miguel Serra,
23-year-old Construction worker**

"As long as I can find a better job, for me it's OK."



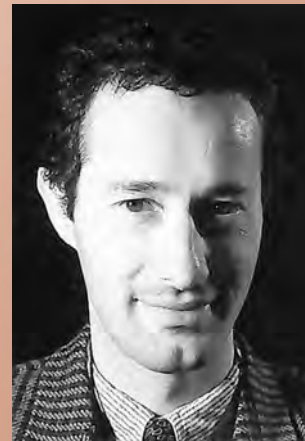
**Rosa Aleu,
44-year-old Merchant**

"If the building work is really as big as they say, that would be great, since there will be more people coming to the city and this would imply more activity. It has also been said that people will earn good salaries, so they could buy and spend more here."



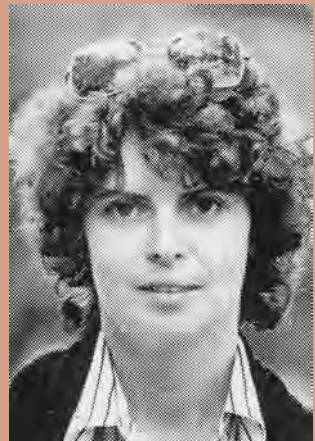
**Montserrat Garcia,
58-year-old Hotel owner**

"I am totally against the building of the refinery less than 50 km from the coast. We won't tolerate more dirt here, and we won't accept that this frightens away our clients."



**Pere Padreny,
39-year-old Philosopher**

"The construction of the refinery would imply great changes, studies, plans and so on. Lots of specialized workers will be needed, so I wonder whether we have enough people here. Probably, more universities and technical schools should be set up... I don't know, it is so complicated. We also must plan where these workers will live... The current services; hospitals or schools, are inadequate. It is a big change."



**Maria Sabaté,
18-year-old Student**

"This can't be possible; an oil refinery will change all our natural landscape, all farming areas will disappear and there will be pollution all around. And... What about water? There won't be enough water for everything."



**Jordi Gómez,
36-year-old General
Director of Heritage**

"We have to be very careful not to damage any park or protected natural area, since they are of great ecologic value. Likewise, we will have to be very careful not to spoil any historical monument of our country."



**Pere Freixes,
29-year-old Ecologist**

"I'm personally concerned in the solid particles chimneys give off. This will cause serious pollution that will certainly have an influence on crops. I shall also emphasize that such refinery involves a great consumption of water, which we don't have".



**Joan Salvador,
72-year-old Retired Fisherman**

"I don't know what to say, I do not see it so clearly. Hot water could be flown into the sea, and I wonder whether this heat could actually be detrimental for fishing. That would be the last straw!"



**Enric Saperes,
45-year-old Engineer**

"If you ask me for my personal opinion, I could only say positive things about the oil refinery. It will entail an economic, technologic and cultural development for our city. We'll grow rapidly, so we must be prepared for the great challenges we are to face."



**Laura Amenós,
37-year-old Doctor**

"If the oil refinery finally becomes a reality, I hope it brings better equipment and hospitals with it. Nowadays we have minimal services in our area and we cannot continue like this. If we have to see more patients, we will need more room, so everything needs to be updated."



**Paco Rodríguez,
36-year-old Chemistry
Professor at the University of Bonaona**

"I'm so satisfied that the government has decided to locate an oil refinery here. Universities and technical schools should be created in order to train young people on chemical issues, especially on research. For our profession, this is going to entail a major boost."



ASSESSMENT OF THE NECESSARY CONDITIONS

1 After having analyzed all the given information, fill the chart below considering every place from a more objective vision in each case.

2 The most punctuated place will give you some appropriateness criteria in the location of the plant, and the most negative for one place or another.

	Cap de mar	Mas Molins	Sorrafina	Bonaona
LAND				
Appropriate relief	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Price of the building land	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surrounding natural areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Archaeological ruins	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proximity to the sea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Space for urban growth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
RAW MATERIALS				
Oil wells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ENERGY				
Proximity to energy sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PRODUCTION				
Proximity to consumption centres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proximity to industrial areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subtotals 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CRITERIA FOR THE LOCATION OF AN OIL REFINERY

...e and parameter. Note the corresponding punctuation from 0 to 4 points. This will help you have a
...the refinery. Thus, you will have a better idea of whether its installation is quite positive or rather

Cap de mar	Mas Molins	Sorrafina	Bonaona
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TRANSPORT

Appropriate port

Railway

Road

Motorway

Airport

DEMOGRAPHY

Qualified manpower

Available housing

Proximity to rural areas

Proximity to urban areas

Minimal services

Subtotals 2

TOTALS

PROJECT

PROJECT FOR THE ESTABLISHMENT OF AN OIL REFINERY IN MARINADA

The business company, represented by:,

.....,,,

proposes to set up an oil refinery in the city of, justified by the following criteria:

Article 1. Valuation of the different locations:

Cap de Mar

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Mas Molins

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Sorrafina

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Bonaona

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Article 2. Justification of the chosen location, taking into account:

2.1. Advantages of the location

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2.2. Incidences in the territory

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2.3. Foreseen inconveniences and possible solutions:

Inconveniences

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Possible solutions

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2.4. Environmental impact

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Article 3. Observations:

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..... (Date)

..... (Signature)

..... (Seal)

CONFIDENTIAL REPORT



GOVERNMENT OF MARINADA

CONFIDENTIAL REPORT BY THE GOVERNMENT OF MARINADA ON THE PREDICTABLE EFFECTS OF THE OIL REFINERY IN THE TERRITORY

1. In Cap de Mar

The establishment of both the oil refinery and other oil-based industries that could be subsequently added would involve the transformation of an extensive area of farming land into industrial land. Thus, Cap de Mar would experience a relevant economic growth.

Substantial investments would be needed to transport the chemical manufactured products to the most important consumer centres. Moreover, considering the dangerousness of these products, safer means of transport are also necessary.

This establishment could mean a great factor for the economic development of the area. However, from the agricultural point of view, it would be interesting to consider placing the refinery in a less profitable area.

2. In Mas Molins

The establishment of the oil refinery in this place would bring great expenses. The land would need to be rearranged and the communications network should be improved, especially when it comes to receiving the oil, which has to be necessarily shipped.

It would entail the economic recovery of the area.

Yet, measures to maximally reduce polluting effects on this sector should be taken. Besides, the urban expansion should be anticipated, since it would certainly affect the surrounding centres of population.

3. In Sorrafina

On the one hand, the establishment of the oil refinery in this area would involve the over-exploitation of an aquifer that is already heavily exploited. As a result, there would also be salinity problems and groundwater depletion.

The current chemical industry facilities would be favoured because of the reduction in transport costs of the raw materials. However, in contrast, the risks and levels of pollution would increase due to the higher concentration of chemical industries in the same area.

The establishment of the refinery would emphasize the industrial growth, and it would also involve an increase in the population. Having said that, if such growth is not properly watched upon, it will aggravate the existing service and town-planning problems.

Eventually, both tourism and agriculture could be negatively affected by the establishment of the refinery.

4. In Bonaona

In this area there is the biggest urban and industrial concentration of Marinada. The establishment of the oil refinery would worsen the existing regional imbalance, fostering even more the industrial and demographic concentration in this area.

It is also important to note that this would negatively affect the current pollution problems, since its current levels would increase.

Finally, the potential hazard that chemical industries entail would be reinforced if the refinery were established in a densely populated area.



In collaboration with:

