

**Trees are worth much more to humanity (and
Europe) alive than dead –
and the climate system agrees**

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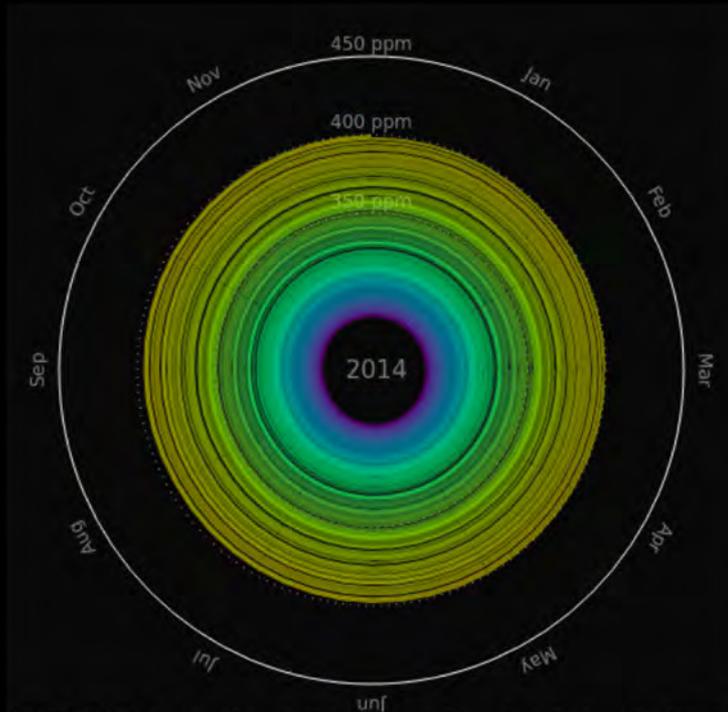
IPCC Vice-Chair from 2008 to 2015

Twitter: @JPvanYpersele

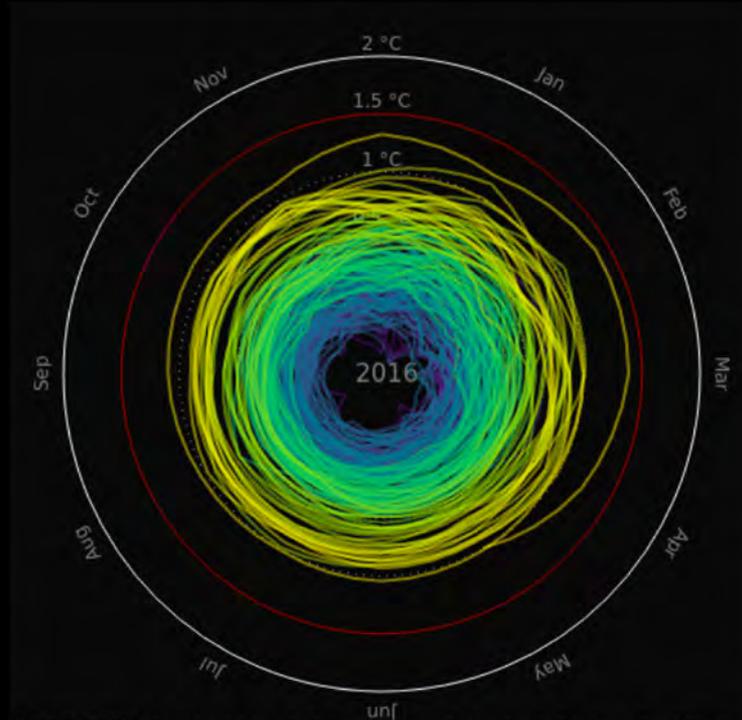
**European Commission 2nd Stakeholder Workshop on the Revision of the
Renewable Energy Directive, online, 22 March 2021**

**Thanks to the Walloon government for supporting www.plateforme-wallonne-giec.be
& my team at UCLouvain**

CO₂ Concentration and Temperature spirals



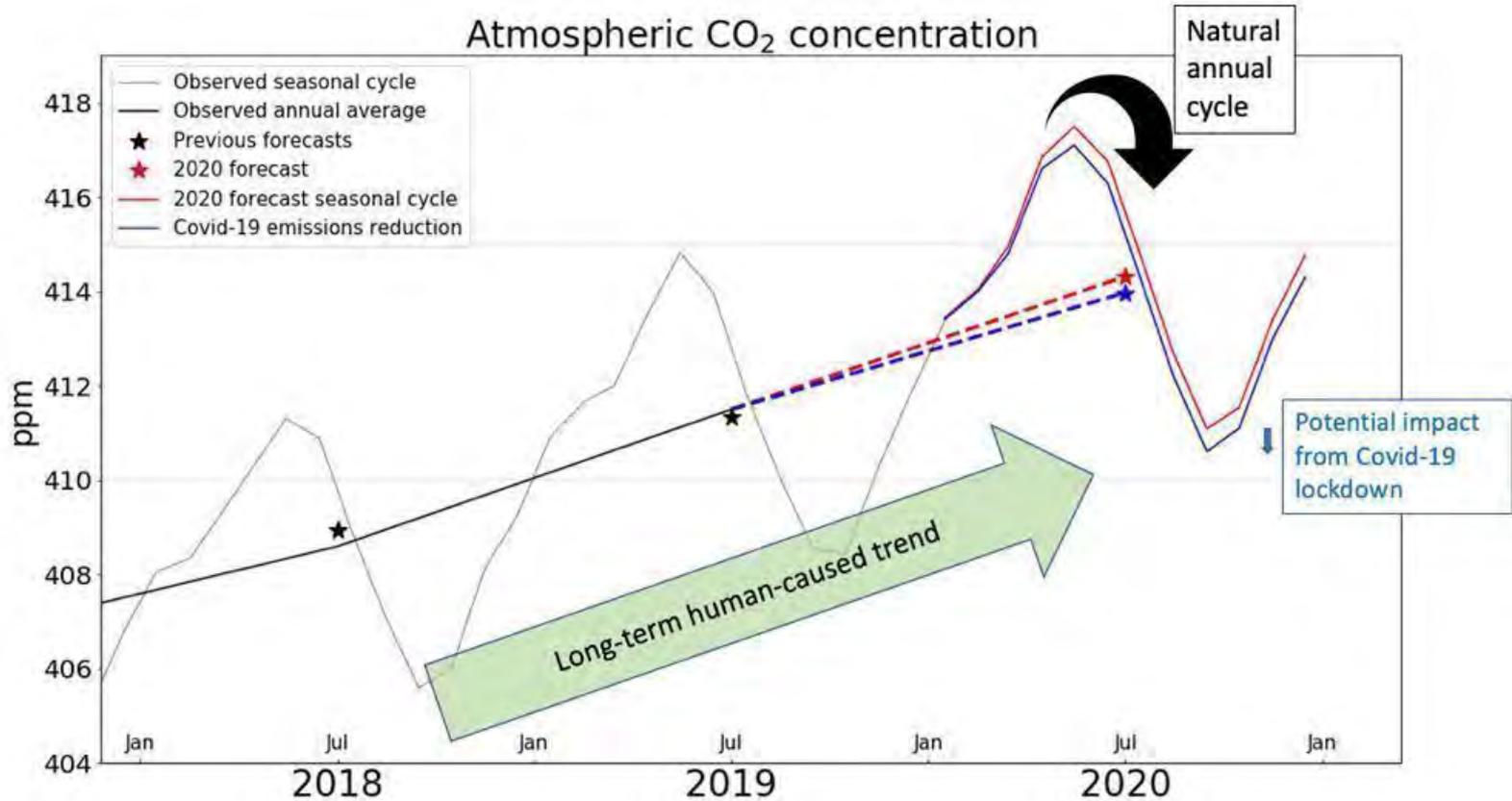
Concentration Spiral pik-potsdam.de/primap-live/ & climatecollege.unimelb.edu.au, Gieseke, Meinshausen. Thx to Ed Hawkins



Temperature Spiral pik-potsdam.de/primap-live & climatecollege.unimelb.edu.au, Gieseke, Meinshausen. Thx to Ed Hawkins

CO₂ Concentration since 1850 and Global Mean Temperature in °C relative to 1850 – 1900
Graph: Ed Hawkins (Climate Lab Book) – Data: HadCRUT4 global temperature dataset
Animation available on <http://openclimatedata.net/climate-spirals/concentration-temperature/>

Confinement « Covid19 »: une effet très limité sur la concentration en CO₂



LETTER FROM (800) SCIENTISTS TO THE EU PARLIAMENT REGARDING FOREST BIOMASS (January 11, 2018) (available on euractiv.com)

To Members of the European Parliament,

As the European Parliament commendably moves to expand the renewable energy directive, we strongly urge members of Parliament to **amend the present directive to avoid expansive harm to the world's forests and the acceleration of climate change.**

The flaw in the directive lies in provisions that would let countries, power plants and factories claim credit toward renewable energy targets for deliberately cutting down trees to burn them for energy.

(...)

2021 Letter of 500 Scientists to Presidents Biden, Michel, von der Leyen, (...)

“Trees are more valuable alive than dead both for climate and for biodiversity.”

“Governments must end subsidies and other incentives that today exist for the burning of wood whether from their forests or others. The European Union needs to stop treating the burning of biomass as carbon neutral in its renewable energy standards and in its emissions trading system.”

Box 1: Research Papers Finding That Harvesting Wood for Bioenergy to Replace Fossil Fuels Increased Carbon in the Atmosphere for Decades to Centuries

Laganière, J., Paré, D., Thiffault, E. & Bernier, P. Y. Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests. *GCB Bioenergy* 9, 358–369 (2017).

Mitchell, S. R., Hamon, M. E. & O'Connell, K. E. B. Carbon debt and carbon sequestration parity in forest bioenergy production. *GCB Bioenergy* 4, 818–827 (2012).

Stephenson, A. L. & MacKay, D. J. C. *Life cycle impacts of biomass electricity in 2020* (Department of Energy & Climate Change, London, 2014).

Bernier, P. & Paré, D. Using ecosystem CO₂ measurements to estimate the timing and magnitude of greenhouse gas mitigation potential of forest bioenergy. *GCB Bioenergy* 5, 67–72 (2013).

Holtmark, B. Harvesting in boreal forests and the biofuel carbon debt. *Clim. Change* 112, 415–428 (2012).

Hudiburg, T. W., Law, B. E., Wirth, C. & Luyssaert, S. Regional carbon dioxide implications of forest bioenergy production. *Nat. Clim. Change* 1, 419–423 (2011).

McKechnie, J., Colombo, S., Chen, J., Mabee, W. & MacLean, H. L. Forest bioenergy or forest carbon? Assessing trade-offs in greenhouse gas mitigation with wood-based fuels. *Environ. Sci. Technol.* 45, 789–795 (2011).

Manomet Center for Conservation Sciences. *Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources* (2010).

Zanchi, G., Pena, N. & Bird, N. Is woody bioenergy carbon neutral? A comparative assessment of emissions from consumption of woody bioenergy and fossil fuel. *GCB Bioenergy* 4, 761–772 (2012).

Holtmark, B. The outcome is in the assumptions: analyzing the effects on atmospheric CO₂ levels of increased use of bioenergy from forest biomass. *GCB Bioenergy* 5, 467–473 (2013).

Booth, M. S. Not carbon neutral: assessing the net emissions impact of residues burned for bioenergy. *Environ. Res. Lett.* 13, 035001 (2018).

Sterman, J.D., L. Siegel, J. N. Rooney-Varga, Does replacing coal with wood lower CO₂ emissions? Dynamic lifecycle analysis of wood bioenergy. *Environ. Res. Lett.* 13 (2018) 015007

Ter-Mikaelian, M. et al. T. (2015). Carbon debt repayment or carbon sequestration parity? Lessons from a forest bioenergy case study in Ontario, Canada. *Global Change Biology Bioenergy*, 7, 704–716.

Malcolm, J., B. Holtmark, P. Piascik. Forest harvesting and the carbon debt in boreal east-central Canada. *Climatic Change* 112:415–418 (2020)

Colne et al. Biomass supply and carbon accounting for Southeastern Forests (Biomass Energy Resources Center, Forest Guild, Spatial Informatic Group 2012)

JRC report: original version,



JRC SCIENCE FOR POLICY REPORT

The use of woody biomass for energy
production in the EU

Camia A, Giuntoli, J, Jonsson, R, Robert, N,
Cazzaniga, N.E., Jasinevičius, G, Avitabile, V.,
Grassi, G, Barredo, JI, Mubareka, S.

2021



Available [here](#):

or annotated:



JRC SCIENCE FOR POLICY REPORT

Annotated version

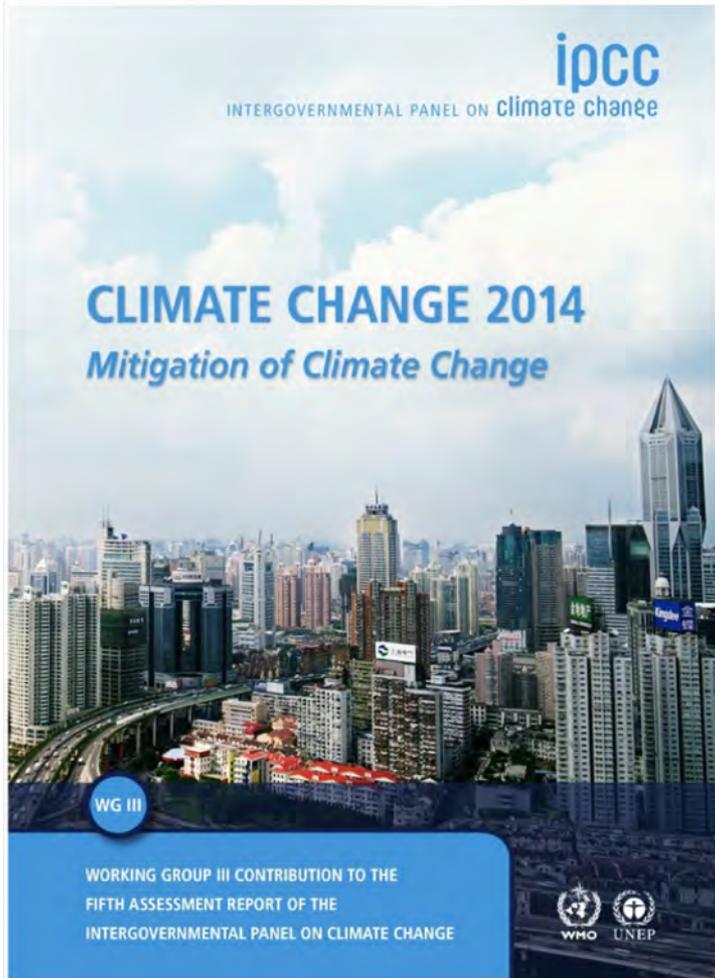
The use of woody biomass for energy
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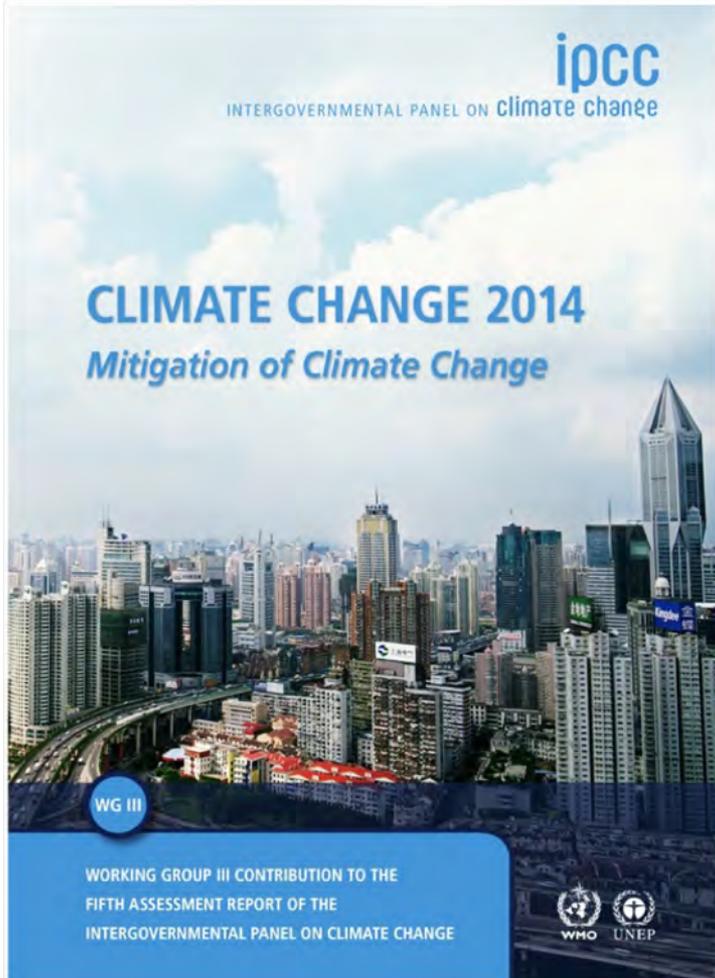
Available [here](#):



P 879:

« Bioenergy systems have often been assessed (e. g., in LCA studies, integrated models, policy directives, etc.) under the **assumption** that the **CO₂ emitted from biomass combustion is climate neutral** (Note: The neutrality perception is linked to a **misunderstanding of the (IPCC) guidelines for GHG inventories**) because the carbon that was previously sequestered from the atmosphere will be re-sequestered if the bioenergy system is managed sustainably...)

The **shortcomings of this assumption have been extensively discussed in environmental impact studies** and emission accounting mechanisms (...).



P 879:

« In the specific case of existing forests that may continue to grow if not used for bioenergy, some studies (...) show that **forest bioenergy systems can temporarily have higher cumulative CO₂ emissions than a fossil reference system** (for a time period ranging from a few decades up to several centuries).

Supplementary Table 2: Typical Smokestack Emissions for Electricity Production.

	Kg CO ₂ eq released/ GJ net calorific value of fuel*	Kg CO ₂ eq/ kWh net calorific value of fuel	Conversion efficiency to electricity**	Total emissions Kg CO ₂ eq per kWh	Ratio of wood to alternative fossil fuel
Wood	112.00	0.40	0.26	1.55	-
Coal	94.60	0.34	0.33	1.03	150%
Oil	71.10	0.26	0.35	0.73	212%
Natural gas	64.20	0.23	0.45	0.51	302%

Sources:

* IPCC, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Stationary Installations, Table 2.2 (ref. 8)

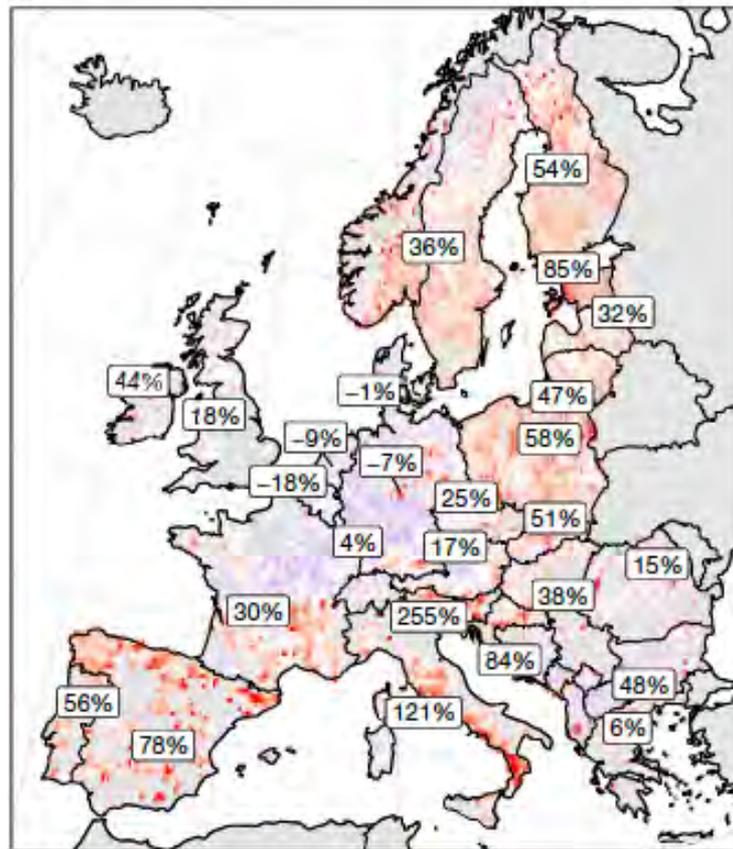
** Laganière et al.⁴

Source: Europe's renewable energy directive poised to harm global forests, Nature Communication (2018), available [here](#)

“Abrupt Increase in Harvested Forest Area in Europe after 2015”

Nature (2020), by
Ceccherini et al.
JRC authors

70% increased
wood harvest



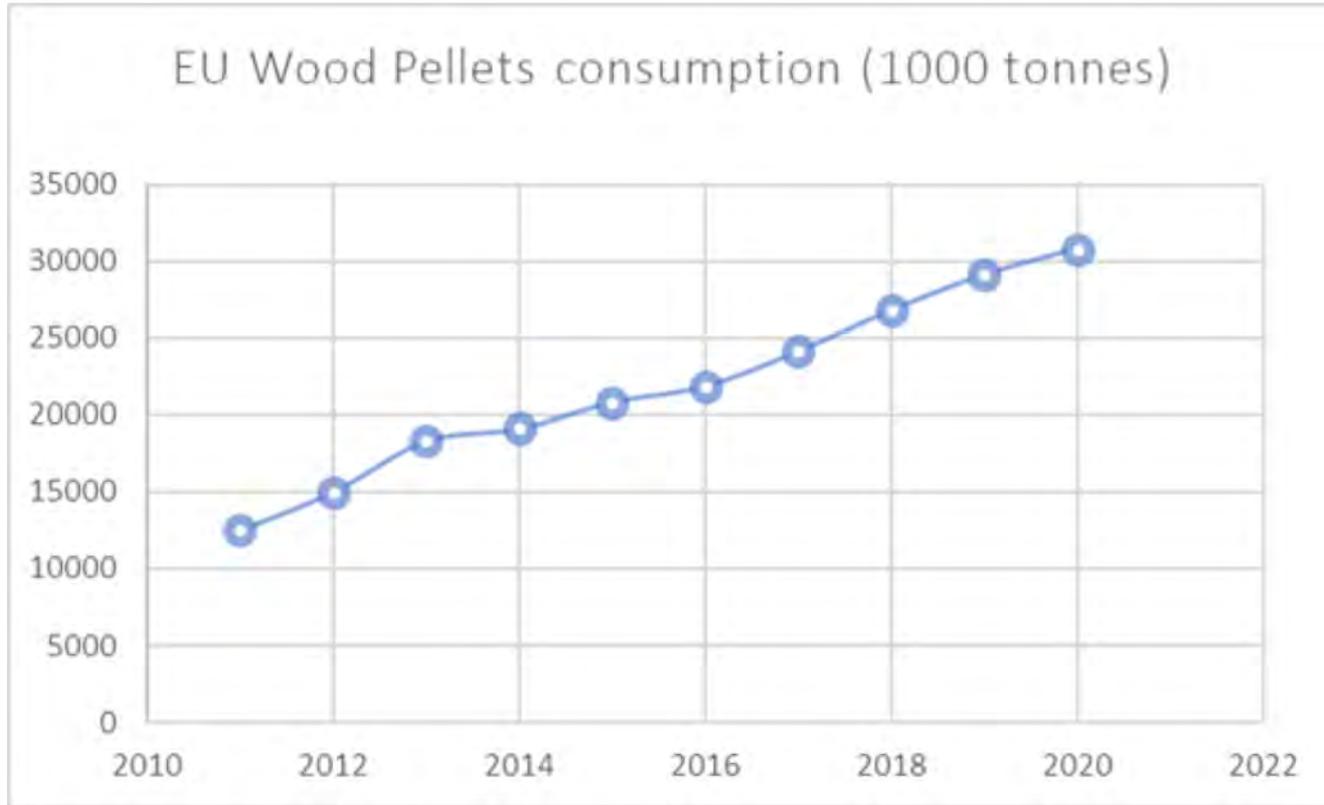
Change in harvested forest area
2016–2018 versus 2004–2015 (%)



Ceccherini et al. (2020) in Nature

« We observe an **increase in the harvested forest area** (49 per cent) and an **increase in biomass loss** (69 per cent) over Europe for the period of 2016–2018 relative to 2011–2015 »... « The increase in the rate of forest harvest is **the result of the recent expansion of wood markets** (...) If such a high rate of forest harvest continues, the post-2020 EU vision of forest-based climate mitigation may be hampered, (...) requiring extra emission reductions in other sectors in order to reach climate neutrality by 2050 »

EU wood burning subsidies (7 billion €/year) help increase pellet usage:



Source: USDA, FAS EU Biofuels Annual Report (2020)



**Commentary by the
European Academies' Science Advisory Council (EASAC)
on Forest Bioenergy and Carbon Neutrality (June 2018)**

EASAC – the European Academies' Science Advisory Council – is formed by the national science academies of the EU Member States, Norway and Switzerland to enable them to collaborate with each other in providing independent science advice to European policy-makers.

**It thus provides a means for
the collective voice of European science to be heard.**

EASAC was founded in 2001 at the Royal Swedish Academy of Sciences.

Preliminary considerations:

- Carbon emissions per unit of electricity generated from forest biomass are higher than from coal
- The initial impact of replacing coal with forest biomass in power stations is to increase atmospheric carbon dioxide levels.
- Regulations thus need to be carefully designed to ensure that only uses making a positive contribution to climate change are allowed to be regarded as 'renewable' energy.

The concept of all bioenergy being carbon-neutral is too simplistic. Carbon neutrality involves a 'payback' period (the time taken for forests to reabsorb the carbon dioxide emitted during biomass combustion), which ranges from decades to hundreds of years.

In calculating payback periods, it is essential to properly include the effects of harvesting on carbon stocks as well as supply chain and biogenic emissions.

Switching from fossil fuels to forest biomass is the equivalent of taking out a carbon 'loan'.

However, although monetary loans require paying back in a specified period, carbon loans currently are free of any such conditions; yet until payback is achieved, the effects on climate are negative.

The proximity of current levels of warming to the 1.5 °C Paris targets requires that only projects whose payback periods are of the order of a decade or less should be regarded as 'renewable energy'.

The distorting effects of the current separation of combustion and Land Use and Land- Use Change and Forestry (LULUCF) emission accounting rules on climate must be considered.

From a mitigation perspective, it is important that forest carbon stocks are maintained — or preferably increased over time.

However, current rules allow countries to record imported biomass as zero emission on combustion, giving a false impression of the importing country's progress towards reducing emissions, and shifting responsibility for LULUCF reporting to the exporting country.

Assessing the 'renewability' of biomass projects should ensure that there is a positive effect on climate across both emission and LULUCF categories.

On the above basis, some of my key conclusions:

- The urgency to protect both climate and biodiversity is very high
- The present Renewable Energy Directive wrongly treats wood burning as carbon neutral
- This led to greatly increased harvesting of forests, and decreased biodiversity

On the above basis, some of my key conclusions:

- The carbon debt created by burning wood will have to be paid for decades to centuries - by our descendants
- Having separate targets for LULUCF and other sectors, w/o trading between them would be much safer (as natural sinks are difficult to account for, and lack guaranteed permanence)

In a nutshell:

Trees and forests are worth much more to humanity alive than dead.

This is not an « emotional statement », it is what the science says.

To go further :

- www.climate.be/vanyp : my slides (under « conferences)
- www.ipcc.ch : IPCC
- www.easac.eu: EASAC
- Letters from 2018 & 2021 (see links in slides above)
- JRC report & annotated version: idem
- **Twitter: @JPvanYpersele & @IPCC_CH**