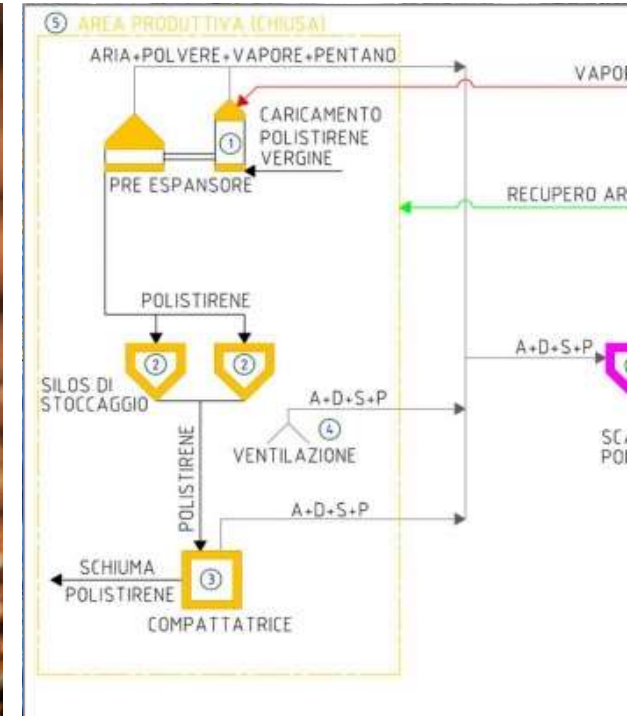




Pentane Recovery Unit



ULIX INNOVATION S.r.l.

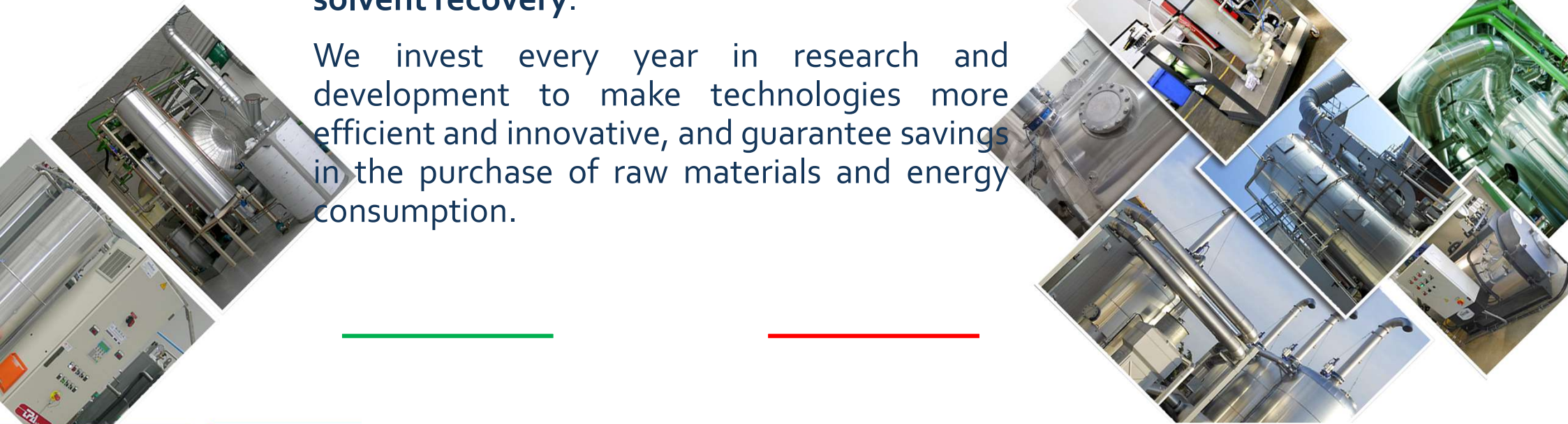
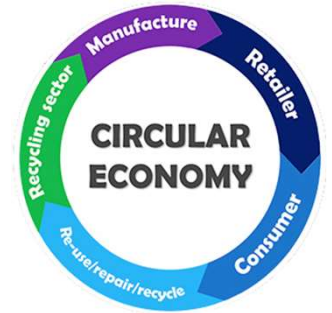


Who we are

ULIX Innovation is an Italian company of young people with a **passion for innovation** and great attention to **environmental pollution issues**.

We specialize in **VOC abatement systems** and **solvent recovery**.

We invest every year in research and development to make technologies more efficient and innovative, and guarantee savings in the purchase of raw materials and energy consumption.



Pentane in the polystyrene (EPS) process

Pentane is a hydrocarbon widely used in the process of expanding **polystyrene (EPS)**. During this process, the polystyrene beads are **impregnated with pentane** and are exposed to a stream of water vapor that evaporates the **pentane** and expands the beads up to 20 times their volume.

Of the pentane used in the process, one sixth remains in the spheres, while the remaining **five sixth are released in the atmosphere**.

Pentane released into the air has a very high polluting impact on plants and ecosystems, especially when combined with other atmospheric pollutants.

EPS in Europe and Turkey

We are interested to know that *about 5% of the weight of polystyrene consists of pentane emissions*. This means that if a company produces **10.000 tons** of polystyrene annually, it is releasing approximately **500 tons of pentane into the atmosphere**.

According to the Mordor Intelligence database, **in Europe**, the annual production volume of **EPS** is estimated to be around **2.71 million tons** per year.

According to the United Nations Development Program, **Turkey's** annual production volume of **EPS** is estimated in **210 thousand of tons**.

This mean approximately **135.000 tons** and **10.500 tons**, respectively, of released pentane into the atmosphere.

Post Combustor: a temporary non-solution

Unfortunately, the most common response to pollution is still the **Regenerative Post Combustor**, which is tasked with *burning pentane*. However, **for two main reasons**, the **Combustor** is not a real solution. **The first** reason that concerns us closely is **environmental**, as the burner produces CO₂ and nitrogen oxides, further polluting the environment.



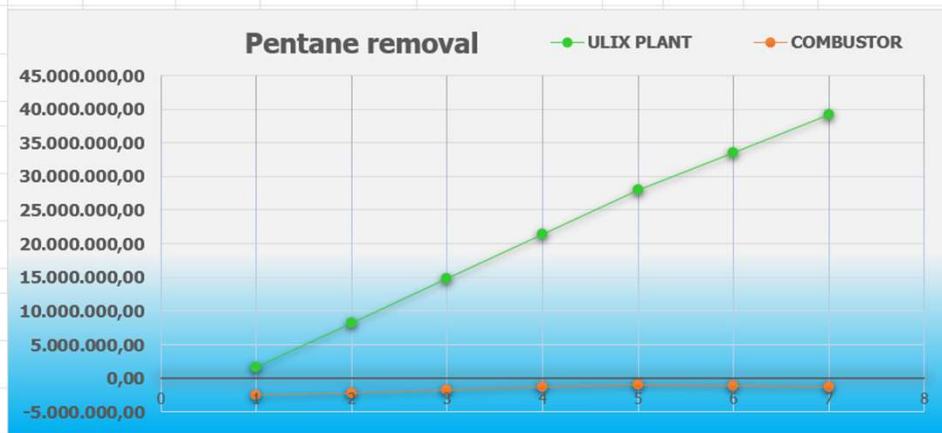
The second reason is of an **economic nature**; despite costing approximately 30% less than a ULIX plant, the **Combustor** is not an investment but rather a **futile expense**. *To burn pentane vapors, it must be diluted with methane*. Many EPS producers who have purchased **Combustors** are now forced to keep them idle due to the excessive cost of keeping them operational.

Comparison (Post Combustor vs ULIX Plant) & Forecasts

Let's now consider the major EPS manufacturing companies in Turkey, "RAVAGO Petrokimya" & "ASCHEM Petrochemical Ind." utilizing public data. We'll make investment forecasts, estimate the environmental impact reduction, and assess the potential earnings. Here is "RAVAGO":

YEAR	ULIX PLANT	Recovered solvent	Plant running costs	Depreciation	White certificates (for Italy)	Carbon credits (globally)	Total	Post combustor	Recovered solvent - plant running cost	Depreciation	White Cert.	Carbon credits	Total	YEAR	ULIX PLANT	COMBUSTOR
1	-5000000	5700000	115000	1000000	0	0	6585000	-3000000	-180000	600000	0	0	420000	1	1.585.000,00	-2.580.000,00
2	0	5700000	115000	1000000	0	0	6585000	0	-180000	600000	0	0	420000	2	8.170.000,00	-2.160.000,00
3	0	5700000	115000	1000000	0	0	6585000	0	-180000	600000	0	0	420000	3	14.755.000,00	-1.740.000,00
4	0	5700000	115000	1000000	0	0	6585000	0	-180000	600000	0	0	420000	4	21.340.000,00	-1.320.000,00
5	0	5700000	115000	1000000	0	0	6585000	0	-180000	600000	0	0	420000	5	27.925.000,00	-900.000,00
6	0	5700000	115000	0	0	0	5700000	0	-180000	0	0	0	-180000	6	33.510.000,00	-1.080.000,00
7	0	5700000	115000	0	0	0	5700000	0	-180000	0	0	0	-180000	7	39.095.000,00	-1.260.000,00
Yearly EPS production	150000	tons														
Years of depreciation	5															
Heating power pentane	45	MI/kg														
White Certificates	5350	kWh/year														
Daily recovered solvent	3000	Kg/day														
Pentane effectively recovered	95%															
Yearly recovered solvent	7125000	Kg/year														
Pentane price	0,8	EURO al Kg														
White certificate value	0	EURO														
Value of carbon credit	33,00	EURO														
GWFP power of pentane	4															

RAVAGO



Comparison (Post Combustor vs ULIX Plant) & Forecasts pt.2

With a 150.000(t) EPS year production, **ULIX Plant** can recover up to **7.125.000 kg of Pentane**. Moreover, as can be seen from the forecasts, with our plant, **the companies return on the investment and begin to make a profit from the end of the first year of operation of the plant.** In the next graph we have "**ASCHEM**" as an example:

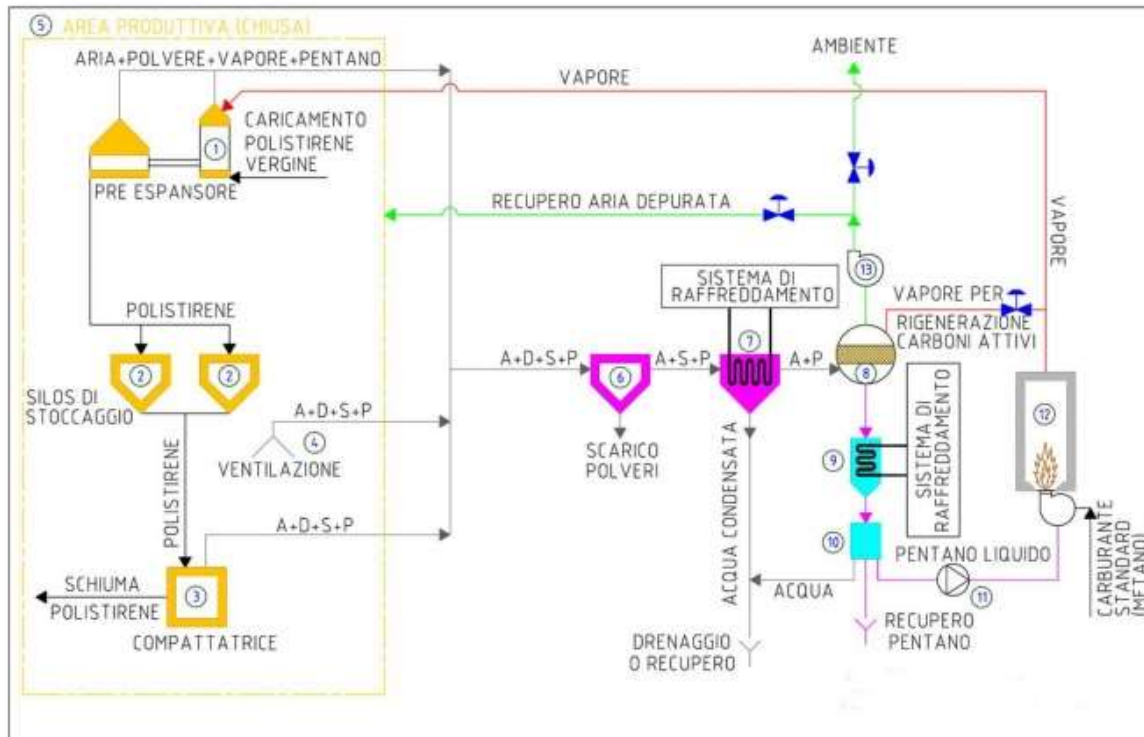
YEAR	ULIX PLANT	Recovered solvent	Plant running costs	Depreciation	White certificates (for Italy)	Carbon credits (globally)	Total	Post combustor	Recovered solvent - plant running cost	Depreciation	White Cert.	Carbon credits	Total	YEAR	ULIX PLANT	COMBUSTOR
1	-2000000	760000	16500	400000	0	0	1143500	-1500000	-25500	300000	0	0	274500	1	-856.500,00	-1.225.500,00
2	0	760000	16500	400000	0	0	1143500	0	-25500	300000	0	0	274500	2	287.000,00	-951.000,00
3	0	760000	16500	400000	0	0	1143500	0	-25500	300000	0	0	274500	3	1.430.500,00	-676.500,00
4	0	760000	16500	400000	0	0	1143500	0	-25500	300000	0	0	274500	4	2.574.000,00	-402.000,00
5	0	760000	16500	400000	0	0	1143500	0	-25500	300000	0	0	274500	5	3.717.500,00	-127.500,00
6	0	760000	16500	0	0	0	760000	0	-25500	0	0	0	-25500	6	4.461.000,00	-153.000,00
7	0	760000	16500	0	0	0	760000	0	-25500	0	0	0	-25500	7	5.204.500,00	-178.500,00

Yearly EPS production	20000	tons														
Years of depreciation	5	-														
Heating power pentane	45	MJ/kg														
White Certificates	5350	kWh/year														
Daily recovered solvent	3000	Kg/day														
Pentane effectively recovered	95%															
Yearly recovered solvent	950000	Kg/year														
Pentane price	0,8	EURO al Kg														
White certificate value	0	EURO														
Value of carbon credit	33,00	EURO														
GWP power of pentane	4															

ASCHEM

Year	ULIX PLANT	COMBUSTOR
1	0	0
2	~500,000	~100,000
3	~1,500,000	~200,000
4	~2,500,000	~300,000
5	~3,500,000	~400,000
6	~4,500,000	~500,000
7	~5,200,000	~600,000

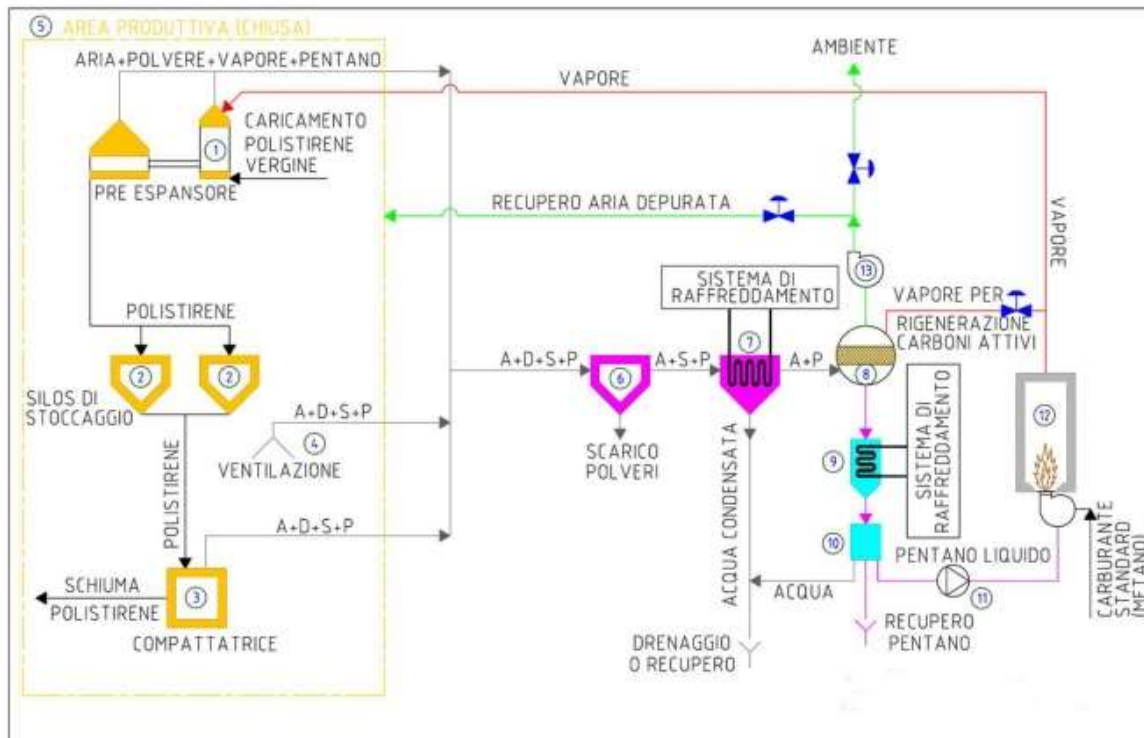
How does ULIX PLANT work? pt.1



Polluted air is contaminated with pentane, dust and water vapor [4]. After extracting dust with a special filter [6], and condensed the vapor with a cooling unit, the air is sent to one or the activated carbon beds where pentane is adsorbed [8]. Pentane is recovered through a water vapor stream and reduced into liquid phase via condensation [9]. Recovered pentane is stored in a tank ready to be used in the industrial process.

In alternative the solvent is sent to the boiler [12], which produces steam for the polystyrene production machines (not advised).

How does ULIX PLANT work? pt.2

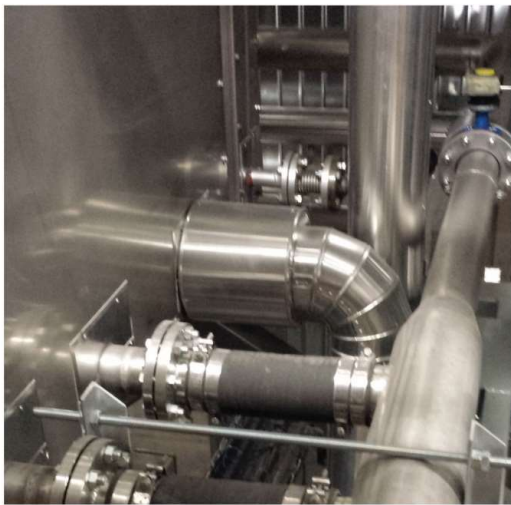


[..] In this way, a zero emission plant is employed, both in terms of pentane and emitted air.

The plant is supplied turn-key, complete with electrical panel, electric system, PLC and operator interface terminal, assembled, calibrated and ready for production.

Additionally, the recovered pentane can be sold to companies that produce expandable polystyrene or for other applications.

some ULIX PLANT pictures



About XPS

Extruded polystyrene (**XPS**) foam is rigid foam providing a strong, yet lightweight and flexible insulation solution which is resistant to water absorption, making it ideal for a range of building and commercial applications. Slightly more permeable to air and moisture, EPS is less resistant to water vapour than **XPS**.

For the production of **XPS**, butane or CO₂ are used.

Both of these compounds can be captured utilizing our plant and reused or resold (for CO₂ there is currently no convenience in recovering it).

KEY BENEFITS OF THE ULIX PLANT:

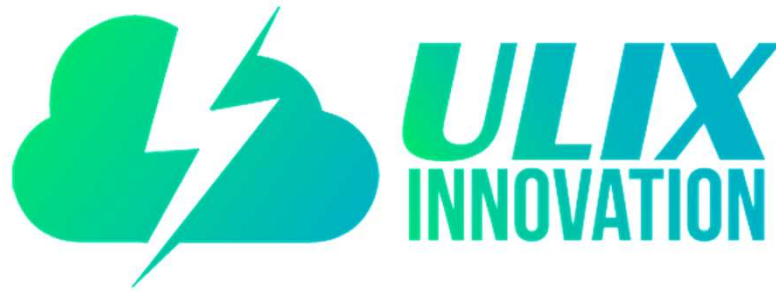
- Complying to ecological principles and European regulations;
- Positive ROI from the first year of plant activation;
- Improved production capacities and development of new business relationships.

ULIX LATEST PLANT

Our latest and largest **Pentane Recovery PLANT** currently built is at a major Swiss company that manufactures EPS insulation, '**ISOPOR Schweiz AG**,' a partner very committed to adhering to modern ecological principles.



www.isopor.ch



ULIX INNOVATION Team
Thanks You for your attention

*We are available for any further
clarification requests*

Best Regards