

Refinery modernization and efforts to meet high environmental requirements of EU Directives

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Pančevo oil refinery – RNP

- Movie – Construction of DCU
- History and development
- Efficiency indicators

EU regulatory framework in RNP

- Investments in fuel quality , energy efficiency and environmental projects
- Emission trends

GHG emissions

- Future obligations
- CO₂ emissions scenario

Conclusion

Film – NIS – Future at work

Pančevo oil refinery - RNP



Location: **20km from Belgrade and 3km from river Danube**

Area: **151 hectares**

Crude oil processing capacity: **4,85 Mt/year**

Nelson complexity index: **9,2**

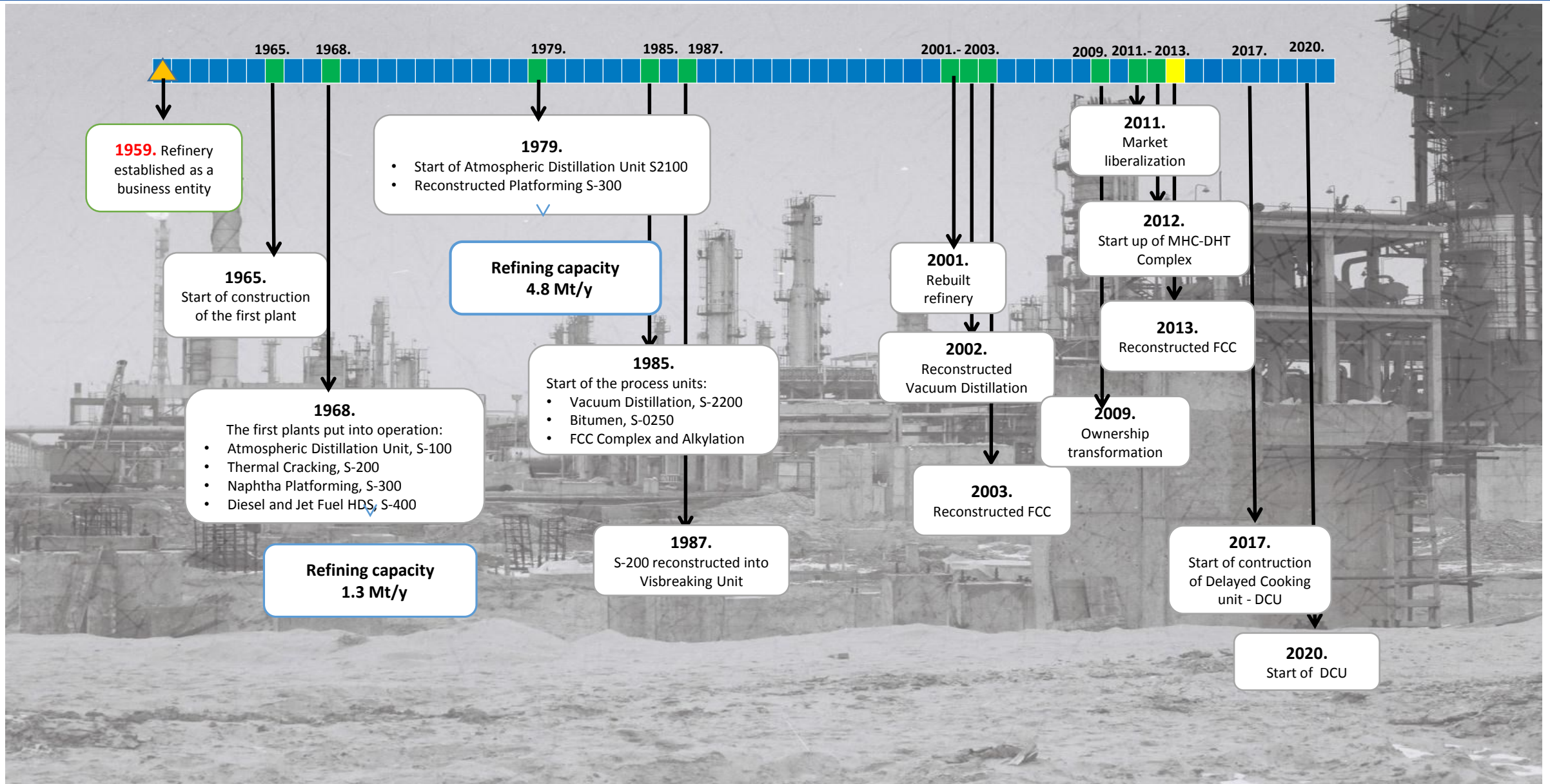
Share of light products: **75%**

No. of employees: **cca 1000**

IPPC Facility

Higher tier SEVESO operator

History and development of RNP



RNP efficiency indicators

- In order to monitor business performance and market position, NIS has opted for an independent methodology for monitoring refining efficiency indicators
- For this purpose, the methodology of **Solomon Associates** was chosen, which as a world leader in this field covers over 85% of refining capacity in over 70 countries worldwide
- RNP has been in the program since 2008, when a system of measuring key performance indicators, planning of target values and development of the Program for achieving the set goals were established
- Since 2008, RNP has recorded a positive trend in all key business parameters:
 - ✓ Increase in operational availability
 - ✓ Improving energy efficiency
 - ✓ Improving staff efficiency
 - ✓ Reduction in operating costs
 - ✓ Reduction of hydrocarbon losses



Investments implemented and ongoing in RNP

1 Fuel quality

- MHC / DHT – fuel EURO 5 standard
- DCU – Zero fuel oil production

CAPEX 2012-2020:
696 million €



2 Energy efficiency

- Optimization of combustion on furnaces
- Thermal isolation of tanks
- Installation of heat exchanger on FCC
- Application of ceramic coatings on furnaces
- Replacement of electric motors and other

CAPEX 2012-2016:
17,3 million €



3 Renewables

- Bio components blending

CAPEX 2016-2021:
6,8 €



4 IED Directive

- Reduction of PM in air (FCC reconstruction)
- Reduction of SO₂ in air (Washing of ejector gas at Vacuum dest.)
- Reduction of NO_x in air (Low NO_x burners installation)

CAPEX 2012-2019:
50,5 million €



5 VOC Directives

- Reconstruction of gasoline tanks
- Installation of VRU unit (Autofiling station, Railway station end Port)
- Instalation of loading arms for bootom loading
- Reconstruction of petrol tanks

CAPEX 2012-2018:
101,5 million €



1 Fuel quality - Modernization of RNP – MHC/DHT

Modernization of RNP was a major requirement for bringing the Company to a strategically important leadership position in the regional petroleum products market

Phase I – MHC/DHT

Description:

- Start up of Mild hydrocracking in 2012
- Capacity 2.970.000 t/year
- Increase in oil refining depth up to 84%
- Output of white derivatives is increased up to 75%

Goal:

- Production of unleaded motor gasoline and euro diesel with a sulfur content not exceeding 10 ppm, according to the Euro 5 standard
- Increase in processing volume and export to the Balkan region

Environmental effects:

- Reduction of sulfur content in derivatives
- Reduction of SO₂ emissions in air

Cost:

- 396 milion EUR



1 Fuel quality- Modernization of RNP – DCU (Delayed coking unit)

Phase II – DCU

Description:

- 2017 beginning of the project
- Start-up of the plant - 2020

Goal:

- Increase in oil refining depth up to 99,2%
- Production of high-calorie fuel - petroleum coke
- Heavy residues will be used as feedstock for DCU
- Increasing the energy efficiency of RNP

Environmental effects:

- Reduction of SO₂, NO_x and PM emissions from all RNP combustion plants
- With the start of operation of DCU, production of fuel oil ceases, thereby reducing the emission of pollutants into the air in the region (NIS markets)

Cost:

- > 300 million EUR



2 Energy efficiency projects in RNP 2013-2019

Project	Realization year	Total mil. EUR
1. The insulation of the tank in RNP	2013	1,9
2. Installation of energy efficient lighting in RNP	2013	0,2
3. Measurement of electricity consumption	2014	0.2
4. Installation of system for the optimization of combustion in furnaces S-300, S-2100, S-2200, S-400 and S-2300)	2014	5,3
5. Installation of energy efficient electric motors	2014	1,2
6. Water-fuel oil emulsion system	2014	0,8
7. Installation of frequency regulation of the electric motors of the air coolers S-400/2100/2200/3600	2016	0.7
8. Reduction of NOx emission in flue gases in RNP – Energy plant	2016	1,5
9. Application of ceramic coatings in BA-2101 and BA-2201 furnaces	2016	0,8
10. Installation of "Packinox" heat exchanger at Plaftofming S-300	2016	4.2
11. Implementation of continuous dry cleaning of the BA-2201A / B furnace	2018	0,14
12. Application of ceramic coatings in furnaces BA-301/2/3/4, BA-305 and BA-306	2018	0,39
13. Application of ceramic coatings in furnaces	2019	0,5
Total:		17,3



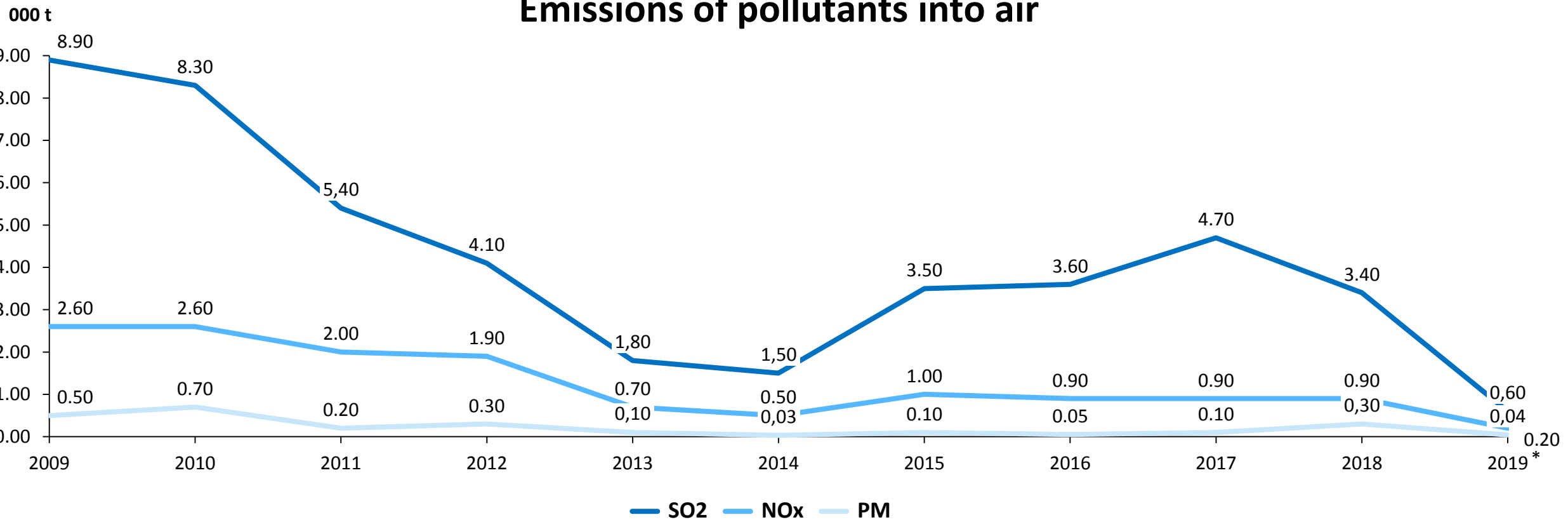
Project	Realization year	Total mil. EUR
Environmental projects		
IED Directives		
1. FCC- reduction of solid particle emissions in air	2012	15,6
2. Regeneration of spent sulfuric acid	2012	14,5
3. Construction of a closed drainage and closed sampling system	2015	6,2
4. Replacement of Low NOx burners on furnaces on: Vacuum dest., HDS, Atm.destillation and FCC	2018/2019	2,8
5. Washing of ejector gas on Vacuum destillation	2019	1,6
6. Other projects	-	9,8
VOC Directives		
7. Reconstruction and modernization of installations for loading and unloading of LPG	2012	3,0
8. Reconstruction and modernization of the port	2013	29,9
9. Reconstruction of auto loading stations	2015	8,8
Biocomponents blending with diesel fuel	2016	6,8
	Total:	99,0
Projects with environmental effect		
Reconstruction of petrol tanks		59,8
	Total:	158,8



- Projects are realized in order to comply with the obligations of IED Directive 2010/75/EU and VOC Petroleum Directive

Air emissions trends (2009-2019)

Emissions of pollutants into air

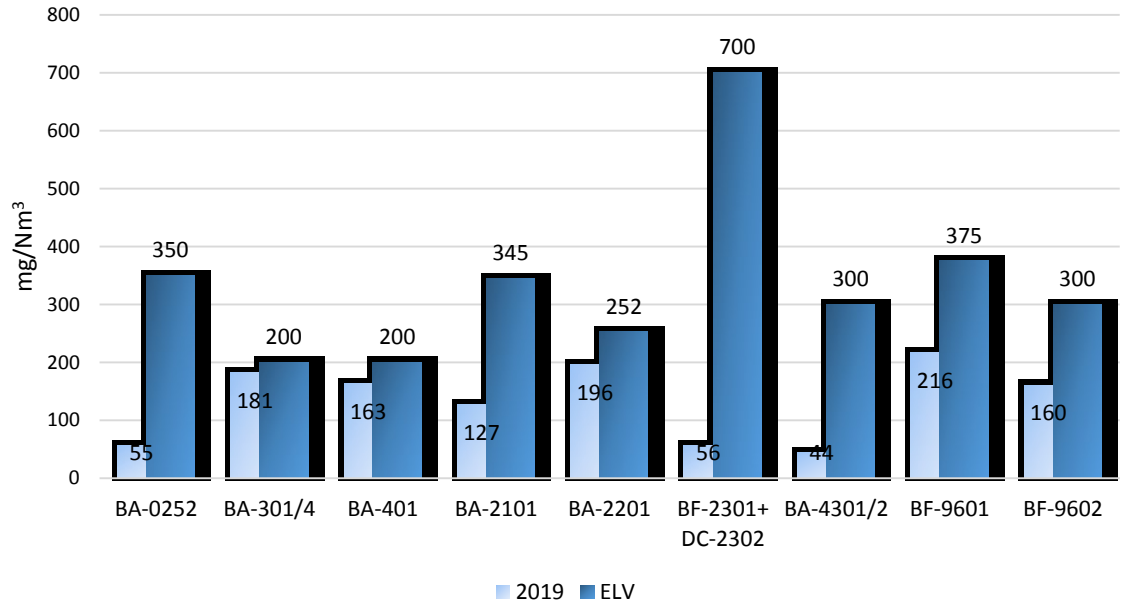


- From 2009 – 2015 significant investments in environmental projects
- From 2015 - 2018 we were burning **fuel oil** as dominant fuel, which reflected on the emissions
- From 2019 dominant usage of natural gas

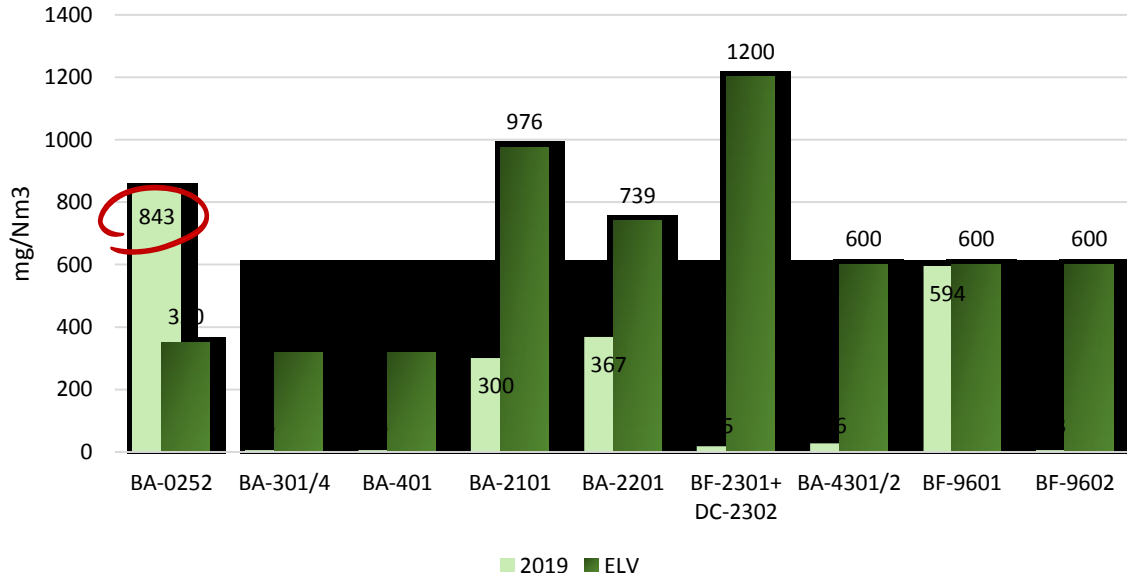
* Projected emissions for 6M 2019. (based on the I series of measurements and operating hours of facilities)

Compliance with environmental legal requirements

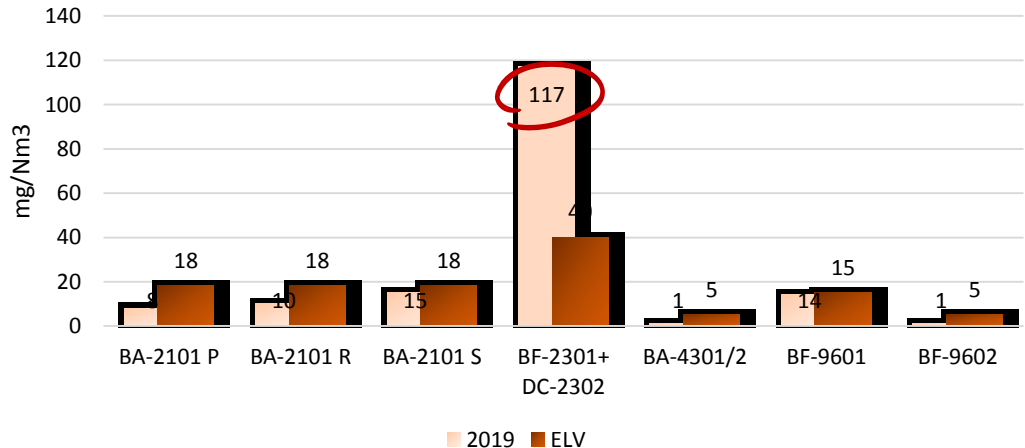
NOx



SOx



Particular matter, PM



For full compliance with Industrial emissions Directive (IED), projects in progress:

- BA-0252 – Fuel gas desulfurization
- BF-2301+DC-2302 – Installation of EC filter

Future obligation – GHG (EU – ETS)

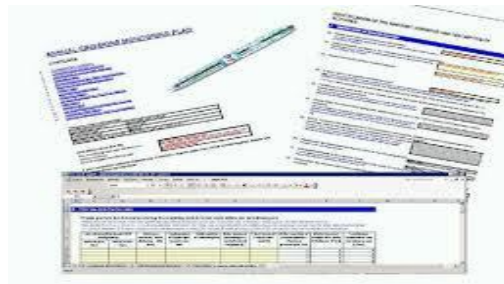
1 Legal framework in RS

- **Law on Climate changes** still not adopted in RS (expected end of 2019)
- Then in 2 years adoption of by-laws, will introduce concrete obligations (monitoring and reporting on CO₂)



2 Preparation for new obligation

- RNP identified as **C category plant, CO₂ emissions > 500 000t***
- Identified new obligations (monitoring plan, emission report)
- Training of personnel for monitoring CO₂
- 2 Studies done



3 Calculation of CO₂ emissions

Year	CO ₂ emissions [t]
2016	982.735
2017	973.222
2018	1.058.820

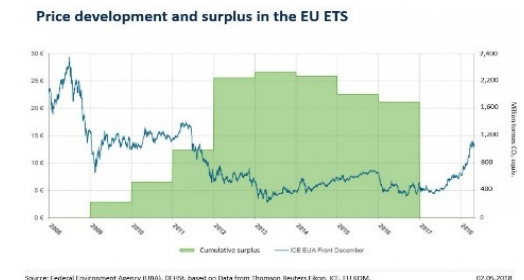
cca 1 mil tons CO₂/year



4 Estimation of costs

- Estimated cost of purchasing emission units for 1 mil. t of CO₂ with:
- 60% share of free units**,
 - Current emission units price 26 EUR/t CO₂ is **10, 4 mil. EUR/year**

10,4 mil. EUR/year



Conclusion

- Good level of compliance with environmental legal requirements, still in progress to achieve full compliance;
- To achieve full compliance it is necessary to:
 - Substitute heavy fuel oil with natural gas;
 - Continue environmental investments Program implementation;
 - Continue Energy efficiency Program implementation;
 - Timely prepare for new obligation (EU-ETS)
- Plan for additional financial costs for EU-ETS:
 - Emission units purchase,
 - OPEX costs (laboratory analysis, measurement devices, reports, stock market, etc.)
- To keep active role in development of new legislation



THANK YOU

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