

# An uncertain future of King Coal

# Coal and our society

- Long history of usage.
- Fueled industrial revolution and modern economy.
- Significant role in shaping modern social policies and left/socialist/communist movements.
- Enormous environmental impacts.

# WAR IN COLORADO! WOMEN AND BABIES SLAUGHTERED

## VOLLEYS FIRED IN STREETS

Militiamen, With Machine Guns, Attack Strikers in Mine They Captured

## 9 KILLED IN BATTLE

Armed Engagements on Today at Several Points in Coal Fields

TRINIDAD, Colo., April 28.—Two hundred militiamen, with a machine gun mounted on a ridge west of Walsenburg to-day were capturing the Mitchell mine, capturing the mine by means, with a terrific fire.

A number of persons are reported to have been wounded during the capture of the mine.

Local officials of the United Mine Workers of America declared 25 militiamen tried to capture the Mitchell mine, but were repulsed.

The militia in Trinidad, Colorado, by capturing here, T. M. Mitchell, one of the district agents of the United Mine Workers, captured the mine and also captured the mine by means of a machine gun.

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## PROPOSES GOVERNMENT OWNERSHIP OF ROCKEFELLER'S COLORADO MINES

WASHINGTON, April 28.—Government ownership and operation of John D. Rockefeller's Colorado mines was proposed in a bill introduced in the house today by Congressman Bryan of Washington.



A Typical Tent in the Colony at Ludlow

## MEXICANS CHEER AS U. S. TROOPS ENTER HARBOR

BY BERNARD HOOKER  
VERA CRUZ, April 28.—San. President's troops were ordered to land from their ships here today to enter the harbor to see the situation of the city.

Typical Group of Children Housed in the Tent Colony at Ludlow by Rockefeller's Workers

By Edward A. Evans  
CORRESPONDENT OF THE STAFF

TRINIDAD, Colo., April 28.—The strikers started all this trouble in Colorado, the militiamen say. Strikers declare they were peaceable until the militia, recruited from the gutter of the cities, and paid by the mine operators, began to shoot and kill.

But it is conceded by all that it wasn't until the bodies of 11 little children and two women

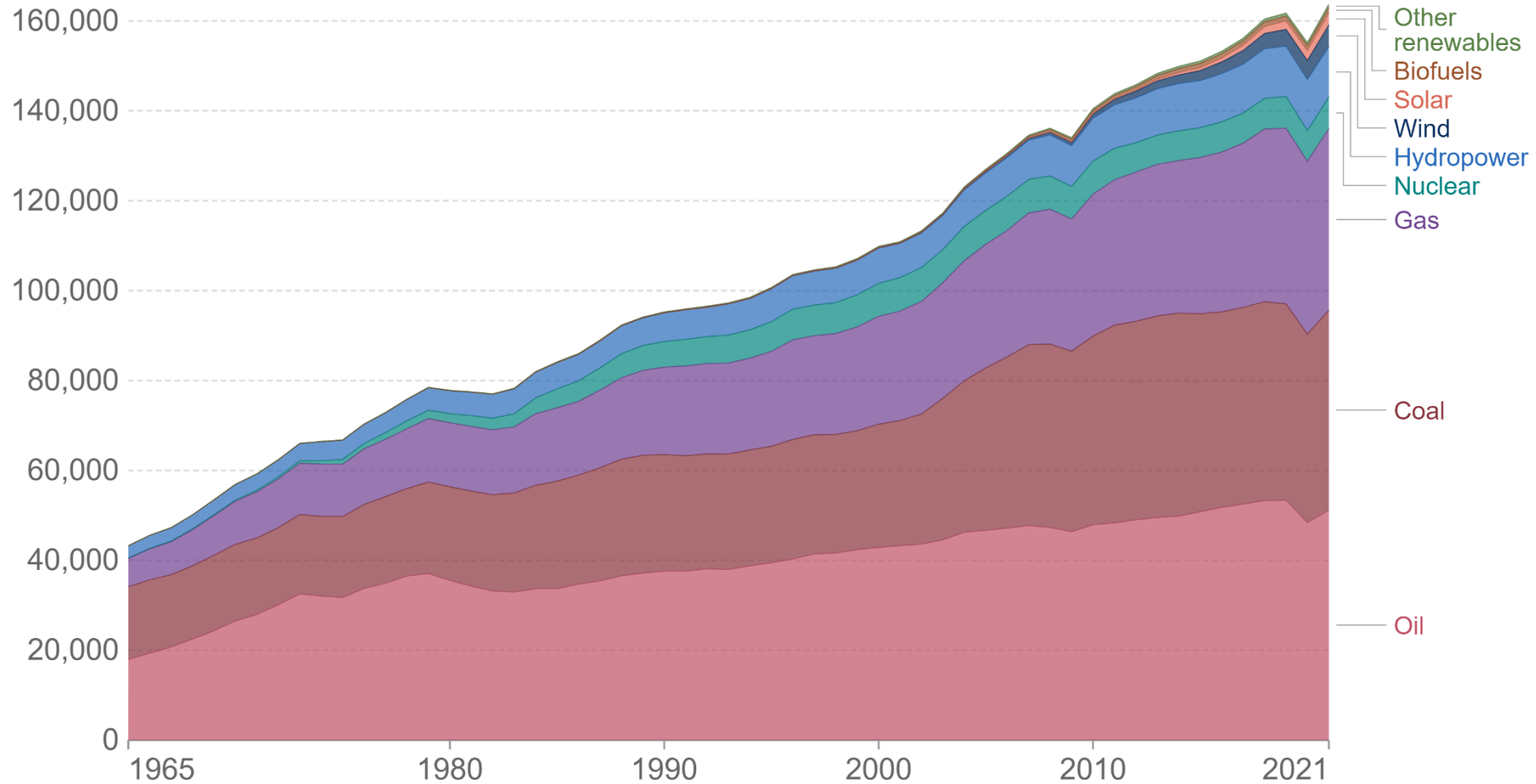
were taken  
seized with  
Eley  
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THE  
F  
and  
Paul G.



# Energy consumption by source, World

Primary energy consumption is measured in terawatt-hours (TWh). Here an inefficiency factor (the 'substitution' method) has been applied for fossil fuels, meaning the shares by each energy source give a better approximation of final energy consumption.

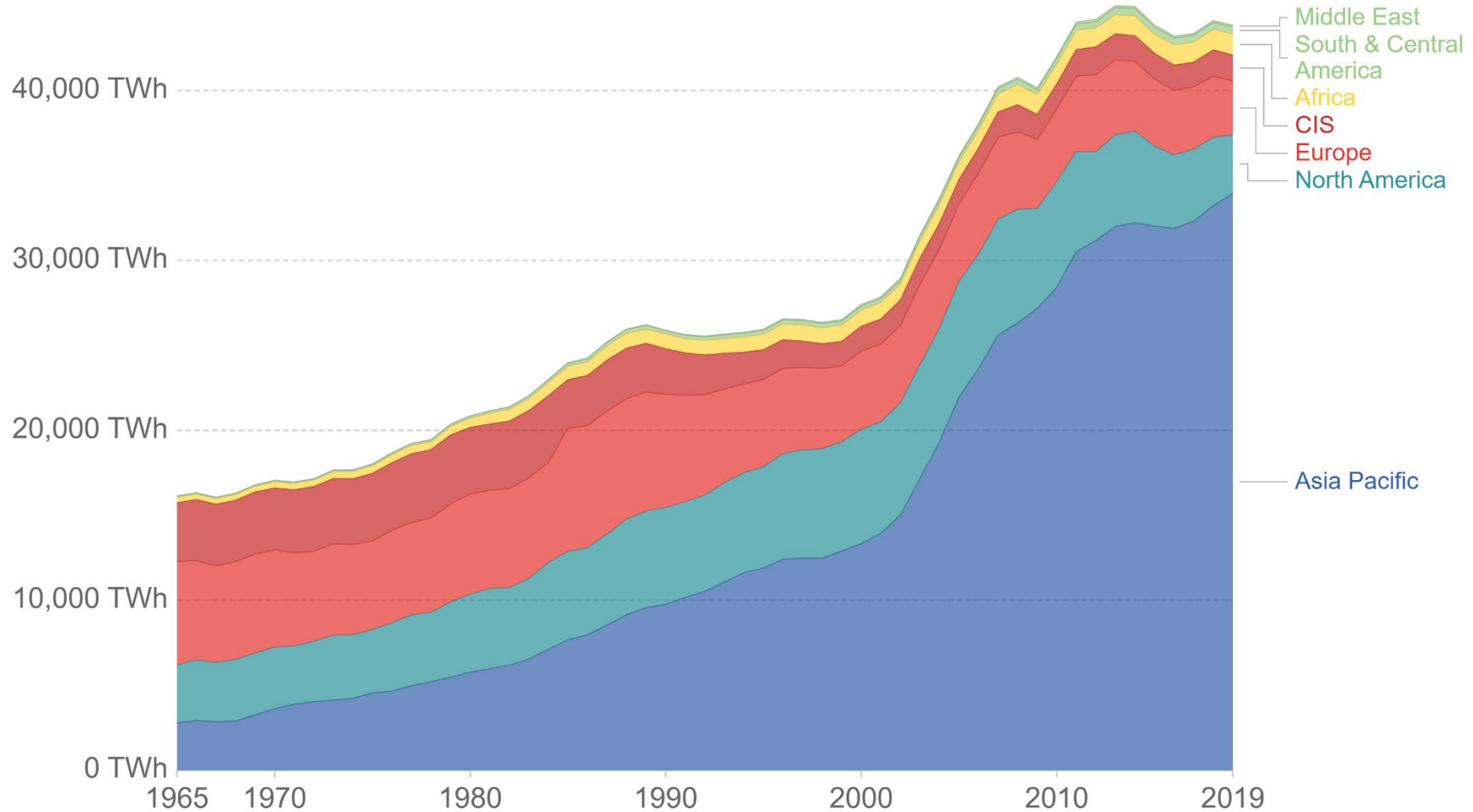


Source: BP Statistical Review of World Energy

Note: 'Other renewables' includes geothermal, biomass and waste energy.

# Coal consumption by region

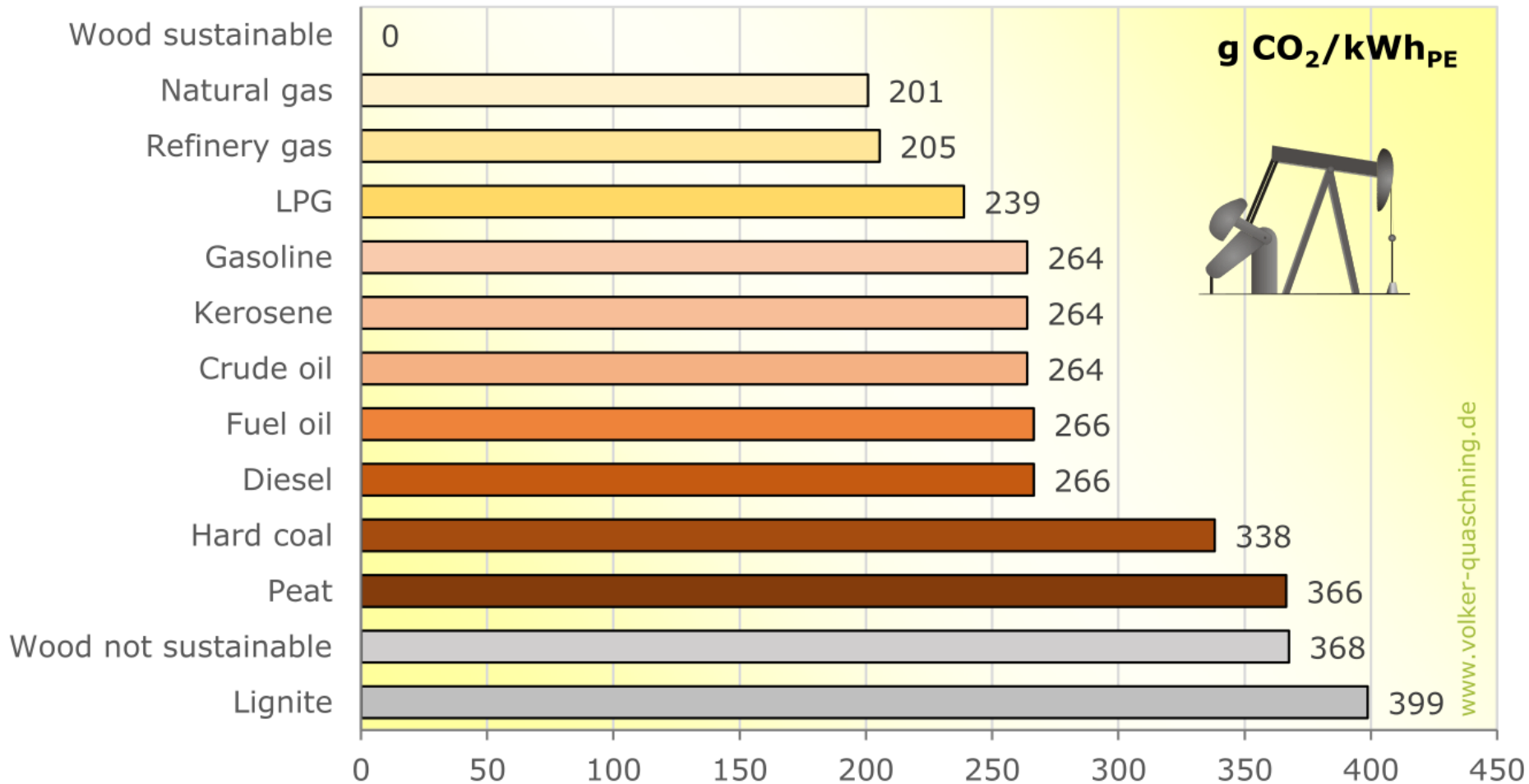
Annual coal consumption, measured in equivalents of terawatt-hours (TWh) per year.



Source: BP Statistical Review of Global Energy (2020)

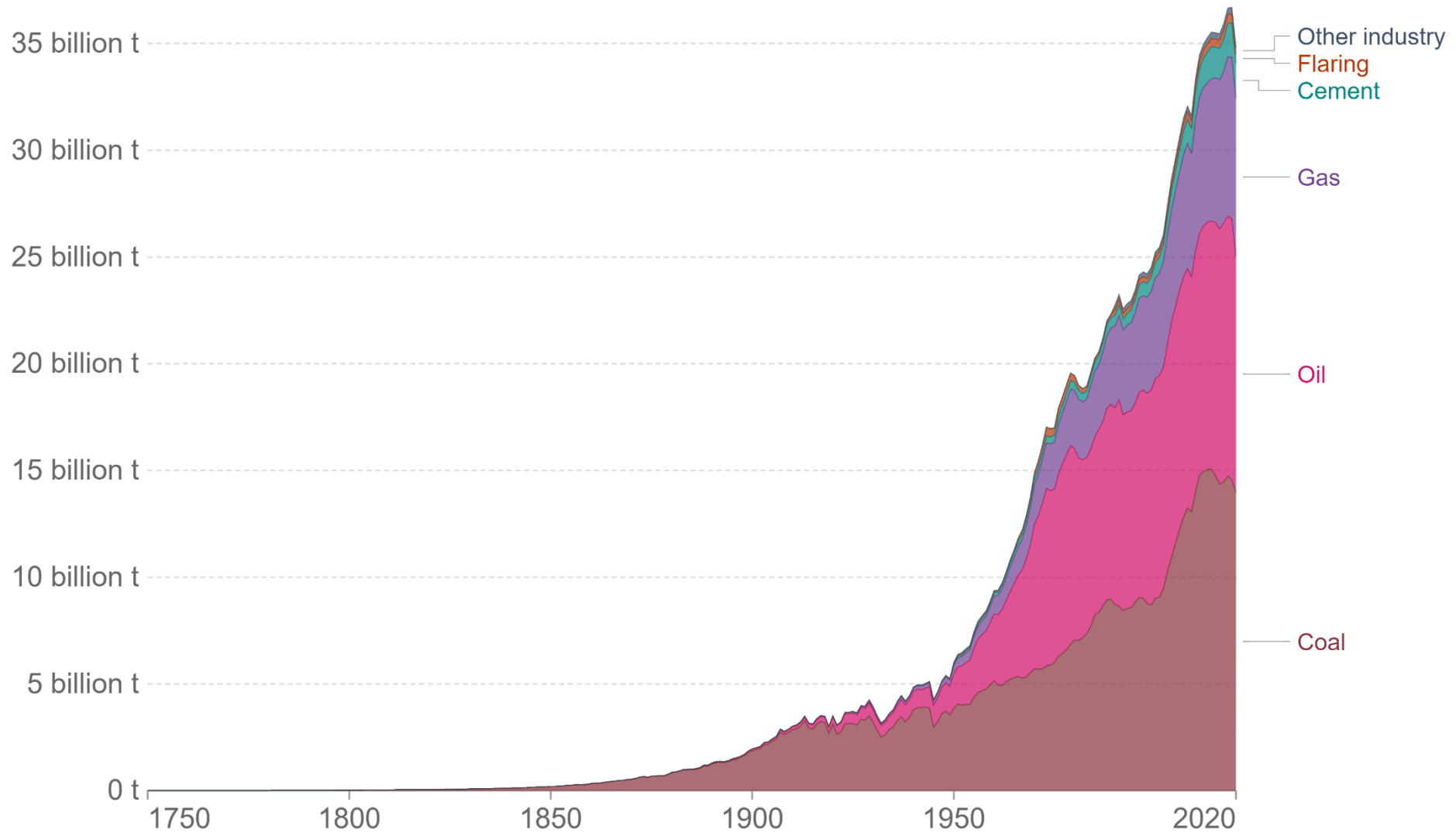
Note: CIS (Commonwealth of Independent States) is an organization of ten post-Soviet republics in Eurasia following break-up of the Soviet Union.

# CO<sub>2</sub> emissions by fuel



# CO<sub>2</sub> emissions by fuel type, World

Annual carbon dioxide (CO<sub>2</sub>) emissions from different fuel types, measured in tonnes per year.



# Coal phase-out (phase-down)

- COP26 in Glasgow – calls for parties to phase-down their use of unabated (*without CCS*) coal power and phase-out subsidies.

## **India Raises Last-Minute Objection (7:40 p.m.)**

In a last-minute move, India proposed weakening fossil fuel language in the pact, shifting from a commitment toward “accelerating efforts towards the phase-out of unabated coal power” to instead supporting a “phase down unabated coal power.”

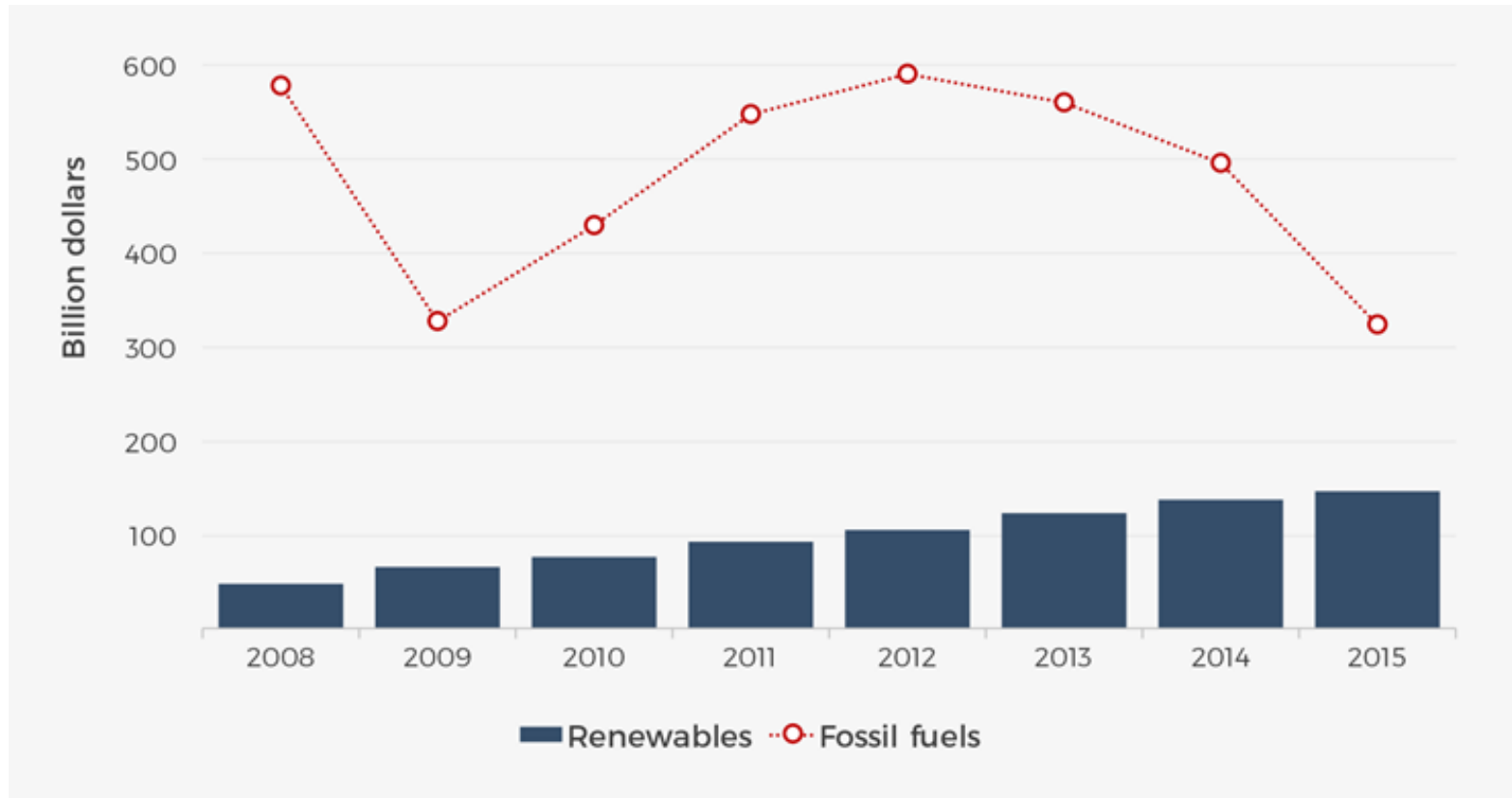
Switzerland and the European Union expressed strong objections to India’s proposal, but ultimately accepted it, paving the way for the adoption of what EU climate czar Frans Timmermans called a “historic” document.






# 1) Economy of coal

- Cheap to produce, easy to use, and abundant.
- Subsidies to coal industry.
- Environmental damages not internalized to the price.

# Global subsidies for fossil-fuel consumption and renewables



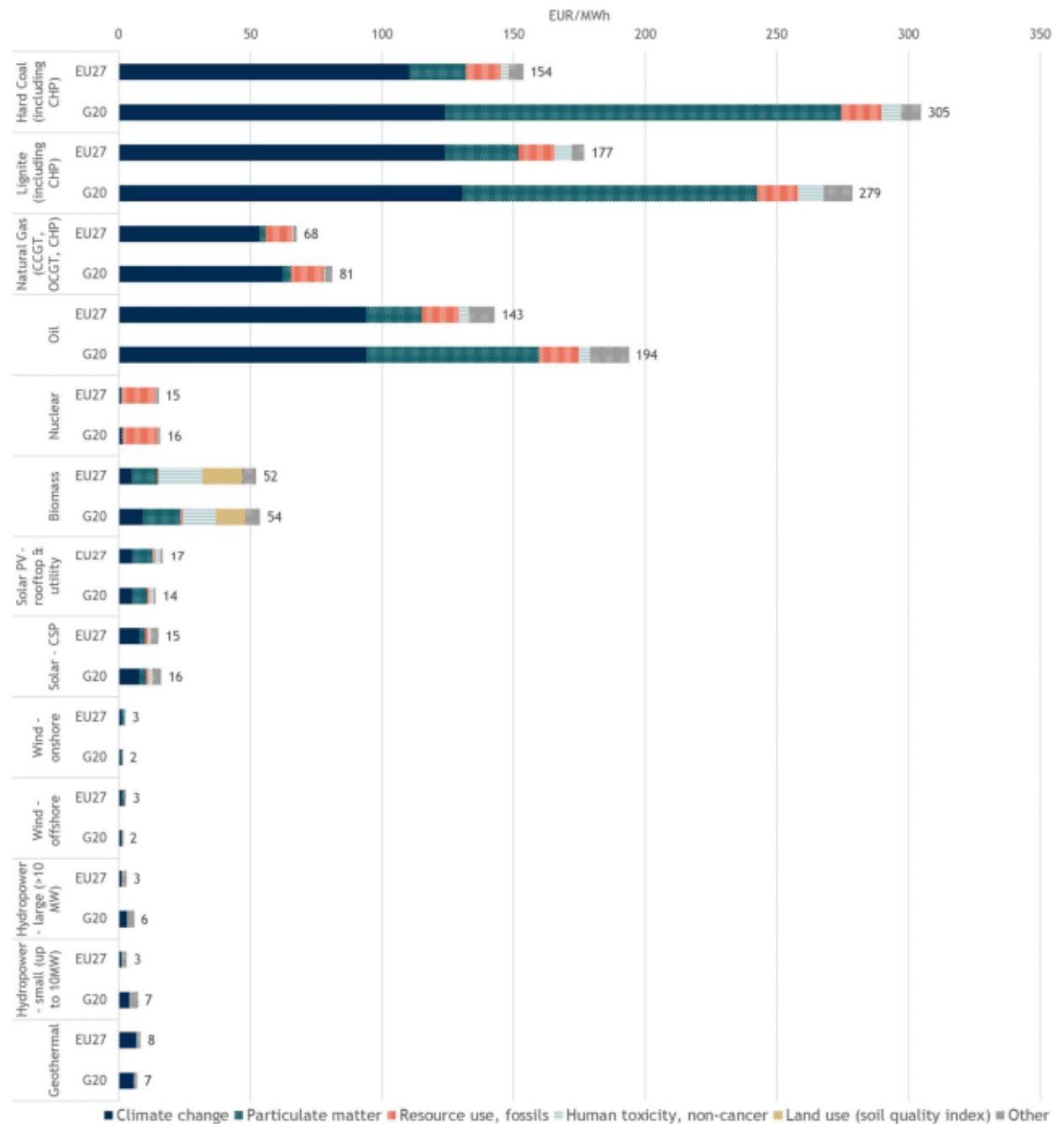
# Use of transition policies in the German hard coal phase-out

	No support	Compensation or grandfathering (backward looking)	Structural adjustment assistance (forward-looking, narrow)	Holistic adaptive support (broad)
<p>Workers</p> 	At the beginning of the crisis (late 1950s), lower wages without compensation	Since early 1960s: early retirement, redundancy payments Shift of employees to the steel industry Strong social security system, unemployment payments	Retraining for workers & Financial support for entering new employment since 1954	-
<p>Regions/ Communities</p> 	No substantial support until mid-1960s	-	Since late 1960s: Subsidies for transport infrastructure, economic reorientation and diversification, training, education and research facilities, recultivation and refurbishment of industrial sites, creation of clusters to strengthen local industries	Since the late 1980s: Integrated transition policies covering cultural and recreational and environmental aspects to improve region's attractiveness (soft-location factors)
			Regional Differences: Saarland more successful in settling new companies, esp. due to 'ground lock' by coal and steel companies in Ruhr area	Regional Differences: Saarland's regional identity less imprinted by coal 2010s: Ruhr area more diversified; Saarland dependent on automotive industry
<p>Coal mining companies</p> 	-	Since mid-1960s: compensation for price difference between domestic and imported coal Tax cuts, fiscal aid for financial stabilization (e.g. debt repayment, interest subsidies) State guarantee to cover 'eternity costs' if necessary	Modernization and restructuring payments:  - for merging of mines and reductions in employment (1969-1987)  - for mine closures (1963-1999)	-

# (Negative) externalities

- Who is paying for the damages to ecosystems and human health?
  - Reduction in life expectancy – respiratory and heart illnesses, cancers...
  - Degradation of buildings.
  - Reduction of crop yields.
  - Global warming.
  - Ecosystem loss and degradation...

External costs of electricity technologies - production weighted average of EU27 and G20 countries

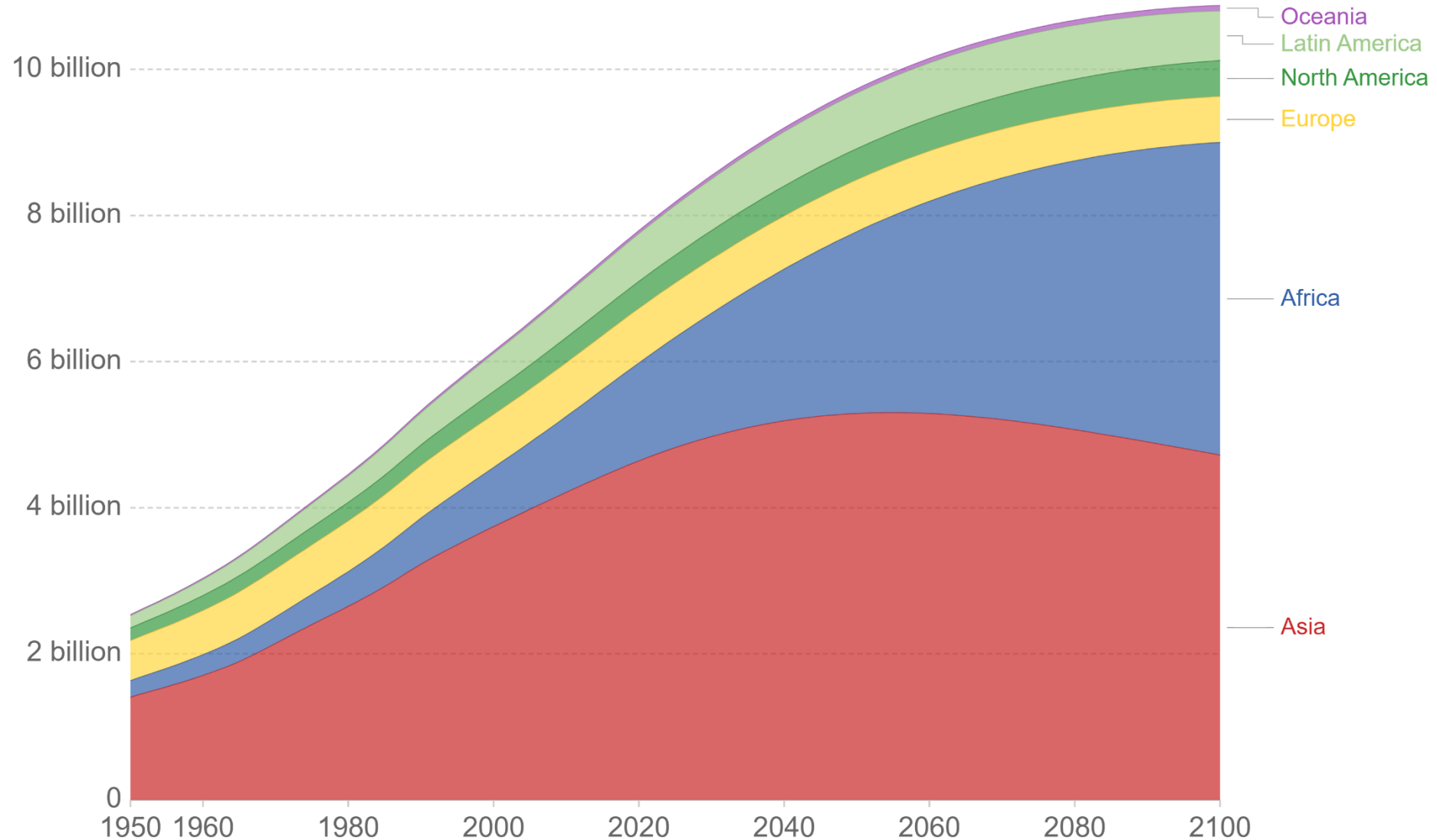


## 2) Demand patterns

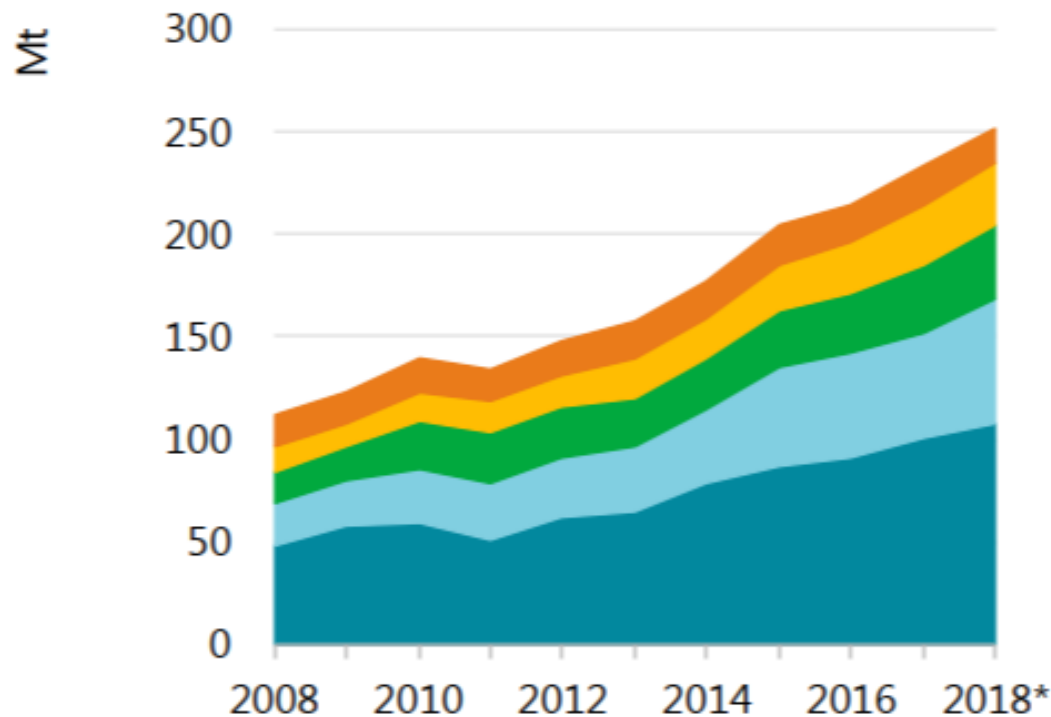
- Developing world = growing population, growing per capita economic output, growing consumption. All sources are considered necessary.
- Developed world = stable population, slow economic growth. Decoupling of energy consumption and GDP increase. Existing fuels being replaced with low carbon ones.

# World population by region projected to 2100, 1950 to 2100

Projected population to 2100 is based on the UN's medium population scenario.



# Thermal coal demand of the major coal consumers in Southeast Asia



■ Indonesia  
■ Malaysia  
■ Thailand

■ Viet Nam  
■ Philippines



### 3) Resistance of the system

- Coal embedded to energy and social systems of (post) industrialized countries.
  - On the physical level, mines, transport, combustion, a huge sunk costs.
  - On the level of actors, vested interests – companies, governments, mining communities.
  - On the level of institutions, coal is important part of national identity, security, embedded in regulation and law.
- See the coal phase-out in Germany, Poland, the Czech Republic.

## Coal „cultural identity“

Coal industry embraced as a cornerstone of the collective sense of self.

Importance of coal for livelihood of the community, independence, the very existence of the industrial sector.



**KOHLE·IST·BROT**



# EU coal phase-outs

Country	Steam coal			Lignite		
	2017	2018*	CAAGR	2017	2018*	CAAGR
Bulgaria	0.9	1.0	8.3%	34	30	-10.5%
Czech Republic	3.4	2.8	-19.0%	39	39	1.0%
France	8.4	6.7	-20.2%	-	-	-
Germany	33	30	-9.1%	171	166	-2.9%
Greece	-	-	-	38	37	-4.4%
Hungary	-	-	-	8.1	8.2	0.2%
Italy	12	11	-11.9%	-	-	-
Netherlands	10.3	8.8	-14.3%	-	-	-
Poland	61	63	3.0%	61	59	-4.3%
Portugal	5.4	4.5	-15.9%	-	-	-
Romania	0.8	1.0	17.4%	26	25	-3.5%
Spain	21	15	-26.3%	-	-	-
United Kingdom	11	10	-15.0%	-	-	-
<b>European Union</b>	<b>180</b>	<b>165</b>	<b>-8.3%</b>	<b>382</b>	<b>369</b>	<b>-3.6%</b>

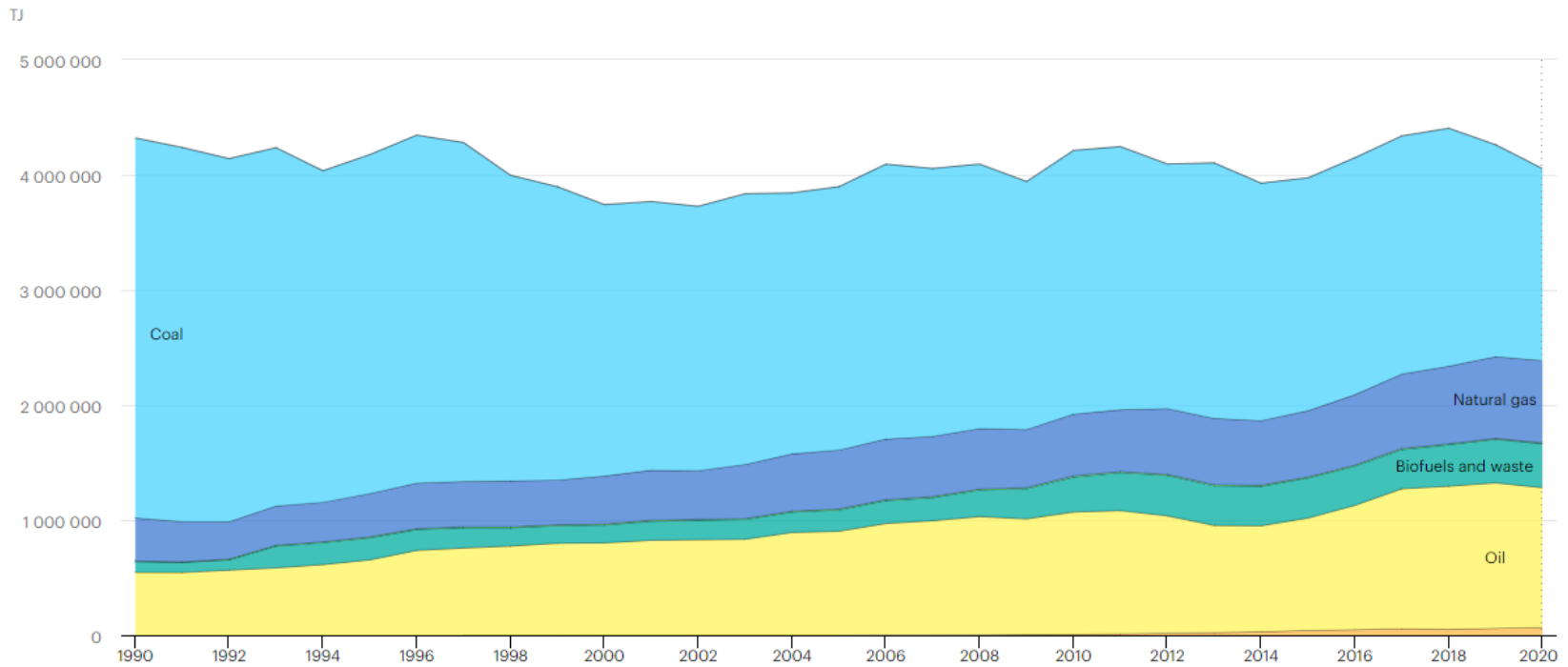
### 3) Just transition?



“...I’m the only candidate who has a policy about how to bring economic opportunity using clean renewable energy as the key into coal country. Because we’re going to put a lot of coal miners and coal companies out of business, right?” – H. Clinton, Ohio campaign, 2016.

# Polish coal phase-out

Total energy supply (TES) by source, Poland 1990-2020

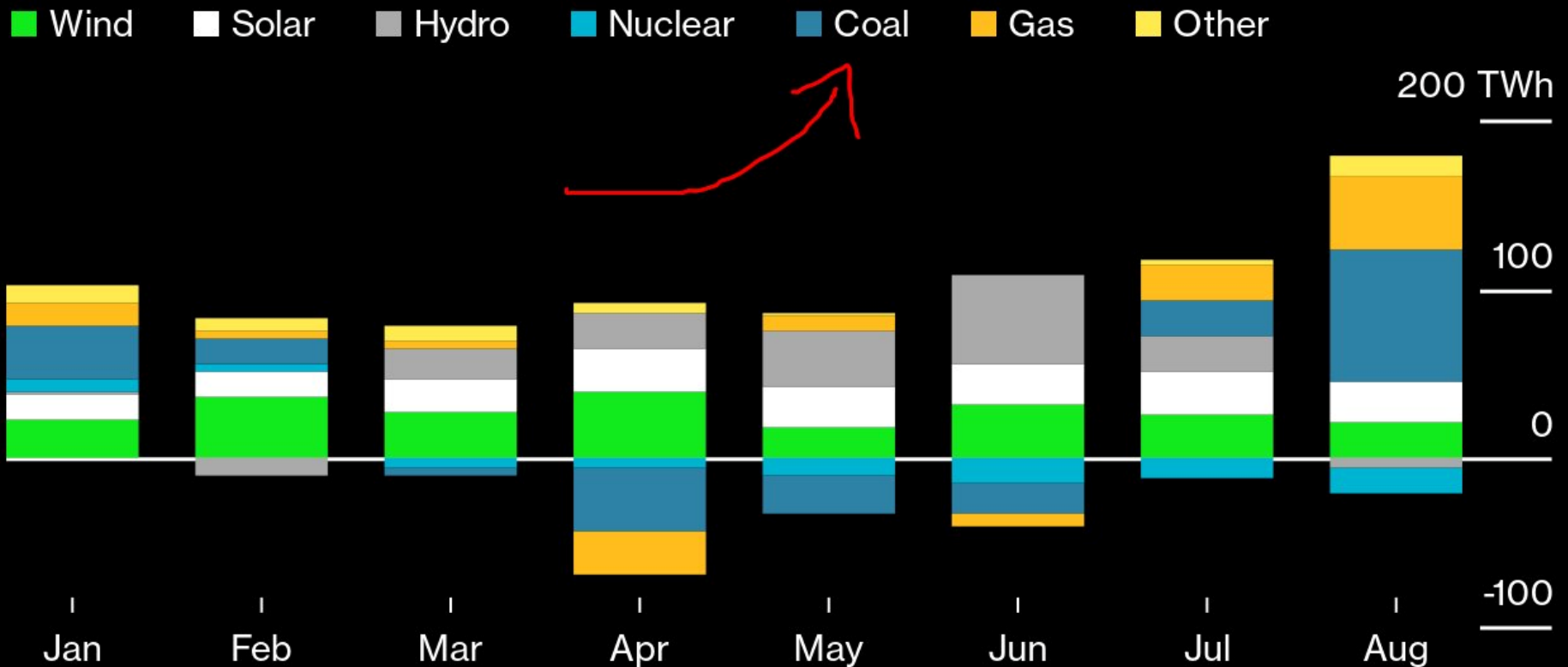


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# Future of coal

**Coal power generation is up about 1% over the previous year through August**



Source: Ember

Data shows change in source of electricity generation on same month in 2021

# Sources

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