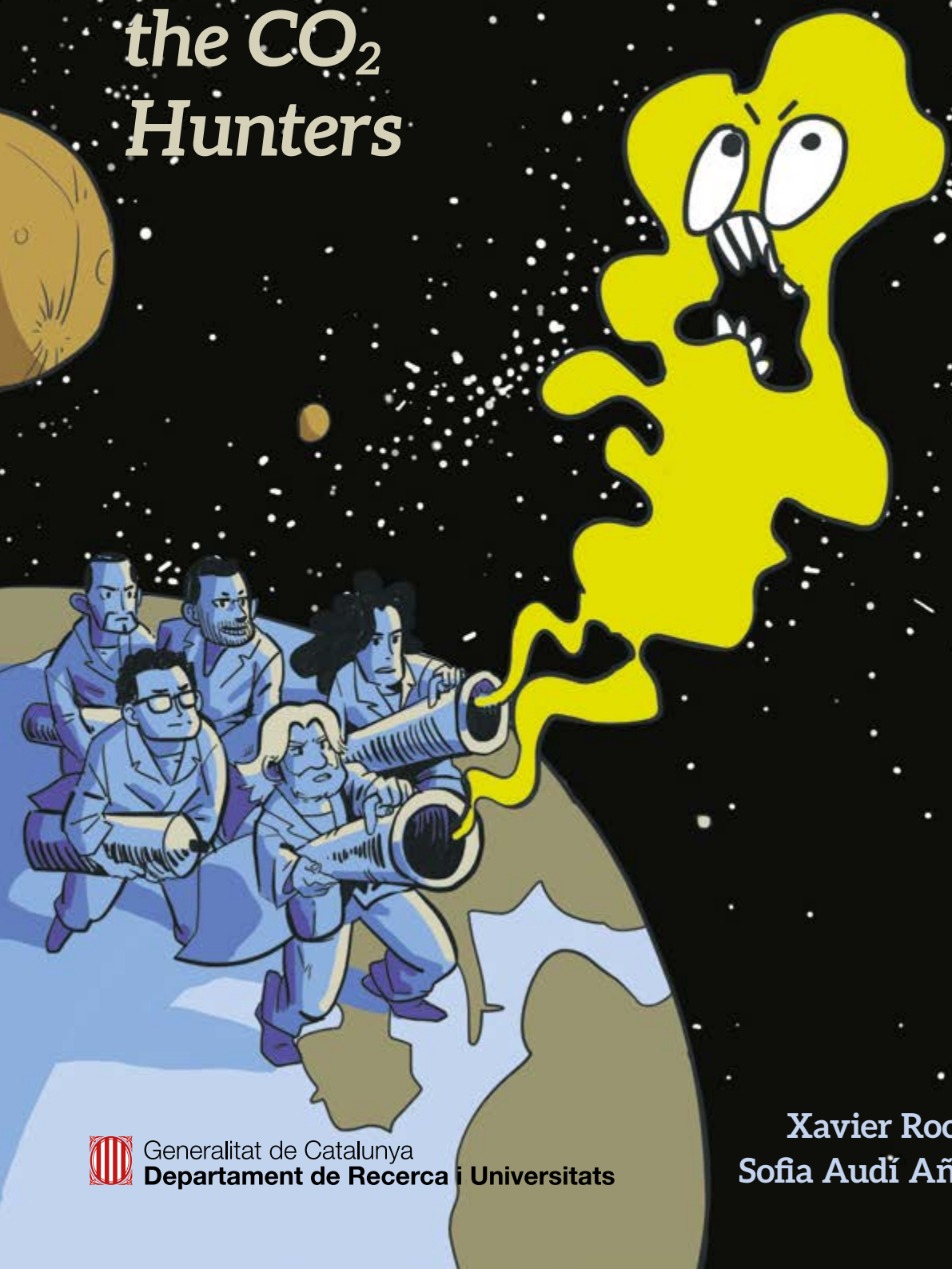


RecerCòmics n. 6

# Orchestra Sci.: *the CO<sub>2</sub>* *Hunters*



Generalitat de Catalunya  
Departament de Recerca i Universitats

Xavier Roca  
Sofia Audí Añó

The ideas developed at universities and research centres can end up as part of our everyday lives in the form of products, services and other innovations that make our lives easier. The *RecerCòmics* collection gives visibility to a selection of research centre spin-offs and knowledge transfer projects. This particular comic is about the company Orchestra Sci, which was born from research carried out at the Institute of Chemical Research of Catalonia (ICIQ).

The comics also showcase the work of young illustrators. This time it featured the work of illustrator Sofia Audí, former student of Plastic Arts and Comic Design at the Escola d'Art i Superior de Disseny (EASD) Pau Gargallo.

<http://universitatsirecerca.gencat.cat/recercomics>



**Xavier Roca (Barcelona, 1966).** His first interest was in becoming a comic book artist, but, looking for job stability and showing incredible foresight, he decided to study journalism. He has written cultural pieces and film reviews for the newspapers *Avui* and *El Punt Avui* and writes for *Catorze*, *El Temps de les Arts* and *Gran enciclopèdia catalana*. As a comic book and graphic humour scriptwriter he has had work published in *El Jueves*, *Avui*, *El Periódico* and *La Vanguardia* and currently writes and draws a monthly strip for the magazine *El Castell*.



**Sofia Audí (Rockets, 2002).** By the time she was ten it was clear that she would make comics her life. Since then, little by little, she has steadfastly worked towards that goal. While completing the advanced training cycles in Comics and Illustration at EASD Pau Gargallo in Badalona, she has taken part in events such as Graf and other exhibitions. Her work has also appeared in fanzines, such as the magazine *La Cripta*. And, of course, had the opportunity to create this story in comic book format together with Xavier Roca!

**Script:** Xavier Roca.

**Illustrations and cover art:** Sofia Audí.

**In conjunction with:** Toni Benages, teacher of Plastic Arts and Comic Design at the Escola d'Art i Superior de Disseny (EASD) Pau Gargallo, Elias Daura, José Luis León, Álvaro Reyes (CTO), Cristina Sáenz de Pipaón and José Ramón Galán-Mascarós (professor ICREA a l'ICIQ), from Orchestra Sci.

**Editorial board:** Joan Gómez Pallarès, Iolanda Font de Rubinat, Olga Alay, Salvador Maturana, Eloi Carbonell and Olga Campillo.

**Translation and correction:** Tys – Traducciones y Tratamiento de la Documentación, SL.

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Generalitat de Catalunya,  
Ministry of Research and Universities,  
Directorate General for Research.

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RecerCòmics n. 6

# Orchestra Sci: *the CO<sub>2</sub> Hunters*

Script:  
**Xavier Roca**

Art:  
**Sofia Audí Añó**



Generalitat de Catalunya  
**Departament de Recerca i Universitats**

IN A REMOTE CORNER OF SPACE,  
BEYOND THE REACHES OF GOOGLE  
EARTH...







OUR HEROES ARE ZAK, ZEK AND ZOK, A CRACK TEAM OF PROFESSIONAL EXTERMINATORS, WHO TRAVEL FROM PLANET TO PLANET RIDDING THE UNIVERSE OF PESTS AND INVASIVE SPECIES.

LET'S SEE... I'VE HEARD THAT OUR SERVICES MIGHT BE NEEDED ON EARTH.

KNOW ANYTHING ABOUT IT, ZEK AND ZOK? LOOKS LIKE THERE ARE SOME DANGEROUS BUGS THERE.



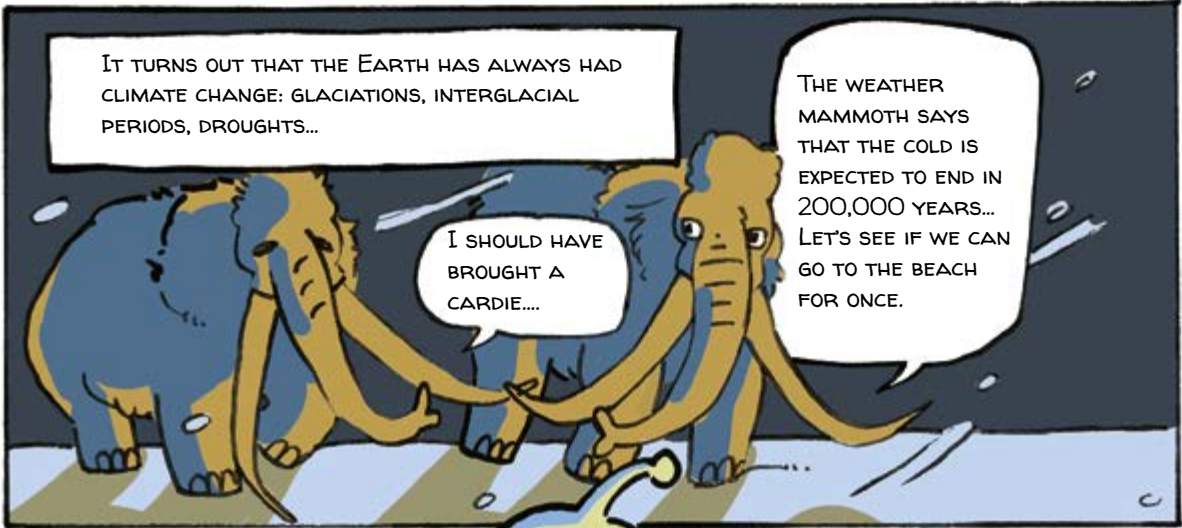
YES! YES! EARTH! THEY'VE GOT BEETLES THERE, MASTER ZAK! LICE! BEDBUGS! RATS! LOCUSTS!



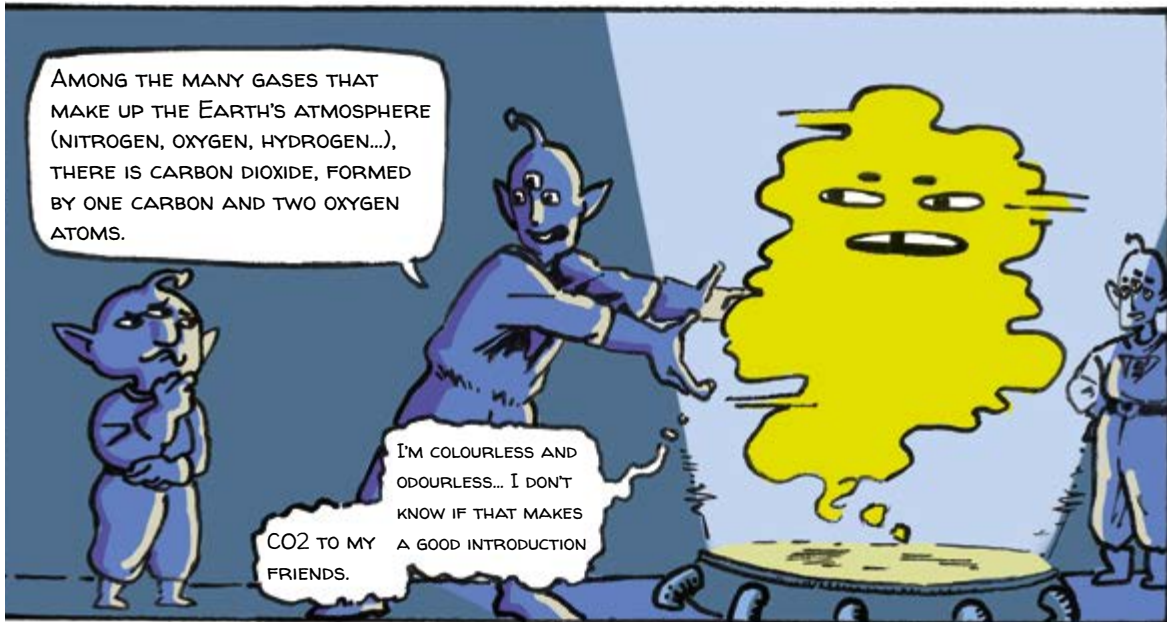
BUT WHAT'S EVEN WORSE... THERE ARE HUMANS THERE! PEOPLE!



OH, YES? AND ARE THEY DANGEROUS, ZOK? WORSE THAN THE GIANT WORMS OF ARRAKIS? OR THE XENOMORPHS FROM THE PLANET LV-426? OR THE DREADLOCKED PREDATORS? THOSE WERE FAR FROM EASY JOBS!

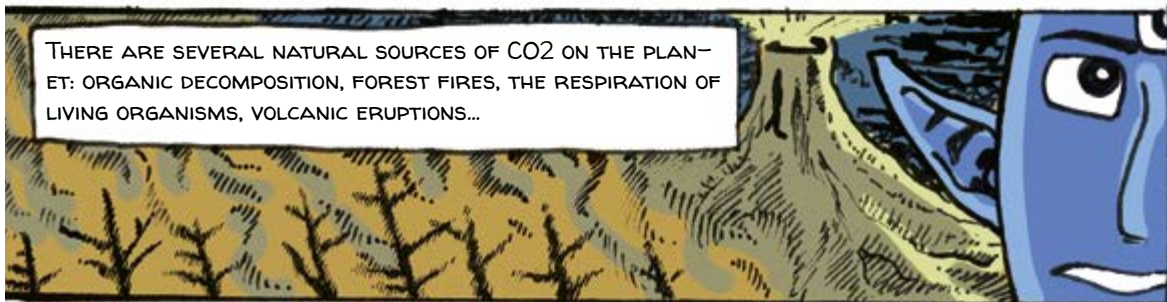




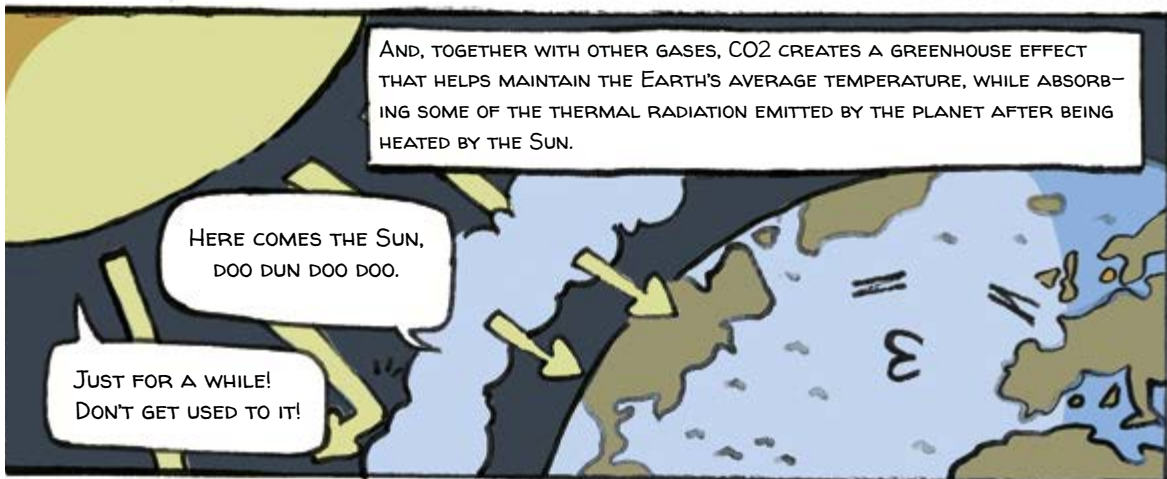


AMONG THE MANY GASES THAT MAKE UP THE EARTH'S ATMOSPHERE (NITROGEN, OXYGEN, HYDROGEN...), THERE IS CARBON DIOXIDE, FORMED BY ONE CARBON AND TWO OXYGEN ATOMS.

I'M COLOURLESS AND ODOURLESS... I DON'T KNOW IF THAT MAKES CO2 TO MY FRIENDS.



THERE ARE SEVERAL NATURAL SOURCES OF CO2 ON THE PLANET: ORGANIC DECOMPOSITION, FOREST FIRES, THE RESPIRATION OF LIVING ORGANISMS, VOLCANIC ERUPTIONS...



AND, TOGETHER WITH OTHER GASES, CO2 CREATES A GREENHOUSE EFFECT THAT HELPS MAINTAIN THE EARTH'S AVERAGE TEMPERATURE, WHILE ABSORBING SOME OF THE THERMAL RADIATION EMITTED BY THE PLANET AFTER BEING HEATED BY THE SUN.

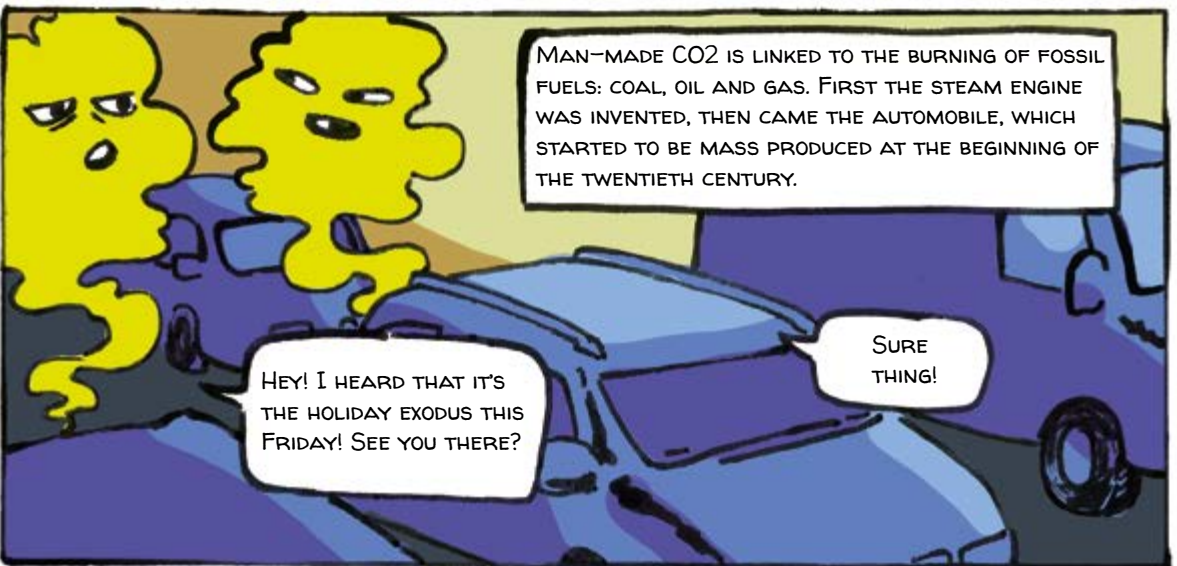
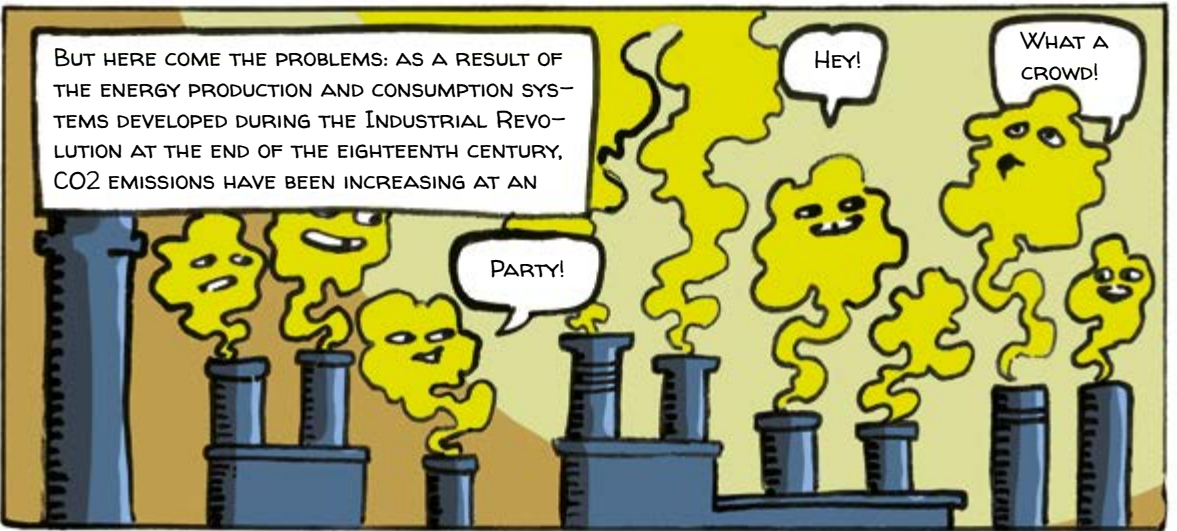
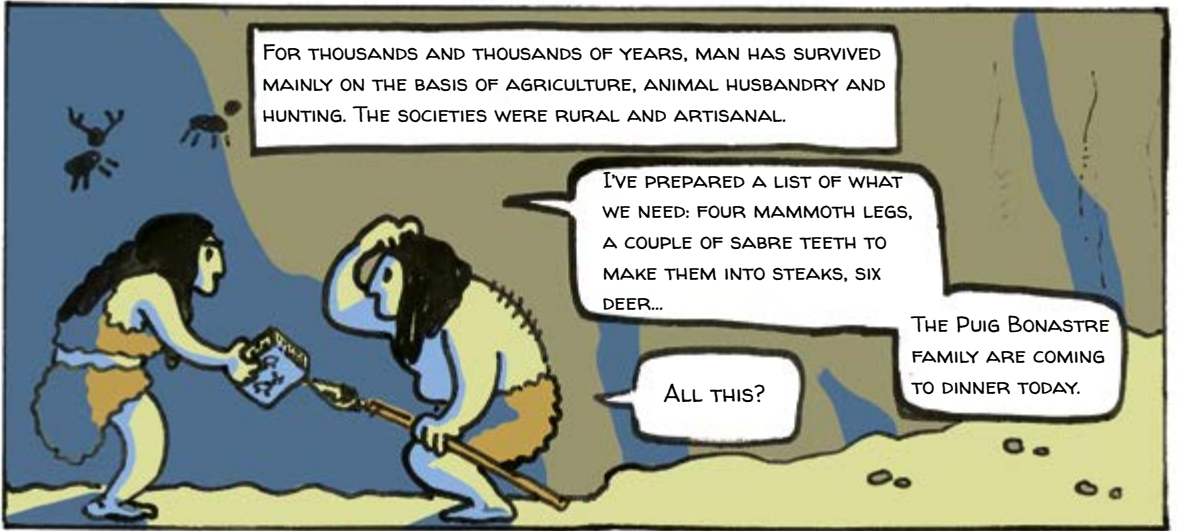
HERE COMES THE SUN, DOO DUN DOO DOO.

JUST FOR A WHILE! DON'T GET USED TO IT!



EVERYTHING SEEMS PERFECT SO FAR, DOESN'T IT?

JUST WAIT! NOW WE COME TO THE STORY OF WHAT'S BEEN HAPPENING OVER THE CENTURIES AND THE CURRENT SITUATION ON THIS PLANET.





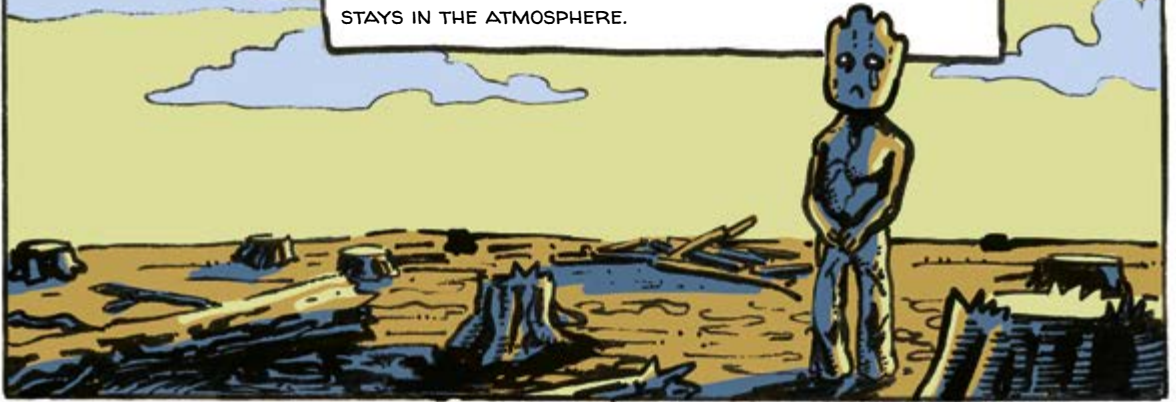
AND CO2 EMISSIONS SKYROCKETED AS A RESULT OF TECHNOLOGICAL DEVELOPMENT AND GLOBAL POPULATION GROWTH AFTER THE SECOND WORLD WAR.



AND WHILE THESE EMISSIONS WERE PREVIOUSLY CONCENTRATED IN EUROPE AND THE UNITED STATES, COUNTRIES, SUCH AS CHINA HAVE NOW JOINED THE PARTY. WITH ITS RAPID ECONOMIC AND INDUSTRIAL GROWTH, IT'S NOW THE WORLD'S LARGEST EMITTER OF GREENHOUSE GASES!

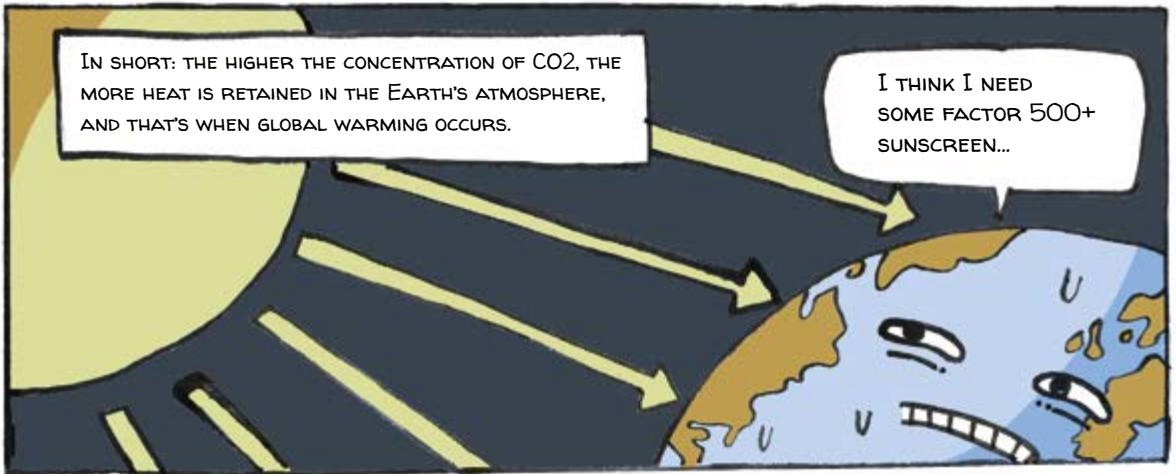


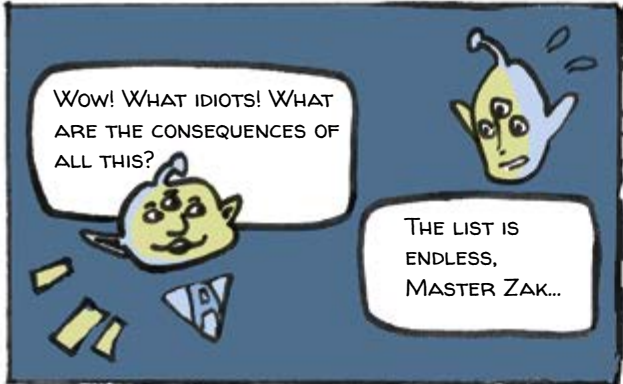
THE DEFORESTATION BEING CARRIED OUT FOR TIMBER EXPLOITATION AND LAND DEVELOPMENT DOESN'T HELP EITHER: WITHOUT TREES, WHICH ARE THE LUNGS OF THE PLANET, CO2 STAYS IN THE ATMOSPHERE.



IN SHORT: THE HIGHER THE CONCENTRATION OF CO2, THE MORE HEAT IS RETAINED IN THE EARTH'S ATMOSPHERE, AND THAT'S WHEN GLOBAL WARMING OCCURS.

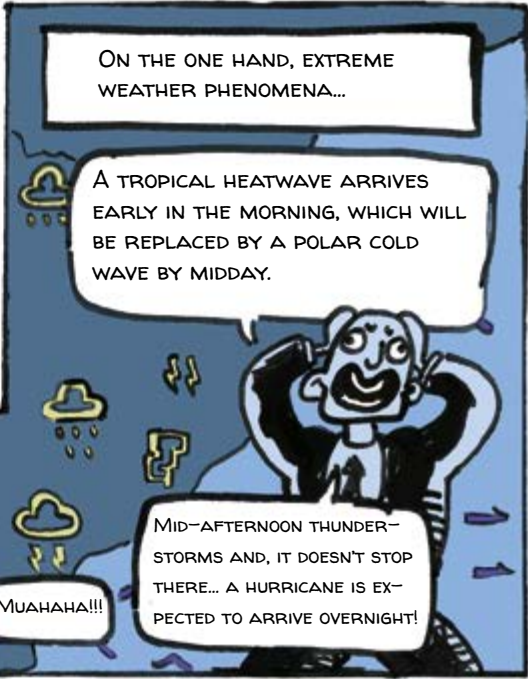
I THINK I NEED SOME FACTOR 500+ SUNSCREEN...





Wow! What idiots! What are the consequences of all this?

The list is endless, Master Zak...



On the one hand, extreme weather phenomena...

A tropical heatwave arrives early in the morning, which will be replaced by a polar cold wave by midday.

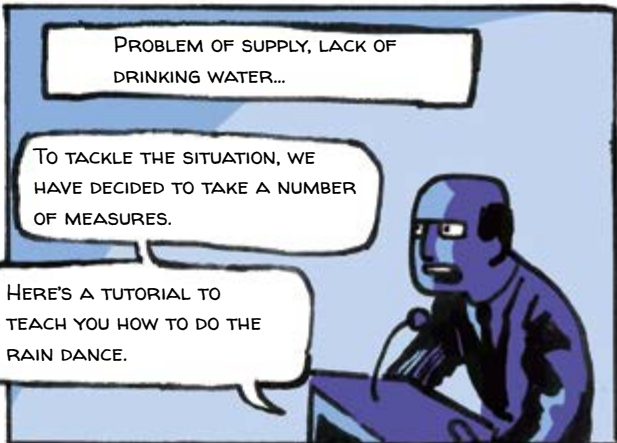
Mid-afternoon thunderstorms and, it doesn't stop there... a hurricane is expected to arrive overnight!

MUHAHAH!!!



Rising sea levels...

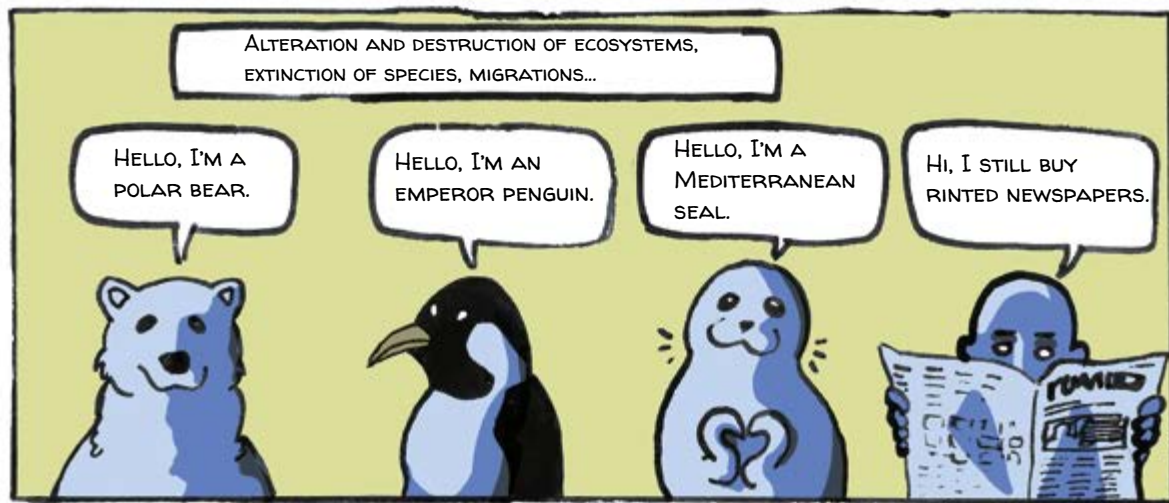
I bought a seafront apartment, and now I have an underwater one.



Problem of supply, lack of drinking water...

To tackle the situation, we have decided to take a number of measures.

Here's a tutorial to teach you how to do the rain dance.



Alteration and destruction of ecosystems, extinction of species, migrations...

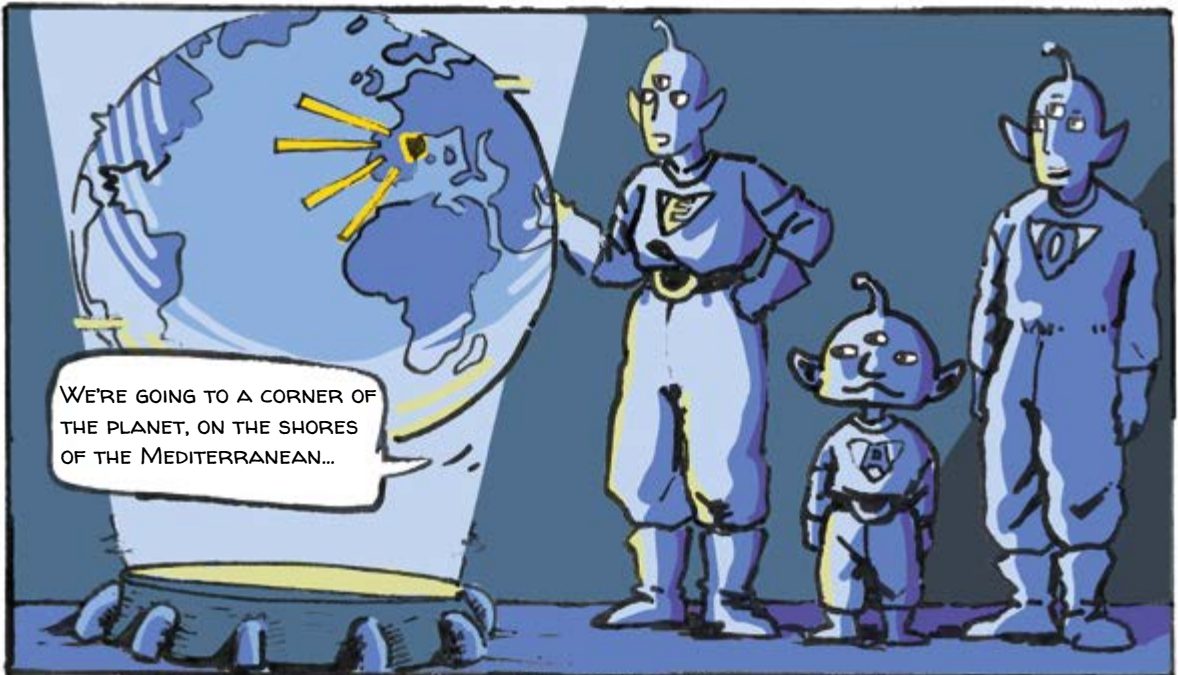
Hello, I'm a polar bear.

Hello, I'm an emperor penguin.

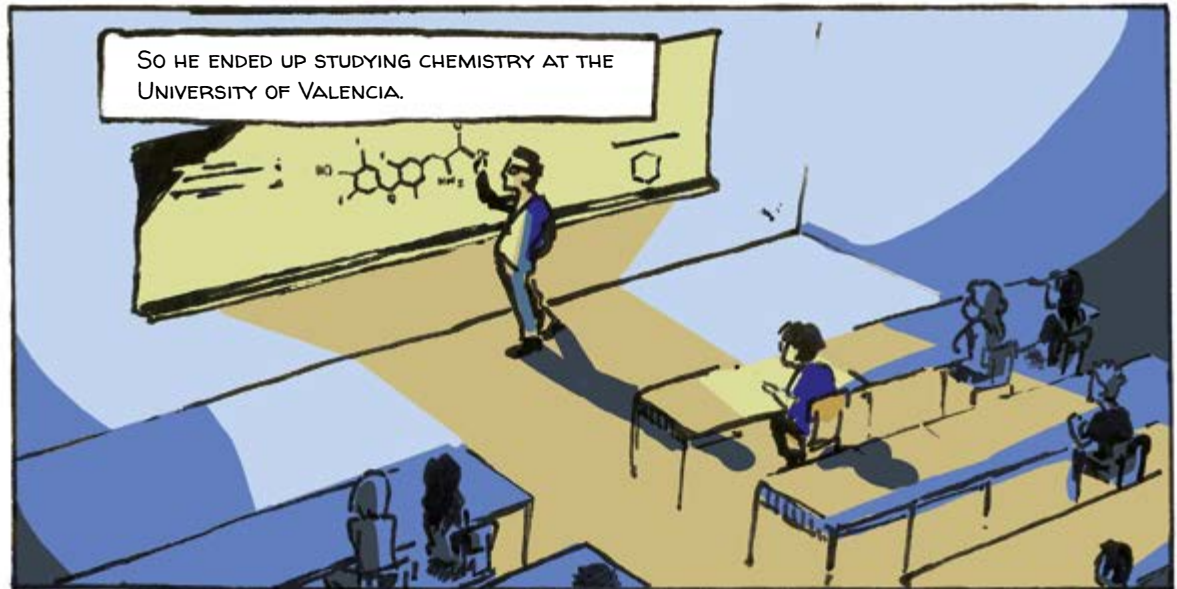
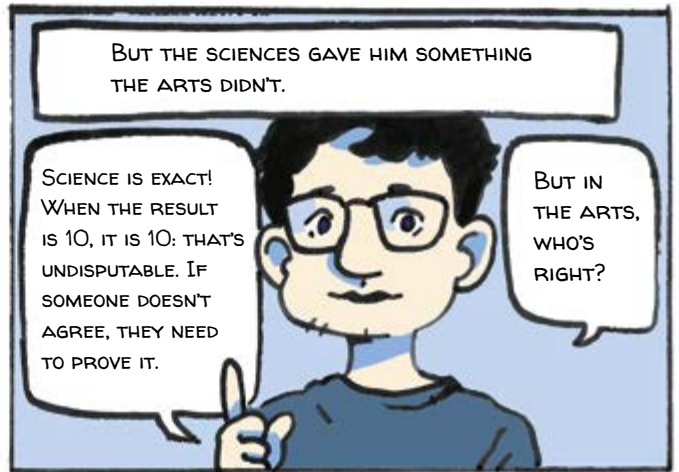
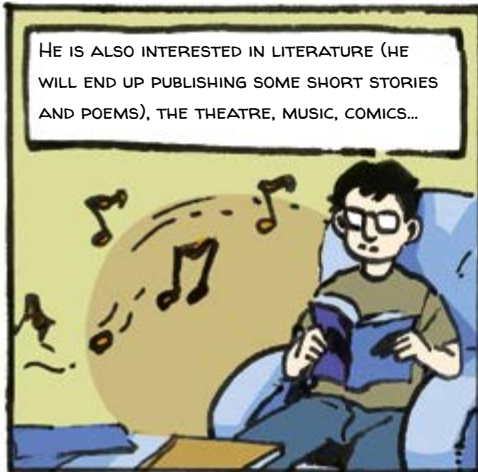
Hello, I'm a Mediterranean seal.

Hi, I still buy tinted newspapers.









UN COP ACABAT EL DOCTORAT VA ESTAR DOS ANYS I MIG A LA UNIVERSITAT DE TEXAS I DESPRÉS VA TORNAR A VALÈNCIA.

BY THE EARLY 2000s, THE GOVERNMENT OF CATALONIA HAD CREATED INSTITUTIONS, SUCH AS ICREA (CATALAN INSTITUTE FOR RESEARCH AND ADVANCED STUDIES) AND CERCA, TO COLLABORATE WITH UNIVERSITIES, PROVIDE OPPORTUNITIES FOR RESEARCHERS AND HELP IN THE DEVELOPMENT OF RESEARCH CENTRES.



ONE OF THESE CERCA CENTRES WAS THE ICIQ (CATALAN INSTITUTE OF CHEMICAL RESEARCH), IN TARRAGONA. AND WHEN JR ALREADY HAD ALMOST TEN YEARS' POSTDOCTORAL EXPERIENCE UNDER HIS BELT...

THE ICIQ WANT ME TO BE ONE OF THEIR PROFESSORS!

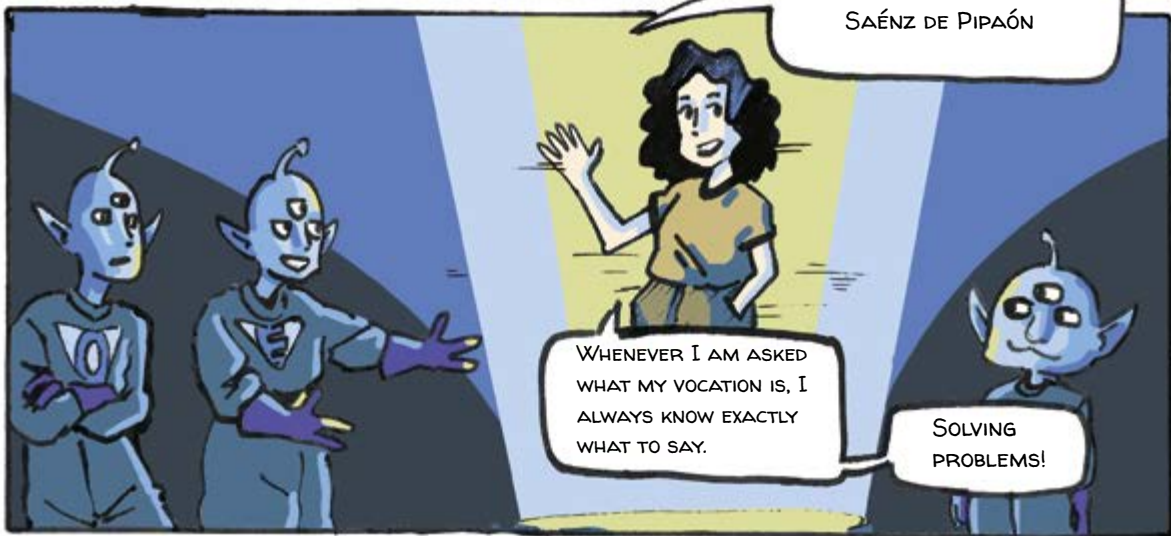
I'LL BE ABLE TO HAVE MY OWN RESEARCH GROUP THERE.



HMM... ALL VERY INTERESTING, BUT I'M NOT QUITE SURE WHERE YOU'RE GOING WITH ALL THIS.

PATIENCE! I'M GOING TO INTRODUCE YOU TO SOMEONE ELSE NOW.

THIS IS CRISTINA SAÉNZ DE PIPAÓN



WHENEVER I AM ASKED WHAT MY VOCATION IS, I ALWAYS KNOW EXACTLY WHAT TO SAY.

SOLVING PROBLEMS!



CRISTINA, BORN IN LA RIOJA, WANTED TO STUDY PHILOSOPHY, BUT HER PARENTS WEREN'T AT ALL CONVINCED. MERLÍ HADN'T COME OUT YET!

BUT THAT'S NOT GOING TO GET YOU A JOB, MY LOVE....

PHILOSOPHY IS SOMETHING YOU CAN DO IN YOUR SPARE TIME....

SHE FOLLOWED THEIR ADVICE, ALTHOUGH SHE SEES THINGS DIFFERENTLY NOW.

IF YOU'RE GOOD ENOUGH, I'M SURE YOU CAN MAKE A LIVING AT ANYTHING.

SO, YOU SHOULD DO WHAT YOU LOVE AND BE HAPPY!

IN ALPHABETICAL ORDER, AFTER PHILOSOPHY CAME PHYSICS, AND CRISTINA REALISED THAT, IN FACT, BOTH DISCIPLINES AIM TO DO THE SAME THING: UNDERSTAND THE WORLD.

PHILOSOPHY DOES IT THROUGH ABSTRACT THOUGHT, AND PHYSICS THROUGH FORMULAS AND MODELS.

SO SHE STUDIED PHYSICS IN ZARAGOZA AND DID HER DOCTORAL THESIS ON MAGNETISM.

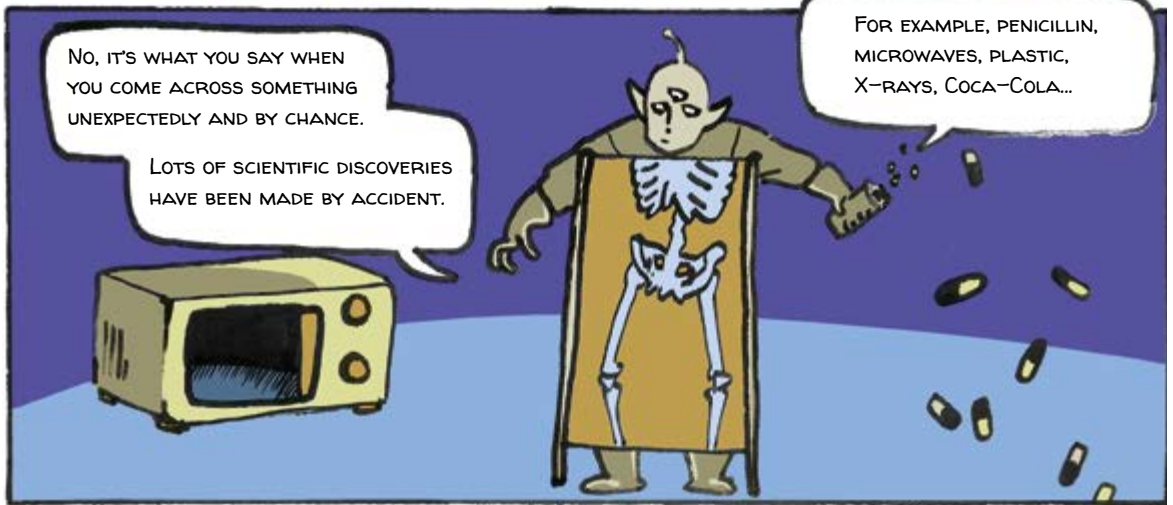
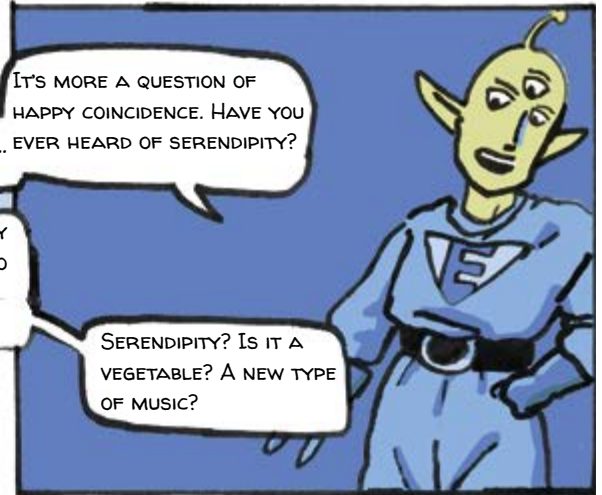
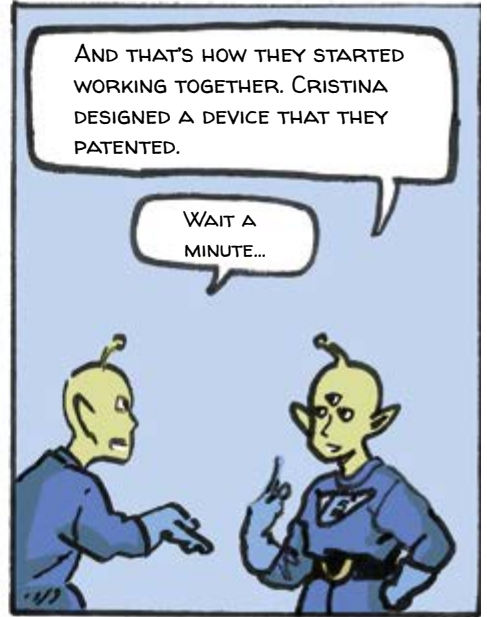
THE JOKER?  
THANOS? LORD  
VOLDEMORT?  
SAURON?

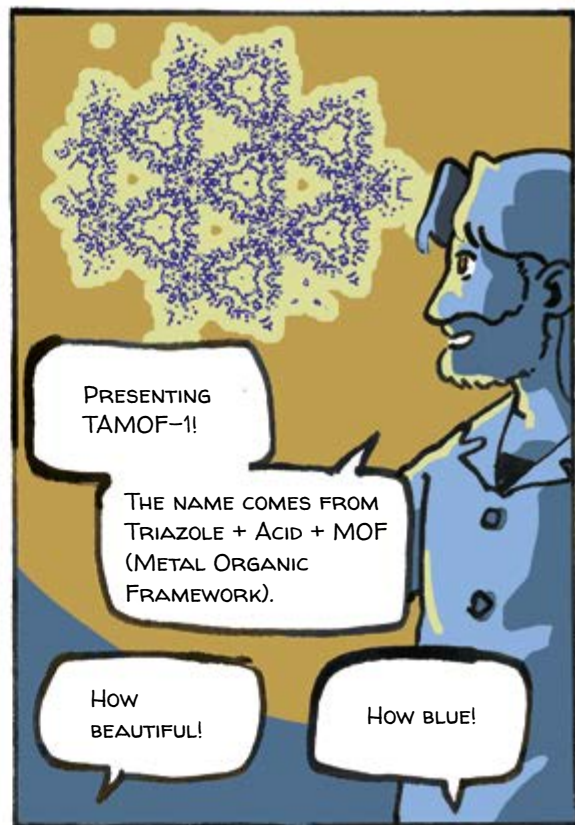
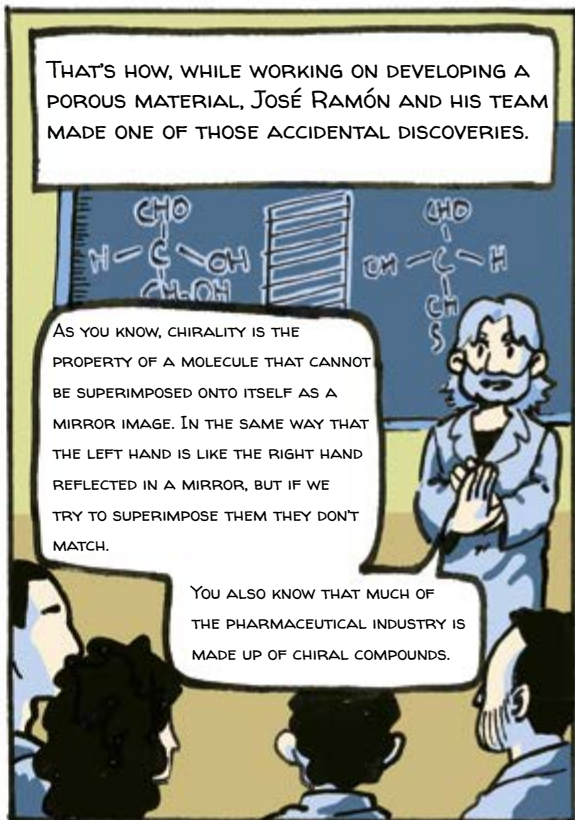
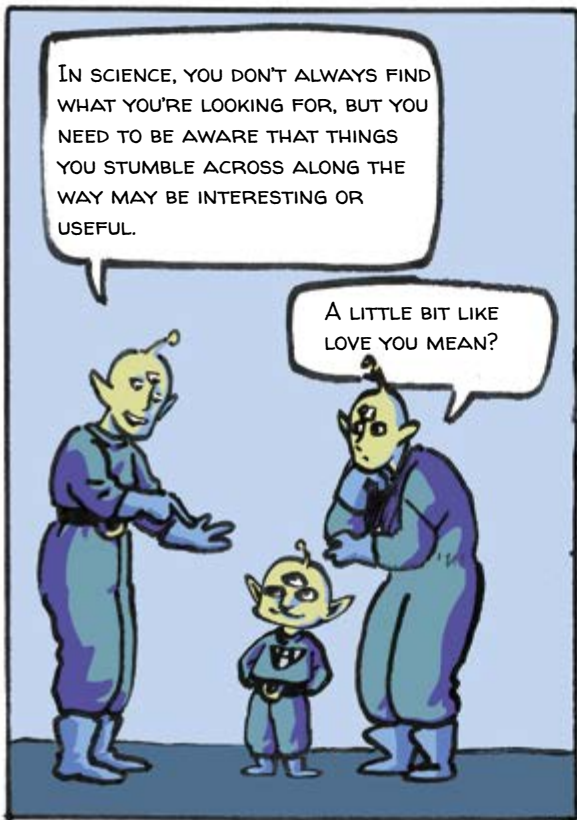
MY FAVOURITE VILLAIN HAS ALWAYS BEEN MAGNETO.

AND DO YOU KNOW WHO WAS ON HER THESIS COMMITTEE?

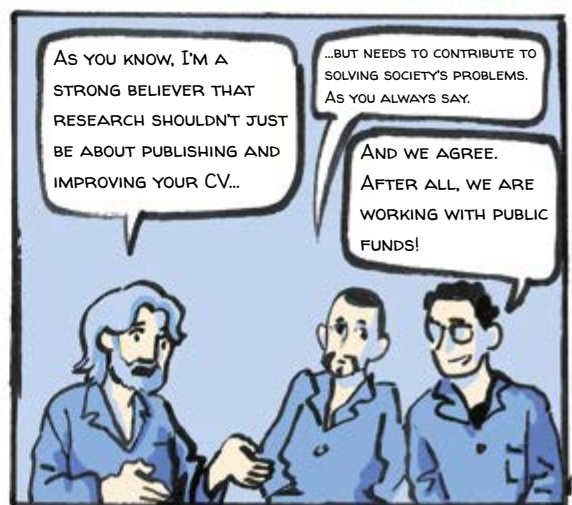
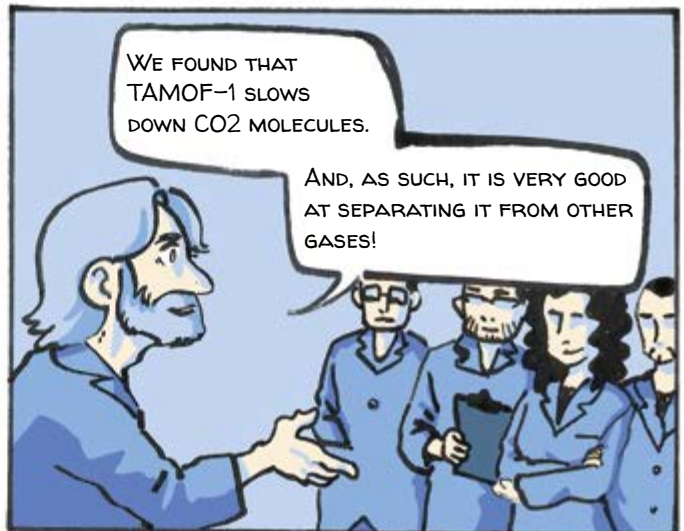
SURPRISE US...



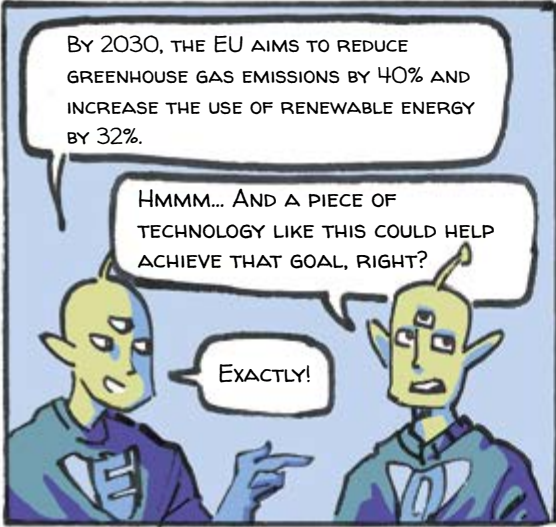








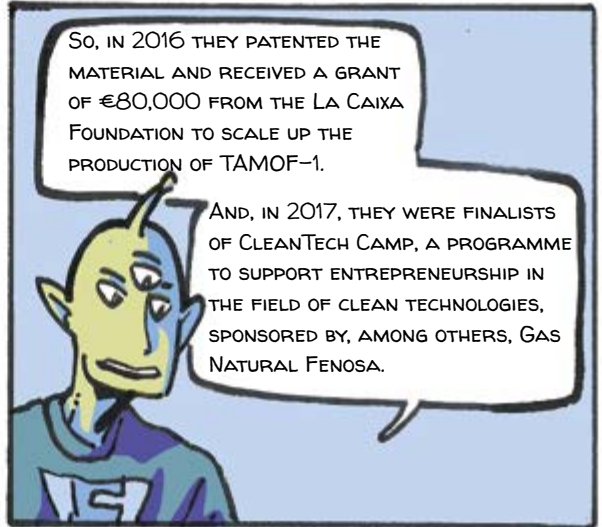




BY 2030, THE EU AIMS TO REDUCE GREENHOUSE GAS EMISSIONS BY 40% AND INCREASE THE USE OF RENEWABLE ENERGY BY 32%.

HMMM... AND A PIECE OF TECHNOLOGY LIKE THIS COULD HELP ACHIEVE THAT GOAL, RIGHT?

EXACTLY!



SO, IN 2016 THEY PATENTED THE MATERIAL AND RECEIVED A GRANT OF €80,000 FROM THE LA CAIXA FOUNDATION TO SCALE UP THE PRODUCTION OF TAMOF-1.

AND, IN 2017, THEY WERE FINALISTS OF CLEANTECH CAMP, A PROGRAMME TO SUPPORT ENTREPRENEURSHIP IN THE FIELD OF CLEAN TECHNOLOGIES, SPONSORED BY, AMONG OTHERS, GAS NATURAL FENOSA.



THEIR PARTICIPATION IN THE CLEANTECH CAMP WAS INSTRUMENTAL IN TAKING A BIG STEP: SETTING UP THEIR OWN COMPANY.

THERE'S NO LONGER ANY DOUBT: WE HAVE EVERYTHING IN PLACE TO LAUNCH A START-UP.

WE CAN TRANSFER THE PATENT OF OUR TECHNOLOGY TO THE NEW COMPANY AND LOOK FOR FINANCIAL SUPPORT FOR ITS DEVELOPMENT.



WE ALREADY HAVE EVERYTHING WE NEED TO GET UNDERWAY.

A VALUE PROPOSITION THAT SOLVES A NEED TO BENEFIT CUSTOMERS AND SOCIETY.

A NEW AND DIFFERENT IDEA, SOMETHING THAT DOES NOT YET EXIST ON THE MARKET.



AND, ABOVE ALL, WE HAVE A TEAM.

EXACTLY... A MULTIDISCIPLINARY TEAM, ABLE TO SOLVE PROBLEMS IN A POLYPHONIC WAY, WITH EACH MEMBER IN CHARGE OF AN INSTRUMENT.

JUST LIKE A GROUP OF MUSICIANS!

I'VE ALREADY TOLD YOU ABOUT CRISTINA SAÉNZ DE PIPAÓN. SHE HAD BEEN IN A START-UP AND HAD A MASTER'S DEGREE IN INNOVATION MANAGEMENT. AND THANKS TO HER ABILITY TO COMMUNICATE, DISSEMINATE AND TRANSFER KNOWLEDGE, FOR A NUMBER OF YEARS, SHE WAS THE FACE OF THE COMPANY, SEEKING INVESTMENT, CONTACTS AND CLIENTS.

"IF YOU ARE A GENIUS IN SCIENCE, BUT KNOW NOTHING ABOUT BUSINESS AND FINANCE, YOU'VE GOT PROBLEMS. IN ADDITION TO BEING A CHEMIST, ELÍAS DAURA HAD A MASTER'S DEGREE IN BUSINESS ADMINISTRATION AND HAD ALREADY HEADED UP TWO SPIN-OFFS.



TO CREATE TECHNOLOGY, YOU NEED ENGINEERS. ÁLVARO REYES CARMONA IS A CHEMICAL ENGINEER, WHO DID HIS THESIS IN FRANCE: HE KNEW HIS WAY AROUND PIPES AND INSTALLATIONS, AND WAS ALSO AN EXPERT IN NEW ENERGIES

WE'LL CALL OURSELVES, ORCHESTRA SCI!

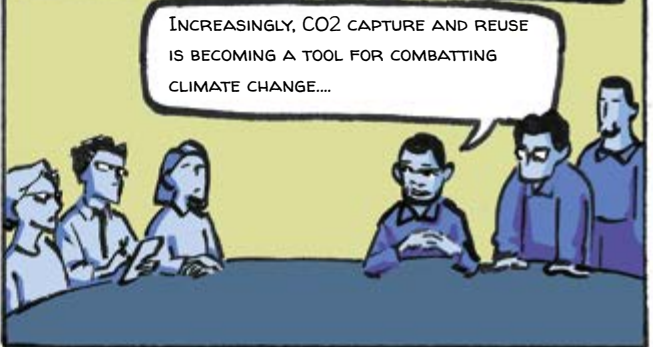
AND FINALLY, THEY NEEDED SOMEONE WHO UNDERSTOOD MECHANICS, WHO KNEW HOW TO BUILD HARDWARE; JOSÉ LUIS LEÓN, A MECHANICAL ENGINEER, WAS THE MISSING PIECE.



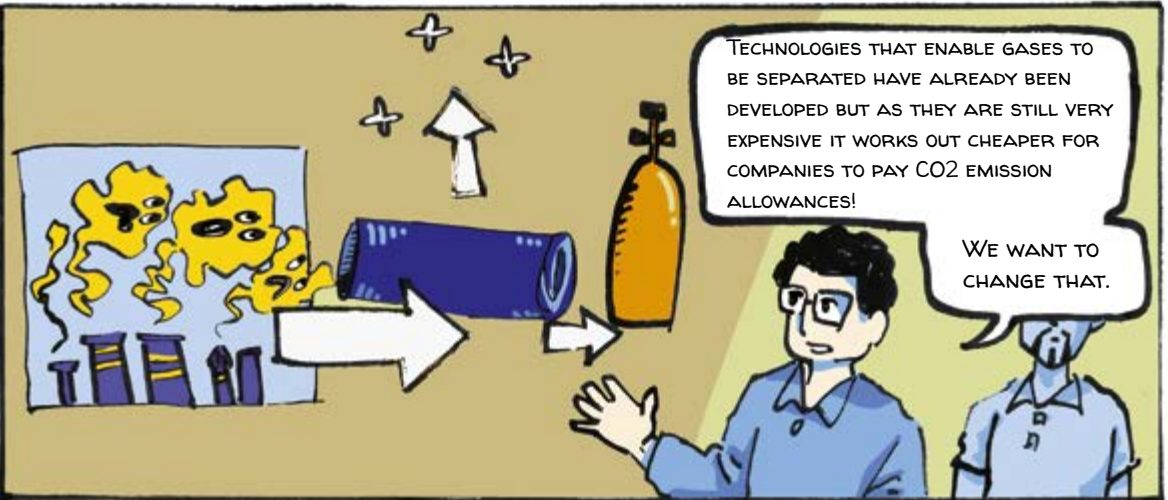


SO, FINALLY, AND THANKS TO THE SUPPORT OF THE ICIQ INCUBATOR SCHEME, THE ORCHESTRA SCI PROJECT WAS BORN. THIS IS THE FIRST TAMOF-1 MEMBRANE TO LEAVE THEIR LAB.

THEY SPENT TWO YEARS PARTICIPATING IN VARIOUS BUSINESS ACCELERATION PROGRAMMES (TARRAGONA OPEN FUTURE, BARCELONA ACTIVA, EMPENTA) AND RECEIVING SUPPORT FROM THE REPSOL FOUNDATION, DEVELOPING BOTH THEIR BUSINESS MODEL AND TECHNOLOGY. THEY WERE ALSO AWARDED A GOVERNMENT OF CATALONIA SGR GRANT (AIMED AT SUPPORTING RESEARCH GROUP ACTIVITIES).



INCREASINGLY, CO2 CAPTURE AND REUSE IS BECOMING A TOOL FOR COMBATTING CLIMATE CHANGE....

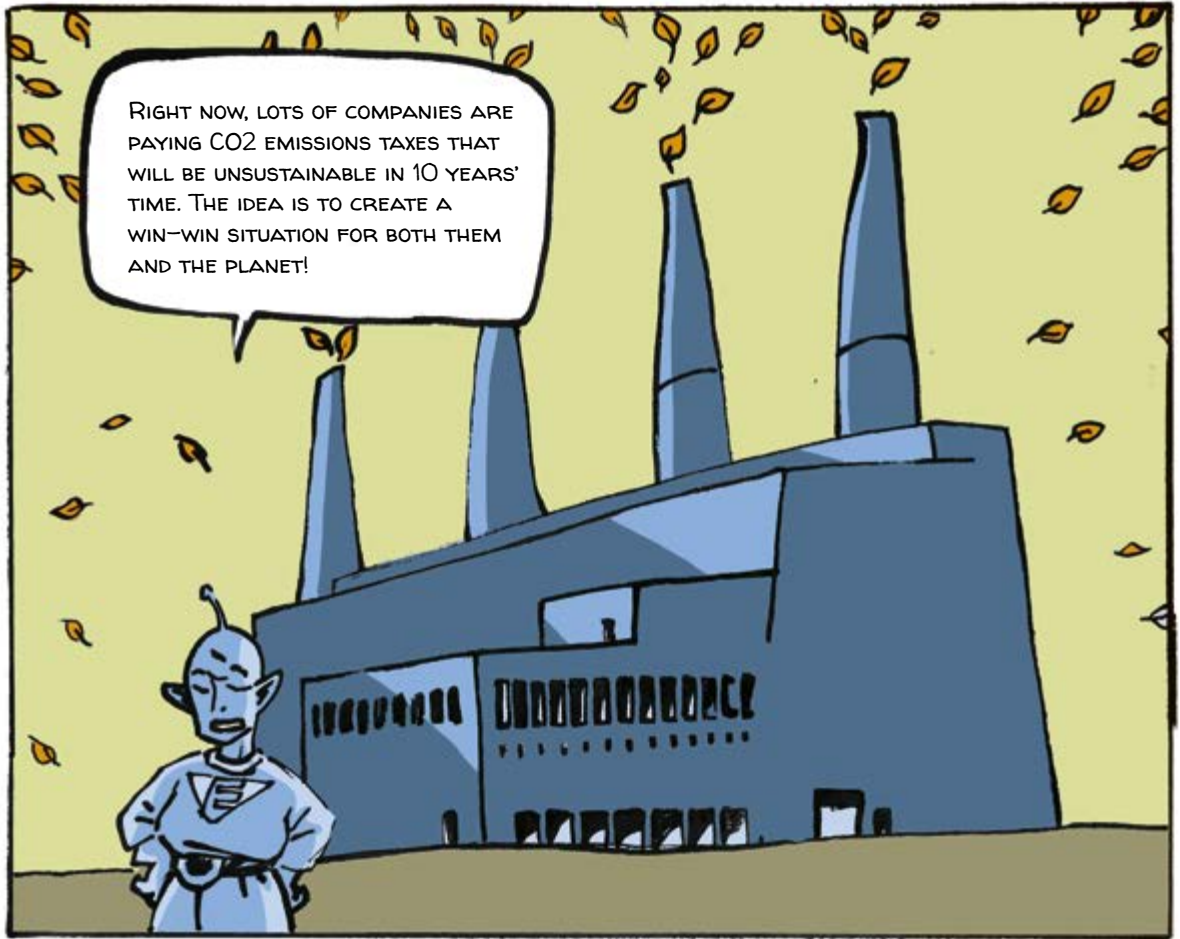
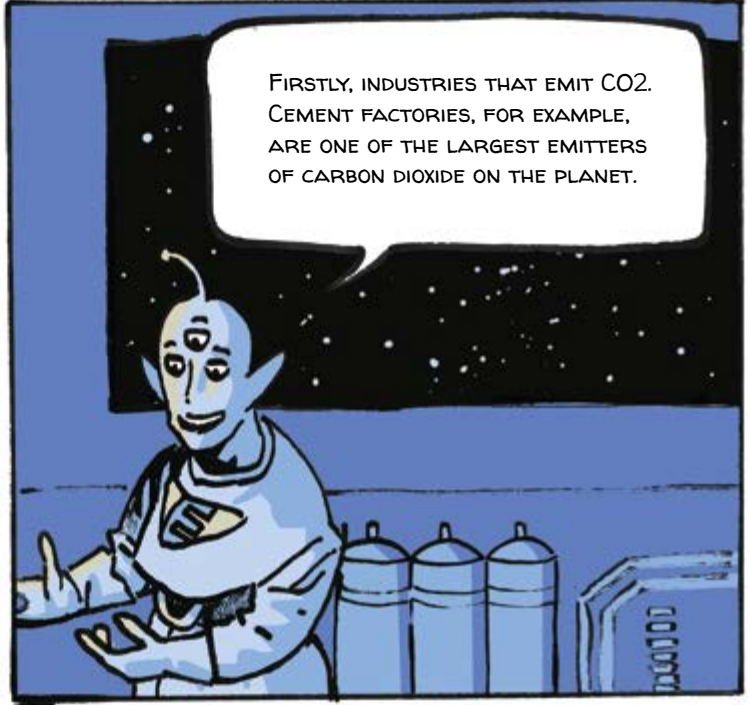


TECHNOLOGIES THAT ENABLE GASES TO BE SEPARATED HAVE ALREADY BEEN DEVELOPED BUT AS THEY ARE STILL VERY EXPENSIVE IT WORKS OUT CHEAPER FOR COMPANIES TO PAY CO2 EMISSION ALLOWANCES!

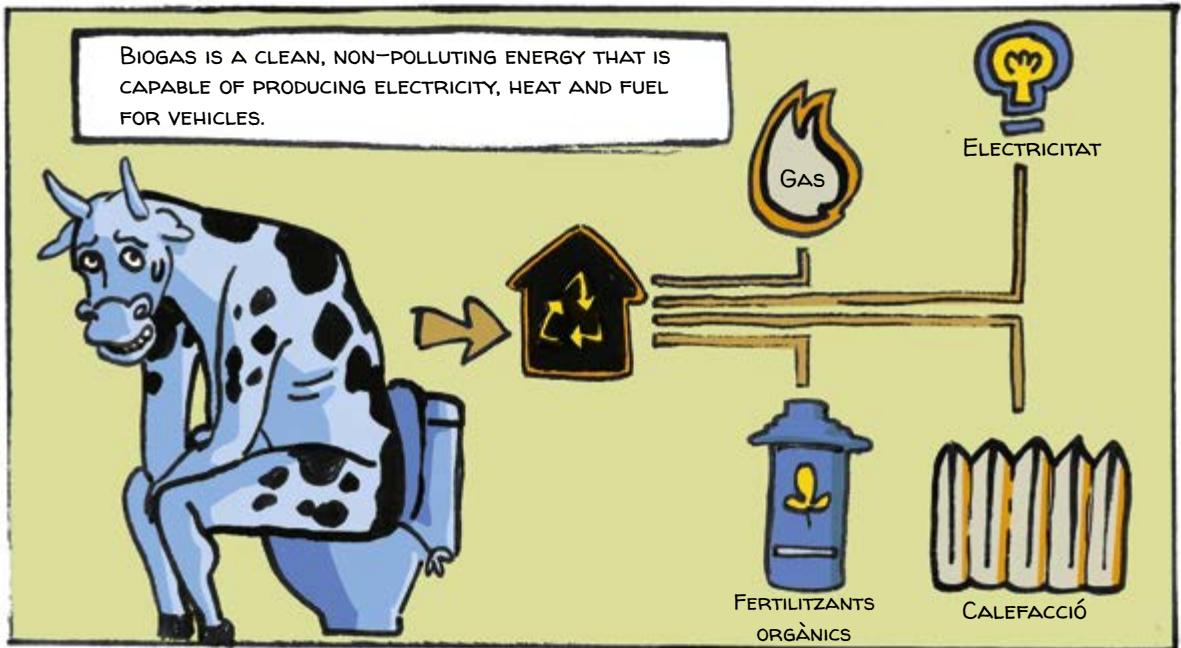
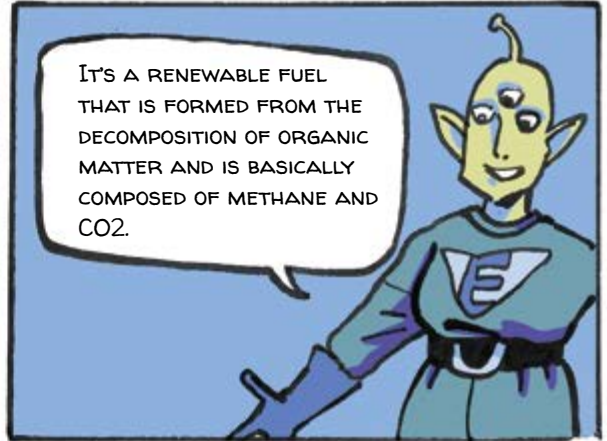
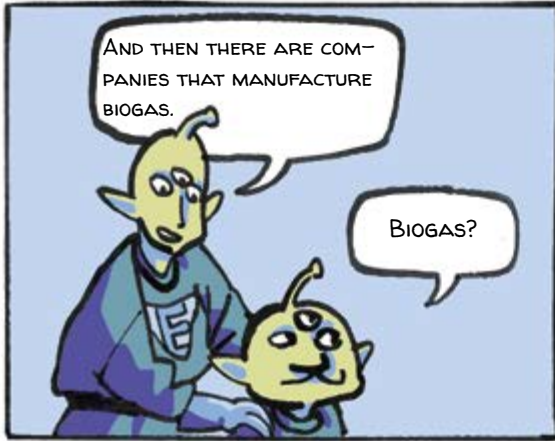
WE WANT TO CHANGE THAT.



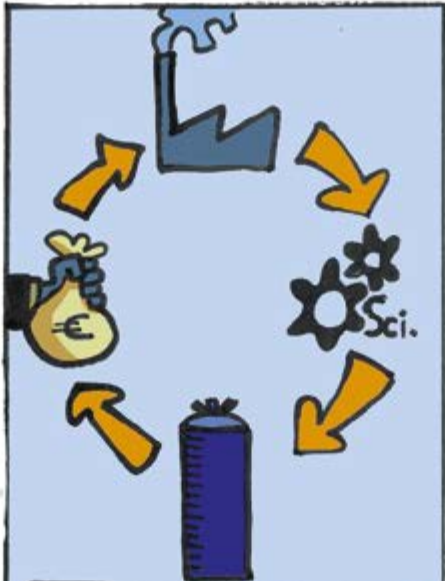
WE CAN PROVIDE ONE THAT IS ECONOMICAL AND MODULAR, WITH LOW ENERGY EXPENDITURE AND MINIMAL ENVIRONMENTAL IMPACT.







AND THE IDEAL CUSTOMERS WOULD BE ALL THOSE COMPANIES THAT, ON THE ONE HAND, EMIT CO2 AND, ON THE OTHER, HAVE TO BUY IT BECAUSE THEY USE IT IN THEIR PROCESSES.



IF, ONCE REFINED, THEY COULD USE THE SAME CO2 THAT THEY THEMSELVES HAVE PRODUCED, IT WOULD BE A PERFECT EXAMPLE OF CIRCULAR ECONOMY!

BUT WHAT IS CO2 USED FOR?

FOR LOTS OF THINGS!!! LET'S ASK THEM FOR SOME EXAMPLES...

FOR THE BUBBLES IN SPARKLING WATER...

FOR BEER AND OTHER BEVERAGES THAT REQUIRE A FERMENTATION PROCESS....

TO PRESERVE MILK SO THAT IT CAN LAST LONGER...

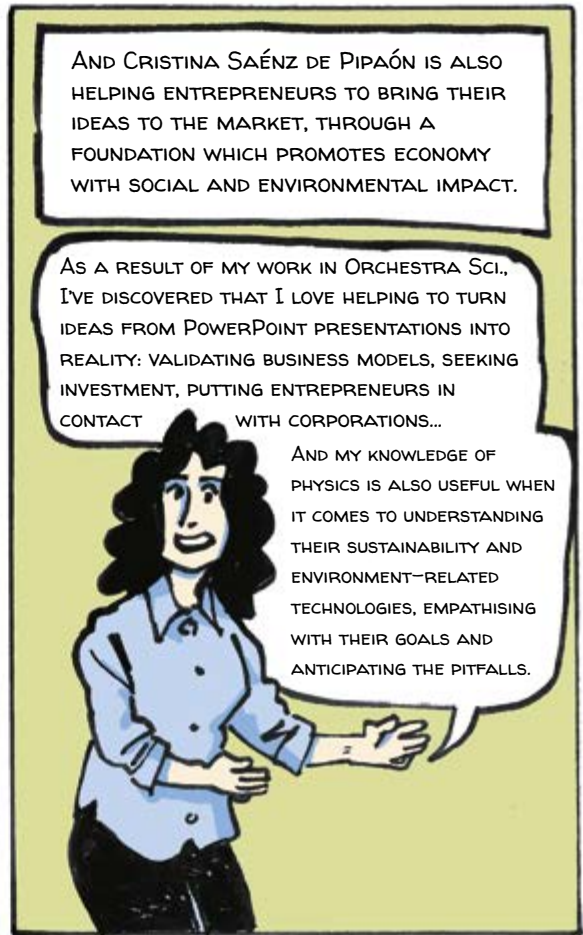
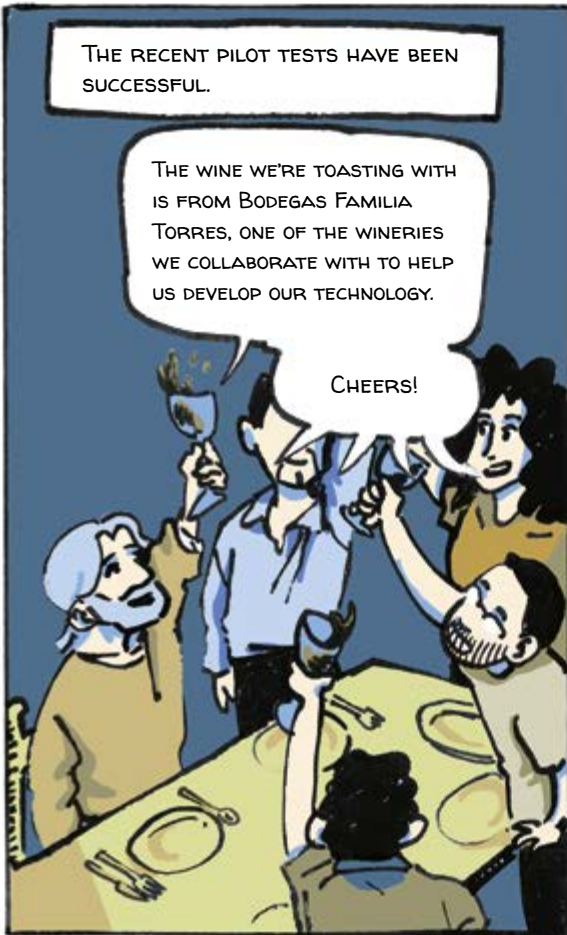
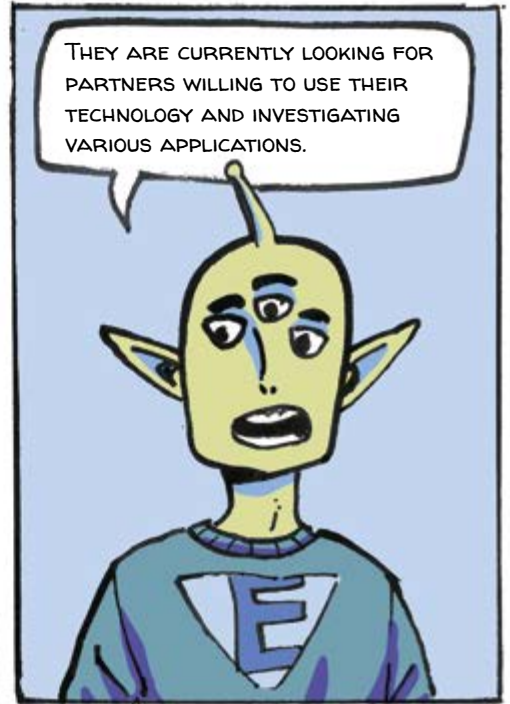
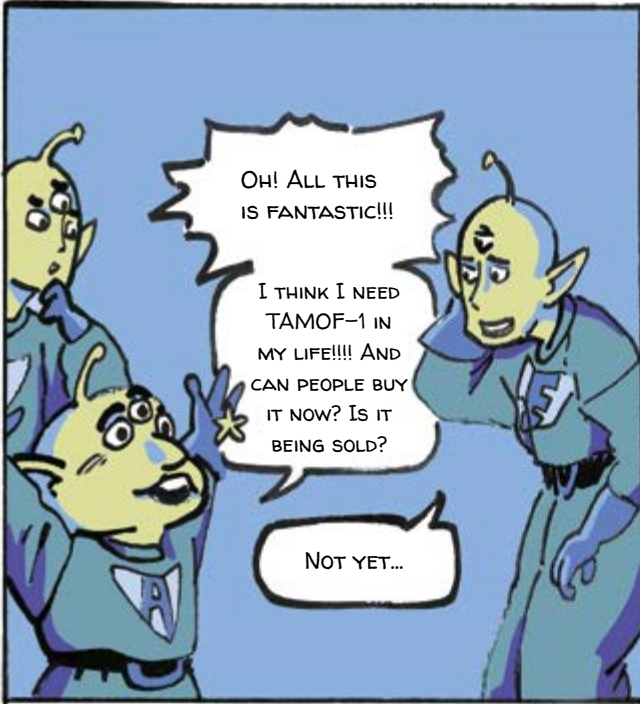
TO DECAFFEINATE COFFEE...

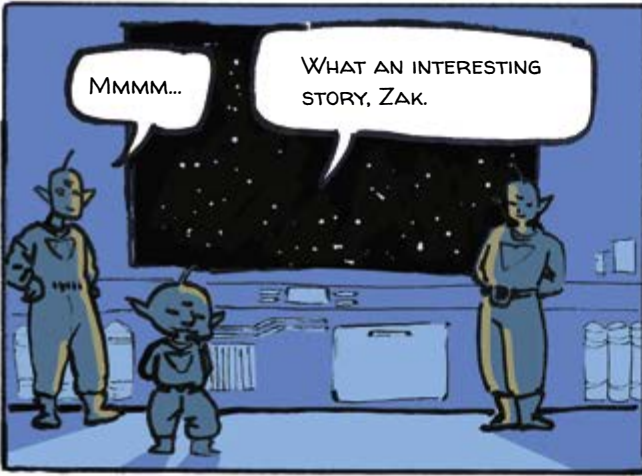
FOR FIRE EXTINGUISHERS...

FOR PACKAGING AND PRESERVING FOODSTUFFS, SUCH AS SALAD OR MEAT...

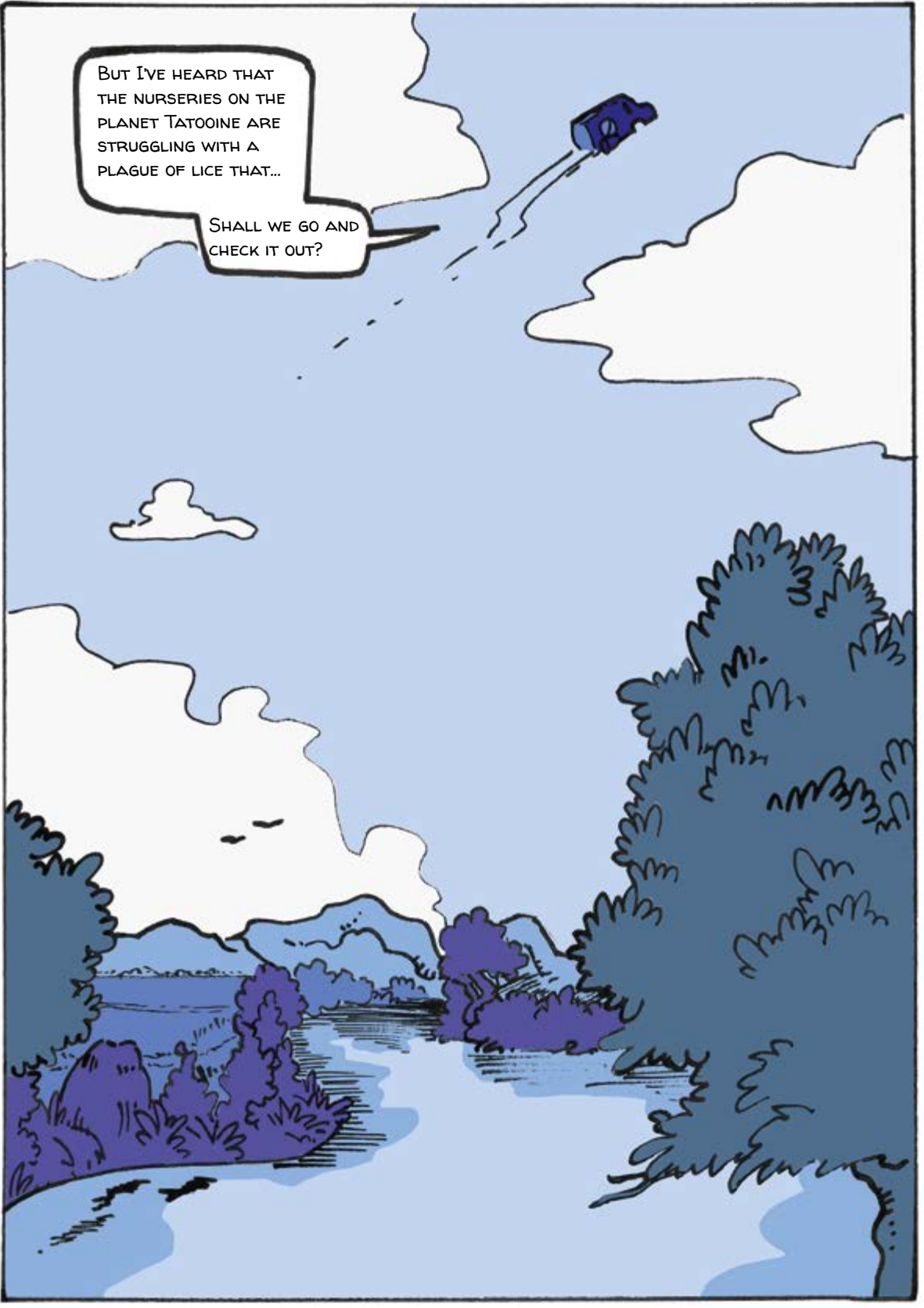
TO MAKE CEMENT MORE SUSTAINABLE, TO STUN ANIMALS BEFORE SLAUGHTERING THEM IN ABATTOIRS, TO SYNTHESISE ASPIRIN, TO MAKE FUEL...











BUT I'VE HEARD THAT  
THE NURSERIES ON THE  
PLANET TATOOWINE ARE  
STRUGGLING WITH A  
PLAGUE OF LICE THAT...

SHALL WE GO AND  
CHECK IT OUT?