

ՄԱՅՔ. ՄԵՆ. ԳՎ. ՐԻՆԻՈՒՅՑ ԳԼԻՒՐՆԻՔ

# OD PARIZA DO +2<sup>0</sup> C

i još ponešto ...

U Zagrebu, 15. STUDENOGA 2017.



Sveučilište u Zagrebu  
Fakultet elektrotehnike i računarstva  
AMAC Alumni FER



Izazov, pa i današnji, slijedi iz mog životnog mota ...

*Así cada mañana de mi vida traigo del sueño otro  
sueño."*  
*(Pablo Neruda)*

"Svako jutro buđenjem iz sna snivam novi san"



Did You  
Know?

... postoje dva **Krajcara** ... pa prvo krenimo s **Drugim** ... 😊



ԿՉՔՓՃՔԻ ԲՃ  
ԲՃ ՐԵՉՈՒԻ ՆՈՅՆՃ  
ԲՃ ՐԵՉՈՒԻ ՍԵՅՄԻՆՃ  
ԲՃ ՆՈԻ  
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ՀՉՔՓՃՔԻ ԲՃ  
ԲՃ ՆՈԻ Ձ ՄՃՆՃ

ԿՉՔՓՃՔԻ ԲՃ  
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ՀՉՔՓՃՔԻ ԲՃ  
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ԲՃ Ձ ԵԻՔԻՐՉՔՃ ՍԵՁՄՁ  
ԹՍԻ ԵՃՀՆԵՍԵ

... ՆՈԻ ԲՃ



**Prijevod:**

Kunfina ni – granice nema;  
 mira – mjera;  
 pomajić – lipanj;  
 žetvenjak – srpanj;  
 smokvenjak – rujan;  
 štajun – godišnje doba;  
 duši – miriši;  
 versi – riječi;  
 pensijeri – misli;  
 arbašpanja - djetelina;  
 mličnjak – maslačak;  
 dub – stablo;  
 rikord - spomen

Kunfina ni  
 ni prema gori  
 ni prema doli  
**ni ga**  
 ni napred  
 ni nazad

Kunfina ni  
**ni ga u miri**

Kunfina ni  
 ni u čerišnji u maju  
 ni mendulah u avrilu  
**ni ga**  
 ni u udoru pomajića  
 ni u udoru žetvenjaka  
 ni, ni u smokvenjaku

Kunfina ni  
**ni ga u štajunu**

Kunfina ni  
 u duši ka duši  
 u verši ki kantaju  
**ni ga**  
 ni s tobom u sebi  
 ni s manon u tebi

Kunfina ni  
**ni ga u pensijeri**

Kunfina ni  
 ni u skritoj arbašpanji  
 ni u mličnjaku na vitru

**Ni ga**  
 ni u ranjenon dubu  
 za rikord

**... Ga ni**





... a sada onaj **Krajcar** kojeg ste pozvali ...

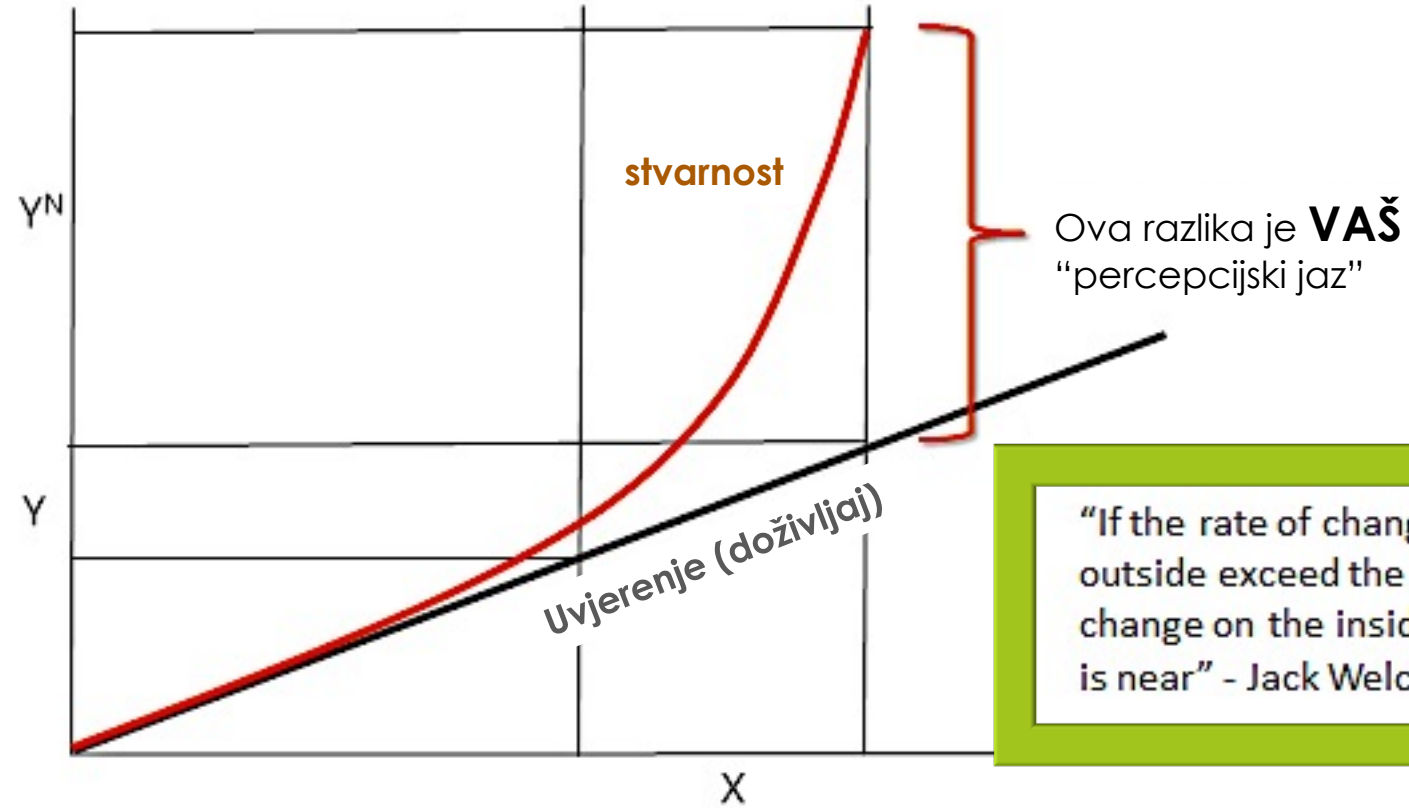




Promjena je stalna, zar ne? ... Kako je doživljavamo?



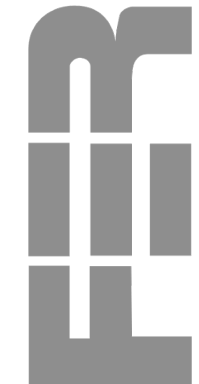
# Živimo u eksponencijalno vrijeme



Did You Know?

DOBRO DOŠLI u eksponencijalni svijet

Jack Welch, bivši CEO od General Electric (1981.–2001.). Vrijednost kompanije u njegovom razdoblju rasla je prosječno 20% godišnje

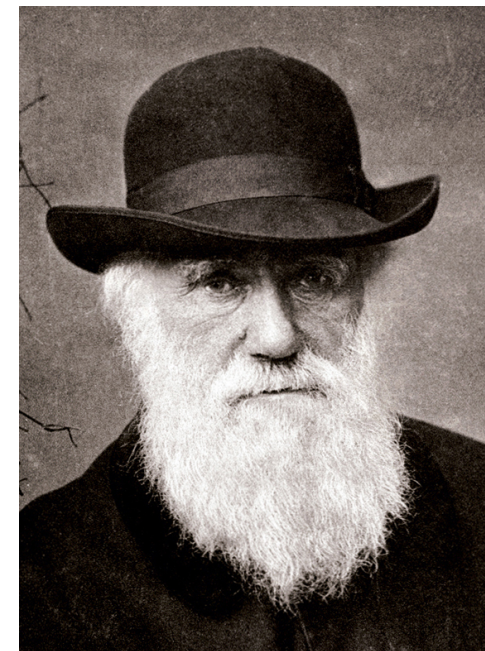




(1874- - 1965.)...1953. Nobelova nagrada za književnost

**“Za poboljšanje – mijenjaj, a za savršenstvo – mijenjaj često.”**

*(Winston Churchill)*



(1809. – 1882.)

"Nije najinteligentnija ona vrsta koja preživi, nije ni najjača ona vrsta koji preživi, ali je vrsta koja preživi ona **vrsta koja je sposobna adaptirati se** ;  
najbolje prilagođavati promjenjivom okruženju u kojem se nalazi "

*"It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able to adapt to and to adjust best to the changing environment in which it finds itself"*

(Charles Darwin)





Činjenično okruženje ...



1.  **Koncentracija CO<sub>2</sub>** je povećana za 40% u usporedbi s pred-industrijskim vremenom
2.  Većinu **zagrijavanja** od 1951. do danas izazvane su **ljudskim djelovanjem**
3.  Zemljina se **površina zagrijala za 0,85°C** U periodu od 1880. godine do danas
4.  **Toplinski valovi i pojačane kiše** ne postale su sve češće od 1950<sup>tih</sup>
5.  **Arktički led se smanjuje** u prosjeku za **3,8%** po dekadi od 1979. godine
6.  **Razina mora povećat će** se između 26 i 82 cm do 2100. godine
7.  Samo "**agresivan**" **scenarij** može zadržati prosječnu temperaturu ispod +2°C do 2100.



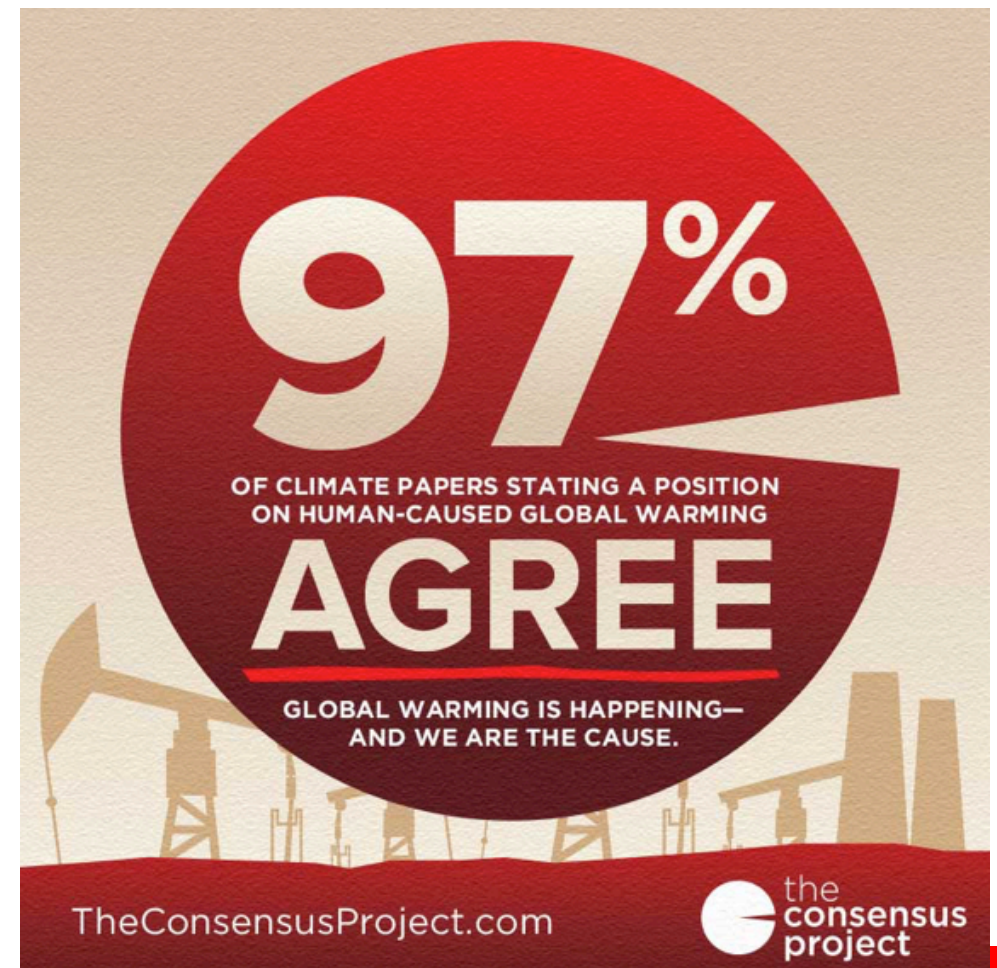
**United Nations**  
Framework Convention on  
Climate Change

UNFCCC ... naša je stvarnost ... ?

<http://unfccc.int/timeline/>



RIGHT  
&  
WRONG



13

Klimatske promjene uzrokovane ljudskim djelovanjem?

<https://www.skepticalscience.com/global-warming-scientific-consensus-intermediate.htm>



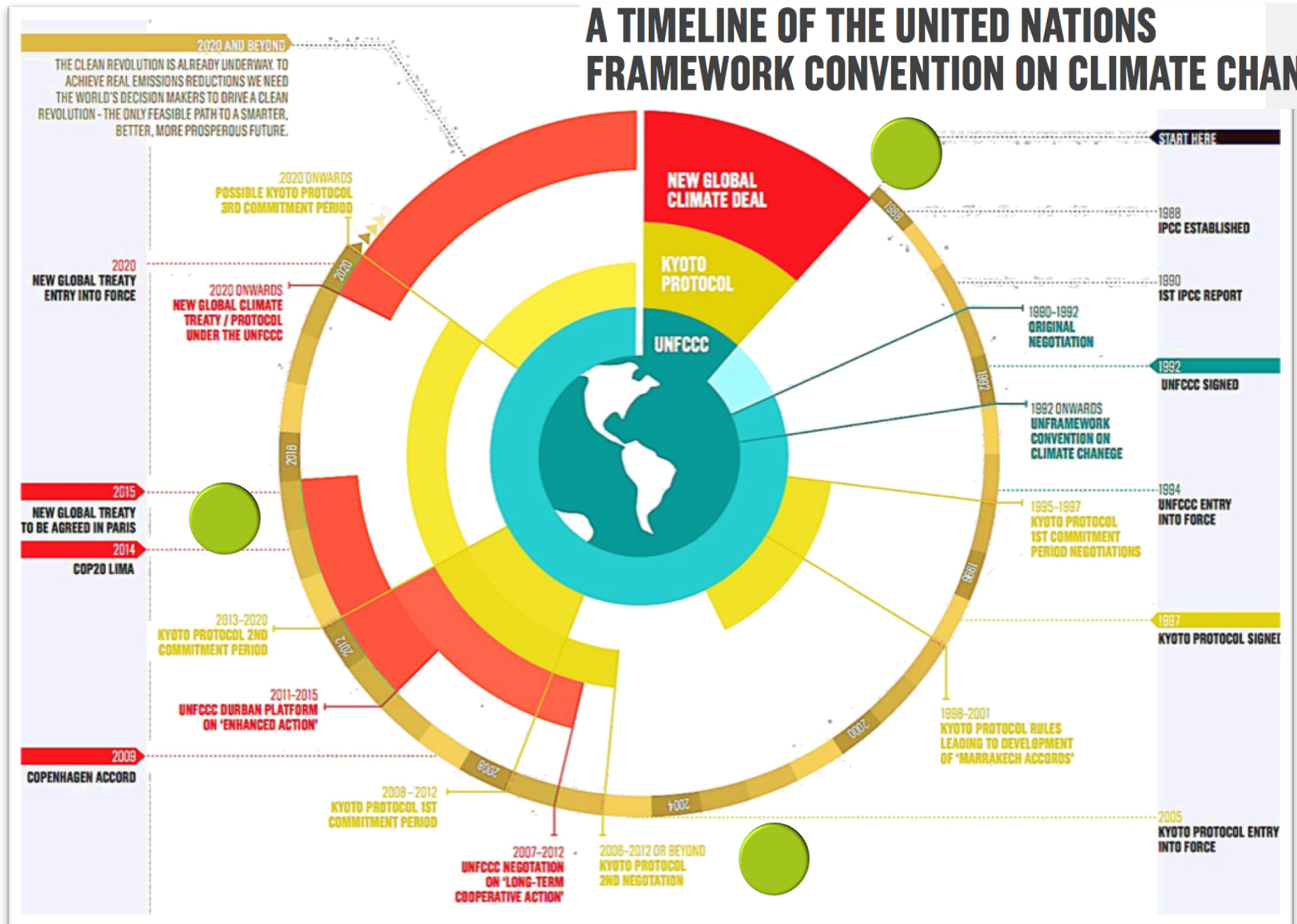
*let it be.*



*UNFCCC Timeline o klimatskim promjenama ...*

[https://www.theclimategroup.org/sites/default/files/archive/files/UNFCCC\\_timeline-2014-v4.pdf](https://www.theclimategroup.org/sites/default/files/archive/files/UNFCCC_timeline-2014-v4.pdf)

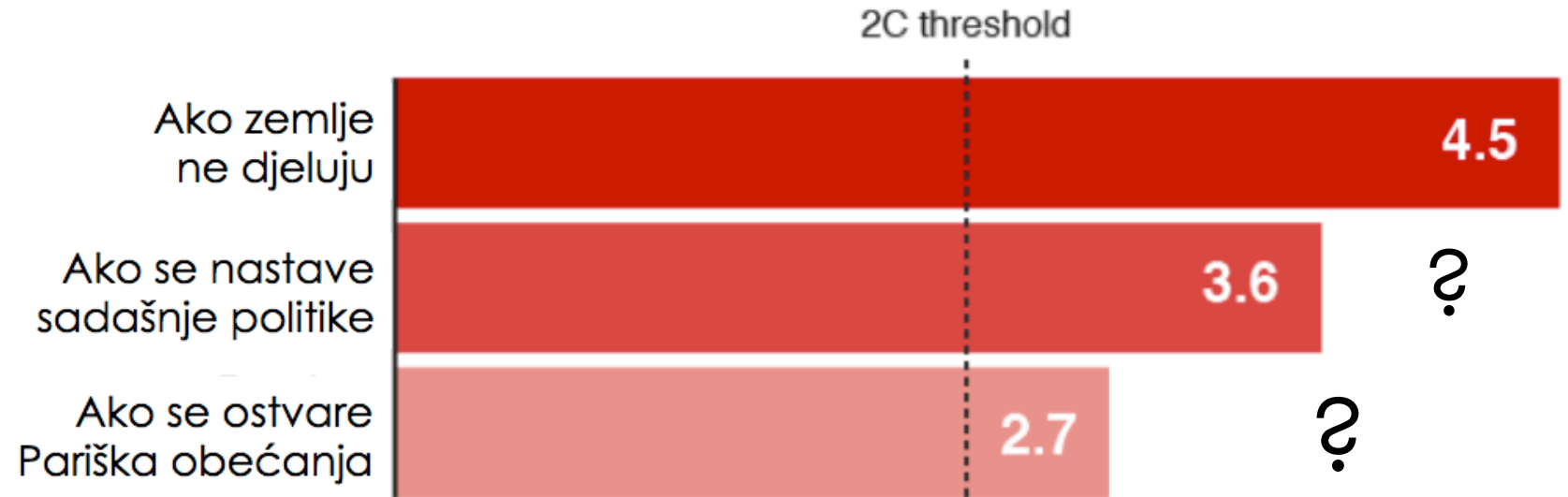
# A TIMELINE OF THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE





... a što je to bilo u Parizu u jesen 2015.?

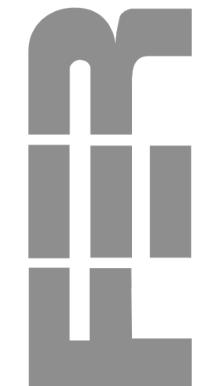
## Prosječno zagrijavanje ( $^{\circ}\text{C}$ ) projicirano na 2100. godinu



Nakon Pariza promjena paradigme se (treba) događati ...

# New economy

Nakon Pariza promjena paradigme se (treba) događati ...



**RE**ASON



*Hope*

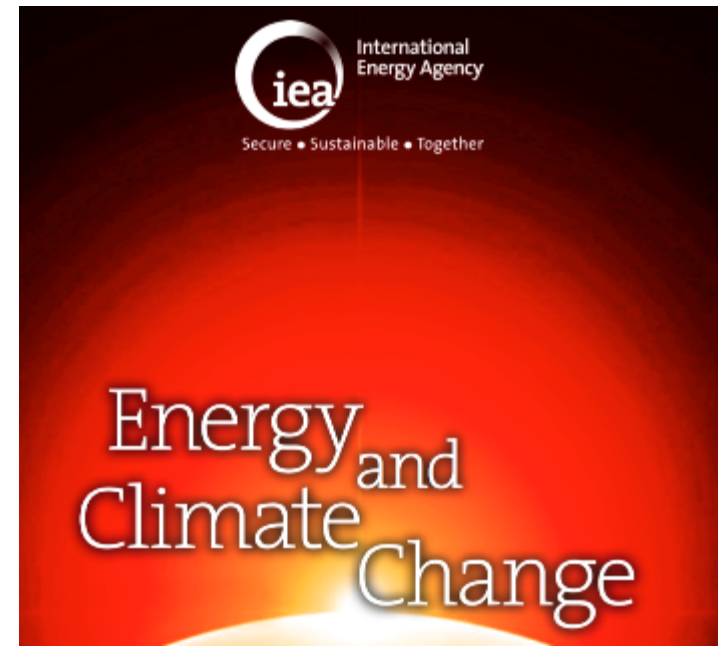
Ima li razloga za nadu?

SHIFT  
HAPPENS



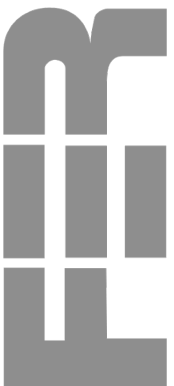
FER



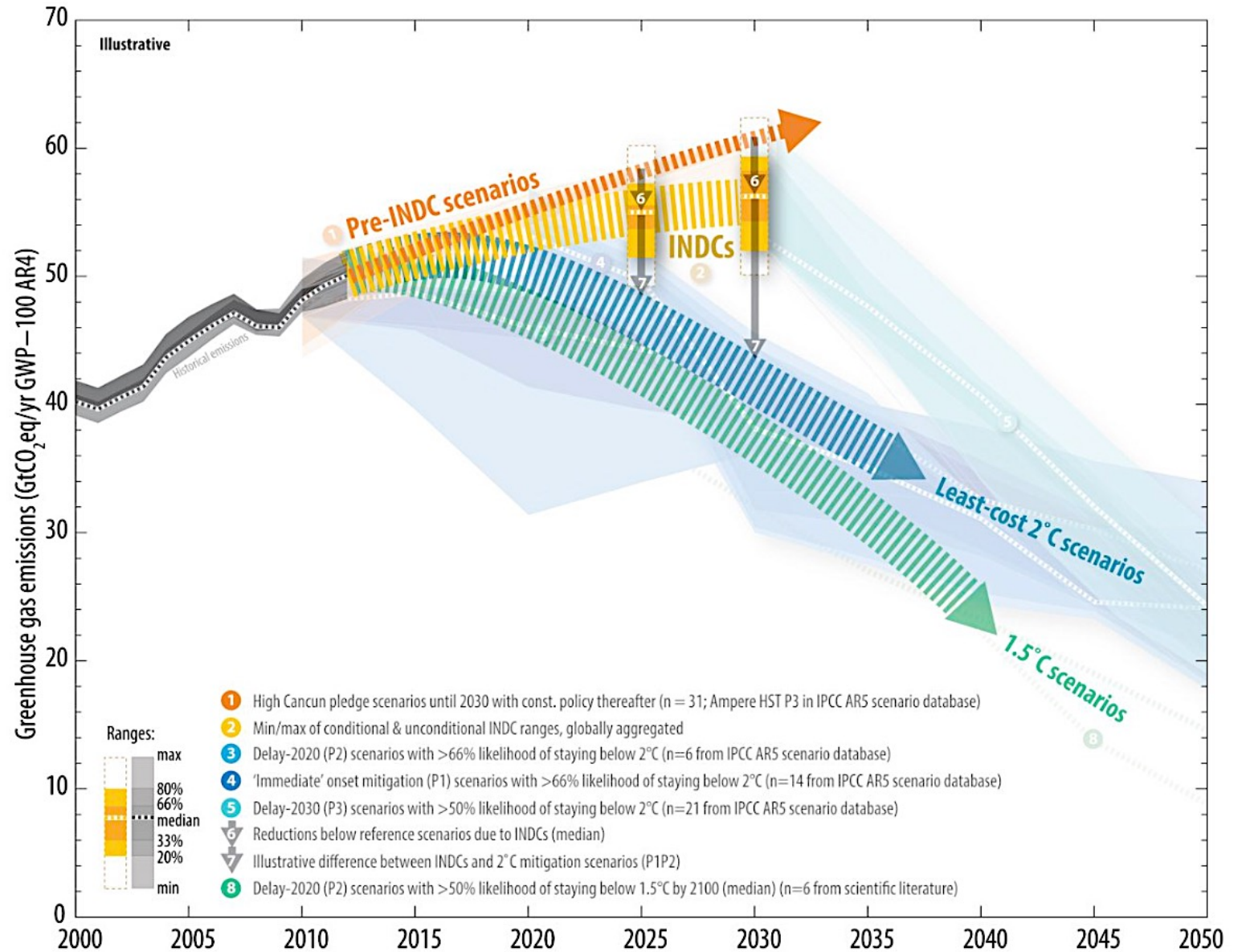


## IEA priča prije Pariza (dokument koji je bio podloga za dogovor)

<https://www.iea.org/publications/freepublications/publication/WEO2015SpecialReportonEnergyandClimateChange.pdf>



# INDC & CO<sub>2</sub>?



BIG  
STEP

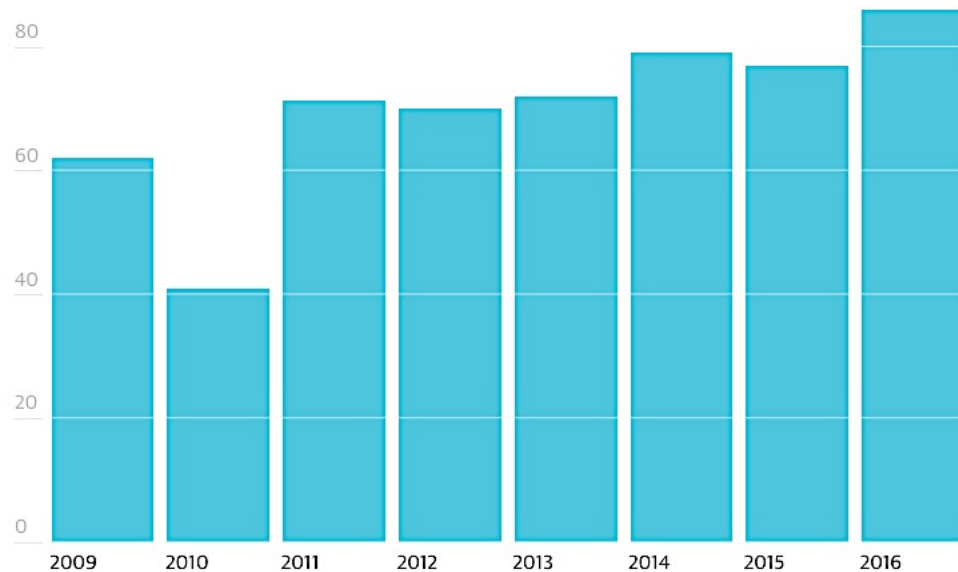


Od *Kyota* do danas ...



## OIE u usporedbi s novim izgradnjama u EU

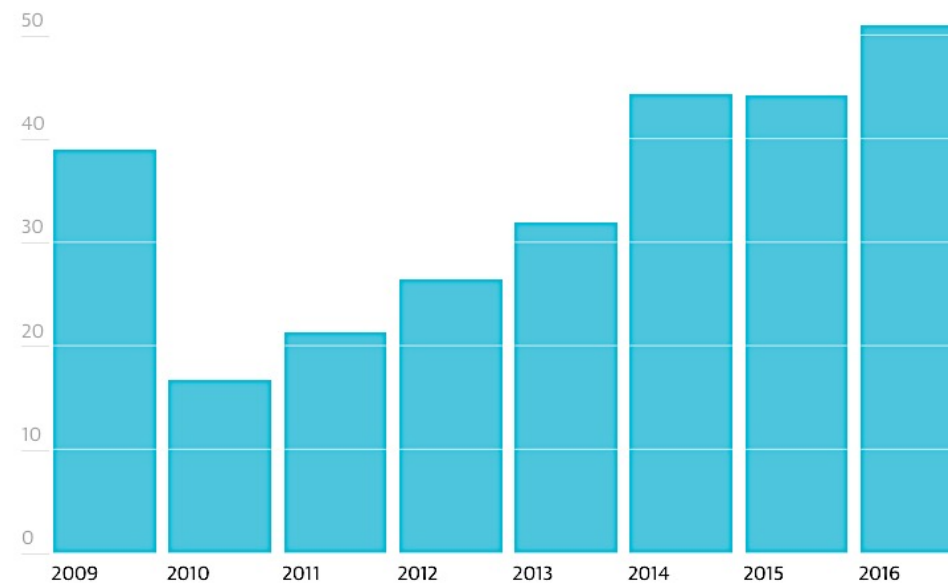
Postotak OIE u ukupnoj izgradnji



Guardian graphic | Source: WindEurope

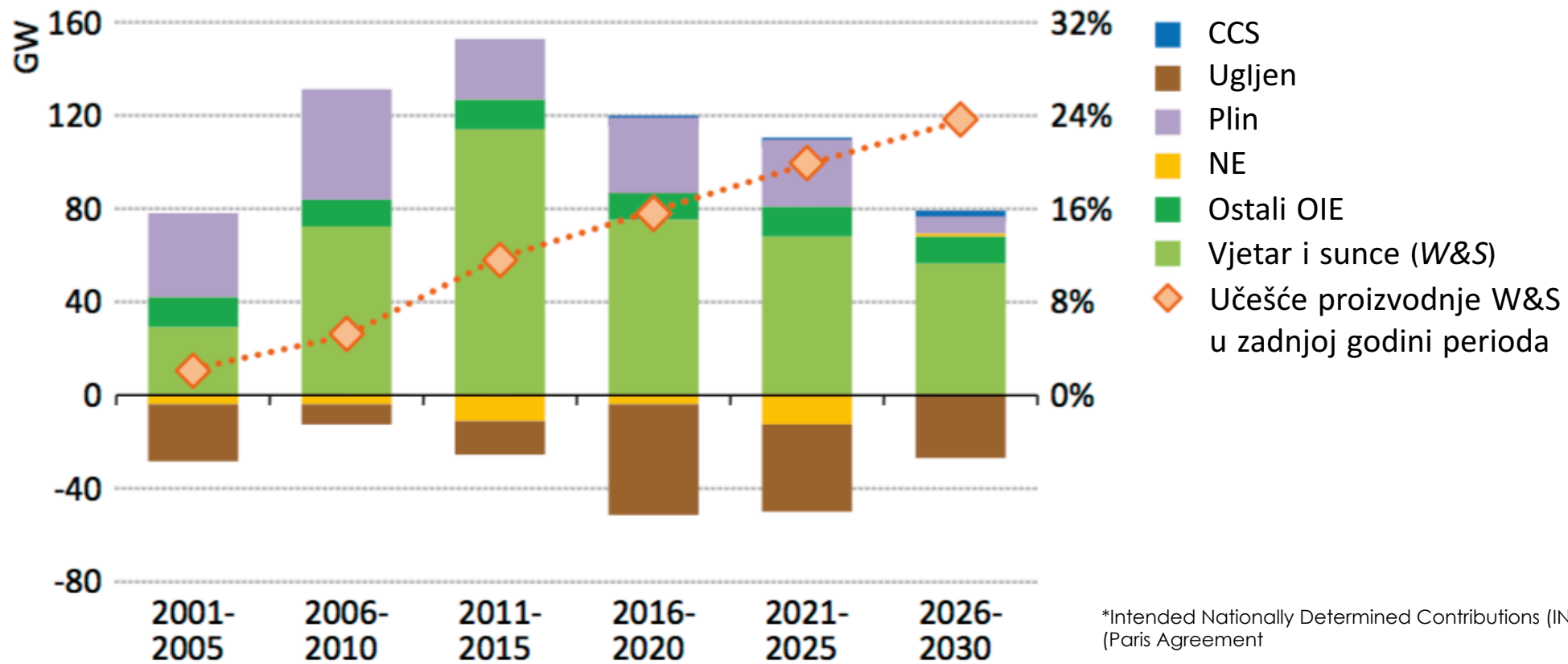
## VE u usporedbi s novim izgradnjama u EU

Postotak VE u ukupnoj izgradnji



Guardian graphic | Source: WindEurope

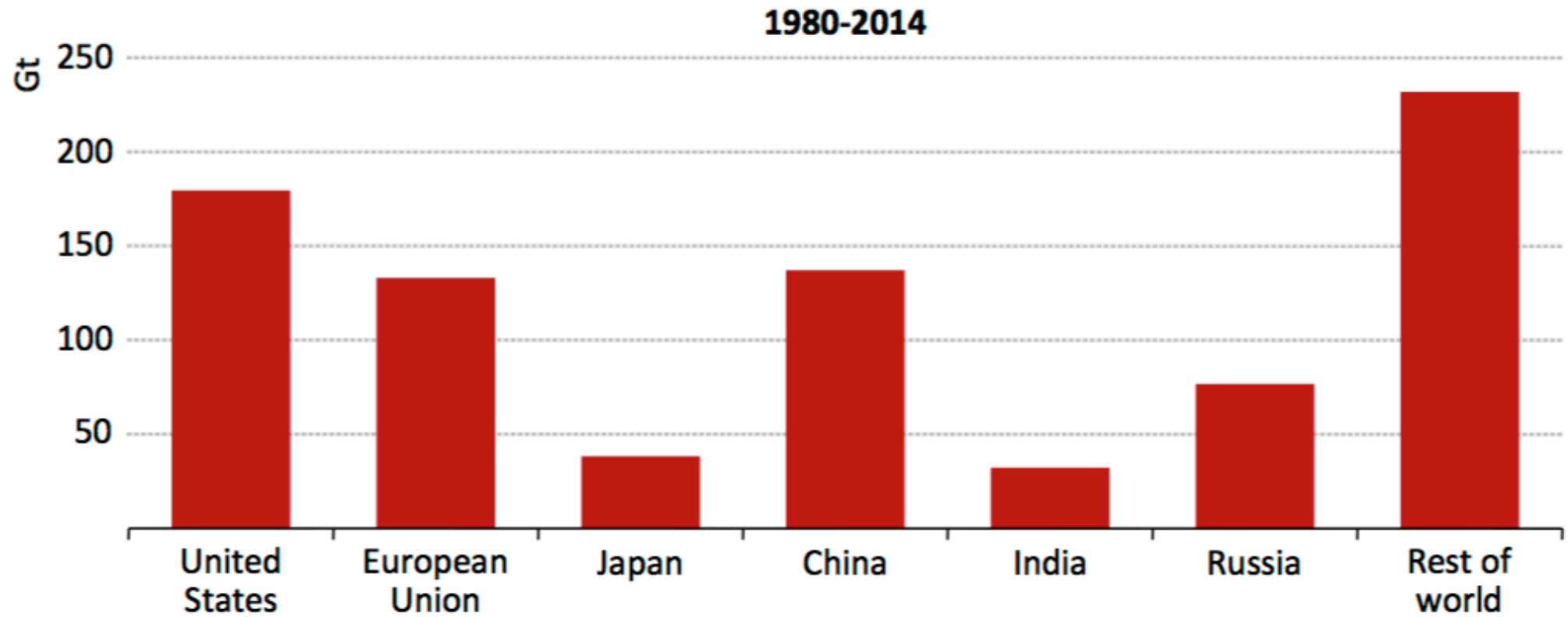




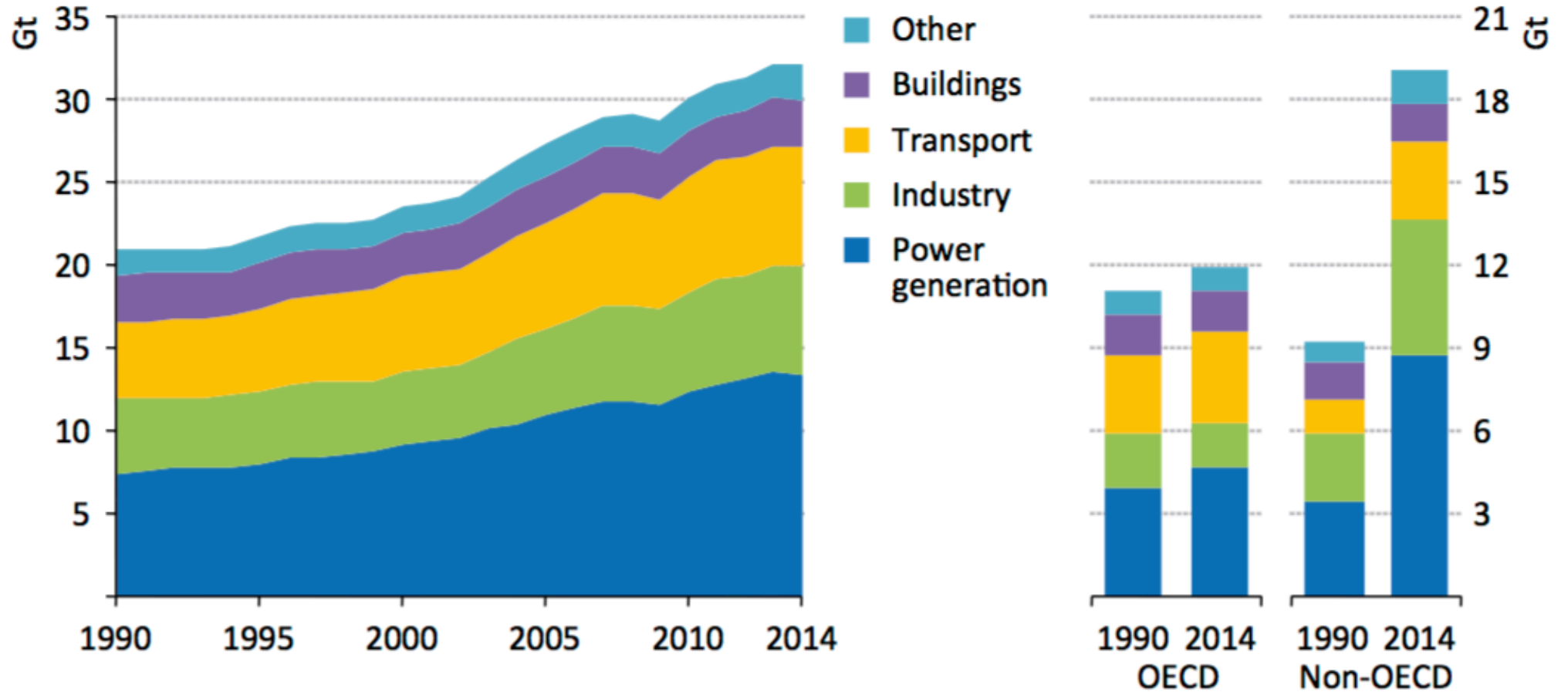
\*Intended Nationally Determined Contributions (INDCs) (Paris Agreement)



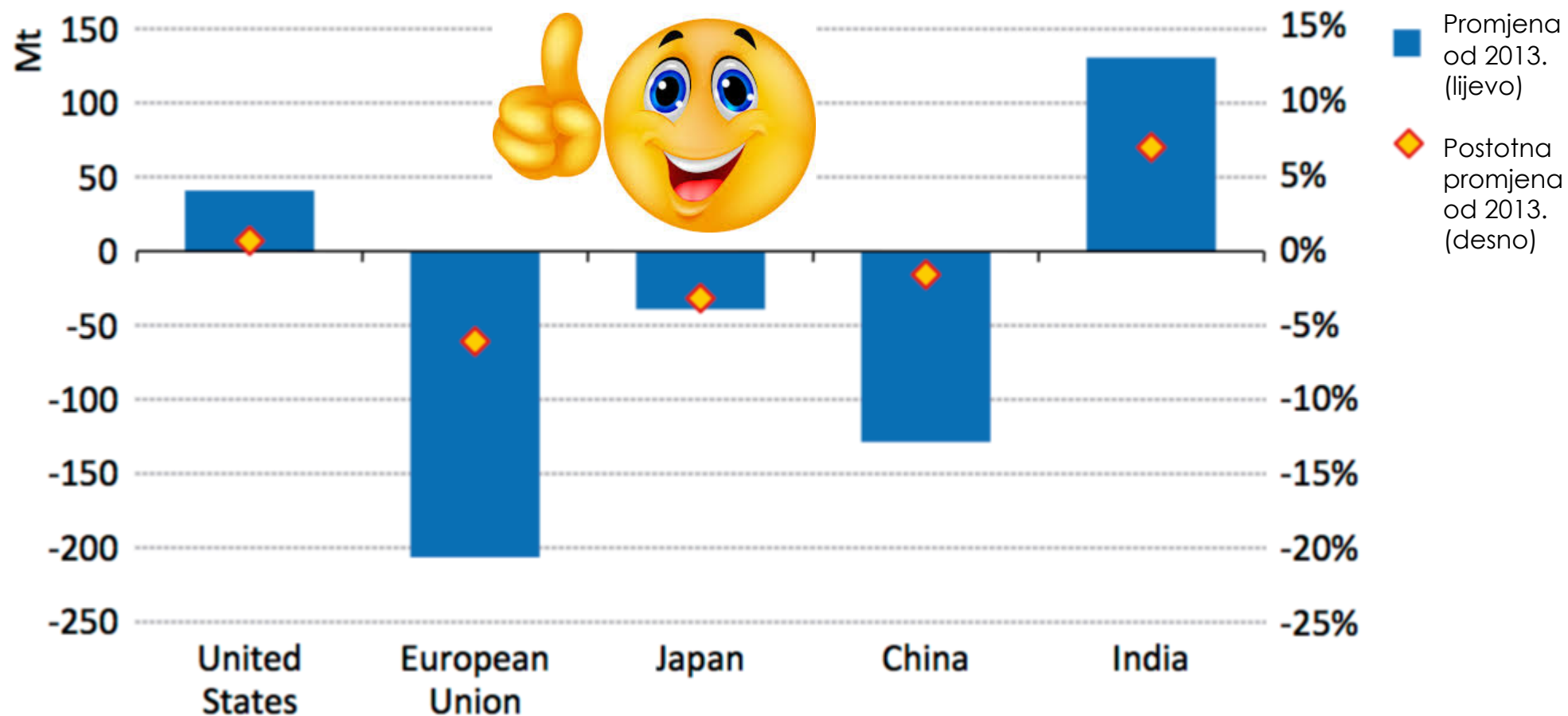
# CO<sub>2</sub> emisije iz energetske postrojenja po regijama



# CO<sub>2</sub> emisije po sektorima i OECD vs non-OECD

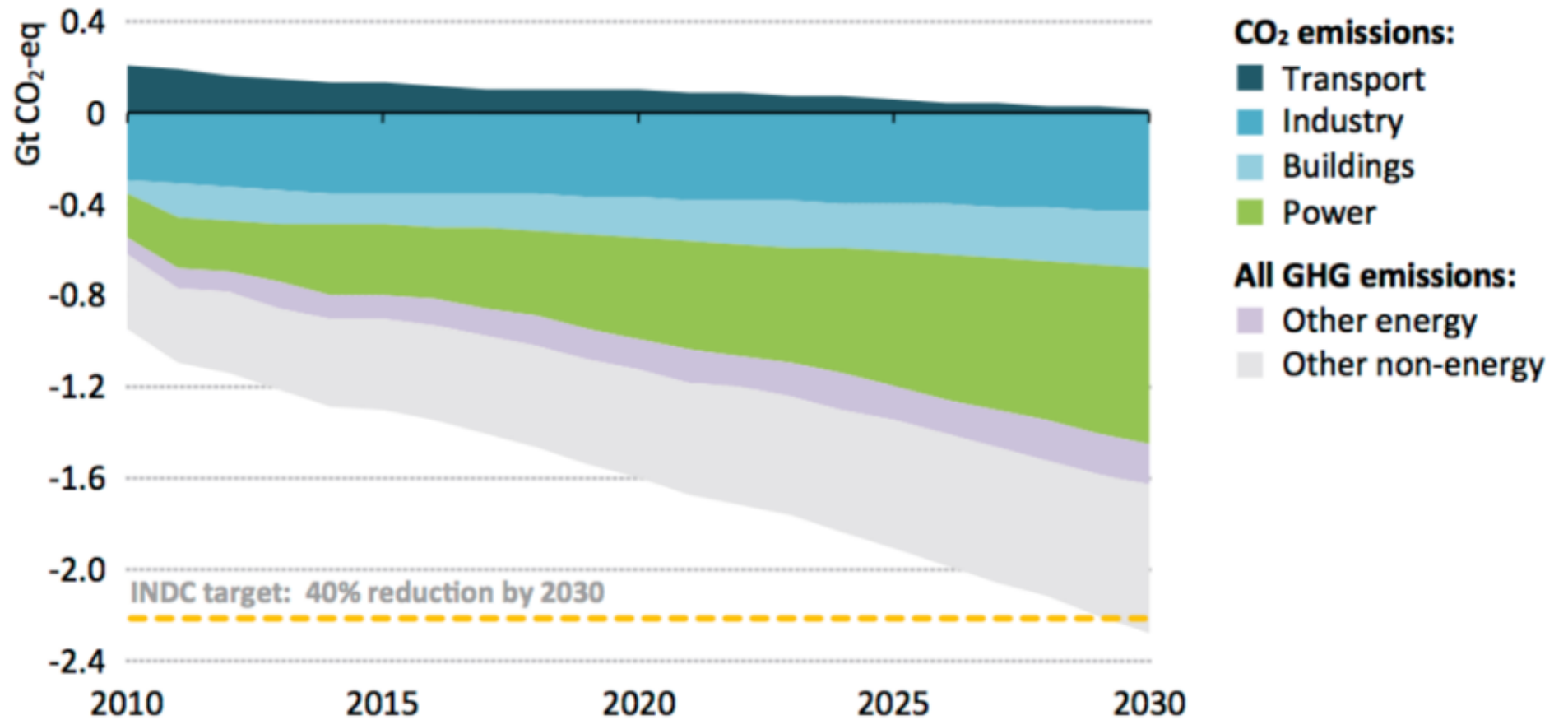


# Promjene CO<sub>2</sub> emisija po regijama 2013.– 2014.





# EU - CO<sub>2</sub> smanjenje prema 1990. u INDCs scenariju



## INDC po zemljama dokaz ozbiljnosti politika ...?

UNFCCC Party	Intended Nationally Determined Contribution (INDC)
<b>Switzerland</b>	Reduce GHG emissions by 50% below 1990 levels by 2030 (35% below by 2025).
<b>European Union</b>	Reduce EU domestic GHG emissions by at least 40% below 1990 levels by 2030.
<b>Norway</b>	Reduce GHG emissions by at least 40% compared with 1990 levels by 2030.
<b>Mexico</b>	Reduce GHG and short-lived climate pollutant emissions unconditionally by 25% by 2030 with respect to a business-as-usual scenario.
<b>United States</b>	Reduce net GHG emissions by 26% to 28% below 2005 levels by 2025.
<b>Gabon</b>	Reduce CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O emissions by at least 50% with respect to a reference scenario by 2025.
<b>Russia</b>	Reduce anthropogenic GHG emissions by 25% to 30% below 1990 levels by 2030 subject to the maximum possible account of absorptive capacity of forests.
<b>Liechtenstein</b>	Reduce GHG emissions by 40% compared with 1990 by 2030.
<b>Andorra</b>	Reduce GHG emissions by 37% with respect to a business-as-usual scenario by 2030.

Note: This table contains all contributions that had been submitted to the UNFCCC by 14 May 2015 and is in the order in which they have been submitted.



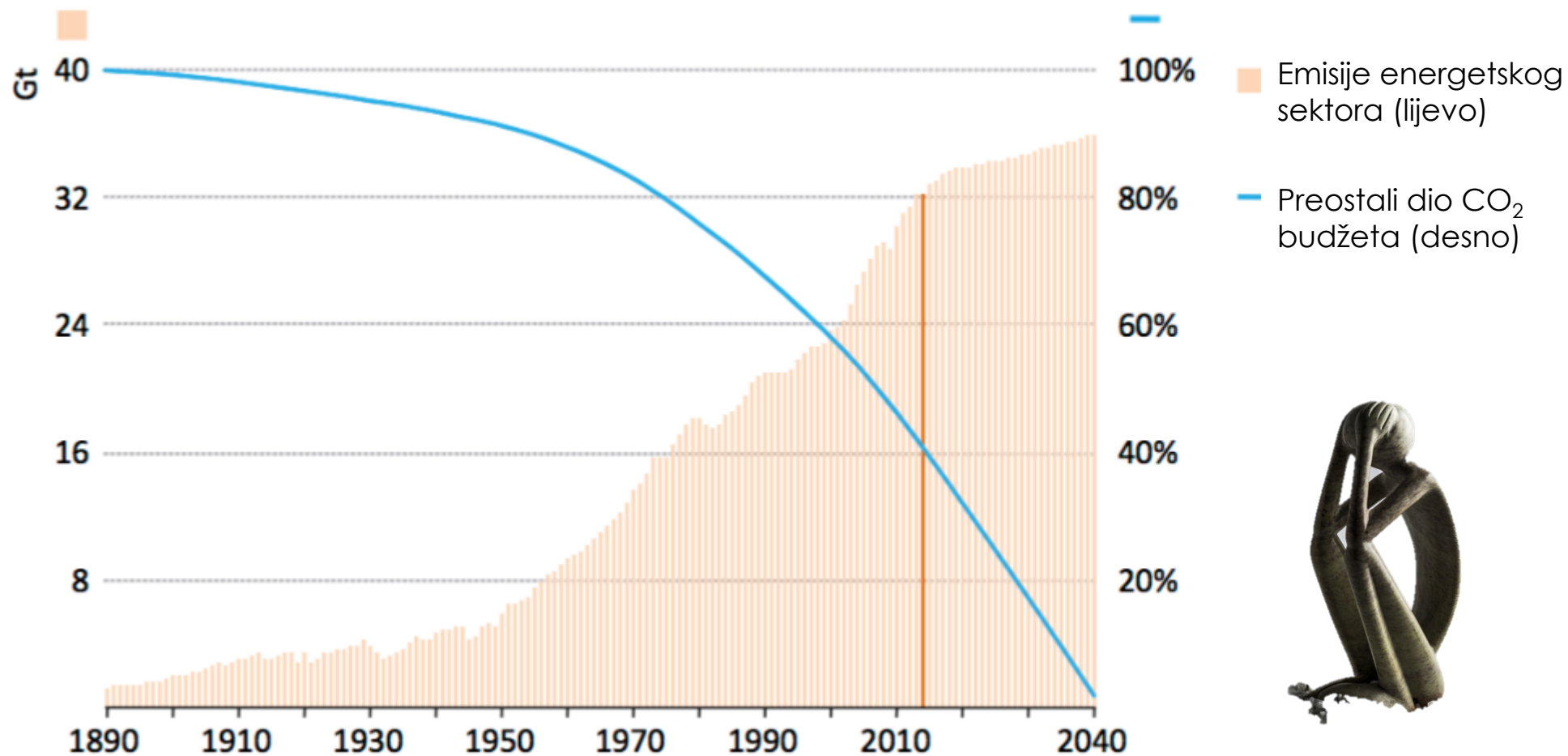
... velika (politička) promjena u načinu realizacije ...

Iz paradigme “MORAŠ” prelazi se na paradigmu koliko “MOŽEŠ”

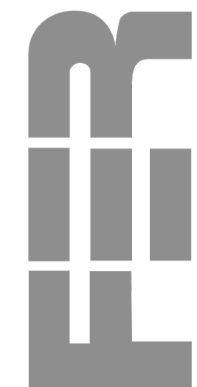
... from *Intended* Nationally Determined Contribution (INDC) to NDC

<http://www4.unfccc.int/ndcregistry/Pages/All.aspx>



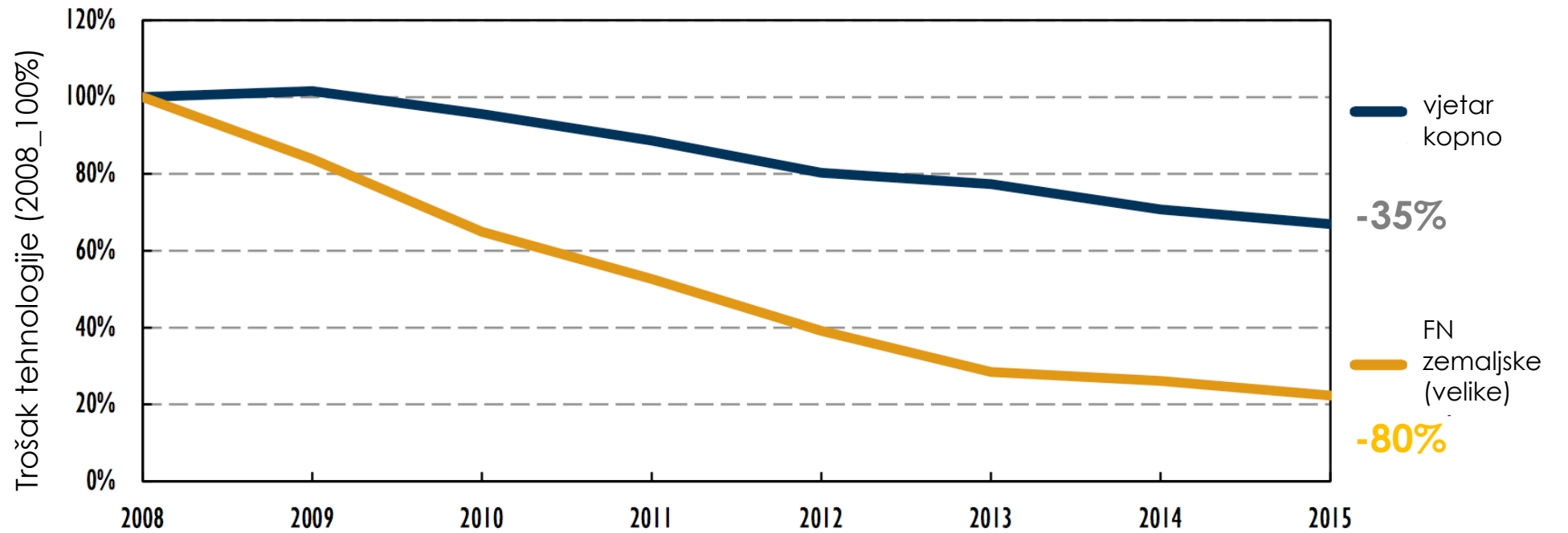


\*Intended Nationally Determined Contributions (INDCs) (made for COP21)





*Još uvijek vrijedi ... We have a problem ... ?*



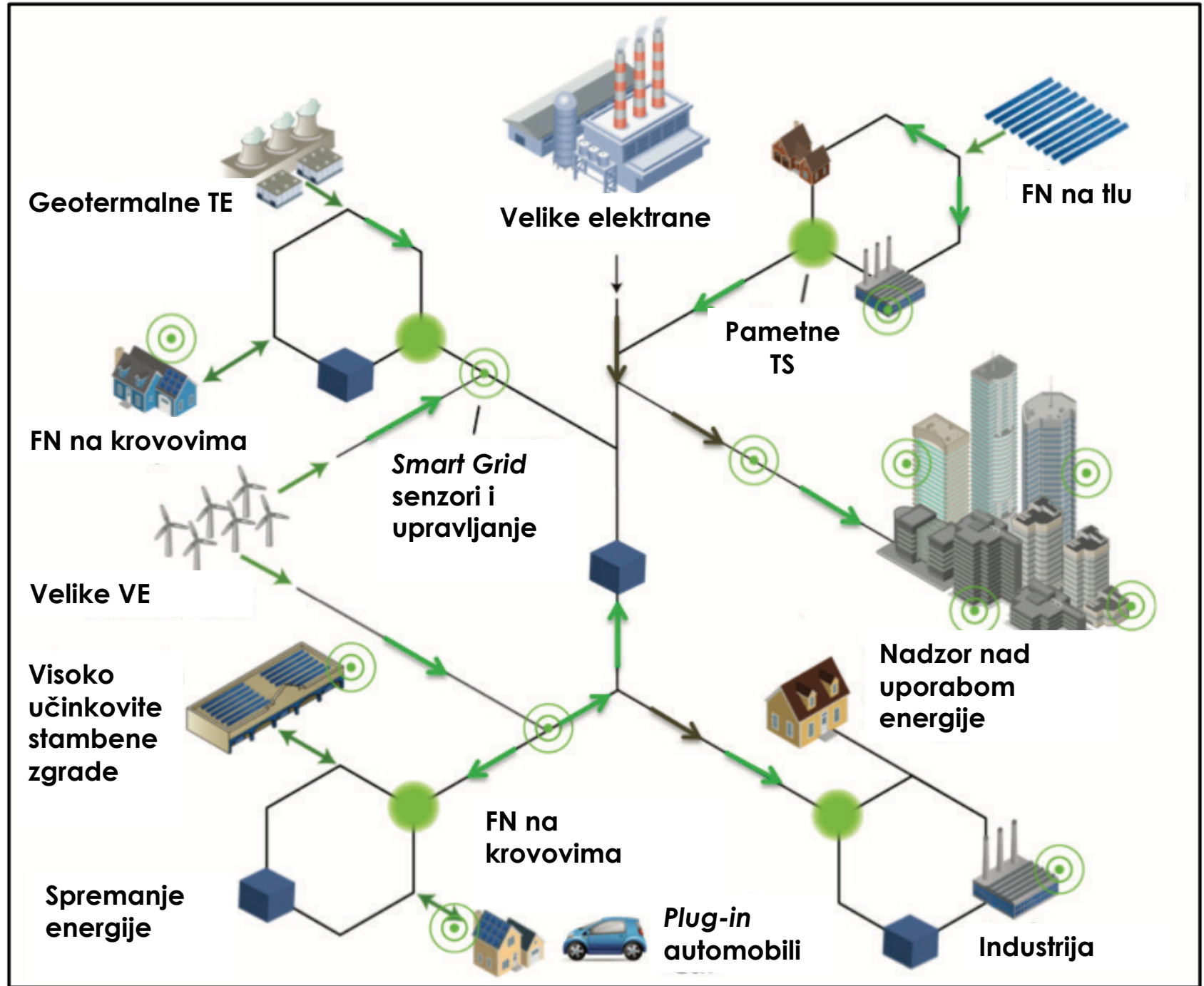
Prvo pitanje: Ima li tu *business-a*?

- ▣ Istraživanje obavljeno od **Bloomberg New Energy Finance** projicira daljnji veliki pad cijena tehnologija OIE kako industrija “sazrijeva”:
  - ▣ “Očekuje se da će projekti OIE “dobiti”  $\frac{3}{4}$  **iznosa globalnog investiranja u novu izgradnju** u energetske objekte (procjena \$10.2tn) do 2040. godine.
  - ▣ U tom se vremenu očekuje da će cijena **PV tehnologija pasti za dodatnih 66 %**, a **zemaljske VE za dodatnih 44 %** što će biti **niže od svih tzv. “zrelih” tehnologija već 2030. godine.**”
- ▣ ***“The impact (of policy) is becoming more and more marginal”.***

<https://www.ft.com/content/fbbc05b0-9c75-11e7-8cd4-932067fbf946>



*Zapravo je to  
Business 4 all ...*



<https://www.nrel.gov/docs/fy14osti/57477.pdf>







PARIS2015  
CONFÉRENCE DES NATIONS UNIES  
SUR LES CHANGEMENTS CLIMATIQUES  
COP21·CMP11

## COP21: *Paris Climate Agreement* - što znači za svijet?

<http://www.bbc.com/news/science-environment-35092127>



PARIS2015  
CONFÉRENCE DES NATIONS UNIES  
SUR LES CHANGEMENTS CLIMATIQUES  
COP21·CMP11

Pariški dogovor kroz pitanja i odgovore ...

<http://www.mirror.co.uk/news/world-news/cop21-you-need-know-after-7002387>

## ▣ Što je postignuto?

- ▣ Prvi *Climate change* dogovor koji može zaustaviti porast globalne temperature, a da u njemu sudjeluju sve zemlje

## ▣ Zašto nam je Pariški ugovor tako važan i zašto tek sada?

- ▣ Kyotski protokol (1997.) bio je dogovor samo razvijenih zemalja, a k tome USA ga nije nikada ratificirala
- ▣ Kyotski protokol ističe 2020. i Pariški bi ugovor trebao biti njegov (na)slijednik

## ▣ 2020. nije daleko – zašto se tek sada dogovaramo?

- ▣ Ozbiljan je pokušaj bio i 2009. u Kopenhagenu, ali pokazalo se da nije postojala ozbiljna namjera i da neke zemlje nisu bile spremne za taj “radikalan” korak (SAD, Kina, ...)



## ▣ Što je ovaj puta bilo drugačije?

- ▣ Svijet više nije u recesiji kao 2009. godine
- ▣ Cijena **nonCO2** tehnologija znatno je pala (*learning curve i economy of scale*) što je stvorilo eksponencijalni rast izgradnje
- ▣ **Kina** se odlučila ozbiljnije pozabaviti s tim problemom (ali i zagađenjem zraka u širem smislu)
- ▣ **Znanost** je postala gotovo **jedinstvena** - *Climate change* je danas znanstveno “nedvosmislen”
- ▣ **Priprema** za COP21 je počela **na vrijeme**. Obavljene su mnoge političke i stručne pripreme prije konferencije
- ▣ **Mnoge zemlje** (njih 187, a koje pokrivaju 95% emisija) već su donijele svoje službene **politike za smanjenje emisija** s ciljevima do 2030. (INDCs)



- ▣ **Ako imamo planove za smanjenje CO<sub>2eq</sub> (INDC) zašto trebamo i ugovor na svjetskoj razini?**
  - ▣ Planovi za smanjenje po zemljama **nisu dovoljni**. Nastavak **današnjih politika** vodi k povišenju globalne temperature **od 3<sup>0</sup>C** u 2100. godini
  - ▣ Ugovor predviđa jednu vrstu "*review and ratchet*" sustava za sve zemlje odnosno obvezu da se **ciljevi provjeravaju na globalnoj razini** i da se politike “jačaju” u skladu s (ne)postignutim
  - ▣ Zemlje su se obvezale da će dostaviti “2020 update” za ciljeve 2030., nakon inventure 2018.



- ▣ Imamo li pozitivnih primjera iz prošlosti? Koliko je prethodnih dogovora na globalnoj razini dalo rezultate?
  - ▣ Ima ih iako ne tako sveobuhvatnih kao što je *Climate change*. Npr. Montrealski dogovor o stavljanju van uporabe kemikalija koje izazivaju ozonske rupe
- ▣ Hoćemo li “sačuvati” planet Zemlju?
  - ▣ Samo **budućnost će znati** reći koliko smo bili uspješni
  - ▣ Predviđeni “**Pariški alati**” omogućavaju sveobuhvatno sagledavanje i prijelaz iz fosilnih ka “čistijim” tehnologijama
  - ▣ Predviđa se potreba “**net zero emissions**” u **kasnijim godinama** ovoga stoljeća
  - ▣ Nada iz Pariza treba **potaći investitore** da ulažu u tehnologije koje omogućavaju zaustavljanje rasta CO<sub>2</sub> emisija, ali i da se spremaju za “*zero-carbon world*”





Zašto je *Paris Climate Agreement* uspio ... ?

**China's Next Steps After COP21** by Richard Brubaker (Forbes)

So, while nothing in COP21 is legally binding, I think that in combination with the US-China announcement, **China has already begun a process of transacting on commitments to bring emissions under control.** It may not be coming out of a sense of moral obligation to the global climate, but perhaps that is why many view China as one of the leaders.

**Because, beyond the emotions behind the issues, concrete actions are being taken in China every day**

Agreement itself was a major achievement because it's the first time that all the major parties, including the United States, **were able to reach a consensus.**

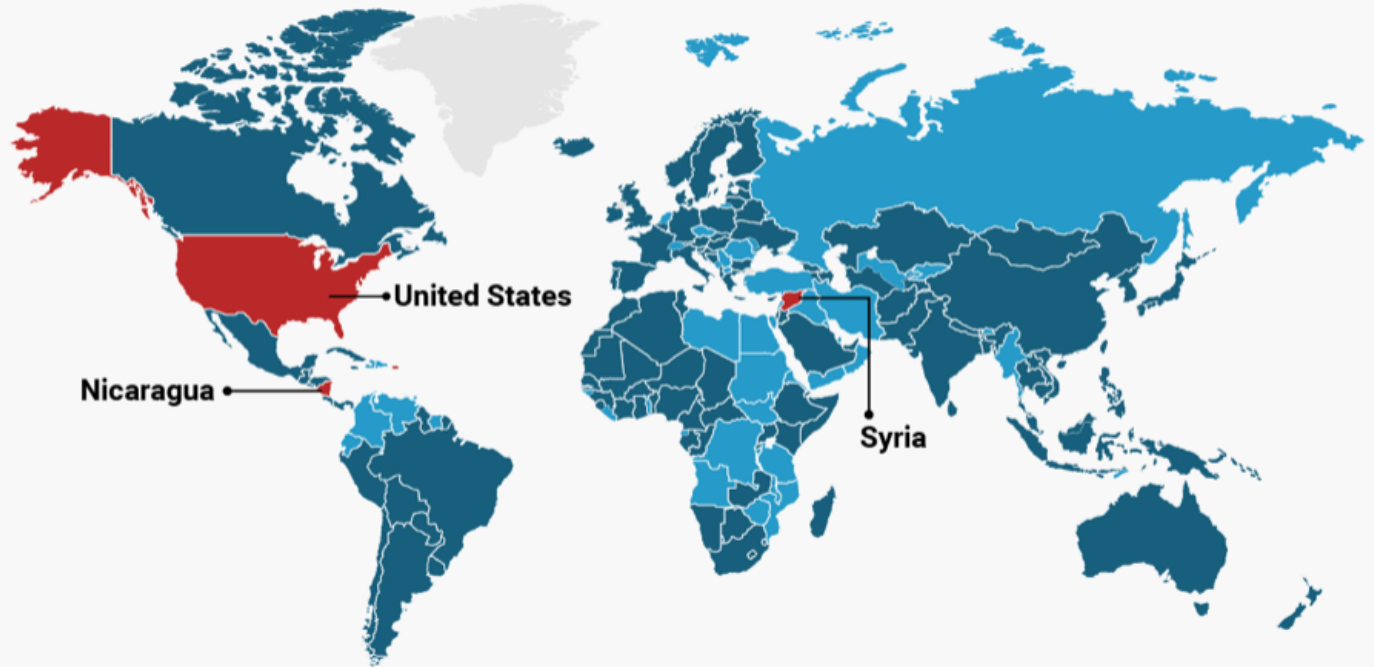
<http://www.forbes.com/sites/ceibs/2015/12/30/chinas-next-steps-after-cop21/#57bed9e07ba1>





# COUNTRIES THAT JOINED THE PARIS CLIMATE AGREEMENT

■ Ratified (146) ■ Signed (48) ■ Not signed/Withdrawing (3)



When Will the Paris Agreement Take Effect?

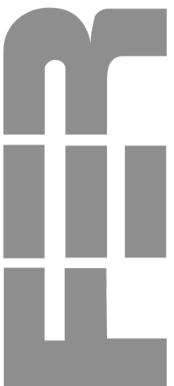
At least **55** PARTIES TO THE UNFCCC representing at least **55%** OF TOTAL GLOBAL GHGS must sign on.

WORLD RESOURCES INSTITUTE

SOURCE: UNFCCC NOTE: Denmark's agreement excludes Greenland. Map is updated as of May 31, 2017.

BUSINESS INSIDER

Pariški je dogovor u nevjerojatno kratkom vremenu stupio na snagu ...





Neki možda imaju ...



... ali Europska unija ide “ozbiljno” dalje ...

**Energetska unija** - okvirna strategije alat za prijelaz na  
**niskougljično, sigurno i konkurentno**  
gospodarstvo.

EU je “Parizom” dobila novi vjetar u leđa.  
***Energy Union*** ide dalje.

<https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>





**Clean energy** for all Europeans



Čista energija za sve (Europljane) ... nova paradigma *Energy Union-a*

The global clean **energy transition has started** and it **is irreversible**. The **European Union** not only wants to adapt, but **to lead**. ([https://ec.europa.eu/commission/sites/beta-political/files/clean-energy-all-europeans-our-action\\_en.pdf](https://ec.europa.eu/commission/sites/beta-political/files/clean-energy-all-europeans-our-action_en.pdf))



# Energetska unija i klimatske promjene

**Investicije**  
Izazov za novo investiranje

**Obrazovanje**  
Pripremiti radnu snagu za "novo" tržište rada



**Tržište kapitala**  
Otvoravanje novih modela financiranja za "čistu ekonomiju"

**Digitalno jedinstveno tržište**  
Osnažiti građane i potrošače za bolju participaciju

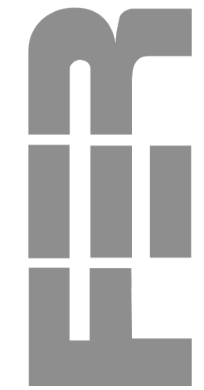
**Inovacije**  
Nove tehnologije iz istraživačkih laboratorija na tržište

**Cirkularna ekonomija**  
Resursno djelotvorna nisko-ugljična ekonomija

kotačići ... *all Europeans* ... znači više nego samo građani ... znači **New Economy**

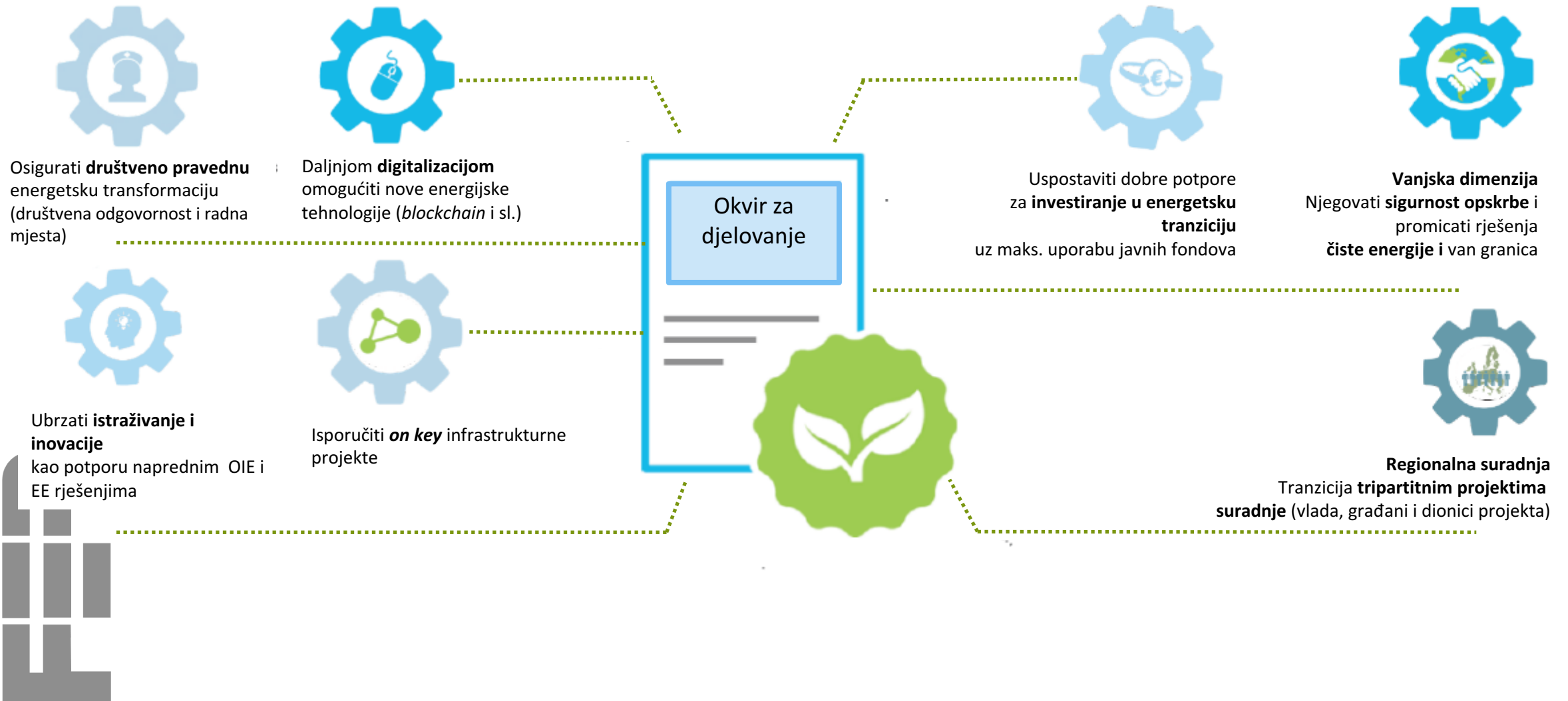
[https://ec.europa.eu/commission/sites/beta-political/files/clean-energy-all-europeans-our-action\\_en.pdf](https://ec.europa.eu/commission/sites/beta-political/files/clean-energy-all-europeans-our-action_en.pdf)





Kako do cilja?

# EC okvir, a ostalo tržište ...







## *5 D's* ... jedinstvena prilika za novu ekonomiju ...

(EU) Liderstvo, ali i **odgovornost** ... **konkurentnost**, ali i kreiranje **novih radnih mjesta** ... i još mnogo toga

# S 5<sub>(five)</sub> D's do cilja ...

- ▣ **Dekarbonizacija** naše ekonomije, ali i više ...
- ▣ **Demokratizacija** proizvodnje i potrošnje (*Energy Democracy*)
- ▣ **Digitalizacija** u svrhu optimiranja uporabe energije i energijska učinkovitosti
- ▣ **Diversifikacija** opskrbe, ali i **pomoć I<sub>straživanja</sub> & I<sub>novacija</sub>** da isporuče nove tehnologije radi ubrzanja procesa tranzicije
- ▣ **Disruption** (raskid) s tradicionalnim energijskim ciklusom





[https://setis.ec.europa.eu/system/files/citizens\\_summary.pdf](https://setis.ec.europa.eu/system/files/citizens_summary.pdf)





Primjeri kako?



**“The Strategic Energy Technology Plan (SET Plan) and its Strategic Energy Technologies Information System (SETIS) play a **vital role in coordinating** and successfully implementing the European Commission’s **Energy Union** Research and Innovation (R&I) strategy.”**



## *The Integrated Strategic Energy Technology (SET) Plan*

<https://ec.europa.eu/research/energy/index.cfm?pg=policy&policyname=set>



- **The Strategic Energy Technology (SET) Plan** rabi se kao **R&I stup (pillar)** za *EU's energy and climate policy* od 2007. Godine 2015. donosi se **revidirani SET** i rabi se kao potpora za **EU's Energy Union R&I** prioritete.
- SET Plan zapravo predstavlja **koordinacijski alat** za nisko ugljični *R&I* aktivnosti svih članica EU (dodatno i Island, Norveška, Švicarska i Turska).
- SET-Plan pomaže u **strukturiranju Europskih i nacionalnih istraživačkih programa** i predstavlja svojevrsni okidač za investicije iz zajedničkih prioriteta nisko ugljičnih tehnologija.
- Revidirani SET-Plan fokusira se na:
  - **Ciljevima orijentirana istraživanja** – deset akcija strukturiranih oko R&I prioriteta za Energy Union ciljeve
  - **Integrirani pristup** – iz pojedinačnih tehnologija prema energetske sustavima
  - Nova **struktura upravljanja** - veća transparentnosti, odgovornosti (*accountability*) i nadzora napretka, kao i naglasak na rezultatima orijentiranih aktivnostima
  - **Jačanje partnerstva** - između EC-a, zemalja SET Plana (28+4), dionika, uključujući istraživačke organizacije i industriju



# 10 Key Actions SET Plan

## Energy Union

Research, Innovation and Competitiveness Priorities

## SET-Plan 10 Key Actions

No1 in Renewables



- 1 Performant renewable technologies integrated in the system
- 2 Reduce costs of technologies

Consumers in the Energy System



- 3 New technologies & services for consumers
- 4 Resilience & security of energy system

Efficient Energy Systems



- 5 New materials & technologies for buildings
- 6 Energy efficiency for industry

Sustainable Transport



- 7 Competitive in global battery sector and e-mobility
- 8 Renewable fuels and bioenergy

Carbon Capture Utilisation and Storage



- 9 Carbon Capture Storage / Use

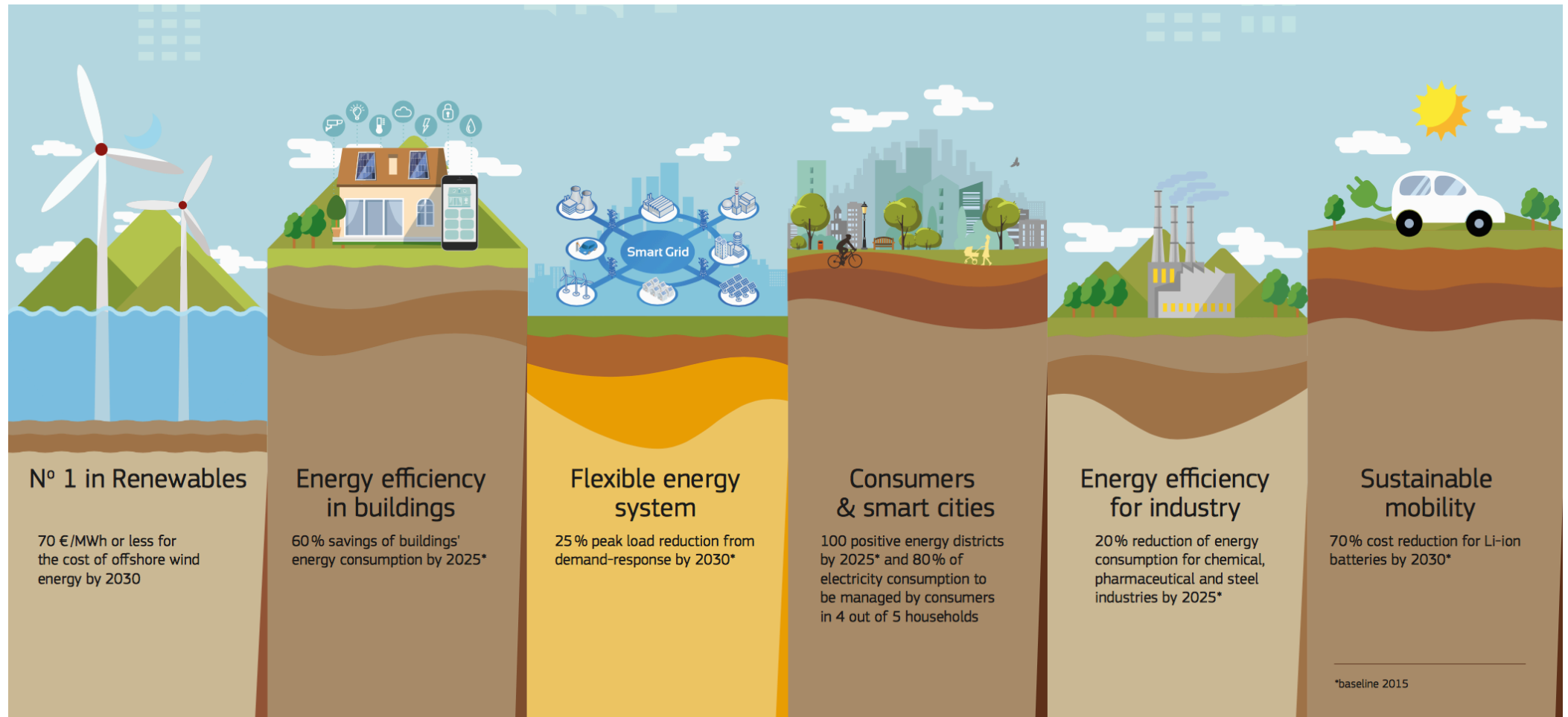
Nuclear Safety



- 10 Nuclear safety



# Po prvi se puta daju kvantitativni ciljevi ...



[https://ec.europa.eu/energy/sites/ener/files/documents/set-plan\\_progress\\_2016.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/set-plan_progress_2016.pdf)

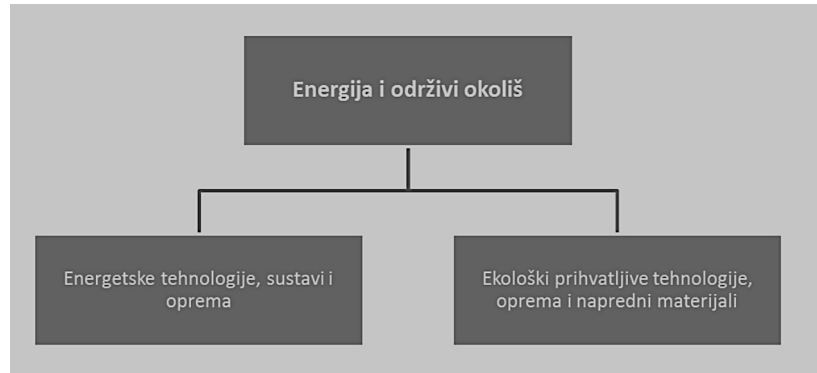
etc.





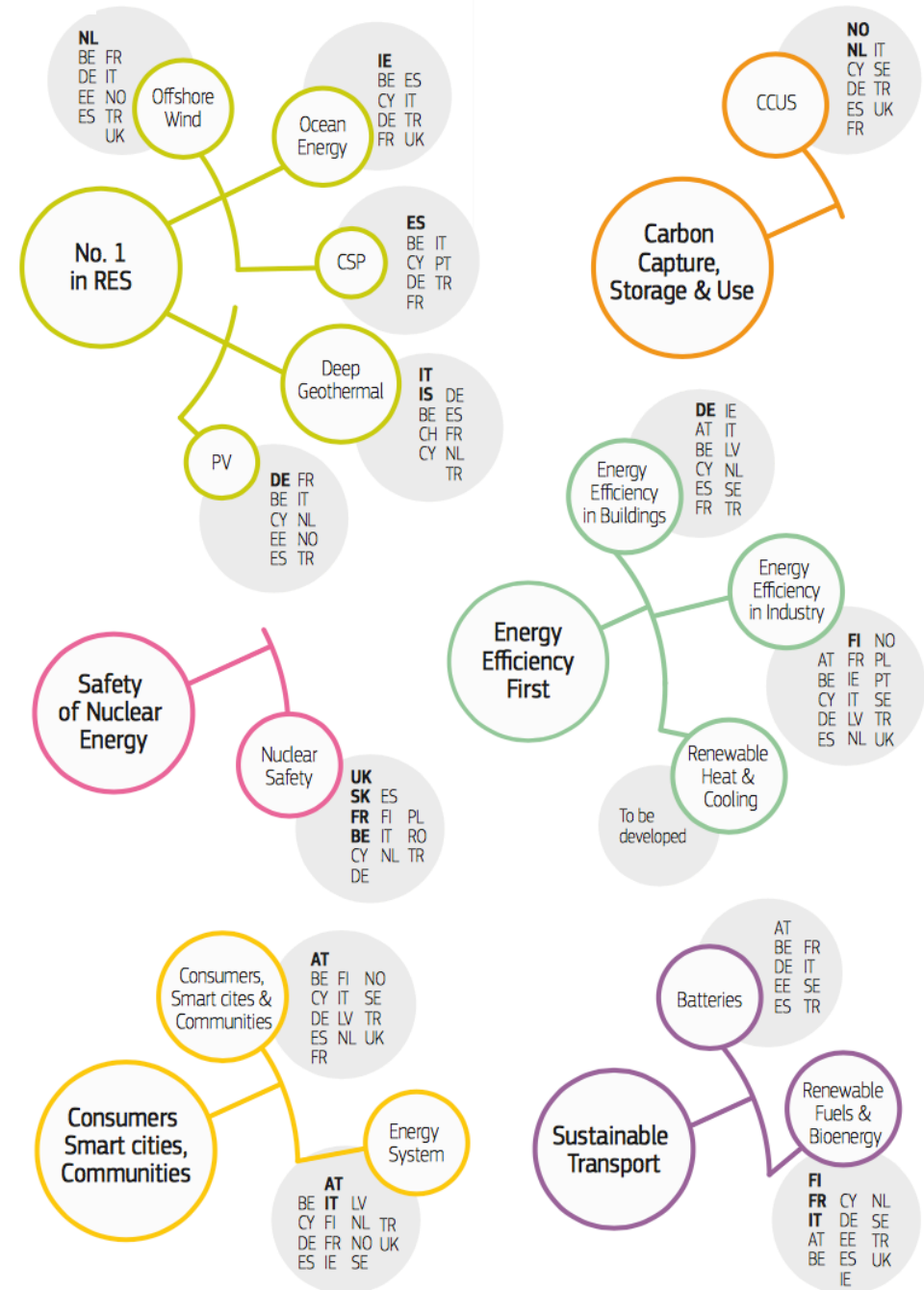
# SET plan, liderstvo, interesi ... i drugi planovi ...

Strategija pametna specijalizacija (S3) ... **S3PEnergy** i druge inicijative dobro došle ...



<https://vlada.gov.hr/UserDocImages//Sjednice/2016/12%20sjednica%20Vlade//12%20-%201.pdf>

## SET Plan countries are taking the lead of the Implementation<sup>15</sup>



## ▣ *SET Plan facts and figures (2014)*

- ▣ Financiranje iz programa Obzor2020 (*Horizon 2020*) za nisko ugljične tehnologije EUR **1.1 mld in 2014.**
- ▣ Javno financiranje iz **nacionalnih** R&D programa blizu dosegnuo je iznos od EUR **4.2 mld.**
- ▣ U 2014., ukupno **EU-28 investiranje u *Energy Union's R&I* prioritete EUR 27 mld.** **Privatni sektor** dosegnuo je **85 % od ukupnih** investicija te godine.
- ▣ Za **javno financiranje** fokus se nacionalnih programa usmjerio prema sustavnim rješenjima - ***smart integrated energy systems.***
- ▣ **Važno: *Energy Union R&I* prioriteti** jedini su koji su dobili povećano financiranje iz javnih sredstava.





*Roadmap-ovi i Implementation Plan-ovi se javljaju ...*

<http://www.eua.be/Libraries/publications-homepage-list/roadmap-for-european-universities-in-energy>

[https://www.etip-snet.eu/wp-content/uploads/2017/03/Final\\_10\\_Year\\_ETIP-SNET\\_RI\\_Roadmap.pdf](https://www.etip-snet.eu/wp-content/uploads/2017/03/Final_10_Year_ETIP-SNET_RI_Roadmap.pdf)

... i visoko obrazovanje prepoznalo *Energy Union* ...

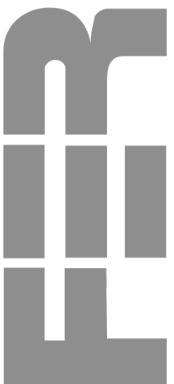
- *Roadmap for European Universities in Energy:*
  - performing research at low **Technology Readiness Levels** (TRL), to provide new solutions and new **low-carbon technologies** with long-term prospects;
  - contributing to research at medium-range TRLs together with **Research and Technology Organisations** (RTOs) and **industry** to facilitate the deployment and integration of low-carbon technologies;
  - performing research and generating **cross-disciplinary knowledge** on the fundamental **societal changes** needed to realise a low-carbon society;
  - **renewing and adapting study programmes** for students through all three cycles, embedded in new knowledge generated by research activity;
  - providing **continuing education** on new energy technologies and knowledge to the existing work force;
  - strong **engagement in providing policy** advice and public debate, reaching out to their communities.



# Roadmap for European Universities in Energy

120 sveučilišta s “Energy” u fokusu

<http://www.eua.be/Libraries/publications-homepage-list/roadmap-for-european-universities-in-energy>



- ▣ **European Technology & Innovation Platforms (ETIPs)** have been created by the **European Commission** in the framework of the new Integrated Roadmap Strategic Energy Technology Plan (**SET Plan**) by **bringing together** a multitude of **stakeholders** and experts from the energy sector.
- ▣ The ETIP **Smart Networks for Energy Transition (SNET)** role is to guide Research, Development & Innovation (RD&I) to support Europe's energy transition (smart grid ... transmission, distribution, storage, digitisation etc.)



**ETIP SNET** PLAN.  
INNOVATE.  
ENGAGE.

**EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM  
SMART NETWORKS FOR ENERGY TRANSITION**

Technologies and methods for making Europe's energy transition a success



**etc...**

*... prepoznavemo zapravo ... New Economy 4 all Europeans ...*





**19.9%** of European electricity demand was met by wind energy

67

## COUNTRIES WITH THE HIGHEST SHARES OF WIND IN THEIR ELECTRICITY DEMAND

Wind power share and generation in each country's demand

- |                           |                                  |
|---------------------------|----------------------------------|
| 1. Denmark: 57% = 47 GWh  | 6. United Kingdom: 27% = 193 GWh |
| 2. Germany: 51% = 631 GWh | 7. Austria: 22% = 33 GWh         |
| 3. Romania: 33% = 54 GWh  | 8. Greece: 21% = 23 GWh          |
| 4. Ireland: 30% = 27 GWh  | 9. Netherlands: 20% = 58 GWh     |
| 5. Portugal: 29% = 35 GWh | 10. Spain: 18% = 113 GWh         |

Find out more facts about wind power in Europe:  
[windeurope.org/dailywind](http://windeurope.org/dailywind)

7.10.2017.

Za optimizam ... (1)

[www.windeurope.org](http://www.windeurope.org)



## How much wind was in Europe's electricity yesterday?

68



**24.6%** of European electricity demand was met by wind energy

### COUNTRIES WITH THE HIGHEST SHARES OF WIND IN THEIR ELECTRICITY DEMAND

Wind power share and generation in each country's demand

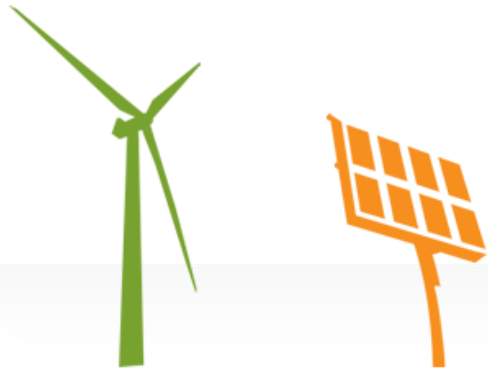
- |                           |                                  |
|---------------------------|----------------------------------|
| 1. Denmark: 109% = 91 GWh | 6. Spain: 31% = 185 GWh          |
| 2. Germany: 61% = 793 GWh | 7. United Kingdom: 29% = 207 GWh |
| 3. Portugal: 44% = 53 GWh | 8. Netherlands: 25% = 72 GWh     |
| 4. Ireland: 34% = 32 GWh  | 9. Sweden: 24% = 82 GWh          |
| 5. Austria: 33% = 48 GWh  | 10. Poland: 22% = 101 GWh        |

28.10.2017. (vikend)

Za optimizam ... (2)



**\$60** per MWh for **PV** in Rajasthan, India, in January  
**\$30** per MWh for **wind** in Morocco, in January  
**\$37.70** per MWh for **wind** in Peru, in February  
**\$40.50** for **PV** in Mexico, in March  
**\$29.90** for **PV** in Dubai, in May  
**\$60** for **PV** in Zambia, in June  
**\$80** for **offshore wind** in the Netherlands, in July  
**\$29.10** for **PV** in Chile, in August  
**\$55** for **offshore wind** in Denmark, in November



FYIO ... *competitiveness* and LCOE '16

<https://thinkprogress.org/renewables-cheapest-new-power-globally-74910c78bbbe>



Ipak postoji jedan “*big Q*” ...



... g. Trump i njegova re-karbonizacija?



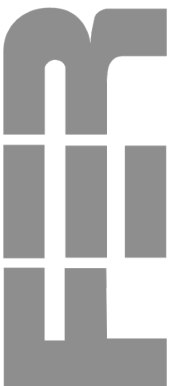
## *Momentous or a Damp Squib?*


<http://www.solarnews.es/america/2017/06/30/trumps-recarbonisation-policy-momentous-or-a-damp-squib/>

*President Trump may push as hard as he wants on new coal— opening more public lands to mining, gutting President Obama’s Clean Power Plan. But **the hard reality of rapidly declining costs for renewables** (and storage) makes clear he will be pushing on a string, and a very dirty one at that.*

<https://thinkprogress.org/renewables-cheapest-new-power-globally-74910c78bbbe>

*It is hard reality?*





“We’re borrowing money from China to buy oil from the Persian Gulf to burn it in ways that **destroy the planet**. Every bit of that’s got to change.”

Al Gore 2008.



Prije ...



... present energy transformation(s):

“This is not plug-and-play; it is civilization reboot”



I ne zaboraviti, promjene nisu obveza samo  
znanstvenika, struke, politike ...

... već **svih**





**Prilika za sve ... Energy democracy ...**  
merges the technological energy transition with a strengthening  
of democracy and public participation

**THE END**

Prijevod:

Kunfina ni – granice nema;

voz – zaprežna kola;

štabel – dobar;

timun – rudo;

žuranda – 2000 m<sup>2</sup>;

sinakoša – livada;

batvo – stabljika;

brija – trudna;

**Jedan** voz

**Dva** štabela vola za timunom

**Tri** železna roga na vilah

**Četire** žurnade šenice za požet

**Pet** grozdi grojza zavišenih u konobi

**Šest** kop sena na sinakoši

**Sedan** kumpiri pod batvom

**Osan** let stara čerišnja

**Devet** miseci brija krava

**Deset** Zapovidi Božjih

...

**Kunfina ni**





# Hvala na pozornosti

ali i ne zaboravite ...

Najbolji način da predvidite budućnost jest da je stvorite

*(Petar Drucker)*

