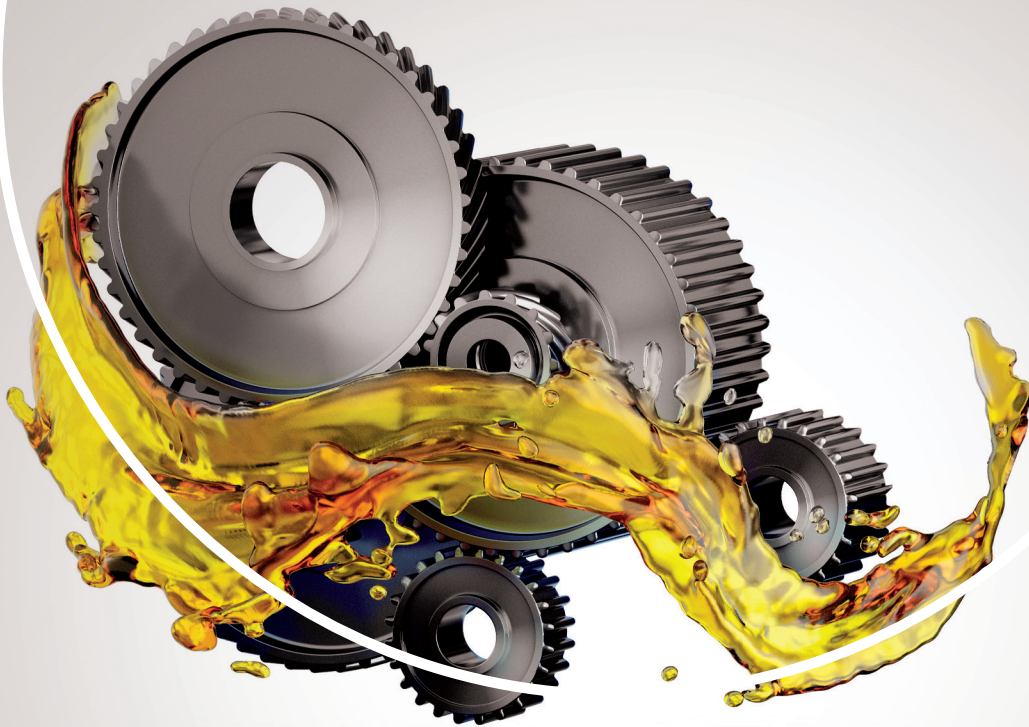




# INNOVATIVE SOLUTIONS FOR **LUBRICANTS** AND **FUNCTIONAL FLUIDS**

## LUBYREN™ Biobased Acids



# GLOBAL CHALLENGES

As pressure on resources continues to increase, our planet's biocapacity is gradually shrinking. Because of the ever increasing gap between demand and supply of natural resources, we would need the equivalent of 1.7 Earths to meet our current needs.



Today,

## 1.7 Earths

to meet our resource needs



The global population keeps growing and should reach **11.2 billion people before the end of the century**. The lubricant industry faces new challenges due to rising environmental restrictions and changing customer requirements. As a result, the industry seeks to replace petroleum based lubricants with innovative products that come with a lower carbon footprint.

Raw materials used for esters can be based either **on petrochemical or renewable sources**. Increasing environmental awareness particularly in Europe and North America, has created a demand for fluids with reduced environmental impacts.



### 12%

**Aeronautic Industry** generates 12% of the global emissions linked to transportation.



**Due to changed global weather conditions, the need for air conditioning and cooling devices has been on the rise for years.** Leading to an ever-increasing demand for coolants. OEMs are replacing conventional systems and fluids by more sustainable solutions.



OEMs\* are pushing for developments of new technologies including products with a more environmental friendly footprint.

Moving to alternative energy sources only will not be sufficient to reach ambitious climate change targets. OEMs have to redesign their whole supply chain and way of producing high performance fluids using sustainable raw materials.

**Demand for battery cooling fluids will increase with the growth of electric vehicle sales.**



\* Relevant OEMs: refrigerator producer, plane engine manufacturers, turbine producers, compressor producers

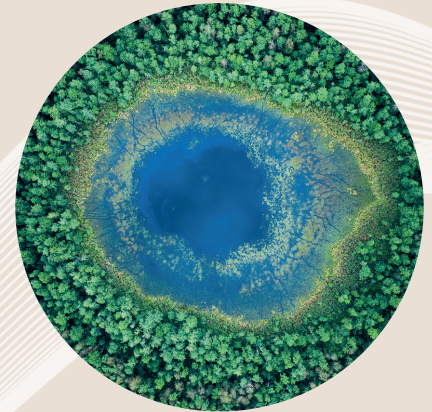
# AFYREN'S COMMITMENTS

Afyren offers solutions that mitigate the impact of complex global problems and contribute to the development of a better balance between human needs and environmental resources.



**Reduce** waste and optimize circularity

**Limit** climate change



**Preserve** natural resources and biodiversity



## DECARBONATION OF PRODUCTION AND CONSUMPTION

- GHG emissions reduction
- Replacement of fossil resources

## NATURAL RESOURCE PRESERVATION

- No additional land use
- Highly renewable resources
- Natural fermentation process
- Low water consumption

## WASTE REDUCTION AND FOSTERING CIRCULARITY

- Zero industrial waste
- Use waste or by-products as raw materials

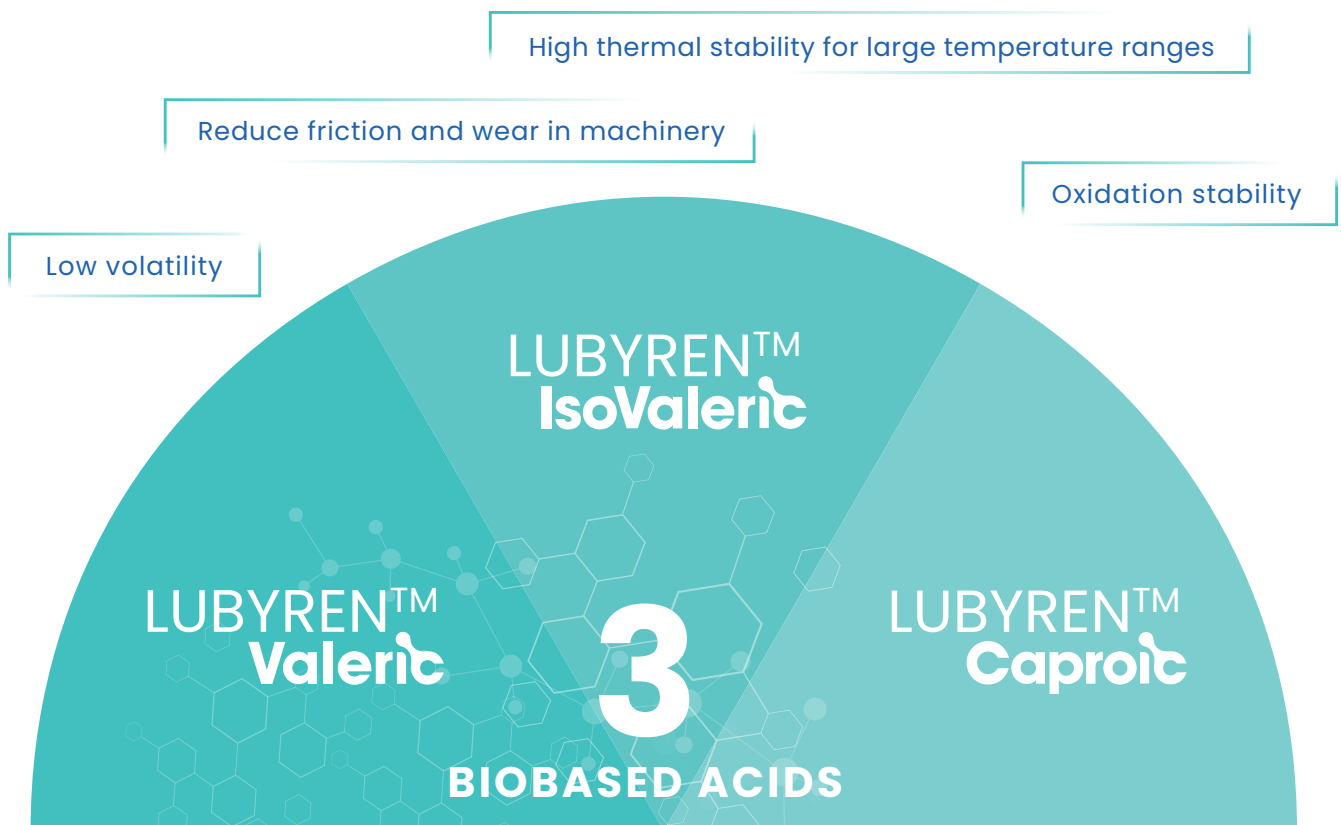
## TERRITORIAL REVITALIZATION

- Conversion of existing industrial sites
- Local value chains
- Employment

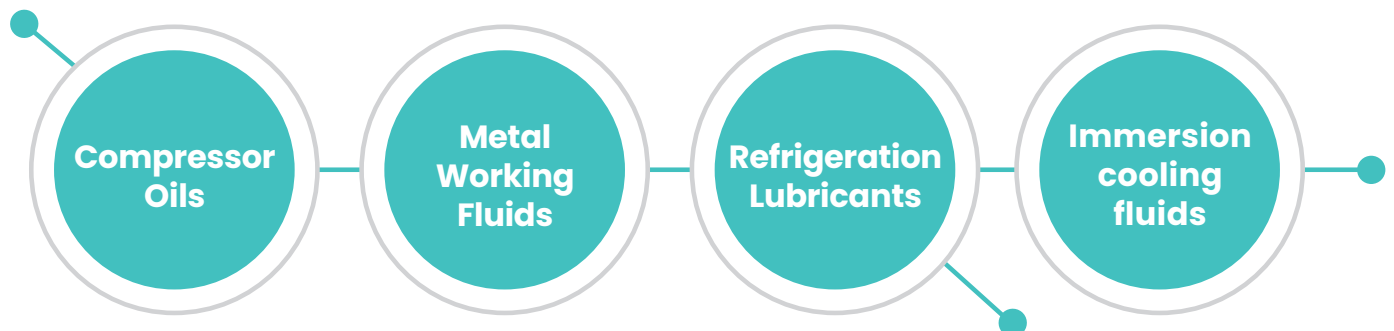
# LUBYREN™ 100% BIOBASED SOLUTION:

LUBYREN™ offers a range of unique high quality biobased organic acids, as building blocks for high performance lubricants and functional fluids.

Valeric (C5), Isovaleric (iC5) and Caproic (C6) acid are well known building blocks for Polyol Ester Lubricants.



## Main application :





## MORE ABOUT LUBYREN™ RANGE ?

- AFYREN is offering LUBYREN™, a range of 100% biobased Carboxylic Acids, as an alternative to the crude and palm oil derived acids that are already used in formulations for Lubricants
- So far supply of natural Valeric Acid (C5) does not exist in commercial amounts for the Lubricant industry
- LUBYREN™ Caproic Acid (C6) is a real sustainable alternative to the same acid made from palm oil (no harvesting of valuable resources as AFYREN acids are made from agricultural by-products)
- LUBYREN™ acids are independent from the known dynamics in the market for crude derived olefins for synthetic lubricants which ensures both stable supply and prices
- Substituting conventional acids with LUBYREN™ acids can significantly accelerate the efforts to reduce greenhouse gas emissions and carbon footprint



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## Nature is the future

Now, more than ever it is time to move forward together towards a sustainable, competitive, innovative industry, combining ecology and economy. With its biomimetic process and its of range of seven 100% biobased acids, AFYREN is revolutionizing the world of chemistry, opening up a range of possibilities for innovation, new products and carbon footprint reduction.

**JOIN THE AFYREN INITIATIVE AND SEIZE NEW OPPORTUNITIES FOR COMPETITIVENESS.**



AFYREN SA au capital de : 349.513,30€ | RCS Clermont-Ferrand 750 830 457

Siège social : 9-11 rue Gutenberg • 63100 Clermont-Ferrand - FRANCE • +33 (0)4 73 90 51 16

[www.afyren.com](http://www.afyren.com)