

# ENERGY SAVINGS AND CO<sub>2</sub> REDUCTION IN CHEMICAL AND PETROCHEMICAL INDUSTRIES

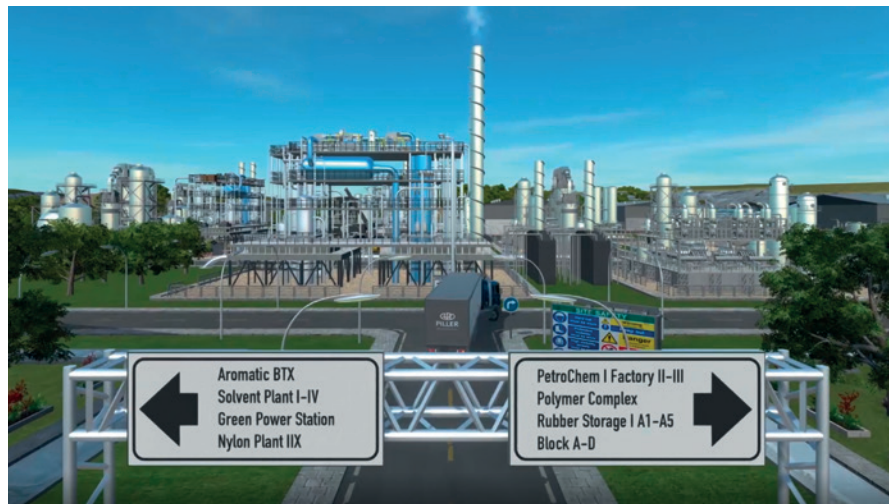
## STRIVING FOR ENERGY EFFICIENCY AND CLIMATE PROTECTION

The world is getting greener: Reducing greenhouse gas emissions is becoming increasingly important. More and more industrial companies have ambitious goals to reduce their energy consumption and CO<sub>2</sub> footprint. PILLER offers an innovative solution to support our customers' success by implementing industrial heat pump systems based on MVR blower technology. The basic principle of Mechanical Vapor Recompression (MVR) is used to compress waste heat mechanically and convert it back into a useful energy source for the production process.

## REACHING GOALS TOGETHER

Our partnership with a leading synthetic rubber producer began in 2008, when the first system to produce steam by recovering waste heat from a solvent stripping process was implemented. Striving for continuous energy efficiency and climate protection, our customer's efforts to reduce energy and protect our climate are a key component of their corporate objectives, and are implemented with support from PILLER – using our waste heat recovery process.

After this initial success, we retrofitted 9 more plants with our Heat Pump System, generating steam out of waste heat from thermal separation processes and reusing it for heating. The system has proven extremely successful in many different applications at our customer's facilities.



*Energy efficient retrofitting of industrial plants*

## PILLER INDUSTRIAL HEAT PUMPS: WASTE HEAT RECOVERY IN THERMAL SEPARATION PROCESSES

SSBR Strippers, EPDM Plants, Flash Vapor Recovery and Cumene Columns – all these chemical and petrochemical processes were optimized with our state-of-the-art PILLER MVR Blowers. Benefiting from PILLER Heat Pump Systems not only means reducing operational costs, industrial process CO<sub>2</sub> emissions also are significantly reduced using our waste heat recycling process.

As the expert in design and manufacture of customized, efficient, and high-performance blowers, PILLER offered a unique solution for every project. After analyzing and rating potential savings for our customer in a feasibility study, we engineered individual heat pump systems to optimize CO<sub>2</sub> and energy savings.

We started with a recovery rate of 6.5 tons per hour, eventually reaching 31.7 tons (usable) steam per hour. The projects with that single customer are listed on page 2.

**67 %**  
CO<sub>2</sub>e  
savings

**83 %**  
Energy  
savings

**68 %**  
Costs  
savings

*Benefits from steam generation heat pumps compared to original system at our customer*

### OPTIMIZING EPDM PLANTS: GENERATING STEAM USING MVR BLOWER TECHNOLOGY

In the case of our customer's EPDM Plant, a steam generating Industrial Heat Pump was built in 2017.

Steam generation here is used for stripping units where solvents from the reaction process are separated from the product. By introducing steam into the stripping unit, a mixed overhead vapor (OHV) containing steam and solvent vapor evaporates. The OHV is then condensed to recover the solvent.

Instead of transferring the heat released by condensation into the environment through cooling towers, it is reused to produce low pressure steam in an evaporator. With a multi-stage mechanical vapor recompression (MVR) system, the steam is compressed back to the pressure level that supplies the stripping unit.



Mechanical steam compression system for a high temperature Heat Pump



To follow our ongoing success story with one of the leading synthetic rubber producers and to get insights to other interesting PILLER Industrial Heat Pump projects and references, please visit our website.

Process	Year	Inlet Temperature [°C]	Temperature Rise [K]	Steam Recovery [kg/h]	Coefficient of Performance [COP]
Cumene Column	2018	80.0	78.5	13,615	3.57
<b>EPDM Stripper</b>	<b>2017</b>	<b>60.0</b>	<b>71.1</b>	<b>16,451</b>	<b>4.38</b>
EPDM Stripper	2016	60.0	70.4	31,659	4.71
Flash Vapor Recovery	2015	94.7	35.9	7,237	7.29
EPDM Stripper	2015	68.0	58.1	16,457	4.59
Flash Vapor Recovery	2013	94.7	36.1	7,240	7.27
EPDM Stripper	2013	68.0	58.3	16,495	4.53
SSBR Stripper	2013	83.2	40.0	15,708	6.51
SSBR Stripper	2010	88.0	35.2	14,347	7.68
Stripper	2008	79.0	28.3	6,481	8.31

Project overview: Steam (re-)generation in synthetic rubber industry

### SAVINGS IN THE EPDM PROJECT: A GREAT INVESTMENT

The PILLER Industrial Heat Pump allows integration of additional heat sources between the stages. In this project, flash vapor was fed into the system in the middle of our Steam Compression Cycle.

A special evaporator design and the high flexibility of PILLER Blowers guarantee reliable heat recovery, saving over 80 % in energy consumption and reducing CO<sub>2</sub> emissions by 62 % in this single project.

In addition to the reduction in steam consumption, the Heat Pump System also reduces cooling water demand, decreasing the overall energy consumption on site. Saving more than 4 Million € annually by retrofitting their existing plants with our PILLER Industrial Heat Pump has provided our customer with a payback period of 1.7 years.

With more than a dozen installations, we have established our position as the pioneer for large scale steam generating heat pumps: PILLER is your expert in energy savings and CO<sub>2</sub> reduction in chemical and petrochemical processes.

Visit our website to find worldwide sales & service contacts

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