

Gas Security

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Difference between Gasoline and Natural Gas

- The difference between gasoline and natural gas is in the number of molecules. Natural gas is much lighter than regular gas and does not take a liquid form like gas.
- Natural gas is an odorless, colorless gas, largely formed over millions of years underground. It's made of a variety of compounds. Natural gas is also a fossil fuel, so it releases greenhouse gases when burnt.
- Natural gas is “cleaner” than gasoline from a carbon standpoint. But it is harder to store than regular gasoline.

History

1000 B.C.
Ancient
Greece



500 B.C.
China:
Discovered
the gas
potential



1785
Britain :
Commercializ
e and use
natural gas



1816
USA
Manufactured
gas



1859
Pipelines
started to be
construcuter

Natural Gas Distribution

- Nearly 80% of the world's total proven natural gas reserves are located in ten countries:

1. Russia
2. Iran
3. Qatar
4. Turkmenistan
5. United States of America

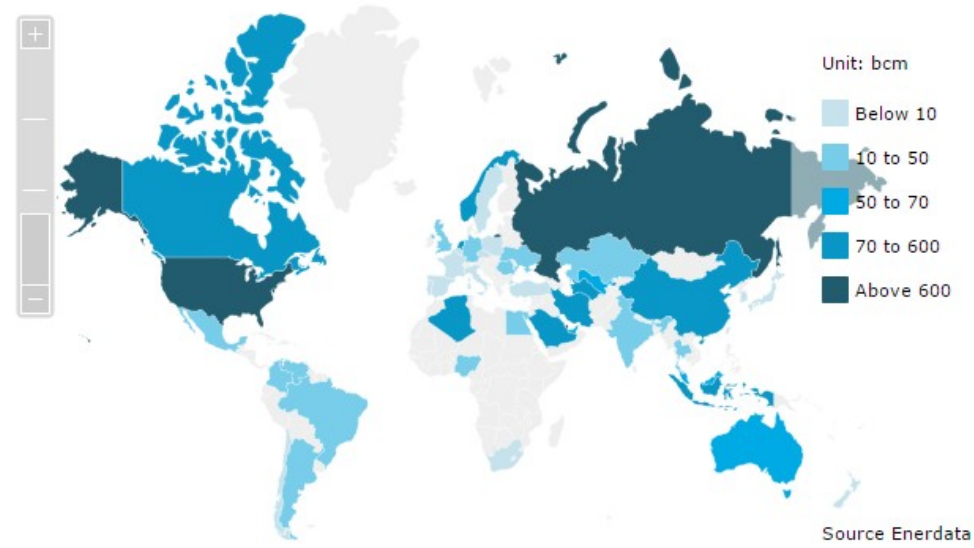
- Other 5 countries: Saudi Arabia, United Arab Emirates, Venezuela, Nigeria, Algeria

Natural Gas Production

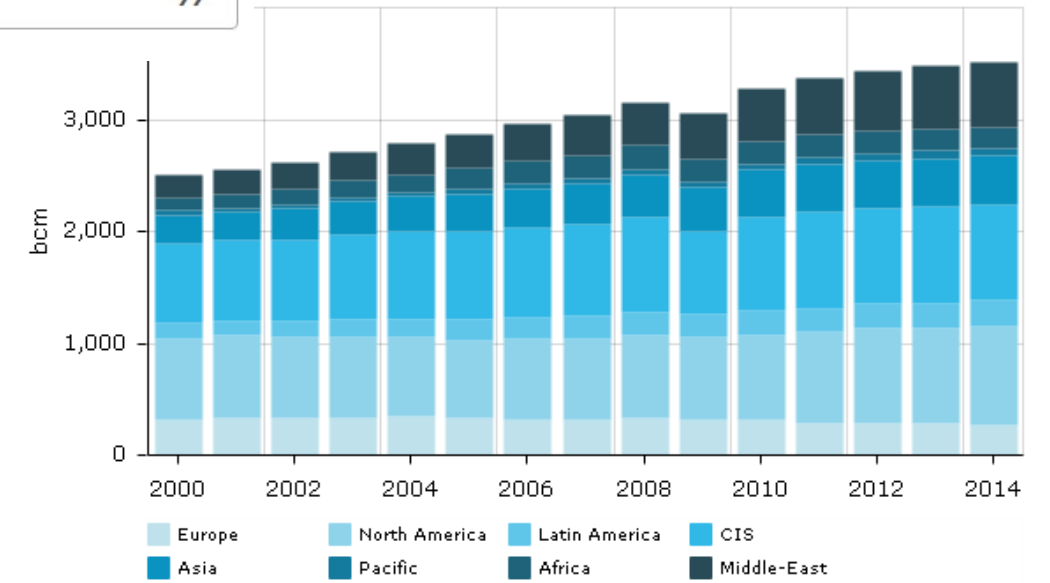
Trend Year: 2014

Map Excel

Year: 2014 Unit: bcm Highest ten



United States	732
Russia	643
Iran	174
Qatar	161
Canada	160
China	127
Norway	108
Saudi Arabia	87
Algeria	80
Turkmenistan	77

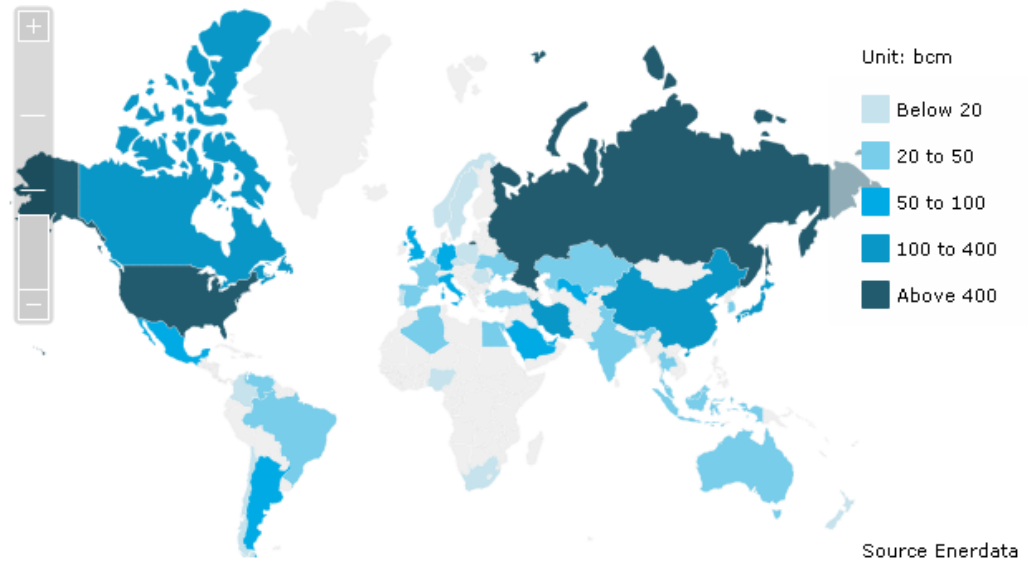


Natural Gas Consumption

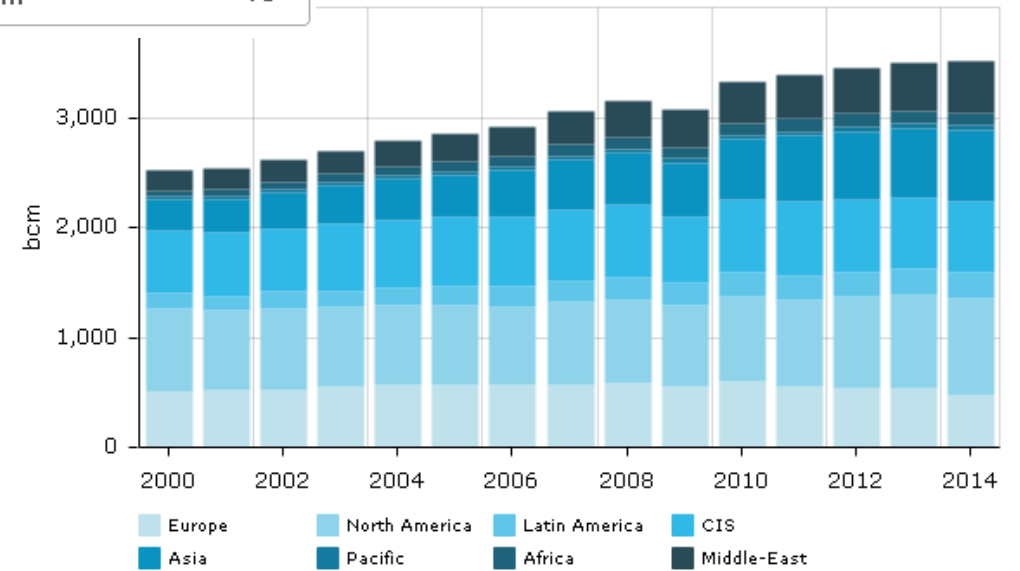
Trend **Year: 2014** [Navigation icons]

[Map] [Excel]

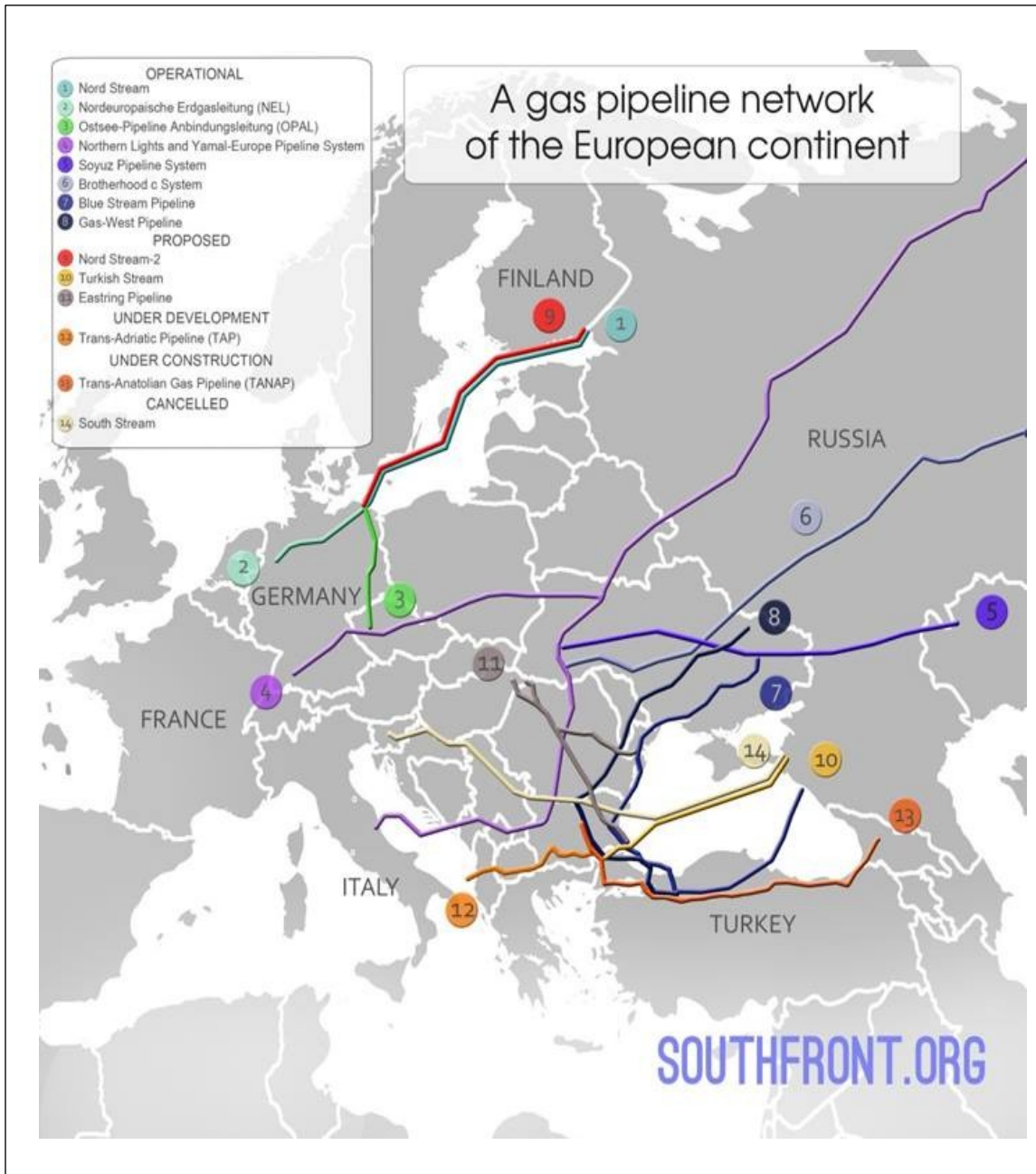
Year: 2014 Unit: bcm Highest ten ▾



United States	757
Russia	462
China	181
Iran	174
Japan	134
Canada	110
Saudi Arabia	87
Germany	81
Mexico	72
United Kingdom	70



Pipelines for gas Transportation: Europe



- Initially, the European gas system was developed around national gas fields in Southern France, Northern Italy, Germany and Romania
- The main North-Eastern corridor from Russia
- The North-Western corridor from Norway
- The South-Western Corridor from Algeria
- The South-Eastern Corridor from Caucasus/Central Asia/Middle East via Turkey/the Black Sea).

Gas Market in the EU

- From 2000 to 2014, Gas consumption decreased by 13.7%
- Gas Production decreased by 42.2% ->>
- Netherlands and the United Kingdom combined makes 70% of EU gas production.
- Norwegian deliveries increased (+13%), making Norway the largest gas supplier to the EU in 2014

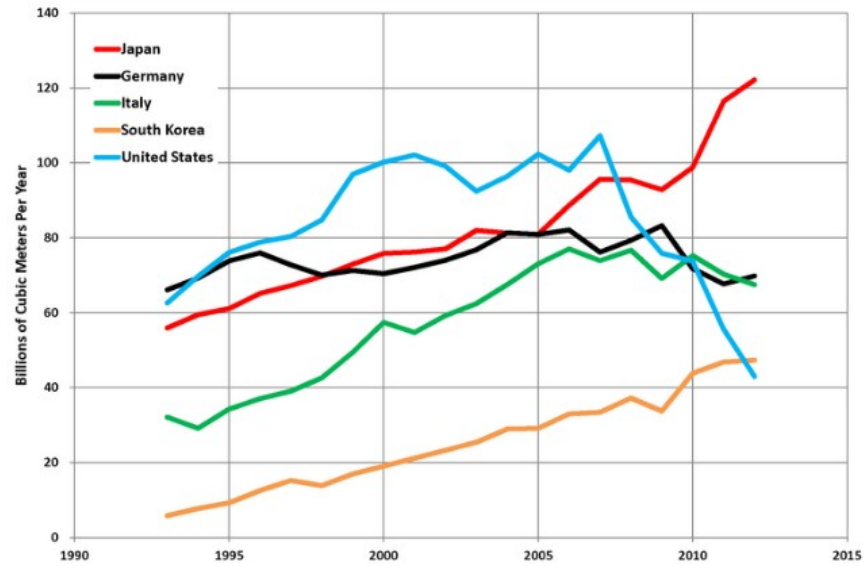
Table 1: Natural Gas Production in the EU, million cubic metres (mcm)

Member State	1990 (mcm)	2000 (mcm)	2010 (mcm)	2014 (mcm)	1990-2014 % change	2000-2014 % change
Austria	1359	1904	1810	1244	- 8.5	- 34.6
Croatia	1983	1659	2727	1713	- 13.6	+ 3.3
Denmark	3137	8153	8219	4612	+ 47.0	- 43.4
France	2857	1878	777	15	- 99.5	- 99.2
Germany	18919	22049	15069	10063	- 46.8	- 54.4
Hungary	4874	3194	2900	1854	- 62.0	- 42.0
Ireland	2318	1186	285	252	- 89.1	- 78.8
Italy	17296	16633	8406	7149	- 58.7	- 57.0
Netherlands	76249	72821	88510	69969	- 8.2	- 3.9
Poland	4095	5224	6079	6080	+ 48.5	+ 16.4
Romania	28366	13750	10855	11006	- 61.2	- 20.0
Spain	1471	171	51	24	- 98.4	- 86.0
UK	49672	115386	59776	38518	- 22.5	- 66.7
TOTAL	213 439	264 460	205 901	152 931	- 28.3	- 42.2

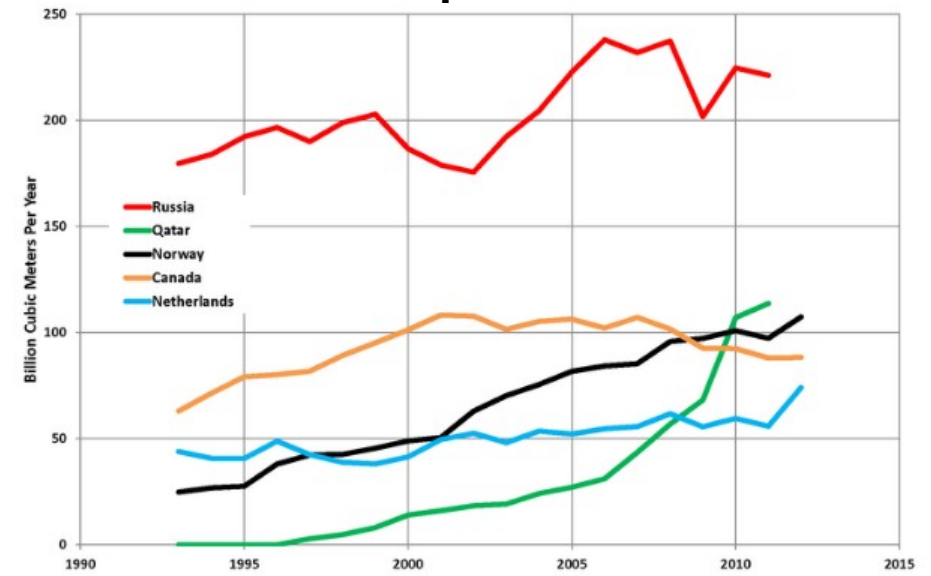
Source: International Energy Agency, [Natural Gas Information](#)

Imports and Exports

Imports



Exports



ENERGY PRODUCTS	Value (billion EUR)		Net mass (million)	
	Extra-EU Imports	Extra-EU Exports	Extra-EU Imports	Extra-EU Exports
27090010: PETROLEUM OILS FROM NATURAL GAS CONDENSATES	7.3	0.0	10.8	0.0
27090090: PETROLEUM OILS AND OILS OBTAINED FROM BITUMINOUS MINERALS, CRUDE	295.0	5.6	487.0	9.1
27111100: NATURAL GAS, LIQUEFIED	13.6	1.7	33.2	3.2
27112100: NATURAL GAS IN GASEOUS STATE	73.4	1.3	167.7	2.4
2701: COAL	16.1	0.2	196.8	1.8

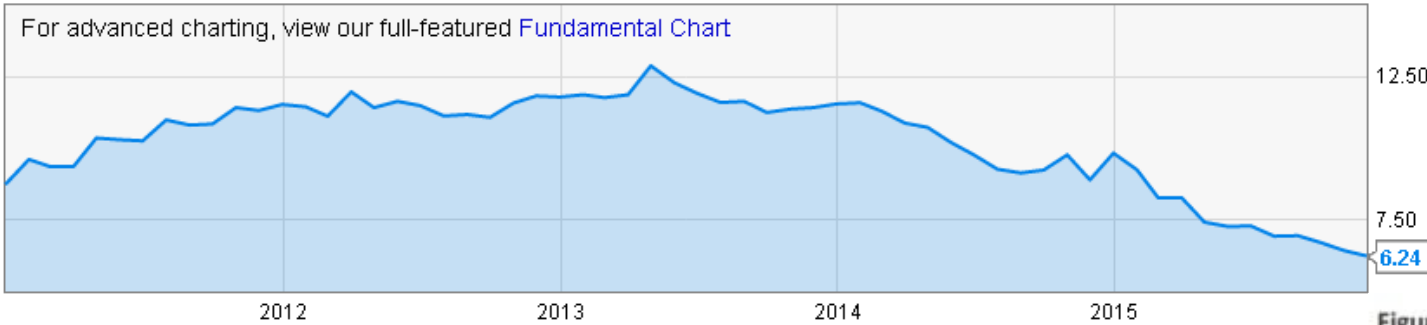
Natural Gas Prices

European Union Natural Gas Import Price Chart

[View Full Chart](#)

5d 1m 3m 6m YTD 1y 5y 10y Max

Export Data Save Image

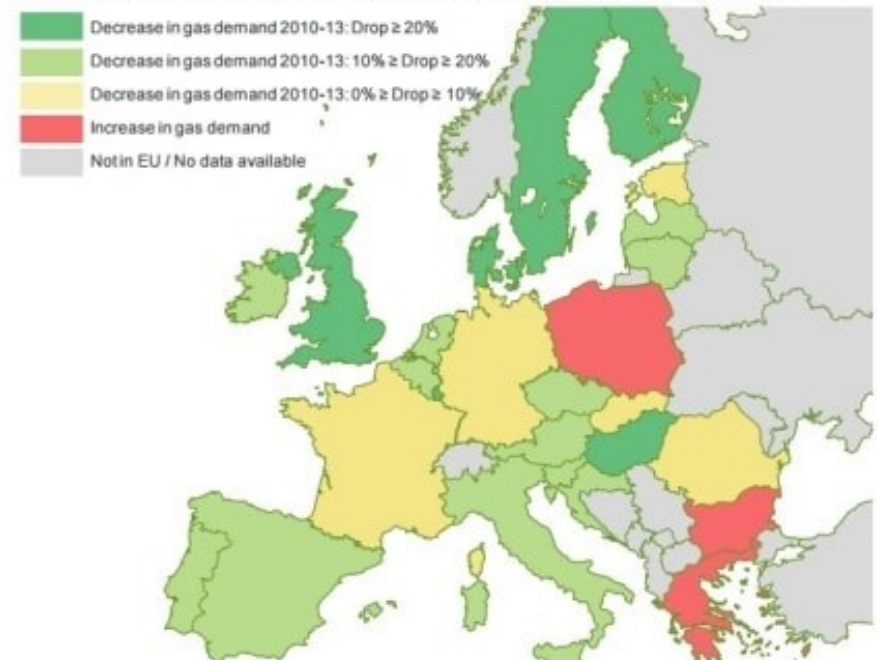


Declining European demand:

- Increased Energy Efficiency
- Shift to Renewables
- Structural shifts to the European economy

Planned supply of U.S LNG to Europe

Figure 3: Evolution of gas demand between 2010 and 2013 across the EU



Source: Eurostat, E3G. Note: Missing data for Cyprus and Malta.

Liquefied Natural Gas - LNG

- It is a clear, colorless, non-toxic liquid that forms when natural gas is cooled to -162°C (-260°F).
- Liquefied Natural Gas (LNG) represents the main alternative to pipeline supplies of gas.
- Gas imports to the EU: 80-85% are delivered through pipelines, the remaining 15-20% in the form of LNG
- Transporting gas by pipeline can be costly and impractical. The LNG can be shipped safely and efficiently.
- LNG supplies to EU Member States arrive mainly from Qatar, Algeria and Nigeria



- Fracking in the US
 - Water usage
 - Carcinogens
 - Distraction from renewable efforts
- The annual volume of consumption is projected to rise from 22.5 trillion cubic feet (tcf) in 2009 to about 23.5 tcf in 2030.
- “Bridge Fuel”
 - With the global flexibility of LNG, natural gas can have a powerful impact in lowering GHG emissions in growing economies like China and India.
- Transport problems in the EU with LNG

Solutions

- Vehicles powered by natural gas rather than regular gasoline
 - Conversion process
 - Waste of existing resources
- Subsidizing clean energy initiatives
 - Develop sustainable energy sources
- Allow countries with developing industries to use natural gas but crack down on other countries that over consume

Natural gas is a temporary solution but is not the answer in achieving a sustainable long term balance

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