

SETMATCH



Sustainable Desalination

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Plastic Eating Bacteria

The solution to the Plastic Soup?

Dutch Climate Policy

The Rise of Offshore Solar

What it's like

To study SET in Delft

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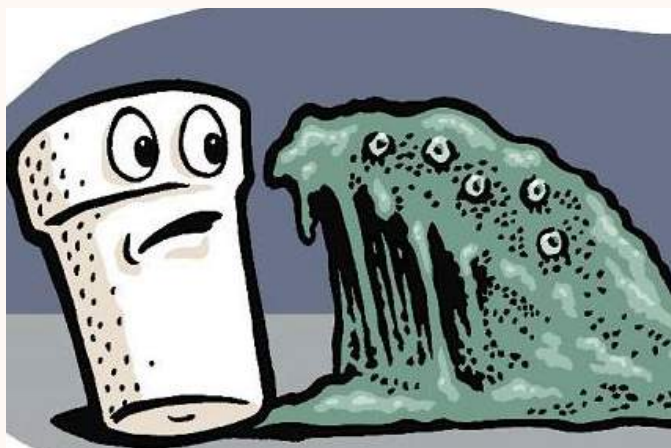
Serendipity leads to super-bacteria that degrades plastic

Leo Franco

The issue of plastic waste in the oceans is not a small one. In fact, over 8 million tonnes of plastic ends up in our oceans each year. This obviously has a very detrimental effect on marine ecosystems and, as plastics do not naturally degrade on a useful timescale, we must look to engineer new solutions to this problem.

In 2016 in a plastic recycling plant in Japan one such solution presented itself. A strain of bacteria known as *Ideonella sakaiensis* was discovered which breaks down polyethylene terephthalate (PET) plastic - this is the plastic used to make millions of plastic bottles. Japanese researchers expect the strain to have evolved very recently as PET plastic has only been in production since the 1940s. This discovery was understandably very exciting to the global scientific community.

Scientists working at the University of Portsmouth in the United Kingdom have now accidentally created a more effective version almost whilst working to validate its properties. When analysing how the enzyme, dubbed 'PETase', which allows the bacteria to break the plastics down was created, they decided to add some amino acids to test its structure.



This small act of serendipity led to a supercharged version of the enzyme which now degrades PET at a much faster rate. The average degradation time of 450 years has now been reduced to a number of days. What's more, the new strain is now also capable of degrading PEF plastics. This has massively raised the profile of the research and it is indicated that much further improvements are still possible.

The leader of the group, Professor John McGeehan, remarked 'It's well within the possibility that in the coming years we will see an industrially viable process to turn PET, and potentially other (plastics), back into their original building blocks so that they can be sustainably recycled'. Of course this is still at an early stage and so the full capabilities of this research are not yet clear. It is also not the first time nature has provided us with such a solution. Mealworms are known to digest polystyrene and waxworm caterpillars are also capable of breaking down plastics in a few hours.

This research is certainly exciting and we hope to see more successes from it in future. In any case, it would seem that accidents are still a powerful force in the human march for progress. If you are feeling stuck with your research, maybe try something different, who knows what might happen.

Elemental Water Makers

Yitzi Snow

I spoke with Sid Vollebregt, a SET graduate and the Managing Director at Elemental Water Makers. As an introduction to EWM, you can check out their [video here](#).

What is the vision of Elemental Water Makers?

Four billion people face water scarcity today, and the problem is increasing. Desalination is one of the solutions, because 70% of the earth is covered by water, 97% of that is sea water. But the problem with it is that a lot of energy is needed, and when energy is expensive, your water becomes expensive. But also, when this energy is being generated with fossil energy, we contribute to climate change, which contributes to water scarcity. So we find ourselves in this loop. And that is where EWM comes in. We have the goal to solve freshwater scarcity, using only the sea, sun, earth and wind.

What do your solutions look like?

Instead of using a battery, it's possible to use salt water as a buffer. We place a seawater tank on a hill and then with that we can run a desalination unit off the grid for 24 hours a day using solar energy. By one of our smart innovations, we can eliminate the elevation that we need by 80%. Of course it's limited to elevation so for other places we have battery based solutions or we have solutions that integrate into existing renewable energy systems. Based on how much water they need, and based on what kind of renewable energies they have, we design a custom solution. Then we ship the components, fly out there to install the systems, and train the local people for the operation and the maintenance.

How did you get started with EWM?

We were very lucky. Reinoud [Feenstra, Technical Director at EWM] and I, we found this thesis where we got the opportunity to investigate the existing solutions for water and renewable energy, and propose new ones. Our professor really liked one of them and he said, I have a friend in Indonesia, we can build a system there. We spent six months of our project in Bali - not a bad place to do a thesis. Because the technological solution worked quite well we said, let's start a company. That has been since April 2012, and this is now a patented technology worldwide.

What are some of the challenges that you're working on right now?

As a SET engineer, people expect to be spending a lot of time on technology. But when you start a company it's not really about the technology any more- it's mostly about selling your technology. Our end users are located far away in Caribbean, Pacific, Mediterranean islands. Our biggest challenge is to get to these end users and convince them that the solution is out there and persuade them to invest.

Interview with Elemental Water Makers

What future projects are you looking into?

If you are a community in Madagascar, who's going to pay for the system? They have less than a dollar a day. So to reach these people we've created a foundation. We've formulated a project in Madagascar that we will in the next six months fundraise. We hope to execute more of these projects to really help the people that actually need drinking water the most.

What advice do you have for students who are interested in sustainable energy?

I think already many people that are in SET do it out of the awareness that we live in this fragile earth and that something needs to change, and that it's our generation, it's the young generation, that needs to power this change. Ask yourself, what is the value that I will add to the future and will I regret the decision that you don't dare to take. Start your own company, start your own initiative, find your dream job and never give up on it. Don't sell out.



Sid Vollebregt (left) and Reinoud Feenstra (right), at an installation in the British Virgin Islands

What opportunities are there now for students who want to join Elemental Water Makers?

We have business development internships available. We are looking for people with language skills and different cultural backgrounds to help us reaching out to end users to help us get entry to new markets. We've had people from the Seychelles, Lebanon, Spain, Greece, that have already done internships or thesis with us and that really helped us to enter new markets and to contact new customers. You can see the opportunities on our [website](#).

Floating wind turbines.. but *floating solar panels*?

Kritika Karthikeyan

Offshore wind turbines are already operating in both shallow and deep seas around the world, but so far a similar concept has not been extensively applied to solar energy collection. That, however, is changing gradually.

Many densely populated nations are finding it hard to locate large sections of land to dedicate to the development of utility-scale solar projects. For them, this means looking to the water to locate solar farms. In February 2018, it was announced that a consortium of six Dutch research institutes and companies (Oceans of Energy being one among them) had embarked on the design, construction and operation of the world's first offshore floating solar farm. Installing solar panels on large bodies of water such as lakes and reservoirs is one thing, but on the open ocean quite another!



Floating solar farm on top of an abandoned coal mine, China,

<https://futurism.com/china-built-huge-floating-solar-farm-top-deserted-coal-mine/>

The Dutch are not the first to consider the many benefits of locating solar generation offshore, China had similar plans to achieve their clean energy goals a few years ago. A 40 MW power plant lies in the central Anhui province of Beijing with 160,000 panels on a lake where once a coal mine rested. This facility surfaced around the same time President Trump decided to back out of the Paris Accord, giving China the spotlight in futuristic clean energy.

Despite the technological challenges like salt water, high waves, growth of algae and harsh natural conditions, experts believe that these issues are solvable and that sun at sea has a surprising potential cheaper than wind at sea. This technology definitely holds a lot of promise, so don't forget to read up more on it!

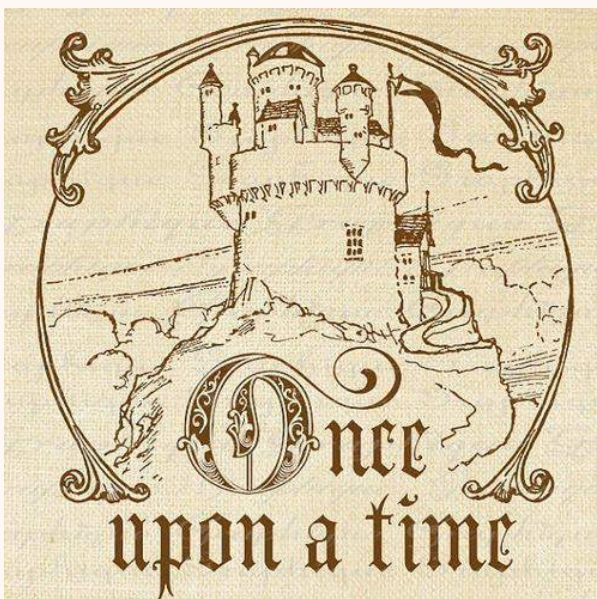
The story of the princess imprisoned by the dragon and rescued by the prince

Carlotta Ferri

Do you remember the first time your parents start telling you "Once upon a time..." and then a fascinating story with undefeatable heroes, beautiful princesses, terrible orcs and magicians had just started? Did you ever come back to these memories and asked yourself: why was I so amazed by these stories? The truth is that you are STILL enchanted by these fairy tales and this because they are made to make you feel good, to make you feel the hero you have never been (yet).

Algirdas Julien Greimas developed in 1966 the so called *actantial model*, which in narrative theory tries to find a structure behind narrations and its building blocks. It is recognized that, in order to build a story able to engage the public, the presence of six actors is undeniable: the *committer*, which sends the hero, the *hero*, who takes action, the *object* (sometimes also called the *princess*), which is the aim of the action, the *auxiliary*, which represents all kinds of help that the hero can rely on, the *aggressor*, which is the one that took the object away and impede the hero to reach it, and eventually the *receiver*, which is the one who needs the object back and from whom the object has been separated.

All participants have a vital role in the success of the story and if one of them is missing, the story simply will not leave you breathless anymore. At this point it is important to mention that literally everything can be put as one of these roles to build a story. It does not necessary need to be a person, not even a living being, what matters is that the roles are clear and publicly recognized. This way of storytelling is not only used to get children gobsmacked, but has a wide application in journalism, marketing and political speech. In particular, environmental politics makes use of this structure to push on the emotions of the public.



In 1995 the Brent Spar, a storage and tanker oil buoy owned by Shell UK, received the green light by the government to be disposed of in the Atlantic deep water, since it reached the end of its operational lifetime. The environmental organisation Greenpeace strongly argued against this disposal measurement, claiming the environmental calamity that this would have caused.

... *how environmental politics work*

Through a worldwide campaign, the organisation was able to stop the multinational from cheaply ending the life of the Brent Spar and forced Shell UK to dismantle it on land. How the environmental politics of Greenpeace worked to have such a great impact on an oil giant like Shell is all explained in the story telling used in their campaign. If we apply the actantial model, we can notice that all the aforementioned roles are filled up. Regarding the Brent Spar, Greenpeace made sure to involve in the campaign an image of a polar bear and a reference to Shell as the devil for the Arctic. In this case, Greenpeace became the story teller of the innocent arctic life (the *receiver*) whose living environment (the *princess*) is treated by the oil company (the *aggressor*).

The German government (the *committer*) objected the decision of the British government to support the dismantling offshore, responding to the protest of the organisation. In this scenario, Greenpeace (the *hero*) wants to save the arctic, sending helicopters, boats and eventually some courageous volunteers, that enchained to the platform, tried to stop its sinking. What people felt listening to this story was that all the roles were clearly distributed: Shell was the villain because it was going to damage the Arctic, while Greenpeace was the good, as it was putting all its desperate effort to save it. This feeling of recognizing distinctive roles makes people act as *auxiliary*. Why does Greenpeace need this approach? It is mainly due to the fact that people often do not have a real grip on what environmental damage means. The only way to sensitise them is with images showing a sad polar bear on a floating iceberg, better if the ice block is clearly too small for the animal. This touches the feelings of the public and make them emotionally aware of the instance of the global warming, even if they rationally do not know anything about it. Though this is how it works: did you ever ask yourself why the dragon imprisoned the princess?

Did you ever wonder why the hero was so committed to save her life? This did not happen due to the strict division of these roles. However, while it is reasonable that a child does not interrupt the father asking if the princess kingdom has already extended fundamental rights to the ethnic minority of the dragons or not, a critical mindset is of vital importance when coming to political decisions.



Introducing ... SET Alumni Committee

Andrew Keys

Working hard behind the scenes this year are the newly formed Alumni committee, another diverse branch of Delft Sustainable Energy Association. The committee officially started in November 2017, with the idea originating from Ibrahim Diab, Delft SEA founder, who wanted to facilitate networking between alumni of SET and for alumni to stay in touch with the current SET program. This is something already successfully implemented in other courses but has yet to be set up for SET. The plan is to maintain an online networking platform for alumni, alongside organising an annual alumni event at the TU Delft. A strong relationship between SET alumni and TU Delft can facilitate guest lectures, job opportunities and networking events; all of which would enrich both parties experiences.



Alumni Committee: (left to right) back row: Gerasimos Kanellos, Rayen Bosch, Rogier Tetteroo; front row: Maksym Semenyuk, Mariana Córdoba Parra, and Yash Tambi.

Under the supervision of Ibrahim, the committee consists of six SET students each taking a different role to create this platform and set the wheels in motion for next years committee to officially launch the platform. Please keep a look out for a launch event in the near future to find out how you can get involved and keep contact with your colleagues into the future!

My first-year experience in Delft

Stella Chtzisakoula

Coming first in Delft on August I didn't know what to expect either from the city or the university, so I was open to this new environment and new step into my life. First the introduction programme and then the kick-off had their role to introduce me to the university and my fellow students. The two first weeks in Delft helped me socialize and meet new people from different nationalities and cultures that now play an important role in my everyday life, here in Delft.

The very beginning in my studies is accompanied with a lot of studying and numerous group projects. At first, it was hard to cope with the fast pace of the challenging quarters and the strict deadlines, but now it is something that I prefer as it's making me more organized and more respectful for my free time and the activities that I choose to do. Group projects really helped me become more sociable, collaborative and hard-working, characteristics that will be very useful in my future career.



The unexpected, adventurous trip to Ghent.

SET is a master mostly consisting of internationals and in my opinion a master with extremely active students that are very close to each other. International dinners, parties, pubcrawls and of course Bouwpub are some of our outdoor activities. I have also visited various cities in the Netherlands during weekends and also during Christmas with their decorated and colorful markts, like Haarlem, Utrecht, Breda, Leiden, Zeeland, and Maastricht. Impressed by Keukenhof with the infinite colorful tulips and of course celebrated like a genuine Dutch girl the King's Day in Amsterdam. This year is also full of memories from trips both fully organized with 15 of us in Morocco, but also totally unexpected and unorganized, in the most adventurous trip I had in Ghent.

Living and studying in Delft

As time passes, the master is getting more and more into depth in the profile I have chosen. This last quarter appears to be the most challenging and insanely crowded with weekly deadlines and presentations. The SET program is more structured and organized, and very different from last year's that was more broad and general. Even though overall it didn't really meet all my expectations, I gained a lot of experience and knowledge in many fields and in many different levels.

Being now in my last quarter of this first year, I started scheduling the following year of my studies. The last months I started searching for an internship that is part of my study guide. As I am now in the most creative period of my life I wanted to get involved in a real project in a working environment, rather than choosing electives again with studying, again with exams. It appeared to be not a really easy task and rejections aren't pleasant for anyone, especially when you aren't rejected for your qualifications and skills, but for not being a Dutch speaker. These rejections made me find out the things that I really enjoy and will prefer to get involved with and eventually found an ideal internship for me and my needs as an engineer.



A life experience in Morocco.

To conclude, this first year in Delft for me is an unforgettable experience that definitely changed my life and the way of thinking towards duties and responsibilities. Patience and persistence are the values and the supplies I gained and will help me overcome any difficulty I'll face. The best is yet to come... Stay positive and always dream big!

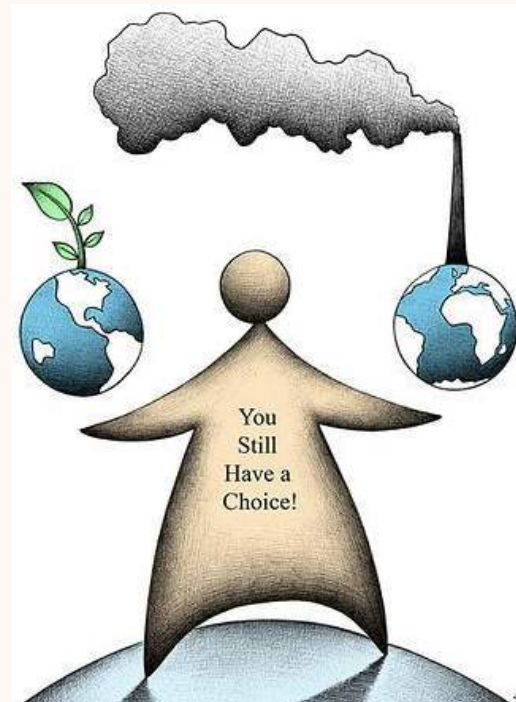
Young professionals influence government policy on climate

Thomas Spruit

Even though the newly formed government of the Netherlands is said to be 'the greenest ever', this is only true compared to the previous coalitions that lacked vision and ideas. Concretely, the policy plans are far from ambitious. The main focus will be end-of-pipe solutions, such as CCS. One could argue that CCS isn't a solution at all, since it does not promote sustainability in a circular economy. Additionally, the introduced minimum CO₂ price in the electricity sector will mostly affect the energy bills of citizens and to a lesser extent the costs of companies, which could turn public opinion against climate policy altogether.

Because those who create the policy today will be retired by the time the goals must be reached, a large movement was formed, consisting of young professionals passionate about climate and energy topics – in other words, those who will put the ideas into practice. They feel the younger generation of professionals should have a say in the policy-making process. Therefore, the Klimaat en Energie Koepel (KEK, Climate and Energy Umbrella) convinced politicians and policymakers it is essential that young professionals have a seat at the table in each sector relevant for the upcoming Climate and Energy Agreement of the Netherlands.

The main tables are Industry, the Built Environment, Electricity, Mobility, and Land Use and Agriculture. These tables each have links to think tanks formed by KEK. This way, young professionals can have significant input in the discussion as they work as a team and send their ideas to the main table. What is fascinating is that people with so many different backgrounds are brought together, from finance to farming and from fossil industries to sustainable start-ups. Examples of issues they tackle are whether to electrify all aspects of energy use or produce gas or fuels from renewable electricity, as well as storage possibilities. Focus points are cross-sectoral cooperation and connecting with all groups within society.



It is interesting to see the passion for bringing people together. This is emphasised time and time again. KEK acknowledges the transition can only work if everyone in society is on the same page, but goes further than just that; it sees the transition as an opportunity for social cohesion throughout all aspects of society.

The key message here is that many things are possible not only when individuals are bold and brave, but also when groups of enthusiastic people come together.

Welcome to the introduction programme of TU Delft

Stella Chatzisakoula

The first experience of a student in TU Delft is the Introduction Programme. That is why TU Delft pays so much attention on it, to make it special for the new international students. Coming in Delft last August I had the opportunity to have a really smooth start of my new step in my life with the unforgettable experience of the Introduction Programme. Games, volleyball in the sand, tours in the different academic spots of TU Delft and treasure hunt in the city center were just a few things that we did to get to know the city and communicate with new people from all over the world.

A good start is everything they say and I completely agree. So I really wanted the new students to have a similar experience as I had. That is the main reason I am participating in the Introduction Programme 2018 as a coach for the new entries of TU Delft. The schedule this year is a bit different than last year's. It is way shorter lasting for 5 days. The most important change is that both international and Dutch students can take part in. That's an ideal opportunity for the international students to get to know more the Dutch by interacting together in games and projects.



Introduction Programme 2017

The Introduction Programme this year is not "compulsory", meaning that students taking part are really willing to have this opportunity to get easily involved in the TU Delft's life. The Introduction Programme for the Master students will take place from 22 to 28 August. Delft SEA will be there as well as many other students associations for the new students to get to know them! Get ready for it! [Teaser](#)



INTRODUCTION PROGRAMME



A man with short brown hair, wearing a light blue button-down shirt and blue jeans, stands with his arms crossed and a smile. He is positioned in front of a large, complex metal electrical pylon structure. The background is a clear blue sky. The overall image conveys a sense of professional confidence and connection to the power industry.

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