



# HYDROGEN IN RUSSIA: CURRENT STATE AND NEW OPPORTUNITIES

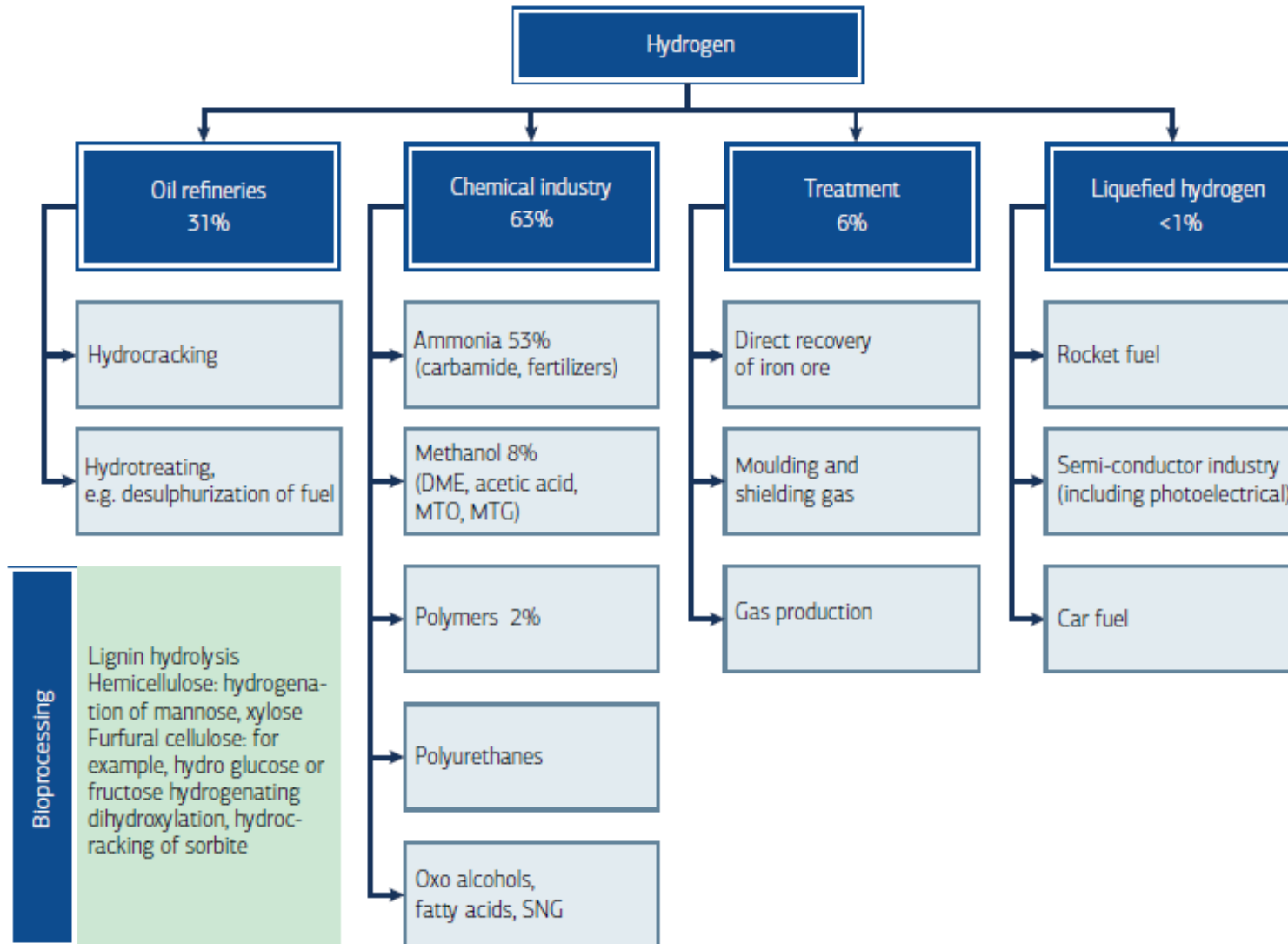
Yury Melnikov, Moscow School of  
Management SKOLKOVO

UNECE Deep-dive on Gas  
Workshop

September 24, 2019, Geneva



# Hydrogen 1.0

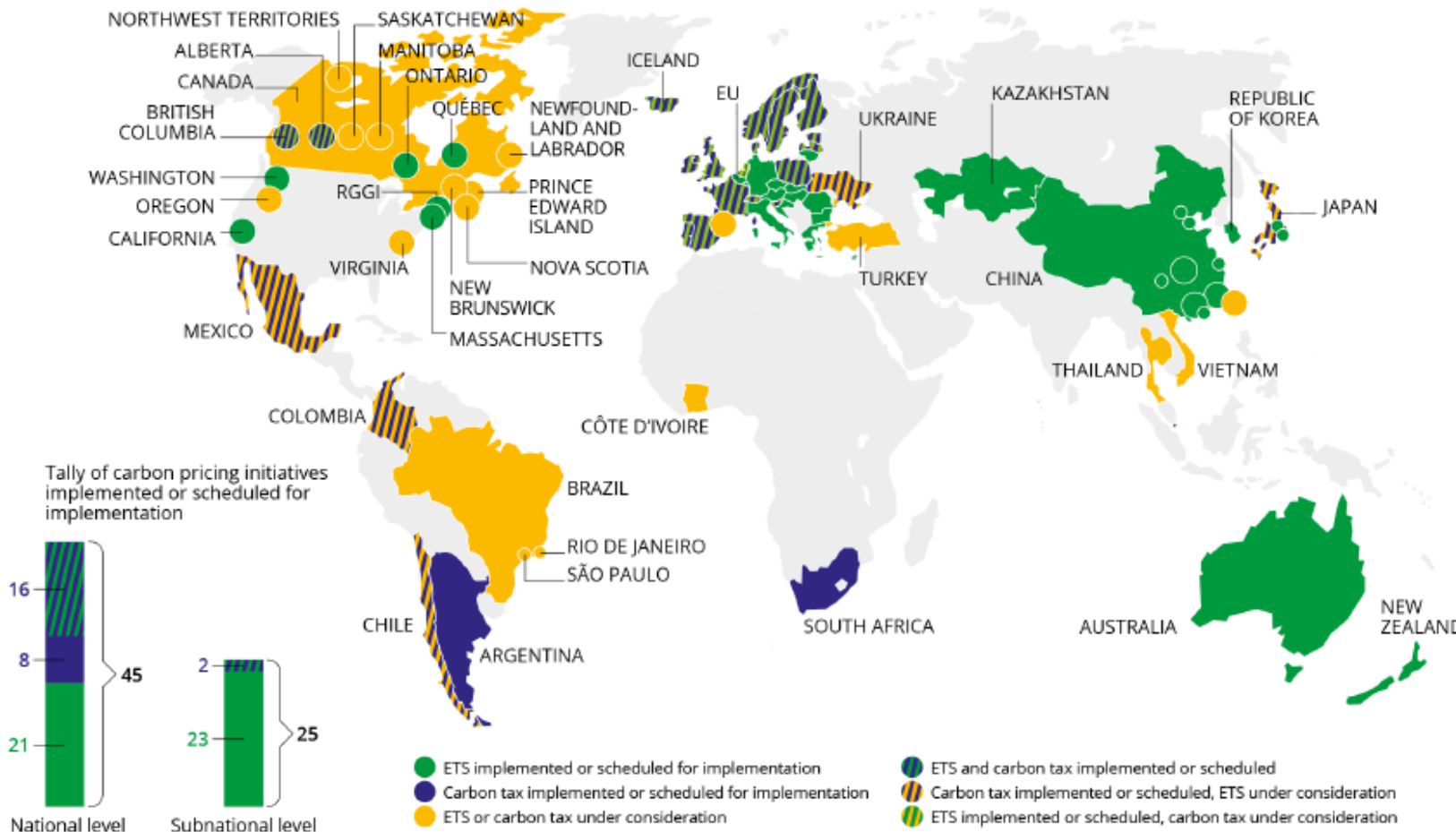


Sources: DECHEMA, DOE, Fair-PR, Linde

- **65 million tons** are produced per year globally (mostly as a captive product)
- Hydrogen is **used for decades** (in chemical industry and refineries)
- **Hydrocarbons** are the main source (gas, oil, coal)
- **Steam Methane Reforming** is the cheapest way to produce (1-2 USD / kg)

# Decarbonization: the main global driver for changing the hydrogen's role

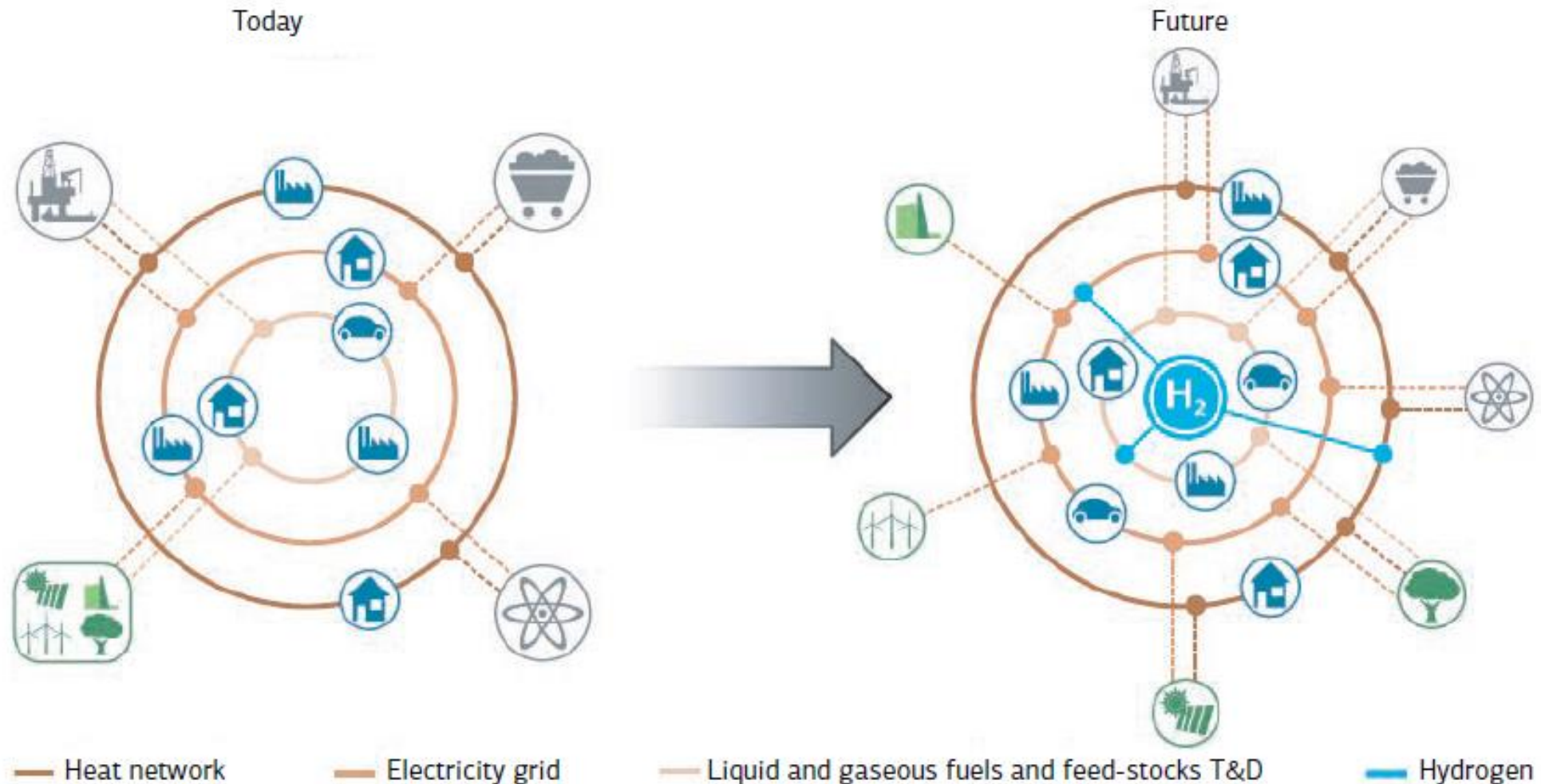
- 186 states are parties to the Paris Agreement
- 45 states and 25 regions either have already launched national CO<sub>2</sub> trading systems or other forms of carbon pricing, or plan to do so soon
- National emissions reduction targets:
  - 2030 - by 25-40% from 1990-2005 level (common target)
  - 2050 – by 80-95% (target discussed in EU)



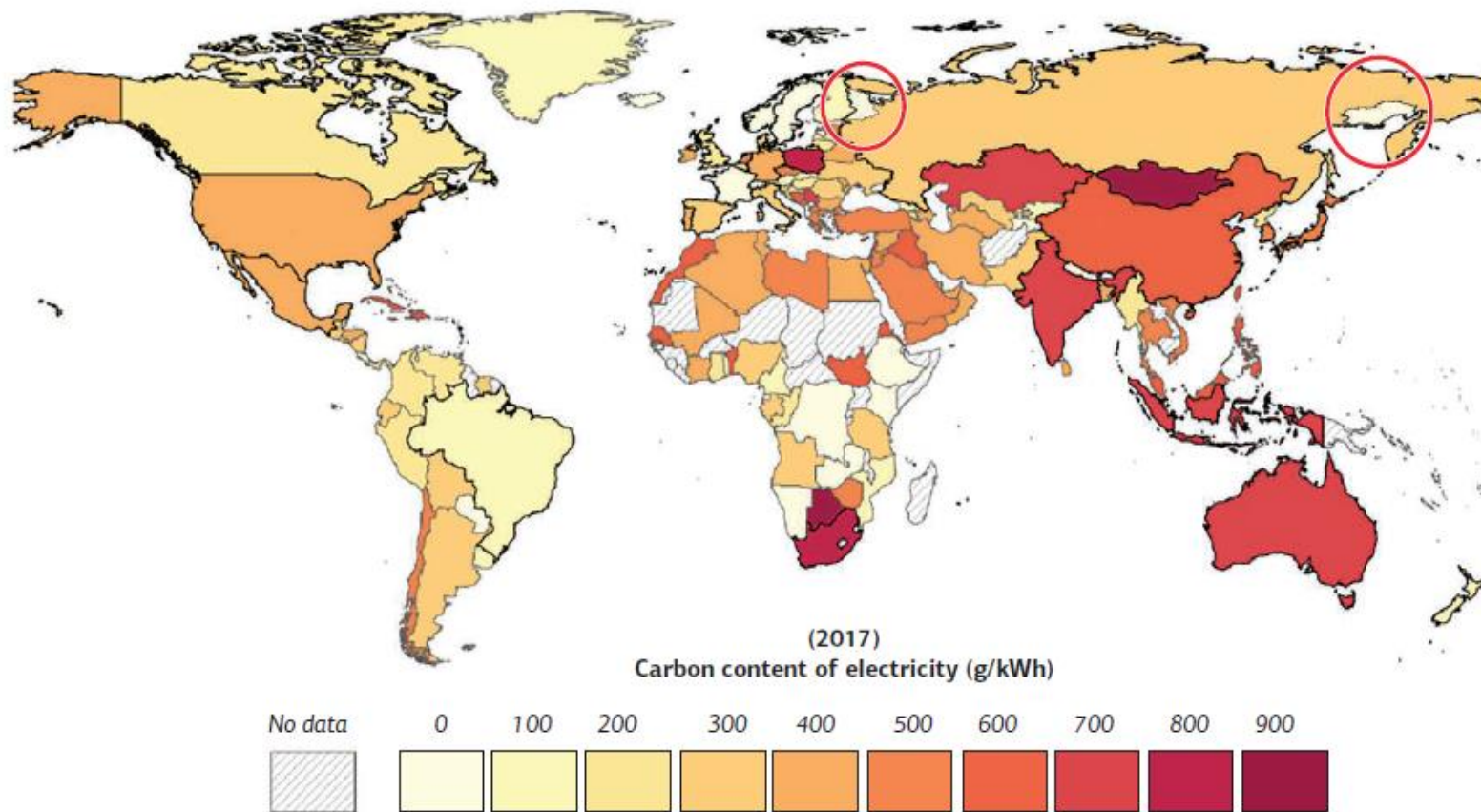
Source: World Bank Group, *State and Trends of Carbon Pricing 2018*



# Hydrogen 2.0: the role of new global clean energy carrier in sector coupling



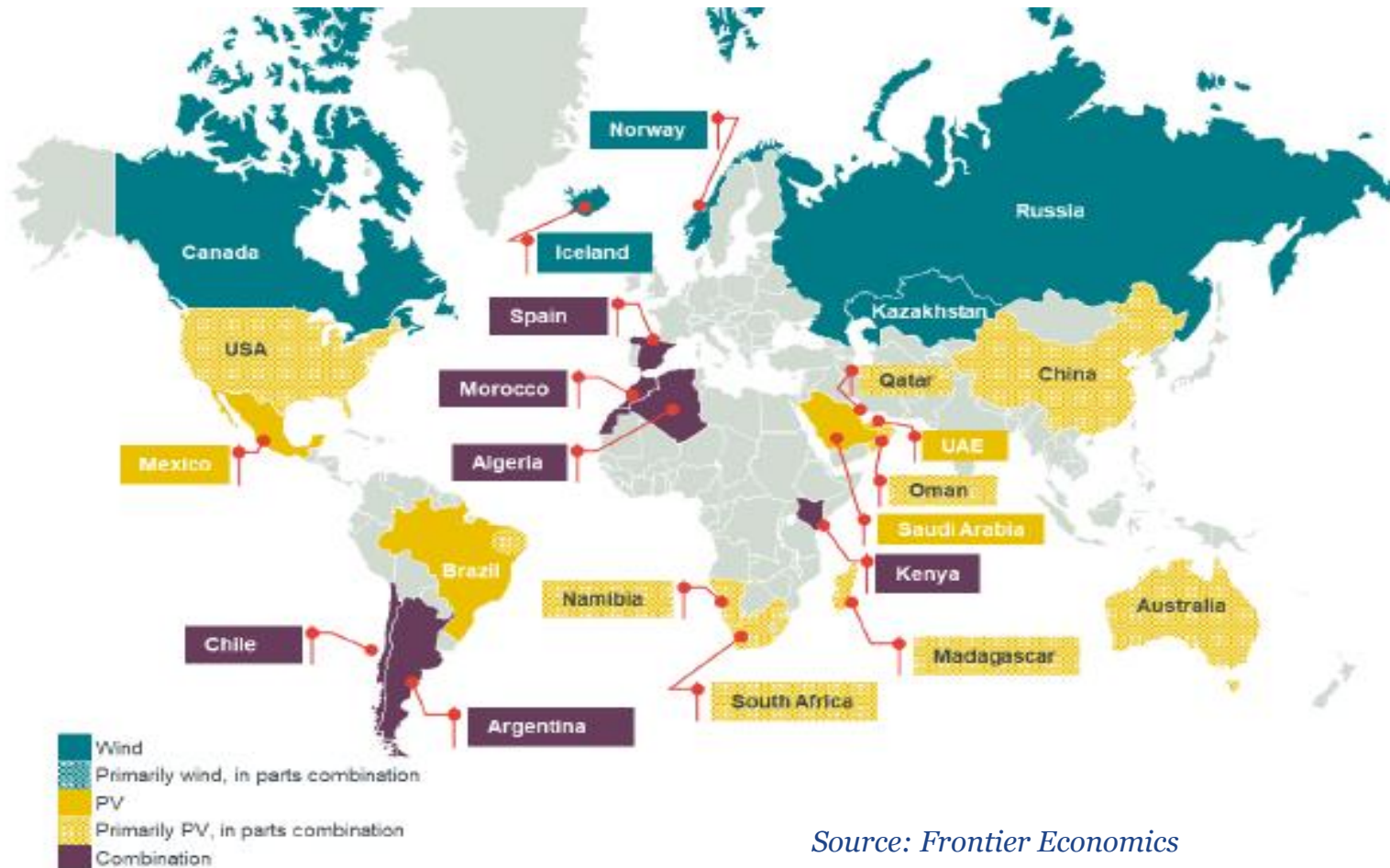
# Climate agenda and the drive for decarbonization are not yet essential factors in the Russian energy policy



Source: I. Staffell, IEA, UNFCCC

- **Skepticism** concerning the **anthropogenic nature** of climate change is prevalent among stakeholders,
- In the 1990s, Russia has de facto sharply **reduced GHG emissions** due to economic downturn (1998 – by 40-50%);
- **Carbon content of electricity is less** than in USA, China, Australia, India, Japan, Germany... - due to big share of nuclear / hydro / gas-fired power generation (and even 4-8 times less in some regions);
- Russia joined the Paris Agreement **LAST FRIDAY**, but **CO<sub>2</sub> pricing** could be implemented **only in 2020s**

# So far, hydrogen agenda in Russia will be determined more by export opportunities than by domestic demand...

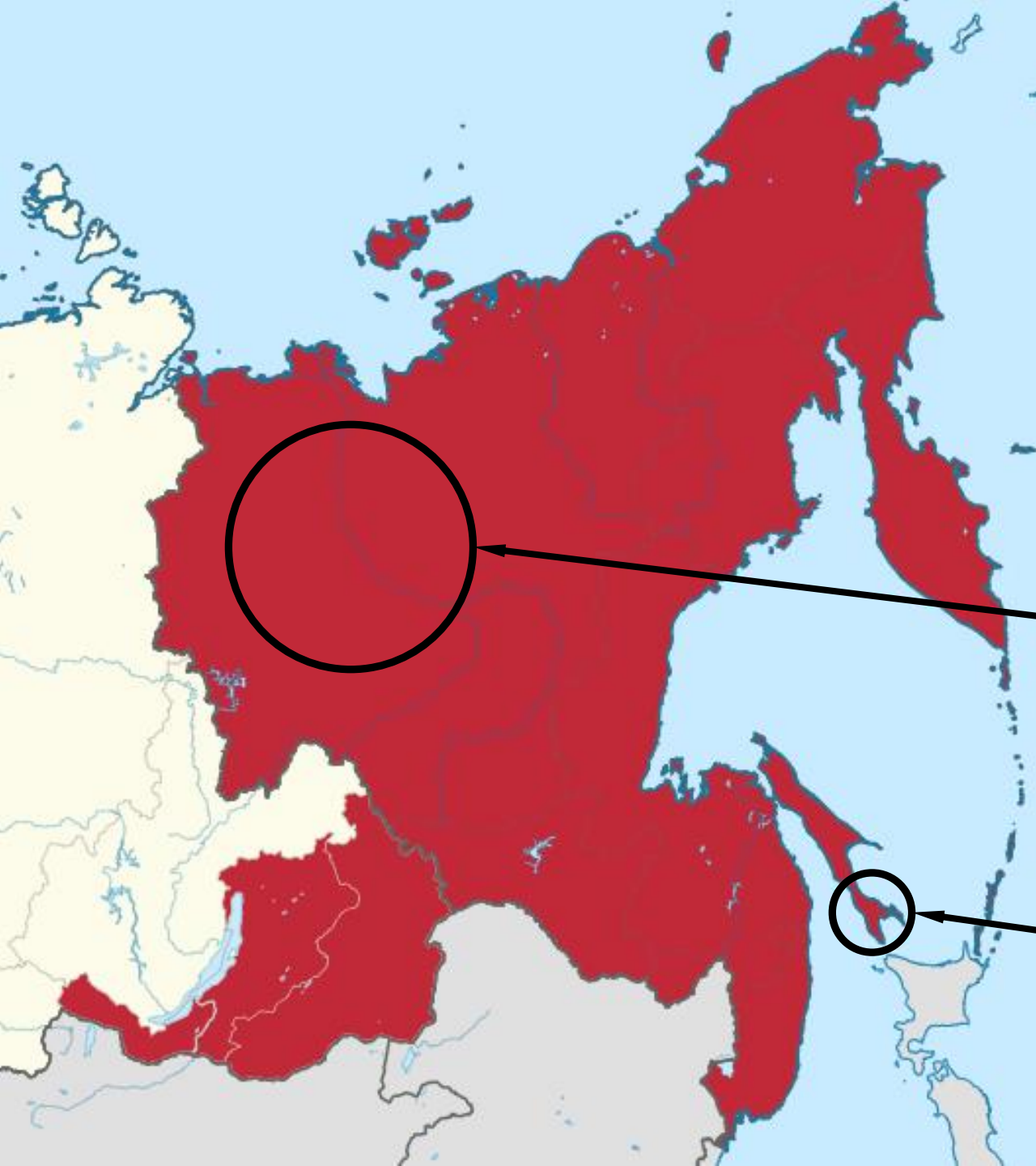


Source: Frontier Economics

- The undiscovered green PtX potential in Russia is one of the strongest worldwide
- Wind is insignificant in current and short-term perspective Russian electricity mix (<1%)
- Wind potential is about 17,101 TWh (16 times more than overall electricity generation in 2018)
- Existing gas transportation infrastructure + proximity to the markets of Europe and Asia are important supporting factors



... and domestic demand  
will be limited by  
demonstration pilots



**Remote areas power supply:**

>150 remote towns & villages with diesel-fueled power plants (Sakha Republic)

**Hydrogen fuel-cell train** pilot project for the city of Yuzhno-Sakhalinsk with polluted air (MoU was signed in September 2019 by Sakhalin Region, Rosatom, Russian Railways)

# Historical space and military capabilities that existed in Russia for many years will help Russia to develop its own competencies for a new hydrogen market...

## PRODUCTION

- Electrolysers: Rosatom, OMZ, OSK
- Methane pyrolysis: Gazprom
- Nuclear SMR: Rosatom

## TRANSPORTATION

- Pipelines: Gazprom
- Compressed/liquid hydrogen: Cryogenmash (OMZ Group)

## USAGE

- Fuel cells for mobility and electricity production: Rosatom, Inenergy

## STORAGE

- Underground gas storages: Gazprom
- Compressed/liquid hydrogen: Cryogenmash (OMZ Group)





**...but a full-scale government funding hydrogen program is needed to realize the potential**

- Integration of hydrogen into low-carbon development strategy (under development);
- Coordination of stakeholders in the national level;
- Enhancing international cooperation;
- Demonstration pilot projects.

The Energy Research Institute of the Russian Academy of Sciences  
SKOLKOVO Energy Centre, Moscow School of Management SKOLKOVO



# GLOBAL AND RUSSIAN ENERGY OUTLOOK 2019



# THE HYDROGEN ECONOMY -

a path towards low carbon development

