EPFL

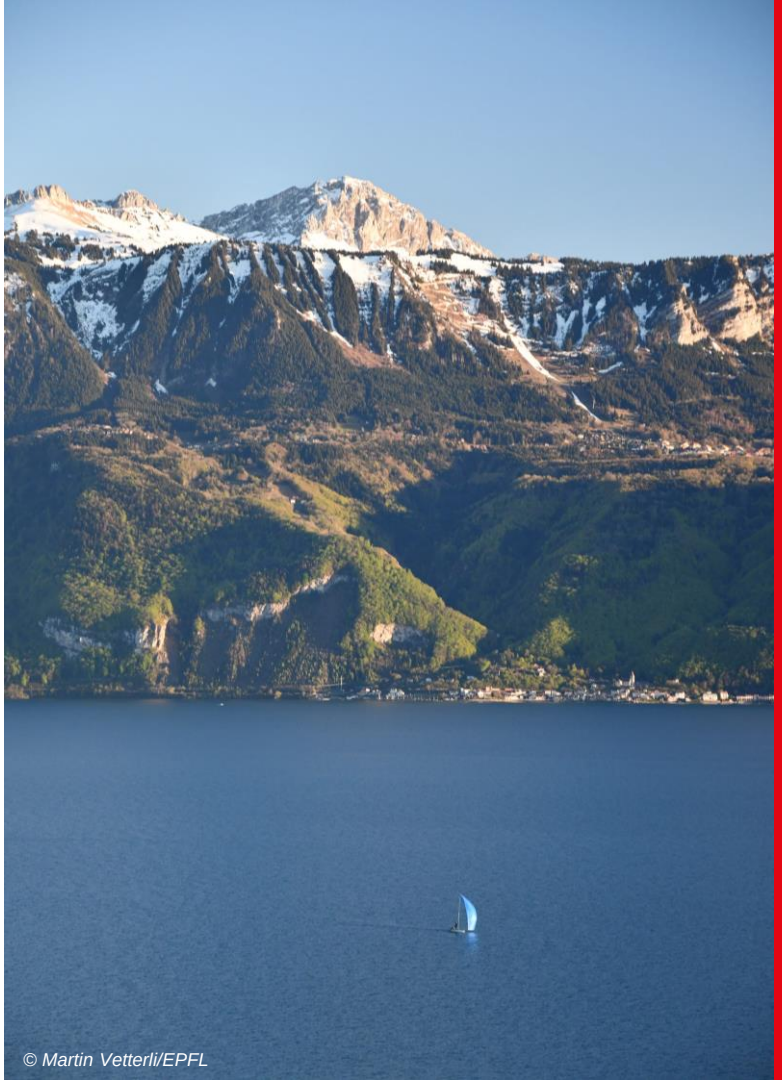
INNOCLIMAT

Climate innovation at EPFL

Martin Vetterli
EPFL President

4 November 2021

École polytechnique fédérale de Lausanne



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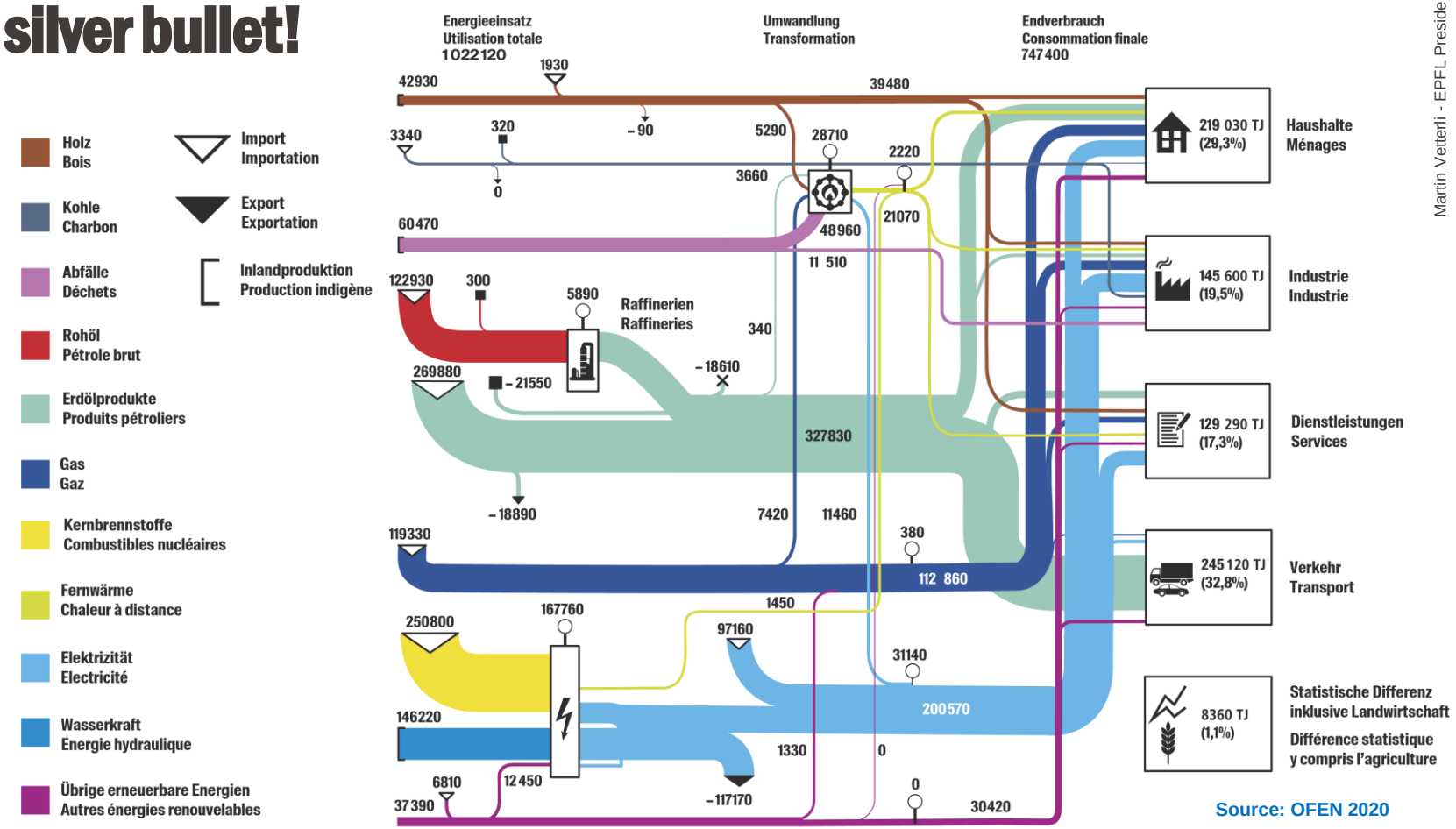
OUTLINE

Introduction

Why we need to invest in technologies

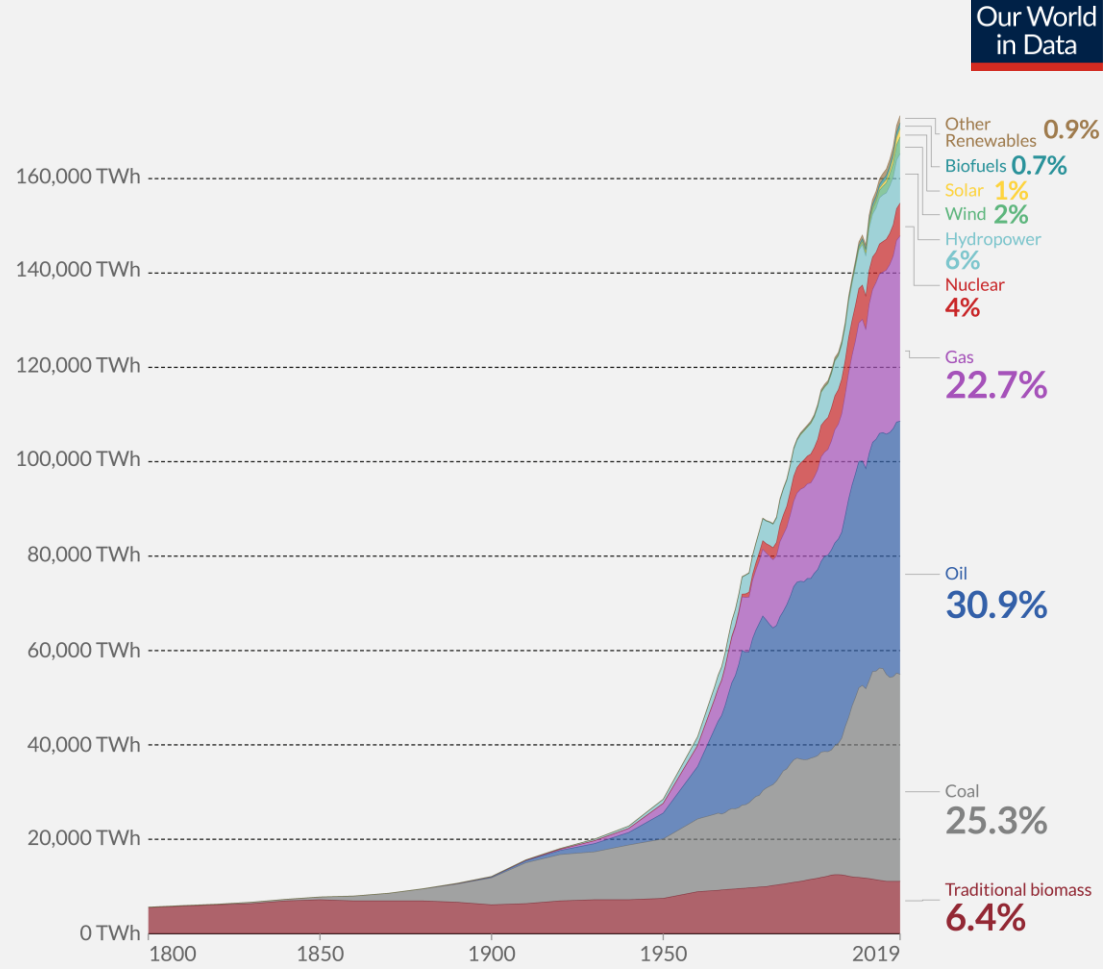
What we do at EPFL

There is no silver bullet!



Source: OFEN 2020

There is no silver bullet!



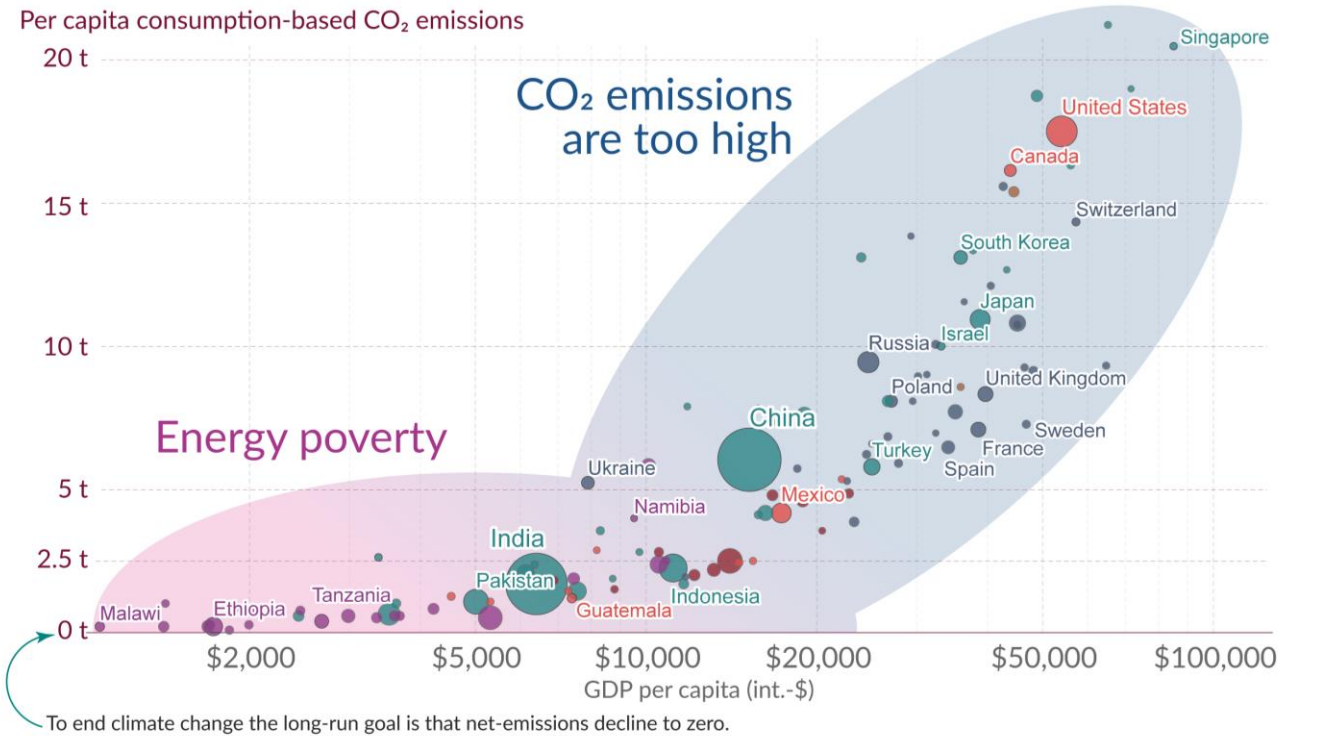
Source: Vaclav Smil (2017) & BP Statistical Review of World Energy

OurWorldInData.org/energy

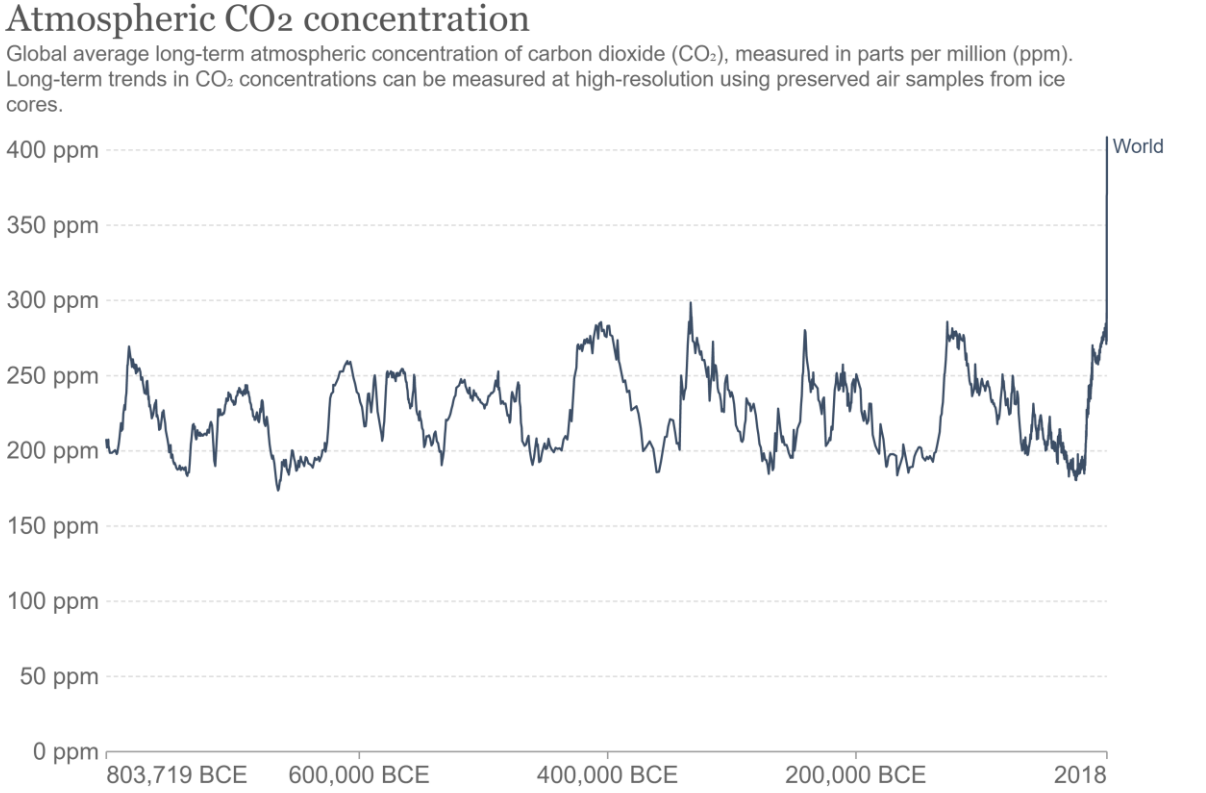
Martin Vetterli - EPFL President

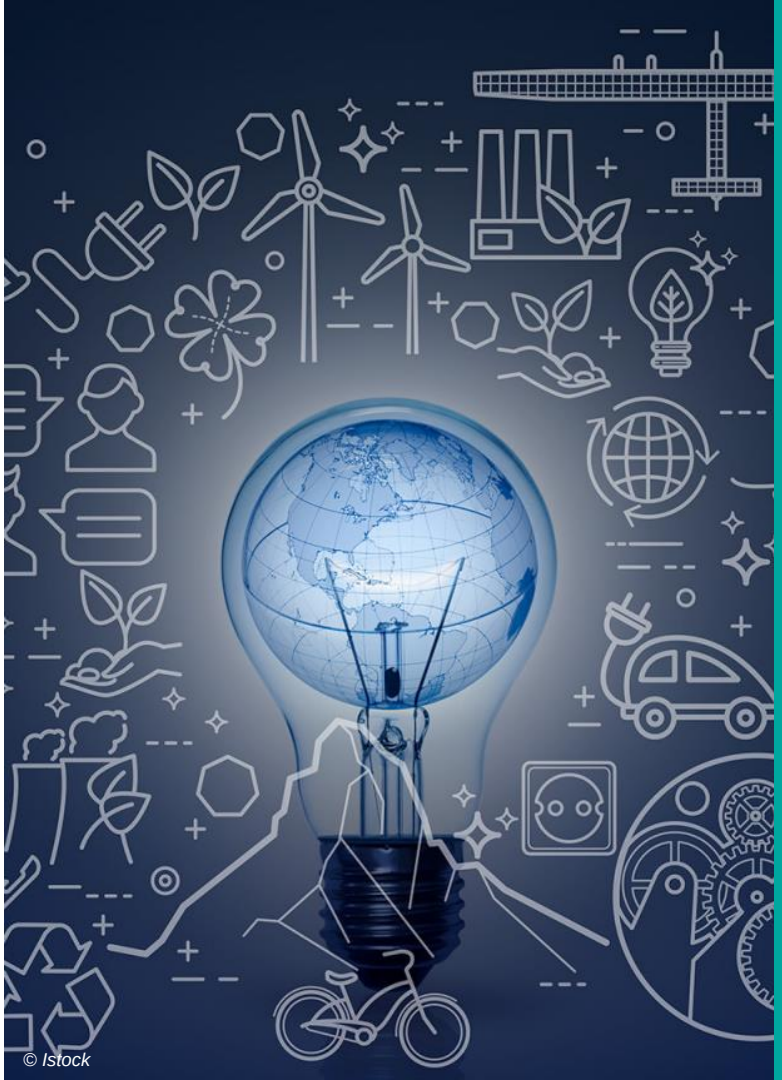
The energy problem

CO_2 emissions per capita vs GDP per capita



The anthropocene





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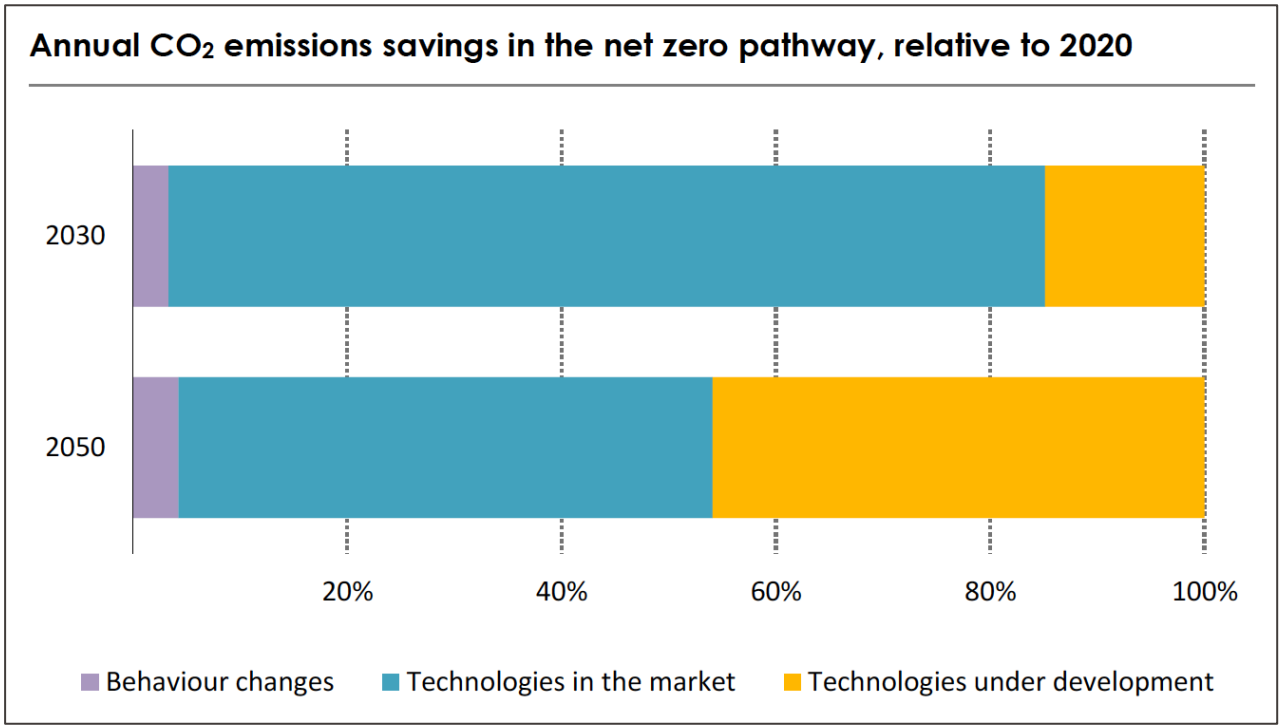
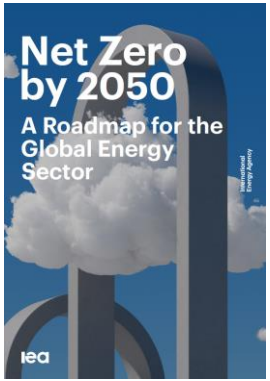
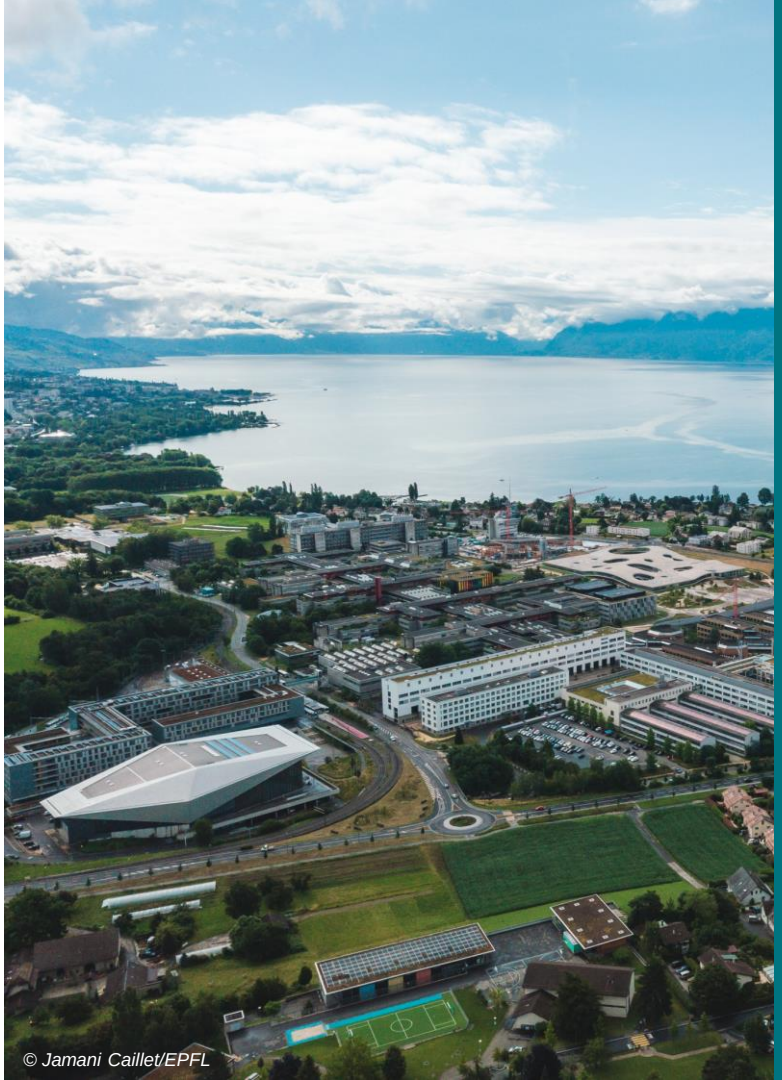
How to reach net zero by 2050



Source: *International Energy Agency, Net Zero by 2050. 2021, p.16*

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Why we need to invest in technologies

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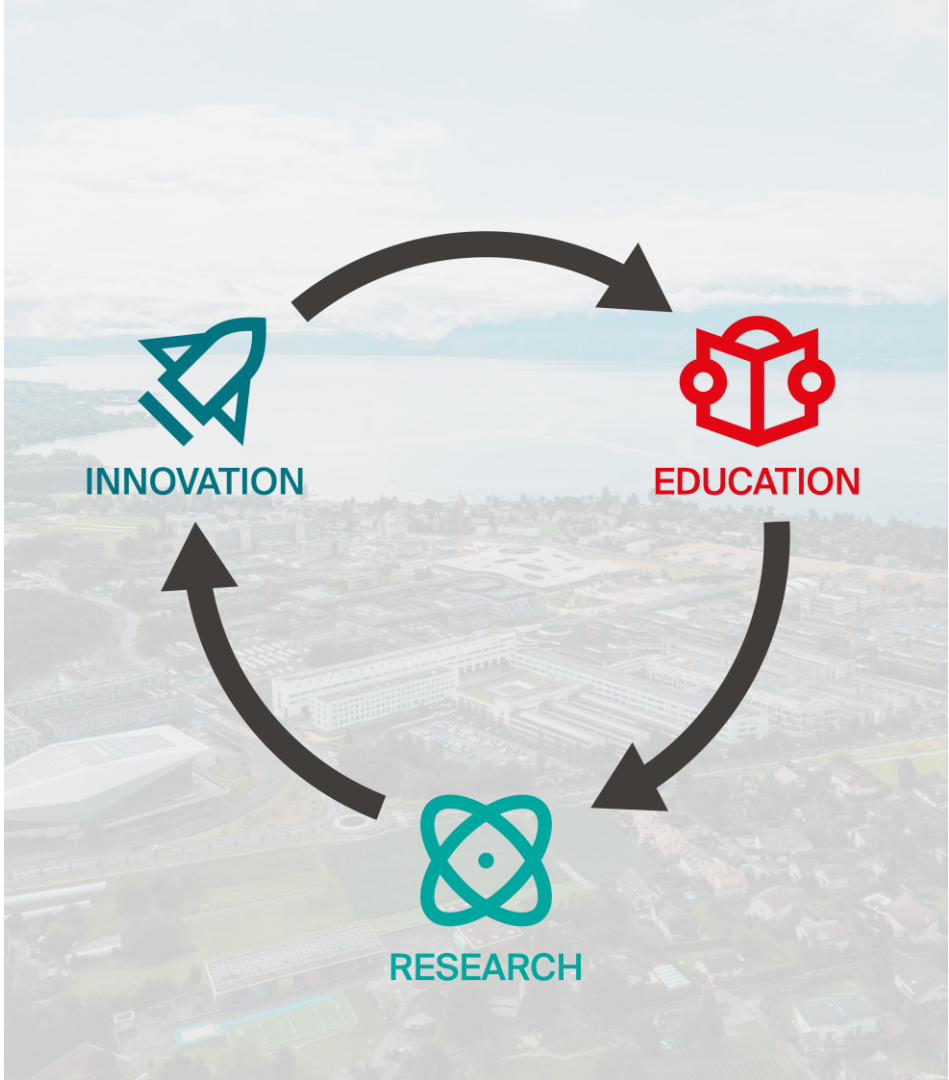
Why universities can play a key role in combating climate change ?



A revolution in solar power technology

Published: 24 October 1991

A low-cost, high-efficiency solar cell based on dye-sensitized colloidal TiO_2 films

Brian O'Regan & Michael Grätzel

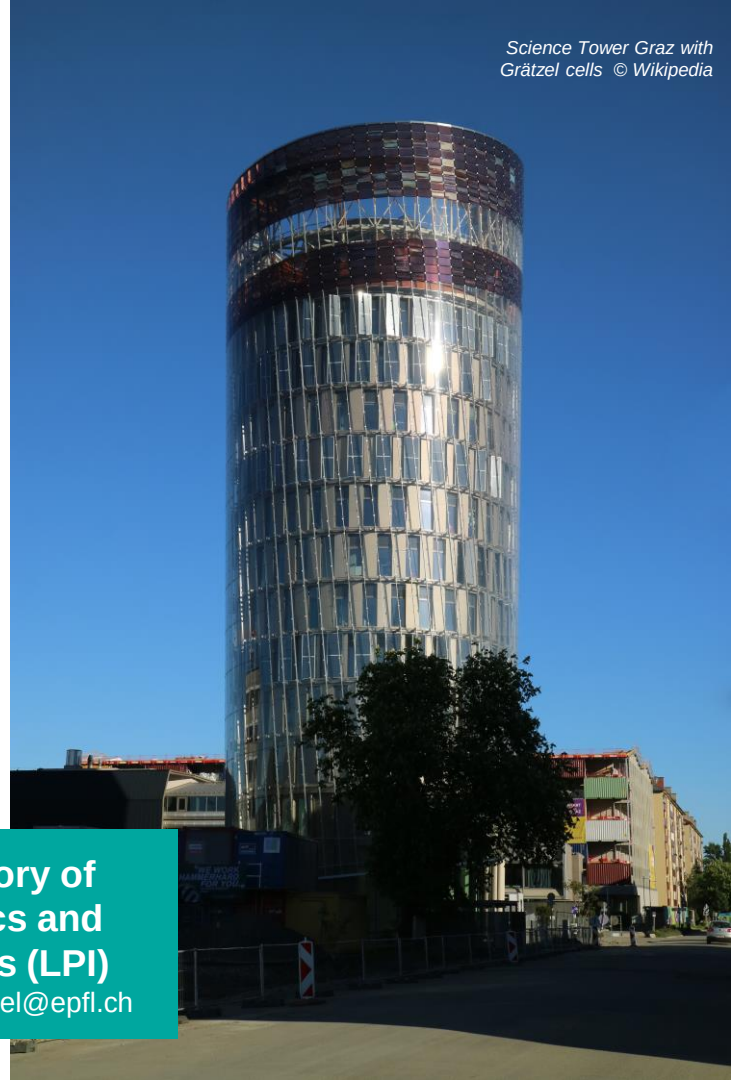
Nature **353**, 737–740 (1991) | Cite this article

66k Accesses | **24037** Citations | **96** Altmetric | Metrics

Abstract

THE large-scale use of photovoltaic devices for electricity generation is prohibitively expensive at present: generation from existing commercial devices costs about ten times more than conventional methods[1]. Here we describe a photovoltaic cell, created from low-to medium-purity materials through low-cost processes, which exhibits a commercially realistic energy-conversion efficiency. The device is based on a 10-μm-thick, optically transparent film of titanium dioxide particles a few nanometres in size, coated with a monolayer of a charge-transfer dye to sensitize the film for light harvesting. Because of the high surface area of the semiconductor film and the ideal spectral characteristics of the dye,

© Alain Herzog/EPFL



Science Tower Graz with Grätzel cells © Wikipedia

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Solar design reshapes architecture

Copenhagen International School© Wikipedia

Student Experience Amsterdam Minervahaven © Wikipedia

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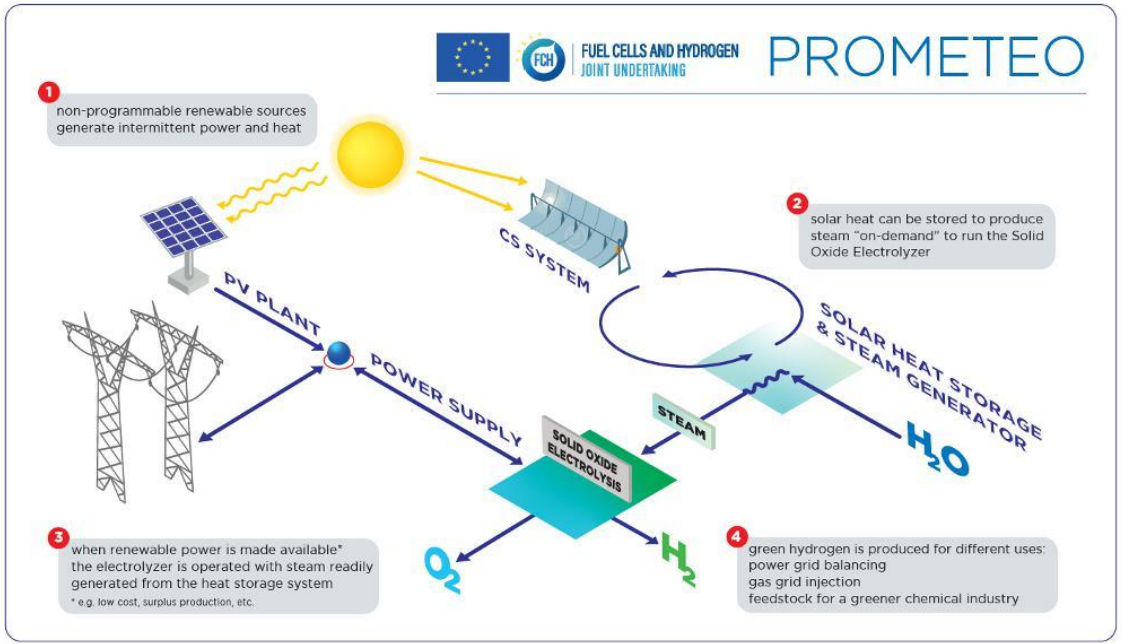
Using solar energy to produce hydrogen



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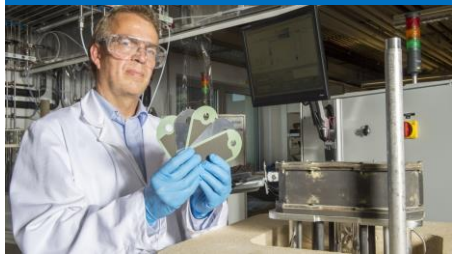
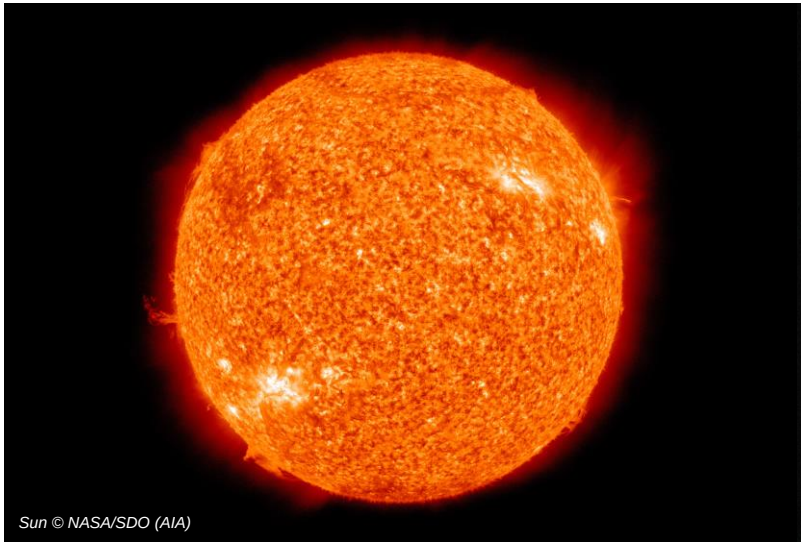


Fusion power

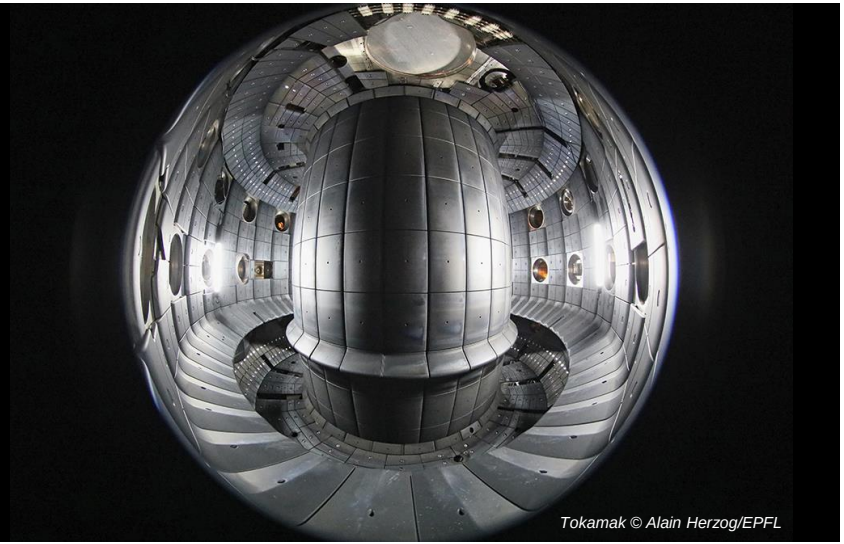
The Swiss Plasma Center

Prof. Bernard Bigot (ITER Director-General), Martin Vetterli (EPFL President), Martina Hirayama (State Secretary) and Prof. Ambriogio Fasoli (EPFL AVP Research) © Alain Herzog/EPFL

Learning from the best …..



Sun © NASA/SDO (AIA)



Tokamak © Alain Herzog/EPFL

Low carbon cement (LC^3)

- 50% less clinker
- **40% less CO_2**
- Similar strength
- Potential world CO_2 saving:
  >400 million tonnes per year
- Two commercial productions started 2020
- Collaborating with companies in more than 40 countries

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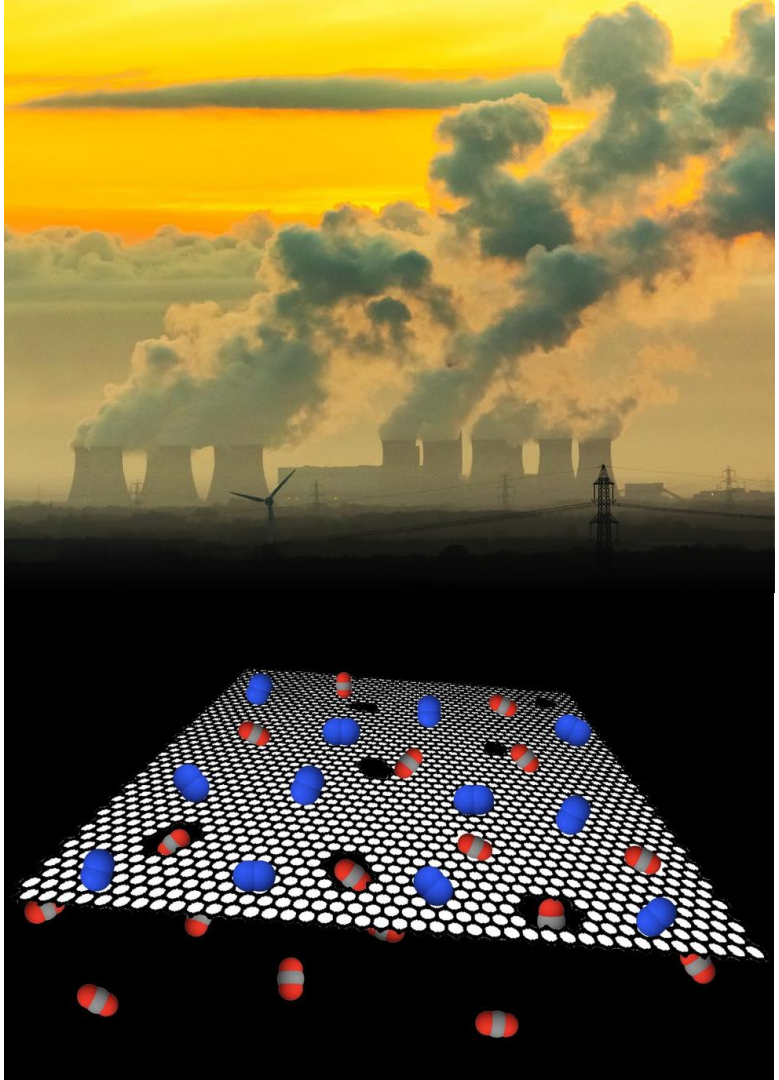
Carbon capture



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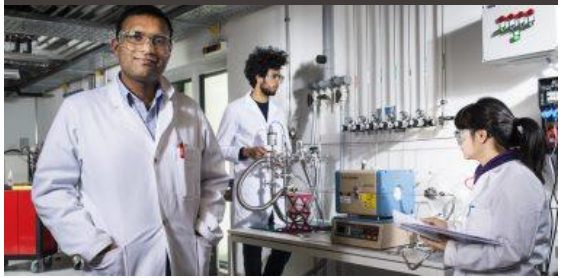


Students: Learning by doing

Swiss Solar Boat

EPFLOOP

From the lab to the market

E4S
Enterprise for Society

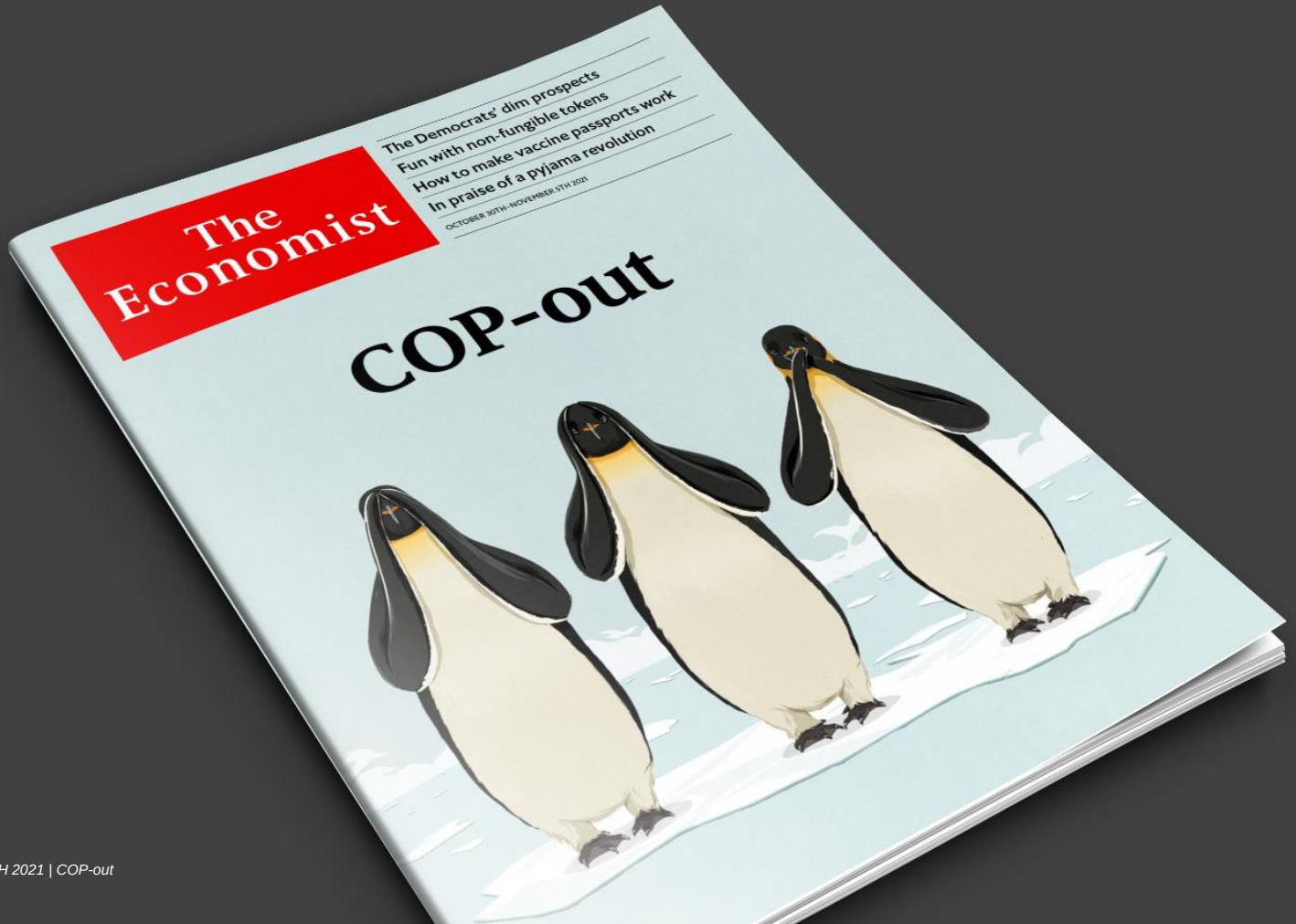
Towards a more resilient, sustainable and inclusive economy

New master since 2021: Sustainable Management and Technology

Photo by Lubo Minar on Unsplash

We are the first generation to feel the effect of climate change and the last generation who can do something about it.“

Barack Obama, Former US President



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Merci

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