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GREEN NEWS

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GLAVNI I ODGOVORNI UREDNIK
Olivera Krstić
EDITOR IN CHIEF

Rešenje sadašnjosti

Solutions for the present

REČ UREDNIKA — *EDITOR WORDS*

Dragi čitaoci,

Svet se danas suočava s izazovima koji zahtevaju hitnu akciju, ali i inspiraciju za promene. U ovom izdanju „Green News-a“ fokus stavljamo na obnovljive izvore energije i zaštitu životne sredine – dva ključna stuba održive budućnosti.

Obnovljivi izvori energije nisu samo tehnologije budućnosti; oni su rešenje sadašnjosti. Vetar, sunce, voda i biomasa pružaju neiscrpan potencijal da transformišemo način na koji proizvodimo i trošimo energiju, smanjujući emisije štetnih gasova i zavisnost od fosilnih goriva. Uz to, ulaganje u obnovljive izvore energije stvara prilike za otvaranje novih radnih mesta i razvoj lokalnih zajednica.

Zaštita životne sredine ide ruku pod ruku s ovim promenama. Svaka odluka koju donosimo – od načina na koji koristimo resurse do toga kako brinemo o prirodnim staništima – ima direktan uticaj na planetu koju ostavljamo budućim generacijama. Odgovornost je na svima nama, bilo da smo pojedinci, kompanije ili države, da uskladimo svoje aktivnosti s principima održivog razvoja.

Pozivamo vas da i vi budete deo ove promene – kroz informisanje, delovanje i podršku inicijativama koje čuvaju našu planetu. Jer svaki korak ka održivosti, ma koliko mali, ima značaj u velikoj slici.

Zajedno možemo oblikovati svet u kojem će harmonija između čoveka i prirode biti pravilo, a ne izuzetak.

Hvala vam što nas pratite na ovom putovanju.

S poštovanjem,
Olivera Krstić

Dear Readers,

The world today faces challenges that demand urgent action, but also inspiration for change. In this edition of „Green News“, we focus on renewable energy sources and environmental protection—two key pillars of a sustainable future.

Renewable energy sources are not just technologies of the future; they are solutions for the present. Wind, sun, water, and biomass offer an inexhaustible potential to transform the way we produce and consume energy, reducing greenhouse gas emissions and dependence on fossil fuels. Moreover, investing in renewable energy creates opportunities for new jobs and the development of local communities.

Environmental protection goes hand in hand with these changes. Every decision we make—from how we use resources to how we care for natural habitats—has a direct impact on the planet we leave for future generations. It is everyone's responsibility—whether individuals, companies, or governments—to align their actions with the principles of sustainable development.

We invite you to be part of this change—through awareness, action, and support for initiatives that preserve our planet. Every step toward sustainability, no matter how small, plays a crucial role in the bigger picture.

Together, we can shape a world where harmony between humanity and nature is the norm, not the exception.

Thank you for joining us on this journey.

Sincerely,
Olivera Krstić

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Siniša Mitrović

RUKOVODILAC CENTRA ZA CIRKULARNU EKONOMIJU PKS

Srbija ne zaostaje mnogo za EU u cirkularnoj ekonomiji

Dinamizirali smo regulatorni okvir i naša Vlada i resorno ministarstvo zaštite životne sredine već 2020 godine donose Program cirkularne ekonomije za Srbiju sa Akcionim planom mera do 2024. godine

Mi redovno istražujemo i anketiramo kompanije i preko 60% naše industrije prepoznaje navigator za budućnost i svesna je da ako ne preduzima promene u kulturi organizacije, nema opstanka na tržištu. Sve se odigrava dinamično i ako niste ušli u voz globalizacije onda rizikujete mnogo. Menja se DNK kompanija, inovacije su program gde se najviše investira, oprema i digitalizacija su važne, ali isto tako i nefinasijsko izveštavanje i kompanijski odnos prema lokalnoj zajednici (ESG standardi), kaže u intervju za naš magazin Siniša Mitrović, rukovodilac Centra za cirkularnu ekonomiju Privredne komore Srbije.

Kako biste ocenili trenutni status cirkularne ekonomije u Srbiji i u kojoj meri su kompanije i privredni subjekti svesni njenog značaja?

- Srbija je na vreme dekodirala budućnost i mi već od 2017. godine u Privrednoj komori Srbije imamo "parkiran" Centar za cirkularnu ekonomiju , kao prvu arhitekturu na Zapadnom balkanu , mnogo pre nego neke evropske zemlje. Centar je za 7 godina postao provajder održivosti i dekarbonizacije i iza nas su stotine radionica, direktnih radova sa kompanijama, univerzitetom, biznis zajednicom i najvažnije sa građanima. Nema te transformacije ako ona nije inkluzivna, ako njene institucije nisu inkluzivne i stvaraju prilike za dijalog i jednake šanse za promene posebno u upravljanju otpadom, otpadnim vodama i zaštitom vazduha. Dinamizirali smo regulatorni okvir i naša Vlada i resorno ministarstvo zaštite životne sredine već 2020 godine donose Program cirkularne ekonomije za Srbiju sa Akcionim planom mera do 2024. godine. Sada se radi novi Program do 2030 godine.

Ono što nas je sve poguralo ka cirkularnosti jeste sinergija kriza:pandemijska-zdravstvena, klimatska i ratna - kada se kidaju sigurni lanci dobavljača i sve postaje skuplje i manje dostupno. Možda su krize koje još pojačavaju, a posebno klimatski slom koji nanosi velike havarije javnoj infrastrukturi i poljoprivredi , bile šansa za PREUMLJENJE NACIJE , da se otreznimo od prejakog konzumerizma. Pojačali smo potrošnju resursa posebno ambalažu i delivery servise preko on line kupovine i značajnim generisanim količinama otpada. Ali za sve ovo vreme Evropa fabrikuje nove programe, Pariski sporazum o klimi, Green agenda, Zakon o kritičnim sirovinama, CBAM-karbon taksa, što celu našu industriju stavlja u nezavidan položaj jer mora da se brže i efikasnije dekarbonizuje, digitalizuje i da uvodi inovacije.

Cirkularna ekonomija u Srbiji ne zaostaje mnogo za EU, neke naše kompanije su uveliko cirkularne, ali ne zbog populizma nego zbog zdrave odluke da nije profit najvažniji. Ono što otežava tim kompanijama je što država trenutno nema mehanizam da potencira takve kompanije; da se razumemo ni EU nije rešila taj problem, ali uveliko raspravlja. Cirkularni proizvod je skuplji i samim tim ima nezdravu konkurenciju od istog proizvoda koji nije cirkularan. Trenutno se sa puno napora radi na sistemu merenja cirkularnosti tako da će svaki proizvod imati svoj takoreći pasoš u kojem će biti zabeležena i potrošnja energije i vrsta energije, vrsta sirovine, da li je korišćen reciklažni materijal i na kraju - kako se reciklira proizvod i u kom procentu. Biće u tom pasošu još podataka ali u svakom slučaju kupci će imati dosta informacija. Zelena transformacija je šansa koja se ne sme propustiti I može pogurati rast BDP zemlje do 1%.

Koje su najveće prepreke s kojima se Srbija suočava u implementaciji cirkularne ekonomije i šta Privredna komora Srbije čini kako bi se one prevazišle?

- Mi redovno istražujemo i anketiramo kompanije i preko 60% naše industrije prepoznaje navigator za budućnost i svesna je da ako ne preduzima promene u kulturi organizacije, nema opstanka na tržištu. Sve se odigrava dinamično i ako niste ušli u voz globalizacije onda rizikujete mnogo. Menja se DNK kompanija, inovacije su program gde se najviše investira, oprema i digitalizacija su važne, ali isto tako i nefinasijsko

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Siniša Mitrović

THE HEAD OF THE CENTER FOR THE CIRCULAR ECONOMY OF THE CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA (PKS)

Serbia Does Not Lag Far Behind the EU in the Circular Economy

We have dynamized the regulatory framework, and our Government and the Ministry of Environmental Protection introduced the Circular Economy Program for Serbia in 2020 with the Action Plan of measures until 2024

We regularly research and survey companies, and over 60% of our industry recognizes the navigator for the future, and is aware that if it does not undertake changes in the organizational culture, there is no survival in the market. Everything happens dynamically, and if you have not joined the globalization train, then you risk a lot. The DNA of companies is changing, innovations represent the program where the most investments are made, equipment and digitization are important, but also non-financial reporting and a company's relationship with the local community (ESG standards), says Siniša Mitrović, the Head of the Center for the Circular Economy of the Chamber of Commerce and Industry of Serbia, in an interview for our magazine.

How would you assess the current status of the circular economy in Serbia, and to what extent are companies and business entities aware of its importance?

- Serbia has decoded the future on time, and we have had the Center for the Circular Economy in the Chamber of Commerce and Industry of Serbia since 2017, as the first such center in the Western Balkans, much earlier than some European countries. The Center has become a provider of sustainability and decarbonization in seven years, and hundreds of workshops, direct work with companies, universities, the business community, and most importantly, with citizens, are behind us. There is no such transformation if it is not inclusive, if institutions are not inclusive, and do not create opportunities for dialogue and equal chances for change, especially in waste management, wastewater treatment and air protection. We have dynamized the regulatory framework, and our Government and the Ministry of Environmental Protection introduced the Circular Economy Program for Serbia in 2020 with the Action Plan of measures until 2024. Now a new program until 2030 is being worked on.

What has pushed us all towards circularity is the synergy of crises: pandemic-health, climate and war - when safe supply chains are torn and everything becomes more expensive and less available. Perhaps the crises that are intensifying, and especially the climate breakdown that is causing great damage to public infrastructure and agriculture, have been a chance to CHANGE THE MINDSET OF THE NATION, to sober up from excessive consumerism. We have increased the consumption of resources, especially packaging and delivery services through online shopping, and generated significant amounts of waste. But during all this time, Europe created new programs, the Paris Climate Agreement, the Green Agenda, the Law on critical raw materials, CBAM, which put our entire industry in an unenviable position because it has to decarbonize faster and more efficiently, digitize and introduce innovations .

The circular economy in Serbia does not lag far behind the EU, some of our companies are highly circular, not because of populism, but because of a healthy decision that profit is not the most important thing. What makes it difficult for those companies is that the state currently has no mechanism to empower such companies; let's be clear, the EU has not solved that problem either, but it is debating a lot. A circular product is more expensive and thus has unhealthy competition from the same product that is not circular. Currently, a lot of effort is being put into the circularity measurement system, so that every product will have its own passport, so to speak, in which energy consumption and the type of energy, the type of raw material, whether recycled material was used, and finally - how the product is recycled and in what percentage, will be recorded. There will be more data in that passport, but in any case, customers will have a lot of information. The green transformation is an opportunity that should not be missed, and it can push the country's GDP growth up to 1%.

Siniša Mitrović

RUKOVODILAC CENTRA ZA CIRKULARNU EKONOMIJU PKS

izveštavanje i kompanijski odnos prema lokalnoj zajednici (ESG standardi). Privredna komora Srbije je na vreme pripremila svoju arhitekturu organizacije i imamo i Zeleni tim za transformaciju koji multisektorski analizaira prepreke i izazove , imamo RBH, kao direktnu podršku kompanijama koje izvoze na nemačko tržište, imamo i poslovnu Greeen Akademiju sa nekoliko kreiranih modula za transfer znanja i najbolje predavače iz zemlje i sveta. Naša udruženja privrede registruju probleme iz tranzicije, sinergijom obrade podataka sa centrima u PKS, mi proizvodimo regulatorne promene - propise radi smanjenja administriranja u privredi i ubijanja parafiskalnih nameta.

Jeftine prirodne sirovine, nekontrolisano odlaganje otpada na deponije po minimalnim cenama. Odlaganje otpada na deponiji se naplaćuje od 1000-3000 dinara, nikom se ne isplati da investira u reciklažu dok je jeftino bacanje otpada u prirodu.

Gde god je uveden sistem razdvajanja otpada pri nastajanju, ali pod uslovima da se nagrade građani ili kompanije koje to rade, sistem je profunkcionisao, ne brzo jer je to domino sistem ili sistem spojenih sudova i dok se ne ispuni prvi uslov drugi ne može da počne. Na primer, cena odlaganja poskupi na 10.000 dinara za odlaganje mešanog otpada, a razdvojeni ostane na istim cenama, s tim da neki razdvojeni otpad može i da se naplati (aluminijum, pet, papir) i nakon toga za godinu dana se razvijaju desetine reciklažnih kompanija.

PKS zagovara godišnja ulaganja od 500 miliona evra do 2030. u izgradnju održive infrastrukture, posebno za tretman otpadnih voda i čvrstog otpada. Najveća prepreka jeste finasiranje zelene transformacije i pristup zelenom novcu i na tome najviše radimo, kako da redizajniramo javne fondove da prepoznaju nove potrebe industrije.

Kako ocenjujete investicije u oblasti održivih izvora energije u Srbiji? Koje oblasti privlače najveću pažnju investitora?

- Uklanjanje zavisnosti od fosilnih goriva i energetska bezbednost su važna pitanja u trenutnoj klimi, kako u pogledu zaštite životne sredine tako i geopolitike. Regionalni program energetske efikasnosti je jedan od alata koje Evropska unija ima da pomogne regionu da postigne ove ciljeve.

Sada smo dostigli skoro 39% obnovljive energije i to je za poslednjih 4 godine radikalni rast. Potvrda naše doktrine je da transparentni podsticaji, investicije i dobar regulatorni okvir privlače investicije. Veći problem od proizvodnje energije jeste potrošnja koja neprestano raste. U julu 2024. godine trošili smo zbog ekstremnih vrućina 30% više energije nego u istom mesecu 2023 godine. Srbiju je teže ohladiti nego zagrejati. Srbija se za jedan stepen brže zagreva od ostatka Evrope, i ako ne nađemo nove izvore proizvodnje (nuklearke) u 2030 godini bićemo u većem problemu sa dvostrukom potrošnjom energije nego danas. Štednja je najbolja investicija, i građani su najbolji saveznici tranzicije sa racionalnom potrošnjom. Ali više od 30% građana se greje na električnu energiju i to je najskuplje sa pozicije države, gde je u ekstremnim danima megavat koštao i do 500 eura. Moramo na svaki mogući način pomoći građanima da menjaju izvore toplote i hlađenja, jer onda je matematika takva da cene moraju ići gore.

Oblast sa najviše interesa za ulaganje jesu solarni paneli, pa je tako i poslednja vest iz te oblasti da je Opština Surdulica oglasila rani javni uvid povodom izrade plana detaljne regulacije solarnog parka

Siniša Mitrović

THE HEAD OF THE CENTER FOR THE CIRCULAR ECONOMY OF THE CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA (PKS)

It is more difficult to cool Serbia down than to heat it up. Serbia is warming one degree faster than the rest of Europe, and if we do not find new sources of production (nuclear plants), in 2030 we will have a bigger problem with double energy consumption than today

What are the biggest obstacles that Serbia faces in the implementation of the circular economy, and what is the Chamber of Commerce and Industry of Serbia doing to overcome them?

- We regularly research and survey companies, and over 60% of our industry recognizes the navigator for the future, and is aware that if it does not undertake changes in the organizational culture, there is no survival in the market. Everything happens dynamically, and if you have not joined the globalization train, then you risk a lot. The DNA of companies is changing, innovations represent the program where the most investments are made, equipment and digitization are important, but also non-financial reporting and a company's relationship with the local community (ESG standards). The Chamber of Commerce and Industry of Serbia has prepared its organizational architecture on time. We also have a Green Transformation Team that analyzes obstacles and challenges in a multi-sectoral manner. We have RBH, as direct support to companies that export to the German market, and Business Green Academy with several created modules for knowledge transfer and the best lecturers from the country and the world. Our business associations register problems from the transition, through the synergy of data processing with the centers in PKS, we produce regulatory changes - regulations in order to reduce administration in the economy and ‚kill' parafiscal levies.

Cheap natural raw materials, uncontrolled dumping of waste in landfills at minimal prices - disposing of waste at landfills is charged from 1000-3000 dinars. It is not profitable to invest in recycling while it is cheap to throw waste into nature. Wherever a waste separation system has been introduced, but under conditions to reward citizens or companies that use it, the system has worked, not quickly, because it is a domino system or communicating vessels, and until the first condition is met, the second cannot begin . For example, the price of disposal increases to 10,000 dinars for the disposal of mixed waste, and the separated waste remains at the same prices, with the fact that some separated waste can also be charged for (aluminum, pet, paper) and after that, dozens of recycling companies have been developed in a year .

PKS advocates annual investments of 500 million euros until 2030 in the construction of sustainable infrastructure, especially for the treatment of wastewater and solid waste. The biggest obstacle is the financing of the green transformation, and access to green money, and that is what we are working on the most, how to redesign public funds to recognize new needs of the industry.

How do you evaluate investments in the field of sustainable energy sources in Serbia? Which areas attract the most attention of investors?

- Eliminating dependence on fossil fuels, and energy security are important issues in the current climate, both in terms of environmental protection and geopolitics. The regional energy efficiency program is one of the tools the European Union has to help the region achieve these goals.

Now we have reached almost 39% of renewable energy, and that has been a radical growth in the last four years. The confirmation of our doctrine is that transparent incentives, investments and a good regulatory framework attract investments. A bigger problem than energy production is consumption, which is constantly increasing. In July 2024, due to extreme heat, we used 30% more energy than in the same month of 2023. It is more difficult to cool Serbia down than to heat it up. Serbia is warming one degree faster than the rest of Europe, and if we do not find new sources of production (nuclear plants), in 2030 we will have a bigger problem with double energy consumption than today. Saving is the best investment, and citizens are the best allies of the transition with rational consumption. But more than 30% of citizens use electricity for heating, and that is the most expensive from the state's point of view, when during extreme days a megawatt cost up to 500 euros. We must help citizens in every possible way to change their sources of heating and cooling, because in that case, the maths is such that prices must go up.

Solar panels represent the area with the most interest for investment, so the latest news is that the Municipality of Surdulica has announced an early public inspection regarding the development of a detailed regulation plan for the Alakince solar park. The future facility should be built on the territory of the cadastral municipalities of Alakince, Kalabovce and Dugojnica. The investor of this project is the company Graditelji sa juga 2020 from Blac, which wants to invest in solar power plants with a planned approved power of 8,000 kW. The plan is to install 13,400 photovoltaic panels. The proposed border covers approximately 44 ha, and it is, as stated in the document, agricultural land. Of course, progress is slow in the projects of obtaining energy from waste, on which the White Book has been published, which provides a complete review on the matter in Europe.

Siniša Mitrović

RUKOVODILAC CENTRA ZA CIRKULARNU EKONOMIJU PKS

Srbiju je teže ohladiti nego zagrejati. Srbija se za jedan stepen brže zagreva od ostatka Evrope, i ako ne nađemo nove izvore proizvodnje (nuklearke) u 2030 godini bićemo u većem problemu sa dvostrukom potrošnjom energije nego danas

Alakince. Buduće postrojenje trebalo bi da bude izgrađeno na teritoriji katastarskih opština Alakince, Kalabovce i Dugojnica. Investitor ovog projekta je firma Graditelji sa juga 2020 iz Blaca koji želi da investira u solarne elektrane planirane odobrene snage 8.000 kW. U planu je, kako je navedno, postavljanje 13.400 fotonaponskih panela. Predložena granica okvirno obuhvata oko 44 ha i reč je o, kako se u dokumentu navodi, poljoprivrednom zemljištu. Naravno sporo se napreduje u projektim dobijanja energije iz otpada na koju temu je sada izdata i Bela knjiga koja daje kompletan osvrt i pregled u Evropi po tom pitanju.

GN ***Kakvu podršku Centar za cirkularnu ekonomiju i Privredna komora Srbije pružaju kompanijama i institucijama koje žele da ulažu u zelene projekte i cirkularnu ekonomiju?***

- Prvo, da se razumemo, mi nemožemo skliznuti u western kapitalizam i da se ostavimo tržištu. Mi u Privrednoj komori Srbiji zagovaramo ekosistem transformacije, u kome se mora pažljivo upravljati resursima. Nije samo oprema, mašine, obnovljiva energija, reciklaža, zelena transformacija, nego i socijalna država, odgovornih institucija, nezavisnog sudstva i jake građanske demokratije. Kredibilno kažem da mi, kao društvo nismo ispregovarali budućnost i šta zapravo tražimo od sebe pa i od države. Svako mora da menja navike i potrošnju roba, da pređemo na ekonomiju deljenja i da razmenjujemo dobra. Zašto automobili moraju biti u vlasništvu, ili npr. da kupite hiljade sati rada veš mašine ili sudo- mašine u domaćinstvu?! A njena popravka, održavanje i servis postaje briga prodavca. Ili iznajmljivanje odeće, to nije odvratno već odgovorno! Za to vreme država mora da menja politike stanovanja, gradnje, saobraćaja, poljoprivrede, vodoprivrede, održavanja zemljišta i gazdovanja prostorom. Mi kao zemlja havarišemo kroz slabu otpornost na klimatske promene infrastrukturu i objekte sa štetom preko 350 miliona evra, a kada se na to dodaju štete od požara još toliko. Mnogo gubimo od javnih finasija i zato sva pamet zemlje i dijaspore mora da bude motivisana i uključena u kreaciju promena. Da ne skliznemo u lažnu i haotičnu dekarbonizaciju sa galamom i konfliktima koji će nas dalje razdrobiti i osiromašiti.

Jedan od načina podrške Centra za cirkularnu ekonomiju je Digitalna platforma koja je zamišljena kao alat za kompanije koje žele da pređu na cirkularni model poslovanja i olakša i omogući kontakte sa drugim kompanijama, naučnom zajednicom, stranim ekspertima i sl. Pored te vrste pomoći biće dostupna dokumentacija koja je aktuelna, važeći zakoni i podzakonski akti kao i studije, analize i primeri dobre prakse. Ono što je najbitnije na platformi se nalazi baza otpada, nusproizvoda i prestanak statusa otpada koju će svaka kompanija moći da popunjava i na taj način da rešava svoj otpad, kao i kompanije koje se bave preradom otpada koje će imati uvid ko i koliko ima otpada. Na ovaj način uspostavićemo uvid u tokove materijala u Srbiji.

Pored platforme izrađena su brojna uputstva, analize, primeri dobrih praksi, okrugli stolovi i razne druge analize i istraživanja koje su javno dostupne na Digitalnoj platformi. Poslednji u nizu veliki doprinos je prevod standarda za Cirkularnu ekonomiju za potrebe Zavoda za standardizaciju koji će nakon zvaničnog usvajanja biti dostupn privrednicima Srbije.

- ISO 59004:2024, Cirkularna ekonomija- Rečnik, principi i uputstva za primenu,
- ISO 59010:2024, Cirkularna ekonomija- Vodič za tranziciju poslovnih modela i mreža vrednosti,
- ISO 59020:2024, Cirkularna ekonomija- Merenje i procena performansi cirkularnosti i
- ISO/TR 59032:2024, Cirkularna ekonomija - Pregled postojeće mreže vrednosti

GN ***Kako ocenjujete značaj Centra za cirkularnu ekonomiju Privredne komore Srbije kao prve infrastrukture u regionu koja je u potpunosti posvećena promociji i implementaciji poslovnih modela koji odgovaraju na izazove klimatskih promena i resursne nesigurnosti? Koje su glavne aktivnosti i postignuća Centra u ovoj oblasti do sada?***

- To bih ostavio kompanijama, ali sve naše ankete pokazuju da nas biznis zajednica prepoznaje, traži dijalog i snažnije promene. Jednostavno moramo biti hrabri i bez sentimenta napuštati tradicionalne modele i organizaciju poslovanja.

GN ***U kojim segmentima cirkularne ekonomije Srbija najviše zaostaje za zemljama Evropske unije i sveta, a u kojim oblastima beležimo napredak?***

- Nije ni svet nešto cirkularan. Cirkularna ekonomija kao ključna strategija za postizanje nižih emisija i održive budućnosti, ponovnim korišćenjem materijala i reciklažom otpada, napravila je mali uticaj na tradicionalne lance vrednosti, posebno u smanjenju plastike i neobnovljivih resursa. Strateška razmišljanja nas vode da je cirkularnost jedini put ka dekarbonizaciji. Sveti gral budućnosti jeste zabrana materijala i proizvoda koji su štetni za planetu, zamena prirodnih materijala kompozitnim, a to je idealno za start up kompanije, i inovacije.

Od prosečne Evrope ne zaostajemo mnogo i u nekim primerima smo i bolji, ali pojedinačno kada se gleda najviše zaostajemo za Skandinavskim zemljama (Švedska, Norveška, Finska i Danska) zato PKS Centar za cirkularnu ekonomiju najviše sarađuje sa njima pored GiZa i UNDP-a.

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Siniša Mitrović

THE HEAD OF THE CENTER FOR THE CIRCULAR ECONOMY OF THE CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA (PKS)

GN ***What kind of support do the Center for the Circular Economy and the Chamber of Commerce and Industry of Serbia provide to companies and institutions that want to invest in green projects and the circular economy?***

- First, let's be clear, we cannot slip into western capitalism and leave ourselves to the market. We, at the Serbian Chamber of Commerce, advocate an ecosystem of transformation, in which resources must be carefully managed. It is not only equipment, machines, renewable energy, recycling, green transformation, but also a welfare state, responsible institutions, independent judiciary and strong civil democracy. I can credibly say that we, as a society, have not negotiated the future and what we actually want from ourselves and from the state. Everyone has to change habits and the consumption of goods, to move to a sharing economy, and to exchange goods. Why do you have to own a car, or buy thousands hours of operations of a washing machine or a household dishwasher?! And their repair, maintenance and service become the concern of a seller. Or renting clothes, that is not disgusting but responsible! During that time, the state has to change the policies of housing, construction, traffic, agriculture, water management, land maintenance and spatial management. We, as a country, are destroying infrastructure and buildings through weak resistance to climate change, with the damage of over 350 million euros, and when fire damage is added, even more. We lose a lot from public finances, and that is why all the minds of the country and the diaspora must be motivated and involved in the creation of changes. So that we do not slip into a false and chaotic decarbonization with uproar and conflicts that will further fragment and impoverish us.

One of the ways of supporting the Center for the Circular Economy is the Digital Platform, which has been designed as a tool for companies that want to switch to a circular business model, and facilitate and enable contacts with other companies, the scientific community, foreign experts, etc. In addition to this type of assistance, valid documentation, laws and by-laws as well as studies, analyzes and examples of good practice will be available. What is the most important on the platform is the database of waste, by-products and the termination of waste status, which every company will be able to fill in, and deal with its waste, as well as companies dealing with waste processing, thus having insight into who and how much waste has. In this way, we will gain insight into flows of materials in Serbia.

In addition to the platform, numerous instructions, analyses, examples of good practices, round tables and various other analyzes and research have been prepared, and are publicly available on the Digital Platform. The last major contribution in the series is

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Siniša Mitrović

RUKOVODILAC CENTRA ZA CIRKULARNU EKONOMIJU PKS

PRIVREDNA KOMORA SRBIJE

CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA

1857

Inače Srbija najviše zaostaje u onim osnovnim sistemima a to su nagrade i kazne. Nažalost jako malo ljudi je kažnjeno za zagađenje i narušavanje životne sredine. Seku se šume, baca nekontrolisano otpad na regularne i divlje deponije, vade se prirodne sirovine uz minimalnu naknadu, a pritom se ne nagrađuju ljudi i kompanije koje su ekološki svesne, koje štite prirodu, razdvajaju otpad, sade drveće i sl. U takvom ambijentu se teško postižu rezultati. Imamo puno lepih primera ali iz gore navedenih razloga se sporo napreduje.

Koji su najznačajniji projekti u oblasti održive energije u Srbiji trenutno u fazi implementacije i kakav je njihov potencijalni uticaj na privredu i životnu sredinu?

- Projekat Energetska efikasnost u javnim zgradama i obnovljivi izvori energije u sektoru daljinskog grejanja, zatim energetska efikasnost u zgradama centralne vlasti – energetska sanacija do 28 zgrada centralne vlasti (javne zgrade) i čista energija i energetska efikasnost zagrađane u Srbiji – energetska sanacija stambenih kuća i stanova. Poslednji projekat je po meni najvažniji jer mi u toku grejne sezone izgubimo 50% energije zbog loše izolacije, a to je direktan gubitak 500 miliona evra. Ako se to indeksira sa kliničkim centrima, putevima, školama i vrtićima koji se mogu izgraditi – to je veliki gubitak za državu i naše finasije.

Koji su ključni sektori u kojima vidite najveći potencijal za razvoj cirkularne ekonomije u Srbiji u narednim godinama?

- Kada se analizira DNK industrije, onda je najveći potencijal moguć u industriji građevinarstva, drvne industrije,prehrambene industrije i tekstila. Srbija je lider u privlačenju stranih direktnih investicija i multinacionalne kompanije donose i nova znanja i prakse koje mogu dosta pomoći u redizajniranju domaće industrije. Ali se stvari dešavaju sporo. Decenije su prošle, gradimo velike infrastrukturne radove (puteve i železnicu), a nikako da otključamo upotrebu tehnogenih sirovina (pepeo iz termoelektrana i šljake iz železare) u putnoj infrastrukturi. Otvaramo kamenolome, raubujemo reke sa nekontrolisanom eksploatacijom peska i šljunka. A onda faktura od prirode dolazi kroz erozije i poplave. Pogledajmo šta se desilo u Jablanici u Bosni. Apokalipsa, kada se dogodi koktel kiše, erozije i poplava. Stradaju nedužni i njihova imovina, a onda se sve to zaboravi i ponovo gradimo kuće u koritima reka bez planske dokumentacije.

U gore pomenutim granama industrije vidimo najbrže rastuću cirkularnost i najnovija Uredba za upravljanje otpadom od građenja i rušenja, koja je nedavno doneta daje prilike da ubrzamo investicije i ulaganja u opremu za reciklažu. Nisam pomenuo gumarsku industriju, Srbija sada proizvodi 1% svetske proizvodnje guma. Ako se samo škart iz proizvodnje upotrebi, imamo nove materijale i proizvode - preko stotinu novih proizvoda koja dolaze iz otpada.

Ali cirkularna industrija nije novitet, pa na našim vašarima su krpili šerpe, popravljali kišobrane,naši dedovi nisu imali otpad...sve se ponovo koristilo a danas sve traje u garantnom roku! Posle se sve baca!

Kako zamišljate zelenu budućnost Srbije? Koji su strateški ciljevi i vizija Srbije kada je reč o održivom razvoju i cirkularnoj ekonomiji?

- Srbiji ne treba samo održiv već robusni pametni rast do 7% BDP, kako bi smanjili razlike prema zemljama EU i podigli kvalitet života. Mi smo stara nacija, prosek godina 44,3. Nama je potreban narod , mladi ljudi koji pokreću promene i donose inovacije. Budućnost Srbije će naličiti na sve EU zemlje, ali treba sačuvati resurse, prirodu, potoke i livade, orlove i volove, zdravu zemlju i vazduh, trpezu i srećnu naciju. Mi to možemo, ali nam treba nova sinergija interesa i da sa dijasporom vučemo ekonomiju i budemo na pravoj strani istorije. Sada se stvara novi svet i nema grešaka kao u istoriji koju smo uvek skupo plaćali. Pokojni Džej je pevao “ni na istok ni

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Siniša Mitrović

THE HEAD OF THE CENTER FOR THE CIRCULAR ECONOMY OF THE CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA (PKS)

PKS advocates annual investments of 500 million euros until 2030 in the construction of sustainable infrastructure, especially for the treatment of wastewater and solid waste. The biggest obstacle is the financing of the green transformation, and access to green money, and that is what we are working on the most, how to redesign public funds to recognize new needs of the industry

the translation of the Circular Economy Standards for the needs of the Institute for Standardization, which will be available to Serbian businessmen after its official adoption.

- ISO 59004:2024, Circular economy – Vocabulary, principles and guidance for implementation,
- ISO 59010:2024, Circular economy – Guidance on the transition of business models and value networks,
- ISO 59020:2024, Circular economy - Measuring and assessing circularity performance,
- ISO/TR 59032:2024, Circular economy – Review of the existing value networks

How do you evaluate the importance of the Center for the Circular Economy of the Chamber of Commerce and Industry of Serbia as the first infrastructure in the region that is fully dedicated to the promotion and implementation of business models that respond to the challenges of climate change and resource insecurity? What have been the main activities and achievements of the Center in this area so far?

- I would leave that to companies, but all our surveys show that the business community recognizes us, it is looking for dialogue and stronger changes. We simply must be brave, and abandon traditional business models and organization without sentiments.

In which segments of the circular economy does Serbia lag far behind the EU countries and the world, and in which areas are we making progress?

- The world is not circular either. The circular economy as a key strategy for achieving lower emissions and a sustainable future, by reusing materials and recycling waste, has made little impact on traditional value chains, especially in reducing plastics and non-renewable resources. Strategic considerations lead us to believe that circularity is the only path to decarbonization. The holy grail of the future is the ban of materials and products that are harmful to the planet, replacing natural materials with composites, which is ideal for start-up companies, and innovation.

We do not lag far behind the average Europe, and in some cases, we are even better. But when viewed individually, we lag behind the Scandinavian countries the most (Sweden, Norway, Finland and Denmark), that is why the Center for the Circular Economy cooperates with them the most, in addition to GiZ and UNDP.

Serbia lags far behind in those basic systems, that is, rewards and punishments. Unfortunately, very few people have been punished for pollution and damage to the environment. Forests are cut down, waste is dumped uncontrollably in regular and wild landfills, natural raw materials are extracted for a minimal fee, and people and companies that are environmentally aware, that protect nature, separate waste, plant trees, etc. are not rewarded. It is difficult to achieve results in such an environment. We have many good examples, but for the reasons mentioned above,the progress is slow.

What are currently the most significant projects in the field of sustainable energy in the implementation phase in Serbia, and what is their potential impact on the economy and the environment?

- The Energy Efficiency Project in public buildings, and renewable energy sources in the district heating sector, energy efficiency in central government buildings - energy renovation of up to 28 central government buildings (public buildings) and clean energy and energy efficiency for citizens in Serbia - energy renovation of residential houses and apartments . In my opinion, the last project is the most important one because during the heating season we lose 50% of our energy due to poor insulation, which is a direct loss of 500 million euros. If it is indexed with clinical centers, roads, schools and kindergartens that could be built - it is a big loss for the state and our finances.

What are key sectors in which you see the greatest potential for the development of the circular economy in Serbia in the coming years?

- When analyzing the DNA of the industry, the greatest potential is possible in the construction, wood, food and textile industries. Serbia is a leader in attracting foreign direct investments, and multinational companies bring new knowledge and practices that can greatly help in redesigning the domestic industry. But things happen slowly. Decades have passed, we are building large infrastructure objects (roads and railways), but we are unable to unlock the use of technogenic raw materials (the ash from thermal power plants and slag from ironworks) in road infrastructure. We are opening quarries, raking rivers with uncontrolled exploitation of sand and gravel. And then the invoice from nature comes through erosions and floods. Let’s look at what happened in Jablanica in Bosnia. Apocalypse, when a cocktail of rain, erosion and flooding occurs. The innocent and their property suffer, and then all that is forgotten, and we build houses in riverbeds again, without planning documentation.

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Siniša Mitrović

RUKOVODILAC CENTRA ZA CIRKULARNU EKONOMIJU PKS

PKS zagovara godišnja ulaganja od 500 miliona evra do 2030. u izgradnju održive infrastrukture, posebno za tretman otpadnih voda i čvrstog otpada. Najveća prepreka jeste finasiranje zelene transformacije i pristup zelenom novcu i na tome najviše radimo

na zapad, na sever ni jug...nigde, nigde bez tebe se Srbijo vrtim još u krug".

GN ***Kakva je saradnja Srbije sa međunarodnim partnerima i institucijama u oblasti cirkularne ekonomije? Da li postoje projekti koji mogu poslužiti kao primer dobre prakse?***

- Kontinuirana i blagovremena. U smislu da, promene koje se dešavaju na opštem nivou, tačnije evropskom, brzo budu transponovane na domaće tržište, bilo da se radi o transferu znanja, tehnologija, generalno tržišnih zakonitosti. Primer takve saradnje jeste zajednička akcija Ministarstva zaštite životne sredine, Privredne komora Srbije i Programa za jačanje kapaciteta za trgovinske politike Vlade Švajcarske na temu smanjenja emisije gasova sa efektom staklene bašte, odnosno Uredbe o mehanizmu prekograničnog prilagođavanja (cene) ugljenika – CBAM Regulation 2023/956, gde je realizovana serija sektorskih obuka za domaće privrednike sa namerom da se najvažniji zahtevi iz ovih propisa prenesu kompanijama i pripreme ih za obaveze koje ih očekuju.

Prema dostupnim podacima o izvoznicima, oko 2400 privrednih društava iz Srbije je tokom 2023. godine izvozilo CBAM „etiketiranu" robu u EU, od toga 1400 u poslednjem kvartalu koji je bio i prvi referentni period za izveštavanje o ugrađenim emisijama.

Privredna komora Srbije se može pohvaliti višegodišnjih partnerstvom sa većinom međunarodnih institucija čije je delovanje usmereno na promociju, i realizaciju, alata cirkularne ekonomije. Prvi među jednakima, jeste Nemačka poslovna saradnja GIZ, sa kojom je realizovano više radionica i treninga na temu nefinansijskog izveštavanja, važnosti ESG-a, pristupa zelenom novcu kroz emitovanje zelenih obveznica, trgovanja i eventualno emitovanja CO2 Offsetting proizvoda. Takođe, uz podršku GIZ-a, privredi je dostupan novi servis, Responsible Business Hub (RBH) koji predstavlja centar za informisanje i povezivanje srpskih kompanija po pitanju novih zahteva koji proizilaze iz nemačkog Zakona o due diligence u lancima snabdevanja, a odnose se na zaštitu ljudskih prava, prava radnika i zaštitu životne sredine. Kancelarija za podršku, koja je deo internacionalne mreže RBH-a (Nemačka, Vijetnam, Kambodža, Bangladeš) i koja nudi veliki izbor usluga iz oblasti odgovornog poslovanja je besplatna za korisnike. Cilj programa je da poboljša sposobnost privatnog sektora da razume i da se pripremi za nove održive standarde iz Zakona o dužnoj pažnji u lancima snadbevanja, kao i da poboljša konkuretnost, održivost i kapacitet kompanija na polju zaštite ljudskih prava i ekologije.

Projekat "Bezbedna priroda i klima" urađen je sa Svetskom organizacijom za prirodu WWF Adria-Srbija. UNDP Srbija pomogla je instalaciju prve Digitalne platforme Centra za cirkularnu ekonomiju PKS, s namerom da se promoviše razmena industrijskih sekundarnih sirovina. Organizacija za evropsku bezbednost i saradnju OESB i PKS emitovali su prvu štampanu brošuru o cirkularnoj ekonomiji, itd.

GN ***Koji su najvažniji koraci koje bi Srbija trebalo da preduzme kako bi ubrzala tranziciju ka cirkularnoj ekonomiji i postigla održivost u skladu sa evropskim standardima?***

- Danas je rast privrede usko povezan sa rastom korišćenja resursa, energije i vode. Subvencionisanje osnovnih fosilnih energetskih dobara je imalo smisla, porez na rad je imao smisla kad smo imali manjak radne snage a efikasnost rada je morala da se poveća. Pitanje se postavlja da li su ovo danas stari pristupi i zastarele politike? Cirkularna ekonomija predlaže promenu politika sa oporezivanja rada na oporezivanje korišćenja sirovina, energije i vode, te produženu odgovornost proizvođača za pravljanje otpada i zagađenje okoline. Danas imamo nezaposlenost, a nestaje nam resursa. Takođe, među predlozima nove ekonomije se nalazi i prelazak sa subvencijana„dinosaurska goriva" na subvencionisanje čistijih tehnologija koje će generisati energiju sa lokalnim prirodnim kapacitetima. Čiste tehnologije su prešle iz kategorije visokog rizika-visoke nagrade u kategoriju masovne proizvodnje, dok je rizik od investiranja u fosilna goriva sve viši.

Važno je naglasiti da se ukazuje na dve faze prelaska na cirkularnu ekonomiju. Faza jedan podrazumeva subvencije i nagrade za privrede koje aktivno i odlučno počnu tranziciju, dok faza dva izostavlja subvencije I počinje da utiče na troškovnu stranu celog privrednog sistema. Iz iskustva i direktnog uvida mogu reći da EU ne planira da odstupi od svog „zelenog" puta i „zelenih" ulaganja. Srpski poslovni sistem predstavlja integralni deo evropskog tržišta. Pitanje se postavlja - kad je logično početi graditi privredni i društveni sistem otporan na disrupcije?

Možda sam to već rekao, ali da pojasnim: država i građani mora da ispregovaraju budućnost. Pa redom, briga o ljudima (sve nas je manje), ubrzana modernizacija, digitalizacija, veštačka inteligencija,biotehnologija i obrazovanje.

Najviše verujem da nas samo obrazovanje i inovacije mogu dići u nebesa, moderni univerziteti i instituti, nauka koja pokreće.

Za zelenu transformaciju potrebno je investirati više od 40 milijardi evra (pijaće vode, otpadne vode, vazduh, energetika). Potrebno je novo tržište kapitala, veći upliv privatnog kapitala u investicije u održivost i nova kreditna banka, javno -privatna, koja kreditira zelene investicije posebno u energetici. Za sve ovo najvažniji je mir i sigurna budućnost bez rata, mi smo izgleda u trećem svetskom ratu samo niko nije javio. GN

Siniša Mitrović

THE HEAD OF THE CENTER FOR THE CIRCULAR ECONOMY OF THE CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA (PKS)

In the abovementioned branches of industry, we see the fastest growing circularity, and the latest Regulation for the management of construction and demolition waste, which has been recently passed, gives us the opportunity to accelerate investments in recycling equipment. I have not mentioned the rubber industry. Serbia now produces 1% of the world's tire production. If only production scrap is used, we have new materials and products - over a hundred new products that come from waste. But the circular industry is not a novelty, so at our fairs people mended pots, repaired umbrellas, our grandfathers had no waste...everything was reused, and today everything lasts within the warranty period! After that, everything is thrown away!

GN ***How do you imagine the green future of Serbia? What are strategic goals and the vision of Serbia when it comes to sustainable development and the circular economy?***

- Serbia needs not only sustainable but robust smart growth of up to 7% of GDP, in order to reduce differences with the EU countries, and raise the quality of life. We are an old nation, the average age is 44.3. We need people, young people who initiate changes and bring innovations. The future of Serbia will resemble all EU countries, but we need to preserve resources, nature, streams and meadows, eagles and oxen, healthy land and air, the dining table and a happy nation. We can do it, but we need a new synergy of interests, to pull the economy together with the diaspora, and to be on the right side of history. Now a new world is being created, and there are no mistakes from history which we had always paid dearly for. The late Dzej sang „neither to the east nor to the west, neither to the north nor to the south... nowhere, nowhere without you, Serbia, I'm still spinning in circles".

GN ***What is Serbia's cooperation with international partners and institutions in the field of the circular economy? Are there any projects that can serve as an example of good practice?***

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THE HEAD OF THE CENTER FOR THE CIRCULAR ECONOMY OF THE CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA (PKS)

- It is continuous and timely. In a sense that the changes taking place at the general level, more precisely at the European level, are quickly transposed to the domestic market, whether it is the transfer of knowledge, technologies, or market laws in general. An example of such cooperation is the joint action of the Ministry of Environmental Protection, the Chamber of Commerce and Industry of Serbia and the Program for Strengthening the Capacity for Trade Policies of the Government of Switzerland on the topic of reducing greenhouse gas emissions, i.e. the Regulation on the mechanism of cross-border adjustment (price) of carbon - CBAM Regulation 2023/956 , where a series of sectoral trainings for domestic businessmen has been carried out with the intention of conveying the most important requirements from these regulations to companies, and preparing them for future obligations.

According to available data on exporters, around 2,400 companies from Serbia exported CBAM „labeled" goods to the EU in 2023, out of which 1,400 in the last quarter, which was also the first reference period for reporting on built-in emissions.

The Serbian Chamber of Commerce can boast of a multi-year partnership with most international institutions whose activities are focused on the promotion and implementation of circular economy tools. The first among equals is the German business cooperation GIZ, with which several workshops and training sessions were held on the topic of non-financial reporting, the importance of ESG, access to green money through the issuance of green bonds, trading, and possibly the issuance of CO2 offsetting products. Also, with the support of GIZ, a new service is available to the economy, the Responsible Business Hub (RBH), which is a center for informing and connecting Serbian companies regarding the new requirements arising from the German Act on due diligence in supply chains, which relate to the protection of human rights, workers' rights and environmental protection. The support office, which is part of the international RBH network (Germany, Vietnam, Cambodia, Bangladesh) and offers a wide range of services in the field of responsible business, is free of charge for users. The goal of the program is to improve the ability of the private sector to understand and prepare for the new sustainable standards from the Law on due diligence in supply chains, as well as to improve the competitiveness, sustainability and capacity of companies in the field of human rights and environmental protection.

The project „Safe nature and climate" has been carried out with the World Wide Fund for Nature WWF Adria-Serbia. UNDP Serbia has supported the installation of the first Digital Platform of the Center for the Circular Economy, with the intention of promoting the exchange of industrial secondary raw materials. The Organization for Security and Co-operation in Europe OSCE and PKS have published the first printed circular economy brochure, etc.

GN *What are the most important steps that Serbia should take in order to accelerate the transition to the circular economy, and achieve sustainability in accordance with European standards?*

- Today, the growth of the economy is closely related to the growth of the use of resources, energy and water. Subsidizing basic fossil energy goods made sense, labor tax made sense when we had a labor shortage and work efficiency had to be increased. The question arises, are these approaches old, and policies outdated today? The circular economy proposes changing policies from taxing labor to taxing the use of raw materials, energy and water, and extended producer responsibility for waste management and environmental pollution. Today we have unemployment, and we are running out of resources. Also, among the proposals of the new economy is the transition from subsidized „dinosaur fuels" to subsidizing cleaner technologies that will generate energy with local natural capacities. Clean technologies have moved from the high-risk-high-reward category to the category of mass production, while the risk of investments in fossil fuels is increasing.

It is important to emphasize that there are two phases of the transition to the circular economy. Phase one involves subsidies and rewards for businesses that actively and decisively begin the transition, while phase two omits subsidies and begins to affect the cost side of the entire economic system. From experience and direct insight, I can say that the EU does not plan to deviate from its „green" path and „green" investments. The Serbian business system is an integral part of the European market. The question arises - when is it logical to start building an economic and social system resistant to disruptions?

I might have already said it, but let me clarify: the state and citizens must negotiate the future. Well, in order, the care for people (there are fewer of us), accelerated modernization, digitization, artificial intelligence, biotechnology and education.

Most of all, I believe that only education and innovation can take us to the heavens, as well as modern universities and institutes, and science that drives.

For the green transformation, it is necessary to invest more than 40 billion euros (drinking water, waste water, air, energy). A new capital market is needed, a greater influx of private capital into investments in sustainability, and a new public-private credit bank that offers green loans, especially in energy. For all of this, the most important thing is peace and a safe future without war. We seem to be in the third world war, but no one has reported it.

GN

NOVI SAVEZNIK
U BORBI ZA
ČIŠĆENJE EMISIJE CO^2

Čonkus

Nedavno otkrivena vrsta bakterije biće dobar saveznik ljudima u suočavanju sa izazovima koje nose klimatske promene, ukoliko mikrobiolozi utvrde njen DNK

NEW ALLY IN THE FIGHT
TO CLEAN UP EMISSIONS CO^2

Chonkus

A recently discovered bacterium will be a good ally for people in facing the challenges of climate change, if microbiologists can determine its DNA

Ovaj mikroorganizam je zapravo cijanobakterija koja je pronađena u vulkanskim okeanskim izvorima

Sakrivena u nepristupačnim kucima Zemlje, u delu u kojem postoje biodiverzitetske grupe mikroorganizama – neke vrste mogu da pomognu u čišćenju atmosfere od ugljen-dioksida.

Jedan mikroorganizam naročito je privukao pažnju naučnika, to je UTEX 3222, imena"Čonkus" zbog načina na koji apsorbuje ugljen-dioksid. Ovaj mikroorganizam je zapravo cijanobakterija koja je pronađena u vulkanskim okeanskim izvorima. U istraživanju objavljenom u časopisu Applied and Environmental Microbiologynavedenoje da ona imapotencijal za pročišćivanje atmosfere. Ukoliko naučnici uspeju da je genetski inženjerski prilagode, prirodne osobine ovih jednoćelijskihorganizama mogle bi postati saveznici u sistemu razgrađivanja ugljen-dioksida.

Cijanobakterije poput "Čonkusa", koje se ponekad pogrešno nazivaju plavo-zelenim algama, vodeni su organizmi koji upijaju svetlost i ugljen-dioksid, i pretvaraju ih u hranu procesom fotosinteze poput kopnenih biljaka. Međutim, unutar telaovih jednoćelijskih organizama, nalaze se komponente koji im omogućavaju da apsorbuju više CO_2 nego njihovi dalji "rođaci". Ove jednoćelijske organizme koji su prisutniu egzotičnim sredinama, odlikuju jedinstvene osobine koje se retko sreću u prirodi. Mikrobiolozima čije je interesno polje bilo usmereno na nekoliko lako uzgajivih organizama poput kvasca i E. coli, ovineiskorišćeni biodiverziteti donose nove mogućnosti, piše Grist.

- Uzbuđenje zbog otkrivanja novih organizama neprestano raste - rekao je **Brejden Terni**, mikrobiolog i jedan od glavnih autora istraživačkih radova koji je i zaslužan za identifikaciju bakterije "Čonkus". Tokom ekspedicije u septembru 2022. godine, Terni i istraživači sa Univerziteta u Palermu u Italiji zaronili su duboko u vode oko Vulkana, ostrva koje se nalazi uz obalu Sicilije, gde vulkanski izvori u plitkim vodama predstavljaju neobično stanište - osvetljeno sunčevom svetlošću, a opet bogato izduvnim gasovima ugljen-dioksida. Ova lokacija pravoje izvorište mikrobiološkog života, koju nastanjuje i "Čonkus".

Nakon što je Terni, za potrebe istraživanja prikupiouzorke morske vode, MaksŠubert, drugi glavni autor rada o cijanobakterijama i vodeći naučni istraživač u nevladinoj organizaciji "Align to Innovate", započeo je proces identifikacijeprisutnih organizama u tim uzorcima. Šubert je rekao da cijanobakterije poput "Čonkusa" u otvorenom okeanu zapravo rastu sporo i rasprostranjene su u malim količinama. "Ali, ako bismo želeli da ih koristimo za čišćenje ugljen-dioksida, morali bismo da ubrzamo njihovo gajenje", rekao je on, "i to u koncentracijama koje ne postoje u otvorenom okeanu."

Prilikom laboratorijskih ispitivanja, "Čonkus"je rastao brže i gušće od drugih, prethodno otkrivenihvrsta cijanobakterija za razgrađivanje ugljen-dioksida. "Kada uzgajate kulturu bakterija, ona izgleda kao supa i bakterije su vrlo razređene u toj kulturi", rekao je Šubert, "ali smo otkrili da se "Čonkus" taloži u supu koja je mnogo gušća, poput zelene kvasaste mase."

This microorganism is actually a cyanobacterium found in volcanic ocean vents

Hidden in inaccessible corners of the Earth, in the part where there are biodiverse groups of microorganisms - some species can help clean the atmosphere of carbon dioxide.

One microorganism in particular has attracted the attention of scientists, it is UTEX 3222, named „Chonkus" because of the way it absorbs carbon dioxide. This microorganism is actually a cyanobacterium found in volcanic ocean springs. In research published in the journal Applied and Environmental Microbiology, it is stated that it has the potential to purify the atmosphere. If scientists succeed in genetically engineering it, the natural features of these single-celled organisms could become allies in the carbon dioxide decomposition system.

Cyanobacteria such as Chonkus, which are sometimes mistakenly called blue-green algae, are aquatic organisms that absorb light and carbon dioxide, and turn them into food through the process of photosynthesis like land plants. However, within the body's single-celled organisms, there are components that allow them to absorb more CO_2 than their more distant „relatives". These single-celled organisms, which are present in exotic environments, are characterized by unique features that are rarely found in nature. For microbiologists whose field of interest was focused on a few easily cultivated organisms such as yeast and E. coli, this exploited biodiversity brings new opportunities, writes Grist.

- „There's more and more excitement about isolating new organisms," said Braden Tierney, a microbiologist and one of the lead authors of the paper that identified Chonkus. On an expedition in September 2022, Tierney and researchers from the University of Palermo in Italy dove into the waters surrounding Vulcano, an island off the coast of Sicily where volcanic vents in shallow waters provide an unusual habitat — illuminated by sunlight and yet rich with plumes of carbon-dioxide. This location is a source of microbiological life, including Chonkus.

After Tierney collected seawater samples for research purposes, Max Schubert, the second main author of the work on cyanobacteria and a leading scientific researcher in the non-governmental organization Align to Innovate, began the process of identifying the organisms present in them. Schubert said that out in the open ocean cyanobacteria like Chonkus actually grow slowly and are thinly dispersed. „But if we wanted to use them to pull down carbon dioxide, we would have to grow them a lot faster," he said, „and grow in concentrations that don't exist in the open ocean."

During laboratory tests, Chonkus grew faster and thicker than other previously discovered cyanobacteria for carbon capture systems. „When you grow a culture of bacteria, it looks like broth and the bacteria are very diluted in the culture," Schubert said, „but we found that Chonkus would settle into this stuff that is much more dense, like a green peanut butter."

GREENNEWS

"Čonkus"je rastao brže i gušće od drugih, prethodno otkrivenihvrsta cijanobakterija za razgrađivanje ugljen-dioksida

Konzistencija slična bakteriji "Čonkus" važna je za potencijal ove vrste u zelenim biotehnologijama. Obično, biotehnička industrija koja koristi cijanobakterije i alge mora da ih odvoji od vode u kojoj rastu. Pošto "Čonkus" to prirodno radi pomoću gravitacije, Šubert kaže da bi to moglo učiniti proces efikasnijim. Međutim, postoji mnogo drugih izazova koje treba rešiti pre nego što otkriće poput Čonkusa može biti korišćeno za čišćenje ugljen-dioksida.

CyanoCapture, startap koji se bavi razgrađivanjem ugljen-dioksida pomoću cijanobakterija, sa sedištem u Ujedinjenom Kraljevstvu, razvio je metodu niskih troškova za hvatanje ugljen-dioksida koja koristi biomasu, smeštajući alge i cijanobakterije u prozirne cevi u kojima mogu da rastu i filtriraju CO2. Iako "Čonkus" pokazuje jedinstven potencijal, Dejvid Kim, izvršni direktor i osnivač kompanije, rekao je da biotehničke kompanije moraju da imaju veću kontrolu nad njegovim osobinama, kao što je skladištenje ugljen-dioksida, kako bi ga uspešno koristile, a to zahteva pronalaženje načina da se otvori njegov DNK.

„Često u prirodi naiđemo na mikroorganizam koji poseduje interesantne karakteristike, ali to ne ide u prilog našim potrebama", rekao je Henri Li, izvršni direktor Cultivarium-a, nevladinog biotehničkog startapa iz Votertaunana u Masačusetsu, koji jespecijalizovan za genetsko inženjerstvo mikroba. Cultivarium sarađuje sa CyanoCapture-om na istraživanju "Čonkusa", ali još uvek nisu uspeli da otkriju na koji način mogu da modifikuju njegov DNK i prilagode njegove karakteristike za razgrađivanje ugljen-dioksida.

Od ekspedicije na ostrvu Vulkano, gde je Terni prikupio "Čonkus", nevladina organizacija koju je on osnovao da istražuje ekstremne sredine širom sveta, Two Frontiers Project, uzela je uzorke iz termalnih izvora u Koloradu, vulkanskih dimnjaka u Tirenskom moru blizu Italije i koralnih grebena u Crvenom moru. Mikrobiolozi se nadaju da će upravo tamo pronaći deblji "Čonkus" koji može da apsorbuje i razgradi više ugljen-dioksida, kao i organizme koji mogu da pomognu u obnovi korala, ili više organizama koji mogu ublažiti posledice koje izazivaju klimatske promene. "Nema sumnje da ćemo nastaviti da nalazimo zaista, zaista interesantnu biologiju u tim dimnjacima", rekao je Terni. "Ovo je bila samo prva ekspedicija."

Kim je napomenuo da je od svih mikroba koji postoje, manje od 0,01 procenata istraženo.

"Oni ne predstavljaju pravi arsenal mikroba sa kojima bismo mogli da radimo kako bismo postigli ciljeve

Chonkus' consistency is important for the potential of this species in green biotechnologies. Usually, the biotech industries that use cyanobacteria and algae need to separate them from the water in which they grow. Since Chonkus does this naturally using gravity, Schubert says it could make the process more efficient. However, there are many other challenges that need to be solved before a discovery like Chonkus can be used for carbon capture.

CyanoCapture, a cyanobacteria carbon capture startup based in the United Kingdom, has developed a low-cost method of catching carbon dioxide that runs on biomass, housing algae and cyanobacteria in clear tubes where they can grow and filter CO2. Although Chonkus shows unique promise, David Kim, the company's CEO and founder, said biotechnology companies need to have more control over its traits, like carbon storage, to use it successfully, and that requires finding a way to crack open its DNA.

"Oftentimes we'll find in nature that a microbe can do something kind of cool, but it doesn't do it as well as we need to," said Henry Lee, CEO of Cultivarium, a nonprofit biotech start-up in Watertown, Massachusetts, that specializes in genetically engineering microbes. Cultivarium has been working with CyanoCapture to help them study Chonkus but has yet to figure out how to tinker with its DNA and improve its carbon capturing attributes.

Since the expedition to Vulcano Island, where Tierney collected Chonkus, the NGO he founded to investigate extreme environments around the world, the Two Frontiers Project, has taken samples from hot springs in Colorado, volcanic chimneys in the Tyrrhenian Sea near Italy, and coral reefs in the Red Sea. Microbiologists hope to find thicker Chonkus right there that can absorb and break down more carbon dioxide, as well as organisms that can help restore corals, or more organisms that can mitigate the effects of climate change. "There's no question we'll keep finding really, really interesting biology in these vents, Tierney said. "I can't stress enough that this was just the first expedition."

Kim noted that out of all the microbes out there, less than 0.01 percent have been studied. "They don't represent the true arsenal of microbes that we could potentially work with to achieve humanity's goals."

Ted Ćang

AUTOR NAJVIZIONARSKE NAUČNE FANTASTIKE NAŠEG VREMENA

Ne bi trebalo da stvaramo digitalne oblike života

Evgenij Morozov je skovao izraz „tehno-rešenjizam” za opisivanje tendencije da se sve posmatra kao problem koji se može rešiti tehnologijom. Jasno je zašto kompanije podržavaju ovu tendenciju, jer je tehnološko rešenje proizvod koji mogu prodati

Ted Ćang, autor najvizionarske naučne fantastike našeg vremena, majstorski kreira budućnosti koje nisu samo zasnovane na najnovijim naučnim i tehnološkim saznanjima već postavljaju i duboka alegorijska pitanja o etičkim dilemama vezanim za ljudsku slobodu, volju, svest, život i sreću.

„Dobra naučna fantastika se bavi zamišljanjem neočiglednih posledica“, objašnjava Ted.

Članica uredničkog tima DISTANCE.media, Dominik Šen (istraživač u oblasti informacionih studija), razgovarala je sa Ćangom o trenutnim i budućim pravcima razvoja veštačke inteligencije (AI) i veštačkog života (ALIFE), nastavljajući da istražuje ove složene teme.

NE TREBA NAM NOVA KATEGORIJA BIĆA SPOSOBNOG ZA PATNJU

Pored toga što sam dugogodišnji obožavalac vaših romana, istraživač sam u oblasti dizajna interakcije i fokusiram se na odnos između ljudi, mikroba i računara. Danas bih želela da razgovaramo o vašem kreativnom procesu, jeziku i etičkim pitanjima u razvoju AI. Videla sam vašu prezentaciju na konferenciji ALIFE2023, gde ste govorili o obrazovanju „digijenata“ (Virtuelna životna forma koja se pojavljuje u delu. Može da uči jezik i ponašanje, a takođe pokazuje radoznalost i emocionalne izraze), pominjući vaš rad „Životni ciklus softverskih objekata.“ Čula sam vašu kritiku prema lakom antropomorfizmu, koji je čest u tehnološkom kontekstu, naročito kada se radi o AI i virtuelnim likovima. Smatram da je ova tema fascinantna, naročito jer me je dirnula vaša interpretacija Aninog (Ana je glavni lik u „Životnom ciklusu softverskih objekata” koja se bori da obezbedi pravično životno okruženje za digijente koje je odgajila) odnosa prema njenim digijentima.

GN ***Koja je razlika između Aninog odnosa prema digijentima i manipulativnog antropomorfizma od strane korporacija, koji ste kritikovali?***

- Razlika je u tome što digijenti u priči zaista imaju subjektivna iskustva, dok ćatbotovi koje danas vidimo to nemaju. To je slično razlici između psa i virtuelnog psa. Ako neko izgladnjuje biološkog psa, on zaista pati. Ako neko „ne nahrani“ virtuelnog psa, virtuelni pas ne oseća ništa. Korporacije možda žele da iskoriste ljudsku emotivnu reakciju na animaciju cvilećeg psa, ali to je samo animacija. Digijenti u mojoj priči su bili sposobni za pravu patnju, i fizičku i emocionalnu, baš kao što su biološki psi. Apsolutno je prikladno da ljudi deluju kako bi smanjili fizičku i emocionalnu patnju životinja, i mislim da bi takođe bilo prikladno da ljudi deluju kako bi smanjili patnju digitalnih organizama. Ali trenutno nemamo ništa slično digitalnim oblicima života. Sve što imamo su animacije i zvučni fajlovi.

GN ***Tačno. Dakle, činjenica da je Džeks bio sposoban za fizičku i emocionalnu patnju omogućila je autentičnu povezanost između njega i Anne. Da li bi onda trebalo razmotriti implementaciju patnje u digitalne organizme da bismo izbegli manipulativni korporativni pristup tehnologiji?***

- Povezanost koju je Ana imala sa Džeksom (Džeks, digijent koji Ana neguje, jedan je od glavnih protagonista u „Životnom ciklusu softverskih objekata) bila je stvarna kao povezanost vlasnika psa sa psom. Možda je bolja paralela veza koju neki primatolozi imaju sa čimpanzama koje su odgajali. Ne mislim da bi trebalo da stvaramo digitalne oblike života, upravo zato što nam ne treba nova kategorija bića koja su sposobna za patnju.

GN ***Razumem. To je važna poruka za IT industriju.***

- Mislim da je teoretski moguće da stvorimo digitalne oblike života koji bi mogli da dožive i radost i patnju, ali mislim da je sprečavanje patnje mnogo veći prioritet. Trenutno ljudi uzrokuju ogromnu patnju životinjama, a

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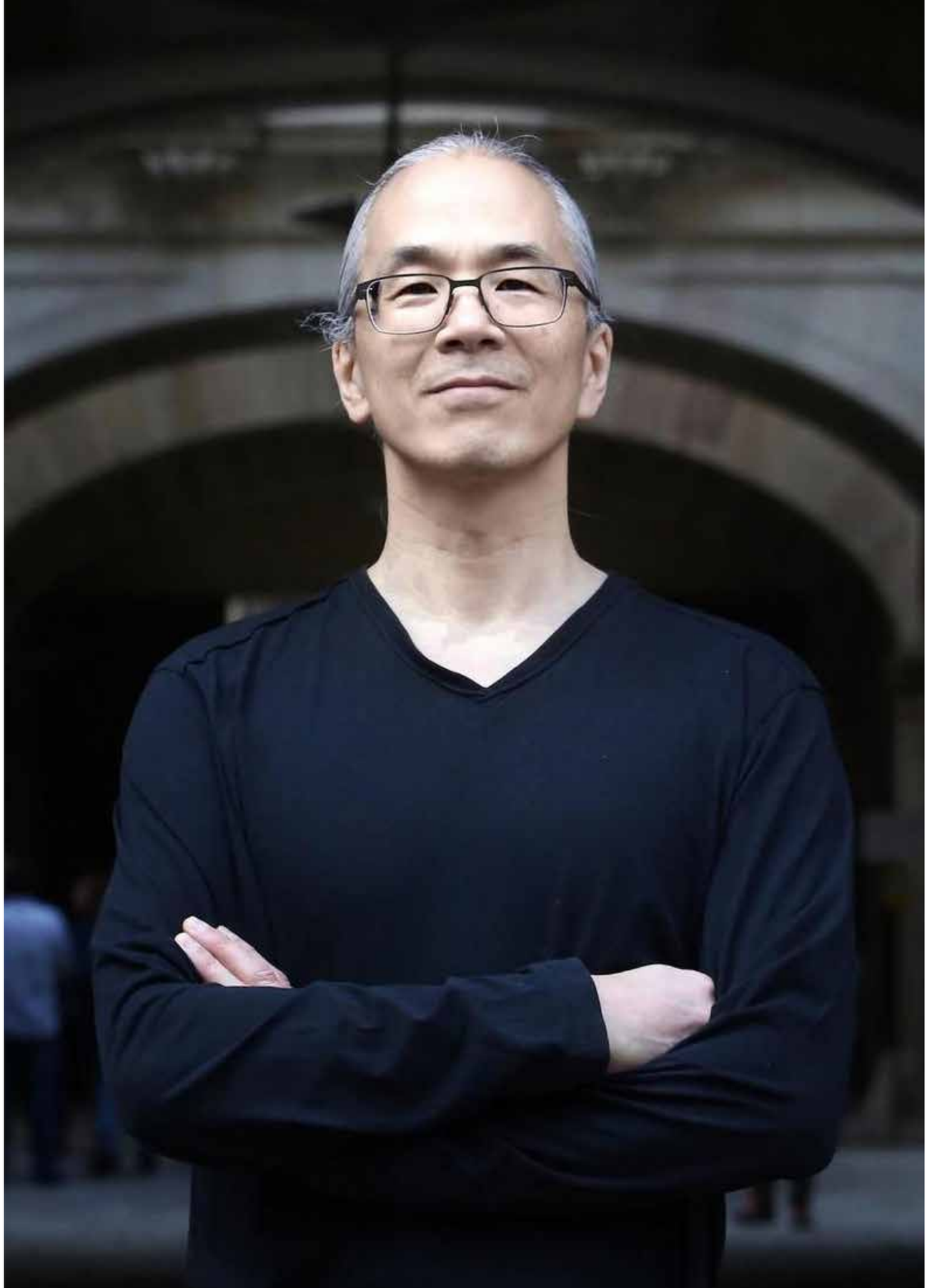


Ted Chiang

THE AUTHOR OF THE MOST VISIONARY SCIENCE FICTION OF OUR TIME

We Should not Create Digital Lifeforms

PN: Evgeny Morozov coined the phrase „techno-solutionism" to describe the tendency to view everything as a problem that can be solved with technology. It is obvious why companies embrace this tendency, because a technological solution is a product that they can sell

Ted Chang, the author of the most visionary science fiction of our time, masterfully creates futures that are not only based on the latest scientific and technological knowledge, but also pose profound allegorical questions about ethical dilemmas related to human freedom, will, consciousness, life and happiness.

„Good science fiction is about imagining the non-obvious consequences," explains Ted.

Editorial board member of DISTANCE.media, Dominique Chen (an Information Studies Researcher) spoke with Chiang about the current and future directions of artificial intelligence (AI) and artificial life (ALIFE), continuing to explore these complex themes.

WE DO NOT NEED A NEW CATEGORY OF A BEING THAT IS CAPABLE OF SUFFERING

In addition to being a longtime fan of your novels, I am a researcher in the field of interaction design, focusing on the relationship between humans, microbes, and computers. Today I'd like to talk about your creative process, language and ethical issues in AI development. I saw your presentation at the ALIFE2023 conference, where you talked about the education of „digients" (A virtual life form that appears in the work. It can learn language and behavior, and also manifests curiosity and emotional expressions), referring to work „Lifecycle of Software Objects ." I heard your criticism of easy anthropomorphism, which is common in the technological context, especially when it comes to AI and virtual characters. I found this topic fascinating, especially because I was touched by your depiction of Anna's (Anna is the main character of „Lifecycle of Software Objects" who struggles to provide a fair living environment for the digients she has raised) attitude towards her digients.

What is the difference between Anna's attitude and the corporate manipulative anthropomorphism you criticized?

- The difference is that the digients in the story really have subjective experiences, while the chatbots we see today do not. It is similar to the difference between a dog and a virtual dog. If someone starves a biological dog, they are causing real suffering. If someone doesn't „feed" a virtual dog, the virtual dog experiences nothing. Corporations may try to take advantage of humans' emotional response to an animation of a whimpering dog, but it is just an animation. The digients in my story were capable of real suffering, both physical and emotional, just like biological dogs. It is entirely appropriate for humans to act to reduce the physical and emotional suffering of animals, and I think it would likewise be appropriate for humans to act to reduce the suffering of digital organisms. But we don't have anything remotely like digital lifeforms right now. All we have are animations and sound files.

So, the fact that Jax was capable of physical and emotional suffering enabled an authentic connection between him and Anna. Then, should we consider implementing suffering to digital organisms to evade the corporate manipulative perspective to technology?

- The connection Anna had with Jax (Jax, a digient nurtured by Anna, is one of the main protagonists in „Lifecycle of Software Objects") was just as real as the connection a dog owner has with a dog. Perhaps a better comparison would be the connection that certain primatologists have with chimpanzees they have raised. I don't think we should create digital lifeforms, precisely because we don't need a new category of beings capable of suffering.

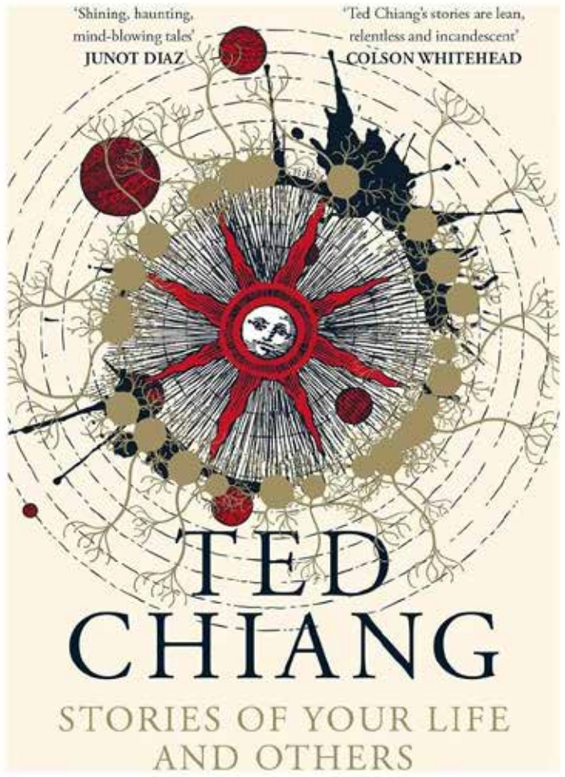
I see. That is a poignant message to the IT industry.

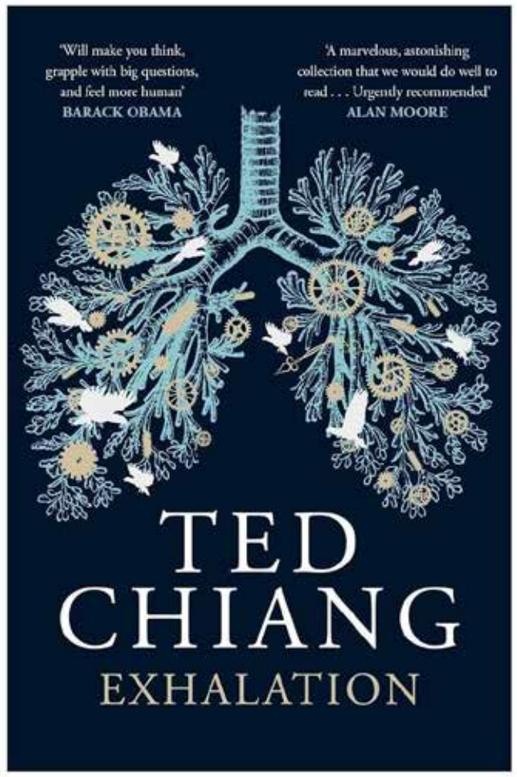
- I think it is theoretically possible for us to create

GN ▶▶▶

Ted Ćang

AUTOR NAJVIZIONARSKE NAUČNE FANTASTIKE NAŠEG VREMENA





životinje su napravljene od krvi i mesa, pa je lako videti da pate. Digitalni organizam ne bi bio od krvi i mesa, i mnogi bi ljudi zanemarili njegovu patnju. Zato, ako bismo stvorili digitalne organizme, mislim da bismo im neizbežno prouzrokovali ogromnu patnju.

GN *Na neki način, situacija u kojoj su se Ana i Derek našli je tragedija koju naše društvo treba da izbegne?*

- Da budem jasan, ovo je potpuno hipotetičko razmatranje. Problem sa kojim se trenutno suočavamo je da korporacije koriste naše emocionalne reakcije na animacije i zvučne datoteke kako bi od nas izvukle novac. Kao što sam rekao Anilu Setu (Odnosi se na razgovor koji je vođen sa kompjuterskim neuro-naučnikom Anilom Setom na ALIFE2023), to je takođe loše, ali je sasvim drugačiji problem. Iz filozofskog ugla, problem patnje digitalnih organizama je interesantan za mene. Ali iz praktičnog ugla, to neće biti nešto o čemu ćemo brinuti veoma dugo. Dovođenje u pitanje pretpostavke da je više tehnologije uvek bolje

GN *Sledeće bih želela da povežem ovo pitanje sa vašim nedavnim esejom u časopisu The New Yorker i posmatram ga iz praktičnije perspektive. U svom članku ste napisali: „Za tehnološke stručnjake, najteži posao od svih – zadatak koji najviše žele da izbegnu – biće dovođenje u pitanje pretpostavke da je više tehnologije uvek bolje i verovanja da mogu nastaviti kao do sada i da će se sve jednostavno rešiti.“ Mi, istraživači tehnologije, trebalo bi ozbiljno da shvatimo vašu poruku. Ali kako zamišljate poželjan oblik AI agenta kao konsultanta?*

- U članku na koji se pozivate, moj fokus je na tome kako široka kategorija tehnologija koje nazivamo AI osnažuje kapital na štetu rada. Pitanje koje me zanima je kako možemo koristiti ove tehnologije da osnažimo rad. Kako bismo mogli da ih iskoristimo za poboljšanje života ljudi koji rade? Nemam dobar odgovor na to.

GN *Rad je drugačija situacija u poređenju sa brigom o digijentima?*

- Veoma različita. Postoje načini da se tehnologija koristi kako bi se ljudima kao radnicima oduzela moć, kao i načini da se tehnologija koristi za izvlačenje veće vrednosti od ljudi kao potrošača. Ova druga kategorija obuhvata virtuelne ljubimce ili romantične ćatbotove.

GN ▶▶▶

Ted Chiang

THE AUTHOR OF THE MOST VISIONARY SCIENCE FICTION OF OUR TIME

I am dismayed by the things that Silicon Valley does, but I think there are plenty of people doing a better job of pointing out its shortcomings

digital lifeforms that could experience both joy and suffering, but I think preventing suffering is a much higher priority. Right now humans cause incredible suffering to animals, and animals are made of flesh and blood, so it is easy to see that they suffer. A digital organism would not be made of flesh and blood, and so a lot of people would dismiss their suffering. So if we created digital organisms, I think we would inevitably cause them enormous suffering.

GN *In a sense, Anna and Derek's situation was a tragedy that our society should avoid.*

- To be clear, this is an entirely hypothetical consideration. The issue we face now is that corporations will take advantage of our emotional responses to animations and sound files in order to extract money from us. As I said to Anil Seth (refers to a related talk conducted with computational neuroscientist Anil Seth at ALIFE2023), this is also bad, but it is an entirely different kind of problem. From a philosophical perspective, the problem of the suffering of digital organisms is interesting to me. But from a practical perspective, it is not something we will need to worry about for a very long time.

GN *Next, I want to connect this issue with your recent essay in The New Yorker and look at a more practical perspective. In your article, you wrote: "For technologists, the hardest work of all—the task that they most want to avoid—will be questioning the assumption that more technology is always better, and the belief that they can continue with business as usual and everything will simply work itself out. "We, researchers of technology, should take your message seriously. But how do you imagine a preferable form of AI agent to a consultant?*

- In the New Yorker article you're quoting, my focus is on how the broad category of technologies that we call AI empowers capital at the expense of labor. The question I'm interested in is, how can we use these technologies to empower labor? How could we use them to improve the lives of people who work? I don't have a good answer to this.

GN *Labor is a different situation than people nurturing digients.*

Very - different. There are ways to use technology to disempower people as workers, and there are ways to use technology to extract more value from people as consumers. The latter is the category that virtual pets or romantic chatbots fall under.

This leads me to think that Blue Gamma's initial decision to do business with digients was a mistake after all, if that ever happens in reality. Very interesting.

GN *Related to that, how do you see the role of, for instance, ChatGPT in people's workplace?*

- Right now, ChatGPT isn't reliable enough to replace humans at almost anything. Every day there's another headline about how ChatGPT bungled some task. We like the idea of technological solutions, because they promise immediate results.

GN *Is it possible for our society to develop technology that truly empowers people as workers? What do you think is needed to tackle this question?*

- This is the central question. Evgeny Morozov coined the phrase „techno-solutionism" to describe the tendency to view everything as a problem that can be solved with technology. It's obvious why companies embrace this tendency, because a technological solution is a product that they can sell. But what about problems whose solution is primarily political in nature? For example, is there a technology that would help workers unionize? And even if such a technology exists, is that a product anyone can sell profitably?

GN *Right. That's a needed perspective that is also possible to deploy into our society. The issue of techno-solutionism is embedded not only in business corporations but also in us, the so-called customers. This topic reminds me of your mentioning people's desire (for digital lifeforms or perfect language) in your talk with Anil Seth.*

- Yes, we as consumers like the idea of technological solutions, because they promise immediate results.

GN *I agree. I believe reading science fictional narratives such as „Lifecycle of Software Objects" helps us get past solutionism because they entangle us in dilemmas that you cannot solve with technology.*

- And social problems can't be solved by individuals acting in isolation. Buying a virtual girlfriend is something that a lonely guy can do by himself. Restructuring our society to reduce loneliness is not. Good science fiction is about imagining the non-obvious consequences.

GN *I wanted to know how you use two types of writing, science fiction and critical essays. Because you make social satire in your fiction as well, and your essays are as powerful as your stories. How do you distinguish your critical essays from your novels? Are they interrelated?*

- Writing essays is something I've only begun doing recently, and I'm still trying to figure out my relationship to it.

GN *I see. I was imagining you would approach some of the topics covered in your essay to construct new novels.*

GN ▶▶▶

Ted Ćang

AUTOR NAJVIZIONARSKE NAUČNE FANTASTIKE NAŠEG VREMENA

Zgrožen sam stvarima koje Silicijumska dolina radi, ali mislim da već postoji mnogo ljudi koji bolje od mene ukazuju na njene nedostatke

Ovo me navodi da mislim da je odluka Blue Gamme da se bavi digijentima na kraju bila greška, ukoliko se to ikada desi u stvarnosti. Veoma zanimljivo. U vezi s tim, kako vidite ulogu, na primer, ChatGPT-a u radnom okruženju?

- Trenutno, ChatGPT nije dovoljno pouzdan da zameni ljude u gotovo bilo čemu. Svakodnevno postoji novi naslov o tome kako je ChatGPT napravio grešku u nekom zadatku. Volimo ideju tehnoloških rešenja, jer obećavaju trenutne rezultate

Da li je moguće da naše društvo razvije tehnologiju koja zaista osnažuje ljude kao radnike? Šta mislite da je potrebno da se pozabavimo ovim pitanjem?

- To je ključno pitanje. Evgenij Morozov je skovao izraz „tehno-rešenjizam" za opisivanje tendencije da se sve posmatra kao problem koji se može rešiti tehnologijom. Jasno je zašto kompanije podržavaju ovu tendenciju, jer je tehnološko rešenje proizvod koji mogu prodati. Ali šta je sa problemima čije rešenje je prvenstveno političke prirode? Na primer, postoji li tehnologija koja bi pomogla radnicima da se sindikalizuju? Čak i ako takva tehnologija postoji, da li je to proizvod koji neko može profitabilno prodati?

Tačno. To je perspektiva koja je potrebna i koja se može primeniti u našem društvu. Problem tehno-rešenjizma nije samo u poslovnim korporacijama već i u nama, takozvanim potrošačima. Ova tema me podseća na vaše pominjanje ljudske želje (za digitalnim oblicima života ili savršenim jezikom) u vašem razgovoru sa Anilom Setom.

- Da, mi kao potrošači volimo ideju tehnoloških rešenja jer ona obećavaju trenutne rezultate.

Slažem se. Verujem da čitanje naučnofantastičnih narativa poput „Životnog ciklusa softverskih objekata" pomaže da prevaziđemo rešenjizam jer nas uvlači u dileme koje se ne mogu rešiti tehnologijom.

- Društveni problemi ne mogu se rešiti pojedincima koji deluju u izolaciji. Kupovina virtuelne devojke je nešto što usamljeni momak može da uradi sam. Restrukturisanje našeg društva kako bi se smanjila usamljenost nije. Dobra naučna fantastika govori o zamišljanju ne-očiglednih posledica.

Želela sam da saznam kako koristite dva tipa pisanja – naučnu fantastiku i kritičke eseje. S obzirom na to da pravite društvenu satiru i u svojoj fikciji, a vaši eseji su moćni kao i vaše priče, kako razlikujete svoje kritičke eseje od svojih romana? Jesu li međusobno povezani?

- Pisanje eseja je nešto što sam počeo tek nedavno, i još uvek pokušavam da shvatim svoj odnos prema tome.

Razumem. Zamišljala sam da biste neke od tema obrađenih u vašem eseju mogli koristiti za izgradnju novih romana?

- Za mene, motivacija za pisanje fikcije je veoma različita od motivacije za pisanje eseja. U svojoj fikciji, uglavnom pokušavam da ispričam priču i, nadam se, izazovem emocionalni odgovor.

Šta očekujete kao reakciju na svoje eseje?

- Nisam imao konkretna očekivanja. Bilo je iznenađenje za mene što su privukli toliko pažnje.

Kakva vas je reakcija iznenadila?

- Zgrožen sam stvarima koje Silicijumska dolina radi, ali mislim da već postoji mnogo ljudi koji bolje od mene ukazuju na njene nedostatke. Ali ljudi su želeli da me intervjuišu zbog eseja, što nisam očekivao.

Pretpostavljam da je to zato što se uticaj vaših stavova kao pisca naučne fantastike razlikuje od uticaja inženjera ili istraživača. Šta mislite o upotrebi naučne fantastike u akademskim krugovima? Kao predavač, koristim prototipove naučne fantastike i zadatke gde studenti pišu vrlo kratke distopijske priče kako bi razvili kritičku perspektivu. Da li očekujete nešto od akademika i studenata u njihovom čitanju i pisanju naučne fantastike?

- Mislim da dobra naučna fantastika govori o zamišljanju ne-očiglednih posledica. To je korisna veština u mnogim kontekstima. Teodor Sturdžen je rekao da naučna fantastika treba da postavi sledeće pitanje. Lako je postaviti prvo pitanje, ali otkriti sledeće je teško.

Na ALIFE2023 u Saporu, govorili ste o konceptu Savršenog jezika Umberta Eka i ukazali na duboko ukorenjenu težnju za tom vrstom ideje, ali smatrate da je to nedostižan san. Ovaj razgovor me podsetio na Heptapod B u vašoj priči „Pričeo tvog života", pisani jezik koji koriste heptapodi. Uzimajući u obzir prirodni jezik kao jednu od osnovnih veštačkih komunikacijskih tehnologija, možemo li osmisliti ideju za evoluciju našeg jezika kako bismo postigli bolju povezanost?

- Jezici nisu statični; oni rastu. Svaki jezik ima potencijalno beskonačnu izražajnu moć, tako da nam nije potreban novi jezik da poboljšamo naše međusobne odnose. Vremenom će naša kultura generisati nove ideje i načine za izražavanje tih ideja postojećim jezikom. Sve što nam treba možemo postići jezicima koje već imamo.

Ted Chiang

THE AUTHOR OF THE MOST VISIONARY SCIENCE FICTION OF OUR TIME

- For me, the motivation to write fiction feels very different from the motivation to write essays. In my fiction, I'm mostly trying to tell a story, and hopefully evoke an emotional response.

What do you expect as a response to your essays?

- I didn't have any specific expectations. It's been a surprise to me that they have attracted as much attention as they have.

What kind of response surprised you?

- I'm dismayed by the things that Silicon Valley does, but I think there are plenty of people doing a better job of pointing out Silicon Valley's shortcomings than me. But people have been wanting to interview me about the essays, which is not something I anticipated.

I suspect that is because the impact of the points you make as a science fiction writer quite differs from that of an engineer or researcher. What do you think about the use of Science Fiction in academia? As a teacher, I have used SciFi prototyping and assigning my students to write very short dystopian SciFi stories to cultivate critical perspective. Do you expect anything from scholars and students for their reading and writing of science fiction?

- I think good science fiction is about imagining the non-obvious consequences. That's a useful skill in a lot of contexts. Theodore Sturgeon said science fiction should ask the next question. It's easy to ask the first question, but figuring out the next one is hard.

At ALIFE2023 in Sapporo, you talked about Umberto Eco's concept of Perfect Language, and you pointed out that there is a deeply rooted urge for that kind of idea, but you think that is an unattainable dream. This conversation reminded me of the Heptapod B in Story of Your Life, the written language used by the heptapods. Considering natural language as one of the foundational artificial communication technologies, can we come up with an idea to evolve our language to make better kinship?

- Languages aren't static; they grow. Every language has potentially infinite expressive power, so we don't need a new language to improve our relationships with each other. Over time, our culture will generate new ideas and formulate ways of expressing those with existing language. Whatever we need to do, we can do with the languages we have.

Konferencije UN o klimi

COP

Konferencija Ujedinjenih nacija o klimatskim promenama, poznata kao COP, osnovana je u okviru konvencije Ujedinjenih nacija o promeni klime (UNFCCC). Ona predstavlja ključnu platformu za međunarodne pregovore o klimatskim pitanjima, okupljajući zemlje sa ciljem rešavanja izazova koje donose klimatske promene

Godišnji COP sastanci omogućavaju zemljama da zajednički rade i dogovaraju se o strategijama i sporazumima koji su usmereni na smanjenje globalnog zagrevanja. Svake godine, države članice Okvirne konvencije UN o promeni klime okupljaju se na "Konferenciji strana", poznatoj kao COP.

Ovaj samit omogućava procenu postignutog napretka, pregovore o zajedničkim strategijama za borbu protiv klimatskih promena i jačanje međunarodne saradnje u ovoj oblasti. Trenutno je 198 strana deo Konvencije – 197 država i Evropska unija, navodi Earth Org.

UNFCCC je multilateralni sporazum uspostavljen 1992. godine, nakon objavljivanja prvog izveštaja Međuvladinog panela o klimatskim promenama (IPCC) 1990. godine. Ovaj izveštaj pružio je sveobuhvatnu procenu naučnih saznanja o klimatskim promenama u to vreme. Izveštaji IPCC-a smatraju se najpouzdanijim izvorom informacija o klimatskim promenama.

Primarni cilj ovakvih skupova je dogovoranje strategija koje bizemlje primenile kako bi se stabilizovala koncentracija gasova sa efektom staklene bašte u atmosferi – glavnog uzročnika klimatskih promena – na nivou koji sprečava štetne, ljudski izazvane aktivnosti u klimatskom sistemu.

Od stupanja na snagu 1994. godine, UNFCCC i njegovi godišnji sastanci postavili su temelje za međunarodne klimatske pregovore, što je rezultiralo značajnim sporazumima poput "Kjoto protokola" iz 1997. i "Pariskog sporazuma" iz 2015. godine.

Organizacija COP sastanaka rotira se među pet regionalnih grupa UN-a: Afrika, Azija-Pacifik, Istočna Evropa, Latinska Amerika i Karibi, te Zapadna Evropa i druge zemlje. Prema podacima UN-a, ove zemlje odlučuju koja će zemlja biti sledeći domaćin narednih konferencija.

Prva COP konferencija održana je u Berlinu, u Nemačkoj, 1995. godine. Ovogodišnji samit, COP29, održan je u Bakuu, u Azerbejdžanu, od 11. do 22. novembra.

GN ▶▶▶

UN Climate Conference Process

COP

The United Nations Conference of the Parties, known as COP, was established under the United Nations Framework Convention on Climate Change (UNFCCC). It represents a pivotal platform for international negotiations on climate issues, bringing together countries to address the challenges posed by climate change

Annual COP meetings allow countries to work together and agree on strategies and agreements aimed at reducing global warming. Every year, nations that are part of the UN Framework Convention on Climate Change gather for the Conference of the Parties, known as COP.

The summit serves to evaluate their progress, negotiate collective strategies to combat climate change and foster international cooperation on climate issues. 198 Parties are currently part of the Convention – 197 states and the EU, according to Earth Org.

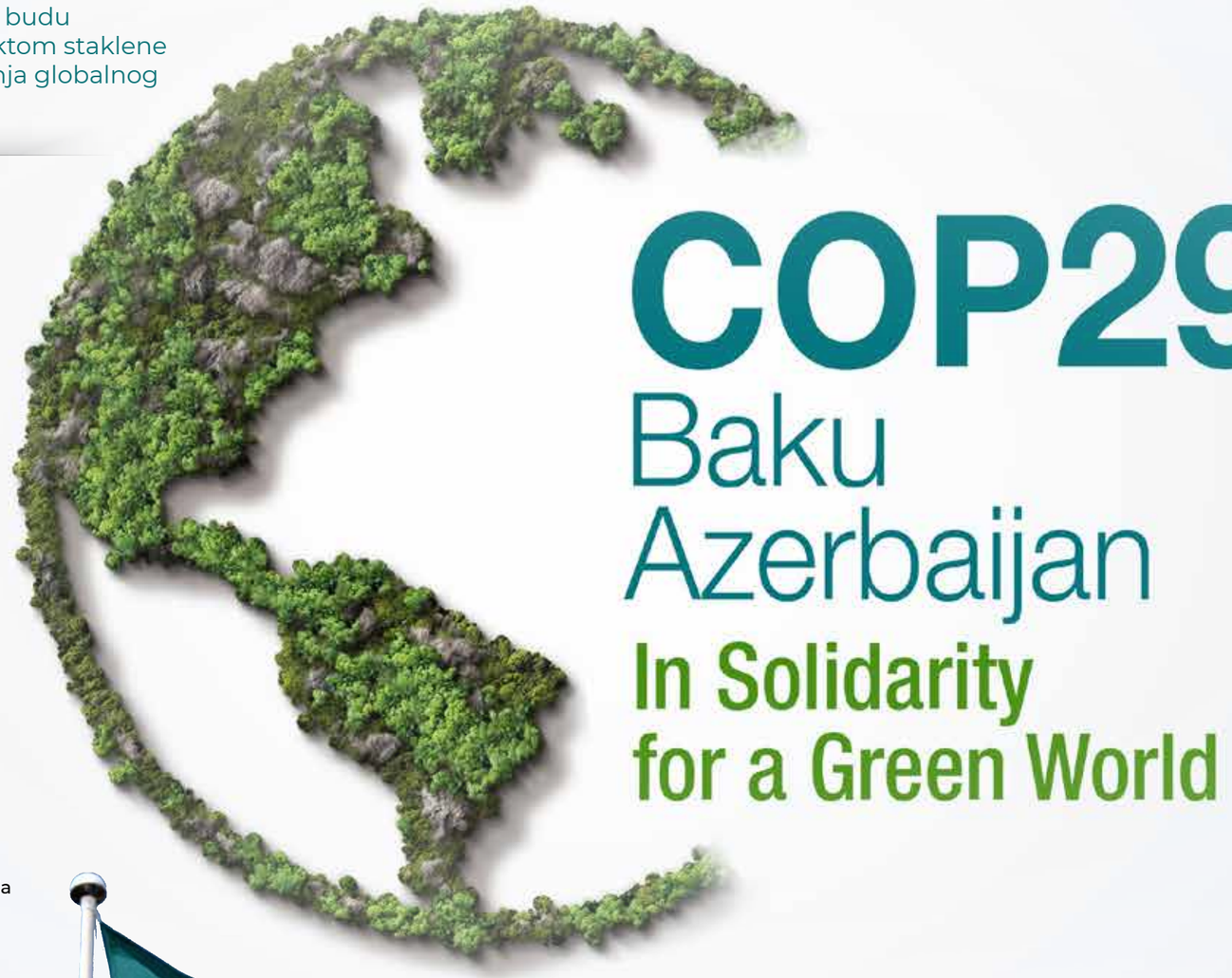
The UNFCCC is a multilateral treaty established in 1992, following the publication of the first report of the Intergovernmental Panel on Climate Change (IPCC) in 1990. This report provided a comprehensive evaluation of the scientific understanding of climate change at the time. IPCC reports are considered the most reliable source of information on climate change.

The primary goal of such gatherings is to agree on strategies to be implemented by countries in order to stabilize the concentration of greenhouse gases in the atmosphere - the main cause of climate change - at a level that prevents harmful, human-induced interference in the climate system.

GN ▶▶▶

GREENNEWS

Do COP30, vlade će morati da predstave ažurirane nacionalno utvrđene doprinose (NDC) koji budu sveobuhvatni, obuhvate sve gasove sa efektom staklene bašte i budu usklađeni sa ciljem ograničenja globalnog zagrevanja na 1,5°C



COP SASTANCI NE OBUHVATAJU SAMO KLIMATSKE PROMENE

Termin COP može se takođe odnositi na sastanke upravljačkih tela drugih ugovornih organa. Pored COP29 konferencije u okviru UNFCCC, za 2024. su planirana još dva značajna COP sastanka posvećena zaštiti životne sredine:

- Konvencija Ujedinjenih nacija o biološkoj raznovrsnosti, poznata kao COP16, usmerena je na prirodu i biodiverzitet. Održana je u oktobru u Kaliju, u Kolumbiji. Konvencija Ujedinjenih nacija za borbu protiv dezertifikacije (UNCCD), biće održana u decembru u Saudijskoj Arabiji.
- COP sastanci obeležili su značajne prekretnice u klimatskom pokretu postavljanjem standarda i promovisanjem inicijativa usmerenih na smanjenje emisije ugljen-dioksida, zatim ubrzavanje prelaska na obnovljive izvore energije, kao i na pomoć zemljama da se prilagode i poboljšaju svoju otpornost na klimatske izazove. Ove konferencije imaju ključnu ulogu u okupljanju vlada i povezivanju privatnog sektora, industrije i pojedinaca kako bi se odgovorilo na klimatsku krizu u svim njenim aspektima.

STRUKTURA COP-A

COP sastanci su ključni za unapređivanje globalne akcije u borbi protiv klimatskih promena u okviru UNFCCC. Sastanci obično počinju plenarim sesijama, na kojima se okupljaju predstavnici gotovo svih zemalja kako bi razgovarali o ključnim pitanjima, prisustvovali govorima i predstavili glavne tačke dnevnog reda za pregovore.

Kako bi se što pre došlo do konačnog dogovora među zemljama, dnevni red je podeljen između različitih pregovaračkih grupa koje se bave specifičnim temama poput ublažavanja klimatskih promena, prilagođavanja, finansiranja i prenosa tehnologije. Ova struktura omogućava detaljnu diskusiju i razvoj predloga koji će biti predstavljeni na plenarnoj sednici.

DVONEDELJNI DNEVNI RED COP29

Pored ovih procedura, održavaju se desetine pratećih događaja koje organizuju vlade, nevladine organizacije i drugi zainteresovani akteri. Oni pružaju priliku za umrežavanje, saradnju i predstavljanje inovativnih rešenja za klimatske izazove.

Mnogi COP sastanci uključuju izložbe i paviljone gde zemlje i organizacije prikazuju svoje k

limatske inicijative i nove tehnologije. Na kraju svakog COP-a, rezultati se sažimaju u završni dokument pod nazivom “Odluka COP-a.” Ovaj dokument navodi postignute dogovore i preuzete obaveze, služeći kao referenca za zemlje dok sprovode svoja klimatska obećanja i naglašava značaj odgovornosti u procesu pregovora.

The United Nations Convention on Biological Diversity, known as COP16, focuses on nature and biodiversity. It was held in October in Cali, Colombia. The United Nations Convention to Combat Desertification (UNCCD) will be held in December in Saudi Arabia

COPs were planned for 2024:

- The United Nations Convention on Biological Diversity, known as COP16, focuses on nature and biodiversity. It was held in October in Cali, Colombia. The United Nations Convention to Combat Desertification (UNCCD) will be held in December in Saudi Arabia.
- COP meetings marked significant milestones in the climate movement by setting standards and promoting initiatives aimed at reducing carbon dioxide emissions, accelerating the transition to renewable energy sources, and helping countries to adapt and improve their resilience to climate challenges. These conferences play a key role in bringing together governments and connecting the private sector, industries and individuals to address the climate crisis in all its aspects.

THE STRUCTURE OF COP

COP meetings are vital for advancing global action to combat climate change within the framework of the UNFCCC. The meetings usually start with plenary sessions, where representatives of almost all countries gather to discuss key issues, attend speeches and introduce major agenda items for negotiations

In order to reach a final agreement among countries as soon as possible, the agenda is split across various negotiating groups dealing with specific topics such as climate change mitigation, adaptation, financing and technology transfer. This structure allows for detailed discussion and the development of proposals to be presented at the plenary session.

COP29 TWO-WEEK AGENDA

In addition to these procedures, there are dozens of accompanying events organized by governments, non-governmental organizations and other interested actors. They provide an opportunity to network, collaborate and present innovative solutions to climate challenges.

Many COP meetings include exhibitions and pavilions where countries and organizations display their climate initiatives and new technologies. At the end of each COP, the results are summarized in a final document called “COP Decision.” This document outlines the agreements reached and the commitments made, serving as a reference for countries as they implement their climate pledges and underlines the importance of accountability in the negotiation process.

Since its entry into force in 1994, the UNFCCC and its annual meetings have laid the foundation for international climate negotiations, resulting in significant agreements such as the 1997 Kyoto Protocol and the 2015 Paris Agreement.

The organization of COP meetings rotates among the five UN regional groups: Africa, Asia-Pacific, Eastern Europe, Latin America and the Caribbean, and Western Europe and other countries. According to the UN, these countries decide which country will host each conference.

The first COP conference was held in Berlin, Germany, in 1995. This year’s summit, COP29, was held in Baku, Azerbaijan, from November 11 to 22.

COP MEETINGS ARE NOT JUST ABOUT CLIMATE CHANGE

The term COP can also denote governance meetings of other treaty bodies. In addition to the UNFCCC COP29, two other significant environmental

Kjoto protokol

“Kjoto protokol” je međunarodni sporazum usvojen 1997. godine u okviru UNFCCC, kojim su se njegove članice obavezale na smanjenje emisija gasova sa efektom staklene bašte, prepoznajući realnost globalnog zagrevanja i ulogu ljudski izazvanih emisija ugljen-dioksida. Protokol je postavio pravno obavezujuće ciljeve za razvijene zemlje, s ciljem ukupnog smanjenja od 5,2% u odnosu na nivoe iz 1990. tokom prvog perioda obaveza od 2008. do 2012. godine.

Protokol je uveo fleksibilne mehanizme poput trgovine emisijama, Mehanizma čistog razvoja (CDM) i Zajedničke implementacije (JI), omogućavajući zemljama da na isplativ način dostignu dogovorene ciljeve. Takođe je priznao princip diferenciranih odgovornosti, ističući da razvijene zemlje imaju veću obavezu smanjenja emisija zbog svojih istorijskih doprinosa klimatskim promenama. Uz to, Protokol je naložio da članice prate i izveštavaju o svojim emisijama, čime se osigurava transparentnost i odgovornost.

Iako je “Kjoto protokol” predstavljao značajan napredak u međunarodnoj klimatskoj politici i postavio osnovu za buduće sporazume poput “Pariskog sporazuma”, suočio se s izazovima, uključujući povlačenje ključnih zemalja emitera i potrebu za širom uključenosti zemalja u razvoju.

Pariski sporazum

“Pariski sporazum” je pravno obavezujući međunarodni ugovor o klimatskim promenama. Usvojen je od strane 196 strana na Konferenciji UN o klimatskim promenama (COP21) u Parizu, Francuska, 12. decembra 2015. godine, a stupio je na snagu u novembru 2016.

Sporazum je ujedinio države u zajedničkoj obavezi da ograniče globalno zagrevanje na „znatno ispod 2°C” u odnosu na predindustrijske nivoe, sa ambicioznim ciljem da se porast temperature ograniči na 1,5°C. On naglašava potrebu da se zemlje prilagode klimatskim promenama i izgrade otpornost. Pored toga, Pariski sporazum ističe važnost usklađivanja finansijskih tokova sa niskim emisijama gasova sa efektom staklene bašte i klimatski otpornim razvojem, obezbeđujući da finansiranje podržava održivost i smanjenje klimatskih rizika.

Središnji deo sporazuma predstavlja obaveza svih strana da podnesu Nacionalno utvrđene doprinose (NDC), u kojima su detaljno navedeni njihovi konkretni planovi za smanjenje emisija gasova sa efektom staklene bašte i poboljšanje otpornosti na klimatske promene. Sporazum prati petogodišnji ciklus, podstičući zemlje da redovno preispituju i unapređuju svoje obaveze tokom vremena.

Kyoto Protocol

The Kyoto Protocol is an international treaty adopted in 1997 under the UNFCCC, by which its members undertook to reduce greenhouse gas emissions, recognizing the reality of global warming and the role of human-caused carbon dioxide emissions. The Protocol set legally binding targets for developed countries, aiming for an overall reduction of 5.2% below 1990 levels during the first commitment period from 2008 to 2012.

To support compliance, the Protocol introduced flexibility mechanisms such as emissions trading, the Clean Development Mechanism (CDM), and Joint Implementation (JI), enabling countries to meet their targets in a cost-effective manner. It also acknowledged the principle of differentiated responsibilities, emphasizing that developed countries have a greater obligation to reduce emissions due to their historical contributions to climate change. Additionally, the Protocol mandated that parties monitor and report their emissions, ensuring both transparency and accountability.

While the Kyoto Protocol represented a significant advancement in international climate policy and set the stage for future agreements like the Paris Agreement, it encountered challenges, including the withdrawal of key emitting countries and the need for broader involvement from developing nations.

The Paris Agreement

The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris, France, on December 12, 2015, and entered into force in November 2016. The agreement united nations in a shared commitment to limit global warming to “well below 2C” above pre-industrial levels, with an aspirational goal of limiting the temperature increase to 1.5C. It emphasizes the need for nations to enhance their capacity to adapt to climate change and build resilience. Additionally, the Paris Agreement underscores the importance of aligning financial flows with low greenhouse gas emissions and climate-resilient development, ensuring that funding supports sustainability and mitigates climate risks.

Central part of the agreement is a commitment by all parties to submit Nationally Determined Contributions (NDCs), detailing their concrete plans to reduce greenhouse gas emissions and improve resilience to climate change. The agreement follows a five-year cycle, encouraging countries to regularly review and improve their commitments over time.

The primary goal of such gatherings is to agree on strategies to be implemented by countries in order to stabilize the concentration of greenhouse gases in the atmosphere - the main cause of climate change - at a level that prevents harmful, human-induced interference in the climate system

Primarni cilj ovakvih skupova je dogovoranje strategija koje bi zemlje primenile kako bi se stabilizovala koncentracija gasova sa efektom staklene bašte u atmosferi – glavnog uzročnika klimatskih promena – na nivou koji sprečava štetne, ljudski izazvane aktivnosti u klimatskom sistemu

Šta se desilo na COP28?

Na poslednjem samitu UN o klimi, koji je održan u Dubaiju, zemlje su postigle bez presedana sporazum, prvi put u istoriji COP sastanaka, koji eksplicitno poziva na „prelazak sa fosilnih goriva". Ovaj dogovor pokriva niz ključnih pitanja, uključujući klimatske finansije, prilagođavanje, bezbednost hrane i rodnu ravnopravnost.

Prvog dana COP28, zemlje su postigle dogovor o operacionalizaciji Fonda za gubitke i štete, koji je inicijalno uspostavljen na COP27. Fond je osmišljen da pruži finansijsku podršku posebno zemljama u Globalnom Jugu za gubitke i štetu koje pretrpe zbog klimatskih promena. Ova inicijativa ima za cilj da se odgovori na hitne potrebe tih zemalja, pomažući im da se oporave i prilagode na kontinuirane posledice klimatskih promena.

COP28 je obeležio istorijski trenutak sa prvim Globalnim pregledom (GST), temeljnom evaluacijom napretka zemalja u ostvarivanju svojih klimatskih ciljeva. Prepoznat kao ključni rezultat samita, GST je obuhvatio sve pregovarane elemente i pružio osnovu zemljama da unaprede svoje planove klimatske akcije, koje su obavezne da ažuriraju i učine dostupnim do 2025. godine.

Pregled je naglasio naučni konsenzus da emisije gasova sa efektom staklene bašte treba smanjiti za 43% do 2030. godine u odnosu na nivoe iz 2019. godine kako bi se globalno zagrevanje ograničilo na 1,5°C, kako je postavljeno Pariskim sporazumom. Utvrđeno je da zemlje nisu na putu da ispune ciljeve i pozvano je na hitnu kolektivnu akciju na globalnom nivou kako bi se utrostručila kapaciteti za obnovljive izvore energije i udvostručila poboljšanja u energetskoj efikasnosti do 2030. godine.

Budućnost COP-a

Uprkos značaju COP sastanaka, ovi skupovi suočavaju se sa nekoliko značajnih izazova koji će uticati na njihovu budućnost. Efikasnost pregovora često je ometena razlikama u političkoj volji između razvijenih i zemalja u razvoju. Čak i kada se postignu uspešni dogovori, problemi sa obezbeđivanjem usklađenosti i efikasnom implementacijom i dalje ostaju. Takođe, osiguranje adekvatne finansijske podrške za zemlje u razvoju kako bi se prilagodile klimatskim promenama i prešle na održive prakse ostaje izazov.

Do COP30, vlade će morati da predstave ažurirane nacionalno utvrđene doprinose (NDC) koji budu sveobuhvatni, obuhvate sve gasove sa efektom staklene bašte i budu usklađeni sa ciljem ograničenja globalnog zagrevanja na 1,5°C.

By COP30, governments need to present updated nationally determined contributions (NDCs) that are comprehensive, encompass all greenhouse gases, and align with the 1.5°C temperature limit

What Happened at Cop28?

At the last UN climate summit held in Dubai, countries reached an unprecedented agreement, the first in the history of COPs to explicitly call for "transitioning away" from fossil fuels. The deal addresses a range of critical issues, including climate finance, adaptation, food security, and gender equality.

On the first day of COP28, countries reached an agreement to operationalize the Loss and Damage Fund, which was initially established at COP27. The fund is designed to provide financial support specifically to vulnerable nations in the Global South for the losses and damage they incur because of climate change. This initiative aims to address the urgent needs of these countries, helping them to recover and adapt to the ongoing effects of climate change. COP28 marked a historic milestone with the first Global Stocktake (GST), a thorough evaluation of nations' progress toward their climate goals. Recognized as a key outcome of the summit, the GST encompassed all negotiated elements and provided a foundation for countries to enhance their climate action plans, which they are required to update and make available by 2025.

The stocktake underscored the scientific consensus that global greenhouse gas emissions need to be reduced by 43% by 2030 compared to 2019 levels to limit global warming to 1.5C as set in the Paris Agreement. It revealed that countries were not on track to meet the targets and called for urgent collective action on a global scale to triple renewable energy capacity and double improvements in energy efficiency by 2030.

The Future of Cop

Despite the importance of COP meetings, these gatherings face several significant challenges that will affect their future. The effectiveness of negotiations is often hindered by differences in political will between developed and developing countries. Even when agreements are successfully reached, problems with ensuring compliance and effective implementation remain. Also, ensuring adequate financial support for developing countries to adapt to climate change and transition to sustainable practices remains a challenge.

By COP30, governments need to present updated nationally determined contributions (NDCs) that are comprehensive, encompass all greenhouse gases, and align with the 1.5C temperature limit.

Tri vrste rešenja za globalno zagrevanje i njihove ekonomske koristi

Strategije prilagođavanja bore se protiv efekata globalnog zagrevanja

Postoje tri vrste rešenja za globalno zagrevanje. Najčešće se diskutuje o tzv. „rešenjima za prilagođavanje“ koja se bave neposrednim efektima, kao što su porast nivoa mora i poplave.

Međutim, ova rešenja ne otkrivaju uzrok globalnog zagrevanja. Istraživanja pokazuju da, ukoliko se emisija gasova sa efektom staklene bašte ne smanji, klimatske promene bi mogle da stvore trajni efekat „kuće staklene bašte“ u roku od dvadeset godina ili manje.

Kako prenosi portal „Treehugger“ drugi tip rešenja podrazumeva smanjenje budućih emisija gasova sa efektom staklene bašte prelaskom sa fosilnih goriva na čiste alternative, kao što su solarna energija, energija vetra i geotermalni izvori.

Treće rešenje je takođe od ključne važnosti, ali se o njemu manje govori. Ono uključuje uklanjanje postojećih gasova sa efektom staklene bašte iz atmosfere. Prema NASA-i, nivo ugljen-dioksida u atmosferi premašuje 400 delova po milionu, što je dovoljno da se temperatura Zemlje poveća za 4 stepena Celzijusa čak i ako prekinemo sve buduće emisije. Nivo mora bi bio viši za 20 metara, jer bi sav arktički led otopio.

REŠENJA ZA PRILAGOĐAVANJE

Strategije prilagođavanja bore se protiv efekata globalnog zagrevanja. One obuhvataju

prirodne katastrofe, poput uragana, tornada i požara. Vlade se suočavaju s posledicama ekstremnih vremenskih prilika, kao što su suše, poplave, toplotni talasi i porast nivoa mora.

Da bi se izborio s toplotnim talasima, grad Los Anđeles premazuje svoje ulice svetlosivom bojom. Ovaj potez će smanjiti temperaturu u Los Anđelesu za 3 stepena do 2038. godine. Grad Njujork je prefarbao više od 6,7 miliona krovova belim reflektujućim premazom. Istraživači kažu da beli krovovi smanjuju temperature za 2,6 stepeni Farenhajta, ali i smanjuju padavine ili dodatno hlade, što može povećati potrebu za grejanjem tokom zime.

Kina će se protiv poplava boriti kroz 30 novih „sunđerastih gradova“. Još 2015. godine pokrenula je inicijativu Sunđerastih Gradova, investirajući 12 milijardi dolara za projekte ponovnog korišćenja vode. Cilj je da do 2020. godine 80% kineskih gradova ponovo koristi skoro tri četvrtine kišnice, čime se istovremeno smanjuju štete od poplava i suša.

Grad Majami Bič na Floridi pokrenuo je petogodišnji javni program vredan 500 miliona dolara kako bi se borio protiv porasta nivoa mora. Program obuhvata podizanje puteva, instalaciju pumpi i rekonstrukciju kanalizacionih veza kako bi se odbranio od poplava tokom visokih plima.

Kolumbija razvija sorte kafe otporne na gljivice i štetočine. Globalno zagrevanje remeti ciklus rasta, slabi biljke i čini ih podložnijim štetočinama.

Three Types of Global Warming Solutions and Their Economic Benefits

Coping strategies combat the effects of global warming

There are three types of global warming solutions. Most often, the so-called „coping solutions” that deal with immediate effects, such as sea level rise and flooding, are discussed.

However, these solutions do not reveal the cause of global warming. Research shows that if greenhouse gas emissions are not reduced, climate change will create a permanent greenhouse effect within twenty years or less.

As the Treehugger portal reports, the second type of solution involves reducing future greenhouse gas emissions by switching from fossil fuels to clean alternatives, such as solar energy, wind energy and geothermal energy sources.

The third solution is also crucial, but it is less discussed. It involves removing existing greenhouse gases from the atmosphere. According to NASA, the level of carbon dioxide in the atmosphere exceeds 400 parts per million, which is enough to raise the Earth's temperature by 4 degrees Celsius even if we stop all future emissions. The sea level would be 20 meters higher, because all the Arctic ice would have melted.

COPING SOLUTIONS

Coping strategies combat the effects of global warming. They include natural disasters, such as hurricanes, tornadoes and wildfires. Governments are dealing with the consequences of extreme weather events, such as droughts, floods, heat waves and the rising sea level.

To combat heat waves, the city of Los Angeles is painting its streets light gray. This move will reduce temperatures in Los Angeles by 3 degrees by 2038. New York City has repainted more than 6.7 million roofs with a white reflective coating. Researchers say white roofs reduce temperatures by 2.6 degrees Fahrenheit, but also reduce rainfall, or lower temperatures, which can increase the need for heating during the winter.

China will fight floods through 30 new „sponge cities”. In 2015, it launched the Sponge City Initiative, investing $12 billion in water reuse projects. The goal was for 80% of Chinese cities to reuse nearly three-quarters of their rainwater by 2020, thereby simultaneously reducing damage from floods and droughts.

The city of Miami Beach, Florida, has launched a five-year, $500 million public work program to combat sea level rise. The program includes raising roads, installing pumps and reconstructing sewer connections to protect against flooding during high tides.

Colombia is developing coffee plants resistant to fungus and pests. Global warming disrupts the growth cycle, weakens plants and makes them more susceptible to pests.

Prema NASA-i, nivo ugljen-dioksida u atmosferi premašuje 400 delova po milionu, što je dovoljno da se temperatura Zemlje poveća za 4 stepena Celzijusa čak i ako prekinemo sve buduće emisije

ZAUSTAVITE EMISIJU GASOVA SA EFEKTOM STAKLENE BAŠTE

Najveći plan za smanjenje emisije gasova sa efektom staklene bašte predstavlja Pariški klimatski sporazum. Dana 18. decembra 2015. godine, 196 zemalja obećalo je da će ograničiti globalno zagrevanje na 2 °C iznad nivoa iz 1880. godine. Mnogi stručnjaci smatraju da je to tačka preloma – sve preko toga moglo bi pokrenuti nezaustavljive posledice klimatskih promena. Da bi se taj cilj postigao, globalne emisije moraju pasti na nulu do 2050. godine.

Članice bi radije da se zagrevanje ograniči na 1,5 °C. Klimatski sat pokazuje da ćemo, ovim tempom, do te tačke doći za 15 godina. Ukoliko se taj cilj postigne, svet će uštedeti 30 biliona dolara. Ova cifra obuhvata gubitak produktivnosti, rast troškova zdravstvene zaštite i smanjene prinose u poljoprivredi.

Studija MIT-a iz 2018. godine pokazala je da bi Kina mogla da uštedi 339 milijardi dolara sprovođenjem svog cilja iz Pariškog sporazuma. Ova ušteda bi proizašla iz smanjenja smrtnosti usled zagađenja vazduha. Zdravstvene i produktivne uštede bile bi četiri puta veće od troškova koje bi Kina imala da ispuni te ciljeve.

ŠTA MORA BITI UČINJENO?

U novembru 2018. godine, Međuvladin panel za klimatske promene Ujedinjenih nacija izjavio je da je cilj od 1,5 °C dostižan jedino ako svet prestane sa emitovanjem ugljenika do 2030. godine. Emisija je 2018. godine iznosila 40 milijardi tona. Potrebno je obustaviti upotrebu uglja do 2050. godine, dok bi solarna i energija vetra trebalo da obezbede 60% svetske električne energije umesto sadašnjih 25%. Saobraćaj mora da pređe na 100% električnu energiju, sa sadašnjih 4%.

Drveće za apsorpciju CO2 trebalo bi da zameni oranice. IPCC je preporučio bioenergetski proces hvatanja i skladištenja ugljenika (BECCS), gde bi se drveće moglo koristiti i kao energent, ali bi se CO2 skladištio ispod zemlje. Protivnici, međutim, tvrde da bi ovaj proces mogao dodatno da doprinese emisiji gasova sa efektom staklene bašte.

PREPREKE

Zemlje se spore oko toga ko bi trebalo da napravi najveće rezove. Zemlje u razvoju tvrde da bi Sjedinjene Američke Države trebalo najviše da smanje emisije, jer su već emitovale najveću količinu. S druge strane, SAD smatraju da bi Kina trebalo da smanji emisije, jer trenutno godišnje emituje najviše gasova. Sve zemlje su zabrinute da bi smanjenje emisije ugljenika moglo negativno uticati na njihov kvalitet života.

NEDAVNI RAZVOJ DOGAĐAJA

U aprilu 2019. godine, osam evropskih zemalja obećalo je da će smanjiti emisije ugljen-dioksida na nulu do 2050. godine. Istaknuto je da bi Evropska unija trebalo da potroši 25% svog budžeta na rešenja za globalno zagrevanje.

Zemlje su potpisale 1.500 klimatskih politika. Nacije koje predstavljaju 56% globalnih emisija saglasile su se sa uvođenjem poreza na emisiju ugljen-dioksida. Ovi Pigovijevi porezi trebalo bi da budu dovoljno visoki da se zagađivači naplate stvarnom cenom proizvoda na bazi nafte. Postoji 180 zemalja sa ciljevima u oblasti obnovljive energije. Gotovo 80% novih automobila podložno je standardima za emisiju iz vozila. Međutim, do sada to nije dovoljno da bi se postigao cilj.

U oktobru 2016. godine, više od 170 zemalja pristalo je na Kigali sporazum. Saglasile su se da postepeno izbace hidrofluorohidrokarbone u zemljama sa visokim prihodima do 2019. godine, a u svim ostalim do 2028. godine. Propan i amonijak su dostupni kao zamene. Ovaj sporazum smanjiće temperature za 1 °F, ali će koštati 903 milijarde dolara do 2050. godine. Prema The Drawdown Project, HFC-ovi imaju 1.000 do 9.000 puta veći kapacitet za zagrevanje atmosfere od CO2.

U 2018. godini, brodska industrija pristala je na smanjenje svojih emisija. Do 2050. godine, emisije će biti smanjene na 50% nivoa iz 2008. godine. Ova industrija godišnje emituje 800 miliona tona CO2, ili 2,3% ukupnih emisija u svetu. Da bi postigla svoj cilj, industrija mora da zameni naftu biogorivima ili vodonikom. Biće potrebno više energetski efikasnih dizajna.

Kina, Egipat, Meksiko i Indija planiraju da izgrade supersized solarne farme. Najveća solarna farmu na svetu biće završena 2019. godine. Egipat ulaže 4 milijarde dolara u izgradnju farme sa 5 miliona fotonaponskih panela. Farma će biti deset puta veća od Njujorkovog Central Parka i generisaće 1,8 gigavata struje. Tri puta je veća od najveće farme u SAD-u u Kaliforniji. Meksiko gradi ono što će biti najveća solarna farma u Americi.

Kina planira farmu snage 2 gigavata, a Indija je upravo odobrila farmu snage 5 gigavata.

Japanska vlada želi da proizvođači automobila prestanu da prave konvencionalne automobile do 2050. godine. Kina, najveće tržište automobila na svetu, već ima cilj da jedan od pet vozila bude na baterije do 2025. godine. Vlada SAD-a ne zahteva od svojih proizvođača automobila da pređu na električne modele, što šteti konkurentnosti američke industrije.

Poboljšana tehnologija baterija mogla bi eliminisati motore sa unutrašnjim sagorevanjem koji troše velike količine goriva. 2018. godine, Sila Nanotechnologies je kreirala litijumsku bateriju na bazi silikona. Ova baterija drži 15% više energije od najbolje baterije koja je trenutno dostupna. BMW će koristiti ovu bateriju u svojim električnim vozilima do 2023. godine. Sila trenutno radi na bateriji koja će postići poboljšanje od 40%.

Sjedinjene Američke Države mogle bi mnogo više da učine kako bi smanjile emisije gasova sa efektom staklene bašte. U 2016. godini, prirodni gas je generisao 34% od ukupne proizvodnje električne energije u SAD-u, koja je iznosila 4.079 triliona kWh. Sledeći su bili termoelektrane na ugalj, koje su generisale 30%. Nuklearne elektrane u SAD-u su proizvodile 19,7% i sprečile emisiju 573 miliona tona CO2. Hidroelektrane su doprinosile samo sa 6,5%. Ostali alternativni izvori, uključujući energiju vetra, dodali su samo 8,4%.

According to NASA, the level of carbon dioxide in the atmosphere exceeds 400 parts per million, which is enough to raise the Earth's temperature by 4 degrees Celsius even if we stop all future emissions

STOP GREENHOUSE GAS EMISSIONS

The biggest plan to reduce greenhouse gas emissions is the Paris Climate Agreement. On December 18, 2015, 196 countries promised to limit global warming to 2 °C above the 1880 level. Many experts believe that this is the tipping point – anything beyond that could trigger the unstoppable effects of climate change. To achieve this goal, global emissions must fall to zero by 2050. Members would prefer to limit warming to 1.5 °C. The Climate Clock shows that, at this rate, we will reach that point in 15 years. If this goal is achieved, the world will save 30 trillion dollars. This figure represents lost productivity, rising health care costs, and lower agricultural output.

A 2018 MIT study found that China could save $339 billion by implementing its Paris Agreement goal. This savings would result from a reduction in mortality due to air pollution. The health and productivity savings would be four times greater than China's costs of meeting those goals.

WHAT HAS TO BE DONE?

In November 2018, the United Nations Intergovernmental Panel on Climate Change stated that the 1.5 °C goal is achievable only if the world stops emitting carbon by 2030. In 2018, the emission amounted to 40 billion tons. It is necessary to stop the use of coal by 2050, while solar and wind energy should provide 60% of the world's electricity instead of the current 25%. Traffic must switch to 100% electric energy, from the current 4%.

Trees to absorb CO2 should replace croplands. The IPCC recommended BioEnergy Carbon Capture and Storage (BECCS) process, where trees could also be used as energy, but the CO2 would be stored underground. However, opponents argue that this process could further contribute to greenhouse gas emissions.

OBSTACLES

Countries argue over who should make the biggest cuts. Developing countries argue that the United States should reduce emissions the most because it already emits the largest amount. On the other hand, the US believes that China should cut emissions, because it currently emits the most gases annually. All countries are concerned that reducing carbon emissions could negatively affect their quality of life.

RECENT DEVELOPMENTS

In April 2019, eight European countries pledged to reduce carbon dioxide emissions to zero by 2050. It was pointed out that the European Union should spend 25% of its budget on solutions for global warming.

Countries have signed 1,500 climate policies. Nations representing 56% of global emissions have agreed to introduce a tax on carbon dioxide emissions. These Pigouvian taxes should be high enough to charge emitters the true cost of petroleum products. There are 180 countries with renewable energy targets.

Almost 80% of new cars are subject to vehicle emission standards. However, so far it is not enough to achieve the goal.

In October 2016, more than 170 countries agreed to the Kigali Agreement. They agreed to phase out hydrofluorocarbons in high-income countries by 2019, and in all others by 2028. Propane and ammonium are available substitutes. This agreement will reduce temperatures by 1 °F, but will cost $903 billion by 2050. According to The Drawdown Project, HFCs have 1,000 to 9,000 times greater capacity to warm the atmosphere than CO2.

In 2018, the shipping industry agreed to lower its emissions. By 2050, emissions will be reduced to 50% of 2008 levels. This industry annually emits 800 million tons of CO2, or 2.3% of the world's total emissions. To achieve its goal, the industry must replace oil with biofuels or hydrogen. More energy efficient designs will be needed.

China, Egypt, Mexico and India are planning to build supersized solar farms. Egypt is investing $4 billion to build a farm with 5 million photovoltaic panels. The farm will be ten times larger than New York's Central Park and will generate 1.8 gigawatts of electricity. It is three times larger than the largest farm in the US in California. Mexico is building what will be the largest solar farm in the Americas.

China is planning a 2-gigawatt farm and India has just approved a 5-gigawatt farm.

Japanese government wants car manufacturers to stop making conventional cars by 2050. China, the world's largest car market, already has a goal of one in five vehicles

Kolumbija razvija sorte kafe otporne na gljivice i štetočine. Globalno zagrevanje remeti ciklus rasta, slabi biljke i čini ih podložnijim štetočinama.

Povećanje globalne energije vetra za 1% moglo bi smanjiti emisiju CO2 za 84,6 gigatona.

Istraživanje iz 2018. godine pokazalo je da 70% Amerikanaca želi da energetske kompanije pređu na 100% čistu energiju.

Bar polovina bi bila spremna da plati 30% više za ovo. Više od 80 američkih gradova, pet okruga i dve savezne države obavezali su se na korišćenje 100% obnovljivih izvora. Šest gradova je već postiglo ovaj cilj. Postoji 144 kompanija širom sveta koje su se obavezale na 100% obnovljive izvore. Među njima su Google, Apple, Facebook, Microsoft, Coca-Cola, Nike i GM.

Novi izveštaj u časopisu Energy and Environmental Science pokazuje kako bi Sjedinjene Države mogle da pređu na energetski sistem zasnovan na 80% solarnim i vetroenergijama. To bi zahtevalo značajan napredak u tehnologijama za skladištenje energije ili stotine milijardi dolara uloženih u infrastrukturu za obnovljive izvore energije. Istraživači su analizirali podatke o sunčanoj i vetrovitoj energiji u SAD-u u poslednjih 36 godina. Ovi podaci omogućili su im bolje razumevanje geofizičkih prepreka sa kojima se susreću obnovljivi sistemi u zemlji.

Najveći izazov je skladištenje dovoljno energije kako bi se snabdevala strujom kada vetar i sunce nisu dostupni. Sjedinjene Države imaju potražnju za energijom od 450 gigavata. Potreban im je mreža objekata za skladištenje energije koji bi mogli da pohrane 12 sati solarne energije u isto vreme. Ovaj sistem bi morao da ima kapacitet za skladištenje od oko 5,4 teravat-sati. To je veličina Tesla Gigafabrike, Elona Maskova ogromna fabrika za proizvodnju baterija u Nevadi. Cena bi iznosila više od trilion dolara.

Kalifornija je naredila da sva električna energija bude generisana iz izvora bez ugljen-dioksida do 2045. godine. Takođe je zahtevala da sve nove kuće imaju solarne panele do 2020. godine. To dodaje između 8.000 i 12.000 dolara na cenu svake kuće ili 40 dolara mesečno na otplatu hipoteke. Međutim, ovo je kompenzovano uštedama na računima za struju u iznosu od 80 dolara mesečno zbog strukture cena u Kaliforniji koja favorizuje obnovljive izvore. Nove Džerzi, Masačusets i Vašington, D.C., razmatraju sličnu legislativu. Kalifornija je već lider u instaliranim solarnim kapacitetima, koji obezbeđuju 15% električne energije u državi i zapošljavaju 86.000 radnika.

Mnogi gradovi podstiču graditelje da dodaju cool ili zelene krovove na svoje zgrade. Cool krovovi se boje belom bojom kako bi odražavali sunčevu svetlost. Zelene krovove prekrivaju biljke. Ovi krovovi koriste manje energije od standardnih zgrada i apsorbuju gasove sa efektom staklene bašte.

Orlando, Florida, postavio je cilj da do 2050. godine generiše svu svoju energiju iz izvora bez ugljen-dioksida. Grad prelazi sa uglja na solarnu i vetrovnu energiju. Takođe testira alge u bazenima kako bi apsorbovale i kišnicu i ugljen-dioksid.

Jedno dugoročno rešenje za smanjenje emisije gasova sa efektom staklene bašte je smanjenje stope nataliteta. Najbolji način da se to postigne je obrazovanje devojčica do srednje škole. Devojčice koje napuste školu u petom razredu kako bi se udale imaju pet ili više dece. Devojčice koje završe srednju školu imaju u proseku dvoje dece. Stopa nataliteta u SAD-u opada jer mnoge žene brinu o klimatskim promenama.

SMANJITI CO2 KOJI JE U ATMOSFERI

Smanjenje budućih emisija nije dovoljno da se zaustavi globalno zagrevanje. Nivo CO2 je porastao toliko brzo da temperatura još nije dostigla taj nivo. Da bi se sprečilo dalje zagrevanje, nivo postojećeg CO2 mora se smanjiti sa trenutnog nivoa od 400 delova na milion na predindustrijski maksimum od 300 delova na milion. Da bismo to postigli, moramo ukloniti i pohraniti 30 godina CO2 iz atmosfere u narednih tri decenije.

Zatvaranje ugljen-dioksida (CO2) u zemljištu je proces koji ga hvata i skladišti pod zemljom. Da bi se postigao cilj Pariskog sporazuma, mora se ukloniti 10 milijardi tona CO2 godišnje do 2050. godine, a 100 milijardi tona do 2100. godine. Prema profesorima sa Univerziteta Princeton, 2018. godine je bilo sequestrovano samo 60 miliona tona ugljen-dioksida.

Jedno od najlakših rešenja je sadnja drveća i druge vegetacije kako bi se zaustavilo krčenje šuma. Tri triliona drveća u svetu skladište 400 gigatona ugljen-dioksida. Postoji prostor za sadnju još 1,2 triliona drveća na neiskorišćenom zemljištu širom planete. To bi apsorbovalo dodatnih 1,6 gigatona CO2. Nature Conservancy procenjuje da bi ovo koštalo samo 10 dolara po toni apsorbovanog CO2.

Drveće takođe pruža hladovinu, hladi okolinu i apsorbuje zagađenje. Kalifornija sadi drveće kako bi sprečila poplave. Sijetl podstiče graditelje da dodaju vrtove na krovovima ili zidovima prekrivenim vegetacijom u novim građevinskim projektima.

Drveće može biti iskorišćeno i za pružanje kreditnih emisija ugljen-dioksida. U Ajdahu će biti zasađeno 600 drveća u gradskim parkovima, stvarajući 1.300 kreditnih emisija u vrednosti od 50.000 dolara. Bilo ko može kupiti ove kredite kako bi kompenzovao emisije gasova sa efektom staklene bašte.

Nature Conservancy je sugerisao da bi obnova područja tresetišta i močvara mogla biti još jedno nisko-kostno rešenje za sekvestraciju ugljen-dioksida. Tresetišta su kompresovani ostaci biljaka u vlažnim područjima, a sadrže 550 gigatona ugljen-dioksida. Vlade moraju razviti planove za identifikaciju, zaštitu i obnovu tresetišta širom sveta.

Colombia is developing coffee plants resistant to fungus and pests. Global warming disrupts the growth cycle, weakens plants and makes them more susceptible to pests

data on solar and wind energy in the US over the past 36 years. The data gave them a better understanding of the geophysical barriers faced by renewable systems in the country.

The biggest challenge is storing enough energy to supply electricity when wind and sun are not available. The United States has an energy demand of 450 gigawatts. They need a network of energy storage facilities that could store 12 hours of solar energy at a time. This system would have to have a storage capacity of about 5.4 terawatt-hours. That is the size of the Tesla Gigafactory, Elon Musk's giant battery production facility in Nevada. It would cost over a trillion dollars.

California has mandated that all electricity be generated by carbon-free sources by 2045. It also required that all new homes have solar panels by 2020. That adds between $8,000 and $12,000 to each home's cost, or $40 a month in mortgage payments. However, this is offset by savings on electricity bills of $80 per month due to California's renewables-friendly pricing structure. New Jersey, Massachusetts and Washington, D.C. are considering similar legislation. California is already the leader in installed solar capacity, providing 15% of the state's electricity and employing 86,000 workers.

Many cities encourage builders to add cool or green roofs to their buildings. Cool roofs are painted white to reflect sunlight. Green roofs are covered by plants. These roofs use less energy than standard buildings and absorb greenhouse gases.

Orlando, Florida has set a goal to generate all of its energy from carbon-free sources by 2050. The city is switching from coal to solar and wind energy. It is also testing algae in pools to absorb both rainwater and carbon.

A long-term solution to lower greenhouse gas emissions is to reduce the birth rate. The best way to achieve this is to educate girls through high school. Girls who leave school in the fifth grade to marry have five or more children. Girls who finish high school have two children on average. The US birth rate is falling as many women worry about climate change.

REDUCE CO2 IN THE ATMOSPHERE

Reducing future emissions is not enough to stop global warming. The CO2 level has risen so fast that the temperature has not caught up. To prevent further warming, the level of existing CO2 must be reduced from the current level of 400 parts per million to the pre-industrial maximum of 300 parts per million. To achieve this, we must remove and store 30 years' worth of CO2 from the atmosphere in the next three decades.

Carbon sequestration is a process that captures and stores CO2 underground. To achieve the goal of the Paris Agreement, 10 billion tons of CO2 must be removed annually by 2050, and 100 billion tons by 2100. According to professors from Princeton University, only 60 million tons of carbon dioxide were sequestered in 2018.

One of the easiest solutions is to plant trees and other vegetation to stop deforestation. Three trillion trees in the world store 400 gigatons of carbon. There is room to plant another 1.2 trillion trees on unused land around the planet. This would absorb an additional 1.6 gigatons of CO2. The Nature Conservancy estimated that this would cost only $10 per ton of CO2 absorbed.

running on batteries by 2025. The US government is not requiring its automakers to switch to electric models, which hurts the competitiveness of American industry.

Improved battery technology could eliminate gas-hungry combustion engines. In 2018, Sila Nanotechnologies created a silicon-based lithium battery. This battery holds 15% more energy than the best battery currently available. BMW uses this battery in its electric vehicles. Sila is currently working on a battery that will achieve a 40% improvement.

The United States could do much more to reduce greenhouse gas emissions. In 2016, natural gas generated 34% of total US electricity generation, which was 4.079 trillion kWh. Coal-fired plants came next, generating 30%. Nuclear power plants in the US produced 19.7% and prevented the emission of 573 million tons of CO2. Hydropower plants contributed only 6.5%. Other alternative sources, including wind energy, added only 8.4%.

A 1% increase in global wind energy could reduce CO2 emissions by 84.6 gigatons.

A 2018 survey found that 70% of Americans want energy companies to switch to 100% clean energy.

At least half would be willing to pay 30% more for this. More than 80 US cities, five counties and two states have committed to 100% renewable energy. Six cities have already achieved this goal. There are 144 companies worldwide that have committed to 100% renewables. They include Google, Apple, Facebook, Microsoft, Coca-Cola, Nike and GM.

A new report in the journal Energy and Environmental Science shows how the United States could transition to an energy system based on 80% solar and wind power. That would require significant advances in energy storage technologies or hundreds of billions of dollars invested in renewable energy infrastructure. The researchers analyzed

Vlada bi odmah trebalo da finansira podsticaje za poljoprivrednike da bolje upravljaju svojim zemljištem. Na primer, mogli bi smanjiti oranje koje oslobađa ugljen-dioksid u atmosferu. Umesto toga, mogli bi saditi biljke koje apsorbuju ugljen-dioksid poput daikona.

Njihovi koreni razbijaju zemlju i postaju đubrivo kada umru. Upotreba komposta kao đubriva takođe vraća ugljen-dioksid u tlo, poboljšavajući pri tom kvalitet zemljišta. Wendee Silver, ekolog sa Univerziteta Kalifornije, Berkeley, otkrila je da je najbolje koristiti stajnjak kao kompost na poljima. To sprečava emisiju ugljen-dioksidnih gasova dok stagnira u lagunama, a takođe hrani travu koja apsorbuje više ugljen-dioksida.

Ako bi samo 41% pašnjaka bilo tretirano na ovaj način, to bi kompenzovalo 80% emisija iz poljoprivrede u Kaliforniji.

Godine 2017. McCarty Farms je posadio pokrivače usjeva na 12.300 hektara koji su nekada bili prazni. Oni su apsorbovali 6.922 tone CO2 i pohranili ih u tlo. To je ekvivalent 7.300 hektara šume. Štaviše, to je upilo emisije više od 1.300 automobila.

Elektrane mogu efikasno koristiti hvatanje i skladištenje ugljen-dioksida jer CO2 čini 5% do 10% njihovih emisija. Stanica Petra Nova u Teksasu će hvatati 90% svog CO2 i pumpati ga u iscrpljena naftna bunare. Ironično, penzionisana naftna polja imaju najbolje uslove za skladištenje ugljen-dioksida. Inicijativa za klimatske promene u nafti i gasu (OGCI) je identifikovala potencijalna podzemna skladišta. Između 70% i 90% ovih skladišta se nalazi unutar naftnih i gasnih polja.

Do 2040. godine, potrebno je izgraditi 100 novih postrojenja za sekvestraciju ugljen-dioksida svake godine. Ova postrojenja filtriraju CO2 iz vazduha koristeći hemikalije koje se vezuju za njega. Proces zahteva mašine koje pomeraju ogromne količine vazduha, jer ugljen-dioksid čini samo 0,04% atmosfere. Prema profesorima Pacali, za 10 godina ovo bi moglo biti moguće za samo 100 dolara po toni uhvaćenog CO2. To je manje od troška klimatskih promena. Nature Conservancy procenjuje da bi to koštalo 100 dolara po toni viška CO2 u atmosferi.

Vlada bi trebalo da subvencioniše istraživanja kao što je to radila sa solarnom i vetroenergetskom energijom. To bi koštalo samo 900 miliona dolara, daleko manje od 15 milijardi dolara koje je Kongres potrošio na pomoć nakon uragana Harvey.

Budžet predsednika Donalda Trampa za fiskalnu 2019. godinu daje kompanijama poreski kredit od 50 dolara za svaku metrisku tonu ugljen-dioksida koju uhvate i pohrane pod zemljom. Ali to je manje od troška hvatanja ugljen-dioksida na elektranama, što košta od 60 do 70 dolara po metričkoj toni. Ali poreski kredit mogao bi podstaknuti istraživanje novih tehnologija sa negativnim emisijama.

Prema istraživaču sa M.I.T.-a, Howardu Herzogu, vlada mora uvesti poreze na ugljen-dioksid kako bi učinila sekvestraciju ugljen-dioksida finansijski održivijom. Bez tih poreza, fosilna goriva su previše jeftina da bi druge opcije mogle konkurisati.

Neki istraživači predlažu da se u okeane ubace sigurni nutrijenti kako bi se podstakao rast fitoplanktona. Ove sićušne biljke apsorbuju ugljen-dioksid. Međutim, to bi takođe predstavljalo zagađenje i moglo bi stvoriti više mrtvih zona.

Manje istraživano rešenje je drobljenje stijena koje apsorbuju ugljen-dioksid, poput olivina ili vulkanskog bazalta. Profesor Pacala procenjuje da postoji 1.000 puta više stijena potrebnih za obavljanje ovog zadatka. Ali to bi moglo biti veoma skupo da se stena dovoljno zdrobi da bi se postigao efekat.

Opasno predloženo rešenje je geo-inženjering. Jedan predlog je korišćenje čestica za hlađenje Zemlje blokiranjem sunčeve svetlosti. Primer za to su vulkanske erupcije. Kada je planina Pinatubo na Filipinima eruptirala 1991. godine, temperatura Zemlje opala je za 0,4 C do 0,6 C. Ali čestice uništavaju ozon koji štiti Zemlju od zračenja koje može izazvati rak. Takođe blokiraju sunčevu energiju koja je potrebna za rad tehnologije solarnih ćelija. Zagađenje takođe hladi Zemlju reflektovanjem sunčeve toplote. Ali to bi takođe blokiralo sunčevu svetlost. GN

Trees also provide shade, cool the environment and absorb pollution. California is planting trees to prevent flooding. Seattle encourages developers to add rooftop gardens or walls covered by vegetation to new construction projects.

Trees can also be used to provide carbon credits. In Idaho, 600 trees will be planted in city parks, creating 1,300 carbon credits worth $50,000. Anyone can buy these credits to offset greenhouse gas emissions.

The Nature Conservancy has suggested that restoring peatland and wetland areas could be another low-cost solution to carbon sequestration. Peatlands are compressed remains of plants in wet areas, and contain 550 gigatons of carbon. Governments have to develop plans to identify, protect and restore peatlands worldwide.

The government should immediately fund incentives for farmers to manage their soil better. For example, they could reduce plowing that releases carbon into the atmosphere. Instead, they could plant carbon dioxide-absorbing plants like daikon. Their roots break up the soil and become fertilizer when they die.

Using compost as a fertilizer also returns carbon into the ground, improving soil quality in the process.

Wendee Silver, an ecologist at the University of California, Berkeley, found that it was best to use manure as compost in fields. It kept it from emitting carbon gases while it festered in lagoons. It also nourished grasses that absorbed more carbon.

If only 41% of the rangeland were treated, it would offset 80% of California's agricultural emissions.

In 2017, McCarty Farms planted cover crops on 12,300 acres that were once vacant. They absorbed 6,922 tons of CO2 and stored it in the soil. That is the equivalent of 7,300 hectares of forest. Moreover, it absorbed the emissions of more than 1,300 cars.

Power plants can effectively use carbon capture and storage because CO2 accounts for 5% to 10% of their emissions. The Petra Nova station in Texas will capture 90% of its CO2 and pump it into depleted oil wells. Ironically, retired oil fields have the best conditions for storing carbon. The Oil and Gas Climate Initiative (OGCI) has identified potential underground storage areas. Between 70% and 90% of this is within oil and gas fields.

By 2040, 100 new carbon sequestration plants need to be built every year. These plants filter CO2 from the air using chemicals that bind with it. The process requires machines that move huge amounts of air, as carbon makes up only 0.04% of the atmosphere. According to Professor Pacala, in 10 years this could be possible for only $100 per ton of captured CO2. That is less than the cost of climate change. The Nature Conservancy estimates that this would cost $100 per ton of excess CO2 in the atmosphere.

The government should subsidize research as it did with solar and wind energy. It would only cost $900 million, far less than the $15 billion Congress spent on Hurricane Harvey disaster relief.

President Donald Trump's fiscal year 2019 budget gave companies a $50 tax credit for every metric ton of carbon they capture and store underground. But it is less than the cost of capturing carbon dioxide at power plants, which costs $60 to $70 per metric ton. But the tax credit could encourage research into new technologies with negative emissions.

According to M.I.T. researcher Howard Herzog, the government has to introduce carbon taxes to make carbon sequestration more financially feasible. Without those taxes, fossil fuels are too cheap for other forms to compete.

Some researchers suggest we dump safe nutrients into the ocean to grow more phytoplankton. These tiny plants absorb carbon dioxide. However, it is also pollution and could create more dead zones.

A less researched solution is to crush carbon-absorbing rock, such as olivine or volcanic basalt. Professor Pacala estimates that there is 1,000 times the amount of rock needed to perform this task. But it could be very expensive to crush enough rock to make a difference.

A dangerous proposed solution is geo-engineering. One proposal is to use particulates to cool the Earth by blocking sunlight. An example of this is volcanic eruptions. When Mount Pinatubo in the Philippines erupted in 1991, the Earth's temperature dropped by 0.4 C to 0.6 C. But the particulates destroy ozone, which protects the Earth from radiation that can cause cancer. They also block solar energy needed for solar cell technology to work. Pollution also cools the Earth by reflecting the sun's heat. But it would also block sunlight. GN

Razlika između globalnog zagrevanja i klimatskih promena

Globalo zagrevanje je glavni uzrok promena u našeg trenutnog klimatskog stanja. Prema podacima Svetske meteorološke organizacije, tokom poslednjih 50 godina, polovina svih zabeleženih nepogoda i 74% povezanih ekonomskih gubitaka nastalo je zbog vremenskih, klimatskih i vodnih opasnosti poput poplava.

Pojmovi „globalno zagrevanje“ i „klimatske promene“ često se koriste naizmenično. U naučnoj literaturi, klimatske promene i globalno zagrevanje su nerazdvojno povezani, iako su to različiti fenomeni. Najjednostavnije objašnjenje ove povezanosti jeste da je globalno zagrevanje glavni uzrok promena u našem trenutnom klimatskom stanju. U ovom tekstu definišemo oba ova pojma, opisujemo kako se mere i proučavaju, i objašnjavamo njihovu međusobnu povezanost.

Šta je globalno zagrevanje?

Kako piše portal „Treehugger“ Međuvladin panel za klimatske promene (IPCC) definisao je globalno zagrevanje kao „povećanje prosečnih temperatura vazduha na površini zemlje i temperatura morskih površina, izračunatih globalno i tokom perioda od 30 godina.“ Više od jednog veka istraživanja sprovedeno je kako bi se izmerili i utvrdili precizni uzroci globalnog zagrevanja.

MERENJA KROZ ISTORIJU

Prosečna temperatura površine Zemlje tokom istorije planeta se kretala, rasteći i opadajući. Najpotpuniji globalni podaci o temperaturama, u koje naučnici imaju visok nivo poverenja, datiraju od 1880. godine. Pre 1880. godine, zapažanja su dolazila od farmera i naučnika koji su još u 17. veku beležili dnevne temperature, količinu padavina, kao i prve i poslednje mrazeve u svojim ličnim dnevnicima. Ovi podaci su često pokazali visok stepen tačnosti kada su upoređeni sa instrumentnim podacima. Za dugoročne podatke, paleoklimatolozi (naučnici koji proučavaju drevne klime) oslanjaju se na istorijske varijacije u broju polena, pomeranje i povlačenje planinskih glečera, ledene jezgre, hemijsko trošenje stena, prstenove na drveću i mesta na kojima se nalaze vrste, promene na obalama, sedimenta u jezerima i druge „proxy“ podatke. Naučnici kontinuirano usavršavaju tačnost zabeleženih podataka i način na koji se ti podaci tumače i modeliraju. Podaci o temperaturama variraju u zavisnosti od regiona, nadmorske visine, instrumenata i drugih faktora, ali što se više približavamo savremenom periodu, naučnici su sigurniji u činjenice o globalnom zagrevanju. Prirodni događaji, poput udara asteroida i velikih vulkanskih erupcija, na primer, mogu imati dramatične efekte na globalne temperature, dovodeći do masovnih izumiranja.

Ciklične promene u položaju Zemlje u odnosu na Sunce, poznate kao Milankovićevi ciklusi, mogu uticati na globalne temperature i imati dugoročne efekte na klimu tokom hiljada godina - iako oni ne objašnjavaju kraće promene koje su zabeležene u poslednjih 150 godina. Zaista, u sadašnjoj eri, iz podataka se izdvaja obrazac: prosečna temperatura Zemlje porasla je mnogo brže u poslednjih 50 godina nego tokom bilo kog prethodnog perioda globalnog zagrevanja.

Difference Between Global Warming and Climate Change

Global warming is the main cause of changes in our current climate According to the World Meteorological Organization, over the last 50 years, half of all recorded disasters and 74% of the associated economic losses have been due to weather, climate and water hazards such as floods

The terms „global warming” and „climate change” are often used interchangeably. In the scientific literature, climate change and global warming are inextricably linked, although they are distinct phenomena. The simplest explanation for this connection is that global warming is the main cause of changes in our current climate. In this text, we define both of these terms, describe how they are measured and studied, and explain the connection between them.

What Is Global Warming ?

As the Treehugger portal writes, the Intergovernmental Panel on Climate Change (IPCC) has defined global warming as „an increase in combined surface air and sea surface temperatures averaged over the globe and over a 30-year period.” For over a century, research has been conducted to measure and pinpoint the precise causes of global warming.

MEASUREMENTS THROUGHOUT HISTORY

The average surface temperature of the Earth has fluctuated throughout the history of the planet, rising and falling. The most complete global temperature records, in which scientists have a high level of confidence, date back to 1880. Before 1880, observations came from farmers and scientists who, as early as the 17th century, recorded daily temperatures, rainfall, and first and last frosts in their personal diaries. These data often showed a high degree of accuracy when compared to instrumental data.

For long-term data, paleoclimatologists (scientists who study ancient climates) rely on historical variations in pollen counts, the movement and retreat of mountain glaciers, ice cores, chemical weathering of rocks, tree rings and species locations, shorelines changes, lakes sediments and other „proxy” data. Scientists continuously refine the accuracy of the recorded data and how it is interpreted and modeled. Temperature records vary by region, altitude, instruments, and other factors, but the closer we get to the present, the more certain scientists are about the facts of global warming. Natural events, such as asteroid impacts and large volcanic eruptions, for example, can have dramatic effects on global temperatures, leading to mass extinctions. Cyclical changes in the Earth's position relative to the Sun, known as Milankovitch cycles, can affect global temperatures and have long-term effects on climate over thousands of years - although they do not explain the shorter-term changes seen in the last 150 years.

Indeed, in the current era, a pattern emerges from the data: Earth's average temperature has risen much faster in the last 50 years than during any previous warming event.

LJUDSKI UZROKOVANI FAKTORI

Ljudi su izazvali najbrže i najteže promene u globalnim temperaturama. Od svedočenja Jamesa Hansena 1988. godine, nivo poverenja u antropogene (ljudski izazvane) uzroke globalnog zagrevanja postao je praktično jednoglasan unutar naučne zajednice.

Ti antropogeni uzroci nisu novi. Još 1800. godine, prirodnjak Alexander von Humboldt primetio je kako krčenje šuma podiže regionalne temperature atmosfere. Kao što danas šumski požari otpuštaju tone ugljen-dioksida u atmosferu, kontrolisani požari su vekovima bili izvor dodatnog ugljen-dioksida.

Međutim, te tradicionalne prakse padaju u senku u poređenju sa količinom gasova sa efektom staklene bašte koji su emitovani od početka kasnog 18. veka, kada je razvijen parni motor na ugalj. Sagorevanje uglja je povećano sto puta u 19. veku, poraslo za dodatnih 50% do 1950. godine, utrostručilo se između 1950. i 2000. godine, a zatim skoro udvostručilo između 2000. i 2015. godine. Potrošnja nafte pratila je još brži rast, povećavši se 300 puta između 1880. i 1988. godine, a zatim porasla za dodatnih 50% do 2015. godine. Potrošnja prirodnog gasa je porasla najbrže, povećavši se hiljadu puta između kasnih 1880-ih i 1991. godine, a zatim još za 75% do 2015. godine.

Sagorevanje fosilnih goriva, koje emituje gasove sa efektom staklene bašte, pretežno ugljen-dioksid, metan i azotni oksid, možda je dostiglo vrhunac 2017. godine, ali je i dalje činilo 82% globalne potrošnje primarne energije 2021. godine.

Paralelan rast potrošnje fosilnih goriva i porast globalnih površinskih temperatura je očigledan. Emisija gasova sa efektom staklene bašte dostigla je nivoe koji su „neviđeni barem u poslednjih 800.000 godina“ i „izuzetno je verovatno da su bili dominantni uzrok posmatranog zagrevanja od sredine 20. veka“, navodi IPCC.

Jednostavan način da se razjasni kako fosilna goriva doprinose globalnom zagrevanju je da se zamisli pokrivač. Sagorevanje fosilnih goriva obavilo je Zemlju pokrivačem zagađenja koji zadržava toplotu. Što više fosilnih goriva sagorevamo, pokrivač postaje deblji, a više toplote može da se zadrži.

Global Climate Action

EFEKAT STAKLENE BAŠTE

Počevši od sredine 19. veka, naučnici su počeli da identifikuju promene u koncentracijama ugljen-dioksida kao vodeći uzrok promena u globalnim temperaturama. Godine 1856, američka fizičarka Eunice Foote bila je prva koja je demonstrirala kako ugljen-dioksid apsorbuje solarno zračenje. Njen predlog da „atmosfera tog gasa može da dâ Zemlji visoku temperaturu“ danas je opšte prihvaćeno razumevanje među naučnicima u vezi sa uzrocima globalnog zagrevanja, fenomenom koji je danas poznat kao efekat staklene bašte. Drugim rečima, veće količine ugljen-dioksida i drugih gasova sa efektom staklene bašte u atmosferi rezultiraju toplijim klimatskim uslovima. Footein doprinos je ubrzo zasenio tri godine kasnije irski fizičar John Tyndall, koji se obično priznaje kao prvi koji je opisao efekat staklene bašte.

Do 1988. godine, James Hansen, direktor NASA-inog Goddard instituta za svemirska istraživanja, mogao je da posvedoči pred Kongresom SAD-a s „visokim stepenom poverenja” da postoji „odnos uzroka i posledice” između efekta staklene bašte i zabeleženog globalnog zagrevanja. Hansen je govorio o nedavnom globalnom zagrevanju, ali se „visok stepen poverenja” odnosi i na paleoklimatologiju. Svojim postojanjem, od nastanka života na Zemlji, organizmi zasnovani na ugljen-dioksidu su menjali nivoe ugljen-dioksida u atmosferi.

Before 1880, observations came from farmers and scientists who, as early as the 17th century, recorded daily temperatures, rainfall, and first and last frosts in their personal diaries

HUMAN-CAUSED FACTORS

Humans have caused the most rapid and severe changes in global temperatures. Since the testimony of James Hansen in 1988, the level of confidence in anthropogenic (human-caused) causes of global warming has become functionally unanimous within the scientific community.

Those anthropogenic causes are not new. As early as 1800, the naturalist Alexander von Humboldt observed how deforestation raised regional atmospheric temperatures.16 Just as wildfires today release tons of carbon dioxide into the atmosphere, controlled burns have been a source of added carbon for centuries.

However, those traditional practices are dwarfed in comparison to the amount of greenhouse gases that have been emitted since the beginning of the late 18th century, when the coal-fired steam engine was developed. Coal burning expanded a hundredfold in the 19th century, grew another 50% by 1950, tripled between 1950 and 2000, and then nearly doubled between 2000 and 2015. Oil consumption followed even faster growth, expanding 300-fold between 1880 and 1988, and then growing another 50% to 2015. Natural gas use has risen the quickest, expanding a thousandfold between the late 1880s and 1991, then another 75% to 2015.

Fossil fuel burning, which emits greenhouse gases, predominantly carbon dioxide, methane and nitrous oxide, may have peaked in 2017, but it still accounted for 82% of global primary energy consumption in 2021.

The parallel growth in fossil fuel consumption and the rise in global surface temperatures is obvious. Greenhouse gas emissions have reached levels that are “unprecedented in at least the last 800,000 years” and „are extremely likely to have been the dominant cause of the observed warming since the mid-20th century,” the IPCC said.

A simple way to explain how fossil fuels contribute to global warming is to imagine a blanket. The burning of fossil fuels has wrapped the Earth in a blanket of pollution, which traps heat. The more fossil fuels we burn, the thicker the blanket gets, and the more heat can be trapped.

THE GREENHOUSE EFFECT

Starting in the mid-19th century, scientists began identifying changes in carbon dioxide concentrations as the leading cause of changes in global temperatures. In 1856, American physicist Eunice Foote was the first to demonstrate how carbon dioxide absorbed solar radiation. Her suggestion that „an atmosphere of that gas would give the Earth a high temperature” is now generally accepted understanding among scientists regarding the causes of global warming, a phenomenon now known as the greenhouse effect. In other words, higher amounts of carbon dioxide and other greenhouse gases in the atmosphere result in a warmer climate. Foote’s contribution was soon overshadowed three years later by Irish physicist John Tyndall, who is usually credited as the first who described the greenhouse effect.

By 1988, James Hansen, director of NASA’s Goddard Institute for Space Studies, could testify to the US Congress „with a high degree of confidence” that there was a „cause and effect relationship” between the greenhouse effect and recorded warming. Hansen talked about recent global warming, but the „high degree of confidence” also applies to paleoclimatology. Through their existence, since the emergence of life on Earth, carbon-based lifeforms have altered the levels of carbon dioxide in the atmosphere.

Šta su klimatske promene?

Klima je vreme tokom dužeg perioda. Promene u klimi izazvane ljudskim globalnim zagrevanjem imaju i nastaviće imati dugoročne efekte. Ti efekti, koji su nekada smatrani nečim što će se desiti u nekoj bližoj budućnosti, danas su sve očigledniji, pri čemu su najvidljivije promene u vremenskim obrascima. Međutim, suptilnije promene u celokupnim ekosistemima takođe predstavljaju vrlo ozbiljnu pretnju.

POVEZIVANJE VREMENSKIH PRILIKA SA KLIMATSKIM PROMENAMA

Često je teško povezati bilo koji konkretni ekstremni vremenski događaj sa globalnim zagrevanjem. Prirodna varijabilnost u klimi odgovorna je za kratkoročne, godišnje promene u vremenskim obrascima, posebno na regionalnom nivou. Međutim, dugoročan obrazac vremenskih događaja otkriva uticaj klimatskih promena.

Ono što se može povezati sa globalnim zagrevanjem je promena klime, u kojoj topliji okeani i topliji vazduh povećavaju verovatnoću i intenzitet suša, toplotnih talasa, oluja, uragana i drugih ekstremnih vremenskih događaja. Povezivanje ekstremnih događaja više je pitanje verovatnoće nego sigurnosti, s obzirom na to da okolnosti često nemaju istorijske precedense.

Međutim, upoređivanjem trenutnih ekstremnih događaja sa istorijskim, različitih intenziteta i različitih atmosferskih uslova, naučnici mogu dati sve rigoroznija objašnjenja o ulozi koju je globalno zagrevanje odigralo u pogoršavanju ekstremnog vremena.

Iako postoji često neslaganje u naučnoj zajednici o stepenu uticaja koji klimatske promene imaju na pojedinačne ekstremne događaje, postoji čvrst saglasnost da klimatske promene izazvane ljudskim delovanjem igraju ključnu ulogu.

EKSTREMNI VREMENSKI USLOVI

Globalno zagrevanje je učinilo vreme divljijim i nestabilnijim, jer su prirodne nepogode pokazale „eksponencijalni porast u poslednjim decenijama“ kako u intenzitetu, tako i u učestalosti. „Nepogode koje se dešavaju jednom u veku“, poput šumskih požara, smrtonosnih toplotnih talasa, suša, poplava, tropskih oluja, uragana, snežnih oluja i lavina, porasle su desetostruko od 1960. godine.

Prema podacima Svetske meteorološke organizacije, tokom poslednjih 50 godina, polovina svih zabeleženih nepogoda i 74% povezanih ekonomskih gubitaka nastalo je zbog vremenskih, klimatskih i vodnih opasnosti poput poplava.

What Is Climate Change?

Climate is weather over a long duration. Changes in the climate created by human-induced global warming are having and will continue to have long-term effects. Those effects, once thought to begin occurring sometime in the near future, are increasingly visible today, with the most apparent being changes in weather patterns. But subtler changes to entire ecosystems also present a very serious threat.

CONNECTING WEATHER TO CLIMATE CHANGE

It is often difficult to link any particular extreme weather event to global warming. Natural variability in climate is responsible for short-term, year-to-year changes in weather patterns, especially at the regional level. However, the long-term pattern of weather events reveals the impact of climate change.

What can be attributed to global warming is a changing climate, where warmer oceans and warmer air increase the likelihood and intensity of droughts, heat waves, storms, hurricanes, and other extreme weather events. Connecting extreme events is more a matter of probability than certainty, given that circumstances involved often have no historical precedents.

However, by comparing current extreme events with historical ones, of different intensities and different atmospheric conditions, scientists can provide increasingly rigorous explanations of the role that global warming has played in worsening extreme weather.

Although there is often disagreement in the scientific community about the level of influence that climate change has on a single extreme event, there is strong agreement that human-induced climate change plays a key role.

EXTREME WEATHER CONDITIONS

Global warming has made the weather wilder and more unstable, as natural disasters have shown an „exponential increases in recent decades” in both intensity and frequency. „Once-in-a-century” natural disasters, such as wildfires, deadly heat waves, droughts, floods, tropical storms, hurricanes, blizzards, and avalanches, have increased tenfold since 1960.

According to the World Meteorological Organization, over the last 50 years, half of all recorded disasters and 74% of the associated economic losses have been due to weather, climate and water hazards such as floods.

Pretnje ekosistemima

Opasnija od prirodnih katastrofa je pretnja klimatskih promena celokupnoj biosferi Zemlje, ekosistemima koji podržavaju život. Vrste koje pokušavaju da se prilagode promenjivoj klimi često ne uspevaju.

Na primer, korali umiru jer okeani apsorbuju atmosferski ugljen-dioksid i postaju sve kiseliji. Kada se močvare i priobalna močvarna područja osuše zbog porasta temperatura, njihova mrtva vegetacija se brže raspada i otpušta gasove sa efektom staklene bašte, čime doprinosi „kaskadnom efektu“, gde jedna katastrofa doprinosi sledećoj. Klimatski „prelomi tačke“, koji su već u toku, dovode do velikih gubitaka u biodiverzitetu i podrivaju čitave ekosisteme.

Iako istraživanja klimatskih promena još uvek sadrže nepoznanice i nesigurnosti, lakše je razumeti prošlost nego predvideti budućnost fizičkih i bioloških sistema čitave planete. Ipak, ključna nesigurnost nije toliko u tvrdim naučnim podacima o klimatskim promenama, koliko u društvenim naukama koje proučavaju kako ljudi reaguju na njih. GN

ČESTO POSTAVLJANA PITANJA:

Može li klima postati lošija ako globalne temperature ostanu stabilne?

Klimatske promene mogu imati kaskadne efekte. Na primer, čak i ako globalne temperature ostanu stabilne, planinski lanac koji je prethodno bio prekriven šumama, a koji je uništen sušom i šumskim požarima, zadržaće manje vode u svom tlu, proizvoditi manje vodene pare kroz transpiraciju biljaka i osušiti lokalnu klimu.

Ako bismo sada smanjili emisiju gasova sa efektom staklene bašte, koliko brzo bismo videli uticaj na klimu?

Prema IPCC-u, značajno smanjenje emisija sada bi rezultiralo nižim koncentracijama ugljen-dioksida u atmosferi za pet do deset godina, što bi dovelo do nižih globalnih površinskih temperatura u narednih 20 do 30 godina. Zbog toga je bitno povećati naše napore kako bismo brže smanjili emisije.

Threats to ecosystems

More dangerous than natural disasters is the threat of climate change to the entire biosphere of the Earth, the ecosystems that support life. Species that attempt to adapt to the changing climate often fail.

For example, corals die as oceans absorb atmospheric carbon dioxide and become increasingly acidic. When peatlands and coastal wetlands dry out due to rising temperatures, their dead vegetation decomposes more quickly and releases greenhouse gases, contributing to a “cascading effect” where one calamity contributes to the next. Climate-driven “tipping points,” already underway, lead to major losses in biodiversity and undermine entire ecosystems.

Although climate change research still contains unknowns and uncertainties, it is easier to understand the past than to predict the future of the physical and biological systems of the entire planet. Yet the key uncertainty lies not so much in the hard scientific data on climate change as in the social sciences that study how people respond to it. GN

FREQUENTLY ASKED QUESTIONS:

Can the climate get worse if global temperatures remain stable?

Climate change can have cascading effects. For example, even if global temperatures remain stable, a previously forested mountain range that has been destroyed by drought and wildfires will retain less water in its soil, produce less water vapor through plant transpiration, and dry out the local climate.

If we reduced greenhouse gas emissions now, how quickly would we see the effects on the climate?

According to the IPCC, significantly reducing emissions now would result in lower concentrations of carbon dioxide in the atmosphere in five to 10 years, which would result in lower global surface temperatures in 20 to 30 years. That is why it is urgent to increase our efforts to lower emissions immediately.

Devet najugroženijih gradova od globalnog zagrevanja

Promene povezane sa globalnim zagrevanjem povećavaju rizik od poplava u priobalnim gradovima

Porast nivoa mora uzrokuje prodiranje slane vode i oštećenja infrastrukture usled udara talasa tokom oluja. Sve intenzivnije padavine povećavaju rizik od poplava. Istovremeno, populacija u gradovima raste, a vrednost ekonomskih ulaganja u gradovima vrtoglavo raste.

Situaciju dodatno komplikuje to što mnogi priobalni gradovi trpe sleganje tla, proces pri kojem dolazi do snižavanja nivoa tla, često zbog iscrpljivanja močvara i intenzivne eksploatacije podzemnih voda. Uz sve ove faktore, sledeći gradovi rangirani su prema prosečnim očekivanim ekonomskim gubicima usled poplava izazvanih klimatskim promenama, piše Treehugger.

Ova lista zasnovana je na ekonomskim gubicima, koji su najviši u bogatim gradovima poput Majamija i Njujorka. Rangiranje prema gubicima u odnosu na bruto domaći proizvod gradova pokazalo bi pretežno gradove iz zemalja u razvoju.

Guangdžou

Kina

Populacija: 14 miliona

Smešten u delti reke Bisera, ovaj prosperitetni grad na jugu Kine ima opsežnu mrežu saobraćajnih veza, a centralna gradska zona nalazi se uz samu obalu estuara.

The Nine Cities Most at Risk from Global Warming

The changes associated with global warming are increasing the risk of flooding in coastal cities

The rise in sea levels has been leading to saltwater intrusion and infrastructure damage from storm surges. Increasingly intense rainfall increases the risk of flooding. At the same time, the population in cities is growing, and the value of economic investments in cities is skyrocketing.

The situation is further complicated by the fact that many coastal cities suffer from subsidence, a process in which the ground level is lowered, often due to depletion of wetlands and intensive exploitation of groundwater. With all these factors in mind, the following cities have been ranked in order of average expected economic losses from climate change induced flooding, Treehugger writes.

This ranking is based on economic losses, which are highest in rich cities like Miami and New York. The ranking based on the losses in relation to the gross domestic product of the cities would show predominantly cities from developing countries.

Guangzhou

China

Population: 14 million

Located on the Pearl River Delta, this prosperous city in southern China has an extensive transportation network, and a downtown area located right on the banks of the estuary.

Majami
Sjedinjene Američke Države
Populacija: 5,5 miliona

S linijom visokih zgrada uz samu obalu, Majami je u velikom riziku od porasta nivoa mora. Kamen krečnjak na kojem je grad izgrađen je porozan, a prodiranje slane vode zbog porasta nivoa mora oštećuje temelje. Uprkos skepticizmu senatora Rubija i guvernera Skota prema klimatskim promenama, grad je nedavno započeo planiranje kako bi se prilagodio višem nivou mora.

Miami United States
Population: 5.5 milions

With a row of tall buildings right along the coast, Miami is at high risk from sea level rise. The limestone bedrock on which the city has been built is porous, and saltwater intrusion due to rising sea levels is damaging the foundations. Despite Senator Rubio's and Governor Scott's skepticism about climate change, the city has recently began planning to adapt to higher sea levels.

Njujork Sjedinjene Američke Države
Populacija: 8,4 miliona
20 miliona sa celim metropolitanskim područjem

Njujork okuplja ogromno bogatstvo i veliku populaciju na ušću reke Hadson u Atlantski okean. Tokom uragana Sendi 2012. godine, udarni talasi su nadmašili zaštitne zidove i izazvali štetu od 18 miliona dolara samo u ovom gradu, što je obnovilo posvećenost grada pripremama za povećanje nivoa mora.

New York United States
Population: 8.4 million,
20 million for the entire metropolitan area.

New York concentrates vast wealth and a very large population at the mouth of the Hudson River on the Atlantic. During Hurricane Sandy in 2012, storm surge overtopped floodwalls and caused $18 million in damage in the city alone, renewing the city's commitment to preparing for increased sea levels.

New Orleans
United States
Population: 1.2 million

Nju Orleans
Sjedinjene Američke Države
Populacija: 1,2 miliona

Delimično smešten ispod nivoa mora, ovaj grad, neprestano vodi egzistencijalnu borbu protiv Meksičkog zaliva i reke Misisipi. Šteta od udarnog talasa tokom uragana Katrine podstakla je značajna ulaganja.

New Orleans, which is partially located below sea level, is continuously fighting an existential struggle against the Gulf of Mexico and the Mississippi River. The storm surge damage during Hurricane Katrina prompted significant investment.

Nagoya
Japan
Population: 8.9 million

Nagoja
Japan
Populacija: 8,9 miliona

Intenzivni pljuskovi postali su mnogo ozbiljniji u ovom priobalnom gradu, a poplave reke predstavljaju veliku pretnju.

Heavy rainfall events have become much more severe in this coastal city, and river floods are a major threat.

Mumbaj Indija
Populacija: 12,5 miliona

Smešten na poluostrvu u Arapskom moru, Mumbaj prima ogromne količine vode tokom sezone monsunskih kiša i ima zastarele kanalizacione i odvodne sisteme.

Mumbai India
Population: 12.5 milions

Located on a peninsula in the Arabian Sea, Mumbai receives huge volumes of water during the monsoon season, and has outdated sewage and drainage systems.

Tampa – St. Petersburg

Sjedinjene Američke Države

Populacija: 2,4 miliona

Prostran oko zaliva Tampa, s mnogom infrastrukturom koja je veoma blizu nivoa mora, grad je naročito ranjiv na porast nivoa mora i udarne talase tokom oluja, naročito od uragana.

Tampa - St. Petersburg,

United States

Population: 2.4 million

Sprawling around Tampa Bay, with much infrastructure very close to sea level, the city is particularly vulnerable to sea level rise and storm surges, especially from hurricanes.

Boston

Sjedinjene Američke Države

Populacija: 4,6 miliona

Sa mnogo razvoja direktno na obalama i relativno niskim obalnim zidovima, Boston je u opasnosti od ozbiljnih oštećenja infrastrukture i saobraćajnih sistema. Uticaj uragana “Sendi” na Njujork bio je poziv za uzbunu za Boston.

Boston

United States

Population: 4.6 million

With a lot of development right on the shores and relatively low sea walls, Boston is at risk of serious damage to its infrastructure and transportation systems. The impact of Hurricane Sandy on New York was a wake-up call for Boston.

Šenžen Kina

Populacija: 10 miliona

Nizvodno od Guangdžoua u delti reke Bisera, Šenžen ima gustu populaciju koncentrisanu duž plitkih obala i okružen je brdima.

Shenzhen China

Population: 10 milions

Down the Pearl River estuary from Guangzhou, Shenzhen has a dense population concentrated along tidal flats and surrounded by hills.

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TRUDNOĆA U SVE TOPLIJOJ KLIMI

MALARIJA

„dvostruki smrtonosni rizik“

Bila je u porođaju, spremna da rodi blizance, ali je imala i težak slučaj malarije, smrtonosne bolesti koju prenose komarci i koja je uobičajena u tropskim zemljama

Komarci se sele u planine Papue Nove Gvineje i druge planinske oblasti. To bi moglo biti kao smrtna kazna za trudnice.

Roger Casupang radio je u priobalnoj klinici na severu Papue Nove Gvineje, ostrvske zemlje sa 9 miliona stanovnika u jugozapadnom delu Tihog okeana, kada je trudna žena ušla u njegovu ustanovu. Bila je u porođaju, spremna da rodi blizance, ali je imala i težak slučaj malarije, smrtonosne bolesti koju prenose komarci i koja je uobičajena u tropskim zemljama.

Casupang, akušer, brzo je procenio situaciju. Kada je trudnica zdrava, trudnoća sa blizancima je dvostruko rizičnija od trudnoće sa jednim detetom. U međuvremenu, teška malarija ubija gotovo polovinu trudnica koje obole. Žena je bila iscrpljena i delirična. Pošto mnogi njegovi pacijenti hodaju danima kako bi dobili medicinsku pomoć za uobičajene tegobe, Casupang nije znao iz koje je provincije došla niti koliko je dugo putovala pre nego što je stigla u njegovu kliniku.

Ono što je znao bilo je da je žena stigla u poslednjem trenutku.

„Ustvari je već počela da se napinje kad je stigla,” rekao je.

Casupang, rođen u jednoj od planinskih provincija Papue Nove Gvineje i lekar na ostrvu već duže od decenije, video je trudnice koje su umirale i u manje strašnim okolnostima. Suprotno očekivanjima i uz ograničene medicinske resurse, Casupang i drugi medicinski radnici uspeli su da bezbedno porode blizance. Obe bebe su težile manje od tri kilograma zbog majčine ozbiljne infekcije. Blizanci su premešteni u odeljenje za novorođenčad dok su Casupang i njegove kolege radili na stabilizaciji majke. Ponovo je ujedinjena sa bebama nakon deset dana intenzivne nege.

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She was in labor, ready to give birth to twins, but she also had a severe case of malaria, a life-threatening mosquito-borne illness common in tropical countries

PREGNANCY IN A HOTTER CLIMATE

MALARIA

Double Deadly Risk

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Mosquitoes migrate to the mountains of Papua New Guinea and other mountainous areas. It could be like a death sentence for pregnant women.

Roger Casupang was working at a coastal clinic in northern Papua New Guinea, an island nation of 9 million people in the southwestern Pacific Ocean, when a pregnant woman entered his facility. She was in labor, ready to give birth to twins, but she also had a severe case of malaria, a life-threatening mosquito-borne illness common in tropical countries.

Casupang, an obstetrician, quickly assessed the situation. When a pregnant woman is healthy, a twin pregnancy is twice as risky as a single pregnancy. Meanwhile, severe malaria kills almost half of the pregnant women who contract it. The woman was exhausted and delirious. Since many of his patients walk for days to get medical care for standard ailments, Casupang did not know which province she came from or how long she had been traveling before she reached his clinic.

What he did know was that the woman had arrived at the last minute.

“She was actually pushing when she came in,” he said.

Casupang, who was born in one of the mountainous provinces of Papua New Guinea, and a doctor on the island for more than a decade, has seen pregnant women die in less dire circumstances. Against all odds, and with limited medical resources, Casupang and other medical workers managed to deliver the twins safely. Both babies weighed less than three kilograms due to the mother’s serious infection. The twins were moved to the neonatal unit while Casupang and his colleagues worked to stabilize the

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„Da se ovaj slučaj dogodio u nekoj udaljenoj ustanovi,” rekao je Casupang, „priča bi bila sasvim drugačija.”

Njegova pacijentkinja je imala sreću da preživi - ali je takođe imala korist od geografskog položaja. Na priobalju lekari viđaju mnogo pacijenata sa malarijom, a mnogi od njih imaju antitela koja ih štite od teške infekcije.

MALARIJA SE KREĆE KA VIŠIM PODRUČJIMA

Temperature rastu širom sveta, posebno u zemljama gde je bolest već prisutna. Ovo zagrevanje podstiče komarce da se pomeraju ka višim nadmorskim visinama, gde su temperature istorijski bile previše niske za njihov opstanak. U ovim visinskim područjima komarci sada napadaju ljude koji ranije nisu imali malariju, i koji su mnogo podložniji smrtonosnim infekcijama.

„Kada malarija pogađa nove populacije bez imunološke zaštite, obično dođe do eksplozivnih epidemija jer ljudi nemaju postojeći imunitet,” rekla je Sadie Ryan, vanredna profesorka medicinske geografije na Univerzitetu Florida.

Trudnice koje žive u planinskim regionima i koje ranije nisu imale malariju su najugroženije od uboda zaraženih komaraca. Sama trudnoća stvara potencijalno smrtonosnu ranjivost na malariju. Posteljica, novi organ koji se formira kako bi hranio fetus, predstavlja nove receptore za koje bolest može da se veže.

Trudnice imaju tri puta veći rizik da razviju tešku malariju u poređenju sa ženama koje nisu trudne. Za one koje mogu ostati trudne, klimatski pokret komaraca koji prenose malariju ka višim područjima predstavlja egzistencijalnu pretnju.

„U zapadnim zemljama, posebno gde malarija nije endemska, postoji percepcija da se sa malarijom

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Temperatures are rising around the world, especially in countries where the disease is already present. This warming encourages mosquitoes to move to higher elevations, where temperatures have historically been too cold for them to survive

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borimo dovoljno dugo da znamo kako da se nosimo s njom," rekla je Deekshita Ramanarayanan, koja se bavi zdravljem majki u organizaciji Wilson Center.

Ali to nikada nije bio slučaj, a sada je ta percepcija posebno pogrešna jer klimatske promene prete da prepišu pravila kontrole malarije. „Trudnice su pogođene ovim dvostrukim faktorom rizika - klimatskim promenama i rizikom od zaraze malarijom tokom trudnoće," rekla je Ramanarayanan.

Stotine miliona ljudi oboli od malarije svake godine, a procenjuje se da oko 600.000 ljudi umre, uglavnom u tropskim i suptropskim regionima. Godine 2022, 94 procenta globalnih slučajeva malarije zabeleženo je u podsaharskoj Africi. Visoke stope bolesti prisutne su i u Centralnoj Americi i Karibima, Južnoj Americi, jugoistočnoj Aziji i zapadnom Pacifiku. Papua Nova Gvineja registrovala je preko 400.000 novih slučajeva u 2022. godini, a te godine je činila 90 procenata slučajeva malarije u zapadnom Pacifiku.

Malariju prenose desetine vrsta komaraca roda Anopheles, poznatih i kao močvarni komarci. Ovi komarci prenose parazita Plasmodium, jednoćelijski rod koji izaziva malariju kod ptica, reptila i sisara, uključujući ljude.

Kada ugriz komarca Anopheles ubaci Plasmodium u ljudski krvotok, paraziti putuju do jetre, gde se

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mother. She was reunited with the babies after ten days in intensive care.

„If this case had happened in a remote facility," Casupang said, „the story would have been very different."

His patient was lucky to survive - but she also benefited from geography. On the coast, doctors see a lot of patients with malaria, and many of them have antibodies that protect them from severe infection.

MALARIA IS MOVING TO HIGHER AREAS

Temperatures are rising around the world, especially in countries where the disease is already present. This warming encourages mosquitoes to move to higher elevations, where temperatures have historically been too cold for them to survive. In these high altitude areas, mosquitoes are now attacking people who have never had malaria before, and who are much more susceptible to deadly infections.

„When malaria hits new populations without immune protection, there are usually explosive epidemics because people don't have any existing immunity," said Sadie Ryan, an associate professor of medical geography at the University of Florida.

Pregnant women who live in mountainous regions and who have never had malaria before are most at risk from bites of infected mosquitoes. The very act of becoming pregnant creates a potentially deadly vulnerability to malaria. The placenta, the new organ that forms to nourish the fetus, presents new receptors for the disease to bind to.

Pregnant women are three times more likely to develop severe malaria compared to non-pregnant women. For those who can become pregnant, the climatic movement of malaria-carrying mosquitoes to higher altitudes is an existential threat.

„In Western countries, especially where malaria is not endemic, there is this perception that malaria has been around for so long that we already know how to deal with it," said Deekshita Ramanarayanan, who works on maternal health at the Wilson Center.

But that was never the case, and now that perception is especially wrong as climate change threatens to rewrite the rules of malaria control. „Pregnant women are hit with this double risk factor of climate change and the risks of contracting malaria during pregnancy," Ramanarayanan said.

Hundreds of millions of people contract malaria every year, and an estimated 600,000 people die, mostly in tropical and subtropical regions. In 2022, 94 percent of global malaria cases occured in sub-Saharan Africa. High disease rates are also present in Central America and the Caribbean, South America, Southeast Asia, and the western Pacific. Papua New Guinea registered over 400,000 new cases in 2022, accounting for 90 percent of malaria cases in the western Pacific that year.

Malaria is transmitted by dozens of species of Anopheles mosquitoes, also known as marsh mosquitoes. These mosquitoes transmit the Plasmodium parasite, a single-celled genus that causes malaria in birds, reptiles and mammals, including humans.

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skrivaju i sazrevaju tokom perioda koji traje od nekoliko nedelja do godinu dana. Kada dostignu zrelost, paraziti prelaze u krvotok i inficiraju crvena krvna zrnca. Domaćin obično oseća simptome u ovoj fazi infekcije - groznicu, drhtavicu, mučninu i opšti, gripu sličan osećaj.

Ranije otkrivanje infekcije malarijom poboljšava šanse da antimalarijski lekovi mogu pomoći u sprečavanju razvoja teške malarije, kada bolest zahvati vitalne organe.

TRUDNOĆA PRIPREMA TELO ZA INFEKCIJU

Imuni sistem, kada funkcioniše pravilno, koristi arsenal oružja kako bi odbio bakterije, viruse i druge patogene. Ali trudnoća deluje kao imunosupresor, govoreći odbrambenom sistemu da se povuče kako telo ne bi odbacilo rastuću bebu. „Imuni sistem je namerno oslabljen da biste mogli tolerisati fetus u sebi," rekla je Marya Zlatnik, akušerka i ginekolog na Medicinskom centru Univerziteta Kalifornija u San Francisku.

Pored toga, telo mora naporno da radi kako bi obezbedilo bebi dovoljno hranljivih materija, vitamina i minerala, što je otežano siromaštvom, neuhranjenošću i nedostatkom medicinske infrastrukture u zemljama gde je malarija česta. Infekcija malarijom na te ranjivosti donosi dodatni, još teži set izazova.

Bolest može izazvati ozbiljnu anemiju kod majke, nedostatak gvožđa ili se može proširiti na bubrege i pluća i izazvati stanje poznato kao crna voda groznica. Poremećaj pacijente čini žuticom, grozničavim i opasno im oskudno sa vitaminima neophodnim za zdravu trudnoću.

„U ruralnim oblastima to je gotovo sinonim za smrt kod mnogih pacijenata," rekao je Casupang. Istraživanja pokazuju da malarija može biti uzrok četvrtine svih smrtnosti

When the bite of an Anopheles mosquito introduces Plasmodium into the human bloodstream, the parasites travel to the liver, where they hide and mature over a period of several weeks to a year. Once the parasites reach maturity, they enter the bloodstream and infect red blood cells. The host usually experiences symptoms at this stage of infection - fever, chills, nausea and general, flu-like discomfort.

Early detection of malaria infection improves the chances that antimalarial drugs can help prevent the development of severe malaria, when the disease affects vital organs.

PREGNANCY PREPARES THE BODY FOR INFECTION

The immune system, when it is functioning properly, uses an arsenal of weapons to ward off bacteria, viruses, and other pathogens. But pregnancy acts as an immunosuppressant, telling the immune system to back off so the body does not reject the growing baby. "Your immune system is, on purpose, dialed back so that you can tolerate the fact that you have this fetus inside of you," said Marya Zlatnik, an obstetrician and gynecologist at the University of California, San Francisco Medical Center.

In addition, the body has to work hard to provide the baby with enough nutrients, vitamins and minerals, which is made difficult by poverty, malnutrition and a lack of medical infrastructure in countries where malaria is common. A malaria infection brings an additional, even more difficult set of challenges to those vulnerabilities.

The disease can cause severe anemia in the mother, iron deficiency, or it can spread to the kidneys and lungs and cause a condition known as blackwater fever. The disorder

majki u zemljama gde je bolest endemska.

Plasmodium paraziti imaju bodlje koje ih čine lepljivima i skloni su da blokiraju organe. Kada Plasmodium dođe do placente, paraziti se vežu za receptore i uzrokuju odumiranje delova placente. „To menja arhitekturu placente i načine na koje se hranljive materije i kiseonik razmenjuju sa fetusom," rekla je Courtney Murdock, vanredna profesorka na odeljenju za entomologiju Univerziteta Cornell. Zgrušavanje placente ometa rast fetusa, i to je jedan od razloga zašto trudnica ima tri do četiri puta veći rizik od pobačaja ako je zaražena malarijom, i zašto se bebe rođene majkama koje su bile bolesne rađaju neuhranjene i sa niskom težinom.

„Vidite kako placenta počinje da otkazuje," rekao je Casupang. Smrtnost fetusa usko je povezana sa tim koliko delova placente ostaje bez kiseonika. „Bebe se rađaju sa veoma niskom težinom," rekao je. Ako su zgrušavanja placente obimna, „one obično umiru."

Godine 2020, približno 122 miliona trudnoća - otprilike polovina svih trudnoća te godine - dogodilo se u područjima gde su ljudi bili izloženi riziku od zaraze malarijom. Studija iz 2023. godine procenjuje da je 16 miliona tih trudnoća završeno pobačajem, a 1,4 miliona mrtvorođenjem.

Istraživači ne znaju tačno koliko je tih pobačaja i mrtvorođenja bilo kod osoba koje su ujedale zaraženi komarci.

Međutim, Svetska zdravstvena organizacija procenjuje da je približno 35 procenata trudnica u afričkim zemljama sa umerenim do visokim prenosom malarije bilo izloženo ovoj bolesti tokom trudnoće u 2022. godini. GN

leaves patients jaundiced, feverish and dangerously low on vitamins necessary for a healthy pregnancy.

„In rural areas, it is almost synonymous with death for many patients," Casupang said. Research shows that malaria may be the cause of a quarter of all maternal deaths in countries where the disease is endemic.

Plasmodium parasites have spikes that make them sticky and prone to clogging up organs. When Plasmodium reaches the placenta, the parasites bind to receptors and cause parts of the placenta to die. „It changes the architecture of the placenta and the ways nutrients and oxygen are exchanged with the fetus," said Courtney Murdock, an associate professor at Cornell University's Department of Entomology. The placenta clots interfere with fetal growth, and they are one of the reasons why a pregnant woman has a three to four times higher risk of miscarriage if she is infected with malaria, and why babies born to mothers who have been ill are born malnourished and underweight.

„You see the placenta start to fail," Casupang said. Fetal mortality is closely related to how much of the placenta becomes oxygen-deprived. „The babies come out with very low birth weights," he said. If the placental clots are extensive, „they usually die."

In 2020, approximately 122 million pregnancies—about half of all pregnancies that year—occurred in areas where people were at risk of contracting malaria. A 2023 study estimated that 16 million of those pregnancies ended in miscarriage and 1.4 million in stillbirth.

Researchers do not know exactly how many of those miscarriages and stillbirths occurred in women bitten by infected mosquitoes.

However, the World Health Organization estimates that approximately 35 percent of pregnant women in African countries with moderate to high malaria transmission were exposed to the disease during pregnancy in 2022. GN

GREENNEWS

Brod koji se bori protiv plime plastike

The Ship That Fights a Tidal Wave of Plastics

Od 2022. godine, posada Plastic Odyssey obilazi 13 najzagađenijih zemalja u svetu, u Africi, Južnoj Americi i Jugoistočnoj Aziji. Njihova misija? Pronaći gde postoje jeftina i lako primenljiva inovativna rešenja za reciklažu plastike i alternative

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Since 2022, the Plastic Odyssey crew have visited the world's 13 most polluted countries, in Africa, South America and Southeast Asia. Their mission? Identify where cheap and easily replicable innovative plastic recycling solutions and alternatives exist

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GREENNEWS

Okeanska ekspedicija koju predvodi bivši francuski pomorski oficir Simon Bernard, sa malim timom inženjera, mornara i komunikatora, upravo to i pokušava da ostvari

Plastic Odyssey je trogodišnja globalna ekspedicija sa misijom izgradnje svetske mreže preduzetnika u oblasti reciklaže, promocije održivih praksi i suzbijanja plastičnog zagađenja na izvoru. Ekipa Earth.Org posetila je ovaj laboratorijski brod tokom njegove pauze u Hong Kongu.

Sve veća količina plastičnog otpada guši naše okeane, s 20 tona plastike koja svakog sata završi u moru. Plastika je revolucionisala naše živote, ali stručnjaci već decenijama upozoravaju da prekomerna upotreba ovog jeftinog i svestranog materijala ima katastrofalne posledice po krhke ekosisteme i biodiverzitet planete.

Predstojeći Globalni plastični sporazum pod okriljem Ujedinjenih nacija pruža nadu u zaustavljanje neprekidnog porasta proizvodnje plastike, iako su već nanete značajne i nepovratne štete. Plastičnom otpadu potrebno je između 20 i 500 godina da se razgradi, ali čak i tada nikada u potpunosti ne nestaje. Dok je zaustavljanje proizvodnje plastike ključno, ogroman volumen već postojećeg plastičnog otpada – procenjuje se da ga ima oko 8,3 milijarde tona – zahteva napore da se taj materijal ponovo upotrebi.

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Na svakoj stanici posada se povezuje sa lokalnim zajednicama kako bi identifikovala mala, lokalna rešenja. „Dokumentujemo male, lokalno osmišljene metode o kojima niko nije čuo, kao neka vrsta Vikipedije sa svim znanjem o reciklaži plastike," kaže Bernard.

Sa stečenim znanjem, postavili su kurseve reciklaže i „fab laboratorije" za edukaciju lokalnih zajednica o plastičnom zagađenju i reciklaži kroz vebinare i radionice. Na svakoj stanici nude i programe inkubacije za 10 do 15 preduzetnika koji žele da pokrenu posao u oblasti reciklaže.

Dok Bernard i njegova posada putuju svetom, tim od 15 inženjera sa sedištem u Senegalu gradi 10 malih, „plug-and-play" fabrika za reciklažu u kontejnerima koristeći model franšize. „Imaćemo jedan model fabrike koju vodi tim Plastic Odyssey, a lokalni preduzetnici će moći da je repliciraju i samostalno vode," kaže Bernard.

Fabrike, koje će biti spremne sledeće godine, prerađivaće tri do pet tona plastike godišnje i otvoriće 200 radnih mesta, rekao je Bernard. „Izazov će zatim biti repliciranje ovoga u različitim zemljama."

Plastic Odyssey is a three-year global expedition with a mission to build a worldwide network of entrepreneurs in the field of recycling, promoting sustainable practices and combating plastic pollution at its source. The Earth.Org crew visited this lab vessel during a stopover in Hong Kong.

An increasing amount of plastic waste is choking our oceans, with 20 tons of plastics ending up in the sea every hour. Plastics has revolutionized our lives, but experts have warned for decades that excessive use of this cheap and versatile material has disastrous consequences for the planet's fragile ecosystems and biodiversity.

The upcoming Global Plastic Treaty under the auspices of the United Nations offers hope of halting the continuous increase in plastic production, even though significant and irreversible damage has already been done. Plastic waste takes between 20 and 500 years to decompose, but even then it never completely disappears. While stopping the production of plastics is crucial, the sheer volume of existing plastic waste – an estimated 8.3 billion tonnes – requires efforts to repurpose the material.

An ocean expedition led by former French navy officer Simon Bernard, with a small team of engineers, sailors and communicators, is doing just that.

Since 2022, the Plastic Odyssey crew have visited the world's 13 most polluted countries, in Africa, South America and Southeast Asia. Their mission? Identify where cheap and easily replicable innovative plastic recycling solutions and alternatives exist, improve their efficiency, and distribute them in open-source across the world.

At every stopover, the crew connects with local communities to identify small-scale solutions at local level. "We document small, locally-designed solutions that no one has heard of or talked about, in a sort of Wikipedia of all the knowledge on plastic recycling," said Bernard.

With the knowledge gained, they have established recycling courses and „fab labs" to educate local communities on plastic pollution and recycling through webinars and workshops. At every stopover, they also offer incubation programs to 10 and 15 entrepreneurs who are interested in setting up a recycling business.

While Bernard and his crew travel the world, a team of 15 engineers based in Senegal is building 10 small, plug-and-play recycling factories inside containers using a franchise model. "We will have one model factory operated by the Plastic Odyssey team that local entrepreneurs will be able to replicate and operate independently," Bernard said

„Naša tehnika je jednostavna, različita od koncepta reciklaže koji poznajemo u Evropi," kaže on. „Ne pokušavamo da dodatno uvećamo ciklus stvaranja nove ambalaže, već se fokusiramo na to kako plastiku pretvoriti u dugotrajne proizvode."

Njihove laboratorije pokreće solarna energija, što čini ceo proces održivim i profitabilnim za siromašne zemlje.

„Veoma je teško. Moramo pronaći način da ovo bude ekonomski isplativo za siromašne zemlje bez dodatnih subvencija," kaže Bernard.

Bez ovog pristupa, rešenja se ne mogu proširiti i postići globalni uticaj u rešavanju plastične krize.

PROŠLOST I BUDUĆNOST

Bernard se sastao sa Earth.Org-om jednog sunčanog oktobarskog dana. Njegova posada je dve nedelje u Hong Kongu kako bi se sastala sa preduzetnicima i našla sponzore i investitore.

„Ovdje je veoma drugačije," kaže, pokazujući pogled iz brodske kuhinje. „Ovde su sve visoke zgrade i tržni centri." Ironično, pristup brodu, usidrenom u Ocean Terminal-u u Tsim Sha Tsuiju, moguć je samo kroz tržni centar.

Ovaj primer je, priznao je Bernard, dobar primer kako Hong Kong doprinosi plastičnoj krizi.

Masovni konzumerizam je u srcu problema plastičnog zagađenja u gradu, koji svakodnevno šalje prosečno 15.725 tona čvrstog otpada na deponije – od čega je 15% plastika.

Plastika je dospela u svaki kutak grada, zagađujući njegove vodotoke i zagađujući prirodu.

Nedavna studija Greenpeace-a u saradnji sa istraživačkim timovima iz Hong Konga i Tajpeja otkrila je zabrinjavajuće količine mikroplastike u izmetu divljih životinja u prirodnim delovima grada. Prošle nedelje, revizija otpada na dve ekološki značajne reke pokazala je da je 97% od 3.263 komada otpada plastično.

Ove istrage su otkrile da mikroplastika koja se često nalazi u jednokratnoj ambalaži, posudama za hranu i priboru za jednokratnu upotrebu – poznatim i kao polietilen (PE) i polipropilen (PP) – preovlađuje u otpadu u rekama i u izmetu.

Poseta Plastic Odyssey-a Hong Kongu poklopila se sa krajem šestomesečnog roka za poslovanja da se usklade sa zabranom jednokratne plastike. Ali prva procena uticaja zabrane, objavljena od strane Odseka za zaštitu životne sredine, pokazala je da samo oko 30% restorana više ne nudi pribor za jednokratnu upotrebu.

„90% zagađenja mora dolazi iz priobalnih gradova 32 zemlje," rekao je Bernard. On prepoznaje da rešenje krize leži u dve stvari: čišćenju prošlosti i izgradnji budućnosti bez plastike. Upravo to je misija njegove posade.

U Hong Kongu, i na svakoj stanici, organizuju vožnje čamcem, filmske projekcije i male edukativne izložbe za škole i nastavnike kako bi podigli svest o plastičnom zagađenju i dali praktične savete za život bez plastike.

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The factories, which will be ready next year, will process three to five tons of plastics annually and create 200 jobs, Bernard said. „The challenge will then be to replicate that in different countries."

„Our technique is simple, different from the concept of recycling we know in Europe," he said. "We are not trying to add to the vicious cycle of creating new packaging but instead we are focusing on how to store plastic into long-lasting products."

Their labs are powered by solar energy, making the whole process sustainable and profitable for poor countries.

"It's very tricky. We have to find the magic recipe to make it economically viable for poor countries without the need for more subsidies," Bernard said.

Without this approach, these solutions cannot be scaled up and have the impact needed to solve global plastic pollution.

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NEMOGUĆA MISIJA

Suočavanje s globalnom plastikom je ogroman izazov i pitanje pokušaja i grešaka, priznaje Bernard. Ali kako je pokazala jedna ekspedicija, ništa nije nemoguće.

Posle meseci priprema, u februaru je Plastic Odyssey stigao na ostrvo Henderson, nenaseljeno UNESCO-vo svetsko nasleđe u Južnom Pacifiku. Ovo ostrvo, jedno od poslednjih povišenih koralnih atola, takođe je jedno od najzagađenijih mesta na svetu.

Na ostrvo je dospelo više od osam tona plastike – najveća zabeležena gustina plastičnog otpada. Procenjuje se da između 3.500 i 13.500 novih plastičnih predmeta svakodnevno dospeva na Henderson.

„Henderson je bio poznat kao nemoguće očistiti bez oštećenja koralnog grebena," objasnio je Bernard. U 2019, jedna ekspedicija je prikupila šest tona otpada sa istočne plaže, ali nisu uspeli da ga odnesu.

Kada je Plastic Odyssey stigao na ostrvo, kese sa otpadom su se raspale.

„Morali smo ponovo sakupiti sve iz šipražja i peska," kaže Bernard. Ali tim je postigao nešto što nikome pre nije uspelo.

Koristeći splavove za transport otpada i padobrane kada je more bilo previše nemirno, tim od 25 ljudi uspeo je da ukloni skoro 10 tona otpada u samo sedam dana. Na brodu su reciklirali plastiku u gradski nameštaj za susedno ostrvo Pitcairn.

„Bilo je to zaista posebno," kaže Bernard, napominjući da je ekspedicija na Henderson označila početak nove ere za Plastic Odyssey.

„Ideja je da se u budućnosti povežemo sa UNESCO-om i drugim međunarodnim organizacijama kako bismo replicirali ono što smo postigli na Henderson-u širom sveta."

Sledeće godine, njegov tim će krenuti ka Zelenortskim Ostrvima u Zapadnoj Africi, koja se takođe guše u plastičnom otpadu, kako bi pokušali sličnu misiju.

„Provodimo sve naše vreme sastajući se sa neverovatnim inovatorima koji nam dokazuju da rešenja koja su nam potrebna postoje. Teško je ne biti optimističan," rekao je.

PAST AND FUTURE

Bernard met with Earth.Org on a sunny October day. His crew is in Hong Kong for two weeks to meet with entrepreneurs and find sponsors and investors.

"It is very different here," he said, indicating the view from the ship's galley window. "We are used to a very different scenario. Here, it's all tall buildings and shopping malls." Ironically, accessing the ship, docked at Harbour City's Ocean Terminal in Tsim Sha Tsui, is only possible through a mall.

This, Bernard admitted, was a good example of how Hong Kong is contributing to the plastic crisis.

Mass consumerism is at the heart of the plastic pollution problem in the city, which every day sends an average of 15,725 tonnes of solid waste to landfills – 15% of which is plastics.

Plastics has reached every corner of the city, polluting its waterways and contaminating nature.

A recent study by Greenpeace in collaboration with research teams from Hong Kong and Taipei has found concerning quantities of microplastics in wild mammal faeces in the city's countryside.Last week, a waste audit of two ecologically significant rivers showed that 97% of the 3,263 pieces of waste collected were plastics.

These investigations revealed that microplastics commonly found in single-use plastic packaging, takeaway containers, and disposable utensils – also known as polyethylene (PE) and polypropylene (PP) – were the predominant types found both in faeces and in rivers.

The Plastic Odyssey's visit to Hong Kong coincided with the end of a six-month grace period for businesses to comply with a ban on single-use plastics. But the first assessment of the ban's impact published by the Environmental Protection Department showed that only about 30% of restaurants no longer provide any takeaway cutlery.

"90% of marine pollution comes from the coastal cities of 32 countries," said Bernard. He recognizes that tackling the crisis comes down to two things: cleaning up the past and building a future without plastics. And this is precisely the crew's mission.

In Hong Kong, and during every stopover, the crew has organised boat tours, film screenings, and small educational exhibitions for schools and educators to raise awareness about plastic pollution and give practical tips on how to live plastic-free.

footprintproject.org™

Neprofitna organizacija pionir uvođenja čiste energije

Organizacija „Footprint Project” želi da stvori „biblioteku za iznajmljivanje” mikro-mreža na solarni pogon koje bi se koristile u oporavku od katastrofa kako bi se smanjila zavisnost od generatora, koji povećavaju zagađenje vazduha i skupi su za održavanje.

Nakon što je uragan Helena razorio zapadnu Severnu Karolinu, obarajući dalekovode, uništavajući vodovodne cevi i onemogućavajući mobilnu mrežu, znaci pomoći bili su svuda.

Kamioni su formirali karavan duž auto-puta I-40, puni kamufliranih vojnika, velikih rezervoara za vodu i osnovnih potrepština od hrane za kućne ljubimce do pelena. U gradovima su se uz put nalazili znaci - zvanični sa logotipima neprofitnih organizacija i improvizovani drveni - koji su nudili besplatnu hranu i vodu.

I tu su bili generatori.

Bučni uređaji napajali su prikolice gde su stanovnici Ešvila mogli da se tuširaju, nedeljama nakon što je gradski vodovod prestao da radi. Napajali su kamione s hranom koji su dostavljali tople obroke hiljadama ljudi koji nisu imali funkcionalne šporete. Filtrirali su vodu za piće i ispiranje toaleta.

Zapadna Severna Karolina nije jedinstvena u ovom slučaju. U svim regionima zahvaćenim katastrofama, generatori su osnova napora za pomoć širom sveta. Međutim, u regionu deluje i neprofitna organizacija iz

A Non-Profit Organization Is Pioneering the Introduction of Clean Energy

The Footprint Project wants to create a „lending library” of solar-powered micro-grids to use in disaster recovery to reduce dependence on generators, which increase air pollution, and are expensive to run.

After Hurricane Helena devastated Western North Carolina, tearing down power lines, destroying water mains, and disabling cell phone towers, signs of help were everywhere.

Trucks formed a caravan along I-40, filled with camouflaged soldiers, large water tanks and basic supplies from pet food to diapers. In towns, there were roadside signs – official versions with nonprofit logos and wooden makeshift ones - offering free food and water.

And there were generators.

The noisy machines powered the trailers where Asheville residents sought showers, weeks after the city’s water system failed. They fueled the food trucks delivering hot meals to the thousands without working stoves. They filtered water for communities to drink and flush toilets.

Western North Carolina is not unique in this regard. In all disaster-stricken regions, generators are the backbone of relief efforts around the world. However, there is also a non-profit organization from New Orleans operating in the region, which is trying to replace as many of these fossil fuel burners as possible with batteries charged with solar panels.

Nju Orleansa, koja nastoji da zameni što više ovih fosilnih generatora baterijama punjenim solarnim panelima. To je najveći odgovor koji je „Footprint Project" ikada realizovao u svom kratkom postojanju, a organizatori se nadaju da će uticaj trajati daleko u budućnost.

„Ako uspemo da uvedemo ovu održivu tehnologiju na vreme, kada počne pravo obnavljanje, imaćemo novi razgovor koji se ne bi dogodio da smo radili isto kao svaki put", rekao je Vil Hegard, direktor operacija organizacije.

„Spasioci koriste ono što znaju da funkcioniše, a naš posao je da im omogućimo nešto što radi bolje od jednokratnih fosilnih goriva", dodao je on. „I tada mogu početi da traže to. To postepeno vodi ka promeni sistema."

REŠENJE „KOJE SE SAMO NAMEĆE" ZA PROBLEM GENERATORA NA GAS

Razlog za korišćenje dizel i benzinskih generatora je jednostavan: dostupni su. Relativno su jednostavni za upotrebu. Ako goriva ima, mogu raditi 24/7, održavajući ljude toplim, sitim i povezanim sa voljenima čak i kada električna mreža ne funkcioniše. Nesumnjivo, spašavaju živote. Ali nisu bez nedostataka. Sagorevanje fosilnih goriva ne emituje samo više ugljenika koji pogoršava klimatsku krizu, već i zagađivače poput smoga i čađi, koji mogu izazvati napade astme i druge respiratorne probleme.

U Portoriku, nakon uragana Maria, generatori su bili toliko rasprostranjeni nakon kolapsa električne mreže da je štetno zagađenje vazduha u San Huanu poraslo iznad bezbednog zakonskog limita. Rizik je posebno visok za osetljive populacije koje koriste generatore za napajanje vitalnih uređaja kao što su kiseoničke mašine.

Postoje i praktični izazovi. Generatori nisu jeftini, prodaju se u velikim prodavnicama za više od 1.000 dolara. Kada početne zalihe goriva nestanu - što se dogodilo u delovima zapadne Severne Karoline neposredno nakon Helene - može biti teško i skupo pronaći više. A uređaji su bučni, što potencijalno ugrožava zdravlje i dodatno stresira radnike i ljude kojima pomažu. Hegard je svedočio ovim izazovima iz prve ruke u Gvineji 2016. godine, dok je odgovarao na epidemiju ebole. Kao bolničar, njegov posao bio je da obuči lokalno stanovništvo kako da sakuplja uzorke krvi i čuva ih u frižiderima napajanim generatorima, koji bi se motociklom prevozili u grad Konakri na testiranje. Imao je grant da obezbedi nadoknadu za gorivo tehničarima u laboratoriji.

„Ovo je već bilo teško, a ideja o nadoknadi za generator na gas u jako siromašnoj ruralnoj zemlji činila se gotovo nemogućom", prisetio se Hegard. „Čuo sam za solarne frižidere i pitao lokalnog logističara u Konakriju: 'Da li su ti uređaji uopšte mogući?'"

Sledećeg dana, logističar je rekao da jesu. Mogli su da budu instalirani za mesec dana. „Bilo je jednostavno logično rešenje", rekao je Heegaard. „Jedini razlog što to ranije nismo uradili bio je taj što grant nije bio napisan na taj način."

It is the largest response effort the Footprint Project has ever deployed in its short life, and organizers hope the impact will extend far into the future.

„If we can get this sustainable technology fast, then when the real recovery starts, there's a whole new conversation that wouldn't have happened if we were just doing the same thing that we did every time," said Will Heegaard, operations director for the organization.

"Responders use what they know works, and our job is to get them stuff that works better than single-use fossil fuels do," he said. "And then, they can start asking for that. It trickles up to a systems change."

A „SELF-IMPOSED" SOLUTION TO THE PROBLEM OF GAS GENERATORS

The reason for using diesel and gas generators is simple: they are available. They are relatively easy to use. If fuel is available, they can run 24/7, keeping people warm, fed and connected to loved ones even when the power grid is down. Undoubtedly, they save lives.

But they are not without flaws. Burning fossil fuels causes not just more carbon that exacerbates the climate crisis, but also pollutants like smog and soot that can trigger asthma attacks and other respiratory problems.

In Puerto Rico, after Hurricane Maria, generators were so widespread after the power grid failed that harmful air pollution in San Juan rose above the safe legal limit. The risk is particularly high for vulnerable populations who use generators to power vital equipment like oxygenators.

There are also practical challenges. Generators are not cheap, they are sold in big box stores for over $1,000. When initial supplies of fuel run out — which happened in parts of Western North Carolina in the immediate aftermath of Helene — it can be difficult and expensive to find more. And the machines are noisy, potentially harming health and creating stress for workers and the people they serve.

Heegaard witnessed these challenges firsthand in Guinea in 2016 while responding to the Ebola outbreak. As a paramedic, his job was to train local residents how to collect blood samples and store them in refrigerators powered by generators, which would be transported by a motorcycle to the city of Conakry for testing. He had a grant to provide fuel reimbursement for lab technicians.

"This is so hard already, and the idea of doing cash reimbursement in a super poor rural country for gas generators seems really hard," Heegaard recalled. "I had heard of solar refrigerators. I asked the local logistician in Conakry, 'Are these things even possible?'"

The next day, the logistician said they were. They could be installed in a month. „It was just a logical solution," Heegaard said. "The only reason we hadn't done it is the grant wasn't written that way."

„REVOLUCIJA ZA ODGOVOR U KATASTROFAMA“

Dve godine kasnije, iz tog iskustva je nastao „Footprint Project”. Sa samo sedmoro stalno zaposlenih, organizacija okuplja radnike nakon katastrofe, sarađujući sa lokalnim solarnim kompanijama, neprofitnim organizacijama i drugima kako bi prikupila i distribuirala što je moguće više opreme.

Distribuiraju solarne stanice za punjenje, sisteme za filtriranje vode i drugu „klimatsku tehnologiju“ najugroženijim zajednicama - počevši od onih bez struje, vode ili generatora, pa sve do onih koje žele da smanje potrošnju fosilnih goriva.

Do sada je grupa izgradila gotovo 50 solarnih mikro-mreža u regionu, od jezera Junaluska do Linvil Folsa, više nego ikada do sada. Korisnici uključuju volonterske vatrogasne stanice, parkove sa prikolicama i umetnički kolektiv u zapadnom Ešvilu.

„Kada smo prešli na solarnu energiju“, rekao je Majk Taljad, fotograf koji je osnovao kolektiv, „to je bilo vreme kada je nabavka goriva još uvek bila neizvesna.“

Nedavno je „Footprint” takođe obezbedio šest solarnih panela, Tesla bateriju i stanicu za punjenje kako bi zamenio bučni generator u domu za stare u južnom Ashevilleu.

„Većina spasilaca ne koristi solarne mikro-mreže zato što su one bolje za životnu sredinu“, rekao je Hegard. „Koriste ih zato što ako mogu da isključe svoj generator na 12 sati dnevno, to znači ušteda goriva od pola. Neki od njih troše desetine hiljada dolara mesečno na dizel ili gas. To je revolucija za odgovor u katastrofama.“

„DOSTUPNO ZA SLEDEĆI ODGOVOR“

Ambicija organizacije „Footprint Project” nije samo kratkoročna pomoć, već i dugoročna promena. Planiraju da stvore „biblioteke za iznajmljivanje“ u mestima kao što je Ešvilu, kako bi se oprema mogla koristiti u raznim prilikama - od lokalnih događaja do sledećih odgovora na katastrofe.

„A REVOLUTION IN A DISASTER RESPONSE”

Two years later, the Footprint Project was born from that experience. With only seven full-time employees, the organization gather workers after a disaster, partnering with local solar companies, nonprofits and others to collect and distribute as much equipment as possible.

They distribute solar-powered charging stations, water filtration systems and other „climate technology” to the most vulnerable communities - starting with those without electricity, water or generators, extending to those who want to reduce fossil fuel consumption.

So far, the group has built nearly 50 solar micro-grids in the region, from Lake Junaluska to Linville Falls, more than ever before. Beneficiaries include volunteer fire stations, trailer parks and an art collective in West Asheville.

“When we did the switchover,” said Mike Talyad, a photographer who founded the collective, “it was a time when gas was still questionable.”

Recently, Footprint has also provided six solar panels, a Tesla battery, and a charging station to replace a noisy generator at a retirement community in South Asheville.

“Most responders are not playing with solar microgrids because they’re better for the environment,” said Heegaard. “They’re playing with it because if they can turn their generator off for 12 hours a day, that means literally half the fuel savings. Some of them are spending tens of thousands of dollars a month on diesel or gas. That is game changing for a response.”

„AVAILABLE FOR THE NEXT RESPONSE „

The ambition of the organization Footprint Project is not only short-term help, but also long-term change. They plan to create „lending libraries” in places like Asheville so the equipment can be used for a variety of occasions - from local events to the next disaster response.

Energija vetra

Ovaj obnovljivi resurs se ne može iscrpeti kroz upotrebu

Energija vetra je električna energija koja se dobija od prirodnog kretanja vazduha u Zemljinoj atmosferi. Kao obnovljiv resurs koji se ne može iscrpeti kroz upotrebu, njegov uticaj na životnu sredinu i klimatsku krizu značajno je manji u poređenju s sagorevanjem fosilnih goriva.

Energiju vetra možemo proizvesti pomoću jednostavne strukture, poput skupa jedara visine 2,5 metra koja hvataju vetar da bi okretala kamen i mlela žito (mlin na vetar). Ili, struktura za energiju vetra može biti složenija, kao što je lopatica od 45 metara koja okreće generator i proizvodi struju koja se skladišti u bateriji ili distribuira preko elektrodistributivne mreže. Postoje čak i turbine na vetar bez lopatica.

Od 2021. godine, više od 67.000 vetroturbina funkcioniše u Sjedinjenim Američkim Državama, u 44 države, kao i na Guamu i u Portoriku. Mehanizmi za energiju vetra generisali su oko 8,4% električne energije u SAD-u tokom 2020. godine. Globalno, vetar obezbeđuje oko 6% potreba za električnom energijom. Energija vetra godišnje raste za oko 10% i ključni je deo planova za smanjenje klimatskih promena i održivog razvoja u mnogim zemljama, uključujući Kinu, Indiju, Nemačku i Sjedinjene Države.

DEFINICIJA ENERGIJE VETRA

Ljudi koriste energiju vetra na različite načine, od jednostavnih (još uvek se koristi za pumpanje vode za stoku u udaljenim mestima) do sve složenijih - pomislite na hiljade turbina koje dominiraju brdima duž autoputa 580 u Kaliforniji.

Osnovne komponente svakog sistema za energiju vetra su prilično slične. Postoje lopatice određenog oblika i veličine koje su povezane s pogonskom osovinom i pumpom ili generatorom koji koristi ili skladišti energiju vetra. Ako se energija vetra koristi direktno kao mehanička sila, kao što je mlevenje žita ili pumpanje vode, naziva se vetrenjača; ako se energija vetra pretvara u električnu energiju, poznata je kao vetroturbina. Sistem turbine zahteva dodatne komponente, kao što je baterija za skladištenje električne energije ili povezivanje s distributivnim sistemom kao što su dalekovodi.

Niko ne zna kada je prvi put čovek iskoristio vetar, ali energija vetra pokretala je brodove na reci Nil u Egiptu oko 5.000. godine pre nove ere. Oko 200. godine pre nove ere, ljudi u Kini koristili su vetar za pokretanje jednostavnih pumpi za vodu, dok su stanovnici Bliskog Istoka koristili vetrenjače s ručno tkanim lopaticama za mlevenje žita. S vremenom su vetrenjače i pumpe na vetar pomogle proizvodnju hrane, a koncept se proširio na Evropu, gde su Holanđani izgradili velike pumpe na vetar za isušivanje močvara – odakle se ideja proširila na Amerike.

OSNOVNI PRINCIPI ENERGIJE VETRA

Vetar se prirodno stvara kada sunce zagreva atmosferu, usled varijacija na Zemljinoj površini i rotacije planete. Vetar može pojačati ili oslabiti pod uticajem vodenih površina, šuma, livada i drugog rastinja, kao i promena nadmorske visine. Obrasci vetra i brzine značajno se razlikuju u zavisnosti od terena i sezonskih faktora, ali neki od tih obrazaca su dovoljno predvidivi za planiranje.

Wind Energy

This renewable resource cannot be depleted through use

Wind energy is electricity obtained from the natural movement of air in the Earth's atmosphere. As a renewable resource that cannot be exhausted through use, its impact on the environment and the climate crisis is significantly lower compared to burning fossil fuels.

We can generate wind energy using a simple structure, such as a set of sails 2.5 meters high that capture the wind to turn a stone and grind grain (a gristmill). Or, a wind power structure can be more complex, such as a 45-meter vane turning a generator that produces electricity that is stored in a battery or distributed through a power grid. There are even bladeless wind turbines.

As of 2021, more than 67,000 wind turbines operate in the United States, in 44 states, Guam, and Puerto Rico. Wind energy mechanisms generated about 8.4% of the electricity in the U.S. in 2020. Worldwide, wind provides about 6% of the world's electricity needs. Wind energy is growing year-over-year by about 10% and is a key part of most climate change reduction and sustainable growth plans in several countries, including China, India, Germany, and the United States.

WIND ENERGY DEFINITION

People use wind energy in a variety of ways, from the simple (it is still used to pump water for livestock in remote places) to the increasingly complex—think of the thousands of turbines that dominate the hills along Highway 580 in California.

The basic components of any wind energy system are quite similar. There are blades of a specific shape and size that are connected to a drive shaft and a pump or generator that uses or stores wind energy. If wind energy is used directly as a mechanical force, like milling grain or pumping water, it is called a windmill; if it converts wind energy to electricity, it is known as a wind turbine. A turbine system requires additional components, such as a battery for electricity storage, or it is connected to a power distribution system like power lines.

ODABIR LOKACIJE

Vrhovi zaobljenih brda, otvorene ravnice (ili otvorene vode za vetar s mora) i planinski prolazi (gde se vetar prirodno kanališe, proizvodeći redovno visoke brzine vetra) su najbolja mesta za postavljanje vetroturbina. Generalno, što je nadmorska visina veća, to je bolje, jer se na višim nadmorskim visinama obično beleže jači vetrovi.

Prognoza vetra važan je alat za odabir lokacije za vetroturbine. Postoji nekoliko mapa brzine vetra i podataka Nacionalne administracije za okeane i atmosferu (NOAA) ili Nacionalne laboratorije za obnovljivu energiju (NREL) u SAD-u koje pružaju ove detalje.

Potrebno je sprovesti specifično istraživanje lokacije kako bi se procenili lokalni uslovi vetra i odredio najbolji pravac za postavljanje turbina radi maksimalne efikasnosti. Svako ko namerava da izgradi vetroturbinu trebalo bi da prati brzinu vetra, turbulenciju, pravac, temperaturu vazduha i vlažnost na željenoj lokaciji, najmanje godinu dana. Nakon procene tih informacija, lakše je projektovati turbine koje će dati predvidive rezultate.

TIPOVI ENERGIJE VETRA

ENERGETSKI SISTEM NA NIVOU ELEKTRIČNE MREŽE

Ovi sistemi su veliki projekti dizajnirani da obezbede energiju za kompanije koje se bave distribucijom električne energije. Slični su po obimu elektranama na ugalj ili prirodni gas, koje ponekad zamenjuju ili dopunjuju. Turbine prelaze 100 kilovata snage i obično se instaliraju u grupama kako bi pružile značajnu količinu energije.

OFFSHORE ENERGIJA VETRA

To su uglavnom sistemi koji se planiraju na obalnim vodama i mogu generisati ogromne količine energije blizu većih gradova (koji su često smešteni bliže obali u SAD-u). Vetar na moru duva konzistentnije i snažnije nego na kopnu, prema američkom Ministarstvu energetike.

MALA ILI LOKALIZOVANA ENERGIJA VETRA

Ovo je suprotan primer u odnosu na prethodne primere. Ove turbine su manje po fizičkoj veličini i koriste se za zadovoljavanje potreba za energijom određenih lokacija ili područja. Ponekad su povezane s većom energetskom mrežom, a ponekad su van mreže.

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No one knows when man first harnessed the wind, but wind energy moved boats on the Nile River in Egypt around 5,000 years B.C. By 200 B.C., people in China used wind to power simple water pumps, while the people of the Middle East used windmills with hand-woven blades to grind grain. Over time, windmills and wind pumps helped produce food, and the concept spread to Europe, where the Dutch built large wind pumps to drain wetlands – from there the idea spread to the Americas.

BASIC PRINCIPLES OF WIND ENERGY

Wind is created naturally when the sun heats the atmosphere, due to variations in the Earth's surface and the rotation of the planet. The wind can increase or decrease under the influence of water surfaces, forests, meadows and other vegetation, as well as changes in altitude. Wind patterns and speeds vary significantly depending on terrain and seasonal factors, but some of those patterns are predictable enough to plan around.

THE CHOICE OF LOCATION

The tops of rounded hills, open plains (or open water for offshore wind), and mountain passes (where wind is naturally funneled, producing regular high wind speeds) are the best locations to place a wind turbine. Generally, the higher the elevation the better, since higher elevations usually have more wind.

Wind energy forecasting is an important tool for the location of a wind turbine. Several wind speed maps and data from the National Oceanic and Atmospheric Administration (NOAA) or the National Renewable Energy Laboratory (NREL) in the U.S. provide these details.

One should conduct a site-specific survey to assess local wind conditions and determine the best direction to place wind turbines for maximum efficiency. Anyone intending to build a wind turbine should track wind speed, turbulence, direction, air temperatures, and humidity in the desired location, for at least a year. After evaluating that information, it is easier to construct turbines that will deliver predictable results.

TYPES OF WIND ENERGY

UTILITY SCALE WIND ENERGY

These systems are large projects designed to provide power for utility companies. They are similar in scope to coal-fired or natural gas power plants, which they sometimes replace or supplement. Turbines exceed 100 kilowatts of power, and they are usually installed in groups to provide a significant amount of power.

OFFSHORE WIND ENERGY

These are mostly systems that are planned in the waters off coastal areas, and can generate tremendous power near major cities (which are often located closer to shore in the US). Wind blows more consistently and strongly in offshore areas than on land, according to the US Department of Energy.

SMALL SCALE OR DISTRIBUTED WIND ENERGY

This type of wind energy is the opposite of the examples above. These are wind turbines that are smaller in physical size and are used to meet the energy demands of a specific site or local area. Sometimes, these turbines are connected to the larger energy distribution grid, and sometimes they are off-grid.

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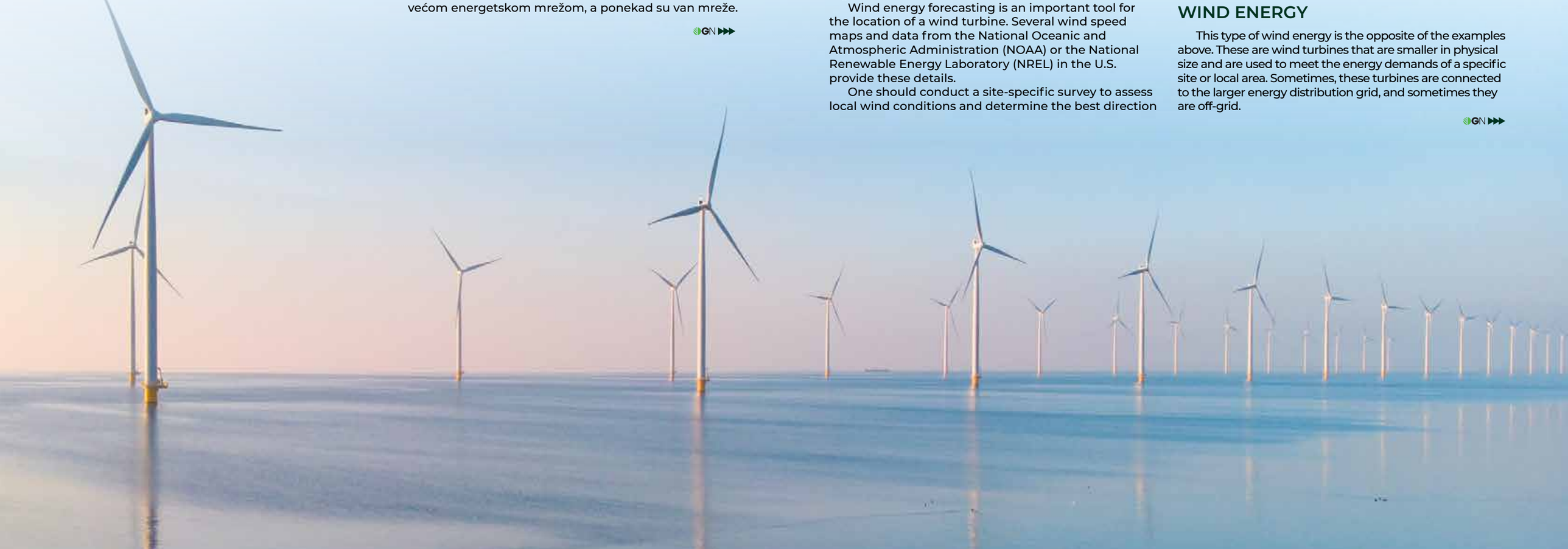

KAKO FUNKCIONIŠE ENERGIJA VETRA?

Funkcija vetroturbine je da koristi lopatice određenog oblika kako bi uhvatila kinetičku energiju vetra. Vetar pokreće lopatice, koje okreću pogonsku osovinu na koju su povezane. Ta osovina zatim pokreće pumpu ili generator, koji stvara električnu energiju koja se može odmah koristiti ili skladištiti u bateriji.

1. Vetar pokreće lopatice:

Vetroturbina se nalazi na mestu s redovnim i konstantnim vetrom, gde lopatice dizajnirane za maksimalno iskorišćenje vetra omogućavaju lako kretanje pod uticajem vetra.

2. Kinetička energija se transformiše:

Kinetička energija vetra se pretvara u mehaničku energiju kada vetar susreće lopatice turbine i gura ih.

3. Proizvodnja električne energije:

U vetroturbini, okretna osovina je povezana s menjačem koji povećava brzinu rotacije, što pokreće generator za proizvodnju struje.

ŠTA JE VETROPARK?

Vetropark je kolekcija vetroturbina koje formiraju vrstu elektrane, proizvodeći struju iz vetra. Nema zvaničnog zahteva za broj turbina koji određuje vetropark, pa može sadržati nekoliko ili stotine turbina koje rade u istom području, bilo na kopnu ili na moru.

HOW DOES WIND ENERGY WORK?

The function of a wind turbine is to use blades of a certain shape to capture the kinetic energy of the wind. The wind flows over the blades moving the drive shaft that they are connected to. That shaft then turns a pump or a generator, which creates electricity that can be used immediately or stored in a battery.

1. Wind pushes blades:

A wind turbine is located in a place with regular and constant winds, where the blades designed for maximum use of the wind allow easy movement under the air movement.

2. Kinetic energy is transformed:

Kinetic energy of the wind is converted into mechanical energy when the wind meets the windmill blades and pushes them.

3. The production of electricity:

In a wind turbine, a spinning drive shaft is connected to a gearbox that increases the speed of the rotation which in turn spins a generator that produces electricity.

WHAT IS A WIND FARM?

A wind farm is a collection of wind turbines that form a type of power plant, producing electricity from the wind. There is no official requirement for the number of turbines that defines a wind farm, so it can contain several or hundreds of turbines operating in the same area, either on land or offshore.

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Zeleno rešenje za crvene muljeve

Očekuje se da će električna vozila činiti 50% prodaje automobila u SAD-u do 2030. godine, što znači da će se prerada glinice i dalje povećavati, dodatno pogoršavajući problem otpada od crvenog mulja

Postoji li skrivena cena proizvodnje aluminijuma? Aluminijum je jedan od najraznovrsnijih i najčešće korišćenih metala u savremenoj infrastrukturi, koristi se u svemu, od električnih vozila do svakodnevnih predmeta poput limenki i folija za kuhinju. Njegova obilnost, lakoća i otpornost na koroziju čine ga idealnim za razne primene. Takođe je 75% reciklabilan, što ga čini relativno održivim materijalom.

Međutim, proces proizvodnje aluminijuma od primarnog sirovog materijala, glinice, stvara zabrinjavajuću ekološku opasnost — crveni mulj. Kako se naučnici bore protiv ovog otpada?

RASTUĆA POTRAŽNJA ZA GLINICOM

Glinica, dobijena od rude boksita, ključna je za proizvodnju aluminijuma. Kako globalna potražnja za električnim vozilima raste, aluminijum je sve popularniji zbog svoje lakoće i energetske efikasnosti — posebno u telima vozila i baterijama. Prema Visual Capitalist-u, kapitalna ulaganja u aluminijum dostići će 9 milijardi dolara do 2030. godine, potaknuta potrebom da se zadovolji rastuća potražnja, posebno za proizvodnju baterija.

Očekuje se da će električna vozila činiti 50% prodaje automobila u SAD-u do 2030. godine, što znači da će se prerada glinice i dalje povećavati, dodatno pogoršavajući problem otpada od crvenog mulja.

Aluminijum je obilan — čini 8,23% zemljine kore — i najviše je eksploatisan industrijski metal, pri čemu Kina topi 59% svetskog aluminijuma. Međutim, kako se više glinice prerađuje da bi se zadovoljila globalna potražnja, deponije crvenog mulja će se uvećavati, predstavljajući ozbiljnu pretnju po životnu sredinu.

ZAŠTO JE CRVENI MULJ PROBLEM?

Crveni mulj je toksičan i predstavlja rizik za životnu sredinu. Ima visoku alkalnost, sa pH vrednošću između 10 i 13, zbog zaostalog natrijum-hidroksida korišćenog u procesu prerade glinice. Ova visoka alkalnost može kontaminirati zemljište i izvore vode, čineći zemljište neplodnim za biljke i životinje i ugrožavajući lokalne ekosisteme. Uz to, crveni mulj sadrži teške metale poput kadmijuma, hroma i vanadijuma, koji su potencijalno toksični za ljude i divlje životinje. Ovi metali mogu dospeti u podzemne vode, dodatno ugrožavajući izvore vode i poljoprivredno zemljište.

Ogromna količina proizvedenog crvenog mulja - do 120 miliona tona godišnje - dodatno doprinosi problemu, jer se često skladišti u odlagalištima ili na deponijama. Ove metode skladištenja su ne samo skupe, već i opasne. Na primer, incident iz 2010. godine u Ajki, Mađarska, kada je brana koja je držala otpad od crvenog mulja popustila, rezultirao je izlaskom toksične muljevitne mase koja je dovela do povreda, pa čak i smrtnih ishoda, uz prouzrokovanje široke ekološke štete. U Kvinslendu, rafinerije glinice u blizini Gladstona stvorile su polja crvenog mulja koja pokrivaju stotine hektara, što je ekološki zabrinjavajuće, posebno tokom jakih kiša ili ciklona, koji mogu dovesti do mogućih probijanja barijera.

Ovakvi incidenti naglašavaju potencijal crvenog mulja da prouzrokuje dugotrajnu štetu, posebno ako mere zadržavanja zakažu. Kombinacija njegovih opasnih hemijskih svojstava i rizika povezanih sa njegovim skladištenjem čini crveni mulj ekološkim i javnozdravstvenim problemom.

ZELENI ČELIK: NOVO REŠENJE

Nedavne inovacije su počele da pretvaraju ovaj opasan otpad u vredan resurs za proizvodnju zelenog čelika. Jedan obećavajući metod uključuje ekstrakciju gvožđa iz crvenog mulja korišćenjem procesa koji minimizira emisiju ugljen-dioksida. Zamenom sredstava za redukciju na bazi ugljenika sa vodoničnom plazmom, gvožđe se može ekstrahovati iz rastopljenih oksida unutar crvenog mulja. Ovaj proces, sproveden u električnoj lučnoj peći, ne samo da smanjuje sadržaj gvožđa, već i eliminiše proizvodnju crvenog mulja u jednom koraku.

Kako potražnja za aluminijumom nastavlja da raste, posebno u sektorima električnih vozila i obnovljive energije, izazovi koje predstavlja otpad crvenog mulja treba da budu u fokusu. Uz inovativna nova rešenja na vidiku, imamo dobre šanse za smanjenje ekološkog otiska proizvodnje aluminijuma

A Green Solution to Red Mud

Electric vehicles are expected to make up 50% of US car sales by 2030, alumina refinement will continue to rise, further exacerbating the problem of red mud waste

Is there a hidden cost of aluminum production? Aluminum is one of the most versatile and widely used metals in modern infrastructure, used in everything from electric vehicles to everyday items like cans and kitchen foil. Its abundance, lightness and corrosion resistance make it ideal for a variety of applications. It is also 75% recyclable, making it a relatively sustainable material.

However, the process of producing aluminum from its primary raw material, alumina, creates a worrisome environmental hazard — red mud. How do scientists fight this waste?

THE GROWING DEMAND FOR ALUMINA

Alumina, derived from bauxite ore, is crucial for aluminum production. As global demand for electric vehicles grows, aluminum is increasingly popular for its lightness and energy efficiency — especially in vehicle bodies and batteries. According to Visual Capitalist, capital investment in aluminum will reach $9 billion by 2030, driven by the need to meet growing demand, particularly for battery manufacturing.

Electric vehicles are expected to make up 50% of US car sales by 2030, alumina refinement will continue to rise, further exacerbating the problem of red mud waste.

Aluminum is abundant — it makes up 8.23% of the earth's crust — and is the most exploited industrial metal, with China smelting 59% of the world's aluminum. However, as more alumina is refined to meet global demand, red mud deposits will grow, posing a serious threat to the environment.

WHY IS RED MUD A PROBLEM?

Red mud is toxic and poses a risk to the environment. It has high alkalinity, with a pH value between 10 and 13, due to the residual sodium hydroxide used in the alumina refinig process. This high alkalinity can contaminate soil and water sources, making the soil infertile for plants and animals, and impacting local ecosystems. In addition, red mud contains heavy metals such as cadmium, chromium and vanadium, which are potentially toxic to humans and wildlife. These metals can reach groundwater, further threatening water sources and agricultural land.

The huge amount of red mud produced - up to 120 million tons per year - further contributes to the problem, as it is often stored in landfills. These storage methods are not only expensive, but also dangerous. For example, the 2010 incident in Ajka, Hungary, where a dam holding red mud waste collapsed, released a toxic sludge that resulted in injuries and even fatalities, and caused widespread environmental damage. In Queensland, the alumina refineries near Gladstone have resulted in red mud fields that cover hundreds of hectares. These fields are environmentally concerning, especially during heavy rains or cyclones, which can lead to potential containment breaches.

Such incidents highlight the potential of red mud to cause long-term damage, especially if containment measures fail. The combination of its hazardous chemical properties and the risks associated with its storage make red mud an environmental and public health problem.

GREEN STEEL: A NEW SOLUTION

Recent innovations have begun to turn this hazardous waste into a valuable resource for green steel production. One promising method involves extracting iron from red mud using a process that minimizes carbon dioxide emissions. By replacing carbon-based reducing agents with hydrogen plasma, iron can be extracted from the molten oxides within red mud. This process, carried out in an electric arc furnace, not only reduces the iron content, but also eliminates the production of red mud in one step.

This approach, which uses green hydrogen and renewable electricity, is an energy-efficient and carbon-neutral pathway to iron production. The reduction of red mud into a viscous oxide melt allows the iron to be separated and formed into metallic nodules, ready for use in steelmaking without further refinement.

As red mud is rich in valuable metals such as iron, scandium and yttrium, this process offers a sustainable method for extracting these resources while reducing the carbon footprint

of steel production. In this way, two major environmental problems are solved: the growing global accumulated red mud, which currently amounts to 4 billion tons, and the reduction of CO_2 emissions in iron production.

As demand for aluminum continues to rise, particularly in the electric vehicle and renewable energy sectors, the challenges posed by red mud waste need to be in focus. With innovative new solutions on the horizon, we have a good chance of reducing the ecological footprint of aluminum production.

These improvements could turn hazardous waste into a sustainable resource, benefiting both the aluminum and steel industries while mitigating environmental damage. GN

Ovaj pristup, koji koristi zeleni vodonik i obnovljivu električnu energiju, predstavlja energetski efikasan i ugljenično neutralan put do proizvodnje gvožđa. Redukcija crvenog mulja u viskozni oksidni rastop omogućava gvožđu da se odvoji i oblikuje u metalne nodule, spremne za upotrebu u proizvodnji čelika bez daljih prerada.

Pošto je crveni mulj bogat vrednim metalima kao što su gvožđe, skandijum i itrijum, ovaj proces nudi održiv metod za ekstrakciju ovih resursa dok smanjuje ugljenični otisak proizvodnje čelika. Na taj način, rešavaju se dva glavna ekološka problema: rastući globalni nagomilani crveni mulj, koji trenutno iznosi 4 milijarde tona, i smanjenje emisije CO_2 u proizvodnji gvožđa.

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Ova unapređenja bi mogla pretvoriti opasan otpad u održiv izvor, donoseći korist i industrijama aluminijuma i čelika, a istovremeno ublažavajući štetu po životnu sredinu. GN

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